

U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF ENTOMOLOGY.

THE

GRASS AND GRAIN JOINT-WORM FLIES

AND

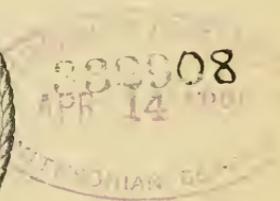
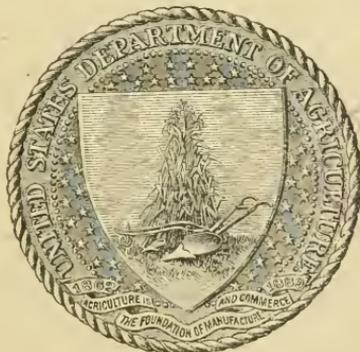
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A CONSIDERATION OF SOME NORTH AMERICAN
PHYTOPHAGIC EURYTOMINÆ.

BY

L. O. HOWARD,

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WASHINGTON:

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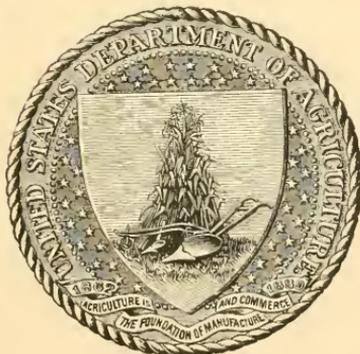
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LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., February 5, 1896.

SIR: I have the honor to submit for publication the second number of the technical series of bulletins of this office, intended especially for working entomologists, and to be distributed also to learned societies and to periodicals and libraries. The phytophagic Eurytominæ here considered, mainly from the classificatory standpoint, work in the stems of grasses and small grains and in the seeds of grapes.

Respectfully,

L. O. HOWARD,
Entomologist.

Hon. J. STERLING MORTON,
Secretary of Agriculture.

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ON SOME AMERICAN PHYTOPHAGIC EURYTOMINÆ.

By L. O. HOWARD.

Ten years ago, when Prof. F. M. Webster, then a field agent of this division, was engaged in studying certain grain-stalk and grass-stalk insects in Indiana and Ohio, and at about the time when he succeeded in securing the material upon which Dr. Riley established, with his assistance, the fact of dimorphism and alternation of generations of *Isosoma tritici* and *I. grande*, he collected and reared several other species of *Isosoma*, and a little later Mr. Koebele, in California, also an agent of the division, reared several additional species. At that time the writer drew up a rather careful paper on the genus as it was then understood, characterizing all the new forms, and had competent figures of the most important species prepared. The manuscript was then laid aside in the hope that further facts would be ascertained concerning the life history of some of the species which would render the account more complete. Other matters have interfered, however, with the proposed studies, and as the importance of placing the facts already collected upon record and of describing and naming the new forms seems great, the whole subject has been carefully gone over again in the light of recent papers which have been published (especially by Mr. Ashmead), and which involve certain generic changes in the subfamily Eurytominae, and the results are presented herewith. The writer has included in his account only the species which have been reared or of which we know the habits with some certainty. There are several additional species in Mr. Ashmead's collection and in the collection of the National Museum, but we do not know their specific habits, and they are omitted from present consideration on that account.

The species here treated are included in five genera, the females of which may be separated by the following table:

ANALYSIS OF GENERA.

Females.

Metathorax much lengthened.	
Metanotum sloping, rounded behind.....	<i>Isosoma</i>
Metanotum quadrate, abruptly truncate behind.....	<i>Isosomorpha</i>
Metathorax not lengthened.	
Postmarginal vein longer than stigmal, but not twice as long.	
Parapsidal furrows obliterated posteriorly.....	<i>Decatomidea</i>
Parapsidal furrows complete, distinct.....	<i>Eurytomocharis</i>
Postmarginal vein twice as long as stigmal.....	<i>Evorysoma</i>

Genus ISOSOMA Walker.

There is no longer any question as to the phytophagic habits of Walker's genus *Isosoma*, although they were questioned by E. A. Fitch as late as 1882. The careful observations of early American writers, particularly Harris, Asa Fitch, Walsh, and Riley, had fixed the status of *Isosoma hordei* as a plant-feeder beyond all peradventure, but their conclusions were not accepted by certain English entomologists until Westwood had published his careful studies on *Isosoma orchidearum* and until Weyhenbergh had called attention to his earlier observations on a Dutch species. (See the writer's paper on the Biology of the Chalcididae, Proc. U. S. Nat. Mus., vol. XIV, p. 585.) In addition to *I. hordei* Harris, the fact of phytophagy was established by Asa Fitch for his *I. secale*,¹ *tritici*, *hordei*, and *fulvipes*. The last of these, as we have shown by comparison of the type specimens, is synonymous with Harris's *I. hordei*, and the third, therefore, through preoccupation of the name, needs a new designation. Riley has also proved conclusively that his *I. tritici* (here treated as *I. grande*) is phytophagic. Of the other species which we treat below, the plant-feeding habit is perhaps not absolutely proven in each case, but the insects are structurally so closely related that, taken in connection with the proof at hand, this habit can not be doubted. The true European Isosomas have now practically all been accepted as plant-feeding species. Schlechtendal, in his "Die Gallbildungen der deutschen Gefässpflanzen" (Jahresbericht des Vereins für Naturkunde zu Zwickau, 1890), gives thirteen species of this genus as true gall makers in Europe.

Owing to the fact that an alternation of generations connected with a peculiar dimorphism has been established in the case of *I. tritici* Riley (= *I. grande*, form *minutum*) and *I. grande* Riley, it is quite likely that a similar phenomenon will be found to occur with more than one of the following species. In the majority of cases, however, the males have been associated with the females, and where species have been described from the females alone, these have been large and well-formed individuals, with no trace of degradational characters, such as the absence of wings, which would indicate that they are parthenogenetic forms. Moreover, *I. tritici* Riley has a somewhat different facies from the other members of the genus, consisting largely in its smooth aspect and one or two other minor points, which practically associate it with Haliday's genus *Philachyra*. While the writer is not inclined to give *Philachyra* generic importance, and considers that its species should be still associated with the true Isosomas, these feeble characters may still be associated with the phenomenon of dimorphism, and

¹ Walsh considered Fitch's species as synonymous with *hordei* since they were distinguished almost entirely by the coloration of the legs. Careful study, however, of Fitch's types, now in the possession of the United States Department of Agriculture, shows them to be distinct in other characters.

we may not find this characteristic present with more typical *Isosomas*. This supposition is to a certain extent supported by the fact that an examination of certain of Portschinsky's species of Russian *Isosomas*, sent us by Professor Portschinsky some years ago, shows that his *I. apterum* and *I. eremitum* belong to the smooth *Philachyra* group, and that the former, as the name shows, is wingless. It may further be considered suggestive that only females of *apterum* were received from the Russian writer, while both a male and a female of *eremitum* were received. Does this not immediately hint at a possible alternation of generations with these two so-called species? This coincidence further suggests that *Philachyra* may be a valid genus after all, even though we are able to separate it from *Isosoma* by no other morphological character than the smoothness of the integument.

ANALYSIS OF THE SPECIES OF ISOSOMA.

Females.

Mesonotum smooth, polished, shining.	
Winged.....	<i>grande</i> , form <i>grande</i>
Wingless.....	<i>grande</i> , form <i>minutum</i>
Mesonotum coarsely, more or less umbilicately, punctured.	
Pronotal spot wanting.....	<i>bromi</i>
Pronotal spot moderately large and rather distinct.....	<i>hageni</i>
Mesonotum rugulose, shagreened or coriaceous; not umbilicately punctured.	
Thorax nearly smooth, feebly shagreened or coriaceous and more or less shining.	
Central furrow of metanotum incomplete.....	<i>websteri</i>
Central furrow of metanotum complete.	
Metanotal furrow with a complete median longitudinal carina.	
Cheeks very full and hairy.....	<i>hirtifrons</i>
Cheeks not especially full and hairy.....	<i>maculatum</i>
Metanotal furrow with no median carina.	
Metanotal furrow shallow and transversely striate.....	<i>elymi</i>
Metanotal furrow strongly emarginate; not striate.....	<i>bromicola</i>
Metanotal furrow with an incomplete median longitudinal carina.....	<i>fitchi</i>
Thorax more coarsely shagreened or finely rugulose, opaque or subopaque.	
Abdomen shorter than thorax.	
Much shorter than thorax, subglobose.....	<i>agrostidis</i>
Nearly as long as thorax, oblong oval.....	<i>captivum</i>
Abdomen longer than thorax.	
Pronotal spot minute.....	<i>hordei</i>
Pronotal spot large, distinct.	
Second abdominal segment longer than fourth and fifth together	<i>secale</i>
Second abdominal segment shorter than fourth and fifth together	<i>tritici</i>

***Isosoma (Philachyra) grande* Riley (fig. 1).**

Isosoma tritici Riley, American Naturalist, March, 1882, p. 247.

Isosoma grande Riley, Ann. Rep. U. S. Dept. Agric., 1884, p. 358.

This species differs at once from all the other American forms by its smooth, polished, and shining mesothorax. Next to *hordei* it is the best known and most important, economically speaking, of the North American species. It is the only species of *Isosoma* for which a true

alternation of generations has been established. The small wingless form, originally described by Riley as *tritici*, is the vernal generation, and consists of both sexes. The large winged form, described as *grande*, is the summer generation, and consists entirely of females. The species is widespread, occurring through the middle belt of country from the Atlantic to the Pacific, and has been reared only from wheat stalks.

The name *tritici* Riley falls on account of its pre-emption by Fitch. Dr. Riley was familiar with Fitch's name, but revived it for the present species, thinking with Walsh that *tritici* Fitch was a synonym of *tritici* Harris. Riley's name, however, even in that event, would have been rejected under the law of "once a synonym always a synonym." The dimorphism in this species is fortunate, since it enables us to retain

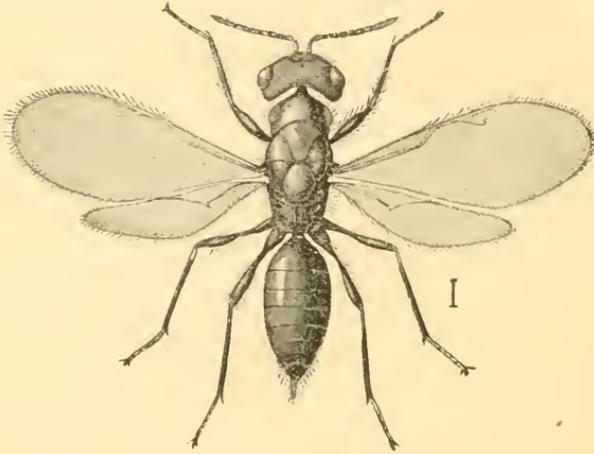


FIG. 1.—*Isosoma grande* Riley.

Riley's name for the summer form as the specific name. The species must, therefore, be known as follows:

Isosoma grande Riley.

Form *grande*=winged summer generation.

Form *minutum*¹ (proposed in place of *tritici*)=wingless spring and winter generation.

Isosoma californicum n. sp.

Female.—Length, 5 mm.; expanse, 8 mm. Head and thorax rather coarsely umbilicate-punctate; petiole distinct, but short and stout; abdominal segments 5 to 8 shorter than 4, 2 and 5 subequal, 3 and 4 subequal; mesoscutellum pointed at tip, axillæ nearly meeting; metanotum with a straight central longitudinal groove which is regularly concave from side to side and slightly emarginate at borders; each side of the groove the metanotum is coarsely umbilicate-punctate; hind coxæ plainly granulate above. Antennæ rather short and stout; joints

¹For a good figure of form *minutum*, see Ann. Rept. Dept. Agric., 1881-82, plate xii, fig. 3

well separated, cup-shaped; funicle joint 1 about as long as pedicel, but longer and narrower than succeeding joint; joints 1-4 each slightly wider than preceding joint; club ovate, as long as two preceding funicle joints together. Abdomen longer than thorax, shining, with very faint sculpturing; penultimate and antepenultimate segments with abundant white pile, which also occurs on the pygidium as well as the head and thorax; spur of stigmal club given off just before tip and reaching farther toward apex of wing than does tip of club; pronotal spot lacking, pronotum uniform jet black, as is the rest of the body; the place ordinarily occupied by the yellowish pronotal spot somewhat sunken, has a finer sculpture, and is lacking in the white pile found elsewhere on the thorax. All legs uniform dark honey-yellow except coxæ, which are black; scape dark honey-yellow; wing veins light brownish-yellow.

Male.—Closely resembles female. Antennæ long and stout; scape slightly expanded below; pedicel small, globose; funicle joints strongly arched above, not constricted in middle, markedly pedicellate, and each with two half whorls of long hairs; funicle joint 1 nearly twice as long as 2; 2, 3, 4, and 5 subequal in length; club elongate, pointed, as long as two preceding funicle joints together. Punctuation somewhat less distinct; legs black, except tarsi and tips of femora and tibiæ, which are yellow; petiole stout, as long as first abdominal joint.

Described from 5 females and 10 males captured April 20, 1891, by Albert Koebele, in the upper part of Shepherd's Canyon, Argus Mountains, California, upon *Eriocoma cuspidata*. The insects were collected in numbers at rest upon the upper part of the plant just before dusk. Upon examining the grass stalks Mr. Koebele found that they contained holes from which the *Isosomas* had apparently emerged.

Isosoma bromi n. sp.

Female.—Length, 3.4 mm.; expanse, 5.6 mm. Head and thorax densely umbilicate-punctate, punctations rather finer and closer than in preceding species; pronotal spot wanting; abdomen without a trace of sculpture, not longer than thorax, but more swollen than in preceding species; mesoscutellum and metanotum as with *californicum*, except that the metanotum each side of median groove is not so coarsely punctate; claw of stigmal club strongly curved; front coxæ honey-yellow, middle and hind coxæ black; front femora and tibiæ honey-yellow, middle femora honey-yellow, tibiæ darker, hind femora and tibiæ dark brown, yellowish at joints.

Male.—Length, 3 mm.; expanse, 5.4 mm. Antennæ as with *californicum*, except that joint 1 of funicle is less than twice as long as 2, and is regularly furnished with long hairs not arranged in whorls. Petiole slenderer than with preceding species, little longer than coxæ, and not as long as first segment of abdomen.

Described from 2 females and 1 male reared from *Bromus ciliatus*, in May and August, 1887, at Los Angeles, Cal., by Albert Koebele.

Isosoma hageni n. sp.

Female.—Length, 4 mm.; expanse, 7 mm.; head and thorax rather coarsely reticulate-punctate, the interspaces of the reticulations finely granulate. Metanotum with three faint subparallel longitudinal submedian carinae. Pronotal spot moderately large and rather distinct. Abdomen a little shorter than the thorax, second segment occupying about one-third of its dorsum; segments 3, 4, 6, and 7 subequal, segment 5 a trifle longer. Petiole rugose, stout; anal coxae slightly shagreened. Antennae not in good condition for study in the two specimens at hand—broken in one and with the pupal sheaths in the other. Stigmal club, rounded; spur distinct, straight.

Color, black; apical third of front femora and tibia and tarsi of the same legs, honey-yellow; knees and tarsi of middle and hind legs also honey-yellow; pubescence of entire body short and sparse, light in color.

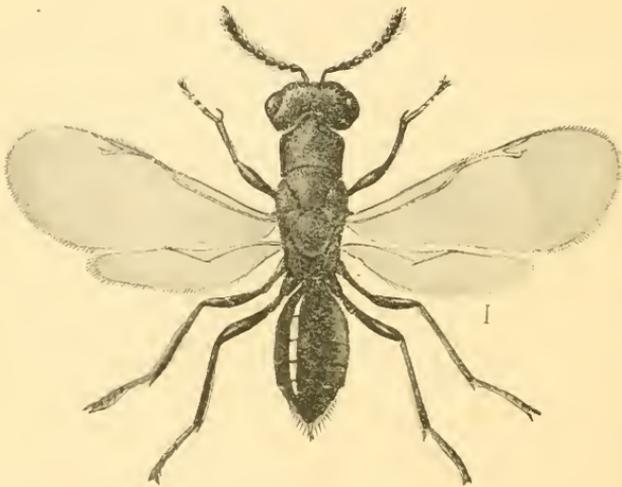


FIG. 2.—*Isosoma agrostidis* Howard.

Described from two female specimens from the collection of the Museum of Comparative Zoology, Cambridge, Mass., labeled in the handwriting of Dr. Hagen, "In quick grass, Boston, March, 1883, H. H."

Isosoma agrostidis n. sp. (fig. 2).

Female.—Length, 2.8 mm.; expanse, 5.2 mm. Head and mesothorax finely shagreened and also very sparsely and finely rugulose; metanotum somewhat coarsely rugulose and without a median furrow, but with a rather faint median longitudinal carina; mesoscutellum rather rounded at apex, not sharply pointed; axillar and parapsidal sutures nearly meeting; pronotal spot evident but small, scarcely seen from above; first funicle joint of antennae not twice as long as second; remaining joints subequal, somewhat rounded; club joints very distinct, terminal one acminate and styliferous. Abdomen short and stout, considerably shorter than thorax; subglobose in shape, its sec-

ond segment occupying nearly half of the whole surface; segments 3 to 7 short, subequal. Entire body very free from pilosity, except metanotal fimbria, which is pronounced and white, and except hind coxæ which have slight whitish pilosity on the outer side. Claw of stigmal club straight, issuing from tip of club and extending considerably beyond it, club itself abruptly truncate, triangular. Entire body, including legs, black, except pronotal spot, femoro-tibial knees and tarsi, which are dark honey-yellow.

Described from two female specimens reared by Albert Koebele, from small galls occurring rarely upon a grass of the genus *Agrostis*, collected at Summit, Placer County, Cal., in September, 1885. The galls were distinct elliptical swellings about 7 to 10 mm. long and from 2 to 3 mm. in greatest diameter, and occurred upon different parts of the stalk.

Isosoma captivum n. sp. (fig. 3).

Female.—Length, 3.4 mm.; expanse, 5.8 mm. Head and mesonotum uniformly, finely, and closely rugulose, not shagreened; metanotum



FIG. 3.—*Isosoma captivum* Howard.

more coarsely rugulose and with a narrow and shallow central longitudinal groove which widens slightly posteriorly; pronotal spot plain, moderately large; hind coxæ delicately punctate. Abdomen shiny, as long as thorax, oblong-ovoid; the second segment occupying nearly one-third the whole surface; segments 4 to 6 subequal, the third a little shorter; funicle joints 2 to 5 subequal; club nearly as long as three preceding joints; joint 1 one-half longer than 2; pile sparse and short, more marked at metanotal fimbria and terminal joints of abdomen than elsewhere. Color uniform black, except for pronotal spot, tarsi, middle and hind femoro-tibial knees, front tibiae and apical third of front femora, which are light honey-yellow. Stigmal club about as in preceding species, except that its tip is more rounded instead of squarely truncate.

Male.—Length, 2.5 mm.; expanse, 5 mm. Punctuation rather finer than with female; petiole as long as first abdominal joint, strongly

rugose; flagellum of antennæ long; pedicel not globose, slightly elongate; joint 1 of funicle longest, twice as long as pedicel; joints 2, 3, 4, and 5, each a little shorter than its preceding joint; not so strongly pedicellate as with *I. californicum* and *I. bromi*, moderately arched above with the hairs arranged in two indefinite whorls; club separated into two subequal pedicellate joints, giving funicle the appearance of being 6-jointed instead of 5-jointed, as with *bromi* and *californicum*; scape short, about as long as pedicel and first funicular joint together; strongly expanded below tip. Coloration like that of female.

Described from 17 females and 12 males captured by Prof. D. G. Webster, in May, 1885-86, at Normal, Ill., and Lorette, Ind., on blue grass.

***Isosoma elymi* French (fig. 4).**

Isosoma elymi French, Canadian Entomologist, vol. XIV, p. 9, 1882.

Female.—Length, 3.8 mm; expanse, 7 mm. Head and mesonotum delicately shagreened, not rugulose; metanotum with a central longitudi-



FIG. 4.—*Isosoma elymi* French.

nal furrow, rather broad and shallow and transversely striate; each side of the posterior two-thirds of the groove is a broad, flat space, closely and finely granulate; above this space is a coarsely rugulose area; pronotal spot very large and conspicuous, occupying one-half of the dorsal aspect of the anterior border of the pronotum. Entire body rather closely but finely pilose. Antennæ unusually hairy; joint 1 of funicle nearly twice as long as joint 2, which is about the same length as pedicel; joints 3, 4, and 5 about equal to 2; club as long as three preceding joints together. Abdomen as long as thorax; joint 2 as long as 3, 4, and 5 together; joints 4 and 5 subequal, 6 and 7 a little longer. Scape and legs black; apical one-third of anterior femora, front tibiæ, all tarsi, and knees of middle and hind legs, honey-yellow; the pronotal spot lighter yellow; claw of stigmal club given off just before the

tip and not extending farther than tip of club in the direction of apex of wing.

Redescribed from 1 female specimen reared from *Elymus americanus* at Carbondale, Ill., April, 1882, by Prof. G. H. French.

Isosoma maculatum n. sp.

Female.—Length, 3.8 mm.; expanse, 5.4 mm. Sculpturing of head and mesonotum as with preceding species; metanotum with a very shallow, scarcely margined, central longitudinal furrow, including throughout nearly its whole length a median longitudinal carina; the rest of the sclerite irregularly and coarsely rugulose, the elevations mainly taking a longitudinal direction; hind coxæ faintly granulate above; pronotal spot very large, even more pronounced than with preceding species and covering two-thirds of dorsal aspect of fore border of pronotum; axillæ meeting at tip. Antennæ as with preceding species, except that club is decidedly flattened from sides. Abdomen smooth and shining, not quite as long as thorax; segments 3 to 5



FIG. 5.—*Isosoma websteri* Howard.

slightly and gradually increasing in length; joint 6 a little shorter than 5; flagellum of antennæ rather shorter than preceding species; relative proportions of joints about the same. Body sparsely hairy; stigmal club as with preceding species. Coloration as with preceding species.

Described from two female specimens collected on blue grass May 19, 1886, and June 3, 1885, at Lafayette, Ind., by Prof. F. M. Webster.

Isosoma websteri n. sp. (fig. 5).

Female.—Length, 3.4 mm.; expanse, 6.3 mm. Head, pronotum, and mesonotum as with preceding species; metanotum with only the beginning of a central furrow, its lateral carinæ immediately curving around to the sides, each inclosing an oval, flattened, nearly smooth portion of the metascutellum; a median carina extending nearly to the tip of the

sclerite; pronotal spot moderately large and plainly seen from above, occupying a little more than one-third of the dorsal aspect of the pronotal foreborder. Abdomen much longer than thorax; segments 3 to 5 increasing in length; 6 and 7 as long as 5. Antennæ with joint 1 of funicle twice as long as 2; joints 3, 4, and 5 gradually decreasing in length, subequal in width; joint 5 more closely connected with club than with preceding joint. Color and wing venation as with preceding species.

Described from 7 female specimens collected on wheat at Normal, Ill., by Prof. F. M. Webster, in May, 1884.

Isosoma hirtifrons n. sp. (fig. 6).

Female.—Length, 3.7 mm.; expanse, 7 mm. Sculpturing of head, pronotum, and mesonotum as in preceding species, except that there are sparse, large, shallow punctures on mesoscutellum; cheeks much fuller than in other species; metanotum as with *I. maculatum*. Abdomen

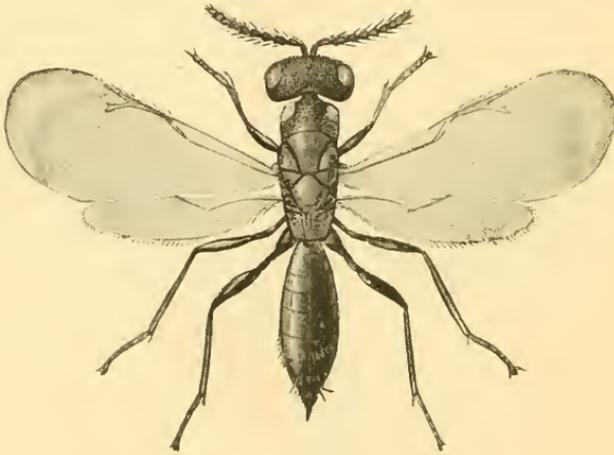


FIG. 6.—*Isosoma hirtifrons*, Howard.

about as long as thorax; segments 3 to 6, increasing in length. Antennæ stout, moderately long, very hairy; proportions about as in preceding species. Body not unusually pilose, except face, which is closely covered with short white pile; pronotal spots very plain, but not large, occupying about one-third of the dorsal aspect of the fore-border of the pronotum. Color black, except for all femero-tibial knees and pronotal spot. Claw of stigmal club given off some distance before tip, delicate and short.

Described from 4 female specimens reared by Mr. D. W. Coquillett March 13, 1886, from rye stalks which he collected in Mercer County, Cal., June 21, 1885.

Isosoma bromicola n. sp.

Female.—Length, 3.1 mm; expanse, 4.6 mm. Punctuation of head, pronotum and mesonotum like that of *I. maculatum*, which it also resembles

in the large pronotal spots. Metanotum with a distinct, strongly emarginate central longitudinal groove, the space either side finely granulate, with occasional irregular carinae. Abdomen longer than thorax; segment 2 as long as 3, 4, and 5 together; 5 and 6, subequal. Antennae rather long and straight; pilose; joint 1 of funicle only slightly longer than joint 2; club not quite as long as three preceding joints together, strongly flattened from side. Face very slightly pilose; metanotal spiracles large. Whole insect is smaller, slenderer, and more delicate in appearance than any except *grande*, form *minutum*.

Male.—Length, 4.0 mm; expanse, 3.4 mm. Petiole short, not as long as first abdominal segment and scarcely as long as hind coxae. Scape of antennae slightly widened; funicle joints very slightly rounded above and very slightly pedicellate; each more than twice as long as pedicel and each faintly constricted in middle; club divided into two pedicellate joints as with *I. captivum*. All legs black with light-yellow knees.

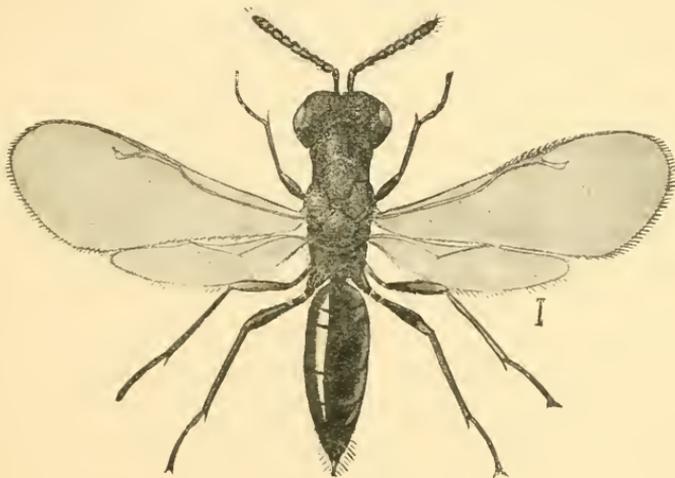


Fig. 7.—*Isosoma tritici* Fitch.

Described from 11 females and 7 males reared by Mr. Albert Koebele, at Los Angeles, Cal., from *Bromus ciliatus* collected at Millard's Canyon, Los Angeles County, Cal. The adults issued in March, 1887, from grass collected September, 1886.

***Isosoma tritici* Fitch (fig. 7).**

Eurytoma tritici Fitch, Jour. N. Y. State Agricultural Society, 1859, vol. x, p. 115.

Isosoma hordei Walsh, Amer. Entomologist and Botanist, Oct., 1870, vol. ii, p. 332.

Decatoma basilaris Provancher, Faun. Ent. Can., vol. ii, p. 569.

Isosoma nigrum Cook, Rural New Yorker, June, 1885, p. 314.

Female.—Length, 4 mm.; expanse, 7.6 mm. Head, pronotum, and mesonotum strongly rugulose but not umbilicate-punctate except toward tip of scutellum, where an occasional umbilicate puncture occurs; metanotum also strongly rugulose with a faint trace anteriorly of a median longitudinal furrow; metanotal spiracles large and per-

fectly circular; pronotal spots moderately large and often faint, but plainly discernible from above, sometimes, however, quite bright and distinct. Abdomen longer than thorax, nearly as long as head and thorax together; abdominal segments 4 and 5 together longer than 2; 3 only about half as long as 4, and 5 as long as two preceding united; first funicle joint one-half longer than second; club longer than three preceding funicle joints together. Body slightly but plainly pilose except at sides of metanotum, where the fimbria is very obvious. Legs black except at joints, which with the tarsi are yellow. Claw of stigmal club given off before the tip.

Male.—Length, 2.9 mm.; expanse, 6 mm. Petiole shorter than hind coxae, faintly punctate; flagellum of antennae uniformly pilose, joints well rounded above, not strongly pedicellate; joint 1 three times as long as wide and nearly three times as long as pedicel; none of the funicle joints constricted in the middle; joints 2 and 3 each nearly as long as 1; joints 4 and 5 each a little shorter; club plainly divided by a distinct incision into two joints, but the terminal ovate joint is not pedicellate.

Redescribed from many male and female specimens reared in December and January, 1885, from wheat stalks collected in Louisa County, Va.; from other specimens received from A. J. Cook, Lansing, Mich.; from others reared by J. H. Comstock, at Ithaca, N. Y., from straw collected in the immediate vicinity; from other specimens received from J. A. Lintner, Albany, N. Y.; from specimens from the Asa Fitch collection, labeled "*Eurytoma tritici* Fitch, Maryland, E. L. Rogers;" from specimens collected on grass at Lafayette, Ind., by F. M. Webster; from specimens received from S. O. Diom, Grantsville, N. C.; from many specimens reared from *Elymus americanus* by Albert Koebele, in Los Angeles, Cal., and from many more specimens reared by the same gentleman from a grass which was supposed by Mr. Koebele to be either *Bromus ciliatus* or a species of *Agropyrum*, in the Santa Cruz Mountains, California.

Isosoma hordei Harris.

Ichneumon hordei Harris, New England Farmer, July 23, 1830, vol. ix, p. 2.

Eurytoma fulvipes Fitch, Seventh Rept. Ins. N. Y. (sep. ed.), 1862, p. 154.

Isosoma hordei (var.). Walsh, Amer. Entom., Oct., 1870, vol. ii, p. 330.

The writer is able to positively assert that Harris's *I. hordei* is identical with Fitch's *I. fulvipes*. Fitch's types are in the possession of the United States National Museum, and through the kindness of Mr. Samuel Henshaw, of the Boston Society of Natural History, I have been able to critically examine Harris's types, consisting of 2 males and 2 females, fragmentary it is true, but perfectly recognizable. The specimens are labeled "281," and the record, as I am informed by Mr. Henshaw, reads "281 *Eurytoma hordei* H. N. E. Farmer, Insect (parasitic?) in Barley, June 15, 1830."

Female.—Length, 3.6 mm.; expanse, 6 mm. Pronotum and mesonotum minutely but strongly rugulose, smoother than *I. tritici*; metanotum

more coarsely rugulose, the larger elevations taking a longitudinal direction, no central furrow or carina; pronotal spot very small, not visible from above. Abdomen as long as head and thorax together; joints 4, 6, and 7 subequal in length, the fifth a little longer; joint 3 a little longer than 4; 2 hardly longer than 3 and 4 united; funicle joints 2 to 5 submoniliform, but still a little longer than broad. All legs (except coxæ) and antennæ honey-yellow, flagellum and femora a little darker; claw of stigmal club straight, given off well before tip of club; pilosity sparse.

Male.—The only males which I have seen are the two from the Harris collection. These are both in very bad condition; neither has an abdomen and one has no antennæ. With the other but three funicle joints remain on the left antenna (the others being broken off) and four on the right, but the latter are still inclosed in the pupal sheath. The three funicle joints remaining on the left antenna are not pedicellate, very slightly arched above, and furnished with close, moderately short hair not arranged in whorls; joint 1 longest, 2 and 3 successively decreasing. Joint 4 is still shorter, judging from the sheathed right antenna.

Described from 14 female and 2 male specimens, two females from the Fitch collection, labeled in Fitch's handwriting "*Eurytoma fulvipes* Fl.," ten females reared in the Division of Entomology, January 23, 1883, from stems of barley received from W. Couper, "Canada West." and two females and two males from the Harris collection, reared from barley, June 15, 1830.

Isosoma secale Fitch.

Eurytoma secalis Fitch, Amer. Agric. Aug., 1861, vol. xx, p. 236.

Isosoma hordei (var.) Walsh, Amer. Entom., Oct., 1870, vol. II, p. 330.

Female.—Length, 3.6 mm.; expanse, 6.6 mm. Punctuation as with preceding species; pronotal spot large, plainly seen from above. Abdomen as long as head and thorax; segments 4 and 5 subequal; 6 and 7 together shorter than 5; 2 much longer than 4 and 5 together. Color black; scape and legs black; front tibiæ, knees, and tips of middle and hind tibiæ and all tarsi honey-yellow; claw of stigmal club given off near tip of club, somewhat curved; antennæ as with preceding species.

Male.—Length, 3 mm.; expanse, 5 mm. Specimen in rather poor condition. Expansion of scape more abrupt from tip than with other males described; funicle joints well arched above, scarcely pedicellate, each with two indefinite whorls of hair and with no median constriction; each joint twice as long as wide; club plainly divided into two joints, but no trace of pedicel to terminal joint, resembling *hordei* in this respect; petiole a little shorter than hind coxæ and shorter than first abdominal segment.

Redescribed from one female and one male from Fitch's collection labeled *Eurytoma secale*.

Isosoma fitchi n. sp.

Eurytoma hordei Fitch (nec Harris) Seventh Rept. Ins. New York (author's edition). p. 151, 1862.

Female.—Length, 3 mm.; expanse, 5.8 mm. Head, pronotum, and mesonotum faintly shagreened, nearly smooth, shining; mesoscutellum with a few sparse punctures; metanotum with a complete median longitudinal furrow emarginate on the anterior half and with a central carina extending nearly to tip; very coarsely rugulose. A central furrow with a faint granulation between raised lines. Central spot large, plainly seen from above and two spots together composing about one-third of the dorsal aspect of the foreborder of the pronotum. Antennæ with well separated joints; funicle joints 2, 3, 4, and 5 equal in length and width; joint 1 a little longer; joint 5 as well separated from club as from preceding joint; club a little longer than 4 and 5 together but of the same width. Abdomen as long as thorax; joint 4 shorter than 6; 5 longer than 6; 7 and 8 subequal. Color black, except for pronotal spot and knees, which are luteous; claw of stigmal club given off about at tip of club, straight.

Male.—Length, 2.2 mm.; expanse, 4.2 mm. Petiole about as long as hind coxæ and nearly equal in length to first abdominal segment. Antennæ with funicle joints very slightly arched above, each joint fully three times as long as wide and slightly constricted in middle; otherwise as with *I. hordei*.

Described from 2 females and 1 male in the Fitch collection, labeled in Fitch's handwriting "*Eurytoma hordei* Harris, Nos. 15223 and 15197."

Genus **ISOSOMORPHA** Ashmead.*Isosomorpha muhlenbergiæ* n. sp.

Female —Length, 2.2 mm.; expanse, 4.8 mm. Thorax with close faint umbilicate-punctate sculpturing; metanotum with a straight central complete groove and a central carina indicated anteriorly—groove, however, not emarginate; entire thorax with a close and very short white pile except in metanotal groove, which is naked. Abdomen shorter than thorax, flattened from sides; joint 4 very long, longer than all the rest together; joints 2 and 3 subequal; joints 5 and 6 very short; joints 2, 3, 4, and 5 of antennal funicle, equal in length and width, subquadrate; joint 1 longer, twice as long as pedicel; club long, ovate, a little longer than funicle joints 4 and 5 together. Color black; front coxæ dark brown, black at base; all legs honey-yellow; scape slightly yellowish at base; wings hyaline; stigmal club very small; claw feeble.

Described from one female specimen reared from a gall on *Muhlenbergia diffusa*, closely resembling deformation made by *Isosoma hordei*, and collected July 25, 1891, by J. G. Barlow, at Cadet, Mo.

Genus **EURYTOMOCHARIS** Ashmead.**Eurytomocharis eragrostidis** n. sp. (fig. 8).

Female.—Length, 1.8 mm; expanse, 4 mm. Head and thorax very faintly shagreened, with minute umbilicate punctures on pronotum and larger ones on mesoscutellum; metanotum with central longitudinal furrow but not emarginate. Abdomen shorter than thorax; petiole as long as 2 and 3 together; 2 and 3 subequal; 5 and 6 short. Abdomen with globose funicle joints; joint 1 of funicle a little longer than petiole; others subequal; club ovate, a little longer than funicle joints 4 and 5 together. All legs, including coxæ, dark yellow brown.

Male.—Length, 1.2 mm; expanse, 2.6 mm. Petiole faintly sculptured, as long as hind coxæ; antennæ with the 5 funicle joints strongly arched above and pedicellate; the body of each joint nearly as wide as



FIG. 8.—*Eurytomocharis eragrostidis* Howard.

long; scape broad, slightly widened below; pedicel globose; club as long as two preceding funicle joints together, not obviously divided.

Described from very many male and female specimens reared September, 1885, and March, 1886, from stems of *Eragrostis povioides*, collected at Lafayette, Ind., by F. M. Webster. The infested grass stem is as a general thing not at all or very slightly swollen. The larva excavates it for a distance of an inch or more and issues from a round hole. The first or second joint below the head seems to be the portion of the grass most commonly attacked.

Eurytomocharis triodiæ n. sp.

Female.—Length, 3.2 mm.; expanse, 5 mm. Resembles closely the foregoing species, except that it is considerably larger. Head, pronotum, and mesonotum coarsely umbilicate-punctate; metanotum with very shallow emarginate central furrow with transverse rugosities

throughout its full extent; the narrow expanse either side of furrow granulate; remainder of metanotum coarsely rugose. Abdomen as long as head and thorax together; fourth segment longer than second and third together; third twice as long as second; fifth equal in length to second. Entire thorax with close white pile. Antennæ about as with preceding species, except that joint 1 of funicle is longer than 2 and nearly twice as long as pedicel; club of stigmal vein triangular; claw not distinctly differentiated. Color, black; scape, honey-yellow; all legs brown, lighter at joints; femora and tibiæ, dark in the middle. All coxæ shagreened.

Male.—Length, 2.1 mm.; expanse, 3.2 mm. Petiole slightly rugose; distinctly longer than hind coxæ; antennæ as with preceding species, except that joint 1 of the funicle is longer than 2, and 2 is longer than 3, while club is not so long as two preceding joints together.

Described from 8 females and 1 male reared April 27 and May 17, 1888, from the dry stems of *Triodia cuprea* collected on the Virginia side of the Potomac River, near Washington, D. C., by Theodore Pergande.

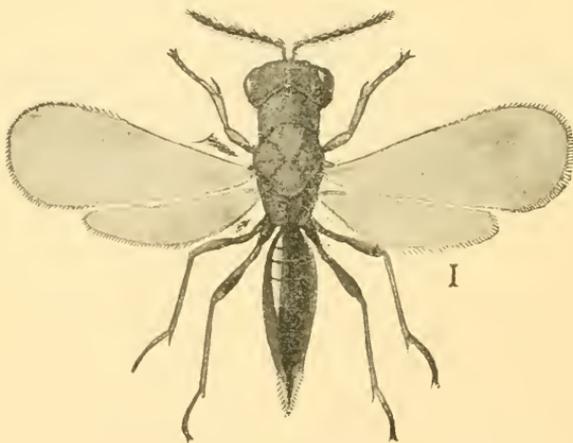


FIG. 9.—*Evoxysoma vitis*, (Saunders).

Genus **EVOXYSOMA** Ashmead.

Evoxysoma vitis (Saunders) (fig. 9).

Isosoma vitis, Saunders, Can. Entom. 1870, vol. II, p. 26.

Female.—Length, 3 mm.; expanse, 5.6 mm. Head, pronotum, and mesonotum closely and rather faintly umbilicate-punctate; metanotum with a broad central longitudinal depression with convex sides, delicately shagreened in center; mesopleura below tegulae delicately shagreened; all coxæ also shagreened. Abdomen as long as head and thorax together; joint 4 as long as 2, 3, and 5 together; 2, 3, 5, and 6 subequal. Antennæ submoniliform; funicle joints 1 and 2 nearly equal in length, 1 slightly longer; remaining joints decreasing in length very slightly; club nearly equal to three preceding joints together; head and

thorax with close, fine, white pile, which is also present on terminal joints of abdomen. Color black, antennal scape yellowish; all coxæ black, the front pair somewhat yellowish at tip; front and middle legs except coxæ honey-yellow; hind femora brown in middle, honey-yellow at either end; hind tibiæ honey-yellow, slightly brownish in middle; base of abdomen below brownish; stigmal club well rounded, claw straight and short.

Male.—Petiole thick, shagreened, longer than hind coxæ, as long as first abdominal joint; antennæ as with male of *Eurytomocharis triodia*, except that the funicle joints are somewhat more strongly pedicellate. All legs, excepting middle and hind coxæ, honey-yellow.

Described from six females and four males apparently reared from grape seeds by C. V. Riley. The specimens are all in the old Riley collection, together with five shriveled grapes from which they have emerged. The series is probably the one referred to in the Second

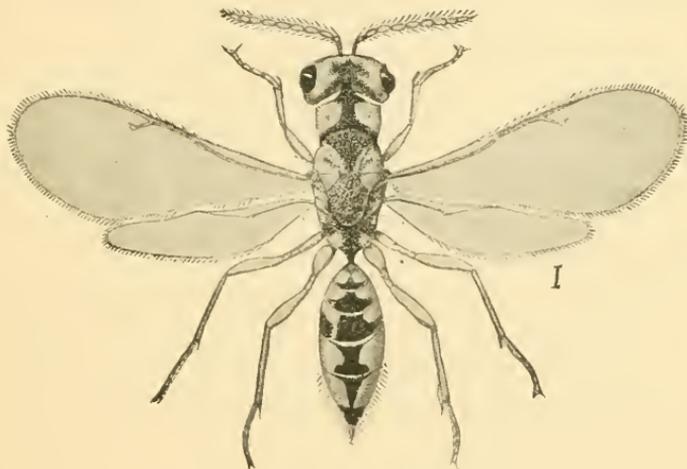


FIG. 10.—*Decatomidea cooki* Howard.

Report on the Insects of Missouri (p. 92), where it is stated that they were reared from infested grapes received in August, 1869, from A. S. Fuller, of New Jersey, and obtained by him from Canada. The evidence in favor of the phytophagic habit of the species, as given by Saunders in the Canadian Entomologist, is apparently conclusive, but there is still a chance that this species and the next one are parasitic or inquilinous. They hardly belong structurally to the phytophagic group of the Eurytominae.

Genus DECATOMIDEA Ashmead.

Decatomidea cooki n. sp. (fig. 10).

Female.—Length, 3.6 mm; expanse, 5.8 mm. Head, pronotum, and mesonotum densely and rather coarsely and regularly umbilicate punctate; metanotum with a very broad central, slightly emarginate, and

very shallow shagreened furrow. Antennæ rather long, moniliform; funicle joint 1 more than three times as long as pedicel and nearly three times as long as thick; joint 2 shorter than 1, twice as long as thick; joint 3 a little longer than 2; 4 and 5 each as long as 2; club as long as 4 and 5 together. Body nearly naked; pile sparse. Color black; antennæ yellowish; all legs yellowish except hind coxæ, which are blackish above and below; underside of head black; anterior margin behind the eyes, and underside of abdomen yellow of the abdomen extending dorsally on the second, third, and sixth segments; fourth segment as long as second and third together; fifth longer than third, but shorter than fourth; second and sixth equal.

Described from one female specimen reared March 12, 1884, from grape seeds received January 28, 1884, from A. J. Cook, at Lansing, Mich. There are four specimens in the national collection received by Professor Riley in the fall of 1886 from Dr. Franz Loew, of Vienna. The females differ from the single female reared from the seed sent by Professor Cook only colorationally; the yellow is much more prevalent and the black is reduced to a series of dorsal markings. Of the four specimens received from Dr. Loew, two are males and two females. The accompanying figure was drawn from one of the Loew females. With the males the antennæ are elongate, the dorsal whorls of hair on the funicle joints being very long, two distinct whorls to each joint, and the segment somewhat constricted between the whorls; not strongly pedicellate; joints 4 and 5 shorter than 2 and 3; club not longer than funicle joint 5. Each funicle joint is at least four times as long as broad, and the dorsal elevation is not strongly marked. In coloration the males are darker than the females. The longitudinal dorsal thoracic black band is broader behind although narrower on the pronotum, where it is supported on either side by a black dot. The dorsum of the abdomen is entirely black.

Dr. Loew wrote that the specimens were reared from seeds of *Vitis californica*. The seeds were imported from California to Vienna in the month of January. The imago emerged from the seeds at some time between April 12 and June 15. A very great number of seeds were infested and the larvæ consumed the entire seed contents.