

REVISION OF THE CHALCID FLIES OF THE TRIBE DECATOMINI (EURYTOMIDAE) IN AMERICA NORTH OF MEXICO

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INTRODUCTION

The family Eurytomidae is one of the least studied groups of the large superfamily Chalcidoidea. On account of the outstanding economic importance of its species as pests on grasses and small grains, the genus *Harmobita* Motsch has received more attention than any other of this family. Sundry habits are represented in the very difficult genus *Eurytoma* Illiger, the outstanding one probably being parasitism on other insects. Comparatively little is known about the latter group, and still less information has been produced regarding the biology of the Decatomini and most of the smaller genera falling within this tribe. The fact that the Decatomini are mostly gall-colours explains the absence of a larger body of facts about their habits, and only a few workers, chiefly of the present day, seem to have been at all interested in preserving specimens of this tribe reared from galls incident to their study of the Cynipidae. As a result, most of the species of the group are represented by relatively small series of specimens, and many species probably still remain undiscovered. The present revision treats 30 species and 5 varieties, of which 14 species and 3 varieties are new. The species previously recorded in the literature were described by Fitch, Walsh, Ashmead, Girault, and Fullaway. The present intensive work of Dr. A. C. Kinsey and L. H. Weld on the Cynipidae has produced most of the new material described herein. In addition to the material received from Messrs. Kinsey and Weld, and specimens reared myself, I have studied the Decatomini in the collections of the United States National Museum, the Canadian Department of Agriculture, a series from Stanford University, California, a small lot belonging to the Illinois State Natural History Survey, and a few specimens from several other State and personal collections.¹ It is to be hoped that the rear-

¹ No doubt additional specimens are housed in various museums of North America, and I shall welcome the opportunity to study any such material that anyone will send me at the University of Illinois, Urbana, Ill.

ing of members of the Decatomini, and Eurytomini also, from galls and other sources, will continue to increase, and thus supply within a few years what may prove to be representatives of most of the species of these tribes in our fauna. Only then may we pretend to produce a complete revision of the tribe Decatomini.

In another sense, also, the present study is in part tentative. The limits of certain species, for example *Decatoma dubia* Walsh, *D. globuli*, new species, and *D. nigriceps* Walsh, can not be determined with precision until their habits can be studied in considerable detail. An effort to separate the species on the basis of male genitalia has not been made, because adequate material of this sex is not at hand. It is probable that the necessary technique for the study of minute parts of these small insects can be developed, but many additional specimens, obtained by careful rearing that involves determination by experts of both the plant and animal hosts, need to be provided before a comprehensive study of the taxonomic value of male genitalia can be profitably undertaken. In view of the great variations in color and size and sometimes sculpture and dimensions the question of species limits, which constitutes the chief problem in a study of this nature, is therefore not fully answered. It has been possible, however, to identify with practical certainty all specimens that came to my attention.

Many specimens were dissected in balsam and permanently mounted on slides with the expectation that valuable characters might thus be discovered. I have concluded, however, that all the characters that really prove to have value for distinguishing species can be seen on the entire specimens by the aid of the ordinary higher powers of a good binocular microscope.

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EXPLANATION OF TERMS

Dimensions of the head.—Measured by aid of an ocular micrometer. Both width and length measurements were taken from the dorsal view at an angle and a position that gave the maximum dimensions.

Cubital row.—A rather well-defined line of hairs not different in size from other hairs on the apical third of the front wing. It is best visible at an acute angle, and extends lengthwise across the outer third about midway between the front and hind margins of the wing. It is designated "cubital" because it seems to have the position of that vein as figured by Snodgrass (Proc. U. S. Nat. Mus., vol. 39, pl. 16, fig. 77, 1910). (Pl. 3, fig. 33, *f.*)

Subdiscoidal row.—A line of hairs similar to but somewhat more readily discovered than the cubital row, and located caudad of it and extending in general parallel with the hind margin of the wing. In species having a fully developed color band, the subdiscoidal row passes near the apex of this band. (Pl. 3, fig. 33, *g.*)

Secondary band.—In some species there occurs a second, but usually more faint and always smaller and irregular, band of color across the wing proximad of the main or submarginal band and coextensive with it. (Pl. 1, figs. 2 and 5.)

Funicular joints.—Frequent reference is made in the descriptions to the several joints of the antennae. For convenience each joint of the funicle is designated by a letter-figure combination, F for funicular joint, and the following figure referring to the particular joint under consideration. For example, F4 designates the fourth funicular joint, counting from the base of the funicle. The female Decatomini possesses five such joints, whereas the male has only four. (Pl. 3, figs. 30 to 32; pl. 4, figs. 41, 42.)

Tribe DECATOMINI: Family EURYTOMIDAE

The Eurytomidae are easily distinguished from the other families of Chalcidoidea, except the Callimomidae, by the form of the pronotum, and from the latter family by the shorter ovipositor and the form of the antennae and the abdomen. The front and hind margins of the pronotum are nearly parallel, and the sides slightly convergent posteriorly, or the sclerite as a whole is subquadrate, usually about twice as wide as long. (Pl. 3, fig. 27.) In the female Eurytomidae the abdomen is moderately to strongly compressed, but in the males this region is subcylindrical, somewhat as in the Callimomidae. The latter group possesses a relatively undifferentiated flagellum, which, in the Eurytomidae, consists of a distinct funicle and more or less developed club. Moreover, the colors of most Eurytomidae are dull, but the Callimomidae have a metallic surface.

The tribe Decatomini² differs from its nearest relatives, the Eurytomini, and other tribes of the family in possessing a distinct stigma (pl. 1, figs 1 to 13, et al.) near the middle of the anterior margin of the front wings. Ashmead³ recognized two genera in this tribe, splitting his genus *Eudecatoma* from *Decatoma* Spinola on the absence of a submarginal color band on the front wings. No adequate structural differences, however, have been found that supplement this somewhat variable character in the color band to justify this division of the old genus *Decatoma*. To Masi,⁴ also, *Eudecatoma* Ashmead does not seem sufficiently different to regard it as a separate genus. These genera have therefore been recombined in this study, and the tribe Decatomini, as known in America north of Mexico, includes the single genus *Decatoma* Spinola.

Genus DECATOMA Spinola

Decatoma SPINOLA, Classification des diplolepires, Ann. Mus. d'Hist. Nat., vol. 17, p. 151, 1811.—WALSH, Amer. Ent. and Bot., vol. 2, no. 10, p. 309, 1870.—ASHMEAD, Trans. Amer. Ent. Soc., vol. 9, p. xxxi, 1881.—PROVANCHER, Petite fauna entomologique du Canada et particulierement de la Province de Quebec, vol. 2, Hymenoptera, pp. 568-569, 1883.—HOWARD, U. S. Dept. Agr., Div. Ent. Bull. 5, pp. 38-59, 1885.—ASHMEAD, Ent. Americana, vol. 4, no. 3, pp. 42-43, 1888, new genus *Eudecatoma*.—ASHMEAD, Trans. Amer. Ent. Soc., vol. 21, p. 319, 1894 (*Diplolepis adonidum* Rossi as the genotype).—BRUES, Bull. Mus. Comp. Zool. 54, p. 25, 1910.—MASI, Nov. Zool., vol. 24, p. 138, 1917, *Eudecatoma* Ashmead synonymous with *Decatoma* Spinola.—GAHAN and FAGAN, U. S. Nat. Mus. Bull. 124, 1923, list of type species, *Decatoma*, p. 59, and *Eudecatoma*, p. 42. Only the chief papers on the genus are listed.

Maximilian Spinola described *Decatoma* as genus No. 19 with a series of other genera, as follows, the first phrase occurring in the key: "Antennis de dix articles, inserees au milieu du front. * * * N. 19. *G. Decatoma*. Abdomen petiole, comprime lateralement. * * * Mihi. Ex. *Chalcis adonidum* Rossi, *Diplolepis Sphegnum*, *stigma* Fabr. etc. *Decatoma splendida*, *metallica*, *rufipes*, *albitarsis* mihi. Medites, etc."

Female.—Length 1.5 to 4 mm., moderately robust in form, or no more than four times as long as maximum width (head and mesothorax), varying from almost black through brown to nearly completely yellow, the intermediate colors being combinations of black, brown, red, and yellow, black species with cephalo-lateral angle of pronotum yellow, yellow species with at least a part of hind legs partly fuscous to black; submarginal band lacking, or faint pale brown to deep brown, a faint secondary band broadly V-shaped and on ridge between band and base of wings sometimes present.

² Ashmead, Classification of the chalcid flies. Mem. Carnegie Mus., vol. 1, no. 4, 1904.

³ Ent. Americana, vol. 4, no. 3, pp. 42, 43, 1888.

⁴ Nov. Zool., vol. 24, p. 138, 1917.

Head usually from two-thirds as broad as long to twice as broad as long, oval to subrectangular in outline above, moderately to slightly convex in front, eyes and malar space nearly equal in length, surfaces reticulate, each reticulation with a small hair-bearing umbilicate puncture, except sometimes cheeks and malar space more or less smooth and shiny, and occasionally cheeks strigose, and usually vertex finely and densely punctate, malar groove broad and well defined usually only on basal half (nearest to eyes); punctate areas of head moderately and inconspicuously hairy, ocelli forming a low triangle, median ocellus very close to upper edge of antennal scrobe; scape of antennae about three times as long as pedicel, and more or less thickened on basal half, pedicel always longer by about one-third than F1, narrow at base and expanding quickly from basal fourth, scape usually reaching about to middle of F3, one ring-joint, five funicular joints constant, F2 to F5 varying in dimensions, sometimes much longer than thick, but mostly not much longer than their greatest diameter, and at times slightly broader than long; club 3-jointed, compact, usually not so long as F3 to F5 combined and slightly broader than the rest of the antenna, widest at second joint, the third small and conical with blunt tip; flagellum moderately clothed with rather short inconspicuous whitish hairs; joints of funicle and club with elongate shallow hair-bearing, and also dot-like, sensoria, quite uniform in number and arrangement. (Pl. 3, figs. 30, 31.)

Pronotum and sclerites of mesothorax above hairy like the face, and umbilicately punctate, becoming smoother at the lower edges where femora fold against the body; prescutum, scapulae, axillae, and scutel definitely distinguished by well-developed sutures and moderately rounded above (pl. 3, fig. 29), mesopleura with lateral area below tegulae and anterior to metapleural cluster of silvery hairs, bare, shagreened, and aciculate-punctate; metapleura punctate and always clothed with a broad, rather dense covering of long silvery hairs; pronotum subrectangular, transverse, front and hind margins almost parallel (pl. 3, fig. 27), sides slightly converging toward rear, about twice as broad as long and transversely arched, length about equal to that of prescutum, usually slightly more narrow than maximum width of mesothorax, latter broadest across tegulae; front legs shortest, but their coxae intermediate in breadth and length between length of meso- and metacoxae, first and second tarsal segments almost equal in length, third and fourth shorter and nearly same length, last segment longest, bearing a pair of simple claws, strigilis with a row of fine short stiff hairs on first tarsal joint, curved tibial spur reaching to about middle of this segment; midlegs most slender, tibiae with a strong apical spur, first and last

tarsal segments longer than two to four, these subequal; hind femora moderately thickened, two strong apical spurs on tibia, outer member about half the length of the inner, proportionate size of tarsal joints as on midlegs; outer face of hind coxae with a narrow band of silvery hairs lengthwise, and hind edges of hind tibiae bordered with two poorly defined rows of long stiff hairs; metanotum very short, transversely curved, its anterior and posterior margins parallel; propodeum about two-thirds wider at front than long, sides rounded and converging broadly posteriorly, median groove moderately developed, usually broad and shallow with bottom rounded, its marginal carinae not always present or complete, groove limited in front by a curved or angulate carina, surface of the segment in part reticulated coarsely to finely, or rugae sometimes lacking just laterad of the groove; spiracles ovate or oval, near cephalo-lateral corners; front wings reaching shortly beyond end of abdomen, hind wings extending halfway between stigma and apex of front wings, latter broadest beyond stigma and twice the width of the hind wings, front margins almost straight, hind margins uniformly oblique, hamular fold on narrow slender thickening on hind margin of basal half; apical two-thirds of front wings mostly densely and minutely hairy and bordered with similar hairs, basal third with a pattern of setae in rows on obscure ridges, submarginal vein slightly thickened proximad of stigma and bearing from 10 to 18 long setae in a single row, stigma situated a short distance behind middle, marginal and stigmal veins shorter than stigma, marginal vein with seven or eight setae, stigmal vein knobbed with a short cephalo-distal tooth, hind wings without large hairs on base, apical two-thirds with vestiture like front wings, three hamuli on front margin short of middle, basal hamulus straight, others recurved.

Petiole about twice as wide as long, rounded and sculptured above, abdomen strongly compressed, rounded above and broadest at upper third, segments converging below, first and second combined shorter than third above, fourth broadly emarginate behind and shorter than third but lateral faces longer and their dorso-ventral margins converging moderately ventrad, those of the third narrowing wedge-like, fifth and sixth segments small, in some specimens telescoped, hidden, spiracles of sixth more or less visible on sides, tips of ovipositor sheaths protruding fairly above oblique posterior face; surface of abdomen smooth, highly polished to very finely coriaceous or granulose, usually bare except segments five and six and sheaths which are hairy, the first sparsely, the latter two more hairy.

Male.—Length, vestiture, and sculpturing much as in female; color generally somewhat darker and form more slender, head and thorax slightly broader in proportion to the pronotum than in female; funicle 4-jointed, the first joint longer, F2 to F4 mostly

equal or subequal, and proportionately longer than those of female; petiole almost three times as long as broad, abdomen subcylindrical, posterior segments six in number when fully extended, but apical ones usually not visible, telescoped, first two combined shorter than third, fourth shorter than third, and remaining three tapering to pointed posterior when exposed, penis often partly exerted on pinned specimens.

Specific characters.—It has been very difficult to find constant characters for the separation of species of *Decatoma*. Color and sculpture are subject to such individual variation that they can be used only in a restricted way. Some of the variation in color depends on the age at which a specimen is killed, fully matured specimens being generally darker. Other variations may be due to the different rates of fading; the submarginal band of the wing, for example, seems to fade more rapidly than the body colors. The form and extent of the submarginal band vary greatly in certain species, while in others they are nearly constant.

Extensive study of the body sculpture has demonstrated very wide variations in nearly all species; and the time and effort necessary to determine the limits of specific variation in sculpture have not seemed justified.

The vestiture of the body, legs, and wings offers very little of value in the way of specific characters. The general surface vestiture of the wings is for the most part very constant in density and length, though in one species, *D. flamminneiventris* Girault, it is distinctly shorter than normal. The best characters of vestiture are found in the number of setae on the submarginal vein, which varies somewhat with the size of the individual and apparently within certain limits for each species.

The dimensions of the various parts of the body offer some specific differences, though the telescoping of the abdomen and the collapsing of the antennal club must be taken into account in the evaluation of characters drawn from those parts. Some of the most available characters of this sort, though these are not without variation, are found in the dimensions of certain joints of the funicle and in the relative length and breadth of the head, and the contour of the eyes, face, and vertex. Certain of these characters are useful in grouping related species.

The characters that seem to be most useful have been employed in the following key:

KEY TO SPECIES OF DECATOMA

- | | |
|--|-----|
| 1. Front wing immaculate (pl. 2, figs. 23-26)..... | 25. |
| Front wing with a more or less distinct color band extending
backward over surface from stigma (pl. 1, figs. 1-13; pl. 2,
figs. 14-22) | 2. |

2. Color of body either predominantly yellow of different shades, or predominantly black; if yellow, not more than minor parts black, such as ocellar area, occiput narrowly, mesonotum on disks of prescutum or scutellum narrowly, and anterior surface and groove of propodeum; if black, usually not more than narrow orbital ring, front corners of pronotum, and sometimes venter of abdomen, yellowish (head of *nigriceps* at times more yellow, but this species is known by its length and often reduced wing band)----- 3.
- Color of body mixed, varying in the different species, ranging from black through brown to yellow, none of these colors predominating to the extent described above----- 14.
3. Color predominantly yellow, or a shade of yellow more or less suffused with red or brown, width of submarginal band various----- 4.
- Color predominantly black, submarginal band usually not so broad as length of marginal vein or stigma----- 12.
4. Apicalmost part of distal margin of submarginal band extending well beyond end of stigmal vein (pl. 1, figs. 2, 5, 6, et al.)----- 5.
- Apical part of the band not or barely reaching as far as end of stigmal vein (pl. 1, figs. 3, 4, 7, 12, et al.)----- 8.
5. Length 1.5 mm., body slender, 10 or 11 setae on submarginal band, head, thorax, and abdomen almost, or sometimes entirely, immaculate bright golden yellow----- *texana* (p. 22).
- Length 2 mm. or more, body moderately robust, 13 to 15 setae on submarginal vein, body sometimes almost immaculate but not bright golden, more or less darker than the above----- 6.
6. Body color as if tarnished, yellow suffused with reddish brown. *bicolor* (p. 29).
- Body color plain golden yellow----- 7.
7. Submarginal band mostly very large, proximal margin moderately convex, distal margin sometimes greatly dilated and forming almost an arc of a circle, sometimes both margins moderately and about equally expanded, the band then jug-shaped or one-fifth longer than broad----- *disholcaspidis* (p. 23).
- Submarginal band smaller, proximal margin straight or feebly concave, distal margin never more than moderately dilated, band about two-thirds as broad as long----- *flava* (p. 14).
8. Funicular joints 2 to 5 (female) each about a third longer than thick, or 2 to 4 (male) twice as long as wide. antennae usually smoky black, head often speckled dusky and body lightly infumated----- *vacciniicola* (p. 12).
- Funicular joints as long as broad or scarcely longer (female), or one-half longer than broad (male), antennae usually yellowish or chestnut brown, body not speckled or plainly dusky----- 9.
9. Submarginal band with a distinct neck at stigma, band well-separated from stigmal vein, body quite immaculate golden brownish yellow, only anterior and groove of propodeum black. *mimosae* (p. 25).
- Submarginal band not extremely constricted, body more black, including ocellar area and propodeum in part, and dorsum of abdomen----- 10.

10. Length 2.5 mm., slender, bright golden yellow, ocelli and occiput narrowly, and most of dorsum of abdomen, black or brown-black, thorax immaculate, submarginal band feebly formed, sometimes fading out at apex, then about one-half longer than broad----- *amsterdamensis* (p. 20).
Length 2 to 2.8 mm., more robust than above, thorax marked black, submarginal bands more distinct----- 11.
11. Disk of scutel more or less black----- *lanae* (p. 19).
At least ocellar area and occiput narrowly, and prescutum beneath pronotum, and on some specimens scutel in part, black.
nubilistigma (p. 26).
12. Head from above transversely rectangulate-ovate in outline, and almost or quite twice as wide as long, front not prominently rounded, posterior half of sides of abdomen coriaceous in both sexes, body black except anterior-lateral corners of pronotum yellow-brown----- *occidentalis* (p. 58).
Head from three-fifths to two-thirds as long as wide, front as seen from above prominent, broadly rounded, abdomen not sculptured, or not continuously coriaceous on posterior half of sides----- 13.
13. Length 1.8 to 2.2 mm., 10 to 13 setae on submarginal vein, sides of abdomen unsculptured and polished, submarginal band highly variable in length but not in width, and never entirely lacking in specimens at hand----- *nigriceps* (p. 62).
Length 2.6 to 2.9 mm., usually about 15 setae on submarginal vein, sides of abdomen usually granulose, at least in female, submarginal band uniformly twice as wide as long----- *globuli* (p. 47).
14. Submarginal band of various shapes, but wider at its widest point than length of stigma or marginal vein, never approaching twice as wide as long, usually but one-fifth or so longer than wide, sometimes abbreviated, then quadrangular in shape ----- 15.
Submarginal band narrow, not broader than stigma or marginal vein, usually twice as long as wide and then usually its apical portion curving toward base of wing, band rarely reduced in length and often with a heclike prominence on outer margin near stigmal vein----- 19.
15. Head seen from above twice as wide as long, or slightly more robust, face not prominently rounded between eyes or on forehead ----- 16.
Head about four-sevenths to two-thirds as long as wide, face quite prominently rounded as seen from above----- *varians* (p. 33).
16. Length 3 mm., color mostly black, at most only laterals of pronotum yellow, most of its dorsum black.
occidentalis var. *flavifrons* (p. 61).
Length 3.3 mm. or more, body less black, and more yellow or mixed yellow----- 17.

17. All legs in part black or brown, never immaculate yellow, length of body 3.3 to 4.6 mm.----- *isis* (p. 30).
 Legs mostly yellow, only hind femora and tibiae sometimes brownish to blackish----- 18.
18. Submarginal band always at least twice as long as wide, with an angular emargination on proximal margin and heellike prominence on distal margin, legs immaculate yellow, length of body 3.4 to 4 mm., vestiture of wings normal.----- *flavipes* (p. 52).
 Band not angulate, not more than twice as long as wide, sometimes only one-fourth longer, length of body 3.7 mm., surface and marginal vestiture of wings (not including setae on submarginal vein) very short and inconspicuous, the usual pattern of larger hairs on basal third lacking.----- *flamminneiventris* (p. 55).
19. Head twice as wide as long, face flat, or feebly convex, length of body 3.2 to 4 mm., 13 to 19 setae on submarginal vein.----- 20.
 Head more than half as long as wide, or sometimes twice as long (occasionally *brevilobae*), length 2.2 to 3 mm., 11 to 15 setae on submarginal vein.----- 22.
20. Color of head and thorax almost or entirely reddish yellow.----- *dubia* var. *rufosa* (p. 41).
 Color of head and thorax, as well as abdomen, mostly not reddish yellow.----- 21.
21. Length range 3.2 to 4.3 mm., face extremely flat and scarcely protruding in front of eyes, 13 to 19 setae on submarginal vein, in general not so dark as variety *doanei*.----- *dubia* (p. 38).
 Length range 3.2 to 4 mm., face fairly flat, but protruding more distinctly in front of eyes, 13 to 16 setae on submarginal vein, in general darker than *dubia*.----- *dubia* var. *doanei* (p. 43).
22. Head five-eighths as long as broad, rather blocky in form, body as a whole robust, large for the genus, 2.6 to 4.3 mm. long, more often 3.5 mm., submarginal band tapering and bending sharply at apex.----- *novascotiae* (p. 50).
 Head not so robust or subquadrangular, body less robust, usually smaller than 3.5 mm., submarginal band not as described above.----- 23.
23. Head mostly light brownish yellow, only throat, vertex narrowly around ocelli, and occiput around foramen, black, face protruding broadly and roundly in front of eyes, about 12 setae on submarginal vein, cheeks polished or inconspicuously sculptured.----- *lobatae* (p. 45).
 Head and thorax in general darker, body mostly black, face not well rounded and prominent, cheeks reticulate-punctate. 11 to 15 setae on submarginal vein.----- 24
24. Abdomen entirely black, or anterior-ventral fourth light brown, antennae dusky, legs, especially hind coxae and femora of middle and hind legs, dark.----- *globuli* (p. 47).
 Abdomen less black on anterior-ventral aspect, legs mostly yellow.----- *brevilobae* (p. 56).

25. Body mostly black,⁵ at most antennae, a narrow ocular band, oral area narrowly, sides of pronotum, tegulae, and most of legs, yellow----- 26.
 Body less black and more yellow than the above, especially head and thorax, and often also abdomen, more yellow----- 28.
26. Length of body in both sexes about 2 mm., 12 or 13 setae on submarginal vein, head almost or quite two-thirds as long as wide----- *wiltzae* (p. 83).
 Length usually distinctly more than 2 mm., always so in females, 16 setae on submarginal vein, head one-half to three-fifths as long as broad----- 27.
27. Yellow of pronotum confined to anterior lateral corners, not reaching to hind edge of this segment, legs yellow except coxae, which are black, head from above twice as wide as long, face flat or feebly convex----- *florida* (p. 86).
 Yellow of pronotum attenuated posteriorly but reaching hind edge of the segment laterad, coxae black, also disks of femora and tibiae especially of middle and hind legs, black, head about three-fifths as long as wide----- *marylandica* (p. 85).
28. Vertex mostly or entirely black, occiput black, the black of these two areas confluent; more or less of middle third of pronotum, all or most of prescutum and scutellum, propodeum entirely, and dorsum of abdomen broadly, black----- 29.
 Usually only ocellar area of vertex, and occiput narrowly, black, the black of these areas usually widely separated or connected only by a narrow band; thorax with a more or less complete and irregular mid-dorsal longitudinal black band, often not extending to pronotum; anterior surface and groove of propodeum, and often only an irregular band on dorsum of abdomen, black, latter band frequently produced sideways on the segments----- 31.
29. Length 2.2 to 2.7 mm., abdomen of females mostly ochreous-yellow on the sides, 12 to 13 setae on submarginal vein.----- *quinqueseptae* (p. 78).
 Length 3 to 3.3 mm., sides of female abdomen not always mostly ochreous-yellow, 12 to 16 setae on submarginal vein----- 30.
30. Length 3 mm., 12 to 14 setae on submarginal vein, sides of female abdomen mostly dark like dorsum, only venter or lower portions of sides lighter in color----- *foliatae* (p. 79).
 Length 3.1 to 3.3 mm., 12 to 17, usually 14 to 17, setae on submarginal vein, sides of female abdomen mostly ochreous-yellow----- *foliatae* var. *arizonica* (p. 82).

⁵ The key does not provide for separating certain mostly black males of the *quercilanae* var. *dorsalis* (Fitch) type. All such will lead to *florida* Girault, *marylandica* Girault, or *wiltzae*, new species that are black in both sexes. Besides these species, *foliatae* Ashmead, *foliatae arizonica*, new variety, and *quinqueseptae*, new species, have this black form of male in addition to the lighter form. The black, or variety *dorsalis* type, of male of all these species is very similar and can not be positively distinguished to date. See discussion under *quercilanae* var. *dorsalis* (Fitch), page 74.

31. Head almost or quite twice as broad as long, a small black spot contiguous with each ocellus, but these spots never confluent, occiput narrowly black, body almost immaculate golden yellow, anterior surface and groove of propodeum, peduncle and dorsum of abdomen, black, 11 or 12 setae on submarginal vein..... *pezomachoides* (p. 69).
 Head about three-fifths as broad as long, 13 to 15 setae on submarginal vein..... 32.
32. Ocellar area not solid black, occiput narrowly black, head otherwise, and thorax almost, immaculate above and on sides, at times a suggestion or a patch of darker color along median line..... *subimmaculata* (p. 66).
 Ocellar area usually solid black, black sometimes reaching beyond ocelli on all sides, at least prescutum mostly black, more often an irregular longitudinal dorso-median black band on at least mesothorax..... 33.
33. Usually a black triangle on, but not coextensive with, prescutum, rest of dorso-median area of mesothorax usually immaculate, sometimes black on males, dorsum of abdomen black, head four-sevenths as long as broad, sometimes almost twice as broad as long, 13 to 16 setae on submarginal vein..... *pomiformis* (p. 70).
 Usually an irregular longitudinal dorso-median black band on mesothorax, sometimes including pronotum, dorsum of abdomen black, head three-fifths as long as broad, 12 to 14 setae on submarginal vein..... *querci-lanae* (p. 72).

1. *DECATOMA VACCINIICOLA*, new species

PLATE 1, FIGURE 1; PLATE 3, FIGURES 30, 31, 33; PLATE 4, FIGURES 35, 36, 40

Decatoma nublistograma ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 198, 1887 (misidentification).

Decatoma varians PROVANCHER, Additions à la faune hyménoptérologique, p. 194, 1889 (misidentification).

Recognizable by the yellow, more or less infuscated body, the usually dusky to black antennae, and the relatively long funicular joints, which are about one-third longer than broad in the female and twice as long as wide in the male. The submarginal band aids in recognizing the species. It resembles *D. flava* Ashmead and *D. nublistograma* Walsh most closely, but the above characters distinguish it from them.

Female.—Length 2.8 to 3 mm.; color mostly yellow to brown-yellow, in part sometimes golden brown; antennae smoky black, except that pedicel is yellow at apex, especially below, and scape and palpi are entirely light yellow; eyes pink, mandibles brown to black, ocellar area in part dark brown, rest of head dull yellow to light brown, in some specimens with more or less of the surface speckled dark brown or continuous dark brown; prothorax pale dull yellow with apex of scutel, lower part of scuto-axillar groove, and sternum,

somewhat black; metathorax and propodeum like the preceding segment, but propodeum darker above and below; legs a shade lighter than pronotum, femora tinged brown, with middle and hind tibiae brown, the latter darker; wings iridescent, stigma dark brown, submarginal band light brown and reaching three-fifths across the wing, its base narrower than length of stigma, widening toward apex but more sharply on the inner edge, the apex broadly rounded, secondary band exceedingly faint, practically wanting, petiole and abdomen more or less yellowish brown.

Head wrinkled-strigose, and finely and sparsely umbilicately punctate compared with punctures of thorax, genae sculptured like face, malar space more nearly smooth, vertex around ocelli finely punctate; head three-fourths as long as wide, and one-fourth broader than pronotum, occipital concavity approximately equal to facial convexity from above; flagellar joints moderately hairy, hairs about half the length of F2 and not definitely in whorls, facial vestiture more sparse and obscure; F1 twice as long as its mean thickness, F2 to F5 of equal width and length, each about a third longer than thick, first joint of club longer than second or third; nota of thorax coarsely umbilicately punctate, sparsely hairy, sclerites well rounded and parapsides fairly deep for the genus; mesopleura aciculate and finely punctate; pronotum definitely narrower than head and mesothorax; parapsidal and scuto-axillar grooves deep and entire; submarginal vein of fore wing with a row of 12 to 15 setae; abdomen, except the petiole, smooth, polished, shiny; segments 1 and 2 bare, 3 and 4 with a few hairs laterad, and apex of ovipositor sheath more densely clothed; petiole as long as segments 1+2, and segments 1 to 3 constituting about half the abdomen.

Male.—Length about 3 mm., color as in the female, but antennae at times almost yellow, yet tinged with brown, and most often dusky; face rarely speckled brown; secondary band of fore wings practically lacking, and apical fourth of abdomen infumated above; form somewhat more slender than female; head slightly more robust than in female, face strigose-punctate, malar space grooved as in female; F1 two and a half times as long as wide, F2 to F4 equal in length and thickness, and each twice as long as wide; 12 to 14 setae in the row on submarginal vein; abdomen polished, smooth, bare except apical fourth moderately hairy.

Type locality.—Dune Park, Porter County, Ind.

Type.—Female, U.S.N.M. No. 42232; allotype in the same collection.

Paratypes.—Ten females and 4 males on points, and 3 females dissected on slides, in the collection of the United States National Museum; 5 females and 5 males on points in the collection of the Illinois State Natural History Survey, Urbana, Ill.; 21 females on points and 11 dissected on slides, and 11 males on points in the

author's collection. This is a common species and has at times been mistaken for *D. nubilistigma* Walsh and *D. varians* Walsh.

Remarks.—All types reared indoors from May 5 to 10 by the author at Urbana, Ill., from stem galls on blueberry (*Vaccinium* sp.) collected April, 1927, by Dr. R. D. Glasgow in Dune Park, Ind. The species is also known as follows: 25 females and 16 males issued April 5 to 10 from stem galls on dryland blueberry (*V. vacillans*) collected March 19, 1922, by J. C. Bridwell in Rock Creek Park, Washington, D. C.; 8 females, labeled 4460, issued May 1, 1883, and the rearing records add that they were obtained from *V. nitidum* and received at the United States National Museum from J. G. Barlow, Cadet, Mo., April 13, 1883; 6 females and 2 males on multiple points labeled only "on *Vaccinium* (Bilberry), gall box 187"; 2 females on multiple points with data "Pol (polythalamous) gall on *Vaccinium pennsylvanicum*"; a series of 10 females and 6 males on three multiple-point mounts with record number 199⁸⁰, from large galls collected by Mrs. Treat at the bases of small oaks in New Jersey; 5 females and 5 males bearing "No. 2," and three pins with data "ex galls on blueberry, Whites Bog, N. J., from B. F. Driggers"; 7 females from New Brunswick, N. J.; 1 female bearing record number 144 with data "J. L. Zabriskei, Nyak, N. J., Feb. 6, '84"; 3 females and 1 male on one mount, labeled "From Fitch's collection"; 6 females and 1 male reared by Dr. L. L. Huber, May 11, 1921, from galls of "*Solenozopheria vaccinii*" in New York; also a series bred by Dr. A. C. Kinsey from "*S. vaccinii*" at Forest Hills, Mass., as follows: May 9 to June 3, 1928, 7 females and 3 males; May 5 to 24, 1918, 5 females and 5 males. A series of 1 female and 7 males with the record number 323⁰¹, 24/484 and 323⁰³, 24/484, came from a "cynipid gall on the roots of *Andromeda ligustrina* from Koebele, Holderness, N. H." Two specimens are labeled "Ottawa, Can.," and L. H. Weld sent me three females and a male that he reared from the kidney-shaped gall on stems of *Vaccinium* at Glencoe, Ill., on May 7, 1913. Mr. Weld deposited in the National Museum collection a series of 15 females and 8 males bred from galls on the same plant at East Falls Church, Va., on April 24, 1927.

The host gall of this chalcid was long believed to be formed by a species of Cynipidae, *Solenozopheria vaccinii* Ashmead,⁶ but B. F. Driggers definitely demonstrated⁷ that the maker of this common reniform swelling on the stems of "cultivated" highbush blueberry (*Vaccinium corymbosum*) is the chalcidoid *Hemadis nubilipennis* Ashmead, in whose gall *D. vacciniicola* lives.

⁶ Trans. Amer. Ent. Soc., vol. 14, p. 149, 1887.

⁷ Journ. New York Ent. Soc., vol. 35, pp. 253-259, 1927.

2. *DECATOMA FLAVA* Ashmead

PLATE 1, FIGURE 2; PLATE 4, FIGURES 39 and 42

Decatoma flava ASHMEAD, Can. Ent., vol. 13, no. 6, pp. 134, 135, June, 1881.—

TRIGGERSON, Ann. Ent. Soc. Amer., vol. 7, pp. 8-10, 1914.

Decatoma catesbaei ASHMEAD, Trans. Amer. Ent. Soc., vol. 9, p. xxxii, 1881.

Resembles *D. vacciniicola* Balduf in superficial appearance, but the eyes are less prominent, the antennal segments are yellow, and the funicular joints scarcely longer than broad; the whole body, except in part the propodeum and dorsal surface of abdomen, is yellow and unmarked with black or brown, the submarginal band is distinctly broader and darker brown, and the average specimen is larger in the present species. This is one of the most nearly yellow species of the genus.

Female.—Length 2 to 2.7 mm., head, thorax, and legs almost entirely yellow of various shades (greenish yellow in fresh specimens, Ashmead), except antennae, which are dull brownish yellow, sometimes metapleura more or less black below, hind femora on inner disk and hind tibiae on outer disk, deep brown; submarginal band medium to dark brown in newer material, faded light brown in Ashmead's paratypes, reaching two-thirds to hind edge of wing, proximal margin almost straight and apical margin broadly and uniformly rounded, sometimes more sharply dilated, these edges extending mostly beyond base of stigma and apex of stigmal vein respectively, apex truncate, also a definite narrow angular secondary band of the same color proximad of the main band; abdomen brownish yellow.

Length of head four-sevenths of width, barely convex behind, face distinctly produced and rounded transversely from above and sloping rather sharply downward and forward from the vertex, eyes but feebly set apart from face by marginal depressions, vertex moderately convex; pedicel slightly shorter than F1; F2 to F5 each slightly longer than broad, or as broad as long; antennae moderately hairy, hairs whitish; surface of front similarly hairy, front and genae reticulate-punctate, basal half of malar groove broad, rest narrow, malar space mostly finely wrinkled, ocellar area for most part very finely and densely punctate; pronotum distinctly narrower than head but nearly as broad as mesothorax at maximum width, these segments umbilicately punctate above, punctures of scutellum coarser, mesopleura rather coarsely aciculate, and finely punctate; 13 or 14 setae on submarginal vein; lateral surfaces of abdomen very finely granulose, the dorsal surface sometimes less so.

Male.—Length 2.5 mm., slenderer than female; colored as female, but dorso-lateral area on each side of propodeal groove in front black, venter of propodeum with a small black area; submarginal band medium to dark brown, and secondary band definite; head, antennae, and thorax sculptured and clothed like female; F1 at least as long

as pedicel, and one-fourth longer than F2, latter only slightly longer than F3, this one as long as F4; F2 to F4 each not greatly longer than thick, club about as long as F3 and F4 combined, funicular joints about uniformly wide; fore part of abdomen smooth, but segments 3, 4, and 5 minutely roughened, granulose.

Type locality.—Jacksonville, Fla. (W. H. Ashmead).

Type.—Female, U.S.N.M. No. 25494.

Paratypes.—One female and one male paratype on slides in the writer's collection; other male paratypes and the allotype on points in the collection of the United States National Museum. Redescribed from several paratypes, and description checked with type, allotype, and other paratypes; bred from an oak gall doubtfully determined by Ashmead as *Cynips q.-ficus* Fitch—*Biorhiza forticornis* (Walsh), known as the oak fig gall. Kinsey, however, states that true *B. forticornis* is not known from Florida.

Remarks.—I am convinced that *D. catesbaei* Ashmead is identical with *D. flava* Ashmead. Both have been reared from galls of *Andricus* in Florida. *D. catesbaei* is represented by three females labeled in Ashmead's handwriting. The type has no submarginal band, while the paratype has a band in every respect like that of the typical *flava*. The third female has a poorly developed band, intermediate in form. In all cases the band is faint. Aside from this variable band, *catesbaei* and *flava* are alike. The *catesbaei* series seems to be abnormal in this wing character. No such variation in the wing band is known from any other species of this genus.

C. J. Triggerson reports rearing 600 of this species from the white-oak leaf galls *Cynips pezomachoides erinacei* (Mayr) [*Dryophanta erinacei* (Mayr)] as parasites of the gall maker. I have examined two specimens of this lot from Cornell University through the kindness of Dr. P. P. Babiý. Six females taken by Doctor Ashmead at Jacksonville, Fla., are labeled "*A. floridensis*" and "*H. omnivora*." They agree in all respects with the female paratype at hand and check also with all the other material of this species recorded here. *Andricus floridensis* (Beutenmueller) lives in a stem gall on the post oak (*Quercus stellata*) and its close relatives, according to Kinsey. This authority states further, in a letter, that "*H. omnivora* is a *Disholcaspis* ordinarily considered a variety of or synonymous with *D. globulus* or *D. mamma*." He adds that *globulus* or *mamma* does not range into Florida.

I have received the following reared specimens from L. H. Weld: 1 female (Weld No. 21) from the gall of *Callirhytis seminator* (Harris) on white oak (*Quercus alba*) at Evanston, Ill.; 2 of each sex (Weld No. 640) from the galls of *C. tubicola* (Osten Sacken) on *Q. stellata* at Ironton, Mo.; 1 of each sex (Weld No. 820) from the gall of *Andricus tubularius* Weld on *Q. undulata* at Tijeras, N. Mex.;

2 of each sex (Weld No. 131) from the galls of *Acraspis macrocarpae* Bassett at Evanston, Ill.; 3 females and 1 male from the woody form gall of *Neuroterus noxiosus* (Bassett) on swamp white oak (*Q. bicolor*) at Evanston, Ill.; 4 females and 2 males from the gall of *Acraspis macrocarpae* Bassett at the same place; 1 female and 2 males from the gall of *Andricus murtfeldtae* Ashmead on *Q. stellata*, East Falls Church, Va.; and the same collector deposited in the United States National Museum 3 females and 2 males (Hopkins U. S. 15634^c), all only 2 mm. long and with apex of scutel and the propodeum in part black, from the galls of *Compsodryoxenus humilis* Weld on *Q. chapmani*, June 30, 1920, at Ocala, Fla.

In the United States National Museum are also 6 females and 4 males that can not be separated from *flava* Ashmead except by size. But all grades of size occur in the material of different lots before me. The present 10 specimens were reared by Theodore Pergande on June 16–21, 1883, from galls of *Neuroterus batatus* (Fitch) on *Q. alba*, in Virginia. R. A. Cushman reared a female and two males (Quaintance No. 7173) from an oak gall at Vienna, Va., August 16, 1911. The males are of special interest because they have more black above on the thorax than the average individual of this sex. A series of 11 females and 9 males (No. 2251) are small but otherwise not distinguishable from *flava*. The galls from which these came were not identified, but the following description of them remains in the records of the Museum: "These galls are sometimes on the leaf stem and connected with the main twig, sometimes on the leaf but always entirely deforming the leaf. They have a compound appearance like a coalescence of several buds, shape irregular but usually globular." They were received at Washington, D. C., on June 20, 1880.

Dr. A. C. Kinsey sent 4 females and 7 males from galls of *Neuroterus batatus noxiosus* form *noxiosus* (Bassett) on stems of *Q. bicolor* at Waterbury, Conn. These specimens were a part of the collection of Homer F. Bassett. Another series, 19 females and 3 males, were received from Doctor Kinsey, who reared them from the galls of *Andricus aciculatus* Beutenmueller on *Q. stellata* at Yoakum, Tex., the gall makers having been reared November 30, 1919. I also have 12 females and 5 males reared by Kinsey at Forest Hills, Boston, Mass., in 1919 from the galls of *Cynips (Acraspis) pezomachoides* Osten Sacken, which makes its galls on *Q. alba*. The specimens from the latter galls are as a whole distinct from all other *flava* at hand, but the differences are only in the color, which is generally darker. Their form, proportions of the antennal joints, sculpturing, vestiture, and wing bands are in all respects like the typical *flava*. One male, reared by Dr. L. L. Huber at Bluffton, Ohio, on April 12, 1921, from the

same gall on *Q. alba* is plain yellow, like the *flava* from Florida and Texas. The Kinsey specimens from Forest Hills are therefore at best only color varieties of *flava*.

I also have two females received through Doctor Kinsey and reared by Dr. J. T. Patterson at Austin, Tex., from the galls of *Andricus murtfeldtae* Ashmead on *Q. breviloba*.

Three females in the National Museum collection were reared at Alexandria, Va., on June 17 from the galls of *Andricus floridensis* (Beutenmueller) on *Q. digitalis*. The generally darker body, particularly the black propodeal groove, the brown abdomen, and the deep brown of the submarginal band of these specimens may justify their recognition as a geographic variety if additional material proves that these color variations are constant for specimens from that region.

One female cut from the gall of *Andricus quinqueseptum* var. from Marco, Lee County, Fla., April 21, 1912, came to me through Doctor Kinsey, who determined the gall, from the American Museum of Natural History and bears record number F.626.Acc.3973. One female (record No. 66^{x01}) reared on June 28, 1883, from the gall of *Disholcaspis globulus* (Fitch) (*Cynips q.-globulus*), collected at Providence, R. I., on April 7, 1883, by A. T. Packard, checks with the types. A single female was taken at Lafayette, Ind., by Dr. F. M. Webster.

3. DECATOMA QUERCII Ashmead

Decatoma querci ASHMEAD, Can. Ent., vol. 13, no. 6, p. 135, June, 1881.

The status of this species is in doubt, for there is no type material and a male labeled *Decatoma querci* Ashmead, in what is perhaps Ashmead's handwriting, does not agree with the original description. Particularly the head of this male is yellow, whereas Ashmead said "vertex inclosing ocelli brownish black." This specimen compares favorably with *flava* Ashmead. Ashmead raised his material "from a dipterous gall on *Quercus catesbaei*"—*Quercus laevis* Walter—at Jacksonville, Fla., but does not give further facts about the gall. Most oak-inhabiting species of this genus are from cynipid galls. It is possible that *Decatoma* from dipterous oak galls may be distinct from those in cynipid galls on the same oak species. I, therefore, am inclined to recognize the present species at least tentatively in the hope that new material may be reared from dipterous galls on *Q. laevis* that may agree with Ashmead's description of *querci*, and prove this to be a good species.

The essential features of the original description of *D. querci* by Ashmead are here reprinted:

Male.—Length 0.12 inch. Head green, slightly yellowish and coarsely punctate, vertex inclosing ocelli brownish black, * * * gula black; antennae * * * pubescent, greenish yellow, third joint dark; thorax coarsely punctate and slightly hairy; collare

* * * broader than mesonotum, greenish yellow, with a slightly darker transverse band of brown in center; mesonotum, scutellum and metathorax dark reddish brown * * *; abdomen smooth, shining black or brownish black, more or less of a reddish brown anteriorly, peduncle two-thirds as long as abdomen, black; * * * stigma black, with a brownish black blotch extending from it to more than half way across the wings; legs, anterior pair greenish yellow, middle tibiae infuscated, posterior tibiae brownish black, tarsi black.”

It is not known how many specimens were used in preparing this description, but presumably they were few. If this species should prove to be variable in color, as is common in the genus *Decatoma*, entire agreement with this description can not be expected even should new specimens become available.

4. *DECATOMA LANAE* Ashmead

PLATE 1, FIGURE 3; PLATE 3, FIGURE 32; PLATE 4, FIGURE 38

Decatoma lanae ASHMEAD, Can. Ent., vol. 13, no. 6, p. 135, June, 1881.

Similar to *D. vacciniicola* Balduf in being mostly yellow, but the female differs in having F2 to F5 as broad as long, and the male with the funiculars only about one-third longer than thick; anterior half of scutel black, abdomen infuscated above, the submarginal band shorter, more narrow, margins less entire, and its apex distinctly curved toward base of the wing.

Female.—Length 2.2 to 2.5 mm., mostly yellow and light orange; antennae honey yellow, base of pedicel brown above; head dull yellow; mandibles, ocellar area in part, and occiput dark; pronotum concolorous with yellow of head, rest of thorax and the propodeum light orange, except front of scutellar disk, sterna, metanotum mostly, and middle half of propodeum on anterior third and groove, almost black; legs yellow, only hind tibiae brownish black; submarginal band medium brown, embracing only base of stigmal vein, mostly narrower than length of stigma, its margins somewhat irregular, its proximal edge concave, apical side more convex and sometimes with a heellike mesal prominence, apex bluntly pointed, reaching slightly beyond middle of wing, secondary band lacking on all specimens at hand; peduncle in part black, abdomen light brown, dorsum infuscated.

Head almost two-thirds as long as wide, eyes not prominent, their juncture with face only feebly interrupted; face strigose-punctate, cheeks and malar space obscurely punctate or smooth, and ocellar area and sometimes adjoining part of vertex minutely punctate; scape almost thrice as long as pedicel, F1 one-third longer than wide, F2 to F5 each not longer than broad, or slightly shorter than wide, each succeeding joint slightly wider than the preceding, antennae more densely hairy than head and thorax, hairs not conspicuous;

prothorax only slightly narrower than head and mesothorax, these segments umbilicately punctate above, mesopleura aciculate and finely punctate; a row of about 12 setae on submarginal vein; abdomen more or less finely granulose.

Male.—Similar to the female, but with the first flagellar joint twice as long as broad, as long as pedicel; second, third, and fourth flagellar joints all longer than broad but shorter than the first; abdominal petiole longer than hind coxae; vertex except narrow line at eye margin and broad transverse stripe behind, occiput, large quadrate spot on pronotum dorsally, prescutum, median posterior angles of scapulae, scutellum dorsally, propodeum dorsally, metasternum, large spot on inner face of hind coxae, inner side of hind femora in part, hind tibiae on outer side except at base, front femora in part, and petiole of abdomen above and below but not laterally, black. Abdomen beyond the petiole piceous.

Type locality.—Jacksonville, Fla.

Cotypes.—Nine females and two males, U.S.N.M. No. 2818.

Remarks.—One of the females on a point, and two dissected on slides, are retained in the writer's collection. All are labeled "Jacksonville, Fla., Collection Ashmead." This species was originally described from numerous specimens of both sexes reared by Doctor Ashmead from the woolly gall of the cynipid *Andricus turnerii* (Ashmead) (*Cynips q.-turnerii* Ashmead) on *Quercus aquatica*, Jacksonville, Fla. I find also in the collection of the National Museum three females from Duval County, Fla., one female labeled "E. Fla., Ashmead." and seven females without data.

5. DECATOMA AMSTERDAMENSIS Girault

PLATE 1. FIGURE 4

Decatoma amsterdamensis, GIRAULT. Descriptiones stellarum novarum, p. 10, 1917.

Similar to *flava* Ashmead; has occiput, anterior dorsal portion (the part telescoped into the prothorax), lower part of axillae, metanotum mostly, anterior third and groove of propodeum, sterna of thorax, top of abdominal segments in part, black contrasting sharply with the yellow; middle and hind tibiae brown; abdomen yellowish brown on the sides and submarginal band more faint; head, thorax, and legs otherwise one shade of lemon yellow.

Female.—Length, 2.4 mm., relatively more slender than most species, colors predominantly yellow with scattered patches of black; head deep lemon yellow, mandibles brown, ocelli bordered or partly to entirely inclosed with small black blotches, occiput narrowly black; scape light yellow, basal third of pedicel brown, rest yellowish,

flagellum light brown; pronotum uniformly concolorous with head, except sternum, which is black; mesothorax deeper yellow, anterior portion and sometimes entire front edge under pronotum, lower portion of axillae, and sternum, black; submarginal band faint light brown, stigma darker, band extending two-thirds across wing, narrower than length of stigma, stigmal vein not involved in band, proximal margin almost straight, slightly oblique basad, distal margin broadly rounded, apex rounded, secondary band lacking; mesothorax mostly black, propodeum likewise on anterior third, on groove and sternum, rest yellow; coxae to femora yellow like head and pronotum, tibiae darker yellow, tarsi of middle and hind legs more or less brown; petiole black and yellow, abdomen brownish yellow, except top and end of ovipositor sheath, which are brown to black.

Head slightly more than half as long as wide, forehead rising sharply above inner margins of eyes; cheeks, labrum, and malar space smooth, rest of head strigose wrinkled, moderately punctate, except anterior part of ocellar area, which is finely punctured, all the parts of the head moderately and inconspicuously hairy; scape as long as pedicel, F1 and F2 combined, F1 slightly shorter than pedicel and a fourth longer than F2; F2 to F5 subequal in length and broadening gradually toward club, each slightly longer than broad, the last barely so, club nearly as long as F3 to F5 combined and somewhat blunt, flagellum moderately hairy, hairs whitish; thorax coarsely punctured above like the head, and similarly hairy, prothorax more than half as long as broad and about as wide as mesothorax; mesopleura aciculate and finely punctate; submarginal vein bearing a row of 11 or 12 setae; apical half of abdomen sparsely hairy, sheath of ovipositor moderately so, surfaces of segments smooth, shining.

Male.—Length, 2.3 mm., slenderer than female; color, proportions, sculpturing, and vestiture in general like those of female, except as follows: Anterior margins of mesonotum (under pronotum) its entire width, and most of propodeum, black; scape not reaching middle of F2, pedicel slightly shorter than F1, F2 slightly longer than F3 and F4, latter equally long and nearly a half longer than thick and barely wider than F1 and F2, club slightly broader than F4.

Type locality.—Penn Yan, N. Y.

Type.—Female, U.S.N.M. No. 20246.

Redescribed from the type, the allotype, two male paratypes, and a series of the original specimens of both sexes, all reared by Dr. W. J. Phillips at Penn Yan and Auburn, N. Y., in 1915 in connection with his study of *Harmolita* (*Isosoma*). These specimens bear Webster No. 9355. Three older specimens, two females and a male, on one card are labeled "Parasit No. 6, *Isosoma hordei*."

6. DECATOMA TEXANA, new species

PLATE 1. FIGURE 5

Very similar to *D. flava* Ashmead in color and sculpturing, but is smaller than most specimens of *flava*, the propodeum is largely or entirely yellow, and the whole vertex is minutely and densely punctate.

Female.—Length 1.5 mm., body and legs almost entirely yellow to yellowish brown; head uniformly light yellowish brown, borders of ocelli in part not so, scape and pedicel light yellow, latter deeper, funicular joints slightly darker than pedicel, and club dull medium brown; prothorax uniformly deep lemon yellow, mesothorax and propodeum concolorous with head, faintly suffused dark above; legs colored like prothorax, except that inner faces of femora are dark brown, hind femora still darker, outside of middle tibiae narrowly, and of hind tibiae mostly, brown; submarginal band medium brown, two-thirds as broad as long (not including stigma), quadrangular, corners rounded, proximal portion extending four-fifths across wing and moderately convex, distal edge reaching well beyond end of stigmal veins and almost straight, apex broadly rounded; secondary band well developed; abdomen deeper yellowish brown than mesothorax.

Head three-fifths as long as wide, facial outline from above broadly and uniformly rounded, vertex feebly convex transversely, receding sharply behind ocelli, eyes and surrounding parts continuous, not sharply demarcated, occiput slightly concave, malar space and cheeks smooth, mostly bare, rest of head moderately hairy and wrinkled-strigose, moderately punctate, except vertex, which is finely and densely punctate, scape as long as pedicel, F1, and F2 combined, more than twice as long as pedicel, latter one-third longer than F1, F1 about one-sixth longer than F2, F2 to F4 broadening slightly toward club, F2 and F3 as broad as long, F4 and F5 broader than long; prothorax distinctly narrower than head, scarcely broader than mesothorax, pronotum and mesonotum coarsely but shallowly sculptured with umbilicate punctures, rather shiny and inconspicuously and sparsely hairy; 10 or 11 setae on submarginal vein, surface vestiture faint just distad of submarginal band, coarser and more obvious beyond; sides of abdomen well rounded, surface smooth, polished, posterior face and sheath of ovipositor moderately hairy.

Male.—Like the female, except for the usual secondary sexual differences in the antennae and the abdomen. F2 to F4 are about one-fourth longer than broad.

Type locality.—Brownwood, Tex.

Type.—Female, U.S.N.M. No. 42233.

Described from five specimens, the type and a female paratype on points in the collection of the United States National Museum, the allotype and the other two paratypes on slides in the writer's collection. It is possible that this is a small, lighter-colored form of *D. flava* Ashmead, but it seems sufficiently distinct to be a separate species.

7. *DECATOMA DISHOLCASPIDIS*, new species

PLATE 1, FIGURE 6; PLATE 3, FIGURE 34

Resembles *D. flamminneiventris* Girault in size and form, but is easily distinguished from it by the absence of the broad black mid-dorsal thoracic band, the shape of the submarginal band, and the presence of the usual longer hairs on the wing surface; still more like *flava* Ashmead in color, differing chiefly in having a much broader submarginal band sometimes greatly dilated on both its lateral margins.

Female.—Length 3.1 mm., rather robust in form; the head and thorax, including propodeum, reddish brown with a tinge of yellow, except as follows: A narrow circumocular band and antennae honey yellow but on more mature specimens medium brown, occiput lighter, approaching pronotum in color, each ocellus partly inclosed in a small dark blotch, on one specimen a faint dark band extending from each lateral ocellus to antennal scrobe; prothorax light brownish yellow, scutel feebly infuscate or disk with a blotch of black, a patch on either side of anterior end of propodeal groove, and sterna of thorax and propodeum in small part, black; front and middle coxae yellow, lighter than pronotum, hind coxae darker and concolorous with femora, but lighter than mesothorax, middle and hind femora more or less black on inner face, and hind femur slightly infuscate on outer face also, tibiae light yellowish brown except outer face of front tibiae lightly infuscate at base, and of middle and hind tibiae entirely brown and black respectively, tarsi honey yellow; submarginal band dark brown, to light brown as in *flava* Ashmead, diverging from stigma, the proximal margin slightly and the distal margin sharply rounded or at an angle of 45° from end of stigmal vein for half the length of the band, then sharply rounded toward its apex, apex very broadly rounded, maximum width of band almost equal to length, extending on proximal side five-sixths across the wing, or both margins almost equally moderately convex, one-fifth longer than wide, jug-shaped, secondary band amber-colored and faint; abdomen light yellowish brown ventrally, becoming darker dorsad and more or less deeply infuscate above.

Head slightly more than half as long as broad, front only slightly convex, vertex only slightly elevated above the eyes, temples not prominent, occiput feebly concave, outline of head

above therefore subrectangular-ovate, surfaces moderately and inconspicuously hairy, finely wrinkled and with occasional shallow umbilicate punctures, more or less of vertex minutely and shallowly pitted, one female with a few umbilicate punctures in ocellar area, malar space smooth and bare; pedicel one-sixth longer than F1, joints F2 and F3 about equal, one-fifth longer than wide, F4 and F5 slightly shorter but a little thicker than the preceding, and only a little longer than broad; head slightly broader than mesothorax, and both these distinctly broader than pronotum; 13 to 15 setae on submarginal vein; abdomen very finely and uniformly granulose, except first segment and venter, which are in part polished, smooth; sparsely to moderately hairy posteriorly.

Male.—Size, vestiture, sculpturing, and color as described for female, except that mesothorax is light brownish yellow, the scutellum partly black as in the female to wholly concolorous with prescutum, and propodeum almost entirely like the mesothorax to black as in the female, and in one specimen the groove also black; F1 as long as pedicel and a fourth longer than F2, F2 to F4 broadening and shortening slightly toward club.

Type locality.—Austin, Tex.

Type.—Female. U.S.N.M. No. 42234.

Remarks.—Described from the type, allotype, and two female and two male paratypes, the type and allotype in the collection of the United States National Museum, the rest in the writer's collection. These were reared by Dr. A. C. Kinsey from the galls of *Disholcaspis cinerosa* (Bassett) on live oak (*Quercus virginiana*) collected in the type locality. The gall makers issued December 4, 1919. Some wings and antennae of both sexes are on slides. In the collection of the National Museum are four females and one male on slender pins with label "Texas, Belfrage." The hind edge of the submarginal band is not so much produced as in the type specimens. It is also represented by several Hopkins lots, as follows: Two females (Hopk. U. S. 15637^b), September 29, 1922, reared by L. H. Weld, presumably from galls on *Q. pungens*, at Tijeras, N. Mex.; 3 females (Hopk. U. S. 15637^d), reared by Weld, October 2, 1922, from the same locality and oak, and the gall is an undescribed *Disholcaspis* (determined Weld); 1 female and 2 males (Hopk. U. S. 15604^a), by Weld, Prescott, Ariz., April 25 and 30, and May 8 (1 female), 1918, presumably from galls, on *Q. grisea* or *Q. arizonica* (evergreen oaks); 9 females and 3 males (Hopk. U. S. 15604^c), L. H. Weld, Prescott, Ariz., May 15 to August 1, 1918, from galls of *Callirhytis ruginosus* (Bassett) on *Q. grisea* and *Q. arizonica*; 2 females and 1 male (Hopk. U. S. 13687^e) reared July 12, 1918, from galls determined by Weld as *Adleria*, on *Q. oblongifolia*, at Esparara Cañon, Ariz.; and 1 male (Hopk. U. S. 10773^w), reared June 11, 1919,

by J. H. Pollock, at Colorado Springs, Colo., presumably from galls, on *Q. gambelii*. These Hopkins materials for the most part have the wing band somewhat less expanded on the sides than those of the types, but are obviously the same species. All the material of this species at hand to date is from the Southwestern States—Texas, New Mexico, Arizona, and Colorado—and judged by the degree of development of the wing band, this species has evolved farthest in the type locality. The specimens from the more northern and western States approach *D. flava* Ashmead, from which *disholcaspidis* differs only in the enlarged submarginal band.

8. DECATOMA MIMOSAE, new species

Nearest to *D. flava* Ashmead in having the body almost entirely yellow, but differs from it in being somewhat smaller, in having the distal margin of the submarginal band more strongly produced and rounded and noticeably more constricted necklike at the stigmal vein, and in the possession of only 9 to 11 setae on the submarginal vein.

Female.—Length, 2.4 mm., almost entirely golden or yellowish brown; head entirely golden brown or lightly infusate, ocelli reddish, antennal scrobe ochreous-yellow, scape light yellowish brown, pedicel medium to darker brown, its apex above lighter, F1 and club moderately dark brown, rest of funicle distinctly lighter brown; prothorax golden yellow, mesonotum light reddish brown tinged with yellow, disks of scapulae and axillae faintly brown, mesopleura concolorous with pronotum, groove and upper anterior portion of propodeum brown black; legs mostly a shade lighter than mesopleura, hind femur faintly brown on outer disk, middle and hind tibiae medium brown or dusky on outer faces, tarsi stramineous; submarginal band medium light brown, the stigmal vein conspicuously dark brown through the stigma, band with a prominent neck, or outer basal shoulder of band widely separated from free portion of stigmal vein, distal margin rather sharply rounded and reaching distinctly beyond apex of stigmal club, proximal margin straight and slightly distad of base of stigma, band about a fourth longer than its maximum width; peduncle and abdomen varnish brown, lightly tinged yellow, the venter feebly lighter, slightly darker on the middle above than on sides.

Head three-fifths as long as wide, front fairly prominent transversely above antennal fossae, broadly and uniformly rounded, occiput rather strongly concave, eyes and front not sharply set off at their juncture; small areas behind anterior and laterad of posterior, ocelli only finely punctate, rest of ocellar area moderately umbilicately punctate, punctures smaller and more shallow than on thorax, more numerous on occiput and antero-laterad of ocelli, cheeks

coarsely strigose, polished, malar space finely strigose, face to oral region inconspicuously reticulate-umbilicate punctate; scape about five times as long as its maximum thickness, pedicel almost a fifth longer than F1, this joint only slightly longer than F2, F2 barely longer than F3, F4, and F5, and slightly longer than broad, the other funiculars as broad as long, or F5 a bit broader than long, club relatively short and thick; head one-sixth wider than pronotum, width of mesothorax intermediate, but nearer that of head; nota of prothorax and mesothorax umbilicately punctate, the interior part of latter finely wrinkled as usual where overlapped by hind portion of pronotum, mesopleura aciculate, the posterior half less conspicuously on posterior two-thirds; anterior carina of propodeal furrow forming a moderately diverging U, furrow bottom with several broken, crooked rugae, lateral and anterior faces of propodeum distinctly reticulate, mesal portion less so; submarginal vein with a row of 11 setae (one specimen); abdomen mostly bare, moderately hairy behind, surface highly polished, unsculptured, glassy transparent.

Male.—2.3 to 2.4 mm. long, colored like female, mesal surfaces of propodeum as reticulated as lateral surfaces, submarginal vein bearing a row of 9 to 11 setae, sculpturing and vestiture as in female, dimensions of head the same; scape five times as long as greatest diameter near base, pedicel one-fifth longer than F1, latter one-eighth longer than each of F2, F3, and F4, each of these two-sevenths longer than broad, club three times longer than broad, and as long as F4, F3, and a fourth of F2 combined.

Type locality.—Huachuca Mountains, Ariz.

Type.—Male, U.S.N.M. No. 42241.

Beside the type, there are at hand the female allotype and one male paratype, the latter two in the writer's collection. All the material was received from Lewis H. Weld, who reared it from a woody stem gall on *Mimosa biuncifera*. The pins bear Weld's record number 375.

9. DECATOMA NUBILISTIGMA Walsh

PLATE 1, FIGURE 7

Decatoma nubilistigma WALSH, Amer. Ent. and Bot., vol. 2, no. 10, p. 301, 1870.

Resembles *D. flava* Ashmead somewhat in length, size of head, in the number of setae on the submarginal vein, and in being largely yellow. *D. nubilistigma* has the head, vertex, prescutum, scutel, and propodeum more or less black, a somewhat smaller wing band, and the yellow of the body is a lighter shade than in *flava*, which is almost entirely yellow of a golden hue.

Female.—Length 2.5 to 2.8 mm., colors various shades of yellow and black; head greatly variable from entirely ochreous-yellow, ex-

cept disk slightly beyond ocelli and occiput, which are more or less black, sometimes lower hind edge of genae more or less black, and on several specimens the black spot of vertex merging caudad with occipital black area, also proceeding over the front below antennal fossae, the frontal black not solid, side margins of antennal scrobe and ocular space narrowly yellow; scrobe yellow, scape lemon yellow, sometimes with a cloudy black stripe on exterior lateral face, pedicel brown at base and sometimes above, otherwise yellow, flagellum reddish brown to light fuscous above, or quite uniformly yellowish brown; pronotum mostly ochreous-yellow, barely lighter than yellow of head, a discal dark brown spot, reaching anterior and posterior margins on one specimen, and almost lacking on another, mesothorax ochreous-yellow or rufous-yellow, disks of prescutum and scutellum always brown-black, their margins usually narrowly yellow, or dark to margins on one specimen, hind margin of scutellum always so, tops of scapulae and axillae with varying degrees of brown, but immaculate on the type, parapsidal and scutello-axillar grooves never darkened completely; metathorax, except pleura, and lateral and posterior surfaces of propodeum somewhat variously, ochreous-yellow; legs mostly lemon yellow, posterior coxae with an exterior longitudinal black stripe, femora each with a superior black stripe, never including entire aspect, and not much larger or intense on hind than on front femora, fore tibiae immaculate or faintly dusky, middle and hind tibiae dark brown outwardly, somewhat more extensively and densely on hind legs; submarginal band light brown, almost amber, faint in all the specimens at hand, slightly broader than length of stigma, about a half longer than wide, distal margin broadly rounded, this edge scarcely extending beyond apex of stigmal vein and feebly dilated at the middle, not parallel with proximal margin, the sides converging to blunt terminus, secondary band almost imperceptible; petiole ochreous-yellow, dorso-median line broadly, sides and venter sometimes dark brown, abdomen mostly yellowish brown, a poorly demarcated dark-brown angular band above but first segment almost entirely immaculate, and one specimen with entire posterior half of abdomen brown black.

Head on average slightly less than four-sevenths as long as wide, face from above not broadly and uniformly rounded, but almost forming a straight transverse line as seen from above, occiput less than moderately concave; several small umbilicate punctures behind anterior ocellus, these more numerous on occiput; genae bare, smooth, shiny; malar space coarsely strigose below groove, finely strigose above mesad of groove, front with shallow, inconspicuous, and rather large hair-bearing reticulations, hairs whitish, sparse; antennae moderately stout, pedicel a fourth longer than F1, F2 to F5 equal in

length. each one-sixth longer than thick, club as long as F5, F4, and half of F3 combined; head one-ninth wider than pronotum and barely broader than mesothorax, side of pronotum papillose wrinkled. mesopleura aciculate, except lower half of the posterior sclerite, which is feebly or not at all so; parapsidal grooves quite deep; anterior of propodeal groove limited by a broad V-shaped carina, its apex very obtuse, groove deep and polished on front fourth, the rest subreticulate, other surfaces of propodeum coarsely reticulate, more coarsely so along groove; 11 to 15, more often 12 to 14, setae in row on submarginal vein, hairs at times more closely set; fourth abdominal segment with a few hairs in a transverse row above, ovipositor sheath more hairy, abdomen otherwise bare, all segments perfectly polished and shining.

Male.—Length 2.2 to 2.5 mm.; the males at hand agree with the females that have the head all yellow except the vertex and occiput. The black on the thoracic nota varies as in the female. but the legs of all the males are distinctly more nearly entirely yellow, only the hind tibiae being darkened outwardly on two specimens and the third has the second tibiae brown also, but feebly; males otherwise like female, except antennae; scape four times as long as major thickness, reaching almost to middle of F2, pedicel and F1 very nearly same length, F1 one-fifth longer than each of F2 to F4, latter almost equal in diameter, F2 five-eighths as thick as long, F3 and F4 each successively slightly thicker, club about same in diameter as funiculars, tapering slightly to a blunt tip, and as long as F4. F3, and a fourth of F2 combined.

Type locality.—Probably Rockford, Ill. (Dr. B. D. Walsh).

Cotype.—Male, U.S.N.M. No. 1536 (through A. Bolter, 1890).

Redescribed from the Manitoba and Fitch specimens referred to below, and checked with the cotype in the United States National Museum. Fragments of a female cotype remain in the latter collection.

Remarks.—A series of five females and one male belonging to the Canadian national collection were reared by Norman Criddle from galls on a willow on June 10, 1906, at Aweme, Manitoba: two females from Hull in the same collection without host data check well with the description by Doctor Walsh, except that the wing bands of the original material were pale fuscous, whereas the Criddle specimens, as well as two males from Fitch's collection, have pale brown bands, which difference might be due to fading through time. The Fitch specimens bear numbers 10185 and 15224, respectively, and one bears information indicating that they came from willow galls.

It is unlikely that one species of *Decatoma* inhabits galls on plants of such diverse relationship as willow and oak. Doctor Walsh in describing this species had before him material from a cecidomyioidous

willow gall, *Rhabdophaga batatas* (*S. batatus* Walsh) and from "an undescribed gall" on swamp white oak (*Quercus bicolor*) which, he states, was "in all probability cynipidous." I have found no means of determining what the oak gall inhabitant is. None of the original specimens is at hand, and the Walsh description brings out no characters that serve as a basis for separation. I am here regarding the *Decatoma* from willow as having priority right to the name *nubilistigma*, and believe that the species from swamp white oak will prove to be distinct from it when it is rediscovered. I have no *nubilistigma*-like material from the oak, hence it has probably not already been described under another name.

10. DECATOMA BICOLOR Ashmead

PLATE I, FIGURE 8

Decatoma bicolor ASHMEAD, TRANS. AMER. ENT. SOC., VOL. 9, P. XXXII, 1881.

Similar to *D. lanæ* Ashmead in having F2 to F4 of female as broad as long, but distinguishable from it by its darker body and legs, and the longer, broader, and almost rectangular form of the submarginal band.

Female.—Length 2.5 mm., mostly yellowish brown to dark or reddish brown; antennae medium brown, pedicel yellow, scape intermediate between flagellum and pedicel in color; head, thorax, and propodeum a mixture of yellow and brown and lightly infuscated above, except pronotum is more nearly brown-yellow, and propodeal groove and area along anterior margin are black; all femora and fore tibiae mostly reddish brown, hind tibiae mostly brownish black, legs otherwise largely yellowish brown; submarginal band dark brown, extending two-thirds across the wing and about two-thirds as wide as long, proximal margin concave, irregular, distal edge almost entire and broadly rounded and reaching, sometimes strongly, beyond apex of stigmal vein, secondary band exceedingly faint, practically lacking; abdomen deep reddish brown and infuscated.

Head from above robust, its length about four-sevenths of its width, about as broad as mesothorax and slightly narrower than prothorax, hind edge almost straight, eyes on almost the same contour level as face, their margins not deeply depressed, head surfaces coarsely reticulate-punctate to strigose, intervals of reticulations sparsely and finely roughened, vertex, chiefly around ocelli, both umbilicately and finely punctate; antennae relatively thick, broadening distinctly from pedicel to first segment of club, F1 scarcely longer than broad, F2, F3, and F4 as long as broad, hairs coarse and partly overlapping next joint; thorax umbilicately punc-

tate above, punctures contiguous, larger on scutel, mesopleura aciculate and finely punctate, the silvery bunch of hairs conspicuous on metapleura; about 13 setae on submarginal vein; abdomen bare except that ovipositor sheaths and last segments are moderately to sparsely hairy, entire tops and sides of the segments shagreened.

Male.—Unknown.

Type locality.—Jacksonville, Fla.

Type.—Female, U.S.N.M. No. 2820.

Redescribed from type and four female paratypes from the same locality as the type. One of the paratypes is in the writer's collection on a slide. The species was originally described from five female specimens; "four captured at large and one bred from cynipidous live oak root gall *Dryorhizoxenus floridanus* Ashmead" by Doctor Ashmead. Three other old specimens, two labeled "Jacksonville, Fla.," may be this species.

Remarks.—No additional material of this species has been collected. I suspect that this may be identical with *D. flava* Ashmead, but am allowing it to stand as distinct until further specimens can be obtained from the above host. The types differ from *flava* in being darker in body color, but this seems to be an abnormal or perhaps tarnished color shade. The wing band of most specimens of *bicolor* bulges more on the distal margin than on *flava*. Furthermore, the unique type of gall from which some of Ashmead's specimens were obtained strengthens the probability that they are a distinct species.

11. DECATOMA ISIS Girault

PLATE 1, FIGURE 9

Decatoma isis GIRAULT, *Descriptiones stellarum novarum*, pp. 10–11. 1917.

From the same genera of Cynipidae as *D. varians* Walsh, and has a "bottle-shaped" submarginal band like that species; *isis* differs in being larger, darker on the average, in having slender antennae, in having 15 to 18 setae on the submarginal vein, and the head almost twice as wide as long, or nearly the shape and dimensions as on *D. dubia* Walsh.

Female.—Length 3.3 to 4.6 mm.; colors chiefly black and rufous-yellow, variable; vertex usually mostly black, but at least band along eyes and oblique stripe from it to top of antennal scrobe reddish yellow, occiput at times almost entirely black but usually in part not so, temples and cheeks largely black with at least hind edge black, malar space and front varying extremely from entirely rufous or reddish yellow to mostly black, margins of eyes and antennal scrobe, region of mouth to lower end of scrobe, and malar groove usually not black; scape dull yellow, pedicel mostly brown, apex yellowish, funicle chestnut-brown, club darker; pronotum

golden reddish brown, except a black mesal area usually about as broad as length of this segment, or less often not black in front but with a pair of black projections reaching close to front edge of segment, or black area in form of a triangle, its apex cephalad: prescutum entirely black, and scutellum mostly so, its sides not so, scapulae and axillae sometimes entirely black above, but sides always more or less reddish brown, mesopleura the latter color. tegulae yellowish brown, propodeum mostly black, sometimes in part reddish on sides and above; legs mostly light yellowish brown, coxae usually so but at times more or less black on posterior faces, front femora sometimes unicolorous or with a superior black stripe, middle and hind femora generally darker, the former at times almost entirely yellowish brown and again more or less dark brown, the latter on the average with more dark brown, its outer face varying from yellowish brown to rarely entirely black; tibiae mostly dark brown or black, front tibiae with outer face only, but middle tibiae more so, and hind tibiae entirely so except base and apex; tarsi usually light yellowish brown, but hind tarsus rarely lightly infuscate behind; submarginal band dark brown, form variable from about twice as long as wide to only one-fourth longer than wide, more often the former and then proximal edge moderately concave and distal edge sometimes about parallel with it or sometimes somewhat dilated below stigmal vein and more sharply rounded, length of band about two-thirds the width of the wing at that point; abdomen brownish black, anterior ventral part of sides, and venter, yellowish to reddish brown.

Head dimensions from above slightly variable but on the average three-sevenths wider than long, on some specimens twice as wide as long, front feebly convex, temples moderately prominent, occiput slightly concave; face coarsely reticulate-punctate, circumocular and malar spaces minutely wrinkled; antennae slender compared with large size of body, but somewhat variable in relative length and diameter of its parts, scape (not including radicle) five times longer than its greatest diameter and as long as pedicel, F1, and F2 combined, pedicel longer than F1 (not including ring joint), F1 one-sixth longer than each of F2 to F5, these uniform in length, width, and form, each about two-fifths longer than thick, club compact, feebly thicker than funiculars, and almost as long as F4 and F5 combined, flagellum moderately hairy; pronota and mesonota umbilicately punctate and moderately hairy, mesopleura as usual aciculate, propodeal groove crossed in front by rounded carina extending caudo-laterad, anterior part of groove smooth, rest of the segment irregularly reticulate; submarginal vein bearing a row of 13 to 18, more often 15 to 17, setae; abdomen when normally extended rather

strongly compressed, mostly bare as usual, segments 1 and 2 polished, from 3 to apex very finely coriaceous, ovipositor sheath moderately hairy.

Male.—Length 3.3 to 4 mm., otherwise like the female, except antennae, which are as follows: Flagellum slenderer than in female, scape as long as pedicel, F1, and half of F2 combined, pedicel and F1 uniform in length, F1 barely longer than F2, F3 and F4 equal in length, slightly shorter than F2, and twice as long as thick, funiculars uniform in diameter, club compact, but sutures plain, feebly thicker than funicle, one-tenth shorter than F3 and F4 combined.

Type locality.—Los Angeles County, Calif.

Type.—Female, U.S.N.M. No. 20247.

Redescribed from the type, the allotype, and the specimens cited below. Original description from type and allotype, from type locality. The allotype, which is in the United States National Museum, was taken in April. The type specimens represent the darker color extreme of the species. In spite of this, and the lack of host data for the type, I feel reasonably certain that these are the same species as the specimens recorded below.

Remarks.—*D. isis* Girault lies between *D. dubia* Walsh and *D. varians* Walsh. It leans toward *varians* in the form and larger size of the submarginal band, but this is not often so extremely developed as in *varians*, and usually has the proximal margin more or less concave as in *dubia*. In its size it favors *dubia*, and in the head dimensions and the number of submarginal hairs it approaches this species more closely. But in its host relations it exhibits greater affinity for *varians* in that it has been reared from *Andricus*, and never from *Disholcaspis*, from which most of the specimens of *dubia* have been obtained.

In addition to the type specimens I have the following material reared from California galls: 4 females and 2 males from *Andricus suttoni* (Bassett), on California live oak (*Quercus agrifolia*) at Carmel; 6 females from the same gall and oak at Pasadena; 12, mostly males from *A. pomiformis* (Bassett) on *Q. agrifolia* at Pasadena; 2 females and 3 males from *A. spectabilis* Kinsey on *Q. chrysolepis* at San Jacinto; the above were reared by Doctor Kinsey, the cynipid gall makers issuing in February and March, 1920. I have one female from the same worker from *Plagiotrochus chrysolepidicola* (Ashmead) on *Q. dumosa*, at Paso Robles, the gall maker having been reared March 7, 1920. This specimen differs from the rest of the series in having the front half of the prothorax reddish, and the basal half of the abdomen below yellowish brown. Another female collected by A. F. Leach and sent me by Doctor Kinsey is from *A. californicus* (Bassett) on California white oak (*Q. lobata*) at Diablo, Calif.

The following were sent from the insect collection of Stanford University by Dr. Isabel McCracken who reared them: 4 females (L. S. J. Lot 554, Sub. 15) from "twig swelling" on *Q. agrifolia*, May, 1915, Stanford campus, and 3 females and 1 male (L. S. J. Lot 554, Sub. 118) from "twig swelling" on *Q. chrysolepis*, Stanford campus, June, 1916. In view of the rearings of Doctor Kinsey, it seems probable that the present "twig swelling" galls are those of members of the genus *Andricus*.

The United States National Museum collection contains three females and a male bearing record number 129°, which is probably equivalent to number 129^k. The insects from the latter number came from a cynipid gall on *Q. agrifolia*, collected in August, 1885, at Alameda, Calif. The specimens bear the same locality name, one being labeled "Feb.," and another "Mar." There is also a female (Hopk. U. S. 15608^b), reared May 24, 1918, by L. H. Weld, from an undetermined gall on *Q. agrifolia*, Los Gatos, Calif., and two females (Hopk. U. S. 15605c¹), reared by L. H. Weld, June 8 and August 17, 1918, from galls on *Q. agrifolia*, at Montecito, Inyo County, Calif.

12. DECATOMA VARIANS Walsh

PLATE 1, FIGURES 10, 11

Decatoma varians WALSH, Amer. Ent. and Bot., vol. 2, no. 10, p. 300, 1870.—ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, p. 198, 1887; Colorado Biol. Assoc. Bull. 1, p. 45, 1890.—VIERECK, Trans. Amer. Ent. Soc., vol. 32, p. 246, 1906.—TRIGGERSON, Ann. Ent. Soc. Amer., vol. 7, p. 8, 1914.

Decatoma phellos ASHMEAD, Can. Ent., vol. 13, no. 6, p. 136, June, 1881.

Decatoma kelloggi FULLAWAY, Journ. New York Ent. Soc., vol. 20, pp. 278, 279, 1912.

This species has been much confused with its close relatives, especially with *D. dubia*, which Walsh regarded as a variety of *variens*. The present species is somewhat smaller and, as a whole, much darker; its submarginal band is usually two-thirds or more as broad as long and reaches distinctly beyond the end of the stigmal vein. The best differences are in the proportions of the heads; in *variens* the head is about two-thirds as long as broad and subovate in dorsal outline, that of *dubia* is about half as long as its width and elongate-ovate in shape, transversely. *D. variens* almost always has the outer face of the hind femur mostly ochreous-yellow, and the hind tibiae mostly black.

Female.—Length 2.5 to 3.5 mm., fairly robust, colors pale ochreous-yellow, honey yellow, brown, rufous, and black, relative degrees of each extremely variable; head usually mostly light ochreous-yellow, a black spot on the vertex sometimes not extending beyond the ocelli,

sometimes covering the whole vertex, rarely extending over the superior half of the occiput; when black, vertex with at least a band along the eye and another oblique from the latter toward top of antennal scrobe, yellowish like most of head; front, cheeks, and back of head below at times lightly infuscate; scape dull yellow to lemon yellow, pedicel pale ochreous-yellow, sometimes brown to black above funicle and club unicolorous, pale, honey yellow, light brown or rufous, pronotum uniformly ochreous-yellow or with posterior margin black, or dorsal area with a subquadrate or otherwise shaped black patch sometimes covering as much as middle half or even with only the sides not black; ground color of mesonotum ochreous-yellow but more or less heavily infuscated, sometimes black, with lower part of scapulae, almost all the axillae, lower edges of scutellum, and sutures yellow or rufous, mesopleura usually not marked with black, metapleura sometimes entirely or not at all black; propodeum ochreous-yellow, or groove and anterior median surfaces black; coxae and trochanters usually plain yellow, hind coxae at times with one or two rather faint longitudinal black bands behind, otherwise unmarked, femora and tibiae colored like coxae but superior face of femora black, front femur least so, black area increasing on middle and hind femora, outer face of femur almost always mostly ochreous-yellow, front tibiae lightly infuscate or immaculate, middle tibiae moderately fuscous but still only on outer face, hind tibiae entirely brownish black, except base and apex, tarsi whitish yellow; stigma dark brown or black, the submarginal band "bottle-shaped," somewhat lighter brown than stigma, rarely reduced in size or deviating from the form here described, in extreme reduction about one-half as wide as long, reaching two-thirds across the wing, usually about two-thirds as broad as long, in one specimen only one-ninth longer than broad, proximal edge almost continuous with base of stigma and irregularly straight, apex fairly straight and forming a right angle with the proximal edge, distal margin broadly rounded and its farthest point usually extending beyond end of stigmal vein; secondary band very faint; abdomen mostly dark, basal third often honey yellow to rufous, shading caudad into reddish brown or brown and black, sheaths honey yellow to light brown.

Head from above almost two-thirds as long as broad, vertex, front, and eyes broadly rounded, or eyes not sharply set apart from their surroundings, temples prominent, rounded, or head, except the moderately concave occiput, almost ovate in transverse outline; face, including genae, reticulate, and with small circular depressions, malar space narrowly smooth and finely wrinkled, groove narrow and incomplete, broader at eyes, face sparsely and inconspicuously hairy; antennae rather densely hairy and broadening gradually and slightly from F1 to middle of club, as a whole relatively stout, scape (not

including radicle) as long as pedicel, F1, F2, and half of F3 combined, F1 four-fifths as long as pedicel and a fourth longer than F2 to F5, the latter segments each almost or quite as broad as long, sometimes distinctly but not greatly longer than thick; pronotum almost two-thirds as long as wide, slightly narrower than head and mesothorax, thorax above coarsely umbilicately punctate, mesopleura aciculate and minutely punctate; hairs on apex of wing about one-half as long as bristles on marginal vein, submarginal vein bearing a row of 12 to 16, more often 12, setae; abdomen bare, except a few hairs on third and fourth segments, last segment before ovipositor somewhat hairy, very smooth, polished, shiny, fourth and fifth segments very finely and densely granulose, the sculpture sometimes scarcely distinguishable, hairy parts punctate.

Male.—Differs from the female only in the usual different form of the abdomen, in having the submarginal band more frequently reduced distad, and in the proportions of the antennal joints; pedicel and F1 equal in length or F1 slightly longer, F1 two and a half times as long as maximum width and as broad as F2 to F4, the latter equal in length and width and each almost or quite two-thirds longer than thick, club scarcely longer than F3 and F4 combined and as broad as the funicular segments.

Type locality.—None given, but probably Rockford, Ill.

Cotypes.—Two females on one pin, and fragments of a third separately mounted, U. S. N. M. No. 1538.

These specimens were received by the National Museum in 1890 through A. Bolter, who was entomological curator in the museum of the Chicago Academy of Sciences, where the collection prepared by Doctor Walsh was deposited after his death.

Remarks.—The specimens from which Walsh described *varians* were reared by him from cynipid galls on oak. Kinsey interprets the original records as *Plagiotrochus punctatus* (Bassett), *Amphibolips inanis* (Osten Sacken), and *A. confluentus* form *spongifica* (Osten Sacken). A few specimens in the collection still bear notes in pencil showing that they were obtained from *P. punctatus*. I find none of Walsh's specimens with data to show that they were reared from *Amphibolips* spp. The National Museum collection also contains the following: 7 specimens of both sexes on one pin that are typical *varians* and bear Accession No. 5961a, A. D. Hopkins, West Virginia; a fine series of 19 females and 6 males from New Jersey, but without further data; 4 males bear record number 2972^a with dates February 10, 1882, February 10 and 24 and March 1, 1883, and were reared from a cynipid gall on scrub oak at Martinez, Calif., by H. W. Turner (Doctor Kinsey interprets "scrub oak" there as usually *Quercus dumosa*); 3 females on one pin bear number 149^o, which I take to be equivalent to 149k, and are from El Dorado, Calif.

(locality on pin) in cynipid galls on *Q. wislizenii*, February, 1886; 1 from Mountain View, Calif., labeled "Ehrhorn Lot 2"; 3 males from galls questionably determined as *Dryophanta* on live oak (probably *Q. virginiana*), at Idlewild, Bexar County, Tex., L. Biediger, collector; 4 males reared by Doctor Ashmead from a gall on willow oak (*Q. phellos*), Jacksonville, Fla., April 18, 1881, and described by him as a distinct species, but it has all the essential characteristics of *D. varians* Walsh.

L. H. Weld sent me three from the galls of *Disholcaspis eldoradensis* (Beutenmueller) on *Q. lobata*, at Cottonwood, Calif., January 22, and four of each sex reared by him from the galls of *Biorhiza caepuliformis* (Beut.) at Evanston, Ill. The pins bear Weld's record number 270. The rather strange shade of yellow is probably due to the preservative in which these specimens were first kept, but the slightly more blocky form of head hints that these specimens comprise a distinct species. Specimens at hand include 2 (No. 245) of each sex from *Callirhytis gemmaria* (Ashmead), Evanston, Ill; 1 male (Hopk. U. S. 13685^e) reared February 26, 1918, from galls of *Disholcaspis globulus* (Fitch) on *Q. alba*, Falls Church, Va., by William Middleton; 2 females and 1 male (Hopk. U. S. 14636^b) reared by William Middleton, April 27, 1920, Falls Church, Va., from galls determined by him as *Callirhytis* sp. on *Q. alba*; 4 females (Hopk. U. S. 10774^b) presumably from galls on *Q. stellata*, Ironton, Mo., May 28, 1919, and 1 female (Hopk. U. S. 10776^a) from same locality, reared June 18, 1919, by S. A. Rohwer from galls determined by him as *Disholcaspis fasciata* Bassett, on common red oak (*Q. rubra*); 3 females and 1 male (Hopk. U. S. 10781^a) reared by J. H. Pollock at Colorado Springs, Colo., presumably from galls, on an undetermined species of *Quercus*; 4 females and 3 males (Hopk. U. S. 13651^m) reared by F. R. Herbert, February 26 and April 5, 1918, from galls determined by William Middleton as *Disholcaspis* sp., from *Q. durata* at Los Gatos, Calif.; L. H. Weld obtained 5 females and 1 male (Hopk. U. S. 15608^b) from the same locality, May 24, 1918, presumably from galls, on *Q. agrifolia*, and 1 female (Hopk. U. S. 15605^b) at Upland, Calif., June 8, 1918, from *Q. chrysolepis*. These Hopkins lots exhibit some further noteworthy variations. Specimens of both sexes from California and Missouri are as small as 2 or 2.1 mm. in length, and whereas the abdomen is usually more or less granulose in the species, some present individuals have this part perfectly smooth and polished. The setae on the submarginal veins range from 9 to 16, both extremes being found on California material. Several males from California are unusual in being black, only the oral area, the front lateral portions of the pronotum, and parts of the legs brown-yellow; on the other hand, the form of the head and wing band, the size and wing vestiture, and the

fact that they are part of a series of typical *varians*, show that they are probably this species. The specimens in the Missouri series are unique in having the band considerably reduced on the proximal and distal margins, but its maximum width is still greater than the length of the marginal vein. These Hopkins lots, however, agree in having the head rounded in front, face receding below antennal fossae, setae on submarginal vein usually 11 to 14, and in their general color pattern.

Dr. A. C. Kinsey provided five females from the galls of *Plagiotrochus chrysolepidicola* (Ashmead), var. undetermined, from *pugnus* Kinsey, in one instance on *Q. dumosa*, Paso Robles, Calif., and again from the same gall at Napa, Calif.; also from the same gall at Exeter, Calif., on *Q. lobata*, and others from Manitou, Colo., from *P. frequens frequens* (Gillette) on *Q. undulata*. The rearing dates for the cynipid gall makers of these Kinsey lots are in February, March, and April, 1920.

Several other California specimens were received through the courtesy of Dr. Isabel McCracken from Leland Stanford Junior University collection (Lot 554, Sub. 111) and reared by her from the galls of *Disholcaspis eldoradensis* (Beutenmueller) on *Q. lobata*, on the Stanford campus, April 1915.

I have not been able to examine specimens of *Decatoma kelloggi* Fullaway. Doctor McCracken kindly compared some of my Kinsey specimens with the type of *kelloggi* and reports that these differ in color from the type. *D. varians* Walsh, however, varies extremely in color. Fullaway states that the head of *kelloggi* is "fairly thick anterior-posteriorly," and the front wing has "a brown gourd-shaped cloud extending across the middle of the wing two-thirds its width." His specimens were reared by Mrs. Rose Patterson Blakeman from a "twig swelling" gall on *Quercus chrysolepis*, the galls collected at Stevens Creek, Santa Clara County, Calif. It is probable that this gall is a close relative, if not a member, of the genus *Plagiotrochus*, from which what I regard as *varians* Walsh has been reared. The head and wing characters quoted above are essential features of *varians*, and altogether it is very likely that *D. kelloggi* Fullaway is identical with Walsh's species.

The outstanding features of *varians* are: The greatly variable body color, the hind femora usually mostly ochreous-yellow outwardly, cheeks reticulate punctate, not polished and smooth, usually 13 to 15 setae on the submarginal vein, and the finely granulose sculpturing of at least the sides of the posterior half of the abdomen. It is also remarkable for its wide geographic distribution, and the broad range of genera of cynipid galls on oak from which it has been obtained.

There is so much variation in the color of this species from Illinois, the type locality, that specimens from the Western United States readily come within the extremes of the color differences. At first inclined to look upon the western lots, as well as some from Illinois, as representing several distinct species on account of both host and color differences, I am at last compelled by the lack of structural characters to regard them all as one. This same inconstancy of color and absence of morphological characters make it impossible to recognize varieties. These differences cut across the generic lines of the cynipid hosts and do not correlate with any geographic boundary lines.

13. DECATOMA DUBIA Walsh

PLATE 1, FIGURE 12

Decatoma varians var. *dubia* WALSH, Amer. Ent. and Bot., vol. 2, no. 10, p. 300, 1870.

Readily separated from *D. varians* Walsh with which it has been frequently confused, by its larger size, generally darker color, the narrower and longer curved submarginal band, and the distinctly relatively shorter and wider head which is much less produced in front than in *variens*.

Female.—Length 3.2 to 4.3 mm., usually of the larger size, fairly robust, mostly black above, some parts of body yellow to rufous and brown; head black, except narrow circumocular band, temples and cheeks mostly, malar space, antennal scrobe and an oblique bar from it to eye, and face at times only below antennae and at times to and including much of vertex, yellow or rufous-yellow, head almost entirely black in a few Michigan specimens; scape light ochreous-yellow, pedicel same but more or less fuscous above, ring joint yellow, flagellum chestnut-brown; sides of pronotum yellow like that of head, top in most cases black, but at times only median third, or even only posterior two-thirds of this area, black, rest yellow; mesothorax black, lower parts of scapulae and axillae and the pleura deep yellow, rufous, or brown to partly black; metathorax and propodeum black; legs mostly yellow, front coxae immaculate to black on anterior surface, middle and hind coxae sometimes rufous-yellow and sparsely marked black, femora yellow, disks of outer surfaces sparsely and feebly to broadly and deeply brown-black, tibiae light yellow, fore tibiae at times immaculate, at times faintly brown, or front pair faintly, and others increasingly brown, the hind pair deeply so except base and apex, tarsi faint yellowish white; stigma almost black, submarginal band deep dark brown, usually about two and a half times as long as wide, its width almost uniform throughout, rarely broader than length of stigma, crooked in form, bending distinctly toward body, reaching two-thirds across wing, its apex

rounded, but sometimes narrowed and roughly tapered; petiole black, abdomen mostly black, only about cephalo-ventral fourth brownish to mostly yellow.

Head mostly just one half as long as wide, sometimes slightly longer and narrower, transversely ovate-rectangular, front extending but feebly ahead of eyes, occiput only slightly concave, vertex laterad of posterior ocelli finely wrinkled and punctate, malar space smooth wrinkled, not punctured, rest of head coarsely reticulate with a small umbilicate puncture in each reticulation, and moderately hairy; scape of antenna as long as pedicel, F1 and half of F2 combined, pedicel and F1 about equal in length, F2 to F4 equally long and thick, length of each one-fifth greater than diameter, club compact and slightly dilated and as long as F4 and F5 combined; pronotum one-seventh narrower at its widest point than head and mesothorax, upper surfaces of prothorax and mesothorax densely and rather coarsely umbilicate punctate; propodeal groove deep, broad, rounded, crossed in front by a prominent carina; surface of propodeum coarsely rugose reticulate, more so in front of the carina; submarginal vein with 13 (rarely) to 19, frequently 18, setae; abdomen shiny, smooth polished, except sometimes third and fourth segments partly coriaceous, bare, except beyond third segment, latter with a transverse row of hairs in the middle, posterior surface of abdomen around ovipositor sheath moderately hairy and punctate, sheath extending prominently above tip of abdomen.

Male.—On the average smaller than the female, but in color, vestiture, sculpturing, and form like the female, except the usual difference in the shape of the abdomen and the antennae; F1 about one-sixth longer than pedicel, F2 barely or not at all longer than F3 and F4, F2 to F4 each one-fourth longer than thick, club feebly dilated and as long as F3 and F4 combined.

Remarks.—The original Walsh specimens of *dubia* are perhaps destroyed. One female in the United States National Museum collection is labeled "*Decatoma dubia* Walsh," probably in Walsh's handwriting, but there is no date, locality, or host given to show whether or not it was used in preparing the original description. Only five females and one male were originally at hand when the form was described. They were reared by Doctor Walsh from the galls of *Disholcaspis mamma* (Walsh) on the mossycup oak (*Quercus macrocarpa*).

This species is well represented from areas ranging from Arizona and Texas through the Mississippi Valley to the Atlantic Ocean from the northern to the southern limits of the United States. But considering the distribution of its variety *doanei* Fullaway, *dubia* occurs also in California areas of the country. Whenever host records accompany the specimens they indicate that *dubia* inhabits

mostly the galls (only stem gall known as hosts to date) of various species of *Disholcaspis* on different oak species of the *Leucobalanus* group. A few records from *Belonocnema* are at hand. Specimens that I have identified as this species are present as follows: 6 females and 3 males from stem galls of *Disholcaspis mamma* (Walsh) on *Q. macrocarpa*, Urbana, Ill., April 20 to June, 1923, and May 20 to June 18, 1924, and from Catlin, Ill., 1 female from the stem gall of *D. globulus* (Fitch) on swamp chestnut oak (*Q. michauxii*), reared April 15, 1929; also 4 females and 4 males from Urbana, Ill., but from stem gall of *D. globulus* (Fitch) on *Q. alba*, May and June, 1923; the aforementioned material was reared by myself; 1 of each sex probably reared by Doctor Walsh at Rockford, Ill., and 1 female labeled "through A. Bolter, 1890." L. H. Weld sent me 4 of each sex bearing No. 38 and reared by him from *D. mamma* (Walsh) at Evanston, Ill., and 4 females from the same host and with the same number reared at Manistee, Mich., June 15, 1907; 7 females and 2 males (U.S.N.M. coll.) were originally obtained from the Michigan Agricultural College, some reared June 28 and 29, 1887, from "red-oak lesser globular leaf-gall," Acc. Cat. 738, and others with Acc. Cat. Nos. 857 (March 23, 1888) and 900 (May 28, 1887) came from the galls of *D. mamma* (Walsh) and *D. globulus* (Fitch), respectively, and one with Acc. Cat. No. 720A (June 23, 1887) is from "bastard-oak apple gall," and another bearing data "Mich., 903" without host records is this species; 2 females (189^{x01}) that issued in April, 1895, 1 labeled "on *Holcaspis globulus*" were reared by J. G. Barlow at Cadet, Mo., both probably coming from the stem gall of *D. globulus* (Fitch); from the same place and collector, are 3 specimens (389^{x02}) dated July 26, 1883, with no host records available; 1 female (2610⁰⁴), probably this species, was reared on May 4, 1882, from a cynipid oak gall received from H. K. Morrison, Fort Grant, Ariz., on March 23 of the same year; 1 female from "Fitch's Collection," and 2 of this sex on one point labeled "Westcott" are without question *dubia*; 4 females and 1 male (165^{x02}), reared June 28, 1883, from the gall of *Belonocnema fossoria* Weld [*Disholcaspis virens* (Ashmead)] on *Q. virens* received from H. G. Hubbard, Crescent City, Fla.; 2 males on one pin (165) reared on March 13, 1875, from galls of *B. fossoria* Weld collected by Muhleman from *Q. virens* (?) on October 31, 1874; 3 males from the same species of gall but on *Q. stellata (obtusiloba)*, the galls collected by Patton at Selma, Ala., in October, 1880, and the insects issuing on December 16 of that year; 1 male (165^{x0}) is from Heavue, Tex., another without locality or hosts (165^{x0}) with label "on oak, Mar. 13, 1875," and a third was from an "undetermined oak gall"; 2 females and 1 male from Texas (Belfrage coll.); 10 females and 3 males reared by C. N. Ainslie from the galls of *D. mamma*

(Walsh) on mossy cup oak (*Q. macrocarpa*); I have 3 additional females from Mr. Ainslie taken by him by sweeping alfalfa at Salt Lake, Utah, and bearing Webster No. 5595, but they are smaller than typical *dubia*; 3 males (66^{x01}) issued from galls of *D. globulus* (Fitch), June 27, 1883, the galls received from A. T. Packard, Providence, R. I., on April 7 of the same year; 2 females (66^{x01}) dated March 4, 1884, bear no other data; 1 female labeled "Melrose Highlands, Mass., July 7," and the following Hopkins lots: 5 females and a male (Hopk. U. S. 13686^e), reared April 5, 12, and 29, 1918, by L. H. Weld, from galls of *Disholcaspis spongiosa* Karsch on *Q. minor* at one or more of these localities: Thebes, Liberty County, Ga., and Palestine, Trinity, or Houston, Tex.; 1 female (Hopk. U. S. 10774a) reared May 14, 1919, by S. A. Rohwer, from undetermined galls on *Q. minor*, at Ironton, Mo.; a pair (Hopk. U. S. 10776a), same collector and locality, reared June 11 (male) and 18 (female), 1919, from galls of *D. fasciata* Bassett (determined S. A. Rohwer) on *Q. rubra*; 1 female (Hopk. U. S. 10777a) reared by S. A. Rohwer, Poplar Bluff, Mo., June 4, 1919, from gall on *Q. minor*; and 2 pairs (Hopk. U. S. 10777b), from undetermined galls on *Q. minor*, Poplar Bluff, Mo., the males issuing June 18 and July 2, and the females on May 14 and June 26, 1919; 5 females and 4 males labeled Worcester, Mass., and Providence and Rumford, R. I., sent me by Doctor Kinsey from the Thompson collection, had been reared from the galls of *D. mamma* (Walsh) and *D. globulus* (Fitch); I have a fine series of 20 females and 2 males reared by Doctor Kinsey from galls of *D. mamma* var. on *Q. bicolor* at Broadway, N. J., on September 4, 1921. From the collection of the Canadian Department of Agriculture, Ottawa, I have 2 females from bullet galls on mossycup oak [*D. mamma* (Walsh) on *Q. macrocarpa*] collected by G. E. Sanders at Tampico, Ill., on May 15 and 20, and July 26, 1909; also one female labeled "on office window, Mar. 3, 1906, J. F."; and one of each sex reared from the gall of *D. globulus* (Fitch) at Guelph, Ontario, by T. D. J.

14. DECATOMA DUBIA RUFOSA, new variety

PLATE 1, FIGURE 13

Differs chiefly from the typical form of *D. dubia* Walsh in having the head and thorax almost or entirely reddish yellow.

Female.—3 to 4.1 mm. long, colors chiefly rufous and black; head rufous, sometimes vertex and also occiput above more or less dark brown, antennae chestnut-brown; prothorax golden brown to light reddish yellow; mesothorax concolorous with head but sometimes front of prescutum, lower edge of axillae posterior margin of scutel, and margins of dorsal sclerites narrowly black; metanotum and propodeum rufous to almost black; legs entirely very pale yellowish

brown, hind tibiae at times dusky brown as in *dubia*; submarginal band in color, size, and form as in *dubia*; abdomen dark brown to black, except that antero-ventral part is in small part light brown to brownish yellow.

The dimensions of the head, the measurements of the antennal joints, the sculpturing and the vestiture of the parts, including the number of setae on the submarginal vein, agree with the typical *dubia*.

Male.—Differs from the female only in being slightly smaller on the average, and in the dimensions of the antennal joints, the latter agreeing with those of *dubia*.

Type locality.—Charleston, S. C.

Type.—Female, U.S.N.M. No. 42235.

Described from the type, the allotype, and five female paratypes; type, allotype, and three paratypes in collection of the United States National Museum, and two paratypes in the writer's collection.

Remarks.—All the type material was reared from the galls of *Belonocnema fossoria* Weld [*Disholcaspis virens* (Ashmead)] at Charleston, S. C., by J. T. Rogers and Charles Pon. One specimen of the series bears a label "Rohwer 2015" and "Pon 287."

In addition I find the following of this variety: 6 females (No. 165^{ox2}) from the galls of *Belonocnema fossoria* Weld [*Disholcaspis virens* (Ashmead)] on *Quercus stellata* (*obtusiloba*), collected by Patton at Selma, Ala., in October, 1880, and the chalcids issued December 16 of that year; another series (165^{xo2}) of 4 females, June 28, 1883, are from the same cynipid and oak hosts, from Crescent City, Fla. (H. G. Hubbard); 3 females (165^{xo2}) are probably from the same hosts and region; 1 females (165^{xo}) is labeled Heavue, Tex.; another from post oak (*Q. stellata*), June 10; 1 of same sex labeled "Mo., 715^{xo}, June 6, 1883"; a male with data "J. L. Zabriskie, Nyack, N. Y., Feb. 6, 1884"; 3 females and a male from eastern Florida, Ashmead; 3 females and a male, some with undecipherable records in pencil, others with no data; one from Doctor Kinsey, reared from the gall of *Disholcaspis mamma* var. on *Q. bicolor* at Broadway, N. J.; a single female reared by myself from the stem gall of *D. mamma* (Walsh) on *Q. macrocarpa* at Urbana, Ill., on June 18, 1924; 1 female from gall of *D. globulus* (Fitch) on *Q. alba*, April 24, 1918, Falls Church, Va., reared by William Middleton; L. H. Weld reared 1 female of this variety (Hopk. U. S. 13686^e) from the gall of *Disholcaspis spongiosa* Karsch on *Q. minor* at one of the following localities: Thebes, Liberty County, Ga., and Palestine, Trinity, and Houston, Tex. The rearing date is May 15, 1918, whereas six typical females of *D. dubia* Walsh issued from the same galls on April 12, 1918.

It is possible that this is a distinct species, but it has been reared from the same lots of galls from which some of the *dubia* material came, and there is some evidence that *dubia* proper and its variety *rufosa* intergrade in color. A larger series, especially additional material from the States intermediate between Illinois and Alabama, is needed to determine the extent of the color variation. There are no recognizable differences in size, sculpturing, vestiture, or dimensions of the head or dimensions of the antennal segments.

15. *DECATOMA DUBIA* var. *DOANEI* Fullaway

PLATE 2, FIGURE 14

Decatoma doanei FULLAWAY, Journ. New York Ent. Soc., vol. 20, pp. 279, 280, 1912.

Most like the typical *D. dubia* Walsh in color, size, dimensions of the head and the antennal segments, and form of the submarginal band; it is darker and smaller on the average, and usually has fewer setae on the submarginal vein.

Female.—Length 3.2 to 4 mm., colors yellow and black, mostly black; head black, circumocular space and an oblique band from it to antennae, malar area, and face below antennal fossae and at times above them halfway to vertex, yellowish to reddish brown; scape dark yellow, in part lightly infuscate, pedicel yellow like scape, but mostly brownish black above, flagellum dark chestnut-brown; prothorax always mostly black above, its sides and anterior face more or less yellowish brown, sometimes a black spot in the lateral depression, on some specimens a faint line of this color from near middle in front obliquely to front end of parapsidal grooves; mesothorax, metathorax, and propodeum black, except mesopleura, tegulae, and narrow area at lower edges of scapulae and axillae, which are reddish brown; coxae black except sometimes the apex, or a stripe on posterior lateral face, outer disks of fore and middle femora, all of hind femora except ends, and front tibiae usually brownish yellow, middle tibiae lightly to moderately brown on outer face, and hind tibiae black except at base and apex, tarsi light to whitish yellow; stigma dark brown, submarginal band medium brown, slightly more than twice as long as wide, width not quite uniform, but not much broader or more narrow than length of stigma, apex curving strongly toward base of wing, distal edge reaching almost or quite as far as stigmal vein, apex rounded; abdomen black, only antero-ventral portion more or less yellowish brown.

Head moderately hairy, very nearly twice as broad as long, face almost flat or slightly convex, vertex weakly convex, occiput slightly concave, malar space smooth in groove only, rest finely coriaceous or sculptured like face, vertex in part around anterior ocellus only

finely punctate, occiput, face, and cheeks with rather coarser punctures than thorax, or subreticulate; antennae rather stout, scape as long as pedicel, F1, and half of F2, moderately dilated toward base, pedicel and F1 about equal in length, latter one-fifth longer than each of F2 to F5, latter each about one-fifth longer than its maximum thickness, length of club equal to that of F3 to F5 combined; width of head and mesothorax nearly equal, pronotum about six-sevenths as wide as mesothorax, dorsal punctures of thorax coarsely umbilicate, bearing small white hairs; 13 to 16 setae on submarginal vein; abdomen mostly smooth and bare, segments beyond the second with a few hairs, more around ovipositor sheath, latter also coriaceous, third and fourth more or less with fine wrinkles, especially on lower lateral surface.

Male.—Like the female in color, vestiture, and sculpturing, but in general slightly smaller and slenderer, from 3.2 to 3.6 mm. long. The ratio of head dimensions is the same in both sexes. Antennae slenderer than in the female, scape gradually dilated toward base, F1 slightly longer than pedicel and one-sixth longer than F2, F3, or F4, latter about equally long or F2 slightly longer than F3 or F4, and each nearly two-thirds as thick as long, club not much thicker than funicle, scarcely dilated, and as long as F3 and F4 combined.

Type locality.—Jaspar Ridge, Stanford University campus, Calif.

Type.—Described from one female from the gall of *Disholcaspis eldoradensis* (Beutenmueller) on *Quercus dumosa*, Stanford University collection reared by Mrs. Rose Patterson Blakeman.

Remarks.—The description of the male is based on one specimen kindly sent me by Dr. Isabel McCracken, curator of the insect collection at Stanford University, California. That collection contains a few other specimens. These lots of material bear record numbers L. S. Jr. U. Lot 508, Subs. 19, 45, and 508, and were reared by Doctor McCracken and Mrs. Blakeman.

Doctor Kinsey sent me the following reared from California galls: 2 females from *D. canescens* (Bassett) on blue oak (*Q. douglasi*) at Merced Falls, and another from the same hosts at El Portal; 1 female from *D. eldoradensis* var. on California white oak (*Q. lobata*) at Diablo; 1 female from *D. plumbella* Kinsey at Upland, and another from the same gall on *Q. dumosa* at Descanso; and 2 females and a male from *D. corallina* (Bassett) on *Q. douglasi* at Napa; the cynipid hosts of the Diablo lot were reared in November, 1923, and those of the remaining series issued in February and March of 1920. The collection of the United States National Museum contains 3 females from the galls of *D. eldoradensis* (Beutenmueller) on *Q. lobata* taken at Cottonwood, Calif., on January 22, presumably 1925; 3 males from the same locality and oak, and probably the same gall, on January 1, 1925; a series of 4 of each sex from Placer County, Calif. (55°, which

is probably of the same series of record numbers as 55k for which the accompanying data are at hand), from cynipid gall on *Q. chrysolepis*, the galls collected October 8, 1885, and the chalcids issuing December 19, 1885; 1 female (3798^{x1}) from *D. chrysolepidis* Beutenmueller on *Q. chrysolepis* collected at Colfax, Placer County, by Albert Koebele, the galls having been received at Washington, D. C., on October 17, 1885, and the insects issued December 28 of that year; 1 female labeled Mountain View, Calif., Ehrhorn lot 2; 2 females (55^a) are from Sonoma County, Calif.; 1 male (59^o) was collected in Placer County, Calif., in February, 1886; and 1 female (3837^x) was reared in January 19, 1886, from a cynipid gall on *Q. douglasi*, Marin County, Calif. A typical female of variety *doanei* is in the collection of the Illinois State Natural History Survey, collected in Colorado and bearing number 1256.

Three females sent me by C. N. Ainslie and collected by him by sweeping alfalfa at Salt Lake, Utah, and bearing Webster No. 5595, seem to be this species. It is probable that they were taken in the vicinity of cynipid-infested oaks.

The general similarity of variety *doanei* Fullaway to *dubia* Walsh in size, color pattern, sculpture, and vestiture, and their common occurrence in the galls of different species of the genus *Disholcaspis*, compel me to conclude that *doanei* is not a distinct species but only a geographic variety. Even as such, it is separable from the typical form *dubia* only by inconstant characters of average size, and the number of setae on the submarginal vein. The series of California material at hand is so small that no conclusions concerning the limits of these characters can be formed at present. The variety *rufosa* Balduf, known in greatest numbers to date from the Southern States, is much more distinct from the typical *dubia* than is the variety *doanei* Fullaway.

16. DECATOMA LOBATAE, new species

PLATE 2, FIGURE 15

Closest to *brevilobae*, new species from Texas, in being the same size, in having the same number of setae on the submarginal vein, and in the similar form of the submarginal band. *D. lobatae*, however, is in general lighter in color and differs especially in the longer and more narrow head and the more strongly convex front. The funicular joints are also shorter, being as broad as long, or slightly broader than long.

Female.—Length 2.3 to 2.6 mm., colors yellow, yellowish brown, reddish brown, and brownish black or black; head mostly light brownish yellow, only the neck below, ocellar area, and occiput around the foramen black; upper part of face black, and the black of vertex and occiput faintly confluent on one specimen, but well

separated and demarcated on the rest; scape a shade lighter yellow than face, pedicel mostly same, but brown above in part, except the apex, flagellum medium brown; pronotum golden yellow tinged with brown, mesal fifth more or less dark on account of black showing through from anterior overlapped portion of mesonotum; prescutum usually mostly dark brown, parapsidal grooves and more or less of their border areas narrowly reddish brown, broadly yellowish brown on one specimen, scutel with at least a broad mesal black or dark brown band broadening behind, more often this sclerite dark, except margins narrowly, scapulae and axillae also mostly light yellowish brown, or suffused with light to medium brown, mesopleura entirely yellowish brown, anterior ventral face of mesothorax darker; propodeum black except lighter apex, legs yellowish and dark brown, coxae yellow, hind pair with black stripe on outer and inner faces, trochanters yellow, femora mostly so, but superior faces of front and middle members and also inner and apical portions of outer face of hind femur brown black, fore tibiae brown black outwardly, middle and hind tibiae entirely of this color except bases and apices narrowly; submarginal band dark brown, almost twice as long as greatest width, reaching two-thirds across wing, its margins ragged, the apical margin constricted necklike just beyond stigma and moderately rounded, the proximal margin slightly concave, apex less intense, fading; no secondary band present; petiole black, abdomen brown black to brown above, sides from brown to brownish yellow, venter light brown-yellow.

Head one-sixth wider than pronotum, and two-thirds or slightly more than three-fifths as long as broad, margins of eyes not prominently set off from surrounding parts, face rather strongly convex as seen from above, occiput feebly convex, vertex broadly rounded longitudinally and transversely, genae and malar space polished and moderately strigose longitudinally, face reticulate punctate, vertex mostly with faint reticulations, these and intervals finely punctate, occiput and temples likewise, face moderately hairy, other parts bare; antennae fairly stout, pedicel about a fourth longer than F1, latter barely longer than F2, F3 to F5 equal in length and each as broad as long or slightly broader and a bit shorter than F2, funicle feebly thicker at apex than at base, antennal vestiture moderate in length and density, inconspicuous as usual; pronotum and mesonotum coarsely umbilicately punctate, mesopleura aciculate or ribbed, ribs of anterior half branching freely and rather densely and finely punctate; carina crossing propodeal groove in front bending posteriorly quite sharply forming a broad V, the angle small but rounded, groove also crossed by about six straight and almost parallel rugae at rather regular intervals, rest of pro-

podial surface more or less uniformly reticulate behind the branches of the anterior carina; submarginal band with about 12 setae in a row; abdominal segments one to three smooth, but not highly polished, at least sides of fourth finely roughened, granulose, moderately hairy, and punctate at the ovipositor sheath.

Male.—Unknown.

Type locality.—Paso Robles, Calif.

Type.—Female, U.S.N.M. No. 42237.

Doctor Kinsey sent me all the type material. It consists of two females, one of which I have designated the type, reared from the galls of *Neuroterus quercicola pacificus*, form *varians* Kinsey, on *Quercus lobata*, at Paso Robles, Calif., and six other more or less fragmentary females reared from the galls of *Andricus wiltzæ* Fullaway on the same oak in the same locality as the first two specimens. The gall makers of these lots issued March 7, 1920. Three paratypes are in the United States National Museum with the type. The other paratypes are in my own collection.

17. DECATOMA GLOBULI, new species

PLATE 2, FIGURE 16

Similar to *D. novascotiae*, new species, in size and in having a narrow, curved submarginal band. The body of *globuli* is less robust, particularly the head is less blocky, and the color in general is more black than in this species.

Female.—Length 2.1 to 3 mm., color more black than yellowish brown; head mostly black, usually with more or less yellow-brown in circumoral area, this color sometimes extending to antennal fossae and including malar space, and branching along lateral margins of antennal scrobe to frons and also around eyes, forming a narrow circumocular band, a rather faint oblique band arising from latter on vertex reaching toward upper limit of scrobe, and dilating more or less on temples, or including genae entirely, the scrobe black; scape yellow with variable longitudinal black bands laterad, pedicel mostly brown, apex above and apical half below yellow, ring joint yellow, flagellar joint yellowish brown, infusate above; pronotum usually mostly black, at least a yellow triangle on anterior lateral half, sometimes the whole side of the pronotum yellow, and on some specimens the anterior lateral area of the dorsum, and at times also the neck in part, yellow; prescutum, scutellum, most of scapulae and axillae above, metapleura, and propodeum, black; scapulae and axillae otherwise, and mesopleura, rufous-yellow, latter sometimes partly lightly infusate; coxae black except apices, or mixed yellow and brown, trochanters yellowish, femora same but superior faces of front and middle femora, and inner and outer faces of hind

femur, brownish black, or all legs with femora mostly black in the extreme instance, tibiae mostly brown-black on the same specimen but usually front tibiae immaculate yellow, middle tibiae yellow on inner face only, hind tibiae entirely dark brown, except bases and apices; submarginal band dark brown (newly emerged specimens), curved, narrow, twice as wide as long, about as broad as length of stigma, or rarely slightly broader, reaching two-thirds of way to hind edge of wing, proximal and apical margins parallel or subparallel, or distinctly concave and convex, respectively, no secondary band; abdomen with ventro-anterior fourth light brown, sometimes entire region black.

Head fairly robust, four-sevenths as long as wide, front seen from above less than moderately rounded transversely, occiput feebly concave, vertex mostly only finely punctate between ocelli and laterad to eyes, also sparsely marked with shallow umbilicate pits, narrow circumocular and malar spaces smooth or minutely wrinkled, genae, and frons to oral region rather coarsely reticulate, pitted, and moderately hairy; antennae fairly stout, scape as long as pedicel, F1, and half of F2 combined, pedicel slightly longer than F1, this one-fourth longer than each of F2 to F5, these equal in length and usually as broad as long, sometimes about one-seventh longer than thick, club compact, as long as F5, F4, and a fourth of F3 combined; head about one-seventh wider than pronotum, latter almost as broad as mesothorax, pronotum and mesonotum umbilicately punctate, moderately hairy, hairs silvery, sides of pronotum longitudinally striate, mesopleura aciculate and minutely punctured, the anterior half more conspicuously so and convex, the posterior half less so and concave; 12 to 15 but more often 12 or 13, setae on submarginal vein; propodeal groove limited in front by a prominent carina in the form of a broad V with rather sharply rounded apex, anterior third of groove deeper, the rest broader and more shallow, and with five rugae crossing somewhat parallel at irregular intervals, rest of propodeal surface variously and rather coarsely reticulate; first three abdominal segments smooth and shiny, fourth revealing front edge coriaceous when fully extended, lower portions of sides likewise coriaceous, rest of surface slightly less shiny than preceding segments, posterior surface adjoining ovipositor sheath punctate and moderately hairy.

Male.—Length 2.1 to 2.8 mm., dimensions, vestiture, sculpturing, and color as described above; antennae less stout than in female, F1 barely longer than pedicel and a fifth longer than F2, F3, and F4, latter three almost equal in length and each five-eighths as thick as long, club as long as F4, F3, and a fifth of F2 combined.

Type locality.—Catlin, Ill.

Type.—Female, U. S. N. M. No. 42240.

The type is selected from a series of nine females and four males reared by the writer in the laboratory during the period of March 15 to April 15, 1929, from the galls of *Disholcaspis globulus* var. undetermined, collected from the stems of, and from the ground beneath, one specimen of *Quercus michauxii* at Catlin, Ill., on February 24, 1929. The galls and oak were determined by Doctor Kinsey. The paratypes are in the collections of the United States National Museum and the writer, and the allotype is deposited with the type.

Remarks.—The United States National Museum collection contains two specimens bearing record number 66²⁰¹, which issued on June 28, 1883, from the galls of *D. globulus* (Fitch). The galls were collected by A. T. Packard at Providence, R. I., and were received at Washington, D. C., on April 7, 1863. I have one male from Doctor Kinsey reared by A. F. Leach, Diablo, Calif., in 1923, from the galls of *D. elderadensis* var. on *Quercus lobata*; and from the same oak, at Cottonwood, Calif., two females and a male from undetermined galls; also a female and two males that I reared from the galls of *D. globulus* (Fitch) on *Q. alba* between May 1 and 15, 1923, at Urbana, Ill. Three females and a male were obtained from the galls of *Biorhiza forticornis* (Walsh) by L. H. Weld (No. 36) at Evanston, Ill. Two males (Hopk. U. S. 13685^e) were reared by William Middleton at Falls Church, Va., April 5 and 12, 1918, from the galls of *D. globulus* on *Q. alba*. The same lot of galls contained *D. varians* Walsh, *D. dubia* Walsh, and *D. dubia* var. *rufosa* Balduf.

The following are additional Hopkins lots: A female and 3 males (Hopk. U. S. 15637^a), reared October 2, 1922, by L. H. Weld, Tijeras, N. Mex., from galls of *Disholcaspis* sp. undescribed, on *Q. pungens*; 2 females (Hopk. U. S. 15637^b), same locality and oak, by Weld, from gall of *Andricus tecturnarum* Kinsey; a male (Hopk. U. S. 15637^c), reared June 1, 1922, Las Vegas, N. Mex., from galls of *Callirhytis ruginosus* (Bassett) collected on various oaks; a female and 3 males (Hopk. U. S. 13686^e), reared by L. H. Weld, April 5, 1918, from galls of *Disholcaspis spongiosa* Karsch, on *Q. stellata* at one or more of the following localities: Thebes, Liberty County, Ga., or Palestine, Trinity, or Houston, Tex.; 1 female (Hopk. U. S. 10777^a), reared by S. A. Rohwer, May 14, 1919, Poplar Bluff, Ariz., from galls on *Q. stellata*; and a pair (Hopk. U. S. 10777^b), same collector, locality, and oak, May 14 and 21, 1919, with no cynipid record. There is also a lot of 2 females and 9 males (Hopk. U. S. 1365^m), reared by F. R. Herbert, February 26, and April 5 and 24, 1918, at Los Gatos, Calif., from galls of *Disholcaspis* sp. on *Q. chrysolepis*.

I sometimes have difficulty in distinguishing between this species and *dubia* Walsh. *D. globuli* Balduf may represent the smaller,

darker extreme of *dubia*. The latter varies somewhat in length, and even in the relative width and length of the head, the more robust heads merging with the typical *globuli* head in dimensions. In most instances, however, the head proportions, body length, and number of setae on the submarginal vein readily distinguish them and seem to justify their separation as two species. On the other hand, small specimens of *globuli* grade into the larger *D. nigriceps* Walsh in form of the head, size of body, and coloration. The subglobose head and small size of the more extreme *nigriceps* require that they be treated as distinct from *globuli*. Here there seems to occur a series of species merging into one another, without well-defined specific limiting characters by which the border line individuals may be distinguished. All of them have at least certain species of *Disholcaspis* as common hosts.

18. DECATOMA NOVASCOTIAE, new species

PLATE 2, FIGURE 17

Similar to *dubia* Walsh in being mostly black, and in having a narrow, curved wing band, but is easily distinguished by its smaller size, the lower numerical range of setae on the submarginal vein, and in the distinctly narrower and longer, more blocky head. The head of this species differs from that of most others of similar dimensions in being almost equally long throughout its width.

Female.—Length 2.6 to 3 mm., mostly black with some yellow, brownish yellow, and brown; head color quite variable, from mostly black to mostly rich yellow, in one extreme only area around mouth-parts and circumocular band, latter expanding caudad on temples, yellow; in other extreme black on vertex continuing broadly over occiput to neck, this briefly interrupted on occiput, and circumocular band of yellow always present with varying width on vertex; face may be black to antennal fossae, and ocular band of yellow on temples very variable in width, reaching occiput in a slender neck-like band, or broadly, or expanding slightly and not reaching occiput; antennal scrobe yellow, scape mostly yellow, outwardly brown, pedicel light brown, yellow at apex, flagellum almost uniformly reddish brown or light brown; pronotum black above, occasionally an oblique longitudinal fine stripe of yellow in middle of each half, sides yellow full length but more broadly in front and extending mesad along upper anterior edge, but not reaching middle; mesonotum black, only scapulae sometimes feebly in front and behind, and axillae on side in front, somewhat yellow, mesopleura yellowish brown except upper portion of caudal half, which is black, metathorax and propodeum black; coxae lemon yellow to dull yellow, except front coxa, which is faintly fuscous outwardly, and outer

half and basal parts of front and inner surfaces, which are black, trochanters yellow, fore femora mostly fuscous outwardly, mid femora including upper and lower faces same, hind femora also fuscous with only outer face mostly yellowish, tibiae mostly brown, front pair only outwardly, middle pair entirely except inwardly, and hind pair completely, only bases and apices narrowly not so, tarsi stramineous-yellow, apex a bit darker; submarginal band brown, about twice as long as broad, reaching two-thirds across wing, broadest at middle, barely narrower here than length of stigma, tapering and fading irregularly toward its apex, proximal margin broadly rounded but not quite regular, distal margin expanding broadly at middle but not extending quite so far as end of stigmal vein, secondary band very faint; petiole black, abdomen black or dark brown, except anterior-ventral aspect, which is in small part yellowish brown.

Body fairly robust; head three-fifths as long as broad almost its entire width, face not prominently convex, temples convex, occiput moderately concave from above; vertex and occiput moderately to sparsely umbilicate punctate, punctures small and shallow, intervals between umbilicate punctures finely and densely punctate, genae more coarsely and sparingly pitted, posterior orbits and malar spaces in part finely wrinkled, latter largely smooth, polished; face reticulate punctate; head rather sparsely hairy, antennae more densely so, scape slightly longer than pedicel and F1 combined, pedicel about a fifth longer than F1, latter one-fourth longer than F2, each of following funicular joints barely shorter and thicker than the preceding, F2 a fourth longer than broad, and F5 almost as broad as long, club compact and tapering to blunt tip, and as long as F5, F4, and half of F3 combined; head one-sixth broader than pronotum and slightly broader than mesothorax; nota of thorax quite coarsely umbilicately punctate, sides of pronotum longitudinally strigose, mesopleura moderately concave, aciculate and finely punctate on anterior sclerite, posterior half feebly convex, finely and more densely aciculate, the fine punctures not readily visible; propodeal groove crossed by a V-shaped carina, its apex broadly rounded, groove mostly polished but feebly rugose on more than posterior half, remainder of the segment rather coarsely reticulate; submarginal vein with 13 to 15, more often the latter, setae, hairs on apical margin of front wing slightly longer than normal; first three abdominal segments highly polished, fourth semiopaque, very finely granulate, posterior face of abdomen moderately punctate and hairy, hairs coarse.

Male.—Length 2.6 to 3 mm., colors, vestiture, and dimensions as described for female; scape of antennae slightly stouter than in the

female, its length equal to length of pedicel, F1, and base of F2 combined, pedicel and F1 equal in length, latter one-sixth longer than F2, F2 to F4 uniform in length and diameter, each one-fourth longer than its maximum diameter, club compact, three times as long as its greatest thickness, as long as F4, F3, and a fourth of F2 combined.

Type locality.—Lequille, Nova Scotia, Canada.

Type.—Female, Canadian National Museum No. 3102.

Paratypes.—Female and male, U.S.N.M. No. 42238.

The type, the allotype, and 1 female and 2 male paratypes were reared by Prof. G. E. Saunders from the galls of *Neuroterus batatus* (Fitch) on April 2, 1911, from the type locality; 1 female and 3 male paratypes from the same host by H. S. Payne, Bear River, April 3, 1911; and 1 of each sex issued April 12, 1911, at Round Hill, G. E. Saunders collector, without host data, but probably belonging to the same lot as the above. The type and allotype are in the Canadian collection, and the paratypes are divided among the collections of that institution, the United States National Museum, and the writer.

Remarks.—Later I find in the National Museum 17 females and 11 males that are probably this species. The range in length and color is greater in this lot than in the smaller type series. The average color pattern agrees quite closely with that of the types, and the size varies from 2.6 to 4.3 mm., or an average of 3.5 mm. The number of setae on the submarginal vein is from 13 on the smaller and more yellow individuals to 17 on the larger and darker specimens. The best evidence, however, that they are *novascotiae* is the form of the head. A series of measurements shows it to be three-fifths as long as broad, and about equally long over its entire width, quite blocky in form, which is a rather distinct feature in this species. The submarginal band is broad on the basal half and tapers usually to a sharp tip, and at the same time bends toward the base of the wing as in some other species. The present series (Quaintance No. 1730) was reared by R. A. Cushman between May 12 and June 1, 1911, at Vienna, Va., from the galls of *Callirhytis cornigera* (Osten Sacken). Kinsey⁸ states that these occur on black oaks in the Eastern United States.

19. DECATOMA FLAVIPES, new species

Resembles *D. flammineiventris* Girault in size, dimensions, and form of the head, numerical range of hairs on the submarginal vein, unsculptured abdomen, in having the sides of the body yellow, and

⁸ Indiana Univ. Studies No. 53, vol. 9, p. 105, 1922.

the dorsal surfaces moderately black; *flavipes* has legs entirely yellow, the submarginal band always at least twice as long as wide and with an angular emargination on the proximal margin and a heel-like prominence on the distal edge, and the surface vestiture of the wings is normally not reduced and inconspicuous as in *flamminneiventris*.

Female.—Length 3.4 to 4 mm., rather robust, colors black, yellow, and yellowish brown; head mostly dull golden yellow, vertex and back of head to neck and temples black except narrow ocular ring and at times a sharp lateral yellow emargination on vertex; scape whitish yellow, pedicel brown-black above, its apex and the flagellum chestnut-brown, sometimes lightly infuscate above, palpi very light yellow; pronotum yellow, slightly darker than head, a circular median area of black reaching hind margin, about four-fifths to front margin, and sometimes joining black of neck by a band of varying widths, not infrequently a black patch on each side of the dorsal surface; mesonotum mostly black, the parapsidal grooves, scapulae except in posterior middle, scuto-axillar grooves, and sides of scutellum and axillae, brownish yellow, mesopleura, metapleura, and sides and posterior-lateral face of propodeum yellow like face and cheeks, propodeum otherwise and sterna of thorax in part, black; stigma dark brown, submarginal band medium brown, its width almost uniform, and always distinctly less than length of stigma, length only slightly variable and easily more than twice as long as wide, basal two-fifths extending sharply disto-caudad, band then bending somewhat abruptly caudo-proximad, and feebly narrowed at bend, outer margin produced heellike just beyond stigmal vein, and roundly emarginate on proximal margin; legs yellow, slightly lighter than sides of pronotum, hind femora and tibiae sometimes lightly infuscate, tarsi stramineous-yellow; abdomen shiny light yellowish brown, peduncle mostly black, dorsum of first abdominal segment with a narrow median longitudinal black band, broadening on hind portion, continuing over segments 2 and 3, broadening greatly on disk of each.

Head uniformly very nearly twice as wide as long, length 0.52 of width, outline of head from above transversely subrectangulate-ovate, face broadly rounded and protruding only slightly beyond eyes, eyes and front definitely demarcated at their junctures, back of head feebly concave, vertex moderately convex, malar space partly and cheeks mostly aciculate, vertex finely and densely punctate with interspersed small umbilicate punctures, latter numerous on back of head, face more sparsely punctate and moderately hairy; pedicel almost one-third as long as scape, subconical, slightly longer than F1, latter one-fifth longer than F2, F2 to F5 almost uniformly

long and thick, each one-fourth longer than broad, these dimensions slightly various on different specimens, club only a little longer than F4 and F5 combined; nota of prothorax and mesothorax umbilicately punctured, but more densely and not so coarsely as in many species of the genus, both the front and hind halves of lateral surfaces of mesopleura aciculate, posterior half more plainly so but with fewer minute punctures; propodeum variously and coarsely rugose-reticulate, groove deep with its basin rounded and limited in front by a V-shaped carina, its apex obtuse and feebly rounded, groove crossed by several low rugae; submarginal vein with a row of 15 to 19 setae, rarely 19, usually 15 to 17; abdomen smooth, polished, unsculptured laterad, rarely feebly granulose on parts of posterior half, hairy and punctate around sheath of ovipositor.

Male.—Length 3.5 mm., somewhat less robust and darker than female; color of head and antennae as in female; lateral areas of pronotum each with an elongate black patch, metapleura, sides of propodeum mostly, and hind coxae with middle of outer faces and peduncle entirely, black; wing band reduced in length, only two-fifths as long as in female, dorsal half of abdomen solidly brown black; dimensions of head, its sculpture as well as that of mesopleura and propodeum, and vestiture of wings, as described for female; F1 twice as long as broad, and a sixth longer and slightly broader than pedicel, and a sixth longer than each of F2 to F4, each of latter three-fifths as broad as long, their length uniform, club as long as F3 and F4 combined.

Type locality.—Oracle, Ariz.

Type.—Female, U.S.N.M. No. 42239.

The type, the allotype, and 14 female paratypes are in the collection of the United States National Museum, and I have 5 female paratypes in my own collection. This species is described and known from this series of 20 females and 1 male (Hopk. U. S. 15639^a) reared by L. H. Weld on September 28, 1922, at Oracle, Ariz., from the galls of *Plagiotrochus* (*Andricus*) *coxii* (Bassett) (determined Weld), on *Quercus emoryi*.

Remarks.—Its size, form of the head, color of the body and legs, and shape of the submarginal band combine to make this one of the most distinct species in the genus. It is probable that some variation from the color of the lot at hand will be found in series discovered in the future. Though it approaches *flamminneiventris* Girault most nearly in color and size, it is far removed from that species in habit. It approximates *dubia* Walsh in size, in the form of the head, and the dimensions of the wing band, and agrees with it in vestiture of the submarginal vein, but the color differentiates it sharply from that species.

20. DECATOMA FLAMMINNEIVENTRIS Girault

PLATE 2, FIGURE 18; PLATE 3, FIGURES 27-29; PLATE 4, FIGURES 37, 41

Decatoma flamminneiventris GIRAULT, Proc. U. S. Nat. Mus., vol. 58, p. 208, 1920.

This is one of the outstanding species of the genus, differing from all other mostly yellow species in having in most specimens a subquadrate submarginal band, the wings clothed with very minute spines on the surfaces and margins, and in the absence of the pattern of large hairs usually found on the basal third of the front wings; definitely larger than any other mostly yellow species, except *disholcaspidis* Balduf.

Female.—Length 3.7 mm., fairly robust, colors chiefly black and yellow; head and antennae honey yellow, mandibles brown, ocellar region and occiput narrowly, black, apex of scape and base of pedicel light brown, eyes brown; prothorax colored like the head, with a broad dorsal longitudinal band of black widening behind and merging reddish brown into the surrounding yellow; rest of thorax and propodeum more brownish yellow, dorsal band of pronotum continuing to end of propodeal groove, spreading laterad on front portion of propodeum, scutellar black area oval covering all but lower sides, and prescutal band only half as broad with edges almost straight, scapulae and axillae without black, sterna of thorax black between coxae; legs honey yellow, tibiae and tarsi slightly darker, except hind tibiae yellow-brown; submarginal band of wing deep brown at base, fading toward apex, subquadrate (one-half longer than broad on the specimens from New Mexico and as broad as long on the Colorado specimens), proximal edge concave, apical margin convex and reaching beyond apex of stigma but not to end of stigmal vein, extending less than a third across the wing, secondary band wanting; abdomen light brown, ochreous.

Head slightly more than a half longer than wide, face moderately convex, vertex but feebly so, malar groove definite, reaching to base of mandibles, cheeks entirely smooth, polished and bare, rest of head uniformly rather coarsely umbilicate punctate, but ocellar area also finely punctured and moderately hairy, antennae slightly more hairy; scape (not including bulb) a little longer than pedicel plus F1, pedicel slightly longer than F1, latter a third longer than F2, F2 to F4 subequal in length, one-fifth longer than thick, and almost equal in diameter; prothorax only slightly narrower than head and mesothorax, nota moderately hairy and umbilicately punctate, mesopleura rather coarsely aciculate and finely punctate, a row of 15 to 17 setae on submarginal vein, surface of apical two-thirds finely and irregularly undulate and rather sparingly vested with minute tapering hairs that are easily overlooked, margin also bearing such hairs.

cubital and subdiscoidal ridges present, but hairs inconspicuous, basal third of wing lacking pattern of long hairs usually present in this group; abdomen mostly bare, sparsely to moderately hairy from middle to apex, surface unsculptured and shiny.

Male.—Length 4 mm., form more slender than female, colored like female, except ocellar area and nota of thorax are more largely black, pronotal band narrower than that of prescutum, both scapulae and axillae tipped above with black, and middle of outer faces of hind coxae black; pedicel and abdomen above darkened.

Vestiture and sculpture including malar space and cheeks not different from female, scape as long as pedicel, F1 and half of F2 combined, F1 one-third longer than each of F2 to F4 and not much shorter than pedicel, F2 to F4 about equal in length and each one-fifth longer than wide, mesopleura coarsely aciculate and punctate as in female; submarginal vein with about 17 setae, surface vestiture of wing perhaps slightly coarser than in female.

Type locality.—Fort Collins, Colo.

Type.—Female, U.S.N.M. No. 20867.

Redescribed from all the material cited herewith.

Remarks.—The type and one female and two male paratypes were obtained by C. F. Baker as parasites of the yucca moth, *Prodoxus quinquepunctellus* Chambers (*decipiens* Riley) on September 19, 1893. A few additional specimens of both sexes from the same place, date, and host, and labeled "Colo., 1231," and a female reared by Chas. F. Hicks in Boulder County, Colo., April 30, 1926, from the above species of yucca moth, are in the National Museum collection. The species is also represented by material bearing No. 3059^o, 19/5/84 and 12/5/84, reared on these dates from *Prodoxus y-inversus* Riley on pod of yucca from New Mexico brought to the Bureau of Entomology of the United States Department of Agriculture on May 11, 1883, by Prof. D. C. Chapman, of Washington, D. C. Two females labeled "Colo., 1777" belong to the Illinois State Natural History Survey collection, Urbana, Ill.

21. DECATOMA BREVILOBAE, new species

PLATE 2, FIGURE 21

Similar to *varians* Walsh in the number of setae on the submarginal vein, and in colors, but readily distinguished by its much narrower and curved wing band, the shorter and broader form of the head, and the smaller size of the body.

Female.—Length 2.3 to 2.8 mm., mostly 2.4 mm., mostly black and yellow to reddish brown; head yellowish to reddish brown, sometimes two spots on forehead, vertex from antennal scrobe, and occiput black; antennae light brown, scape and pedicel dull yellow, latter

feebly brown above; pronotum light yellowish brown, with a subquadrangular black area on median third, sometimes neck feebly black at the middle; prescutum, scutel, and propodeum black except sides, which are narrowly or feebly reddish brown; mesopleura yellowish or reddish brown, scapulae and axillae same, with only their upper surfaces narrowly black; legs mostly yellowish, the outer surfaces of femora and tibiae of the middle legs lightly infuscated, those of hind legs darker; submarginal band dark brown, on the average twice as long as wide, measuring from inner edge of stigma, proximal margin rather sharply emarginate before the middle, distal margin produced, proximal and distal margins subparallel, apical portion of band curving distinctly toward base of wing, apex subtruncate; no secondary band; abdomen deep brown black, except venter narrowly and lower anterior fourth of sides, which are yellowish brown fading into the dark brown above.

Head slightly variable in form, from twice as wide as long in most specimens to almost three-fifths as long as broad, front feebly to moderately convex from above, occiput slightly concave; head feebly reticulate, narrow space along upper part of malar groove smooth, the rest of the groove, the genae, and the vertex sculptured like face, except a small space laterad of each posterior ocellus, which is finely punctate, the usual small umbilicate punctures wanting; antennae moderately stout, scape slightly more than four times as long as thick (not including radicle), and as long as pedicel, F1, and half of F2 combined, pedicel and F1 equal in length, F2 to F5 uniform in length and each four-fifths as thick as long, diameter of club and funicle alike, club compact and as long as F5, F4, and half of F3 combined; pronotum five-sixths the width of the head and the mesonotum, mesopleura aciculate and finely punctate; anterior of propodeal groove crossed by V-shaped carina, the apex of the angle rounded, groove also crossed at irregular intervals by a series of parallel rugae, sides of propodeum coarsely reticulate; submarginal vein with a row of 11 to 14 setae; all of abdomen smooth, polished; few hairs on segment 4, region of ovipositor sheath moderately hairy.

Male.—Length 2.2 mm., blacker than female; entire occiput, hind margins of genae, face almost down to antennal fossae, vertex entirely black; antennae slightly darker than on female; all of pronotum above, except lateral edges, mesothorax, metathorax, and propodeum, black, mesopleura reddish brown to partly black, front femora infuscate outwardly, femora and tibiae of middle and hind legs brown except bases and apices, hind coxae with faint longitudinal black stripes; submarginal band dark, almost twice as long as wide; head two-thirds as long as broad, face rounded, vertex mostly only finely punctate; antennae more slender than in female, pedicel and

F1 equal in length, F2 to F4 one-half longer than thick, club compact and almost as long as F4, F3, and F2 together; submarginal vein with 11 setae; abdomen entirely polished above, venter in part coriaceous.

Type locality.—Austin, Tex.

Type.—Female, U.S.N.M. No. 42242.

Remarks.—The type and one male and seven female paratypes were reared by Dr. J. T. Patterson from the galls of *Andricus murtfeldtae* Ashmead on *Quercus breviloba* at the type locality. The material was sent me by Doctor Kinsey. L. H. Weld reared a female from the gall of *Callirhytis flavipes* (Gillette) on *Q. macrocarpa* at Moline, Ill.

The single male at hand exhibits an unusual degree of color variance from that of the female. The sculpture of the vertex and the dimensions of the head also depart strikingly from the condition in the other sex. It may be that further rearings will show these differences of the male to be abnormal.

22. DECATOMA OCCIDENTALIS, new species

PLATE 2, FIGURES 19, 20

Similar to *nigriceps* Walsh in color, but distinctly larger, head usually shorter and wider, submarginal band usually longer and less variable in length, often almost twice as long as wide; abdominal segments more extensively coriaceous than in *nigriceps*.

Female.—Length, 2.5 to 3.5 mm., almost entirely black; head black, mandibles brown, sometimes a faint ocular band either in front of or behind eye, or both, and rarely a fine line on lateral edges of antennal scrobe, brownish yellow; scape yellow, pedicel brown, but yellow at apex and somewhat more extensively so beneath, ring joint yellow, flagellum uniformly chestnut-brown; pronotum black, except a yellowish brown patch on anterior lateral corners, which extends more or less mesad on anterior surface and caudad on lateral surface but not beyond middle; rest of thorax and propodeum wholly black; rest of legs brownish black, except trochanters, which are partly yellowish brown, apical half of front femora, most of front tibiae, especially their bases and apices broadly, and these parts of the other femora and tibiae, yellowish brown, tarsi stramineous-yellow; stigma dark brown, submarginal band medium brown, length varying from one-half longer than wide to twice as long as wide, but somewhat shorter than wide to one-half longer than wide on the specimens from Arizona and New Mexico, and entirely lacking on one male and one female from Arizona, width of band not greater than length of stigma, scarcely touching stigmal vein, distal margin convex, and obtusely angulate just beyond stigmal vein, proximal

margin broadly rounded, concave, apex more or less pointed and fading out; abdomen black to reddish brown, lighter below.

Head dimensions slightly variable, from four-sevenths as long as wide to only one-half as long as wide, mostly the latter, never distinctly longer at middle than at sides of face, head noticeably wider than prothorax, about as broad as mesothorax, most of its surfaces moderately hairy and reticulate-punctate, malar space and genae the same, malar groove hairless and finely rugose; antennae moderately hairy, rather robust, scape as long as pedicel, F1, and F2 combined, pedicel slightly longer than F1, F1 almost a fourth longer than F2, latter about as long as each of F3 to F5, these broadening slightly toward club and scarcely longer than broad, club slightly longer than F4 and F5 combined; dorsum of thorax umbilicately punctate, mesopleura aciculate and finely punctate; propodeal sculpturing reticulate, groove polished in front, rugose behind like rest of propodeum; submarginal vein bearing a row of 13 to 17 setae; abdomen mostly polished, segments 3 and 4 always finely coriaceous on the sides, sometimes the dorsum also, region of ovipositor sheath hairy and punctate.

Male.—Length, 2.3 to 2.6 mm., colors, vestiture, and dimensions as described for the female; antennae less stout, the scape as long as pedicel, F1, and half of F2 combined, pedicel and F1 about equal in length, F1 a fifth longer than F2 and three-fifths as thick as long, F2, F3, and F4 subequal in length, each one-fourth longer than thick, club compact and as long as F4, F3, and half of F2 combined.

Type locality.—San Bernardino, Calif.

Type.—Female, U.S.N.M. No. 42236.

Remarks.—The type, the allotype, and 18 female and male paratypes were reared by Dr. A. C. Kinsey from the leaf galls of *Andricus lasius areolaris* Kinsey taken at the type locality on *Quercus chrysolepis*. The gall maker came from the galls on January 31, 1920. The allotype and a paratype of each sex are with the type in the United States National Museum. The rest of the paratypes are in the writer's collection.

It was reared as follows by Doctor Kinsey in California from cynipid galls: *Andricus lasius sublasius* Kinsey on *Q. chrysolepis*, Pasadena and San Jacinto; *A. lasius lasius* Ashmead on *Q. chrysolepis*, El Portal; same gall and oak at Dunsmuir and Placerville; *Plagiotrochus chrysolepidicola* (Ashmead) on *Q. dumosa*, at Paso Robles; *Disholcaspis corallina* (Bassett) on *Q. douglasi* at Napa; *D. canescens* (Bassett) on *Q. douglasi*, at Galt; and *Cynips weldi* var. on *Q. grisea*, Prescott, Ariz. A good series of both sexes is involved in these records. The Cynipidae were reared from these lots between January 25 and April 3, 1920.

Other specimens found in the National Museum were reared from galls as follows: 4 females and 2 males from *Disholcaspis truckeensis* (Ashmead), Big Bar, Calif., L. H. Weld collector, bearing Weld's record number 1622; 3 labeled "Ex *Diplolepis echina* O. S., California, Weld #1707"; and 7 females and 10 males with record No. 2615°, reared from April 4 to 20, 1882, from petiole galls on live oak (interpreted by Dr. William Trelease, University of Illinois, as *Q. virginiana*). These galls were collected by H. K. Morrison on March 24 and April 2, 1882; Mr. Weld also reared the following, except as otherwise stated: 11 females and 6 males (Hopk. U. S. 15637°) September 28 and 29, 1922, from galls on *Q. pungens* at Tijeras, N. Mex.; 1 female (Hopk. U. S. 15637¹) on July 1, 1922, from galls of *Callirhytis ruginosus* (Bassett) on *Quercus* sp., Las Vegas, N. Mex.; 1 female (Hopk. U. S. 15639^d), September 28, 1922, from galls on *Q. emoryi*, at Oracle, Ariz.; 5 females and a male (Hopk. U. S. 15922^h) May 21 and 28, 1918, from galls of *Andricus* (determined Middleton) on *Q. chrysolepis* at Los Gatos, Calif.; 1 female (Hopk. U. S. 15607°), June 17, 1918, at Paso Robles, Calif., from galls resembling *Neuroterus majalis* (Bassett), on *Q. douglasi*; 5 females (Hopk. U. S. 13687°) July 12, 1918, at Esparara Cañon, Ariz., from galls of *Adleria* (determined Weld) on *Q. oblongifolia*; 6 females and 10 males (Hopk. U. S. 15639°) January 23, February 3, and September 28, 1922, mostly labeled Oracle, Ariz., from galls on *Q. arizonica*; 6 females (Hopk. U. S. 15604°) at Prescott, Ariz., May 15 and June 1 and 17, 1918, from galls of *Callirhytis ruginosus* (Bassett), on *Q. grisea* or *arizonica*; 8 of each sex (Hopk. U. S. 10781^s) reared by George Hofer, May 21 to July 16, 1919, Sycamore Flat, Ariz., from galls on *Q. oblongifolia*; and 5 females and 6 males (Hopk. U. S. 10773^w) reared May 28 and June 11, 1919, by J. H. Pollock, Colorado Springs, Colo., from galls on *Q. gambelii*. One female labeled "Colo. 1257" is in the collection of the Illinois State Natural History Survey.

Nowhere in the genus *Decatoma* has been observed so striking a correlation between color development and geographical distribution as in *D. occidentalis*. There is good reason for including *D. florida* Girault as a member in the series that shows this correlation. These species are extremely similar in being almost entirely black, with only the anterior lateral upper corners of the pronotum, and sometimes a narrow ocular ring, yellow brown. Structurally they are alike in the number of setae on the submarginal vein, and the form of the head, which is almost or actually twice as wide as long, the face feebly or not at all convex, and the surfaces, except the malar space narrowly along the groove, are sculptured in a uniform manner in both species. The differences between them are in the color of the

legs and the extent of development of the submarginal band of the front wing. *D. florida* falls in the old genus *Eudecatoma* of Ashmead, there being but the usual faint trace of a submarginal band on the inner edge of the stigma. It is consistently rudimentary in the whole series of 10 females at hand. Correlated with the absence of the band is the yellow of all parts of the legs except the coxae, which are black.

Neither of the two species is known to date from areas between Florida and New Mexico or from States just west and north of the latter. A series of both sexes from Oracle, Ariz., has in it a pair that must, by all the characters known, be classified as *D. florida*. No color band is present, and the legs are yellow beyond the coxae. All the other specimens of this series from that locality, however, and a number of individuals from Prescott, Ariz., have all the legs more or less black, as in the typical *D. occidentalis* from California, and the color band is in almost every instance not fully formed, usually being only one-half as long as on the California members of the species where it is somewhat more than twice as long as broad and broadly curved. Another good series, from Sycamore Flat, Ariz., has mostly black legs like those of the Oracle lot, but the band of the wing is fully formed in the majority of specimens. Material from Colorado Springs, Colo., compares favorably with the latter. Three lots, from Tijeras, N. Mex.; Esparara Cañon, Ariz.; and Los Gatos, Calif., respectively, have complete bands almost without exception. The band is not abbreviated in any of the specimens from Pasadena, El Portal, Dunsmuir, Placerville, Paso Robles, Napa, and Galt, Calif. There is a little evidence that *florida* inhabits galls of *Andricus flocci* (Walsh) in Florida, and Kinsey reared the Prescott, Ariz., lot from galls of *Cynips*, and the typical California *occidentalis* from *Andricus*, *Plagiotrochus*, and *Disholcaspis*. Weld reared the lot from Esparara Cañon, Ariz., from the galls of *Adleria*.

This instance particularly throws doubt on the value of *Eudecatoma* Ashmead as a distinct genus, in view of the extreme variation in length of the submarginal band.

23. DECATOMA OCCIDENTALIS FLAVIFRONS, new variety

Differs from the typical *D. occidentalis* Balduf only in color, having the face and cheeks mostly yellow, the pronotum and legs more yellow, and sides of mesothorax in part so. The dimensions of the funicular joints and the head, the sculpturing of the head, mesopleura and abdomen, and the number of setae on the submarginal vein agree with the typical black form of this species. The wing band is shortened as in typical specimens from the Southwestern States.

Male.—Length 3 mm., colors black and yellow; back of head, vertex, cheeks in part behind, malar space entirely on one specimen, and forehead in part, black; one specimen with pronotum yellow brown only on front lateral corner, as on typical black *occidentalis*, but entire side and the anterior lateral portion of upper surface of pronotum yellow on the other specimen; mesopleura black on one specimen but lower third of scapulae, and upper portion of mesopleura yellow on the other; legs of lighter-colored specimen with bases of front and middle coxae, and all of hind coxae, black, femora and tibiae of all legs with at least middle of outer surfaces narrowly black, legs otherwise yellow, except tarsi, which are stramineous, the other specimen with legs dark as on typical specimens of *occidentalis*; venter of abdomen yellow.

Type locality.—Prescott, Ariz.

Type.—Male, U.S.N.M. No. 42268.

Remarks.—Described from the type and a male paratype, both in the National Museum and from the type locality. They were reared by L. H. Weld, May 15 and August 17, 1918, from undetermined galls on an evergreen oak (*Quercus grisea* or *arizonica*). The type issued on the latter date. Both individuals are labeled "Hopk. U. S. 15604^a."

24. DECATOMA NIGRICEPS Walsh

PLATE 2, FIGURE 22

Decatoma nigriceps WALSH, Amer. Ent. and Bot., vol. 2, no. 10, pp. 300, 301, 1870.

Perhaps nearest to *occidentalis* Balduf, from which it may be distinguished by the differences enumerated before the description of that species.

Female.—Length 1.8 to 2.2 mm., mostly black with greatly variable degrees of yellow; head black, except a narrow circumocular yellowish-brown band with sometimes an oblique wedge-shaped branch extending forward from it on the vertex toward the antennal scrobe, lateral margins of scrobe usually, oral area more or less, in some specimens a band extending upward from oral region to each antennal fossa and in others to the malar space narrowly, yellowish brown, and a few specimens have the head yellow except the vertex and the forehead; palpi whitish; scape entirely honey yellow, pedicel yellowish beneath, light brown above, flagellum medium to dark brown; pronotum black but anterior lateral corners always, and sometimes the side more or less, dull yellow, in some specimens all the anterior margin of the segment dull yellow, in others only the mesal third of the upper surface black, with front margin yellow; mesothorax black, lower part or all of scapulae and

axillae, and more or less and sometimes all of mesopleura, brownish yellow, darker than the yellow of the pronotum; metanotum and propodeum black, except at times the latter is faintly yellow; apices of coxae yellow, the rest black, trochanters yellow, femora and tibiae mostly brownish black, their bases and apices yellow, tarsi stramineous-yellow, in some specimens the coxae and most of the rest of legs yellow; submarginal band pale to medium brown, extremely variable in size, extending from one-third to two-thirds across the wing, width rather constant regardless of length, maximum width scarcely greater than length of stigma, band curved in form, first bending toward apex, then at end turning toward base of wing, tapering slightly at tip, no secondary band present; pedicel black, abdomen brownish to black, some specimens yellow shading to brown on anterior-ventral part, one specimen with entire abdomen yellow except dorsum, ovipositor sheath sometimes more or less yellowish.

Head three-fifths to two-thirds as long as broad, rounded above, front strongly to moderately rounded and protruding, occiput rather strongly convex; vertex only sparsely marked with small umbilicate punctures and in part punctate, malar space and genae rather coarsely wrinkled, shiny, rest of head, especially the face, coarsely reticulate, punctures few, sparsely hairy, more densely hairy above oral space; antennae moderately hairy, relatively robust, scape moderately thickened near base, as long as pedicel, F1, and part of F2 combined, pedicel one-fifth longer than F1, F2 to F5 of equal length and width, each scarcely longer than broad, club slightly thicker than funicle and tapering from second segment to blunt tip; head and mesothorax slightly broader than prothorax, pronotum more than twice as broad as long, parapsidal grooves complete but narrow and shallow, thorax coarsely umbilicately punctate and moderately hairy; anal margin of wing beyond hamular fold rather strongly dilated, surface densely hairy, submarginal vein with a row of 10 to 13 setae, more often 11; abdomen rather strongly compressed, highly polished, smooth, except dorsum of fifth segment sometimes feebly coriaceous, and the sides of the sixth sparsely pitted near the spiracle, segments 5 and 6 sparsely and moderately hairy, respectively, tips of ovipositor sheaths protruding rather prominently beyond apex of abdomen, region of sheaths hairy, punctate.

Male.—Length, 1.8 to 2 mm.; slenderer and generally somewhat darker than the female, vestiture and sculpture as in that sex; legs almost lemon yellow in a few specimens; scape slightly longer than pedicel and F1 combined, pedicel and F1 almost equal in length, F2 to F4 each two-fifths longer than its greatest thickness, their length uniform and each about five-sixths the length of F1, club

slightly smaller in diameter than funicle, length equal to F1 plus F2, with a fairly blunt end.

Type locality.—Probably Rock Island, Ill.

Cotypes.—A female and two males, U.S.N.M. No. 1535.

Remarks.—Redescribed chiefly from the two male cotypes and a series of both sexes reared from the same source as the original specimens. The description was checked with the female cotype. Color extremes as found from Virginia are also included in the description. This species has been difficult to identify with certainty by means of the description by Walsh, which does not agree in some color features with the type material and other specimens reared later by others. Notably, the scape is always yellow instead of brown black, as described by Walsh. It is recognizable, however, from the original account by the size, its usually mostly black color, the extremely variable extent of the submarginal band, and the host. The male paratypes have the legs chiefly yellow, whereas the other specimens check with the original description in having the legs chiefly black. It has been thought that many of Walsh's specimens were destroyed in the Chicago fire. Doctor Walsh originally possessed 3 males and 2 females reared September 22 to 24, and 40 males and 16 females reared May 8 to 20 from the oak-fig gall, *Biorhiza* (*Xanthoheras*) *forticornis* (Walsh) (*ficus* Fitch). The only other series in my possession that is positively known to have been reared from this gall was received from Doctor Kinsey, who reared them at Forest Hill, Boston, Mass. The host insects issued between April 8 and July 9, 1918. This series consists of 21 males and 8 females. *B. forticornis* is known to make its galls on white oak (*Quercus alba*), dwarf chinquapin oak (*Q. prinoides*), and chestnut oak (*Q. prinus*), and may occur on other species of *Leucobalanus*. Additional specimens are at hand as follows: 16 females and 13 males bearing the record numbers 2F41⁰¹, 2F41⁰², and 2F41⁰³, with dates ranging from August 6, 1882, to August 5, 1884. The records show that these were the rearing dates of specimens collected several weeks earlier in galls from *Q. alba* in Virginia. Some of the data were lost in the meantime, and the cynipid host of this lot is not known; 1 male is labeled New Brunswick, N. J.; 10 females and 4 males with no data are mounted on a single card; 2 females and 5 males originated at the Michigan Agricultural College with the accession catalogue numbers and data as follows: 857, March 24, 1888, from the gall of *Disholcaspis* (*Holcaspis*) *mamma* (Walsh); 600B, March 23, 1887, from mossycup oak (*Q. macrocarpa*), "corky gall," *D. mamma*; 601, April 25, 1887, reared from white-oak bladder gall, without scientific name; 601A, April 28, 1887, reared from same as 601; and 738, June 27, 1887, from "red-oak lesser globular leaf gall." The rearings were probably by

Gager C. Davis. Three females and two males in the entomological collection of the Canadian Department of Agriculture, Ottawa, were collected at Tampico, Ill., on June 15, 1909, by G. E. Saunders. One of the pins bears a corky gall, probably of *Disholcaspis mamma* (Walsh). I have 2 females and 10 males from *D. mamma* on *Q. macrocarpa* at Urbana, Ill., reared in indoor cages from April 20 to June, 1923. L. H. Weld presented three females and one male reared by him at Evanston, Ill., from the gall of *Plagiotrochus (Callirhytis) tumifica* (Osten Sacken) on red oak (*Q. maxima*). A lone male in the collection of the United States National Museum bears data as follows: April, Riley County, Kans., Marlatt, 983; a female (Hopk. U. S. 10777^b) reared May 14, 1919, and a male (Hopk. U. S. 10777^a) dated May 7, 1919, are both presumably from galls, on *Q. minor*, at Poplar Bluff, Mo., by S. A. Rohwer.

It is not possible to distinguish positively between some *nigriceps* Walsh and certain individuals of *globuli* Balduf. The smaller individuals of the latter grade into the larger specimens of the former, and this merging is also true of the form of the heads, the shape and extent of the band on the wing, and the coloration. I do not place as *globuli* any specimens with an imperfect wing band. This band is very often more or less reduced in *nigriceps*. The head of the *nigriceps* as described originally by Walsh is subglobose, and about two-thirds as long as broad, whereas it is always about three-fifths as long as broad in *globuli* and approaches a transversely rectangular-ovate form as seen from above. But the lots from the Michigan Agricultural College contain specimens that range from abbreviated bands and somewhat rounded heads in the one extreme to complete bands and rectangular-ovate heads on the other extreme from the same host. They can therefore be classed as either species, and such a classification is valueless. It is possible that these supposed species are all one, but this theory leads to trouble when it is recognized that the larger *globuli* grade into the smaller, more stocky-headed forms of *dubia* Walsh, which certainly is a distinct species by virtue of its size and usually the dimensions of the head. I prefer to believe that three species are involved here, which, however, are not sharply definable in terms of structural characters studied to date. Any arbitrary limitations of size, form, and color are not positively practicable for convenience of separation, and certainly are misleading as means of indicating the true natural border lines of these species, but are now our only known aids for making even approximate distinction. A study of the genitalia may prove helpful in the search for means of separating the borderline specimens.

25. *DECATOMA NIGRICEPS* var. *EXCRUCIANS* Walsh

Walsh⁹ recognized this variety, the specimens of which, he states, "differ from the normal form of *nigriceps* only in the scape of the antennae being dull rufous instead of brown-black. The antennal groove is black." He had three males and one female reared July 2 from the gall of the cynipid, *Andricus seminator* Harris [*Callirhytis seminator* (Harris)]. None of this material is at hand. The extreme variation of color in this species, even in lots obtained at one time from the same locality and hosts, is so great that any color limit set up for varieties has no value. I am compelled to disregard this variety of Walsh.

26. *DECATOMA SUBIMMACULATA* Girault

Decatoma subimmaculata GIRAULT, Journ. Ent. and Zool., vol. 9, p. 11, 1917.

Decatoma autumnalis GIRAULT, Proc. U. S. Nat. Mus., vol. 58, p. 209, 1920.

Decatoma compressa GIRAULT, Proc. U. S. Nat. Mus., vol. 58, pp. 209-210, 1920.

Nearest to *D. quercilanae* (Fitch) in its mostly yellow body, but is distinguishable by its lack of most of the black dorsal markings on the thorax present on Fitch's species. *D. subimmaculata* is, in general, somewhat larger.

Female.—Length 2.5 to 4.9 mm., mostly 3 mm. or longer, moderately robust, colors chiefly golden or honey yellow, in small part black; head yellow but space within ocelli, and forward into antennal scrobe more or less, and occiput about halfway from foramen to eyes behind, black; scape concolorous with head or lined with brown on basal part of outer edge, pedicel feebly infusate above mostly on basal two-thirds, flagellum light brown; pronotum usually immaculate golden yellow, sometimes darkened behind by black on prescutum beneath or occasionally on hind part of pronotum itself; mesothorax concolorous with pronotum, prescutum at times immaculate, but more often a subtriangular patch of black on disk, which extends forward broadly under pronotum and tapers caudad, front edge of scutel at times faintly black, and a mere tinge of black longitudinally on the middle and sometimes small areas black on lower edge of axillae near tegulae; metanotum yellow, propodeum black on middle half in front, and groove sometimes narrowly, sometimes broadly black, sterna of thorax not extensively black; legs immaculate, light yellow, tibiae approaching stramineous-yellow, tarsi still more nearly so; stigma as on other species, with only a rudiment of submarginal band; peduncle black, abdomen ochreous-yellow to golden yellowish brown, usually a narrow, irregular longitudinal mid-dorsal black band without pronounced lateral projections on the segments.

Head slightly variable in dimensions, from one-twentieth more than half longer than wide to about half as long as wide, face mod-

⁹ Amer. Ent. and Bot., vol. 2, no. 10, p. 301, 1870.

erately prominent and rounded between eyes as seen from above, hind edge of head scarcely convex, vertex moderately so; ocellar area finely punctate, malar space smooth, bare; cheeks and temples semi-smooth or feebly strigose, reticulate, face more coarsely reticulate; pedicel almost a fourth as long as scape (not including radicle), slightly longer than F1, latter about a fifth longer than each of F2 to F5, these subequal in length, and each approximately one-fifth longer than thick, club not thicker than flagellum and slightly longer than F4 and F5 combined; pronotum one-tenth narrower than head and almost as broad as mesonotum; pronotum and mesonotum uniformly and rather coarsely umbilicately punctate; anterior lateral half of mesopleura minutely papillose, posterior half aciculate and finely punctate; a row of 13 to 18 setae on submarginal vein, more often about 15; propodeum coarsely and variously reticulate, a broad U-shaped carina limiting groove in front, anterior third of groove smooth and polished, the rest crossed by several subparallel and not quite uniformly spaced rugae; abdomen in part or mostly polished, sometimes posterior portions finely granulose, region of ovipositor sheath punctate and hairy.

Male.—Length 1.2 to 3 mm., or in general a bit shorter than female and somewhat slenderer, antennae and scrobe sometimes dusky, and thorax at times slightly blacker than in female, but dimensions, sculpture, and vestiture similar in both sexes; pedicel slightly more than twice as long as wide, not much longer than F1, latter fully twice as long as wide, F2 to F4 not equal, F2 twice as long as thick, sometimes barely so, F3 and F4 alike but slightly less than half as broad as long, these dimensions varying among individuals.

Type locality.—Claremont, Calif. (C. F. Baker).

Holotype.—Female, U.S.N.M. No. 20400, antennae and a hind leg on a slide.

Remarks.—Originally described from this holotype; redescribed from the type, the type of *compressa* Girault, and a series of both sexes from various localities in California. *D. compressa* Girault differs from *subimmaculata* only in being somewhat larger with a few more setae on the submarginal vein, but no differences in dimensions, sculpture, and general color pattern are present. Moreover, the California specimens below that were reared from known gall and oak hosts show a similar variation in size and vestiture, which I take to be adequate evidence for placing *compressa* Girault in synonymy. The types of *subimmaculata* Girault and *compressa* Girault were not reared.

D. autumnalis Girault also was described from a single specimen from unknown hosts in California. It has a somewhat darker head than *subimmaculata*, but the thorax is lighter, indicating that the coloration of the former is abnormal. This type has the hind tibiae

infuscated, but is otherwise like *subimmaculata*, and seems to be merely an anomalous specimen of the latter species.

There is a rather pronounced variation in size among the series described below, and the vestiture of the submarginal vein varies numerically somewhat with the size of the specimen, as has been noted in other instances within the genus.

The collection of the United States National Museum contains a series (3767 and 3767^x) of 17 females and 10 males, all representing the smaller sizes of this species, reared by Albert Koebele from the twig galls of *Heteroecus pacificus* (Ashmead). Koebele reported it from *Quercus pumila*, but Doctor Kinsey informs me that *Q. chrysolepis* is the only known host of *H. pacificus* and that *Q. pumila* is a species of Southeastern United States. The specimens bear dates as follows: September 24 and October 2, 1885, and January 21, 1886. Most of them are not dated. The galls were collected September 9, 1885, at Colfax, Calif. In the same collection is one female reared at Cottonwood, Calif., January 19, and a small, darker male dated February 11, both from a gall on *Q. lobata*. It is probable that these are conspecific despite their differences in color.

Eight males and females, with record numbers 3794a^x, 3794a^{x2}, 3795^{x2}, and 3797^x, were reared by Mr. Koebele at Colfax, Placer County, Calif. The one specimen from 3797^x was reared January 8, 1886, and the gall received, presumably at Washington, D. C., on October 17, 1885. This female was reported by Koebele from the gall of *Heteroecus dasydactyli* (Ashmead). Kinsey¹⁰ indicates that Ashmead had mixed galls, which probably represented two species, *H. dasydactyli* and *H. melanoderma* Kinsey. Hence, the exact cynipid host for this lot is in question.

The specimens numbered 3794a^x, and presumably those bearing other combinations of 3794 and 3795, came from an unidentified gall collected by Mr. Koebele at Colfax, Calif., from *Q. chrysolepis* and were received at Washington, D. C., on October 17, 1885. One rearing record is January 20, 1886 (3794^x). It is highly probable that the maker of these unidentified galls was also a species of *Heteroecus*.

Two specimens (59°) from Placer County, Calif., probably issued January 2, 1886, from a cynipid gall collected October 8, 1885, on *Q. chrysolepis*. Joseph Wade furnished me these data, which accompany record number 59^k, and probably refer also to this series. Mr. Koebele was perhaps the collector.

In addition I have a series of 10 specimens reared by Dr. A. C. Kinsey from California cynipid galls on *Q. chrysolepis* as follows: El Portal; San Jacinto Mountains, *Andricus spectabilis* Kinsey; Placerville and El Portal, *Heteroecus pacificus pacificus* (Ashmead);

¹⁰ Indiana Univ. Studies No. 53, vol. 9, p. 89, 1922.

Auburn and San Jacinto Mountains, *Andricus lasius sublasius* Kinsey; and Placerville, *A. lasius lasius* Ashmead. The rearing dates of the gall makers fall between February 28 and March 30, 1920.

The following were reared by L. H. Weld in California localities: 1 male from the gall of *Disholcaspis truckeensis* (Ashmead), on *Q. chrysolepis*; a pair (Hopk. U. S. 15613°), July 8 (male) and 15 (female), 1918, from the same species of oak and gall, Camp Baldy, Calif., and a female (1732) from the gall of *Andricus lasius lasius* Ashmead, at Los Gatos. The male of the above pair is distinctly darker than the female.

Two fine lots of typical *subimmaculata* are at hand as follows: 8 females (Hopk. U. S. 15922f) reared by R. D. Hartman, May 21 and June 4 and 11, 1919, from galls of *Callirhytis* sp. (determined Middleton) on *Q. chrysolepis*, at Los Gatos, Calif.; 15 females and 6 males (Hopk. U. S. 15605°) reared by L. H. Weld, July 8, 15, and 23 and November 6, 1919, at Camp Baldy, Calif., from galls of *Andricus pomiformis maculipennis* (Kieffer) on *Q. wislizenii*.

27. DECATOMA PEZOMACHOIDES, new species

Similar to *D. subimmaculata* Girault in color, but may be distinguished by its more robust form; it has 11 to 12 setae on the submarginal vein, the head is very nearly to actually twice as wide as long, and the face seen from above is only feebly rounded.

Female.—Length 2.75 mm., form quite robust for the genus, color predominantly golden yellow; head golden yellow, except slightly around mouth, a small blotch contiguous with and scarcely larger than each ocellus, and occiput narrowly, black; scape pale yellow, pedicel same with basal upper third brown, flagellum uniformly pale brownish yellow; neck narrowly black, thorax yellow like head, except a fragmentary dorso-median longitudinal band variable in size and intensity on prescutum and extending forward under pronotum, and lower hind edge of axillae narrowly, black, venter of thorax from middle coxae to and including propodeum, more or less black; legs bright honey yellow, tibiae approaching stramineous-yellow, tarsi stramineous; pedicel black; an irregular dorso-median band usually not extending full length of the abdomen.

Head transversely subrectangulate-ovate, about twice as wide as long, face from above protruding feebly in front of eyes and not sharply set off from eyes, hind edge of head almost straight or feebly concave, vertex moderately convex transversely; malar space behind groove smooth, polished, cheeks same or becoming semismooth above, ocellar area finely punctate, occiput and hind portion of vertex inconspicuously sculptured, face moderately reticulate-punctate, and sparsely hairy; pedicel twice as long as its greatest diameter, only

slightly longer than F1, F1 a fourth longer than F2, funiculars 2 to 5 subequal, becoming more robust from 2 to 5, the second slightly longer than thick, the fifth as broad as long and subquadrate, club at greatest width as broad as F5 and a little longer than F4 and F5 combined, antennae as a whole rather stout and densely hairy; pronotum one-fifth narrower than head, and about one-tenth narrower than mesonotum, these nota moderately and not deeply umbilicated; anterior lateral half of mesopleura feebly, posterior half more coarsely, aciculate, both finely and rather sparsely punctate; 11 or 12 setae on submarginal vein, hairs widely spaced; propodeum coarsely and irregularly netted, groove polished, fairly deep and broad, bottom rounded and crossed by several diagonal unevenly spaced rugae, groove ended in front by an arcuate carina; anterior lateral half of abdomen mostly smooth, polished, but posterior portions in part inconspicuously and minutely granulose, particularly on posterior parts of the segments, abdomen practically bare, except area along ovipositor sheath, which is hairy and finely punctate.

Male.—Unknown.

Type locality.—Bluffton, Ohio.

Type.—Female, U.S.N.M. No. 42245.

Remarks.—Known from four females collected by Dr. L. L. Huber. Two were taken at Flint, near Columbus, Ohio, August 15, 1921, and two were reared at the type locality, August 29, 1921, from galls of *Cynips pezomachoides* Osten Sacken (determined Huber), probably var. *erinacei* (Beutenmueller), on *Quercus alba*. Three paratypes are in the writer's collection.

28. DECATOMA POMIFORMIS, new species

PLATE 2, FIGURE 24

Perhaps nearest to *D. subimmaculata* Girault, from which it may be distinguished by characters in the key; furthermore, the head is somewhat broader, and the body is on the average a little longer in the present species.

Female.—Length 3.5 to 3.8 mm., fairly robust, colors yellow and black; head golden yellow, oral region faintly brown, occiput rather broadly black, and vertex with a subquadrate black patch not reaching beyond ocelli behind and on the sides, extending to and narrowing toward antennal scrobe; scape a shade lighter than face, pedicel brown above, darker on basal two-thirds, ring joint dull yellow, flagellum chestnut-brown; black of neck sometimes extending caudad as a band more or less upon meson of pronotum but never more than halfway to hind margin, pronotum otherwise concolorous with head; mesonotum often showing black through middle third of pronotum

and with a discal triangle on prescutum, apex of triangle narrowed to a broad mesal longitudinal stripe on posterior half of this sclerite, stripe extending almost to margin, anterior disk of scapulae and at times their lower edge, sometimes lower edge of axillae, often a mesal longitudinal band on anterior half of scutel, anterior portion of metapleura sometimes, upper front surface and the groove of propodeum, and most of venter of thorax, black; legs bright honey yellow, basalmost parts of front and middle coxae partly, and basal portions of hind coxae in part, black, tibiae and tarsi almost stramineous-yellow; stigma dark brown, a mere rudiment of submarginal band present; peduncle and a dorso-median band with lateral projections on the first four segments, black, abdomen otherwise brownish to ochreous-yellow.

Head from above never quite twice so wide as long, about four-sevenths as long as wide, face feebly rounded and protruding moderately in front of eyes, rather sharply set off from margins of eyes, vertex fairly convex, hind edge about straight transversely; malar space smooth along groove, polished, becoming strigose toward cheek, latter semismooth below, reticulate-punctate above, ocellar area finely and densely punctate, rest of head surface reticulate, sparsely and inconspicuously hairy; scape nearly three times as long as pedicel, latter conical, twice as long as its maximum diameter, and one-fifth longer than F1, F1 one-fourth longer than thick, F2 to F5 subequal, becoming more robust from second to fifth, second only slightly shorter than F1, fifth scarcely longer than broad; head slightly more than a seventh broader than pronotum, and an eighteenth wider than mesothorax; nota of prothoracic and mesothoracic segments umbilicately punctate, moderately hairy, mesopleura aciculate, the posterior half more coarsely, both parts minutely punctate but the front half densely so, 13 to 16 setae on submarginal vein; dorsum of propodeum coarsely and variously rugose-reticulate, the cells more finely sculptured, groove limited in front by a broadly V-shaped carina, apex of carina almost arcuate, groove sculptured much as the other propodeal surfaces, and shallowly rounded; abdomen mostly bare, and polished, shiny, mostly unsculptured, posterior half more or less very finely granulose, hairy, and punctate around ovipositor sheath.

Male.—3.5 mm. long, slightly slenderer than female, color darker than female as follows: Occipital black area approaching closer to eyes, and ocellar area black, neck blacker, and a mesal longitudinal band extending from neck to pronotum, band broadening abruptly from middle of pronotum to caudo-lateral corners and thus reaching hind margin of the segment; prescutum and propodeum more largely, outer face of hind coxae, upper disk of hind femora, and dorsum of

abdomen more broadly, black; vestiture, sculpture, and the head dimensions, as described for female.

Type locality.—Gaviota, Calif.

Type.—Female, U.S.N.M. No. 42246.

Remarks.—The known material of this species consists of the type, the allotype, and 11 female paratypes; the first two, with three paratypes and the front wing of a female paratype on a slide, are deposited in the collection of the United States National Museum, and the remainder are in the collection of the writer. All these specimens were reared by Doctor Kinsey from the galls of *Andricus pomiformis rossi* (Kieffer) on California live oak (*Quercus agrifolia*) at Gaviota, Calif., the gall makers issuing on March 5, 1920.

29. *DECATOMA QUERCI-LANAE* (Fitch)

PLATE 2, FIGURE 26

Spalangia querci-lanæ FITCH, Ann. Rep. New York State Agr. Soc., p. 816, 1859; 5th Rep. Nox. Ins. New York, p. 36, 1859.

Decatoma querci-lanæ ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, pp. 196, 197, 1887.

Decatoma hyalipennis WALSH, Amer. Ent. and Bot., vol. 2, no. 10, p. 301, 1870.—PROVANCHER, Additions à la faune hymenopterologique, p. 193, 1887.

Decatoma simplicistigma WALSH, Amer. Ent. and Bot., vol. 2, no. 10, p. 301, 1870.

Decatoma flavicollis WALKER, Ent. Mag., vol. 2, p. 156, 1834. Original description. A European species.—MAYR, Verh. Zool. Bot. Ges. Wien, Band 55, pp. 532-534, 1905. Redescribed.

Decatoma flavicollis ASHMEAD, Trans. Amer. Ent. Soc., vol. 12, p. xiii, 1885. An American species.

Decatoma floridana J. B. SMITH, Ent. Americana, vol. 2, p. 19, 1886. New name for *flavicollis* Ashmead.

Decatoma michiganica GIRAULT, Proc. U. S. Nat. Mus., vol. 58, p. 209, 1920.

Similar to *foliatae* Ashmead in size, form of the head, and number of setae on the submarginal vein, but differs from it in having even the coxae all yellow and the thorax with a more or less developed irregular dorso-median longitudinal black band, while *foliatae* has most of head, the prescutum, scutellum, propodeum, and most of abdomen black. Specimens having scapulae more or less black are being regarded as *foliatae*.

Female.—Length, 2.5 to 3.5 mm., mostly about 3 mm.; fairly robust, colors yellow, brownish yellow, and black, relative degrees of each variable; head and thorax honey yellow; scape almost concolorous with head, basal two-thirds of pedicel brown-black, its apex honey yellow, flagellum chestnut-brown; head with only vertex and occiput black; black of vertex narrowly, or sometimes barely, inclosing ocelli, or sometimes extended to include disk of vertex but very rarely reaching eyes laterad or farther than apex of antennal scrobe or

hind edge of head; occiput usually mostly black, this not uncommonly broadening toward but seldom reaching the vertex except by a narrow, or rarely a broad, longitudinal median band, the band sometimes extending caudad varying in width and length, occasionally reaching hind edge of pronotum; mesonotum rarely almost immaculate, usually with a median longitudinal black band varying in width at different points and in a series of specimens, often broadened especially on prescutum, sometimes enlarged to a triangle almost coextensive with borders of prescutum and extending forward under pronotum, band more regular on scutellum, almost always full length of the sclerite, and usually not broader than half the width of this area, scapulae and axillae immaculate, rarely in part infuscated, sterna of thorax black mostly between coxae only; anterior portion and groove of propodeum black, often feebly so; legs yellow, coxae concolorous with sides of thorax, rarely the hind pair feebly and partly blackened, femora slightly lighter, tibiae light yellow, tarsi stramineous; stigma brown, submarginal band lacking; peduncle black, dorsal area of abdomen narrowly to broadly black with pointed projections extending toward middle of sides, abdomen otherwise ochreous-yellow.

Head three-fifths as long as broad from above, face broadly rounded, eyes not abruptly separated from front, vertex feebly convex, hind edge of head almost straight; ocellar area finely punctate, malar space smooth, polished, rest of head moderately reticulate-punctate and sparsely and inconspicuously hairy; about two-thirds as long as pedicel and a fifth longer than each of F2 to F5, latter joints subequal, scarcely longer than broad, club not quite so long as F3 to F5 combined, flagellum rather densely hairy; pronotum slightly narrower than head and mesothorax; pronotum, prescutum, and scutellum moderately umbilicately punctate and hairy, mesopleura aciculate and finely punctate; 12 to 14 setae on submarginal vein; groove of propodeum crossed by a rounded carina in front and by feeble rugae on posterior two-thirds; abdomen polished, sparsely hairy on the sides, moderately hairy and punctate in the region of the ovipositor sheath.

Male.—The male of this species is extremely variable in color. One color variety is being recognized in this sex in addition to the lighter form described herewith.

Like the female in general, except on the average slightly darker, the occipital black space usually larger, the scapulae, hind coxae, and abdomen more often partly and more extensively black; pedicel a fourth longer than F1, latter twice as long as wide, F2 to F4 equal in width and subequal in length, about five-sixths as long as F1, club slightly longer than F3 and F4 combined.

Type locality.—New York State (Asa Fitch).

Type.—Female, U.S.N.M. No. 1832.

No other type material in the United States National Museum collection.

Remarks.—Redescribed from the type, the types of synonymous forms, and a series of specimens from various regions in the eastern half of the United States.

Ashmead pointed out that *D. hyalipennis* Walsh is conspecific with *querci-lanae* (Fitch). He likewise showed that *D. simplicistigma* Walsh is also this Fitch species, but only established the identity of Walsh's species with *dorsalis* (Fitch), a dark color variety of *querci-lanae*. There are present, in addition to the dark specimens, typical light-colored forms of *simplicistigma* that agree fully with the Fitch type and check with the descriptions of the typical *querci-lanae*. A comparison of the above forms and the available rearing data leave no doubt about the correctness of Ashmead's conclusions that *simplicistigma* and *querci-lanae* are conspecific.

Professor Smith placed *flavicollis* Ashmead in synonymy, renaming the species *floridana* in view of the preoccupation of the name by *flavicollis* Walker. *D. floridana* is no doubt just another lot of *querci-lanae* (Fitch). All the type specimens, except one, are males. The female is a good *querci-lanae*, and the males mostly come close to variety *dorsalis* (Fitch), and agree in color variation with series since reared from galls of *Andricus flocci* (Walsh) on *Quercus alba*, the hosts of the types of *querci-lanae*.

Similarly, *michiganica* Girault, represented in the United States National Museum collection by the type and a paratype, both females, are true *querci-lanae* (Fitch), agreeing in all essential respects with the typical light color form of this species.

No other species of this genus has perhaps been collected and reared so commonly as this one. Following are the records at hand: The female type alone remains of a series reared by Doctor Fitch in New York State from galls of *Andricus flocci* (Walsh) (*Cynips quercus-lana* Fitch); Walsh's series (*simplicistigma*) came from galls of *Cynips pezomachoides* Osten Sacken and *Biorhiza forticornis* (Walsh), both on *Q. alba*, and *A. petiolicola* (Bassett) on swamp white oak (*Q. bicolor*), all presumably from northern Illinois; Ashmead's *floridana* (*flavicollis*) specimens were "bred from an undescribed *Cynips* gall," Jacksonville, Fla.; and the Girault types of *michiganica* are from a "white oak woolly twig gall" (Acc. Cat. 737, Agr. Coll. Mich., June 27-28 and July 9, 1887) in Michigan; another Ashmead series from Jacksonville, Fla., has on several pins the label "*N. (Neuroterus) majalis*, on *Q. alba*"; a few old specimens are labeled "*A. flocci*," and Doctor Kinsey reared a large series, both sexes, from a variety of this gall as follows: Jacksonville, Tex., *Q. stellata*; Big

Stone Gap, Va., *Q. alba*; a few from galls of *A. aciculatus* Beutenmueller on *Q. stellata*, Austin, Tex.; and one, same, from Yoakum, Tex.; the gall makers of these Kinsey lots issued between October 25 and December 4, 1919. Several specimens dated June 29, 1924, from galls of *A. petiolicola* var. on *Q. bicolor* at Winona Lake, Ind., were collected by F. Payne and sent me through Doctor Kinsey; I have reared a female from the stem gall of *Disholcaspis mamma* (Walsh) on *Q. macrocarpa*, Urbana, Ill., May 23, 1924, and 3 females issued March 21, 1929, from galls of *D. globulus* (Fitch) collected on and under *Q. michauxii* at Catlin, Ill., on February 24, 1929; a female (463°) reared by J. W. Lloyd, Cincinnati, Ohio, on June 24, 1895, from gall of *Neuroterus saltatorius*?; several females (3126°) from *N. batatus*? (*Cynips q-batatus*?), on *Q. alba*, June 30, 1883, Virginia, by Theodore Pergande; 2 (2610°) issued May 4, 1882, from cynipid galls received at Washington, D. C., on March 23, and collected from oak by H. K. Morrison at Fort Grant, Ariz.; another (2744°) with same data as preceding issued in transit to Washington, D. C., and was received on June 12, 1882; a female (189°) came from Cadet, Mo., where it was presumably reared on February 10, 1883; 3 females (158°) on multiple point mount are from J. W. Letterman, Allenton, Mo., *A. flocci* (Walsh), *Q. alba*, February 14; 2 from oak, Washington, D. C., May 12, 1895; 1 Biscay Bay, Fla., 2 from Texas (Belfrage); 2 from New Brunswick, N. J.; 1, probably from a gall, is dated October 27, 1876; another (17°) from oak gall, St. Louis, Mo., C. V. Riley; A. T. McClay reared a female from an unidentified gall at Hillview, Ill., April 6, 1928; L. H. Weld reared and sent me a small series of each of the following from cynipid galls, the numbers in parentheses being Weld's record numbers; Evanston, Ill. (210), *Callirhytis scitula* (Bassett), *Q. coccinea*; same locality (209), *C. tumifica* (Osten Sacken), *Q. borealis*; same place (21), *C. seminator* (Harris), on *Q. alba*; Moline, Ill. (168), *C. flavipes* (Gillette), *Q. macrocarpa*; Winnetka, Ill. (35), *Acraspis erinacei* Beutenmueller, *Q. alba*; Ironton, Mo. (660), *Andricus pattoni* (Bassett), *Q. stellata*; and East Falls Church, Va. (1124), *A. murtfeldtae* Ashmead, *Q. stellata*. I find in the National Museum collection one female (Hopk. U. S. 14636°) reared from a gall, determined by William Middleton as a *Callirhytis* sp., on *Q. alba*, at East Falls Church, Va., April 27, 1920. It has the color and form of the typical *querci-lanae*, but departs strangely in possessing a faint band on the wing. This is distinctly narrower than the length of the marginal vein and more than twice as long as broad. Such instances of the occasional occurrence of a band on wings of a species typically lacking it are rare in material accumulated to date.

A single female (Hopk. U. S. 15639°), reared by L. H. Weld, February 3, 1922, at Oracle, Ariz., supposedly from a cynipid gall, on

Q. arizonica, has the legs in part lightly clouded, but is otherwise a typical *querci-lanae* (Fitch).

30. *DECATOMA QUERCI-LANAE* var. *DORSALIS* (Fitch)

Spalangia querci-lanae var. *dorsalis* FITCH, Ann. Rep. New York Agr. Soc., pp. 816-817, 1859; 5th Rep. Nox. Ins. New York, p. 36, 1859.

Decatoma querci-lana-dorsalis (FITCH), Ann. Ent. Soc. Amer., vol. 7, p. 8, 1914.

Decatoma querci-lanae ASHMEAD, Trans. Amer. Ent. Soc., vol. 14, pp. 196, 197, 1887.

Differs from the lighter form by its smaller size and in having the head always continuously black from vertex to occiput, and the rest of the body generally blacker.

No such dark forms are known in the female sex.

Male.—Length, 1.9 to 2.5 mm., mostly intermediate size, relatively slender, colors black and yellow, black predominating; in extreme black specimens, head black except oral area and narrow circum-ocular ring, otherwise degree of yellow variable, the ocular ring sometimes dilating to include cheeks and temples and yellow of oral area extending to occiput behind and up the face to antennal fossae or higher, but vertex almost always entirely black from antennal scrobe to ocular band, black area of vertex always broadly continuous with that of occiput, latter also entirely black; antennae colored as on lighter males, and the females; pronotum of darkest specimens with an almost square black area full length of median third, and rest of sclerite lemon yellow; but median black space sometimes not so long as pronotum and not so broad as median third of this segment, and sometimes hind edge of pronotum narrowly yellow or with a somewhat rounded yellow area; on one specimen the lateral thirds black, these separated from mesal black area only by a fine oblique line of yellow on each side; mesothorax usually mostly black, sometimes entirely so with only tegulae yellow brown, mesopleura occasionally with yellow patches, more often scapulae and axillae in part brown yellow, rarely a yellow line or narrow band in each parapsidal furrow and continuing caudad over lateral thirds of scutellum; metathorax and propodeum almost always entirely black, occasionally a yellowish patch on metapleura; legs mostly yellow, coxae almost always more or less black, hind pair mostly so, disks of middle femora and tibiae sometimes lightly infuscated, those of hind legs darker still, rarely entirely black, peduncle black, abdomen likewise, frequently shading to brown black on ventral half.

Dimensions of head and funicular segment, and sculpturing and vestiture as in lighter form males.

Type locality.—New York State.

Type.—Male, U.S.N.M. No. 1833 (Dr. Asa Fitch).

No other type material has been found.

Remarks.—Redescribed from the type and a good series of reared specimens from various localities in the eastern half of the United States and Texas.

D. querci-lanae var. *dorsalis* (Fitch) represents a unique color phenomenon in the genus. Sufficient intergrading variations between the lighter male and variety *dorsalis* occur to show that they are conspecific. The specimens that have the black of the vertex and occiput interrupted, namely the lighter form, are not more numerous than variety *dorsalis*, and among the latter the majority approach the extreme black state rather than the lighter male form. Fitch (loc. cit.) states: "Specimens frequently occur, so very different in their colors that they might almost be deemed a distinct species." The sex of his specimens thus described is not given, but his decision to regard *dorsalis* as a variety proved sound in view of subsequent rearings. First, no mostly black females have been taken to date that can be placed in variety *dorsalis*; and second, I find several instances in which only the *dorsalis* variety of males and the typical light-colored females were reared from the same lot of galls.

A further point of interest is the occurrence of similar mostly black males in *foliatae* Ashmead, *foliatae arizonica*, new variety, and *quinqueseptae*, new species, in addition to a lighter-colored form, as in *querci-lanae* (Fitch). On the other hand, *D. wiltzae*, new species, is mostly black in both sexes, and its male has the colors and pattern of variety *dorsalis* (Fitch). So similar are the males of these species that to date no means of distinguishing them has been discovered. This similarity extends also to size, dimensions, sculpture, and vestiture, but the differences between the females, supplemented by some distinctions in host relations, constitute good reasons for regarding these species as distinct. The only present hope of determining the black males of these several species is to rear them with the females from known oak and cynipid hosts.

Variety *dorsalis* has been obtained from most of the sources named under the typical *querci-lanae*. Only the localities need to be named here, the dates, oaks, and cynipids being as already detailed: Winona Lake, Ind., Urbana and Catlin, Ill., Jacksonville and Yoakum, Tex., Michigan Agricultural College, Texas (Belfrage), and Jacksonville, Fla. [*N. majalis* (Bassett)]. Additional records are: One from "oak wool gall," *Andricus flocci* (Walsh), labeled "Illinois," emerged November 16, 1908; one (158^{x05}) was collected by Mr. Koebeler, February 1, 1883, on *Q. macrocarpa*, Washington, D. C.; one taken in April, Riley County, Kans., by Doctor Marlatt; one from gall of *Callirhytis tumifica* (Osten Sacken), at Braintree (near Boston, Mass., July 6, 1918, determined by Doctor Kinsey; one (Quaintance No. 24477) collected by H. K. Plank, November 17, 1924, Wagners Ferry, La.; two from J. G. Barlow, Cadet, Mo., collected May 3,

1885, "on buds of white oak"; and data are at hand for a Michigan specimen (Agr. Coll. Mich., Acc. Cat. 592c) reared May 20, 1888, from the gall of *Neuroterus noxiosus* (Bassett) on "swamp oak."

31. *DECATOMA QUINQUESEPTAE*, new species

Near *D. foliatae* Ashmead in having the yellow on the prescutum variable and the scutel almost always entirely black, and in the number of setae on the submarginal vein; *D. quinqueseptae* is somewhat larger and less robust, and differs most conspicuously in having most of the sides of the abdomen ochreous-yellow, whereas these are entirely dark in *foliatae*.

Female.—Length 2.4 to 2.7 mm., colors yellow and black; head black, only narrow ocular band with sometimes an oblique projection from it on vertex toward scrobe, and oral area, labium, and space below antennal fossae and between malar grooves more or less, yellowish brown; scape lemon yellow, its radicle yellowish brown, pedicel dark brown outwardly, only small part of apex lighter, flagellum uniformly light chestnut-brown; pronotum mostly lemon yellow, black of neck extending caudad and forming subquadrangular patch on middle third of pronotum and occasionally reaching hind edge, usually leaving narrow border of yellow on hind edge of pronotum; mesonotum mostly black, parapsidal grooves rather broadly, and posterior part of side of, or more often more than posterior half of scapulae, yellowish orange, tegulae light brown, upper edge of pleura brown, scutel, axillae, metanotum, propodeum, and venter of thorax, black; legs mostly immaculate lemon yellow, only base of coxae sometimes narrowly black, and tarsi stramineous-yellow; stigma dark brown, faint rudiment of submarginal band present; peduncle black, upper two-thirds of first abdominal segment black to brown, lighter beneath, upper third of second segment brown black, lower edges of dark areas irregular, dorsum of posterior half of abdomen lightly infuscated, and most or all of its lateral surfaces and venter ochreous-yellow.

Head from above three-fifths as long as its maximum width, face rather well-rounded transversely between eyes, more prominent dorso-ventrally, eyes and face not abruptly set apart at their junction, vertex moderately convex, hind edge of head feebly convex, hence head not approaching rectangulate-ovate from above; lower portion of genae and most of malar space polished, shiny, upper part of cheeks becoming strigose-reticulate, ocellar area finely punctate, also bearing small umbilicate punctures, rest of head more coarsely reticulate-punctate, and moderately hairy, antennae more densely hairy; pedicel scarcely twice longer than its maximum thickness, conical, about a fourth longer than F1, F1 nearly a fifth longer

than each of F2 to F5, latter joints uniform in dimensions and barely longer than wide, club as thick as funicular joints, tapering to a blunt tip, and slightly longer than F4 and F5 combined; pronotum and mesonotum rather coarsely umbilicate, anterior-lateral sclerite of mesopleura densely papillose, posterior area aciculate-punctate, polished; propodeum coarsely reticulate, or rugose, groove limited in front by a rounded carina, and with a polished depression in anterior portion; 12 or 13 setae on submarginal vein; abdomen polished, smooth, with only small parts granulose, area of ovipositor sheath densely and rather coarsely punctate, hairy.

Male.—Length 2.2 to 2.5 mm., fairly slender, blacker than female; head black, except oral area narrowly brown, scape sometimes dusky; sides of pronotum yellow, the yellow area emarginate in front and below, rest of thorax, the propodeum and peduncle, black, legs lemon yellow except basal half to two-thirds of coxae black; abdomen brown-black above, shading to brown on the sides; funicular joints not much longer than broad. In proportions of the head, sculpture, and vestiture of the submarginal vein, the two sexes are alike.

Type.—Female, U.S.N.M. No. 42244. Alpine, Calif. (A. C. Kinsey).

The allotype is with the type in the collection of the United States National Museum.

Remarks.—Described from the type, allotype, and 12 male and female paratypes reared by Dr. A. C. Kinsey in the type locality from the galls of *Plagiotrochus quinqueseptum* var. on *Quercus engelmanni*. The gall maker issued on February 24, 1920.

All the males of this species at hand are predominantly black, resembling closely the dark variety *dorsalis* of *D. querci-lanae* (Fitch). The females are darker than those of *querci-lanae*, but do not reach the degree of blackness present in the male of either of these two species.

32. DECATOMA FOLIATAE Ashmead

Decatoma foliatae ASHMEAD, Can. Ent., vol. 13, no. 6, p. 136, June, 1881.

Decatoma batatoides ASHMEAD, Can. Ent., vol. 13, no. 6, p. 136, June, 1881.

Eudecatoma batatoides ASHMEAD, Trans. Amer. Ent. Soc., vol. 21, p. 319, 1894.

(*D. batatoides* Ashmead designated type of new genus *Eudecatoma* Ashmead.)

Differs from the light-colored *querci-lanae* (Fitch) in having vertex and occiput continuously black, prescutum and scutellum usually entirely so, also propodeum and mesopleura black; the dark males of *foliatae* are similar in degree and arrangement of black and yellow, to *querci-lanae* var. *dorsalis* (Fitch); these species are similar

in size, number of setae on submarginal vein, and in coloration of the legs.

Female.—Length 2.8 to 3 mm., fairly stout, colors yellow through reddish yellow to black; head color variable; occiput, vertex, and face at least down to antennal fossae always continuously black, sometimes as far as oral area, all or only upper portion of malar space black, and occasionally also hind portion of cheeks from malar space to occiput, temples more or less brown yellow, circumocular band and sometimes also an oblique stripe from it to scrobe, yellow, ocular band often broadening on face, edges of antennal scrobe usually narrowly yellow; scape dull yellow, basal two-thirds of pedicel brown, apex lighter, flagellum chestnut-brown; neck and front portion of mesal third to all of mesal half of pronotum, black; mesonotum at times entirely black, at least prescutum and scutel black, their lateral margins sometimes brown-yellow, scapulae and axillae variously brownish or reddish yellow, in extreme cases almost entirely so but at least hind part of axillae black, mesopleura black, with upper edge adjoining tegulae sometimes yellowish, metathorax and propodeum black; legs yellow, coxae sometimes in part black, the inner and outer surfaces of hind pair more so; stigma of wings brown, only a rudiment of a submarginal band present; peduncle black, abdomen mostly brown-black, venter and posterior-lateral areas brown.

Head from above about three-fifths as long as broad, face only feebly protruding and rounded, temples not prominent, hind edge of head almost straight transversely, vertex moderately convex, eyes not sharply set off from vertex and face, hence, head subrectangulate-ovate; malar groove polished, cheeks feebly reticulate punctate, rest of head more coarsely so, but ocellar area more finely punctured, head inconspicuously and rather sparsely hairy; antennae moderately hairy, pedicel almost a third as long as scape, and about a fourth longer than F1, latter approximately a fifth longer than each of F2 to F5, latter subequal in length and diameter, each only slightly longer than broad, club slightly thicker than funicular joints and somewhat longer than F4 and F5 combined; prothorax almost one-seventh narrower than head, and almost as broad as mesothorax, pronota and mesonota coarsely umbilicately punctate, moderately hairy, mesopleura finely papillose on front half, aciculate-punctate on posterior half; propodeal groove broad, shallow, anterior third polished, limited in front by a sharply curved carina, surface of propodeum as a whole irregularly and rather coarsely reticulate-rugose; 12 to 14 setae on submarginal vein; abdomen polished, smooth and bare except area of ovipositor sheath, which is punctate and hairy.

Male.—Length 2.5 to 2.9 mm., rather slender compared with females, distribution and relative degrees of yellow and black much as described for *querci-lanae* var. *dorsalis* (Fitch), as follows: Head black, a narrow ocular band and a short oblique stripe from it toward antennal scrobe, and oral area not up to antennal fossae, brownish yellow; scape dull yellow, pedicel brown on basal two-thirds, its apex lighter, flagellum brown on one specimen and yellowish on another, probably usually chestnut-brown; neck black, pronotum with a black rectangle on mesal third or more, its sides dull lemon yellow, mesothorax black, but sometimes hind portion of scapulae, pleura just below tegulae, and tegulae, brownish yellow; metathorax, propodeum, and peduncle black; legs a slightly lighter shade of yellow than sides of pronotum, except front and middle coxae blackish at base, darker on the anterior surface, hind coxae entirely blackish except apical fifth and small part of hind surface feebly brown yellow, stigma brown, band rudimentary; abdomen brown-black above and on most of lateral surface, venter brown.

Pedicel twice as long as thick and slightly longer than F1, F2 to F4 subequal in length and diameter, each about one-half longer than thick, the flagellum moderately hairy; male otherwise like female in dimensions of head, vestiture, and sculpture.

Type locality.—Jacksonville, Fla. (W. H. Ashmead).

Type.—Female, U.S.N.M. No. 2819.

Remarks.—The type, allotype, and a series of mostly female paratypes were used in preparing the redescription of the species. A few nontypes are at hand. Among these are two females received from L. H. Weld, who reared them from galls of *Callirhytis flavipes* (Gillette) at Moline, Ill.

The lots listed below bearing Hopkins numbers are of special interest because they resemble the darker specimens of *D. querci-lanae* (Fitch). Here, as in the *nigriceps-globuli-dubia* series, as well as in the *florida-occidentalis* group, there appears to be an intergrading of characters, with the result that arbitrary color marks of doubtful value need to be adopted to separate *foliatae* from *querci-lanae*. Some of the present Hopkins specimens have only a small black patch on the scapulae, which with the rather broad black mid-dorsal band on the mesonotum, and the almost dark vertex, is regarded as a recognition mark of *foliatae*. I suspect that eventually a complete color series ranging from the lighter, mostly yellow *querci-lanae* to the darker, mostly black *foliatae* may be found when large numbers have been reared from different localities in the distributional limits of these species. Some of the Hopkins specimens are from galls of *Disholcaspis*, whereas all other *foliatae* known to date are from other cynipid genera. Most of the *querci-*

lanae material at hand is from *Andricus* galls, although other cynipid genera are represented among its hosts. The Hopkins lots are as follows: 1 female (Hopk. U. S. 13685^e) from gall of *Disholcaspis globulus* (Fitch) on *Quercus alba*, reared April 5, 1918, at Falls Church, Va., by William Middleton; a pair (Hopk. U. S. 15633^a), reared by L. H. Weld from unidentified gall on *Q. chapmani*, May 26, 1920, Clarabella, Fla.; 2 pairs (Hopk. U. S. 10773^a) from the galls of *D. fasciata* Bassett on *Q. velutina*, May 14, 1919, Falls Church, Va., and 1 pair (Hopk. U. S. 10777^b), reared by S. A. Rohwer on May 21 (female) and 14 (male), 1919, from undetermined galls on *Q. minor* at Poplar Bluffs, Mo. The males are all mostly black and have the characteristics of variety *dorsalis* of *querci-lanae* (Fitch).

After repeated study I conclude that *batatoides* Ashmead is identical with his species *foliatae*. The general color scheme and the limits of color variation are alike in the two lots, and no differences in head dimensions, sculpture of the malar space, cheeks and abdomen, nor in the number of setae on the submarginal vein, can be found to justify retaining them as two species. Ashmead, in his description of *batatoides*, says it "very much resembles *foliatae* * * * in punctation and shape," and points out that they may be easily distinguished by size and color. But there are no such size and color differences in the types of the two Ashmead species. His description of *batatoides* does not mention some outstanding color aspects found on the specimen designated by him as the type. The type (female) and allotype are certainly identical with his *foliatae* types. *D. foliatae* Ashmead was reared by Ashmead "from leafy live oak gall," *Andricus foliatus* (Ashmead) (*Cynips q. foliatae* Ashmead), and *D. batatoides* Ashmead was reared by the same worker "from live oak potato gall," *Plagiotrochus batatoides* (Ashmead) (*Cynips q. batatoides* Ashmead). The live oak mentioned is probably *Quercus virginiana*. Both series are from Jacksonville, Fla. These galls are very different in structure, yet this *Decatoma* could live within each as a parasite. Could it be that these galls will prove to be alternate seasonal forms of one species?

33. DECATOMA FOLIATAE ARIZONICA, new variety

PLATE 2, FIGURE 23

Not distinguishable from *D. foliatae* Ashmead in the range of variation in the color of the head, pronotum, and mesonotum; the females of variety *arizonica* in the series at hand have the sides of the abdomen mostly brown yellow to ochreous-yellow, whereas these are darker in *foliatae*; specimens of the variety *arizonica* at hand differ also in being from 3.1 to 3.3 mm. long and in having 14 to 16

setae on the submarginal vein as contrasted with a length of 3 mm. and 12 to 14 setae on the latter vein in *foliatae*. Both these lots are from cynipid galls on live oak, and when more specimens are reared they may not prove to be separable in the respects stated above, despite the difference in geographical distribution.

Type.—Female, U.S.N.M. No. 42243, from Fort Grant, Ariz.

Remarks.—In addition to the type and the allotype, this variety is represented by 5 female and 2 male paratypes reared at Washington, D. C., on April 5, 1882, from unidentified cynipid galls received March 24, 1882, and collected from live oak by H. K. Morrison at Fort Grant, Ariz. Some of the paratypes occur in the writer's collection; the rest, together with the allotype, are in the National Museum. The specimens bear numbers 2634⁰, 2634⁰² and 2634⁰³. One female (Hopk. U. S. 15604^c), which I have determined as this variety, was reared by L. H. Weld, April 29, 1918, from a gall of *Callirhytis ruginosus* (Bassett), at Prescott, Ariz. Mr. Weld had galls of this species from *Q. grisea* and *arizonica*.

34. DECATOMA WILTZAE, new species

Nearest to *D. marylandica* Girault in being mostly black, but has the front and middle legs blacker, is distinctly smaller, and the head is more robust.

Female.—Length 2 mm., fairly robust, color mostly brownish black, some parts yellow; head brownish black, oral space around base of mandibles brownish yellow; scape concolorous with face, apex of pedicel yellowish, rest like scape, funicular segments (specimens imperfect) yellowish and lightly infusate, especially above; thorax, including tegulae, deep brownish black, slightly darker than head, upper front corner of pronotum with a triangular patch of lemon yellow; front and middle coxae mostly, hind coxae entirely, outer disks of front and middle, and all of hind femora and tibiae, dark brown, except ends narrowly; legs otherwise yellow, tarsi light, approaching stramineous; stigma dark brown, submarginal band rudimentary, propodeum, peduncle and abdomen brown black.

Head two-thirds as long as broad, subglobose, broadening behind, face from above feebly protruding beyond eyes, receding rather sharply below antennal fossae, eyes and face moderately set off at their junctions, hind edge of head broadly, vertex more sharply, convex; malar space behind groove, and cheeks entirely smooth, polished, bare, numerous small umbilicate punctures on vertex and occiput, face subreticulate and moderately hairy; pedicel half as long as scape, two and a half times as long as its own diameter at apex, and more than twice as long as F1, F1 not so broad as and slightly longer than F2, F2 and F3 each scarcely longer than wide, rest of antenna not present, but F4 and F5 probably as broad as long; head

only a twelfth broader than pronotum, and as broad as mesothorax; umbilicate impressions of pronotum and mesonotum shallow and indistinct, these nota rather sparsely hairy, anterior half of mesopleura shagreened, posterior portion feebly aciculate and minutely and sparsely punctate; about 12 setae on submarginal vein; propodeal surface rather feebly and variously rugose, the groove broad, moderately concave transversely, and not prominently sculptured, limited in front by V-shaped carina, apex of V acute, more so than in other species studied; abdomen highly polished, smooth, and bare, except posterior face around ovipositor sheath, which is conspicuously hairy.

Male.—Length 2 mm., slenderer and legs blacker than female, color otherwise more variable; only oral area yellowish as on the female, or face almost up to antennal fossae, circumocular band broadly below and narrowly above, and a stripe from each eye obliquely toward scrobe, ochreous-yellow; lateral surfaces and hind edge of pronotum, and a pair of subparallel lines on lateral thirds converging toward front margin, yellow; mesothorax black, sometimes upper part of mesopleura and lower edges of scapulae, axillae and scutel, yellow brown; legs as on female but the brown black of middle legs both more extensive and intense; propodeum, peduncle, and abdomen brown black.

Head not so robust as on female, not quite two-thirds as long as broad, sculpture of head, mesopleura, and abdomen as on female, but carina limiting front of propodeal groove with rounded apex on one specimen; 12 or 13 setae on submarginal vein; ratio of scape and pedicel as in female, F1 a third longer than thick, F2 a fifth longer than wide, rest of antennae lacking, but F3 to F4 probably only slightly longer than wide.

Type locality.—Pasó Robles, Calif.

Type.—Female, U.S.N.M. No. 42247.

Remarks.—Described from the type, the allotype, and two male paratypes. The allotype is placed with the type in the National Museum and the paratypes are in my collection. All these were reared by Dr. A. C. Kinsey at the type locality from the galls of *Andricus wiltzæ* Fullaway on *Quercus lobata*. The cynipid gall makers issued on March 7, 1920.

Later I find six females (Hopk. U. S. 15608^a) reared by L. H. Weld on June 5 and 17, 1918, from undetermined galls on *Q. suber*, at San Jose, Calif. They range from 1.6 to 2.3 mm. in length, the head dimensions vary from five-ninths to two-thirds as long as broad, head rounded, subglobose, and the setae on the submarginal vein number from 11 to 13, mostly 12. This lot agrees with the types also in the following essential respects: F2 to F5 subequal, all about as broad as long, but becoming gradually larger toward club, face and

genae subreticulate, except cheeks along lower hind edge of eye smooth, polished, malar space feebly strigose; anterior lateral portion of mesopleura shagreened, hind part aciculate punctate, anterior end of propodeal groove limited by a V-shaped carina, sides of abdomen entirely unsculptured and highly polished, smooth. The body is entirely black, only the front upper-lateral corners of pronotum are brown yellow; legs variable in color, front and middle coxae yellow to entirely infuscate, hind coxae always black, femoral and tibial disks of all legs more or less black, those of front pair feebly to those of hind legs entirely so. The agreement of this series with the types is so close that I am certain that these are the same species even in the absence of host records for the latter lot. The dimensions of the funicular joints in this series of specimens confirms my descriptions of these joints in the imperfect types.

Six females and four males (Hopk. U. S. 15600^d) were obtained on April 22, 24, 25, and 29, 1918, from galls taken at Flagstaff, Ariz. According to the data on the pins these came from galls on *Rhodites fusiformans* Ashmead on *Rosa* sp. The rearing records accompanying the specimens from these galls, however, do not coincide with the data on the pins. Aside from the confusion in the records, it is quite unlikely that a *Decatoma* known from an oak gall would also inhabit galls on plants so far removed in relationship as the rose. I have studied these specimens repeatedly with great care and am satisfied that they are *Decatoma wiltzae*. I find no characters that are at variance with the essential features of the other specimens at hand. It is probable that the host is a gall on oak.

35. DECATOMA MARYLANDICA Girault

PLATE 2, FIGURE 25

Decatoma marylandica GIRAULT, Bull. Brooklyn Ent. Soc., vol. 2, p. 112, 1916.

Resembles *D. florida* Girault in being mostly black; but *florida* has head twice as wide as long, only the anterior-lateral corners of the pronotum yellow, and legs yellow except coxae, which are black; in *D. marylandica* the head is about three-fifths as long as wide, lateral surfaces of pronotum yellow full length, but narrowly on posterior half, and at least the hind femora and tibiae black.

Female.—Length 2.5 to 3 mm., fairly robust, color mostly black; head black, with fine ocular ring of yellow-brown, labium and palpi yellowish white; scape and pedicel lemon yellow, but basal two-thirds of latter brown above, F1 to F3 dusky, F4, F5, and club light chestnut brown; pronotum black, anterior-lateral half broadly and posterior half narrowly yellow, lower edge of notum black; rest of thorax and propodeum black, tegulae brown; front and middle legs lemon yellow, except base of coxae and outer femoral disks, which

are faintly brown or brown black, middle pair somewhat darker, basal four-fifths of hind coxae black, the femora and tibiae brown black, except base and apex narrowly, tarsi almost stramineous, other parts of legs lemon yellow; stigma dark brown; peduncle and most of abdomen black, or abdomen in part brownish black on the sides.

Head three-fifths to four-sevenths as long as broad, face protruding rather strongly beyond eyes, well-rounded and distinctly set off from eyes, vertex feebly convex above transversely, back edge of head almost straight; all of vertex finely and densely punctate, with sparse small umbilicate punctures, malar space smooth, shiny, cheeks finely strigose-punctate, scantily hairy, face reticulate-punctate, moderately hairy; pedicel a fourth longer than F1, latter slightly longer than F2, F2 to F5 subequal in length, each only slightly longer than thick; mesothorax almost as broad as, and pronotum about one-sixth narrower than, head; pronotum and mesonotum coarsely punctate, punctures umbilicate and almost contiguous, anterior half of mesopleura finely and densely pitted, posterior half aciculate-punctate; propodeal surface rather coarsely and variously reticulate, groove broad, its bottom rounded and rugose, the anterior fourth smooth, shiny, groove limited anteriorly by a broadly V-shaped carina with rounded apex; submarginal vein with about 16 setae; abdomen polished and smooth, and bare except moderately hairy along ovipositor sheath.

Male.—Unknown.

Type locality.—Glenn Dale, Md.

Holotype.—Female, U.S.N.M. No. 20364.

Originally described from the holotype, and presumably also another female from oak at Washington, D. C., which Mr. Girault had at hand. The holotype was collected at large in a woods on June 26, 1916. Two additional females were sent me by Dr. J. McDunnough from the entomological collections of the Canadian Department of Agriculture, Ottawa. These agree in every way with the type and the Washington specimen, and issued June 3, 1911, from the galls of *Neuroterus batatus* (Fitch). The galls were collected by H. G. Payne at Bear River, Nova Scotia. This is the oak potato gall, and appears on white oak (*Quercus alba*).

36. DECATOMA FLORIDA Girault

Decatoma florida GIRAULT, Descriptiones hymenopterorum chalcidoidicarum variorum cum observationibus, pt. 5, p. 6, 1917; Proc. U. S. Nat. Mus., vol. 58, p. 208, 1920.

Most like *marylandica* Girault from which it may be distinguished by characters given before the description of that species.

Female.—Length 3 to 3.1 mm., fairly robust, body almost entirely black; head black except a narrow ocular band of yellowish brown, an

inconspicuous stripe from each antennal fossa to base of mandibles, and oral area narrowly, brown, palpi light yellow, gula light brown; scape light lemon yellow, almost stramineous, pedicel yellowish brown above, sometimes darker on sides, ring joint and flagellum light yellowish brown; dorso-cephalic corner of pronotum yellow, rest of thorax, including propodeum, black, tegulae brown; legs yellow, but all coxae black, and tarsi stramineous; stigma not densely brown; peduncle and abdomen entirely black.

Head always distinctly twice as wide as long, face almost flat, scarcely protruding beyond a straight line tangent to front edge of eyes, vertex elevated somewhat abruptly between hind ocelli, upper hind edge of head quite straight, occiput broadly concave, temples fairly prominent, hence head from above strongly rectangulate-ovate; vertex feebly umbilicate and finely and densely punctate, malar groove entire, malar space reticulate-punctate, and sparsely hairy like genae and face; pedicel slightly more than twice as long as its greatest width at apex, and one-fourth longer than F1, latter a fourth longer than thick and only slightly longer than F2, F2 to F5 subequal, F2 and F3 each a bit longer than thick, F4 and F5 scarcely longer than wide, club as long as F5, F4, and a third of F3 combined; pronotum narrower than head and mesothorax, and thorax rather coarsely umbilicate above, moderately hairy, front of mesopleura finely punctate, hind half aciculate-punctate; submarginal vein with a row of 16 to 17 setae; propodeal surface quite coarsely and variously sculptured, nearly reticulate, groove fairly deep, posterior two-thirds crossed by several subparallel rugae, the anterior third polished, and limited in front by a V-shaped carina with a rather sharply rounded apex; abdomen polished, smooth, and bare, except area of ovipositor sheath hairy and punctate.

Male.—Unknown.

Type locality.—Jacksonville, Fla.

Type.—Female, U.S.N.M. No. 20868.

Remarks.—Girault's original description was based on the type and a female paratype in the United States National Museum and collected at the type locality by W. H. Ashmead. No further facts are known about this material. In studying the National Museum specimens of this genus I have found eight additional individuals of this species that no doubt belong to the original lot taken by Ashmead but were overlooked by Girault. They bear the same locality label as the types, and agree with them in color and structural features. On one of the pins is written "*A. flocci*," which is the only hint we have concerning the host of this species. *A. flocci* is *Andricus flocci* (Walsh), which forms galls on *Quercus alba*.

It is of interest that no males are known. It is possible that some specimens of that sex belonging to this species are confused with the

mostly black males of other species, notably variety *dorsalis* of *D. querci-lanae* (Fitch). As noted heretofore, the mostly black males of several species belonging to the division of this genus without submarginal wing bands are so similar that they are not yet distinguished. This species must be reared in order to obtain males that can safely be associated with the known females.

Girault did not indicate in his privately published description of 1917 that *D. florida* is a new species. It is the first record of this species in the literature, however, and is therefore the original description. The second description, 1920, erroneously designates it as a new species. There is no question concerning the identity of the forms he had at hand on the two occasions. The locality, dates, and descriptions agree, and in each article this species is likened to Girault's *D. marylandica*, which is similar to *D. florida*.

37. *DECATOMA GRACILIS* Fullaway

Decatoma gracilis FULLAWAY, Journ. New York Ent. Soc., vol. 20, p. 280, 1912.

Described by Fullaway from the holotype male. The type was reared by Mrs. Rose Patterson Blakeman from the gall of *Andricus californicus* (Bassett) at Stanford University and is housed in the collection of that institution. It bears lot number 508, sub. 30. Dr. Isabel McCracken writes me that the type locality is St. Helena, Napa County, Calif.

I have not seen this type. Doctor McCracken kindly compared with it some specimens from my Kinsey material reared from *Andricus* galls in California, which seemed to me to fit the description. She reports that my specimens do not agree with the type. The color phase of the original description indicates strongly that the type is a specimen of an extreme dark form of male similar to variety *dorsalis* (Fitch) of *querci-lanae*. This form of male also occurs in *foliatae* Ashmead, *foliatae* var. *arizonica* Balduf, and in my species, *quinqueseptae* and *wiltzae*. Some dark males of *foliatae*, *wiltzae*, and variety *dorsalis* (Fitch) are known from *Andricus* species. They agree with *gracilis* Fullaway in being mostly black with legs mostly yellow. Much variation in the degree of yellow on the head, pronotum, and legs, as well as on the mesonotum, occurs on the series of *dorsalis* and *dorsalis*-like males at hand. The type of *D. gracilis* Fullaway is black and has only the anterior of the face, the pronotum, "except for a median V-shaped black area anteriorly," and legs, except "mid and hind femora and tibiae and hind coxae outwardly marked with black," lemon yellow. This color picture comes within the limits of color variation in my series of the mostly black males named above. Especially is the lemon yellow characteristic on this black form of male. I am unable to identify *D. gracilis* Fullaway

with certainty with any material at hand. Further rearings from the galls of *A. californicus* (Bassett) in the type locality are necessary to determine the status of Fullaway's species.

HOSTS OF THE SPECIES OF DECATOMA

Most of the known North American species of *Decatoma* live within galls made by Cynipidae. It is probable that they are parasitic on the larvae of the gall makers, but this relation has been demonstrated only in the case of *D. flava* Ashmead, by Triggerson. In the list below, the gall makers are cited as the hosts, but it is to be understood that the parasites may possibly develop on other insects that commonly share galls with the makers.

Decatoma amsterdamensis Girault has been reared from *Harmolita* spp., or joint worms. *D. nubilistigma* Walsh was obtained from a cecidomyid gall on willow, and *D. querci* Ashmead from a dipterous gall on oak. *D. flamminneiventris* Girault is apparently directly parasitic on the bogus yucca moths, *Prodoxus* spp. The stem swelling on *Mimosa*, which yielded *D. mimosae* Balduf, may prove to be a cynipid gall.

HYMENOPTERA

HOST SPECIES	PARASITE (DECATOMA)
<i>Acraspis erinacei</i> (Beutenmueller)-----	<i>querci-lanae</i> (Fitch)
<i>macrocarpae</i> Bassett-----	<i>flava</i> Ashmead
<i>Adleria</i> sp.-----	{ <i>disholcaspidis</i> Balduf
	<i>occidentalis</i> Balduf
<i>Amphidolips confluentus spongifica</i> (OstenSacken)-----	<i>varians</i> Walsh
<i>inanis</i> (Osten Sacken)-----	<i>varians</i> Walsh
<i>Andricus aciculatus</i> Beutenmueller-----	{ <i>querci-lanae</i> (Fitch)
	<i>querci-lanae dorsalis</i> (Fitch)
	{ <i>isis</i> Girault
<i>californicus</i> (Bassett)-----	<i>gracilis</i> Fullaway
	<i>florida</i> Girault
<i>floci</i> (Walsh)-----	<i>querci-lanae</i> (Fitch)
	<i>querci-lanae dorsalis</i> (Fitch)
<i>floci</i> var-----	<i>querci-lanae</i> (Fitch)
<i>floridensis</i> (Beutenmueller)-----	<i>flava</i> Ashmead
<i>foliatus</i> (Ashmead)-----	<i>foliatae</i> Ashmead
<i>lasius areolaris</i> Kinsey-----	<i>occidentalis</i> Balduf
<i>lasius lasius</i> Ashmead-----	{ <i>occidentalis</i> Balduf
	<i>subimmaculata</i> Girault
<i>lasius sublasius</i> Kinsey-----	{ <i>occidentalis</i> Balduf
	<i>subimmaculata</i> Girault
	<i>brevilobae</i> Balduf
<i>murtfeldtae</i> Ashmead-----	<i>flava</i> Ashmead
	<i>querci-lanae</i> (Fitch)

<i>Andricus pattoni</i> (Bassett)-----	<i>querci-lanae</i> (Fitch)
<i>petiolicola</i> (Bassett)-----	<i>querci-lanae</i> (Fitch)
<i>petiolicola</i> var-----	<i>querci-lanae</i> (Fitch)
<i>pomiformis</i> (Bassett)-----	<i>isis</i> Girault
<i>pomiformis maculipennis</i> (Kieffer)-----	<i>subimmaculata</i> Girault
<i>pomiformis rossi</i> (Kieffer)-----	<i>pomiformis</i> Balduf
<i>quinqueseptum</i> var-----	<i>flava</i> Ashmead
<i>spectabilis</i> Kinsey-----	{ <i>isis</i> Girault <i>subimmaculata</i> Girault
<i>suttoni</i> (Bassett)-----	<i>isis</i> Girault
<i>tecturnarum</i> Kinsey-----	<i>globuli</i> Balduf
<i>tubularius</i> Weld-----	<i>flava</i> Ashmead
<i>turnerii</i> (Ashmead)-----	<i>lanae</i> Ashmead
<i>wiltzae</i> Fullaway-----	{ <i>lobatae</i> Balduf <i>wiltzae</i> Balduf
sp-----	<i>occidentalis</i> Balduf
<i>Belonocnema fossoria</i> Weld-----	{ <i>dubia</i> Walsh <i>dubia rufosa</i> Balduf
<i>Biorhiza caepuliformis</i> (Beutenmueller)-----	<i>varians</i> Walsh
<i>forticornis</i> (Walsh)-----	{ <i>globuli</i> Balduf <i>nigriceps</i> Walsh <i>querci-lanae</i> (Fitch)
<i>Callirhytis cornigera</i> (Osten Sacken)-----	<i>novascotiae</i> Balduf
<i>flavipes</i> (Gillette)-----	{ <i>brevilobae</i> Balduf <i>foliatae</i> Ashmead <i>querci-lanae</i> (Fitch)
<i>gemmaria</i> (Ashmead)-----	<i>varians</i> Walsh
<i>ruginosus</i> (Bassett)-----	{ <i>disholcaspidis</i> Balduf <i>foliatae arizonica</i> Balduf <i>globuli</i> Balduf <i>occidentalis</i> Balduf
<i>scitula</i> (Bassett)-----	<i>querci-lanae</i> (Fitch)
<i>seminator</i> (Harris)-----	{ <i>flava</i> Ashmead <i>querci-lanae</i> (Fitch)
<i>tubicola</i> (Osten Sacken)-----	<i>flava</i> Ashmead
<i>tumifica</i> (Osten Sacken)-----	{ <i>querci-lanae</i> (Fitch) <i>querci-lanae dorsalis</i> (Fitch)
sp-----	<i>querci-lanae</i> (Fitch)
sp-----	<i>subimmaculata</i> Girault
sp-----	<i>varians</i> Walsh
<i>Compsodryoxenus humilis</i> Weld-----	<i>flava</i> Ashmead
<i>Cynips pezomachoides</i> Osten Sacken-----	{ <i>flava</i> Ashmead <i>pezomachoides</i> Balduf <i>querci-lanae</i> (Fitch)
<i>pezomachoides crinacci</i> (Mayr)-----	<i>flava</i> Ashmead
<i>weldi</i> var-----	<i>occidentalis</i> Balduf
sp-----	<i>querci-lanae</i> (Fitch)
<i>Diptolepis china</i> Osten Sacken-----	<i>occidentalis</i> Balduf
<i>Disholcaspis corallina</i> (Bassett)-----	{ <i>dubia doanei</i> Fullaway <i>occidentalis</i> Balduf
<i>chrysolepidis</i> Beutenmueller-----	<i>dubia doanei</i> Fullaway
<i>cinerosa</i> (Bassett)-----	<i>disholcaspidis</i> Balduf

<i>Disholcaspis corallina</i> (Bassett)-----	{	<i>dubia doanei</i> Fullaway
		<i>occidentalis</i> Balduf
<i>eldoradensis</i> (Beutenmueller)-----	{	<i>dubia doanei</i> Fullaway
		<i>varians</i> Walsh
<i>eldoradensis</i> var-----	{	<i>dubia doanei</i> Fullaway
		<i>globuli</i> Balduf
<i>fasciata</i> Bassett-----	{	<i>dubia</i> Walsh
		<i>foliatae</i> Ashmead
		<i>varians</i> Walsh
		<i>dubia</i> Walsh
		<i>dubia rufosa</i> Balduf
		<i>flava</i> Ashmead
<i>globulus</i> (Fitch)-----	{	<i>foliatae</i> Ashmead
		<i>globuli</i> Balduf
		<i>querci-lanae</i> (Fitch)
		<i>querci-lanae dorsalis</i> (Fitch)
		<i>dubia</i> Walsh
<i>mamma</i> (Walsh)-----	{	<i>nigriceps</i> Walsh
		<i>querci-lanae</i> (Fitch)
		<i>querci-lanae dorsalis</i> (Fitch)
<i>mamma</i> var-----		<i>dubia rufosa</i> Balduf
<i>plumbella</i> Kinsey-----		<i>dubia doanei</i> Fullaway
	{	<i>dubia</i> Walsh
<i>spongiosa</i> Karsch-----		<i>dubia rufosa</i> Balduf
		<i>globuli</i> Balduf
		<i>occidentalis</i> Balduf
<i>truckeensis</i> (Ashmead)-----	{	<i>subimmaculata</i> Girault
sp-----		<i>disholcaspidis</i> Balduf
sp-----		<i>flava</i> Ashmead
sp-----		<i>globuli</i> Balduf
sp-----		<i>globuli</i> Balduf
sp-----		<i>varians</i> Walsh
<i>Dryorhizoxenus floridanus</i> Ashmead-----		<i>bicolor</i> Ashmead
<i>Harmolita hordei</i> (Harris)-----		<i>amsterdamensis</i> Girault
sp-----		<i>amsterdamensis</i> Girault
<i>Hemadis nubilipennis</i> Ashmead-----		<i>vacciniicola</i> Balduf
<i>Heterococcus dasydactyli</i> (Ashmead), or <i>H. melanoderma</i> Kinsey.		<i>subimmaculata</i> Girault
<i>pacificus</i> (Ashmead)-----		<i>subimmaculata</i> Girault
<i>pacificus pacificus</i> (Ashmead)-----		<i>subimmaculata</i> Girault
sp-----		<i>subimmaculata</i> Girault
	{	<i>flava</i> Ashmead
<i>Neuroterus batatus</i> (Fitch)-----		<i>marylandica</i> Girault
		<i>novascotiae</i> Balduf
		<i>querci-lanae</i> (Fitch)
<i>batatus noxiosus</i> form <i>noxiosus</i> (Bassett)-----		<i>flava</i> Ashmead
<i>majalis</i> (Bassett)-----		<i>querci-lanae</i> (Fitch)
		<i>querci-lanae dorsalis</i> (Fitch)
<i>noxiosus</i> (Bassett)-----		<i>flava</i> Ashmead
		<i>querci-lanae dorsalis</i> (Fitch)
<i>quercicola pacificus varians</i> Kinsey-----		<i>lobatae</i> Balduf
<i>saltatorius</i> (Edwards)-----		<i>querci-lanae</i> (Fitch)

<i>Plagiotrochus batatoides</i> (Ashmead)-----	<i>foliatae</i> Ashmead
<i>chrysolepidicola</i> (Ashmead)-----	} <i>isis</i> Girault
<i>chrysolepidicola pugnus</i> Kinsey-----	
<i>coxi</i> (Bassett)-----	<i>varians</i> Walsh
<i>frequens frequens</i> (Gillette)-----	<i>flavipes</i> Balduf
<i>punctatus</i> (Bassett)-----	<i>varians</i> Walsh
<i>quinqueseptum</i> var-----	<i>quinqueseptae</i> Balduf
<i>tumifica</i> (Osten Sacken)-----	<i>nigriceps</i> Walsh

MISCELLANEOUS

Dipterous gall on <i>Quercus laevis</i> Walter (<i>catesbaei</i> Michaux).	<i>querci</i> Ashmead
<i>Prodoxus quinquepunctellus</i> Chambers-----	<i>flamminneiventris</i> Girault
<i>y-inversus</i> Riley-----	<i>flamminciventris</i> Girault
<i>Rhabdophaga batatae</i> (Walsh)-----	<i>nubilistigma</i> Walsh
Stem gall on <i>Mimosa biuncifera</i> -----	<i>mimosae</i> Balduf

REFERENCES

In addition to the references listed in the accounts of the several species of *Decatoma*, I have found certain works on oaks and galls and other fields of knowledge essential in this study, and cite them here for the convenience of persons who may need them.

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EXPLANATION OF PLATES

The photographs of the wings on Plates 1 and 2 were made by A. D. Eldredge, formerly in charge of photography at the University of Illinois, and the drawings by Mrs. W. V. Balduf. The photographed wings are all to the same scale, and the drawings of Plates 3 and 4 vary slightly in the rate of magnification.

PLATE 1

- Figure 1. *Decatoma vacciniicola*, new species. Right front wing.
2. *Decatoma flava* Ashmead. Right front wing.
3. *Decatoma lanae* Ashmead. Right front wing.
4. *Decatoma amsterdamensis* Girault. Left front wing.
5. *Decatoma texana*, new species. Right front wing.
6. *Decatoma disholcaspidis*, new species. Left front wing.
7. *Decatoma nubulistigma* Walsh. Left front wing.
8. *Decatoma bicolor* Ashmead. Left front wing.
9. *Decatoma isis* Girault. Right front wing.
10. *Decatoma varians* Walsh. Right front wing. California.
11. *Decatoma varians* Walsh. Left front wing. Illinois.
12. *Decatoma dubia* Walsh. Right front wing.
13. *Decatoma dubia rufosa*, new variety. Right front wing.

PLATE 2

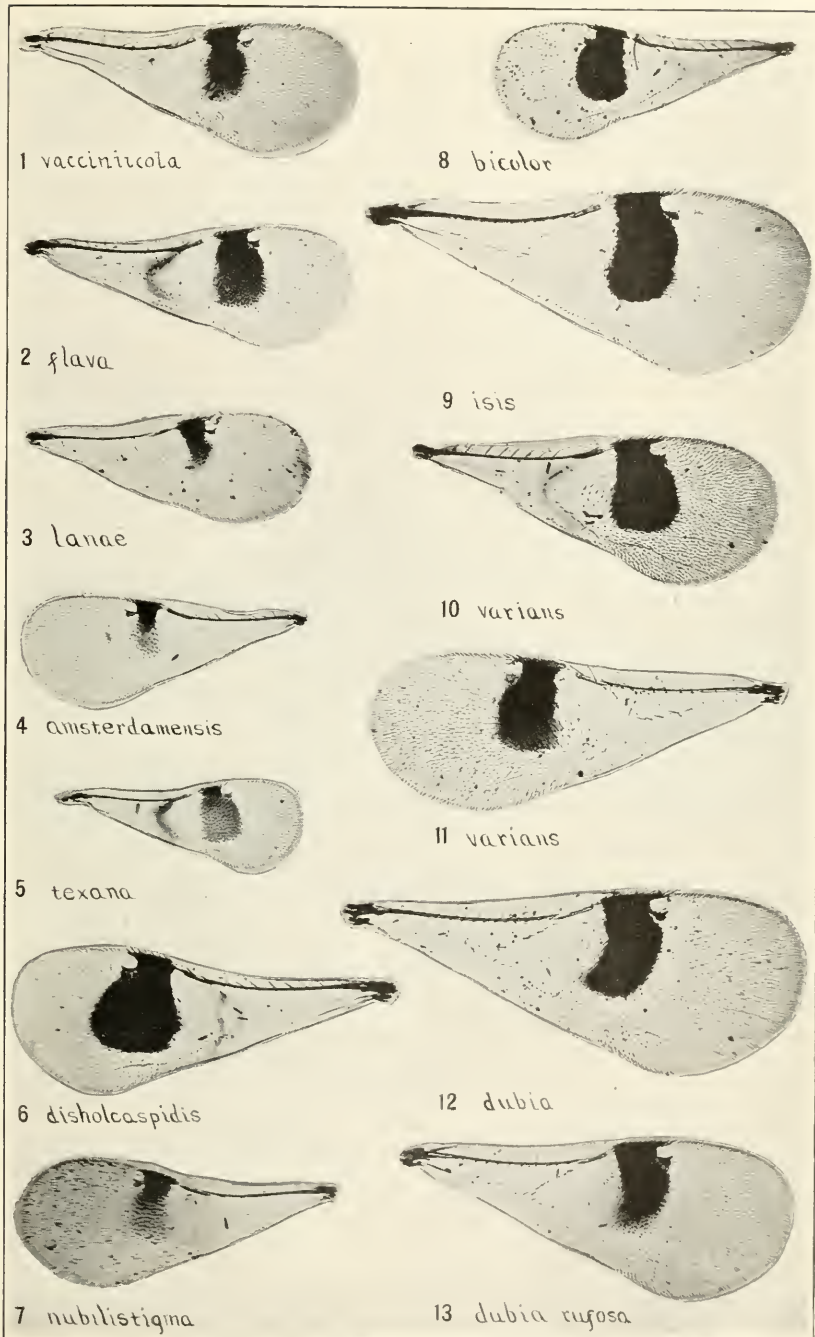
- Figure 14. *Decatoma dubia doanei* Fullaway. Left front wing.
15. *Decatoma lobatae*, new species. Right front wing.
16. *Decatoma globuli*, new species. Right front wing.
17. *Decatoma novascotiae*, new species. Left front wing.
18. *Decatoma flamminneiventris* Girault. Right front wing.
19. *Decatoma occidentalis*, new species. Left front wing. Arizona.
20. *Decatoma occidentalis*, new species. Right front wing. California.
21. *Decatoma brevilobae*, new species. Left front wing.
22. *Decatoma nigriceps* Walsh. Right front wing.
23. *Decatoma foliatae arizonica*, new variety. Left front wing.
24. *Decatoma pomiformis*, new species. Left front wing.
25. *Decatoma marylandica* Girault. Left front wing.
26. *Decatoma querci-lanae* (Fitch). Right front wing.

PLATE 3

- Figure 27. *Decatoma flamminneiventris* Girault. Pronotum, male.
28. *Decatoma flamminneiventris* Girault. Umbilicate punctures of scutel, greatly enlarged.
29. *Decatoma flamminneiventris* Girault. Mesonotum, male. *a*, Pre-scutum; *b*, *b*, scapulae; *c*, *c*, axillae; *d*, scutel.
30. *Decatoma vacciniicola*, new species. Male antenna. Sensoria.
31. *Decatoma vacciniicola*, new species. Female antenna. Sensoria.
32. *Decatoma lanae* Ashmead. Female antenna.
33. *Decatoma vacciniicola*, new species. Front wing; *a*, submarginal vein; *b*, marginal vein; *c*, postmarginal vein; *d*, stigmal vein; *e*, submarginal band; *f*, cubital row; *g*, subdiscoidal row.
34. *Decatoma disholcaspidis*, new species. Front wing.

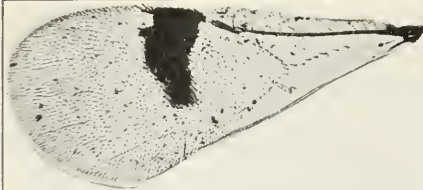
PLATE 4

- Figure 35. *Decatoma vacciniicola*, new species. Female propodeum. Dorsal view.
36. *Decatoma vacciniicola*, new species. Male propodeum. Dorsal view.
37. *Decatoma flamminneiventris* Girault. Female propodeum. Dorsal view.
38. *Decatoma lanae* Ashmead. Female propodeum. Dorsal view.
39. *Decatoma flava* Ashmead. Female propodeum. Dorsal view.
40. *Decatoma vacciniicola*, new species. Female. Front view of head. Antennae removed.
41. *Decatoma flamminneiventris* Girault. Male. Head, dorsal view.
42. *Decatoma flava* Ashmead. Male. Head, dorsal view.

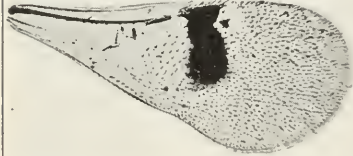


WINGS OF VARIOUS SPECIES OF DECATOMA

FOR EXPLANATION OF PLATE SEE PAGE 93.



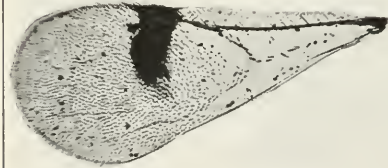
14 *dubia doanei*



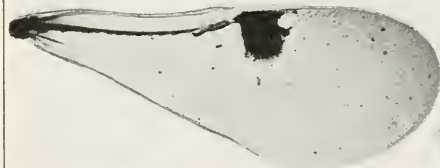
15 *lobatae*



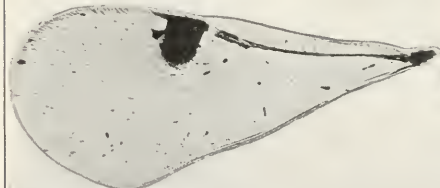
16 *globuli*



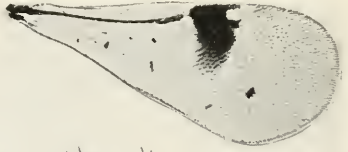
17 *novascotiae*



18 *flammineiventris*



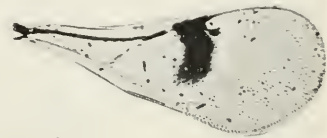
19 *occidentalis*



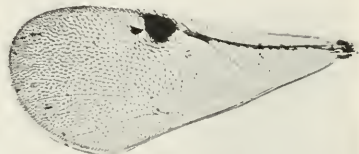
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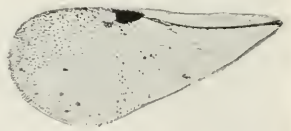
21 *brevilobae*



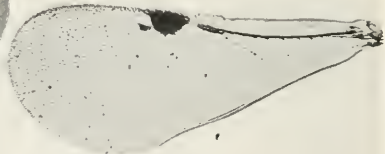
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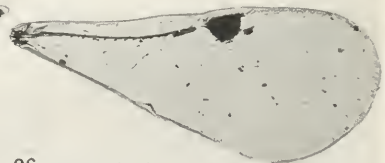
23 *foliatae arizonica*



24 *pomiformis*



25 *marylandica*



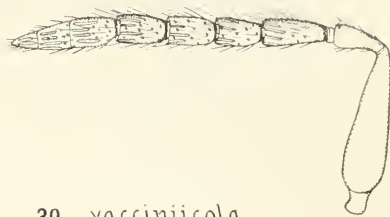
26 *querci-lanae*

WINGS OF VARIOUS SPECIES OF DECATOMA

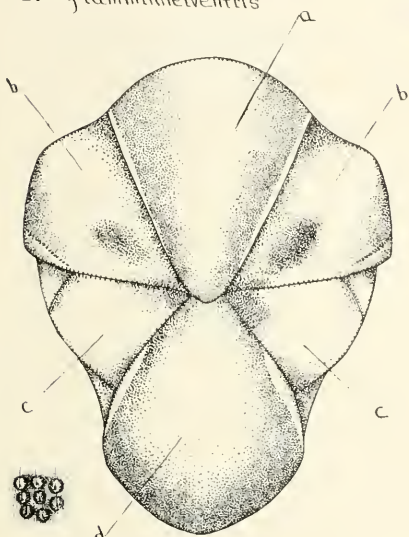
FOR EXPLANATION OF PLATE SEE PAGE 93.



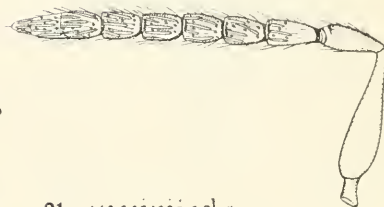
27 *flaminneiventris*



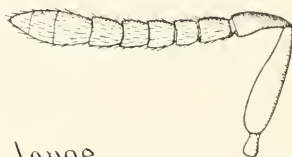
30 *vaccinicola*



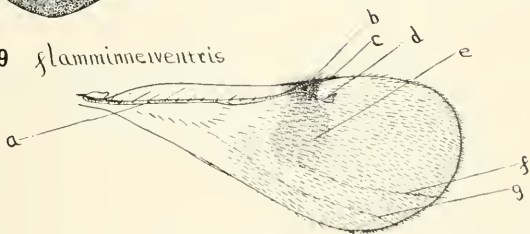
28 & 29 *flaminneiventris*



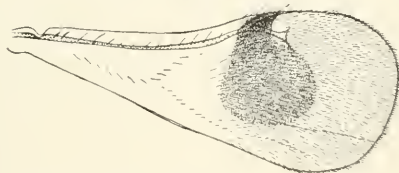
31 *vaccinicola*



32 *lanae*



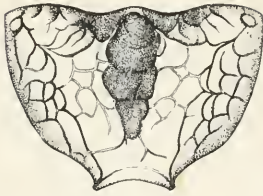
33 *vaccinicola*



34 *disholcaspidis*

PARTS OF VARIOUS SPECIES OF DECATOMA

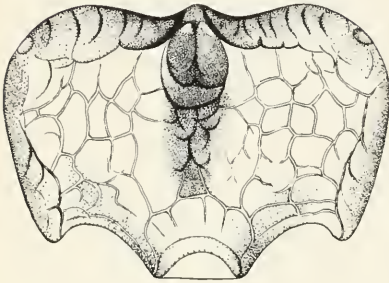
FOR EXPLANATION OF PLATE SEE PAGE 94.



35 *vacciniicola*



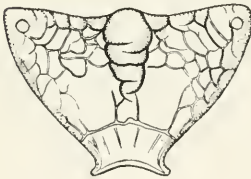
36 *vacciniicola*



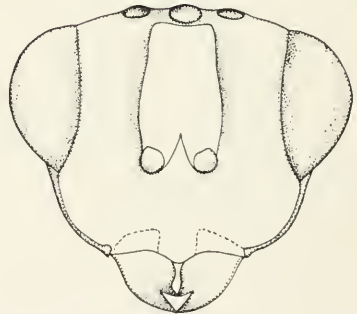
37 *flamminneiventris*



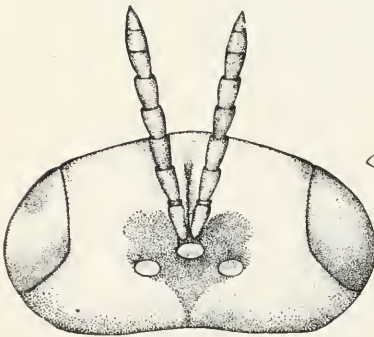
38 *lanae*



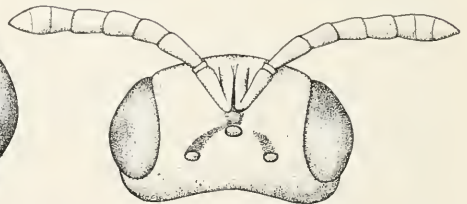
39 *flava*



40 *vacciniicola*



41 *flamminneiventris*



42 *flava*

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