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REVISIONS OF TWO GENERA OF CHALCID-FLIES BELONGING TO THE FAMILY EUPELMIDAE FROM NORTH AND SOUTH AMERICA

By A. B. GAHAN

THE family Eupelmidae contains some of the most interesting forms to be found in the Chalcidoidea. Only a comparatively small number of the species belonging to the group have yet been described notwithstanding the fact that many of them are associated, either as primary or secondary parasites, with important insect pests of agriculture. The two genera *Arachnophaga* and *Encyrtaspis* each contain species associated with such pests and therefore are of some economic interest, although it is probable that they are secondary parasites oftener than primary ones and hence oftener harmful than beneficial.

Family EUPELMIDAE

Genus ARACHNOPHAGA Ashmead

Arachnophaga ASHMEAD, Proc. Ent. Soc. Washington, vol. 4, pp. 9, 10, 18, 1896.

Arachnophaga can be distinguished from *Encyrtaspis* Ashmead only by the fact that the female does not have a tuft or pencil of long black hairs on the middle of the scutellum and that the hind tibia, although more or less strongly compressed, is not so broad as in *Encyrtaspis* and its posterior margin never has a white border. Males of the two genera are apparently indistinguishable. It is also very similar to *Anastatus* Motschulsky, differing principally in that the head as viewed from in front is somewhat more elongate; the anterior extremity of the frons forms a more or less distinct, often

cariniform ledge from the lower extremities of the eyes to the antennal fossae; the eyes are usually pubescent; the scutellum is broadly rounded posteriorly, moderately convex dorsally, and finely sculptured; the tergites, except the fifth, are not emarginate at apex; and the ovipositor is always distinctly exerted. It differs from *Anastatoidea* Gahan by having the scrobes never margined above, the ocelli in an obtuse triangle, the frons not narrow, the frontal ledge from the antennal fossae to the eyes present, the scutellum broader and a little more convex and with finer sculpture, the hind tibia somewhat compressed but never expanded into a broad flange on the posterior margin, and the posterior basitarsus not strongly compressed.

The eyes are more or less convergent above; frons not narrow; lateral ocelli farther from each other than from the front ocellus; antennal scrobes shallow, confluent, and not sharply margined; antennae broadly separated at base, 13-jointed, and inserted below a line connecting the lower eye margins; parapsidal grooves deep; axillae separated; propodeum deeply emarginate medially; marginal vein two to four times as long as stigmal vein, postmarginal vein usually less than twice as long as stigmal; forewing in large part fuscous, with or without a hyaline band; front femora distinctly thickened toward apex; middle tarsus thickened basally and with a double row of short, stiff spines on the ventral side of basal segments 1 to 3; hind tibia either slender or strongly compressed and moderately broad, with two apical spurs.

The male is similar to the male of *Anastatus* but may be distinguished by its somewhat longer and slenderer scape, by the short antennal club, which is obliquely truncate from base to apex, by the shallow and flat scrobal cavity, by the usually pubescent eyes, by the slightly longer head as viewed from in front, and by the incomplete or less distinctly impressed parapsidal grooves.

Genotype, *Eupelmus piceus* Howard.

KEY TO THE KNOWN SPECIES OF ARACHNOPHAGA ASHMEAD

- | | |
|---|---------------------------|
| 1. Females..... | 2 |
| Males..... | 14 |
| 2. Forewing in large part strongly infuscated, but hyaline at base and with a distinct crossband beyond and just touching apex of stigmal vein, this crossband distinctly angled and connected with hyaline basal area by a broad medium longitudinal stripe, crossband and median stripe clothed with whitish cilia, infuscated portion of wing with dark cilia; posterior femur a little thicker beyond than before middle; costal cell densely ciliated at apex..... | 1. <i>albolinea</i> Gahan |
| Forewing infuscated but without a definite hyaline crossband and without a median hyaline stripe..... | 3 |

3. Apex of costal cell densely ciliated distad of point where submarginal vein begins to curve toward anterior margin of wing; frontal ledge not cariniform; vertex forming an abrupt sharp angle with occiput; lateral ocellus less than twice its own diameter in front of occipital truncation..... 4
- Apex of costal cell bare except for a row of slender, straight hairs on ventral surface adjacent to curve in submarginal vein; frontal ledge cariniform; vertex not forming an abrupt, sharp angle with occiput but declining posteriorly for a short distance before reaching occipital truncation; lateral ocellus two or more times its own diameter in front of occipital truncation..... 8
4. Mesoscutum nearly uniformly densely punctate, dull; base of forewing behind submarginal vein densely ciliated except for a narrow area along posterior margin and sometimes a narrow subtriangular area adjacent to submarginal vein basad of point where vein begins to curve; hind femur slightly narrowed beyond middle and without a marginal flange on its ventral margin..... 5
- Mesoscutum with concave posterior portion and scapulae less strongly sculptured than prescutum; base of forewing behind straight portion of submarginal vein bare except on a narrow streak or area extending obliquely distad from basal angle of wing nearly to reach densely ciliated median portion; hind femur broader beyond than before its middle and with a distinct, narrow flange on apical one-third of its ventral margin..... 6
5. Mesoscutum, axillae, and scutellum clothed with long, coarse, whitish hairs; forewing behind and adjacent to submarginal vein with a narrow subtriangular area bare or nearly bare; general color dull black
2. *hirtibasis*, new species
- Mesoscutum and axillae clothed with short, pale hairs; scutellum with numerous black bristles; forewing without a bare area behind and adjacent to submarginal vein; general color dark brownish testaceous varied with black..... 3. *longiceps* (Brues)
6. Infuscated medial area of forewing with a strong yellowish or golden tint; general color of head and thorax pale yellowish testaceous, only middle of mesoscutum and middle of mesosternum blackish..... 7
- Infuscated medial area of forewing blackish, without a strong yellowish or golden tint; general color darker, mesoscutum at least mostly blackish..... 4. *costalis*, new species
7. Length 4.5 mm. Posterior ocellus distinctly more than its own diameter in front of the sharp occipital margin..... 5. *aureicorpus* (Girault)
- Length 2.75 mm. Posterior ocellus about its own diameter in front of occipital margin..... 6. *nocua*, new species
8. Mesoscutum nearly uniformly densely punctate over its whole surface, concave posterior portion and scapulae about as strongly sculptured as prescutum..... 9
- Mesoscutum with concave posterior portion perfectly smooth and polished, or, if weakly sculptured, sculpture obviously weaker than that of prescutum..... 10
9. Mostly black or piecous; anterior femur distinctly broadened beyond middle; scutellum nearly as broad as long; mesoscutum and scutellum conspicuously hairy, hairs moderately long; posterior tibia compressed and broad; prothorax conical but fully twice as broad as long..... 7. *opaca*, new species
- Mostly testaceous, mesoscutum always brownish and abdomen always more or less brownish apically; anterior femur only slightly broadened; scutellum nearly twice as long as broad; mesoscutum and scutellum less conspicu-

- ously hairy, hairs very short; posterior tibia compressed but not broad; prothorax conical and about as long as broad----- 8. *scutata*, new species
10. Head and thorax black or brownish black, more or less faintly tinged with metallic green, sutures around base of wings, scutellum basally, axillae dorsally, and pleura sometimes diluted with reddish----- 11
Head reddish testaceous; thorax variable but usually reddish testaceous, mesoscutum sometimes more or less tinted with metallic green posteriorly; only one species with thorax extensively marked with dark brown or blackish----- 12
11. Marginal vein about twice as long as stigmal vein; lateral ocellus a little more than its own diameter from eye margin; frons obviously sculptured but weakly so; concave posterior portion of mesoscutum smooth and polished; eyes bare or very nearly so----- 9. *picea* (Howard)
Marginal vein obviously a little more than twice as long as stigmal vein; lateral ocellus not more than its own diameter from eye margin; frons dull, with very distinct reticulate sculpture; concave posterior portion of mesoscutum weakly sculptured; eyes distinctly pilose
10. *frontalis*, new species
12. Frons above scrobicular depression perfectly smooth and polished; mesoscutum uniformly testaceous or with only faint metallic reflections posteriorly; forewing with infuscated area clothed with pale yellowish, scale-like hairs on anterior portion, hairs on a little less than posterior half of its width darker----- 13
Frons above scrobicular depression not perfectly smooth, weakly reticulated; concave posterior portion of mesoscutum dark with metallic green reflections, prescutum and inner faces of scapulae also usually dark metallic; anterior half of mesopleuron usually dark brown with weak metallic reflections; forewing with infuscated portion uniformly dark except for a narrow proximal border, which is paler----- 11. *aldrichi*, new species
13. Concave posterior portion of mesoscutum nearly bare, with only a few weak and inconspicuous hairs scattered over surface; scape reaching level of vertex; hypopygium extending very nearly to apex of abdomen
12. *ferruginea*, new species
Concave posterior portion of mesoscutum clothed with conspicuous, short, silvery hairs; scape not quite reaching level of front ocellus; hypopygium attaining approximately apical one-fourth of abdomen
13. *abstrusa*, new species
14. Thorax beneath at least partly yellowish testaceous; head also usually more or less marked with yellowish----- 16
Thorax not yellowish beneath; head without yellowish markings except sometimes narrowly around mouth----- 15
15. Head and thorax densely and closely punctate, dull black with little or no metallic tinge; hind femur broad, hind tibia also compressed and moderately broad----- 7. *opaca*, new species
Head and thorax densely punctate but punctures shallower, with a distinct metallic tinge especially on face and frons; hind femur and tibia not so broad----- 9. *picea* (Howard)
16. Posterior ocelli about diameter of an ocellus in front of occipital truncation ----- 17
Posterior ocelli about twice diameter of an ocellus in front of occipital truncation ----- 18
17. Basal cell of forewing uniformly ciliated; whole dorsum of thorax dull dark green and mesopleuron and metapleuron more or less infuscated or aene-

- ous; head largely yellowish but with vertex, broad lateral margins of frons, occiput below neck, and posterior margins of temples greenish; legs brownish..... 3. *longiceps* (Brues)
- Basal cell of forewing outlined by cilia but otherwise mostly bare; dorsum of thorax medially dull green, pronotum laterally, broad lateral margins of mesoscutum, declivous portion of axillae, perpendicular sides of scutellum, pleura, legs including coxae, and head except vertex and lateral margins of frons orange-yellow..... 6. *nocua*, new species
18. Whole head, except narrowly around the mouth, dull black with a purplish tinge; dorsum of thorax mostly black with a purplish tinge
10. *frontalis*, new species
- Head mostly pale orange-yellow with more or less of vertex and frons greenish or brassy; dorsum of thorax bronzy or metallic green medially.. 19
19. Dorsum of thorax almost entirely dark bronzy; vertex and frons brassy
8. *scutata*, new species
- Dorsum of thorax with broad lateral margins orange yellowish, median portion of mesoscutum and scutellum metallic green; head with only a transverse area on the vertex greenish..... 13. *abstrusa*, new species

1. ARACHNOPHAGA ALBOLINEA Gahan

Arachnophaga albolinea GAHAN, Mem. Soc. Cubana Hist. Nat., vol. 8, p. 125, 1934.

This species is easily distinguished from all other known species of the genus by the hyaline crossband and median stripe on the forewing. The types are said to have been reared from puparia of *Argyrophyllax albincisa* Wiedemann that had parasitized the pyralid *Lamprosema indicata* Fabricius infesting lima beans in Cuba.

2. ARACHNOPHAGA HIRTIBASIS, new species

This species is very similar to *longiceps* (Brues) but is distinguished immediately by the much longer and more conspicuous hairs on the mesoscutum and by the much darker color.

Female.—Length 3.6 mm. General color black, very slightly tinged with metallic on vertex, pleura, apex of scutellum, and dorsum of abdomen; face below antennae, cheeks mesad of malar groove, posterior orbits narrowly, antennal grooves, and scape testaceous; legs dark brownish varied with testaceous, the anterior pair usually somewhat lighter than the others and the posterior femora slightly tinged with metallic; antennal pedicel, basal two or three segments of funicle, and the club dark brown to blackish, apical four or five funicular segments yellowish; forewing from base to beginning of curve in submarginal vein hyaline, from that point to apex of stigmal vein dark fuscous, and beyond apex of stigmal vein subfuscous; posterior wing hyaline; abdomen black with dorsum basally tinged with testaceous; ovipositor sheaths pale yellowish.

Head, viewed from in front, about as long as broad, slightly narrowed below; cheeks nearly straight; eyes converging above, sparsely pubescent; frons equal to about one-third the width of head; scrobe

shallow, immargined, extending more than half the distance between antennal fossae and front ocellus; frontal ledge very distinct but not cariniform; malar furrow distinct; ocellar triangle obtuse; ocellular line very slightly shorter than diameter of an ocellus; posterior ocellus a little more than its own diameter in front of the sharp posterior margin of vertex; head in dorsal view thin at vertex and rather deeply concave, the vertex and occiput forming a sharp angle; whole head with fine, strong, ruguloso-punctate sculpture and clothed with pale hairs which are longest along the inner eye margins. Antenna long, slightly clavate; scape subcylindrical, slightly curved and extending above level of anterior ocellus; pedicel nearly three times as long as broad; ring joint quadrate; first funicular segment a little longer than pedicel, nearly four times as long as broad; seventh funicular segment subquadrate; club a little longer than two preceding segments combined.

Thorax rather short and robust; pronotum rather short and strongly sculptured; mesoscutum uniformly and unusually strongly sculptured, only the crest of the very short carinae at the posterior end of scapulae shining; parapsidal grooves and depression at posterior middle of mesoscutum deep; scutellum and axillae also strongly sculptured; whole of mesoscutum, scutellum, and axillae covered with unusually conspicuous, long, pale hairs; mesosternum and anterior half of mesopleuron shagreened and clothed with short, pale hairs. posterior half of mesopleuron finely striated and bare; propodeum with shallow reticulate sculpture and hairy only at lateral margins. Anterior femur swollen, broadest very near apex, the apical truncation rounded, less oblique than usual; calcarium of middle tibia strong, about two-thirds as long as basitarsus; posterior femur distinctly narrower beyond than before the middle; posterior tibia strongly compressed, very nearly as broad as femur, its posterior margin with a fringe of moderately long hairs. Forewing about two and one-third times as long as broad; costal cell densely ciliated in apical angle and weakly ciliated basad of middle, with a bare area between; area behind straight portion of submarginal vein for the most part strongly ciliated but with a narrow, subtriangular area adjacent to the vein and a rather broad strip along the posterior margin bare; discal cilia on dark medial portion of wing coarser than those on basal and apical portions. Abdomen about as long and as broad as thorax, strongly sculptured; ovipositor exerted about half length of abdomen.

Type locality.—Rio de Janeiro, Brazil.

Type.—U.S.N.M. No. 56648.

Remarks.—Described from four females reared from *Brassolis astyra* Godart at Rio de Janeiro, Brazil, in 1931, by C. Camargo.

3. ARACHNOPHAGA LONGICEPS (Brues), new combination

Anastatus longiceps BRUES, Wisconsin Nat. Hist. Soc. Bull. 5, p. 108, 1907.

The female agrees very closely with the description of *hirtibasis* on another page of this paper but may be distinguished at once by the shorter and less conspicuous hirsute covering of the mesonotum, by the uniform ciliation of the basal area of the forewing behind the submarginal vein, and by the fact that the head and thorax are mostly brownish testaceous, the abdomen mostly blackish but marked with testaceous basally above and on the sides.

Male.—Length 2.5 mm. Vertex, frons above and laterad of scrobe, area between antennal fossae, and posterior portion of temples and cheeks dark green or tinted with green; scrobal depression, face below antennae, cheeks adjacent to malar furrow, posterior orbits narrowly, and upper part of occiput yellowish testaceous; apices of mandibles and the rest of mouthparts more or less fuscous; antennal scape testaceous, flagellum dark brown to blackish; thorax above dull greenish black with the region around base of wings more or less yellowish; thorax beneath largely yellowish, the mesopleura, mesosternum, and metapleura more or less aeneous; propodeum dark brown; legs brownish testaceous with the anterior pair not quite so dark as the posterior pair; wings hyaline, venation yellowish; abdomen brownish black, paler at base above and beneath.

Head viewed from above strongly transverse, shallowly concave behind, almost perpendicularly truncate behind vertex; lateral ocellus very slightly less than its own diameter in front of the sharp posterior margin of head and about half its own diameter from the eye margin; postocellar line twice as long as the line from lateral ocellus to median ocellus; anterior margin of frons not forming a sharp ledge; malar space equal to a little more than half the vertical length of eye; eye distinctly pubescent; antennae inserted distinctly below eyes; scape distinctly though not greatly thickened beyond the middle, attaining the level of anterior ocellus; pedicel a little more than twice as long as broad; ring joint broader than long; first funicular segment about as long as pedicel, and about twice as long as broad; last segment of funicle subquadrate; club a little longer than two preceding funicular segments, obliquely truncate. Mesoscutum convex, with fine, close sculpture; parapsidal grooves complete but shallow; scutellum a little more finely sculptured than mesoscutum; axillae narrowly separated and sculptured dorsally about like mesoscutum; propodeum with shallow but distinct reticulate sculpture and a delicate median carina, bare medially, densely hairy at posterior lateral angles. Anterior femur distinctly swollen; basitarsus of middle leg not at all thickened, the calcarium moderately thick and about two-thirds as long as basitarsus; posterior femur moderately broad, and

about as broad before as beyond the middle; posterior tibia slightly compressed, not so broad as femur. Forewing with costal cell ciliated throughout its whole length, the hairs in apical angle longer and more numerous than in rest of cell; area behind submarginal vein nearly uniformly ciliated except along the posterior margin; surface of wing distad of point where submarginal vein begins to curve toward margin uniformly ciliated; marginal vein about twice as long as postmarginal and a little over twice as long as stigmal. Abdomen nearly as long as thorax but narrower, parallel-sided, smooth at base above and weakly sculptured elsewhere, with a very short, ringlike, and smooth petiole.

Originally described by Brues from a single female taken at Brownsville, Tex., and deposited in the Brooklyn Museum but now in the United States National Museum collection. Besides the type the national collection now possesses 30 females and 7 males reared at Brownsville, November 21, 1938, by O. D. Deputy, from a chrysalis of *Papilio* sp.

4. ARACHNOPHAGA COSTALIS, new species

Agrees very closely with the description of *nocua* and may prove to be only a host variant of that species. It apparently differs from that species only by being much larger, by having the black bristles on the scutellum somewhat more numerous, by having four instead of three short, stiff spines on the outer apical margin of the middle tibia, by having the antenna proportionally somewhat longer, by having a distinctly more conspicuous though narrow flange on the apical one-third of the ventral margin of the posterior femur, and by being more extensively marked with black or dark brown.

Female.—Length 4.4 mm. Color varying to some extent but mostly brownish black with some metallic reflections. Holotype brownish black; face below antennae, mandibles except their apices, palpi, occiput, and temples testaceous; a median stripe on frons starting at median ocellus and embracing the whole scrobicular cavity and a narrow longitudinal stripe along upper part of each inner orbit dark reddish testaceous with brassy tints in some lights; vertex and frons, except as indicated, blackish with some metallic greenish reflections; cheeks and lower part of temples brownish testaceous. Antennal scape testaceous, flagellum black. Pronotum yellowish testaceous; mesoscutum brownish black with its anterior lateral angles dark testaceous; scutellum dark brownish, slightly paler toward base; propodeum brownish with weak metallic reflections; pleura testaceous mixed with brownish; mesosternum with a broad black longitudinal stripe down the middle. Anterior legs entirely testaceous; middle and posterior legs also testaceous but tinged with brownish, the posterior tibiae especially dark. Forewing hyaline from base to begin-

ning of curve in submarginal vein, dark fuscous from that point to apex of stigmal vein, and subfuscous from there to apex. Abdomen mostly dark brown with apex of first tergite, all of second, and most of third paler on dorsum.

Malar groove distinct; malar space equal to about one-third length of eye; ocellular line a little shorter than the diameter of an ocellus; posterior ocellus about one and one-half times its own diameter in front of occipital margin; antennae long, weakly clavate; scape very nearly reaching anterior ocellus; pedicel two and one-half times as long as broad at apex; ring joint very nearly as long as broad; fourth segment of antenna about three times as long as broad; following segments successively a little shorter, the tenth approximately one-third longer than broad; club somewhat longer than two preceding segments combined, obliquely truncate. Mesonotal scapulae and medio-posterior portion of mesoscutum with sculpture only slightly less distinct than that of prescutum; scutellum with approximately 50 black bristles of varying lengths; propodeum behind the spiracles obviously but weakly reticulated, spiracles elliptical and large.

Forewing nearly three and a half times as long as broad, marginal vein nearly four times as long as stigmal; postmarginal vein about a half longer than stigmal; costal cell finely ciliated on approximately the basal half, entirely bare medially, its apex beyond the point where submarginal vein starts to curve toward anterior margin of wing densely ciliated; area behind submarginal vein basad of curve in vein bare except for a moderately broad streak of rather coarse cilia running obliquely distocaudad from the basal angle of wing, this streak broadest basally, tapering distad, and terminating before reaching the heavily ciliated discal area of wing; surface of wing distad of curve in submarginal closely ciliated.

Middle tibia with four or five short, blunt spines on outer apical margin; posterior femur a little broader beyond than before the middle, with a very distinct though narrow flange on a little more than one-third its ventral margin apically; posterior tibia strongly compressed, about as broad as femur.

Abdomen as long as head and thorax combined, a little narrower than thorax; ovipositor sheaths exerted about one-third length of abdomen.

Two paratypes from Maryland agree in nearly every particular with the holotype except that one of these is slightly darker in color, the posterior legs being almost entirely brownish black.

Male.—Unknown.

Type locality.—Moorestown, N. J.

Type.—U. S. N. M. No. 56649.

Remarks.—Described from three females. The holotype was reared in 1931 at the Oriental Fruit Moth Laboratory, Moorestown, N. J., from the cocoon of a *Macrocentrus* infesting *Grapholitha molesta* (Busck) and recorded as specimen No. 564. A second female, reared at the same laboratory in 1933 as specimen 1504, apparently emerged from a pupa of *G. molesta* taken at Berlin, Md. One female was reared by H. S. McConnell, of the Maryland Agricultural Experiment Station, from a cocoon of *Macrocentrus* infesting *G. molesta* taken at Salisbury, Md., in 1929.

5. ARACHNOPHAGA AUREICORPUS (Girault)

Anastatus aureicorpus GIRAULT, Ann. Ent. Soc. Amer., vol. 9, p. 299, 1916.

In color this species is almost exactly like *nocua* and can be distinguished only by its much larger size, by the more numerous bristles on the scutellum (approximately 50), and by the fact that the posterior ocelli are placed distinctly more than the diameter of an ocellus in front of the sharp angle formed by vertex with occiput. Also extremely similar to *costalis*, from which it differs mainly in that the heavily infuscated medial area of forewing is yellowish (golden in some lights) instead of blackish; the head, thorax, abdomen, and legs are mostly pale yellow with only the prescutum, concave posterior portion of mesoscutum, middle of mesosternum, and to some extent the vertex and frons blackish with slight metallic reflections. In the type the scutellum is entirely yellow, but in two specimens from South Carolina it is weakly tinged with metallic apically.

Described by Girault from one female specimen reared by Carl Hartman, at Austin, Tex., from what Girault said appeared to be a syrphid puparium. The alleged puparium, however, is a lepidopterous pupa and, according to Carl Heinrich, is that of some species of *Lycanidae*. Besides the type, the national collection contains two females from Greer, S. C., taken September 18, 1930, by J. O. Rowell.

6. ARACHNOPHAGA NOCUA, new species

Female.—Length 2.75 mm. Color yellowish testaceous, only the ocellar triangle, medioposterior depressed portion of mesoscutum, and middle of mesosternum dark brownish or blackish; antennal flagellum and scape brownish testaceous, and club blackish; forewing hyaline from base to beginning of curve in submarginal vein, strongly fuscous from there to apex of stigmal vein, and subhyaline at apex with an irregular transverse band just distad of stigmal vein slightly paler, the coloration of different areas due to differently colored cilia, those on infuscated median portion giving to that area a distinctly yellowish tinge in some lights while on the obscure, transverse, pale band

the cilia are whitish; posterior wing hyaline; legs uniformly yellowish testaceous; ovipositor yellow.

Head, viewed from in front, as long as broad, rounded above, narrower below; cheeks slightly rounded, nearly straight; eyes rather large, slightly converging toward vertex, sparsely pilose; frons equal in width to a little more than one-third width of head; scrobe shallow, immargined, extending approximately half the distance between antennal fossae and anterior ocellus; ventral margin of frons laterad of antennal fossa more or less abruptly truncate and forming an oblique ridge extending from ventral margin of eye to base of antenna; malar groove complete but very fine and obscured by sculpture; ocelli in an obtuse triangle; ocellocular line equal to diameter of a lateral ocellus; entire head with nearly uniform, fine, shallow, reticulate-punctate sculpture; lateral margins of frons clothed with long whitish hairs; vertex and middle of frons with much shorter and sparser hairs; head, in dorsal view, thin anteroposteriorly; occiput slightly concave and forming with vertex a sharply abrupt angle. Antenna slender, weakly clavate; scape not quite attaining front ocellus, cylindrical; pedicel about two and one-half times as long as broad; ring joint twice as broad as long; first funicular segment a little shorter than pedicel, fully twice as long as thick; second and third segments each about equal in length to first; following funicular segments successively decreasing in length, the seventh subquadrate; club obliquely truncate, nearly as long as the three preceding funicular segments.

Thorax, when in natural position, approximately twice as long as broad; prothorax conical, short; mesoscutum a little longer than broad; parapsidal grooves deep and broad; prescutum with fine, shallow, reticulate-punctate sculpture; scapulae and the depressed medio-posterior portion of mesoscutum very weakly sculptured; whole mesoscutum sparsely clothed with very short, inconspicuous hairs; scutellum finely sculptured, opaque, with about 30 black bristles of varying lengths scattered over the disk; axillae sculptured like scutellum, each with several short black bristles; propodeum deeply emarginate, almost reduced to a transverse line medially, the lateral lobes practically smooth; propodeal spiracles conspicuous and nearly circular.

Forewing very nearly thrice as long as broad; marginal vein about three times as long as stigmal vein; postmarginal vein a little longer than stigmal; costal cell in large part bare but with some weak cilia on the basal one-third and with apical area in front of the curved portion of submarginal vein densely clothed with coarse blackish cilia; area behind the straight portion of submarginal vein mostly bare but with a few irregularly placed cilia in the proximal angle and extending in a narrow streak a short distance distad near the posterior

margin of wing; whole surface of wing distad of the upward curve in submarginal vein densely ciliated; marginal cilia very short.

Anterior femur distinctly swollen, broadest between middle and apex; anterior tibia moderately stout and shorter than femur; middle tibia with three short, blunt spines on outer apical margin, the calcarium a little shorter than basitarsus; basitarsus and two following tarsal segments of middle legs each with a double row of stiff spines beneath; posterior coxa densely clothed with short white pile; posterior femur moderately broad, a little broader beyond than before the middle, and with its apical one-third weakly margined beneath by a very narrow flange; hind tibia strongly compressed, not quite so broad as femur, its posterior margin sharp; basal segment of posterior tarsus about as long as two following segments combined.

Abdomen as long as thorax and slightly narrower, weakly sculptured, its apex rounded; ovipositor sheaths exerted about one-third the length of abdomen.

Male.—Length 2.1 mm. Color in large part testaceous, the vertex, broad stripe along inner orbits, mesoscutum except broad lateral margins, entire scutellum, and dorsal angles of axillae dark metallic green or aeneous; frons medially, cheeks, most of propodeum, and mesosternum more or less tinged with metallic or brassy; dorsum of abdomen, except at base and apex, dark brown; antennal flagellum blackish; legs concolorous with sides of thorax, only the hind legs sometimes a little brownish; wings hyaline. Pubescence pale, short, and moderately dense on dorsum of thorax, longer on inner orbits and propodeum.

Head strongly transverse, broadly but not deeply concave behind, almost perpendicularly truncate behind vertex; lateral ocellus a little less than its diameter in front of sharp posterior margin of head and about equally distant from the eye margin; ocellar triangle obtuse, the postocellar line about twice as long as line from lateral ocellus to front ocellus; anterior margin of frons not forming a sharp ledge at its junction with malar space but with a trace of this ledge; malar space equal to about half the vertical length of eye; eye weakly pubescent; antenna inserted below a line connecting lower extremities of eyes; scape cylindrical, not quite attaining level of front ocellus; pedicel about twice as long as broad; ring joint transverse; first funicular segment about as long as pedicel; last funicular segment subquadrate; club a little longer than two preceding segments combined, obliquely truncate. Mesoscutum convex, with fine reticulate-punctate sculpture above, more weakly reticulated laterally; parapsidal grooves traceable but not deeply impressed; scutellum convex, with very fine reticulate-punctate sculpture giving an almost granular appearance; axillae narrowly separated, the dorsal portion with sculpture like that

on middle of mesoscutum, the declivous portion nearly smooth; propodeum faintly reticulated, shining, with a delicate median carina and with the extreme lateral margin covered with silvery-white hairs. Anterior femur distinctly but not greatly thickened; basitarsus of middle leg only slightly thickened, the calcarium about three-fourths as long as basitarsus and moderately stout; posterior femur broad, not more slender beyond than before the middle; posterior tibia strongly compressed, a little narrower than the femur and tapering from near middle toward base; two calcaria very distinct. Forewing with the costal cell mostly ciliated; area behind submarginal vein with some rather coarse cilia marking the obsolete basal and median veins and a few similar hairs irregularly placed within the median cell; beyond point where submarginal vein begins to curve toward wing margin nearly uniformly ciliated; marginal vein a little more than twice as long as stigmal, postmarginal approximately three-fourths length of marginal. Abdomen about as long as thorax but much narrower; first tergite smooth, the following tergites weakly reticulated.

Type locality.—Brownsville, Tex.

Type.—U.S.N.M. No. 56650.

Remarks.—Described from 1 female (holotype) and 19 males reared by T. C. Barber, in May 1933, as secondary parasites of *Estigmene acraea* Drury, the actual host in this case probably having been *Apanteles* sp.

7. ARACHNOPHAGA OPACA, new species

Similar in most respects to *picea* but distinguishable at once by the more strongly and more uniformly sculptured mesoscutum.

Female.—Length 3 mm. General color dull black; pronotum laterally and head behind the eyes usually tinted with metallic green; propodeum smooth with strong metallic reflections; pleura, legs, and base of abdomen brownish black; scape yellowish testaceous, flagellum brownish black; forewing hyaline at base, fuscous behind the marginal vein, and subhyaline apically; hind wing hyaline; ovipositor sheaths yellowish.

Head viewed from in front about as broad as high; cheek nearly straight; malar space equal to about two-thirds the length of eye; eyes sparsely pilose, converging above, the frons equal in width to about two-fifths the width of head; scrobal depression broad, shallow, and poorly delimited; frontal ledge forming a sharp carina from lower extremity of eye to antennal fossa; ocelli in an obtuse triangle; ocellocular line equal to very slightly more than the diameter of an ocellus; head in dorsal view thin anteroposteriorly; occiput concave; angle formed by occiput and vertex rounded, not sharp; whole head with unusually strong and nearly uniform sculpture and

clothed with long whitish hairs which are particularly conspicuous on the frons and behind the eyes. Antenna weakly clavate; scape reaching level of anterior ocellus, cylindrical, and slightly curved; pedicel two and one-half to three times as long as thick; ring joint a little longer than broad; first funicular segment about as long and as broad as pedicel, following segments gradually decreasing in length and increasing in thickness, the seventh funicular segment a little broader than long; club about as long as three preceding segments combined, not thicker than last funicular segment, obliquely truncate at apex.

Prothorax short, conical, strongly sculptured; mesoscutum longer than broad, uniformly and strongly sculptured, and rather densely clothed with moderately long whitish hairs; concave medio-posterior portion of mesoscutum as strongly sculptured as prescutum; parapsidal grooves deeply impressed; scutellum a little longer than broad, nearly circular, strongly sculptured, and more sparsely clothed with longer hairs; axillae sculptured like scutellum; propodeum deeply triangularly emarginate medially, its surface smooth, polished, and bare except for a dense row of white hairs along the lateral margin; metanotum with a rounded flangelike elevation medially just behind apex of scutellum; mesosternum and mesopleuron strongly sculptured, clothed with short, whitish hairs except that the posterior half of mesopleuron is bare.

Forewing a little more than two and one-half times as long as broad; marginal vein not over twice as long as stigmal vein; post-marginal vein a little longer than stigmal; costal cell mostly bare, but with some weak discal cilia basally and with about 8 to 10 rather long hairs arranged in an irregular row on the under surface of wing near the apex of cell and adjacent to the curved portion of submarginal veins; area of wing behind straight portion of submarginal vein bare except for a few very weak cilia in the basal angle; rest of wing surface densely ciliated; marginal cilia very short.

Anterior femur broad, broadest between middle and apex; anterior tibia slightly thickened and about equal to femur in length; middle tibia with four short, blunt spines on its apical margin; calcarium of middle tibia about two-thirds as long as basitarsus; hind femur somewhat broader basad than distad of its middle and without a carinate ventral margin; hind tibia compressed, about as broad as femur, its posterior margin sharp and with a fringe of rather coarse, pale hairs.

Abdomen ovate, about as long and as broad as thorax, strongly sculptured and hairy except first and second segments, which are dorsally bare and practically smooth; hypopygium extending to approximately the apical third of abdomen; ovipositor exerted approximately one-fourth the length of abdomen.

Male.—Length 1.9 mm. Dull black; scape and mouth parts testaceous; pedicel and flagellum brownish black; legs brownish black, the apices of tibiae very narrowly and basal three joints of middle and hind tarsi pale yellowish; propodeum with metallic greenish reflections; wings hyaline; abdomen more or less brownish black. Pubescence pale, shorter and less conspicuous than in female.

Head strongly transverse, broadly concave behind, the angle formed by vertex and occiput slightly rounded; lateral ocellus nearly or quite twice its own diameter in front of occipital margin and about its own diameter from eye margin; ocellar triangle strongly obtuse; anterior margin of frons slightly angulated but not forming a sharp carina from antennal fossa to lower margin of eye; malar space equal to more than half the vertical length of eye; eye pubescent; antennal scape obviously somewhat swollen, thickest beyond the middle; pedicel about twice as long as thick; ring joint broader than long; first funicular segment a little shorter than pedicel, seventh about as broad as long; club apparently solid, obliquely truncate, not thicker than last funicular segment, and nearly equal in length to three preceding segments. Entire head densely sculptured and with short pubescence. Mesoscutum convex, densely punctate, dull, clothed with short pubescence; parapsidal grooves barely indicated; scutellum convex, sculptured like mesoscutum; axillae with same sculpture as mesoscutum; propodeum practically smooth, without definite folds or carinae, bare except at lateral margins; spiracles round and rather large. Anterior femur rather broad, tibia slightly thickened; middle tibial spur moderately stout and about two-thirds as long as basitarsus; posterior femur compressed and about three times as long as broad, evenly elliptical in outline; posterior tibia also compressed but only about half as broad as femur. Forewing with marginal vein about one and one-half times as long as stigmal vein and usually somewhat shorter than postmarginal vein. Abdomen about as long as thorax but narrower, rather weakly reticulately sculptured.

Type locality.—Pedro Miguel, Canal Zone, Panama.

Type.—U. S. N. M. No. 56651.

Remarks.—Described from 30 females (1 holotype) and 14 males (1 allotype) reared from egg masses of an unidentified spider collected by H. Dietz and sent in for identification by James Zetek.

8. ARACHNOPHAGA SCUTATA, new species

Similar to *opaca* in sculpture but easily distinguished from that species by color as well as by other characters. Resembling *ferruginea* in color but differing markedly in sculpture.

Female.—Length 3 mm. General color testaceous; mesoscutum brownish and abdomen mostly dark brown; propodeum shining; scape

testaceous, flagellum blackish; legs concolorous with thorax; forewing hyaline at base and apex, distinctly infuscated behind marginal vein; hind wing hyaline; abdomen testaceous at base, dark brown to blackish on apical half or more; ovipositor sheaths testaceous.

Head viewed from in front as long as broad; cheek nearly straight in profile; malar furrow distinct, malar space equal to more than half vertical length of eye; eyes inconspicuously pilose, converging above; frons constituting a little more than one-third the total width of head; scrobes shallow, poorly delimited; frontal ledge sharply cariniform; ocellar triangle obtuse; ocellocular line about equal to diameter of lateral ocellus; head in dorsal view transverse; occiput slightly concave; vertex not abruptly truncate behind, forming with occiput a slightly rounded angle; lateral ocellus placed fully three times its own diameter in front of occipital margin; whole head strongly reticulate punctate; pubescence of head pale and rather short except on lower part of frons along eye margins, where the hairs are longer; antenna long, slightly clavate; scape cylindrical, slightly curved, reaching to front ocellus; pedicel about two and one-half times as long as broad; ring joint very slightly longer than broad; first funicular segment equal to pedicel, seventh funicular segment very slightly longer than broad; club obscurely 3-segmented, obliquely truncate, very slightly thicker than last segment of funicle and not quite equal in length to three preceding funicular segments combined.

Pronotum conical, about as long as broad, strongly sculptured; mesoscutum about a half longer than broad, finely and almost uniformly punctate, dull, deeply concave behind the prescutum, the concave portion sculptured about like the rest; parapsidal grooves deep; prescutum a little longer than the concave area behind it; scapulae sharply cariniform for a short distance posteriorly; scutellum very nearly twice as long as broad, finely reticulate punctate, dull, with many short, brownish hairs scattered over its surface; axillae sculptured like scutellum; mesopleuron finely reticulated and clothed with whitish pubescence anteriorly, approximately the posterior half finely longitudinally striated and bare; propodeum deeply emarginate medially; metanotum with a subtriangular, translucent, flangelike elevation medially adjacent to apex of scutellum.

Forewing nearly or quite three times as long as broad; marginal vein fully twice as long as stigmal vein; postmarginal longer than stigmal; costal cell mostly bare but with some weak cilia basally and with a row of about 7 or 8 moderately long, straight hairs on the under surface of wing near the apex of cell adjacent to the curve in submarginal vein; area behind the straight portion of submarginal vein mostly ciliated but with the cilia sparse distad of middle; infuscated middle portion of wing clothed with short, flattened, scalelike hairs; area distad of stigmal vein with normal cilia.

Anterior femur only slightly swollen; middle tibia with four short, stiff spines on its apical margin; calcarium of middle tibiae two-thirds as long as basitarsus; posterior femur and tibia both slender, only very slightly compressed, the femur slightly narrower beyond than before the middle.

Abdomen about as long and as broad as thorax, ovate, rounded at apex, distinctly sculptured, and clothed with short, pale hairs except the first and second segments dorsally, which are apparently smooth and bare; hypopygium extending about to middle of abdomen; ovipositor exerted one-third to one-half the length of abdomen.

Male.—Length 2.2 mm. Head mostly testaceous, the vertex dull blackish with a slight greenish tinge, and the frons tinted with coppery; scape testaceous, flagellum brownish black. Dorsum of thorax mostly dull greenish black, the scapulae anteriorly and laterally, sclerites adjacent to bases of wings, and whole underside of thorax testaceous, the mesosternum and mesopleura with mixed brownish and metallic tints; propodeum with strong metallic green and coppery reflections; legs including all coxae testaceous, more or less mixed with brownish and with some metallic reflections on middle and hind coxae. Wings hyaline. Abdomen mostly dark with metallic reflections, basally more or less testaceous.

Agreeing structurally with the description of the male of *opaca* except in the following particulars: Scape a little less obviously thickened; pedicel no longer than first funicular segment; propodeum with shallow reticulate sculpture, shining; propodeal spiracles distinct but not large; femur of anterior legs very slightly enlarged, tibia scarcely at all thickened; middle tibial spur fully three-fourths as long as basitarsus and moderately stout; posterior femur about five times as long as broad; posterior tibia weakly compressed and about two-thirds as broad as femur. Marginal vein of forewing twice the length of stigmal vein and as long as postmarginal. Abdomen a little shorter and narrower than thorax.

Type locality.—Urbana, Ill.

Type.—U.S.N.M. No. 56652.

Remarks.—Described from 7 females (1 holotype) and 6 males (1 allotype) reared from the egg sac of an unidentified spider, February 19, 1922, by A. O. Weese.

9. ARACHNOPHAGA PICEA (Howard)

Eupelmus piccus HOWARD, Proc. Ent. Soc. Washington, vol. 2, p. 296, 1892.

Arachnophaga picea ASHMEAD, Proc. Ent. Soc. Washington, vol. 4, p. 18, 1896.

Female.—Length 2–2.75 mm. General color brownish black; scape, mandibles, clypeal area, and thoracic sutures around bases of wings

more or less testaceous; legs brownish testaceous to dark brown or nearly black; forewing with a dark fuscous cloud behind marginal vein and embracing its whole width, hyaline basally, and subhyaline apically beyond apex of stigmal vein; abdomen blackish.

Head with cheeks rounded; frons about two-fifths as broad at its narrowest point as the greatest width of head; malar space equal to more than half the height of eye and with numerous coarse bristles studding its surface; ocelli in a low triangle; ocellular line a little longer than the diameter of an ocellus; frons shining, more weakly sculptured than the rest of head. Scape not quite reaching level of front ocellus; ring joint subquadrate. Prescutum extending distinctly beyond middle of mesoscutum; concave posterior portion of mesoscutum perfectly smooth, polished, and very nearly bare; propodeum smooth and entirely bare, the elevated flange at middle of metanotum distinct. Anterior femur broadest beyond middle, with some weak bristles on the obliquely truncated apical margin; posterior femur not thickened, a little broader before than beyond the middle, and with a very delicate carina on approximately the apical half of its ventral margin.

Forewing about two and one-half times as long as broad; marginal vein about twice as long as stigmal vein and one-third longer than postmarginal; costal cell mostly bare but with a few cilia basally and a single short row of about six hairs on the under surface near where submarginal vein begins to curve toward margin of wing; area behind submarginal vein basad of beginning of curve entirely bare; clouded portion of wing densely clothed with short, flattened, scalelike hairs, the remainder of wing densely covered with normal cilia.

Abdomen about as long and as broad as thorax; basal two segments dorsally shining and nearly smooth, remainder of abdomen with distinct sculpture and less shining; hypopygium reaching a point approximately one-third the length of abdomen before its apex; ovipositor sheaths exerted about one-third the length of abdomen.

Male.—Length 1.8–2.25 mm. Black, more or less distinctly tinged with metallic green or bronze; face and pleura sometimes brownish; legs concolorous with sides of thorax, tinted with metallic; anterior tarsi dark; intermediate and posterior tarsi white with two apical segments brownish; wings hyaline, venation brownish; abdomen uniformly black with slight metallic tints.

Lateral ocellus about its own diameter from eye margin; malar space equal to more than half the eye height; scape slightly thickened beyond middle and not reaching front ocellus; pedicel about twice as long as broad; ring joint broader than long; first funicular segment approximately as long as pedicel but distinctly thicker, about one and a half times as long as thick; last funicular segment subquadrate;

club nearly equal to three preceding segments together. Whole head with distinct sculpture, which is slightly shallower on frons than elsewhere; propodeum smooth and bare except for a few moderately long hairs laterad of spiracle. Marginal vein not more than twice as long as stigmal vein and no longer than postmarginal vein; base of forewing a little more sparsely ciliated than outer portion, with a bare area along the posterior margin.

Other characters in both sexes as described for *frontalis*, new species.

Redescribed from the types and many specimens of both sexes reared from spider egg sacs collected at Los Angeles, Santa Ana, Riverside, and Orange, Calif., and at Tempe, Ariz.

10. ARACHNOPHAGA FRONTALIS, new species

Very similar to *picca* (Howard) but may be distinguished by the characters given in the key.

Female.—Length 4.4 mm. Color mostly blackish; oral region, prepectus, tegulae, sutures about base of wings, scutellum, and legs reddish testaceous to dark brown; mesopleuron dark reddish varying to brownish black; palpi black; antennal scape pale testaceous, flagellum black; abdomen mostly black but mixed with some reddish basally; ovipositor sheaths uniformly yellowish testaceous; base of forewing including entire costal cell hyaline, except for a slight fuscous stain in basal angle; wing medially with a dark-fuscous band embracing its whole width from a little proximad of base of marginal vein to apex of stigmal vein, the apical portion of wing subfuscous; hind wing entirely hyaline.

Head, viewed from in front, as long as broad, narrower below than above; cheeks nearly straight; eyes converging dorsally; frons equal in width to approximately one-third the greatest width of head; scrobes very shallow, poorly defined; frontal ledge extending from antennal fossa to lower eye margin sharply cariniform; malar space equal to a little less than half the length of eye; malar furrow delicate but complete; ocelli in an obtuse triangle; ocellocular line equal to very nearly the diameter of an ocellus: head, in dorsal view, thin anteroposteriorly; vertex not abruptly truncate behind, forming with occiput a slightly rounded angle; whole head strongly reticulate-punctate: frons dull, clothed with pale hairs, which are somewhat longer along the lateral margins than on median portion; cheeks with numerous rather coarse blackish hairs. Antenna long; scape cylindrical, slightly curved, reaching to level of front ocellus; pedicel about two and a half times as long as broad; ring joint longer than broad; first funicular segment about equal to pedicel, following segments successively a little shorter, the seventh funicular segment sub-

quadrate; club very slightly thicker than funicle, obliquely truncate at apex, and slightly longer than two preceding segments combined.

Mesoscutum much longer than broad, deeply concave posteriorly; parapsidal grooves deep; prescutum extending a little beyond middle of mesoscutum, very finely sculptured, opaque; scapulae anteriorly sculptured like prescutum, posteriorly a little less strongly sculptured and compressed into sharp cariniform ridges for about one-third their length; concave posterior portion of mesoscutum somewhat shining but with distinct shallow sculpture and with pubescence similar to that on rest of mesoscutum; scutellum sculptured about like prescutum, with numerous erect black bristles evenly distributed over its surface; axillae sculptured like scutellum; propodeum very faintly reticulated, shining and bare except for a row of hairs along the lateral and posterior margins, the elevated flange at middle of metanotum distinct; mesopleuron finely reticulated anteriorly, its posterior half very finely longitudinally striated.

Forewing a little less than three times as long as broad; marginal vein slightly more than twice as long as stigmal vein; postmarginal longer than stigmal; costal cell with weak ciliation basally, a little more than apical half entirely bare except for a conspicuous and more or less double row of long, straight hairs on under surface near the point where submarginal vein begins to curve; area behind submarginal vein and basad of beginning of curve in that vein bare except for a few weak cilia in basal angle; whole width of wing between beginning of upward curve in submarginal vein and apex of stigmal vein densely clothed with flattened, scalelike cilia; beyond apex of stigmal vein about as densely ciliated as behind marginal vein, hairs slender, not scalelike; hind wing more weakly ciliated than forewing.

Anterior femur broad, obliquely truncate apically, with about four moderately strong, black bristles on the oblique part of margin; middle tibia with five short, blunt, spines on outer apical margin; posterior femur narrower beyond than before the middle, without a marginal flange; posterior tibia compressed but not especially broad, its margin with a fringe of short, pale hairs.

Abdomen about as long and as broad as thorax, distinctly sculptured all over but with the first, second, and third tergites dorsally more shining than rest of abdomen; ovipositor sheaths exerted one-fourth to one-third the length of abdomen.

Male.—Length 2.5 mm. Head black with a slight purplish tinge on vertex, the clypeal region yellowish; scape yellow; flagellum black; apices of mandibles brownish; thorax above mostly black with a slight purplish tinge, the lateral margins of mesoscutum and perpendicular sides of axillae and scutellum pale orange yellow; pleura yellow mixed with fuscous on mesopleura and metapleura; mesosternum

blackish; anterior legs including their coxae yellow; middle legs brownish yellow; posterior legs dark brownish with aeneous reflections, the apices of their coxae yellowish; wings hyaline; abdomen black with the short petiole and base of following tergite yellow.

Structurally similar to *longiceps* but with head not perpendicularly truncate behind; lateral ocellus about twice its own diameter in front of occipital margin and not more than half its diameter from eye margin; distance between lateral ocelli a little less than twice the distance from lateral ocellus to anterior ocellus; malar space equal to about half the height of eye; scape subcylindrical, not thickened, and not quite attaining level of front ocellus; pedicel more than twice as long as thick; ring joint short; first funicular segment a little shorter than pedicel, last segment about as broad as long; club about as long as two preceding segments. Whole head with nearly uniform, close, fine, and shallow punctate sculpture.

Pronotum short, conical; mesoscutum a little broader than long, narrowing and rounded anteriorly; parapsidal grooves traceable but very shallow; axillae narrowly separated; scutellum moderately convex, a little shorter than mesoscutum, rounded at apex; propodeum less than half as long as scutellum, without carinae or grooves, bare medially but densely hairy laterad of spiracles. Dorsum of thorax sculptured like head, and clothed with short pubescence; pleura more weakly sculptured and more shining. Marginal vein of forewing a little more than twice as long as stigmal vein and a little longer than postmarginal; base of wing nearly uniformly ciliated but more sparsely so than remainder of surface. Anterior femur slightly enlarged, straight above, nearly evenly rounded beneath; hind femur moderately broad, straight beneath, evenly rounded above; hind tibia compressed, not so broad as femur. Abdomen nearly as long as thorax, and a little narrower, elongate-elliptical in outline, and very weakly reticulated.

Type locality.—Beverly, N. J.

Type.—U. S. N. M. No. 56653.

Remarks.—Described from 32 females and 1 male. Twenty-four of these specimens were received from the Oriental Fruit Moth Laboratory, at Moorestown, N. J., and of this number 20 are labeled as having been reared from *Grapholitha molesta* (Busck). It is evident, however, that at least 8 of these were not primary parasites of the fruit moth, since cocoons of *Macrocentrus* from which they had obviously emerged were pinned with the specimens. It is possible that in some instances the species was actually a primary parasite of *Grapholitha*. Localities represented in the Oriental Fruit Moth material were Beverly, Masonville, Moorestown, Parry, Evesboro, and Burlington, N. J. The 4 other specimens received from the Moorestown Laboratory bear the following data: 1 from Farmington, Conn.,

reared in 1933 from *Macrocentrus* sp.; 1 from Moorestown, N. J., reared January 2, 1932, from the egg cluster of an unidentified spider; 1 from Staunton, Va., reared in 1932 from a chrysopid cocoon; and 1 from Broadway, Va., reared August 17, 1932, from an unidentified ichneumonid cocoon. Other paratypes include 1 from Greer, S. C., collected September 20, 1930, by J. O. Rowell; 1 from Clemson, S. C., taken August 29, 1932, by W. C. Nettles; 2 females from Tucson, Ariz., reared from the creosote bagworm, *Thyridopteryx meadii* (Edwards), by R. H. Crandall, January 12, 1939; and 4 females and a single male (allotype) said to have been reared from *Anarsia lineatella* Zeller, at Brigham, Utah, August 25, 1942, by C. J. Sorenson.

11. ARACHNOPHAGA ALDRICHI, new species

Female.—Length 3.1 mm. Agrees with *abstrusa* except in the following particulars: Frons above scrobicular depression faintly reticulated, not perfectly smooth and polished; flagellum black, scape testaceous; pronotum dorsally, concave posterior portion of mesoscutum, inner faces of scapulae, usually the greater part of prescutum, dorsal portion of axillae, more or less of scutellum apically, mesopleuron anteriorly, mesosternum, propodeum, and metapleuron dark brownish with some metallic greenish reflections; legs varying from mostly dark testaceous to dark brown, the intermediate tarsus pale, except at apex, and the posterior tarsus more or less pale with the basal and apical segments dark; forewing strongly infuscated across middle, the infuscated area dark with a narrow band of paler cilia along its proximal border; posterior wing hyaline; abdomen black with a broad base more or less brownish testaceous; ovipositor exerted half the length of abdomen and testaceous. Readily distinguished from *picea* by the longer marginal vein, which is more than three times as long as stigmal and by the markedly lighter color, especially of the head. Distinguished from *frontalis* by the less strongly sculptured frons, by the longer ovipositor, by the bare eyes, and by the more extensive testaceous coloration.

Male unknown.

Type locality.—Chesapeake Beach, Md.

Type.—U.S.N.M. No. 56654.

Remarks.—The species is named in honor of the late Dr. J. M. Aldrich, who collected the holotype on June 2, 1933, at Chesapeake Beach, Md. Six paratypes, some of which are now imperfect specimens, were collected at Hagerstown, Md., July 7, 1914, by J. A. Hyslop, and bear the number P135. Other paratypes are 1 from Cranford, N. J., collected August 5, 1926, by F. M. Schott; 1 from Sherborn, Mass., swept June 10, 1934, by C. A. Frost; and 1 from Mississippi State College, Miss., taken in a cage containing cotton squares, August 25, 1934, by P. M. Gilmer.

12. ARACHNOPIHAGA FERRUGINEA, new species

This species differs from *picea* chiefly in color, in the scape extending to or a little above the anterior ocellus, and in the longer hypopygium.

Female.—Length 3.5 mm. Antennal pedicel and flagellum dark brown; palpi black; mandibular teeth dark brown; abdomen beyond first segment black; head, thorax, legs, and base of abdomen nearly uniformly ferruginous, the propodeum and posterior coxae dark brown; tegula concolorous with thorax, its apex dark brownish; forewing hyaline basally to near apex of submarginal vein; strongly infuscated from that point to stigmal vein and across the whole width of wing, subfuscous from stigmal knob to apex; hind wing entirely hyaline; ovipositor reddish testaceous, sometimes more or less fuscous at base and apex.

Frons above the shallow scrobal depression smooth and polished; rest of head finely sculptured, the sculpture strongest on sides of face and on cheeks; malar space longer than half the height of eye and without bristles; antennal scape reaching to or a little beyond anterior ocellus; pedicel about twice as long as broad; ring joint subquadrate; first funicular segment very slightly longer than pedicel, about twice as long as broad; seventh segment of funicle subquadrate; club as long as three preceding joints combined, not broader than last funicular segment, and obliquely truncate. Prescutum finely and densely punctate, extending distinctly beyond middle of mesoscutum; scapula anteriorly sculptured like prescutum, posteriorly smooth and compressed into a sharp ridge; concave posterior portion of mesoscutum perfectly smooth and polished and very nearly bare of pubescence; scutellum sculptured like prescutum, with a few stiff hairs scattered over its surface; axillae dorsally sculptured like scutellum and with a very few inconspicuous, short, silvery hairs; propodeum smooth, polished, and bare except for a very few fine hairs at the extreme posterior lateral angles; metanotum medially with the flange-like elevation behind apex of scutellum rounded dorsally.

Forewing with costal cell bare except for a more or less double row of long straight hairs on ventral surface near point where submarginal vein begins to curve toward anterior margin of wing; base of wing behind submarginal vein entirely bare proximad of beginning of curve in submarginal vein; distad of that point densely ciliated, the cilia on fuscous portion of wing scalelike, elsewhere normal. Anterior femur distinctly thickened, obliquely truncate apically beneath, and without conspicuous bristles on the oblique apical margin; middle tibia with four short, stiff spines on its apical margin; posterior femur very slightly thickened, narrower beyond than before its middle, and without a carinate ventral margin; posterior tibia compressed, broad-

est near apex, where it is nearly as broad as femur, its posterior margin with a loose fringe of whitish hairs.

Abdomen not quite so long as thorax, with shallow reticulate sculpture, the first tergite practically smooth; hypopygium extending nearly to apex of abdomen; ovipositor exerted about half the length of abdomen.

Male unknown.

Type locality.—Arlington, Va.

Type.—U.S.N.M. No. 56655.

Remarks.—Described from 27 females labeled as having been reared in May 1884 from eggs of "*Epeira globosa* Keyserling," now called *Araneus pegnia* Walckenaer.

13. ARACHNOPHAGA ABSTRUSA, new species

Female.—Length 2.70 mm. Differs from *ferruginea* by being somewhat smaller, a little more slender, and very slightly paler in color, by the scape not quite reaching the level of anterior ocellus, by the posterior concave portion of the mesoscutum as well as the dorsal surface of the axillae bearing a moderately dense and conspicuous covering of silvery-white pubescence, by the tegula being unicolorous throughout and somewhat paler than mesoscutum, by the anterior femur being only very slightly thickened, by the infuscated area of forewing being distinctly paler on anterior half of wing than on posterior half, by the abdomen being for the most part concolorous with the thorax, its apex usually more or less brownish, and by the hypopygium being apparently a little farther from the apex of abdomen. In other respects the female agrees with the description of *ferruginea*.

Male.—Head mostly pale ferruginous but with a transverse area on vertex encompassing the ocelli dark metallic green; mesoscutum except broad lateral margins, scutellum dorsally, and dorsal angles of axillae metallic green; remainder of thorax, propodeum, and all legs pale ferruginous; wings hyaline; abdomen missing.

Antennal scape about five times as long as thick; pedicel nearly twice as long as thick; ring joint transverse, small; first funicular segment about one and one-half times as long as broad, thicker than pedicel; seventh funicular segment subquadrate; club not so long as three preceding segments. Head weakly sculptured except on vertex, where the sculpture is fine and distinct; frons not entirely smooth but the sculpture very weak; metallic green area on dorsum of thorax distinctly finely sculptured, remainder of thorax more weakly sculptured; propodeum practically smooth, without carinae or folds, and with the posterior lateral angles densely hairy; forewing with costal cell and basal area sparsely ciliated, the ciliation on remainder of wing uniform

but not dense; marginal vein about two and one-half times as long as stigmal vein; postmarginal about twice as long as stigmal.

Type locality.—San Diego, Tex.

Type.—U. S. N. M. No. 56656.

Remarks.—Described from 5 females (1 holotype) and 1 male labeled as having issued in May 1895 from *Cyrtarachne* sp., collected at San Diego, Tex. Two of the female paratypes and the lone male are badly broken and incomplete.

Genus ENCYRTASPIS Ashmead

Encyrtaspis ASHMEAD, Mem. Carnegie Mus., vol. 1, pp. 290, 492, 1904.—GAHAN, Proc. U. S. Nat. Mus., vol. 71, art. 4, p. 9, 1927.

This genus is closely related to *Arachnophaga* Ashmead but may be separated by the characters indicated in the discussion of that genus. It is also close to *Tineobius* Ashmead but differs by having a distinct tuft of long, stiff bristles on the scutellum, the ocelli in an obtuse instead of an acute triangle, the frons not especially narrow, the vertex without a conspicuous patch of long, stiff bristles behind the ocelli, and the postmarginal vein equal to or only slightly longer than the stigmal vein.

I published a full description of the genus together with a key to the three then known species in the above cited reference. In the present paper three additional species are added, two by transfer from other genera and one a new species.

The only species of which the male has been described is *semirufus* Gahan.

KEY TO THE KNOWN SPECIES OF ENCYRTASPIS ASHMEAD

FEMALES

1. Exserted portion of ovipositor longer than head, thorax, and abdomen combined and with a broad, pale band near apex; hypopygium extending a little beyond apex of last dorsal segment of abdomen
 1. *brasilensis* Ashmead
- Exserted portion of ovipositor shorter and usually without a band; hypopygium not extending beyond apex of last dorsal segment of abdomen..... 2
2. Frons above scrobicular depression finely and densely sculptured, subopaque..... 3
 - Frons above scrobicular depression smooth and polished, with only sparse and very minute hair punctures, or very weakly reticulated and always shining..... 5
3. Ovipositor sheath dark, with a yellowish band before its apex
 2. *proximus* Costa Lima
- Ovipositor sheath unicolorous or at least without a pale band..... 4
4. Antennal scape reaching level of anterior ocellus; posterior one-third of scapulae sharply carinate; hypopygium very nearly attaining apex of abdomen..... 3. *laticeps* (Brues)

- Antennal scape not reaching level of anterior ocellus; scapulae posteriorly carinate only at extreme apex; hypopygium apparently terminating some distance before apex of abdomen..... 4. *adjunctus*, new species
5. Ovipositor exerted the length of abdomen; frons above scrobicular depression with very weak but evident reticulate sculpture; antennal scape attaining level of vertex..... 5. *californicus* (Ashmead)
- Ovipositor exerted approximately two-thirds the length of abdomen; frons above scrobicular depression perfectly smooth except for sparse and very minute hair punctures; antennal scape attaining about level of anterior ocellus..... 6. *semirufus* Gahan

1. *ENCYRTASPIS BRASILIENSIS* Ashmead

Encyrtaspis brasiliensis ASHMEAD, Mem. Carnegie Mus., vol. 1, pp. 290, 492, 1904.

This species, which is the genotype, differs from all other species of the genus by having the ovipositor distinctly a little longer than the body and by having the hypopygium extending distinctly beyond the apex of the last dorsal segment. The frons above the very shallow and poorly delimited scrobicular depression is weakly sculptured and slightly shining. The malar space is approximately half as long as the eyeheight and rounded. The prescutum is about equal in length to the concave posterior portion of the mesoscutum, finely and densely punctate. The concavity is smooth and shining with some pubescence, at least at the bottom. The scapulae are not carinate except for a very short distance at the extreme posterior ends, their outer faces entirely and the inner faces anteriorly with very fine granular sculpture. The scutellum and axillae are likewise very finely sculptured, the scutellum fully twice as long as broad. The mesopleuron is smooth and polished, except for a broad band along the anterior margin, which is densely clothed with silvery pubescence. The propodeum is smooth and bare except for a few weak hairs at its posterior lateral angles. The anterior femur is only slightly thickened, and the hind tibia is compressed but not especially broad.

The head is dark brownish testaceous with a slightly aeneous tinge on frons, and slight bluish reflections behind the eyes. The antennae are yellowish with the club blackish, the pedicel, basal segment of the funicle, and two or three apical segments of the funicle more or less dark brownish. The thorax is brownish testaceous with the dorsum of prothorax and concave posterior portion of mesoscutum with strong violaceous reflections, the prescutum dark with a tinge of metallic green, the scutellum and axillae pale yellowish, the tuft of hairs on scutellum black. The propodeum is dark with greenish reflections. The legs are fuscotestaceous with the hind coxae bright metallic green above, the hind tibia with a narrow white margin posteriorly, the basal three segments of middle tarsus, apex of first segment and all of second and third segments of hind tarsus white. The abdomen

is blackish with its base yellowish, the ovipositor blackish with a broad whitish band before the apex. The forewing is strongly infuscated from base of marginal vein to apex of venation, hyaline at base and apex; posterior wing hyaline.

The only specimen known is the unique female holotype, which was collected at Pernambuco, Brazil, by Albert Koebele and which is now in the United States National Museum.

2. *ENCYRTASPIS PROXIMUS* Costa Lima

Encyrtarpis (sic) *proximus* COSTA LIMA, Arch. Esc. Super. Agr. e Med. Vet. [Nichteroy, Rio de Janeiro], vol. 3, p. 58, 1919.

A female paratype of this species in the United States National Museum collection differs from *brasiliensis* by having the frons densely and finely rugulose, the concave posterior portion of mesoscutum only a little less strongly sculptured than the remainder of mesoscutum, the mesopleuron finely but distinctly sculptured all over and clothed with very short, silvery-white pubescence over approximately the anterior two-thirds of its surface, the anterior femur distinctly broadened, and the hind tibia compressed and distinctly broader than in *brasiliensis*. The paratype has lost its abdomen, but in the original description the ovipositor is said to be about equal in length to the abdomen. The antennal flagellum is entirely black, the scape testaceous. The head is entirely reddish testaceous, and the thorax is in large part of the same color but with the whole mesoscutum (except the lateral margins) and the axillae dull dark aeneous, the mesopleuron metallic greenish anteriorly along its dorsal margin, and the mesosternum blackish. The propodeum is polished piceous, with the apices of the lateral lobes rather densely clothed with whitish pubescence. The legs are fuscotestaceous, with the hind coxae greenish above, the hind tibia dark with a moderately broad white margin posteriorly, the first to fourth segments of the middle tarsus white, the dorsal margin of the hind basitarsus and the three following segments white. The forewing is strongly infuscated from a point a little proximad of the base of marginal vein to the apex of venation, its base and apex hyaline. The hind wing is hyaline. The color of the abdomen is unknown but the ovipositor is said to be dark with a yellowish band before the apex.

Described from a female paratype the abdomen of which is missing. The species is said to be a parasite of *Pectinophora gossypiella* (Saunders) in Brazil.

3. *ENCYRTASPIS LATICEPS* (Brues), new combination

Anastatus laticeps BRUES, Wisconsin Nat. His. Soc. Bull. 5, p. 107, 1907.

This species, the type of which is now in the United States National Museum collection, has a distinct pencil of hairs on the scutellum and

a broadly compressed hind tibia margined with white posteriorly. These characters, together with the shallow scrobicular depression and the strongly exerted ovipositor, place the species in *Encyrtaspis* instead of *Anastatus*.

The densely and finely sculptured frons, sharply carinate posterior, one-fourth of scapula, hypopygium extending very nearly to apex of abdomen, robust and strongly sculptured abdomen, and the unicolorous ovipositor, together with the more or less distinctive coloration, make this species rather easy to recognize. The ovipositor is distinctly a little longer than the abdomen. The eyes are convergent above, the frons at vertex being about equal to one-third the greatest width of head. The scape reaches about to the level of the posterior margin of the anterior ocellus. The mesoscutum is nearly uniformly finely sculptured and covered with silvery-white pubescence. The head and most of the thorax are yellowish testaceous with the mesoscutum except its lateral margins, the mesosternum, the propodeum, and the hind coxae dorsally distinctly dark greenish. The abdomen is mostly black or blackish, with the base more or less testaceous, the ovipositor uniformly yellowish testaceous. The legs are mostly fuscotestaceous, the hind tibia with a moderately broad white margin posteriorly, the middle tarsus (except its apical segment) and segments 2 to 4 of the posterior tarsus white. The antennal scape is testaceous and the flagellum black. The forewing basally is hyaline and bare except for a patch of dark-colored cilia in the proximal angle, medially it is dark fuscous and densely ciliated, while beyond the apex of stigmal vein it is subhyaline and a little less densely ciliated. The posterior wing is entirely hyaline.

Redescribed from two female specimens (one the holotype) in the United States National Museum, collected at Esperanza Ranch, Brownsville, Texas.

4. ENCYRTASPIS ADJUNCTUS, new species

Similar to *laticeps* Brues but somewhat smaller, with the antennal scape shorter, the scapulae apparently carinate only for a very short distance at extreme posterior ends (the mesoscutum in the single specimen before me is somewhat distorted and it is possible that normally the scapulae may be more extensively carinate), the hypopygium not extending so nearly to apex of abdomen, and the color, especially of the head, darker. Also very similar to *proximus* but differing in the unbanded ovipositor sheaths and in the darker color of head and thorax.

Female.—Length 2.6 mm. Head fuscotestaceous, tinged with metallic green behind eyes and on lower part of frons laterad of scrobicular depression; antennal pedicel and flagellum black; scape dark testa-

ceous; face somewhat lighter testaceous than rest of head; apices of mandibles dark brown; palpi fuscotestaceous; vestiture of head white, the hairs along inner orbits longer than on remainder of head, posterior orbits with a dense border of short silvery-white pile along eye margin. Pronotum dorsally, mesoscutum except lateral margins, axillae, most of mesopleura, mesosternum, propodeum, and posterior coxae dorsally blackish with a more or less strong aeneous tinge; prothorax beneath, prepectus, narrow lateral margin of mesoscutum, tegulae, scutellum, mesopleuron posteriorly, anterior and intermediate coxae, and trochanters dark testaceous; all femora and tibiae fuscotestaceous, the posterior tibiae with a moderately broad, white, posterior margin; anterior tarsi fuscous; intermediate tarsi, except apical segment, white; posterior tarsus with dorsal margin of basitarsus and all of second, third, and fourth segments white; basitarsus beneath and apical segment black. Forewing dark fuscous from beginning of curve in submarginal vein to apex of stigmal vein, subhyaline basally and apically; posterior wing hyaline; abdomen brownish black with weak aeneous reflections; ovipositor uniformly testaceous.

Head viewed from in front very slightly higher than broad, slightly narrower below than above; eyes convergent; frons at its narrowest point about equal to one-third the greatest width of head; scrobicular depression shallow, poorly delimited; ocelli in a distinctly obtuse triangle, the lateral ones a little less than their own diameter from the eye margins and fully three times their own diameter in front of the occipital margin. Whole head finely sculptured and subopaque. Antennae inserted below eyes, 13-jointed, weakly clavate; scape subcylindrical, slightly curved, not attaining level of anterior ocellus; pedicel approximately twice as long as broad; ring joint subquadrate; first funicular segment about three times as long as broad, seventh segment subquadrate; club slightly thicker than funicle, indistinctly 3-jointed, obliquely truncate.

Prothorax short, conical, finely sculptured dorsally; mesoscutum very slightly longer than broad; prescutum and scapulae very finely punctate, the posterior median portion of mesoscutum weakly sculptured and not deeply concave, the scapulae apparently very slightly compressed at their posterior ends (the mesoscutum somewhat distorted); scutellum strongly convex, ovate, nearly twice as long as broad, very finely and uniformly sculptured, dull, with a tuft of coarse black bristles medially; axillae sculptured like prescutum, separated by a distance somewhat less than the width of base of an axilla; propodeum deeply semicircularly emarginate, transversely linear medially, the lateral lobes subtriangular and weakly sculptured around the spiracle and apically but polished medially and with the apical one-third pilose; prepectus and tegula finely sculptured, dull; mesopleuron

and mesosternum rather weakly sculptured and nearly uniformly clothed with short silvery pile. Anterior femur moderately thickened, broadest a little before apex; anterior tibia a little shorter than femur and slightly thickened; intermediate femur rather long and somewhat flattened; intermediate tibia as long as femur, with a group of four short spines on its apical margin, the calcarium about half as long as the first tarsal segment, which is slightly thickened and armed beneath with a double row of short spines, as are also the second and third tarsal segments; posterior femur fusiform; posterior tibia as long as femur and trochanter combined, as broad as femur, strongly compressed, slightly slenderer at base than at apex, the two calcaria distinct but both rather short; posterior tarsus rather slender and about equal to tibia in length. Anterior wing very nearly three times as long as broad, for the most part densely ciliated but with a bare transverse band behind the apical half of submarginal vein; marginal vein more than three times as long as stigmal; postmarginal vein subequal to stigmal; posterior wing approximately two-thirds as broad and three-fourths as long as anterior wing.

Abdomen a little longer than thorax, weakly sculptured dorsally, more distinctly sculptured on the sides; hypopygium prominent but not attaining apex of abdomen; ovipositor sheaths about as long as abdomen and scutellum combined.

Type locality.—Montevideo, Uruguay.

Type.—U. S. M. N. No. 56657.

Remarks.—Described from one female specimen said to have been reared from "*Neocoelostoma* material" collected by H. L. Parker at Montevideo, Uruguay, in 1941, under South American Parasite Laboratory No. 791-1.

5. *ENCYRTASPIS CALIFORNICUS* (Ashmead), new combination

Tincobius californicus ASHMEAD, Proc. Ent. Soc., Washington, vol. 4, p. 15, 1896.

This species differs from the genotype of *Tincobius* (*T. citri* Ashmead) by having the ocelli arranged in an obtuse instead of an acute triangle, the frons not especially narrow, the postmarginal vein no longer than the marginal vein, the scutellum with a pencil of long black bristles at its dorsal middle, and the abdominal tergites not incised apically. On the other hand, it possesses all of the essential characteristics of *Encyrtaspis* and is accordingly transferred to that genus.

The species is extremely similar to *Encyrtaspis scmirufus* Gahan, apparently differing from it only by having the frons above the shallow scrobicular depression very weakly reticulated, the antennal scape reaching to the level of the posterior margin of the anterior ocellus or nearly to the level of the vertex, and the ovipositor as long as the

abdomen. In color and sculpture the two species are practically identical.

The female type was collected in Kern County, Calif., by Albert Koebeler. Besides the type, the United States National Museum collection contains a female from Yuba City, Calif., reared from *Anarsia lineatella* Zeller, July 13, 1902, by L. S. Jones and another female from Fort Bayard, N. Mex., reared November 3, 1913, from *Evetria* sp. on *Pinus ponderosa* by Carl Heinrich under Hopk. U. S. No. 12101c.

6. ENCYRTASPIS SEMIRUFUS Gahan

Encyrtaspis semirufus GAHAN, Proc. U. S. Nat. Mus., vol. 71, art. 4, p. 10, 1927.

Encyrtaspis semirufus is extremely close to *californicus* and may possibly prove to be merely an eastern form of the west coast species. The two forms apparently can be distinguished only by the characters mentioned in the foregoing key to species.

The holotype female was reared from a pupa of *Grapholitha molesta* (Busck) taken at Macon, Ga., whereas the allotype, together with two other males and a single female, is said to have been reared at New Orleans from an unknown leaf skeletonizer. Other specimens in the national collection include a paratype taken in Spanish moss at Victoria, Tex.; a series of 7 females reared from *G. molesta* at Clemson College, S. C., by W. C. Nettles; specimens reared from this same host at the Oriental Fruit Moth Laboratory of the Bureau of Entomology and Plant Quarantine, from material collected at Beverly, Masonville, Moorestown, and Burlington, N. J., Olcott, N. Y., and Smithsburg, Md., and 5 specimens said to have parasitized *Laetilia coccidivora* (Comstock) at New Orleans.

