

DATA ON *DECODES*, A NEW NORTH AMERICAN  
CNEPHASIID GENUS, WITH DESCRIPTIONS OF NEW  
SPECIES (TORTRICIDÆ)

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In 1879, Lord WALSINGHAM described a new North American species *Sciaphila basiplagana*. FERNALD (1903) transferred it to the genus *Tortrix* Linné, but MEYRICK (1912) came back to the point of view of WALSINGHAM, and placed this species in the genus *Cnephasia* Curtis which at that time was treated as synonymous with *Sciaphila* Treitschke. BUSCK (1919) was the first who noticed the relationship between *basiplagana* and the Palearctic genus *Tortricodes* Guenée, placed it in this genus, and described one more North American species as *Tortricodes fragariana*. MCDUNNOUGH (1939) treated *basiplagana* again as belonging to *Cnephasia*, but *fragariana* he left in the genus *Tortricodes*, in which, in accordance with BUSCK (1919), he also placed *horariana* Walsingham as the second North American species.

Later BUSCK changed his opinion about the systematic position of *basiplagana*, *fragariana*, and *horariana*, and treated them as members of a separate genus *Decodes*, the description of which he never published. This name of BUSCK is known only from his labels in the United States National Museum, and hand written or typed notes deposited in this museum. On one place in these notes, "*Decodes* gen. nov." is mentioned as including *fragariana*, *basiplagana*, and *horariana*, but no diagnosis of this new genus is given. In two drafts of generic keys of the Tortricidæ, based on the male genitalia and dated "May 1922" and "July 1923", a "n. gen." with *fragariana* as the type is mentioned, but not named. The keys dated "May 1929" and "July 1929" include the name "*Decodes* Busck" without any reference to the species. From these keys a comparative, genitalic diagnosis of *Decodes* is seen, but it does not give a complete idea of this genus. In a synoptic table of the Tortricid genera, based on external characters and dated "May 1929", BUSCK again gave only a comparative diagnosis of *Decodes*, but did not name any species of this genus. As is seen from the above, BUSCK did not leave any note which might be published post-humously, to secure his authorship of the genus *Decodes*, and it remained merely a manuscript name.

The name *Decodes* represents probably an arbitrary combination of letters, imitating the name *Tortricodes*, and should therefore be treated as being of masculine gender. In describing the genus, the present author does not see any objections to the application of the name *Decodes* to the new genus established below, especially because this name became familiar to the students dealing with the collections of the United States National Museum. He only regrets that there is no chance to attribute its authorship to the late AUGUST BUSCK who should, in fairness, be considered the real author of this name.

In its present conception, the genus *Decodes* includes two of the species named by BUSCK as its members, and four more new species described below. The species *horariana* should be excluded from *Decodes*, because it shows some characters justifying its generic separation. This problem will be treated by OBRATZOV in his revision of the Nearctic genera of the Tortricidæ, planned for publication before long.

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### DECODES Obraztov, NEW GENUS

Type: *Tortricodes fragariana* Busck, 1919.

*Sciaphila* (in part), Walsingham, 1879, *Illustrations typical specimens Lepidoptera Heterocera* 4: 23. Fernald, 1882, *Trans. Amer. ent. soc.* 10: 17. Grote, 1882, *New check list North American moths*: 58.

*Tortrix* (in part), Fernald, "1902" [1903], *Bull. U. S. nat. mus.* 52: 484.

*Cnephasia* (in part), Meyrick, 1912, in Wagner, *Lepid. catalogus*, pt. 10: 45; 1913, in Wytzman, *Genera insectorum*, fasc. 149: 45. Barnes & McDunnough, 1917, *Check list Lepidoptera Boreal America*: 178. McDunnough, 1939, *Mem. so. California acad. sci.* 2: 58.

*Tortricodes*, Busck (not Guenée), 1919, *Proc. ent. soc. Washington* 21: 52. Barnes & Busck, 1920, *Contr. nat. hist. Lepid. North America* 4: pl. 32: figs. 3-4. Forbes, "1923" [1924], *Mem. Cornell univ. agr. exp. sta.* 68: 488. McDunnough, 1939, *Mem. so. California acad. sci.* 2: 58.

*Peronea* (in part), Meyrick, 1922, *Entomologist* 55: 255 (by mistake).

Head (fig. 1) with dense, moderately long, somewhat rough or velvet-like scaling. Antenna simple, densely short ciliated, in males sometimes slightly subserrate apicad. Labial palpus ascending with scaling appressed; second joint slightly bent upward, a little dilated apicad; terminal joint rather long, obtuse. Proboscis moderate, well developed. Maxillary palpus rather long. Thorax smooth or with a slight posterior tuft. Abdomen with a moderate anal tuft in male, with a typical "floricomous" tip in female.

Forewing (fig. 2) smooth or with groups of raised scales, broad lancet-shaped; costa more or less arched; apex narrowly rounded; termen oblique, slightly convex; tornus flatly rounded; dorsum gently arched, more rounded basad. Twelve veins, all separate; S almost straight;  $R_1$  from middle of discal cell;  $R_2$  nearer to  $R_3$  than to  $R_1$ ;  $R_3$  twice as remote from  $R_4$  as  $R_4$  is from  $R_5$ ; the latter to costa; internal vein of discal cell from between  $R_1$  and  $R_2$ , or lacking;  $M_1$  to termen, more or less close to apex;  $M_2$ ,  $M_3$ , and  $Cu_1$  almost equidistant at origin;  $Cu_1$  from lower angle,  $Cu_2$  from behind middle of discal cell, but distinctly before two-thirds;  $A_1$  distinct tornad; basal fork at  $A_{2+3}$  a quarter of entire vein.

Hind wing (fig. 2) subtrapezoidal, broader or narrower than forewing; costa gently arched; apex rotundate, sometimes slightly projected; termen below it, straight

or concave; tornus broadly rounded; dorsum convex or straight externad, strongly arched basad. Seven veins; S slightly undulate, almost straight; R and  $M_1$  long stalked;  $M_2$  and  $Cu_1$  closely approximated toward lower angle of discal cell;  $M_3$  lacking;  $Cu_2$  from slightly behind three-quarters of discal cell. Cubitus without pecten.

Male genitalia (figs. 3-8). Tegumen moderately broad with more or less oblique shoulders; pedunculi rather long and narrow; saccus complete. Valva elongate, weak, narrowed apicad; length larger than width; costa more or less sclerotized, often strong; sacculus either developed as a rather weak fold, or long with a free point bent downwardly; upper basal angle of valva more or less produced; no pulvinus and processus basales. Uncus slender, tapering, spinulate; gnathos rather long with a spoon-like dilated middle process; socii weak, drooping, dilated, rather large. Fultura superior sclerotized, forming a dilated, shield-like middle plate over ædæagus. Fultura inferior sclerotized, more or less high, subtrapezoidal with two apical points; caulis moderate, joined to or close to cæcum penis; two weak, haired papillæ on diaphragma dorsolaterad from fultura inferior. Ædæagus slender, more or less long bent or elbowed, slightly tapering apicad; cæcum penis elongate; no cornuti.

Female genitalia (figs. 9-14). Papillæ anales floricomous with caudal lobes more or less broad and cephalary parts narrow. Sinus vaginalis wide; lamella antevaginalis narrow, fused with a sclerotized, more or less long antrum; lamella postvaginalis dilated with cephalary angles rotundate. Ductus bursæ moderate or rather short, sometimes slightly sclerotized on certain places; no cestum. Corpus bursæ rotundate or slightly elongate, finely punctate or smooth; signum stellate or ribbon-like, scobinate. Ductus seminalis merging with corpus bursæ caudad, sometimes through its slightly produced caudal part.

Remarks. In the venation of hind wing this new genus approaches the Palearctic genera *Tortricodes* Guenée, *Oxypteron* Staudinger, and *Oporopsamma* Gozmány, but differs from all of them in having the subcostal area of the forewings distinctly broader and all branches of the vein R correspondingly longer. Moreover, in *Decodes*,  $R_5$  of the forewing terminates distinctly at the costa, while in the above Palearctic genera it reaches the termen or at least (*Oporopsamma*) the apex. All of the latter genera have the antenna in the male more or less fasciculate-ciliated, the proboscis greatly reduced, and the maxillary palpus rudimentary or absent. All of them have the socii much narrower, and the middle process of the gnathos is never spoon-like. In addition, *Tortricodes* has no fultura superior, and in *Oxypteron* the gnathos is semimembranous, fused with anal tube. A dilated sterigma is typical of the females of the above Palearctic genera. The venation of hind wings of the Neotropical genus *Rhythmologa* Meyrick is also similar to that of *Decodes*, but in *Rhythmologa* the forewing vein  $R_5$  terminates below the wing apex, and the sterigma of the female is underdeveloped.

The six known species of the genus *Decodes*, according to their male genitalia, might be distributed among two groups. In one of them (*johnstoni*, *aneuretus*, and *bicolor*) the sacculus is strongly sclerotized and ends in a free tip; in the other group (*montanus*, *basiplaganus*, and *fragarianus*) it is weak, developed merely as a fold at the lower margin of the valva. For the present time it would seem imprudent to treat these groups as separate subgenera, especially with regard to a similar specific modification of the sacculus in the genus *Cnephasia* Curtis where it cannot be valued as a subgeneric character.

At our present knowledge, the genus *Decodes* is exclusively Nearctic. All of the six known species are recorded in California, but two of them (*basiplaganus* and *fragarianus*) have a wider distribution in North America.

NORTH AMERICAN *Decodes* SPECIES

## GROUP I

*Decodes fragarianus* (Busck), NEW COMBINATION

*Tortricodes fragariana* Busck, 1919, *Proc. ent. soc. Washington* 21: 52 Barnes & Busck, 1920, *Contr. nat. hist. Lepid. North America* 4: pl.32: fig 5. Blackmore, 1920, *Rept. Brit. Columbia prov. mus.* for 1919: 19; 1921, *ibid.* for 1920: 24; Forbes, "1923" [1924], *Mem. Cornell univ. agr. exp. sta.* 68: 488. McDunnough, 1939, *Mem. so. California acad. sci.* 2: 58, no.7456.

*Peronea elapsa* Meyrick, 1922, *Entomologist* 55: 255 (substitute name, by mistake).

A gray species having the color of the forewings variable from nearly a uniform mouse gray to having a distinct antemedian whitish band preceded by a dark band and followed by an ill-defined dark area, a pale area, and a pale subterminal spot.

*Male.* — Forewing length 6.3 to 8.0 mm. *Head:* labial palpus, second segment narrow, about six times longer than wide, not expanded apically, about as long as vertical diameter of eye; gray exteriorly, the scales tipped with whitish, white to grayish interiorly; terminal segment less than half the length of second, slightly narrower, dark gray exteriorly, paler interiorly. Antenna gray, annulated paler above, scape whitish below. Head with tufts of dense, prominent, dark gray scales tipped with whitish. *Thorax:* gray above including tegula, mottled indistinctly with paler, brownish white scales; metanotum unscaled except for weak whitish tufts at sides posteriorly; a tuft of elongate brownish gray scales, minutely tipped with white projecting from below base of tegula posteriorly under wings; underside scales large, whitish. Pro- and mesothoracic legs gray exteriorly, each marked with whitish on the coxa, lower margin of femur, median and terminal band on tibia, and terminal bands on tarsal segments, whitish exteriorly; metathoracic legs whitish throughout. *Forewing:* about 2.75 times longer than greatest width, costa curve slightly flattened at about middle; ground color mouse gray, usually with markings indistinct, consisting of a broad, dark fascia in costal half of wing at basal one fifth, bordered internally and externally by more or less distinct black lines, sometimes preceded by some red brown overscaling in basal area, followed by a broad pale fascia bordered outwardly by an incomplete narrow band of upraised black scales which are followed by a few brownish scales; outer half of wing usually showing almost no markings; sometimes an indistinct, irregular row of upraised black scales from near end of cell, curving downwards toward tornus. Cilia gray, tipped with whitish. Underside pale gray, darker along costa; costa whitish at middle, marked in outer half with five indistinct whitish blotches. *Hindwing:* pale silver-gray throughout, cilia margined basally by a row of short, darker scales, underside similar. *Abdomen:* shining silver-gray above and below including prominent, dorsal tuft on eighth segment. Genitalia as in fig.3 (drawn from plesiotype, San Francisco, JAP slide No.488, 20 slides examined); fultura superior rounded apically with lateral margins straight; socii small, rounded; shape of valva variable, depending upon mounting technique; ædæagus evenly curved, more strongly so than in *montanus* or *basiplaganus*.

*Female.* — Length of forewing 6.5 to 8.4 mm. *Head:* essentially as described for male; color, especially of labial palpus tending to be whiter. *Forewing:* more distinctly marked than male; less distinctly marked specimens show some brownish scaling at base, borders of dark fascia indicated by upturned black scales at least in middle of wing, outer border of pale submedian fascia, when the latter is not evident, indicated by central tuft of upraised red-brown scales; specimens vary through successive degrees to a distinctly banded form as follows: basal patch red-brown. dark fascia at one-fifth, distinctly bordered with a black band outwardly and inwardly on costal half of wing, blending with basal patch towards dorsum; broad whitish submedian band across wing, expanding on dorsum, indistinct outwardly, bordered outwardly below cell by a row of upturned black scales; outer half of wing mouse gray

with suggestion of a second white postmedian band blending into ground color, most evident on dorsal half, with whitish in the terminal area and along margin towards tornus. Underside as described for male, with more distinct costal spots in heavily marked specimens. *Hindwing*: as in male, darker towards apex; underside as in male. *Abdomen*: dull gray above, paler below; genital tuft gray to brownish, prominent. Genitalia as in fig.9, (drawn from plesiotype, Redwood City, JAP slide No.518, 17 slides examined); plate of antrum very short, broadly emarginate at junction of ductus bursæ; ductus bursæ longer than corpus bursæ, with a sclerotized curvature at about middle, corpus bursæ very weak (frequently broken or lost in dissections) without any signum, with only some minute spicules along the central portion.

*Known range*: British Columbia; Oregon; California; Utah; Colorado; New Mexico.

*Type*: HOLOTYPE male (genitalia on slide, prepared by C. HEINRICH on February 25, 1919), Victoria, British Columbia; deposited in the United States National Museum, and examined by the present authors.

*Other material examined*: BRITISH COLUMBIA: 1♂ (genitalia on slide prepared by A. BUSCK on November 16, 1922), Kaslo (Dyar, 39013); 5♂♂, 8♀♀ (genitalia on slides, prepared by C. HEINRICH on January 29, 1919, by A. BUSCK on October 3, 1925, and April 1929, and JAP slide Nos. 466♂, 493♀), Victoria, September 1, 1903, August 17, 1918, September 14-16, 1920 (E. H. BLACKMORE), August 21 and September 9, 1921, August 30, 1922 (W. R. CARTER), deposited in U. S. National Museum; 1♀ (genitalia on slide no. 105-Obr.), Victoria (A. J. CRAKER), deposited in American Museum of Natural History. OREGON: 1♂ (genitalia on slide, prepared by A. BUSCK on April 8, 1929), "Oregon". CALIFORNIA: 2♂♂ (one has the genitalia on slide no.341-Obr.), Berkeley, June, deposited in American Museum of Natural History and U. S. National Museum; 92♂♂, 78♀♀ from various localities, Sonoma County south to San Diego County, data to be given in detail elsewhere. COLORADO: 1♂ (genitalia on slide no. 1-Obr. 3/9 1960), Glenwood Springs, August 1893. NEW MEXICO: 5♂♂, 2♀♀ (genitalia on slides, prepared by C. HEINRICH on January 29, 1919, and A. BUSCK on September 30, 1919—figured in BARNES & Busck, 1920, *Contr. nat. hist. Lepid. North America* 4: pl.32, fig.5—, January 15, 1923; and January 11 and October 2, 1925; and JAP slide No. 479), Hell Canyon, September 10, 1916 (C. HEINRICH), deposited in U. S. National Museum; 1♂ (genitalia on slide no.344-Obr.), Galisteo, September 4, 1916 (C. HEINRICH), deposited in American Museum of Natural History. UTAH: 4♀♀ (genitalia of two of them on slides, prepared by A. BUSCK on October 10, 1923, and May 9, 1925), Provo, August 20, 1911, October 1-2, 1912 (T. SPALDING), deposited in U. S. National Museum.

#### *Decodes basiplaganus* (Walsingham), NEW COMBINATION

*Sciaphila basiplagana* Walsingham, 1879, *Illustrations typical specimens Lepidoptera Heterocera* 4: 23, pl.65: fig.8. Fernald, 1882, *Trans. Amer. ent. soc.* 10: 17. Grote, 1882, *New check list North American moths*: 58, no.69.

*Tortrix basiplagana*, Fernald, "1902" [1903], *Bull. U. S. nat. mus.* 52: 484, no. 5412.

*Cnephasia basiplagana*, Meyrick, 1912, in Wagner, *Lepid. catalogus*, pt.10: 45; 1913, in Wytzman, *Genera insectorum*, fasc 149: 45. Barnes & McDunnough, 1917, *Check list Lepidoptera Boreal America*: 178, no.7406. McDunnough, 1939, *Mem. so. California acad. sci.* 2: 58, no.7464.

*Tortricodes basiplagana*, Busck, *Proc. ent. soc. Washington* 21: 52. Barnes & Busck, 1920, *Contr. nat. hist. Lepid. North America* 4: pl.32: fig.4.

A dark and light banded species, superficially indistinguishable from certain distinctly marked individuals of *fragarianus*.

*Female*. — Forewing length 8.5 to 8.8 mm. Essentially as described for the extreme distinct marked form of *fragarianus*. *Forewing*: about 2.65 times the greatest width, costa evenly curved. Basal patch brownish; a transverse band at basal one-fifth bending outward at middle, margined with black; submedian band whitish, expanding towards dorsum to a round projection along dorsum, bordered below cell and above dorsal projection by upraised black scales; mouse gray in outer half of wing, interrupted by an incomplete, whitish band on dorsal half at outer third and an ill-defined subterminal whitish band and subapical blotch. *Genitalia*: as in fig.10 (drawn from plesiotype, Petaluma, JAP slide No.470, eight slides examined); plate of antrum well defined, short without emargination; ductus bursæ short, without sclerotized area; corpus bursæ strong, round, with patch-like signum and dense comb-like scobination, most pronounced around signum.

*Male*. — Length of forewing 8.0 mm. The one dry specimen available for study is damaged, but superficially appears essentially as described for female, although not so distinctly banded, with the pale antemedian area grayish. *Genitalia*: as in fig.4 (drawn from plesiotype, Pleasant Hill, JAP slide No.496, two slides examined); fultura superior short, the basal width of dilated portion shorter than the length; produced slightly apically, the lateral margins showing a slight sigmoid curvature.

*Known range*: California; Arizona; Texas; Illinois; New York; Pennsylvania; Massachusetts.

*Type*: HOLOTYPE, male (genitalia on slide no.5356), Bosque Co., Texas, October 12, 1874 (BELFRAGE); deposited in the British Museum, and examined by OBRAZTSOV.

*Other material examined*: CALIFORNIA: 1 ♀ (JAP slide No.508), Cotati, Sonoma Co. X-7-36; 1 ♀ (JAP Slide No. 470), Petaluma, Sonoma Co. IX-20-39 (E. C. JOHNSTON) deposited in Canadian National Collection; 1 ♂, 3 ♀ ♀ (JAP Slides, Nos.504, 510, 521), Pleasant Hill, Contra Costa Co., IX-(15, 20)-58, X-2-59 (W. E. FERGUSON); 1 ♀ (JAP Slide No.517), Redwood City, San Mateo Co., X-13-59 (P. H. ARNAUD, JR.) deposited in California Academy of Sciences. ARIZONA: 2 ♂ ♂, 1 ♀ (genitalia on slides, prepared by A. BUSCK on September 21, 1925, and April 20, 1929; slide no. 3-Obr. 2/25 1960), Prescott, October 1-7; 2 ♂ ♂, 1 ♀ (genitalia on slides, prepared by A. BUSCK on September 1, 5, and 22, 1925), Mohave Co., September 8-15, and October 16-23; 1 ♂, 6 ♀ ♀ (genitalia of 1 ♀ on slide no.1-Obr. 2/25 1960), Paradise, Cochise Co., August 24-31, and September 8-30; 1 ♂ (genitalia on slide no.2-Obr. 2/25 1960), South Arizona. TEXAS: 1 ♀ (genitalia on slide no.4-Obr. 2/25 1960), Kerrville, October 1908. ILLINOIS: 1 ♀ (genitalia on slide, prepared by A. BUSCK on December 5, 1938), Putnam Co., September 22, 1937 (M. O. GLENN). NEW YORK: 2 ♂ ♂, 2 ♀ ♀ (genitalia on slides, prepared by A. BUSCK on September 20 and 21, and October 1, 1925), Ithaca, September 9-26, 1924 (Cornell Uni-

versity Expedition); 2♂♂, 2♀♀ Six Mile Creek, Ithaca, August 29 and September 9, 1923 (J. G. FRANCLEMONT), all of the above specimens deposited in U. S. National Museum; 7♂♂, 19♀♀ (genitalia of 1♂ and 1♀ on slides nos.343-Obr. and 104-Obr., correspondingly), Pelham, Westchester Co., September 2 and 24, and October 2, 1954 (A. B. KLOTS), deposited in American Museum of Natural History. PENNSYLVANIA: 1♂ (genitalia on slide, prepared by A. BUSCK on September 30, 1919; figured in Barnes & Busck, 1920, *Contr. nat. hist. Lepid. North America* 4: pl.32, fig.4), New Brighton, September 23, 1905 (H. D. MERRICK). MASSACHUSETTS: 1♂ (genitalia on slide, prepared by A. BUSCK on April 18, 1929), Cohasset, September 28, 1907 (O. BRYAN); these specimens deposited in U. S. National Museum.

### DECODES MONTANUS Powell, NEW SPECIES

Superficially resembling *fragarianus* but with a strongly contrasting, well defined basal patch; usually the remainder of the markings diffuse and pale. Female with a conspicuous band of dark scales on the seventh abdominal sternite.

*Male*. — Length of forewing 8.7 mm. *Head*: labial palpus, second segment nearly cylindrical, slightly expanded distally, three times longer than maximum width, slightly longer than vertical eye diameter; gray exteriorly, the scales tipped with white, less broadly so distally, whitish interiorly with a few brownish scales apically; terminal segment about half the length of second, brownish, the scales tipped with white, more broadly so interiorly. Head tufts prominent, not appressed, the scales whitish below, dark brown on outer half, tipped with white deeply notched; loose tuft of whitish scales under eye. Antenna brown, annulated paler; scape white below. *Thorax*: tegula dark brown at base, lighter brown distally, apical scales broadly tipped with white. Thorax above banded as follows: dark at base, followed posteriorly by a pale brownish white band and a narrow dark brown band; posterior half of mesonotum light brown, the scales tipped with white, less broadly so posteriorly; metanotum unscaled except for thin white hair brush on each side posteriorly. Thorax below white; pro- and mesothoracic legs brown exteriorly, marked with white as follows: coxæ irregularly speckled, femora below, tibiae banded above at middle, tarsal segments apically banded; whitish interiorly (described from paratopotype; holotype lacks both mesothoracic and one metathoracic legs). Metathoracic leg whitish. tibia and tarsus faintly tinged with brown exteriorly. *Forewing*: length about 2.8 times greatest width; costa evenly curved, slightly bowed at base. Upperside with basic arrangement of markings as in *fragarianus*. Basal area tan, blending to darker brown on dorsum. Transverse band at basal one-fifth dark chocolate brown, well defined by marginal darker lines, blending dorsally with darker part of basal area: remainder of wing essentially brownish white; outer margin of antemedian white band indicated by a short row of dark scales above the fold; costal area beyond narrow costal portion of antemedian band brownish, slightly darker than remainder of wing, the shading extending towards dorsum in a blunt spur outside the median row of dark scales: costa with about eight short, obscure, dark, oblique dashes in shaded area; a vertical, well defined dark line in terminal area: dorsal margin with about six irregular, dark spurs between basal band and terminal line. Fringe long, pale brownish, scales white tipped, extending conspicuously above apex. Underside pale brownish, lighter towards dorsum, costa with ill-defined but contrasting whitish area along middle third. *Hindwing*: shining whitish, pale brownish towards apex; fringe with basal pale brown band; underside similar. *Abdomen*: holotype abdomen treated in caustic solution and placed on slide; genitalia as in fig.5 (drawn from paratype, Donner Summit, JAP slide No.460, three specimens examined); socii large; arms of gnathos bowed at middle, short; fultura superior elongate, produced and nar-

rowed apically; valva with membranous projection at end of sacculus, costal margin strongly bowed; ædæagus only slightly curved, longer than in *basiplaganus*.

*Female*. — Length of forewing 9.1 mm. Essentially as described for male. Labial palpus more extensively marked with white. Thorax above rubbed on allotype but appears to be darker and less conspicuously banded than in male. Allotype lacks one meso- and one metathoracic leg. *Forewing*: more contrastingly marked than in male. Basal band darker, well defined with some brown scales in middle; antemedian band well defined, pale gray, margined outwardly by nearly complete row of dark scales; costal area and spur above dorsal expansion of antemedian band darker gray, well defined. Subterminal line not so well defined as in male. *Abdomen*: tan or pale brown (although this may be due to artificial discoloring); underside of seventh segment with a conspicuous posterior margin of large purple-black scales which expands laterally into huge tufts (these are very noticeable on the whole specimen). Genitalia as in fig. 11 (drawn from paratype, Donner Summit, JFGC slide No.4385; four slides examined); plate of antrum more elongate than in *basiplaganus*, longer than its median width, tapering at junction with ductus bursæ, not emarginate; ductus bursæ short; corpus bursæ strong, round with a stellate, patch-like signum and tiny comb-like scobination most pronounced around signum.

The specimens from Donner Summit are larger (length of forewing 9.8-9.9 mm.) and apparently have the markings paler and less well defined, although both are somewhat rubbed. However, the genitalia of both sexes match the remainder of the widely distributed type series, and the dark scale band of the seventh abdominal sternite on the female is quite distinctive.

*HOLOTYPE* male, Mt. Lowe, Los Angeles Co., California, Sept. 18, 1925 (E. PIAZZA) deposited in California Academy of Sciences. *ALLOTYPE* female, Mt. Shasta, Siskiyou Co., Calif., Aug. 19, 1939 (E. C. JOHNSTON) deposited in Canadian National Collection. Six *PARATYPES*, all California: 1 ♂, 1 ♀ Donner Summit, Nevada Co., VIII-7-35 (E. C. JOHNSTON); 1 ♀ Mill Valley, Marin Co., IX-9-48 (H. B. LEECH); 2 ♂♂ Mt. Hermon, Santa Cruz Co., IX-(5-8)-31 (H. H. KEIFER); 1 ♂ with same data as holotype (abdomen lost), deposited in collections of American Museum of Natural History, Canadian National Collection, California State Department of Agriculture, U. S. National Museum, and author. Three additional female specimens examined in alcohol: 2 ♀♀ Soquel, Santa Cruz Co., IX-24-43; 1 ♀ Calimesa, Riverside Co., IX-14-43, not designated as paratypes, in California Department of Agriculture collection.

Additional material examined by OBRATSOV: 2 ♂♂ (genitalia on slides, prepared by A. BUSCK on January 12 and 14, 1925), San Diego, California, October 6, 1919 (K. R. COOLIDGE); 4 ♂♂, Mt. Hermon, Santa Cruz Co., California, September 5-8, 1931 (H. H. KEIFER) all deposited in U. S. National Museum.

## GROUP II

### *DECODES JOHNSTONI* Powell, NEW SPECIES

A gray species with elongate, narrow forewings which are quite variable in color, ranging from uniform pale gray through a darker form with basal third of wing inside oblique line and terminal area flushed with white to a distinctly marked form having a crescent-shaped black spot in the basal white area and the dividing line and outwardly adjoining area black.



*Male*. - Length of forewing 10.2 mm. *Head*: labial palpus narrow, second segment slightly longer than vertical eye diameter, narrow at base, expanding gradually to apex, length about 3.5 times greater than apical width, gray exteriorly, the scales dark, tipped with white, whitish interiorly; terminal segment slightly longer than half the length of second, rounded at apex, dark gray exteriorly, the scales only narrowly margined with white, lighter interiorly. Antenna gray, segments obscurely annulate with whitish basally; underside of scape white. Head with tufts prominent, compact, dark gray, the scales only shallowly notched in the narrow whitish apical band. *Thorax*: tegula and mesonotum dark gray, not banded; metanotum unscaled, with small lateral tufts. Underside whitish. Pro- and mesothoracic legs dark gray exteriorly, the tarsal segments with narrow white apical bands; whitish interiorly; metathoracic leg whitish, suffused with grayish exteriorly, tibial spurs and tarsal segments except apical bands, gray. (The holotype lacks the meso- and metathoracic legs on one side.) *Forewing*: costa evenly but only slightly curved from base to apex; apex rounded acute, termen very oblique; length about three times greatest width. Gray, basal area whitish, its outer margin indicated by an obscure line from inside basal one-third of costa towards anal angle, notched inwardly just above fold and disappearing below fold; terminal area outside cell diffused by whitish blending into darker gray of outer costal area towards apex. Fringe short, whitish with a basal row of short gray scales. Underside uniform gray; costa indistinctly marked with several whitish spots on outer half. *Hindwing*: grayish, paler basally. Fringe whitish with a basal row of short brownish scales from before apex to first anal vein. Underside paler. *Abdomen*: gray, darker below; tufts of eighth segment conspicuous, silvery, shaded with purplish below. Genitalia as in fig.6 (drawn from paratype. Alpine Lake, JAP slide No.369; three slides examined); socii small; costal margin of valva heavily sclerotized, produced apically into expanded portion; sacculus heavily sclerotized, free end longer than in other known *Decodes*.

*Female*. - Length of forewing 9.8 mm. Essentially as described for male but more heavily marked with white. Head, labial palpus, antenna, thorax paler. *Forewing*: more distinctly marked due to the heavy white overscaling. Basal one-third whitish, more distinctly so costally and outwardly; outer margin of whitish area, a line from inside basal one third of costa obliquely outward, broadly notched inward above fold and just above dorsum, ending a little before anal angle; area outside this dark gray, shading gradually to whitish in terminal area; indication of two vertical black lines in terminal area. Underside, hindwing and abdomen as in male. Genitalia as in fig. 13 (drawn from paratopotype, JAP slide No.485, three slides examined); plate of anturum small but heavily sclerotized, joining ductus bursæ without emargination; ductus bursæ with light sclerotized curvature just before corpus bursæ; signum ribbon-like, weakly formed to base of ductus seminalis, not expanding towards center of bursa.

*HOLOTYPE* male and *ALLOTYPE* female, Mt. St. Helena, Napa Co., California, March 7, 1940 and March 24, 1939, respectively, (E. C. JOHNSTON), deposited in Canadian National Collection. Fourteen *PARATYPES*, all California, as follows: 1 ♂, The Geysers, Sonoma Co., III-19-39 (E. C. JOHNSTON); 1 ♀ same data as holotype, 1 ♀ same data except III-26-46; 1 ♂, Spring Mt., Napa Co., III-25-46 (E. C. JOHNSTON), 1 ♀ same data except IV-2-40; 5 ♀ ♀ Mill Valley, Marin Co., III-12-20 (E. P. VAN DUZEE); 1 ♂, Alpine Lake, Marin Co., III-30-56 (J. POWELL), 1 ♀ same locality, IV-1-59 (J. M. BURNS); 1 ♀ Mt. Tamalpais, Marin Co., IV-3-07 (F. X. WILLIAMS); 1 ♂ San Francisco, "V" (F. X. WILLIAMS), deposited in American Museum, California Insect Survey, California Academy of Sciences, Canadian National Collection, U. S. National Museum, and author's collection.

Length of forewing of paratypes, 9.2 to 11.0 mm. The variation in color of the forewings is remarkable. A less distinctly marked form exists ( $\sigma$ ,  $\text{♀}$  Marin Co.) in which the wing is uniform whitish gray with a few scattered small groups of black scales in areas of black on the marked varieties. The variation is gradual, and more distinctly marked forms than in the above description have the basal white area interrupted by a black crescent spot, which varies in development, and a blackish suffusion outward from the margin of the light basal area. In extreme forms the crescent spot is shaped like the neck of a swan, which begins at the base of the dorsal margin, the head of which is in the middle of the basal area with the beak extending outward on the fold.

The species is dedicated to the late EDWARD C. JOHNSTON, formerly of Petaluma, California, who, in building probably the largest collection of California Microlepidoptera ever assembled, provided many valuable records for the present study, including nearly half of the known specimens of the endemic California *Decodes* species.

#### DECODES ANEURETUS Powell, NEW SPECIES

A dark gray species having the forewing marked only by an indistinct, oblique, pale grayish antemedian band and an indication of pale banding in the terminal area, the pale areas margined by dark, upraised scales.

*Female*. - Length of forewing 10.2 mm. *Head*: labial palpus cylindrical, narrow; second segment about one-fifth longer than vertical diameter, about four times longer than wide, very little expanded apically, dark gray above and exteriorly towards apex, the scales only narrowly tipped with white, blending to whitish basally exteriorly and below, white interiorly; terminal segment about one-half the length of second, rounded apically, dark gray, interior whitish basally. Antenna gray, scape and first twelve segments below white. Head with tufts of prominent, dense, dark gray scales which are only minutely tipped with whitish. *Thorax*: tegula and mesonotum dark gray showing no color pattern, metanotum unscaled, lateral posterior tufts short, dense; ventral side of thorax whitish. Pro- and mesothoracic legs gray exteriorly with indication of whitish at tibial and tarsal segment apices, whitish interiorly; metathoracic leg whitish, tibia and tarsal segments obscurely mottled with pale brown exteriorly, spurs brown below. *Forewing*: costa nearly straight for about basal third, sharply curved there, then nearly straight to apex. Length about three times greatest width. Dark gray, only indistinctly marked. Three antemedian, incomplete transverse lines of upraised, dark scales: first at basal one-sixth of costa, angling outward, bending inward in cell, disappearing below fold; second parallel, obscure at costa, more distinct in cell, bending slightly at fold, disappearing below fold; third at bend in costa, the most distinct of the three, angling outward towards dorsum just before anal angle, disappearing below cell. Area inside first line pale grayish; between first and second darker, blending into pale of base at dorsum; area between second and third lines whitish, forming an oblique pale band, the most distinct marking on the wing. Ground color uninterrupted between third line and end of cell; apical area paler, gray to whitish, marked by three parallel, outward curving lines of dark scales in middle. Area between the first two lines slightly darker. Fringe long, pale gray, scales with subterminal darker bands, the rows forming three more or less distinct bands. Underside gray; base of cell with a patch of upraised white scales; outer half of costa indistinct but broadly marked with whitish, surrounding three rather distinct gray subrescenscent spots bordering costa; submarginal area and fringe mottled whitish. *Hindwing*: whitish basally, brownish marginally, darkest at apex; veins brown towards margin. Fringe white with a basal brown band around apex disappearing before anal area. Underside similar, costa and veins brownish throughout. *Abdomen*: the abdomen of the unique female has been treated

in caustic solution and is on a slide. No unusual external features were noted. Genitalia as in fig.12 (drawn from allotype, JAP slide No.481; one specimen examined); plate of antrum weakly sclerotized, narrowly emarginate at junction of ductus bursæ; ductus sclerotized and folded just before corpus bursæ; signum gradually becoming broader towards center of corpus bursæ.

*Male*. - Length of forewing about 9.9 mm. Essentially as described for female. The unique male appears to be an older, somewhat more worn specimen, and the markings are only faintly indicated. *Forewing*: almost unicolorous gray, with an indication of the broad submedian pale band; white markings on underside of costa restricted to four rather distinct, oblique dashes. *Abdomen*: on slide, genitalia as in fig. 7 (drawn from holotype, JAP slide No.463, one specimen examined); socii moderately long, reaching over half the length of the short gnathos; costal margin of valva weakly sclerotized but with an expanded base and definite apex; sacculus heavily sclerotized, free end narrow, short.

*HOLOTYPE male* and *ALLOTYPE female*, Carmel, Monterey Co., California, April ("IV") (A. H. VACHELL), deposited in American Museum of Natural History.

The types, which were recently discovered among unworked Kearfott Collection material at the American Museum, have at some time in the past become moldy, and the appendages are somewhat obscured by dry fungal parts which remain despite an attempted cleaning.

#### *DECODES BICOLOR* Powell, NEW SPECIES

A large species having the costal half of the forewing white, the dorsal half dark gray.

*Female*. - Length of forewing 11.9 mm. *Head*: labial palpus cylindrical, the segments not expanded apically; second segment about as long as vertical eye diameter, four times longer than wide; gray exteriorly, the scales tipped with white, less broadly so apically on the segment; basally white interiorly; terminal segment about one-half the length of second; gray with scattered whitish interiorly. Antenna gray, annulated paler, basal ten or twelve segments white anteriorly and below. Head tufts conspicuous, loose, dark brown, the scales moderately notched at tips, very contrastingly and distinctly tipped with white. *Thorax*: tegula whitish; mesonotum pale gray (probably showing two paler transverse bands, but specimens available mostly rubbed); metanotum unscaled except having rather dense, flat, lateral, white tufts. Ventral side of thorax pale brownish-white. Pro- and mesothoracic legs nearly uniform gray-brown exteriorly, showing only faint banding on tarsal segment apices; paler interiorly. Mesothoracic leg whitish, coxa exteriorly, tibial spurs, and last four tarsal segments brown. *Forewing*: three times longer than greatest width; costa evenly bowed in basal half, less so apically; apex acute. Color pattern divided by a longitudinal line beginning just below fold at base crossing fold in an oblique line near base to near costal margin of cell at basal one-fifth of wing, angling downward slightly through middle of cell, turned upward just basad of end of cell to costal margin of cell, then straight to apex of wing. Area above this line white, more completely so adjacent to line end basally; outer half of costa and apex blending to dark grayish. Area immediately below the line dark brown, darkest in cell, shading gradually to lighter gray-brown along dorsal margin, palest at tornus. Fringe short, pale brownish white. Underside uniform brown, an elongate pale spot at base in middle. *Hindwing*: brownish white, paler basally; fringe long, white, with a brown band on base around apex of wing. Underside similar, the veins brown. *Abdomen*: shining brownish white, darker below. Genitalia as in fig.14 (drawn from paratopotype, JFGC slide No. 4375, two slides examined); plate of antrum large, heavily sclerotized; ductus bursæ without sclerotized band; signum ribbon-like, not extending beyond base of ductus seminalis.

*Male.* - Length of forewing about 11.6 mm. External characteristics as described for female. (Only two males available for study, both badly damaged.) Head and thorax (mostly lacking scales) apparently not differing from female. *Wings*: (one pair of wings of allotype removed and bleached for study of venation; JFGC slide No.4374) marked as female. *Genitalia*: as in fig.8 (drawn from paratype. Mill Valley, JAP slide No.477; two slides examined); *socii* long, reaching to apex of short gnathos; costal margin of valva and the sacculus heavily sclerotized; tip of sacculus free, flared, rounded.

*HOLOTYPE* female and *ALLOTYPE* male, Mt. St. Helena, Napa County, California, April 18, 1939 (E. C. JOHNSTON) deposited in U. S. National Museum. Fifteen *PARATYPES*, all California, as follows: 1 ♀ same data as holotype; 1 ♀ McCloud, Siskiyou County, VI-5-35 (E. C. JOHNSTON); 1 ♀ Foresthill, Placer Co., VIII-31-37 (W. R. BAUER); 1 ♀ The Geysers, Sonoma Co., V-9-39 (W. R. BAUER); 1 ♀ same locality, IV-28-40 (E. C. JOHNSTON); 1 ♀ Pope Creek, Napa Co., IV-6-57, at light (J. POWELL); 1 ♀ Mill Valley, Marin Co., V-3-24 (E. P. VAN DUZEE); 1 ♀ same locality, III-17-26; 2 ♀ ♀ same locality, IV-19-50 (H. B. LEECH); 1 ♀ same locality, IV-29-58, light trap; 1 ♀ Descanso, San Diego Co., "1914" (W. S. WRIGHT); 4 ♀ ♀ Pine Valley, San Diego Co., IV-17-50 (E. C. JOHNSTON), deposited in collections of American Museum of Natural History, British Museum, Canadian National Collection, California Insect Survey, California Academy of Sciences, San Diego Museum of Natural History, U. S. National Museum, and author.

Forewing length range of paratypes, 10.1 to 11.6 mm. All of the paratypes from the northern part of the range match the holotype description well. The San Diego County specimens show considerable variation in replacement of the costal white by gray, especially apically. One specimen is nearly entirely gray, showing the characteristic contrasting white and dark above and below the line only in the cell.

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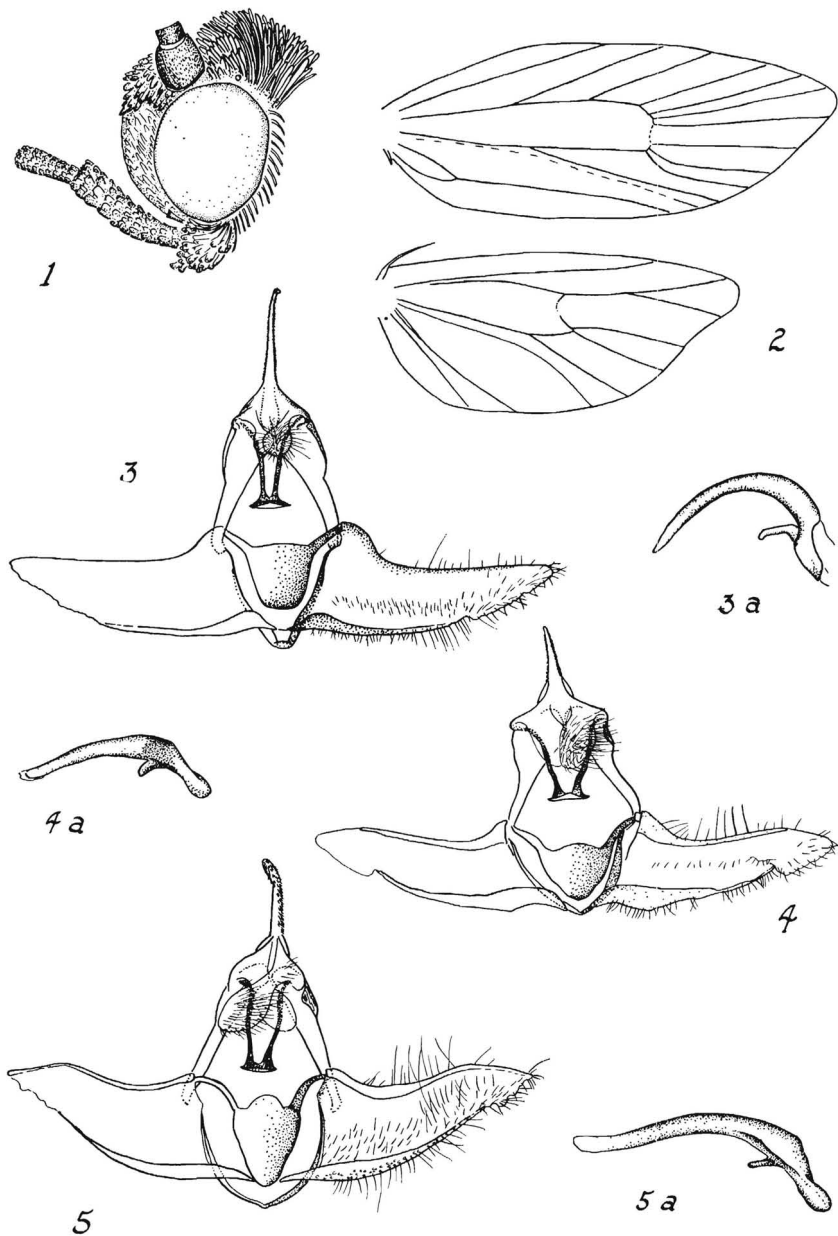
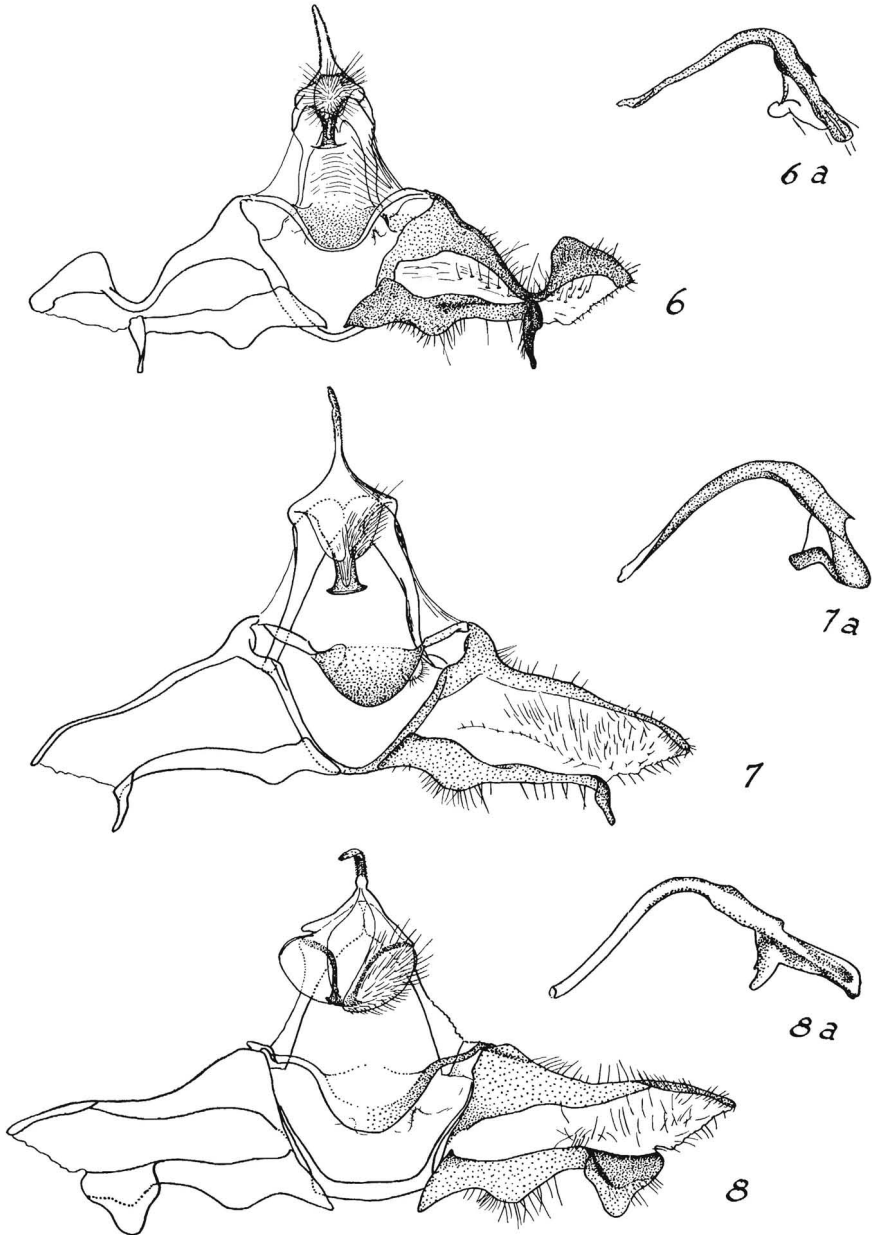
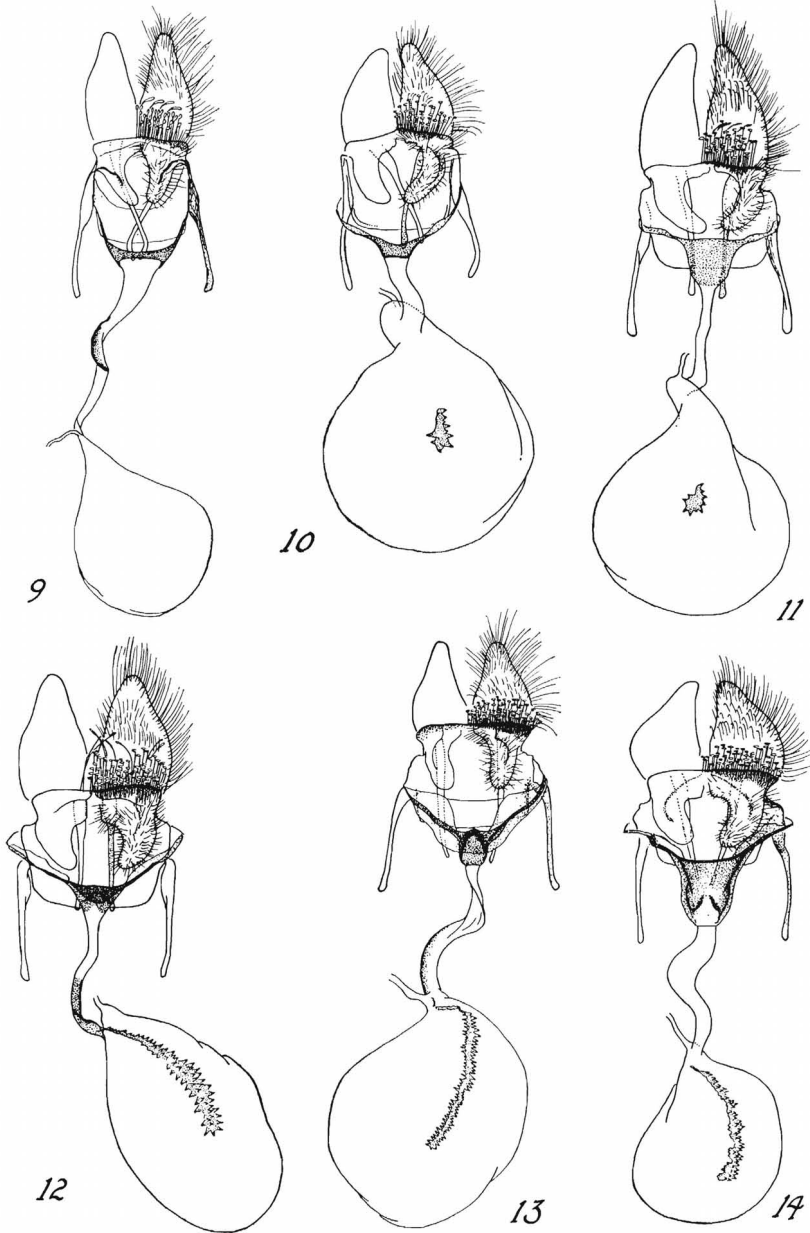


Fig.1. *Decodes*, head, lateral aspect; fig.2. *Decodes*, wing venation; figs.3-5, male genitalia of *Decodes* spp., ventral aspect, spread, aedeagus and fulcrum inferior removed, a = aedeagus, lateral aspect: fig.3. *D. fragarianus* (Busck); fig.4. *D. basiplanatus* (Walsingham); fig.5. *D. montanus* Powell.



Male genitalia of *Decodes* spp., ventral aspect, spread, aedeagus and futlura inferior removed, a = aedeagus, lateral aspect: fig.6. *D. johnstoni* Powell; fig.7. *D. anuretus* Powell; fig.8. *D. bicolor* Powell.



Female genitalia of *Decodes* spp., ventral aspect: fig.9. *D. fragarianus* (Busck); fig.10. *D. basiplaganus* (Walsingham); fig.11. *D. montanus* Powell; fig.12. *D. aneuretus* Powell; fig.13. *D. johnstoni* Powell; fig.14. *D. bicolor* Powell.