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CONTRIBUTION TO THE STUDY OF THE GENUS *HELICOPSYCHE* (TRICHOPTERA) FROM CUBA, HISPANIOLA, AND PUERTO RICO

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ABSTRACT

Seven new species and one new subspecies of *Helicopsyche* von Siebold are described from Cuba, Hispaniola, and Puerto Rico based on adults; additionally four species and one subspecies belonging to the fauna of these islands are redescribed. Both sexes are described when correct association of females is possible. Considerations are made on the value of different characters in discriminating species in this genus. Presently 10 taxa are known from Cuba, 5 from Hispaniola, 4 from Puerto Rico (and 3 from Jamaica). An attempt is made to establish the affinities of these species. The West Indian *Helicopsyche* represent one of the richest assemblages of this genus in the world fauna.

INTRODUCTION

Helicopsyche von Siebold is presently one of the less satisfactorily known genera of the Greater Antillean Caddisfly fauna. The adults of 4 species were described from Cuba (Banks, 1938; Kingsolver, 1964; Botosaneanu & Sykora, 1973; Botosaneanu & Flint, 1990); some problems concerning the Cuban *Helicopsyche* were briefly, and sometimes erroneously, mentioned in other publications (Botosaneanu, 1977, 1979). From Hispaniola 3 species were previously described (Hagen, 1861; Banks, 1938; Botosaneanu & Flint, 1990). Most information concerning the 2 known species from Puerto Rico is in Flint (1964), and that on the 3 Jamaican species in Flint (1968).

The aim of the present paper is to redescribe several known species, and to describe 7 species and 1

subspecies new to Science from the collections of the two authors. The descriptions are exclusively based on adults, both sexes being described when correct association of females is possible.

The reticulation on some pregenital abdominal sternites will be often mentioned in the descriptions*, as well as the appendage (or lack of appendage) on sternite VI. In the male genitalia, segment IX and the superior appendages are only sometimes of use in reliably characterizing the species; the same is true

*) These reticulations are referred to as "loose" when they are faint and more irregular, rarely touching and thus leaving open spaces between them; they are "not loose" when they are thickened, more polygonal in outline and touching on most sides with no open spaces between them.

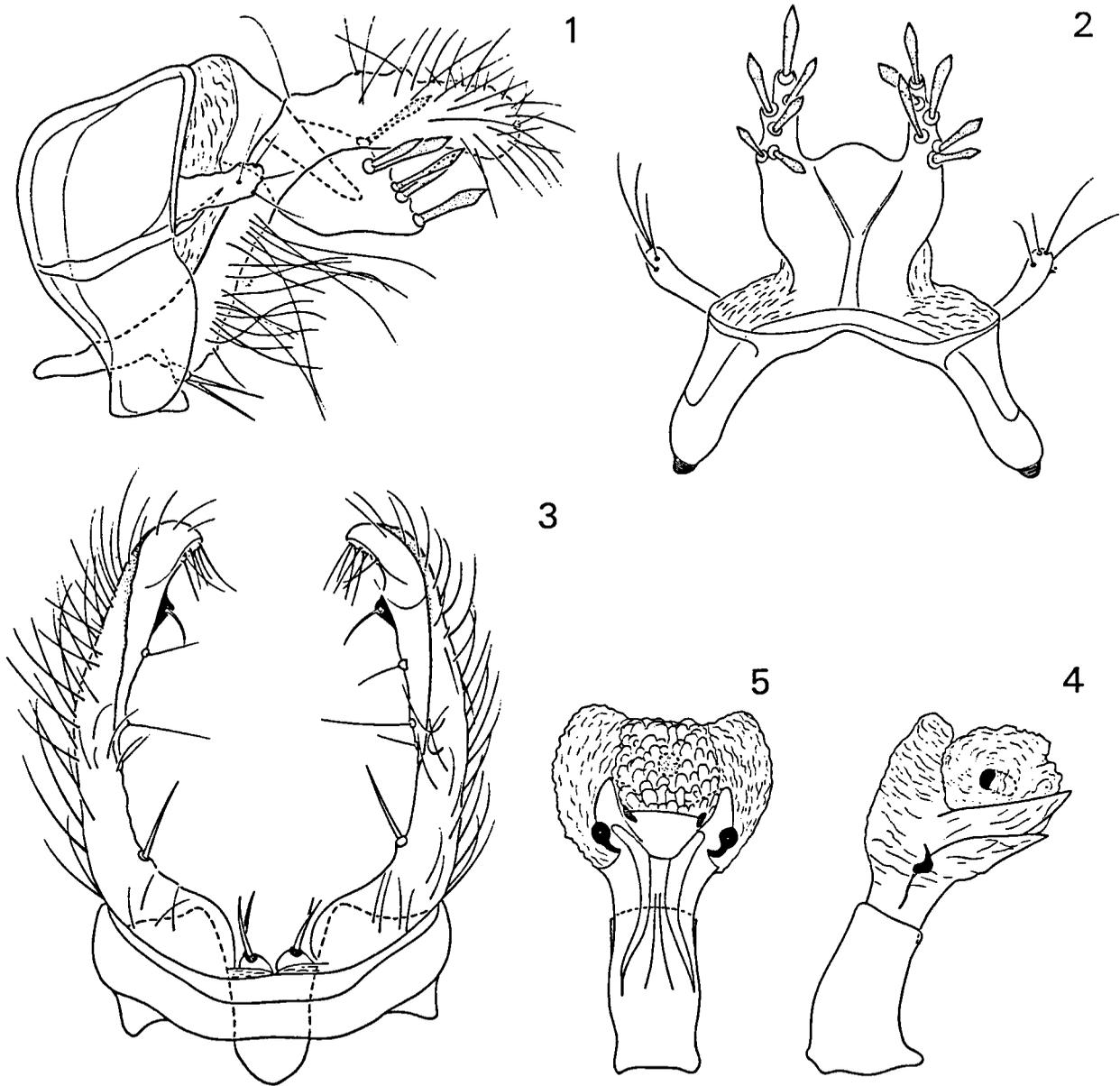


Fig. 1-5. *H. singulare* n. sp., ♂ genitalia; 1. lateral; 2. dorsal; 3. ventral; 4-5 phallus, ventral and lateral.

for the phallic apparatus. Segment X in lateral, and especially in dorsal view, offers some of the most useful distinguishing characters in its size, shape, pattern of dark stripes, distribution and length of spines and setae, and sometimes in the shape of its apical margin. The lateral branch of the gonopod can only in some cases be considered as really useful in distinguishing species, especially because its shape appears to differ very considerably even under slightly different observation angles - a potential source for serious mistakes. However, the basomedian branch of the gonopod gives some of the most reliable dis-

criminating characters: its size, shape, relations to the lateral branch - in ventral and in lateral view -, as well as its armature, should be always carefully observed. As for the female genitalia, the structure of segments IX and X (for instance, their conspicuous "sensillar areas" with honeycombed or reticulate structure) offers many useful distinguishing characters. To some extent this is true also for the conspicuous internal structures of the vaginal sclerite described in this paper as "spermathecal neck" and "spermatheca". An excellent species-specific character was found in the pattern of dark areas on sternite VII of the female,

which was generally neglected in previous descriptions.

Most of the material used for the present study is kept either in the National Museum of Natural History, Washington (U.S.N.M.) or in the Zoologisch Museum of the University of Amsterdam (Z.M.A.). Several specimens are in the Museum of Comparative Zoology, Harvard University (M.C.Z.).

DESCRIPTIVE PART

Helicopsyche singulare n. sp.

Figs. 1-5

Material examined

All from Puerto Rico. - El Verde Field Station, Quebrada Prieta, 370 m., Malaise trap, 6-10 Feb. 1990, O.S. Flint, Jr.: male holotype (pinned, U.S.N.M.), 2♂ paratypes (pinned U.S.N.M.). El Verde, Luquillo Experimental Forest, Rio Prieta, emergence traps, Mar.-May 1989, E.C. Masteller: 1♂ paratype (alcohol, Z.M.A.); same, but emerged 27 Apr. 1990, 1♂ paratype (alcohol, U.S.N.M.).

Description of ♂

Length of forewing: 4.5 mm. Forewing very dark (blackish) to the naked eye; vestiture rather uniform, dense, of coppery setae; if directly lighted, these setae with distinct metallic shine; in the fringe of the apical part of the wing, several groups of distinctly darker setae. Sternites III and IV with well developed reticulation centrally; in some specimens, rather well developed reticulation (smaller meshes) also on sternite V; no appendage on sternite VI. In lateral view, segment IX with proximal margin simply sinuate, tergite much longer than sternite; superior appendages elongate. Segment X with very unusual structure: distally distinctly trilobed, lateral lobes much longer than the simple, rounded median lobe; in dorsal view the lateral lobes look narrow, but this is due to the fact that they are laterally compressed (in fact, they are very strong, and angular, as seen in lateral view); on each lateral lobe 6 very strong spatulate spines are inserted; dark stripes on segment X forming an Y with faint superior branches. Lateral branch of the gonopod in lateral view very distinctive, with a long, narrow, oblique shaft and a broader (but still relatively narrow) distal part almost at right angles to the shaft;

it is very narrow also in ventral view, with a blunt tip only very slightly turned mediad, a tuft of axillar setae (replacing the unique axillar seta of most species), and a preapical internal triangular projection on which a seta is inserted. There is no basomedian branch of the gonopod, its basomedial angle being simply rounded and glabrous; but between these basomedial angles, and not contiguous with them, there is a pair of characteristic small, rounded lobes, each with a pair of setae. Phallic apparatus stout, and with quite complex structure, allowing distinction of the phallobase, phallosome, and endosoma.

Comments

This is one of the most extraordinary *Helicopsyche* species from the West Indies, totally distinct from all others in the shape of all the male genitalic parts. Presumably the (presently unknown) female will possess very distinct genitalia.

Helicopsyche hageni Banks, 1938

Figs. 6-9

This species was described by Banks (1938); a lectotype (♂) was designated by Flint (1967) who also gave a drawing of the genitalia in lateral view, and one of the gonopod in ventral view. This pinned specimen is labelled "Helicopsyche hageni Bks. Lectotype ♂ by Flint 64"; "M.C.Z. Type 22668"; "Cuba 1936 Darlington collector"; "Pico Turquino N. side June 18-20, 1936, 4500-6000 ft". The present description and drawings are prepared from it.

Forewing 4 mm long, very dark brown (looking blackish), with coppery reddish setae. This species is readily distinguished from almost all other Cuban species by the male genitalia, especially its segment X, which, in dorsal view, is extremely short and stout (apically very slightly emarginate, with median longitudinal dark stripe), and by the boomerang-like lateral branches of the gonopod in lateral view, devoid of a distinct apical point. The basomedian branch of the gonopod is well separated from the lateral branch, well distinct in lateral view, angular, with spines and setae along the whole length of its truncated distal margin. Other interesting characters are the absence of an appendage on sternite VI, and a phallus unlike

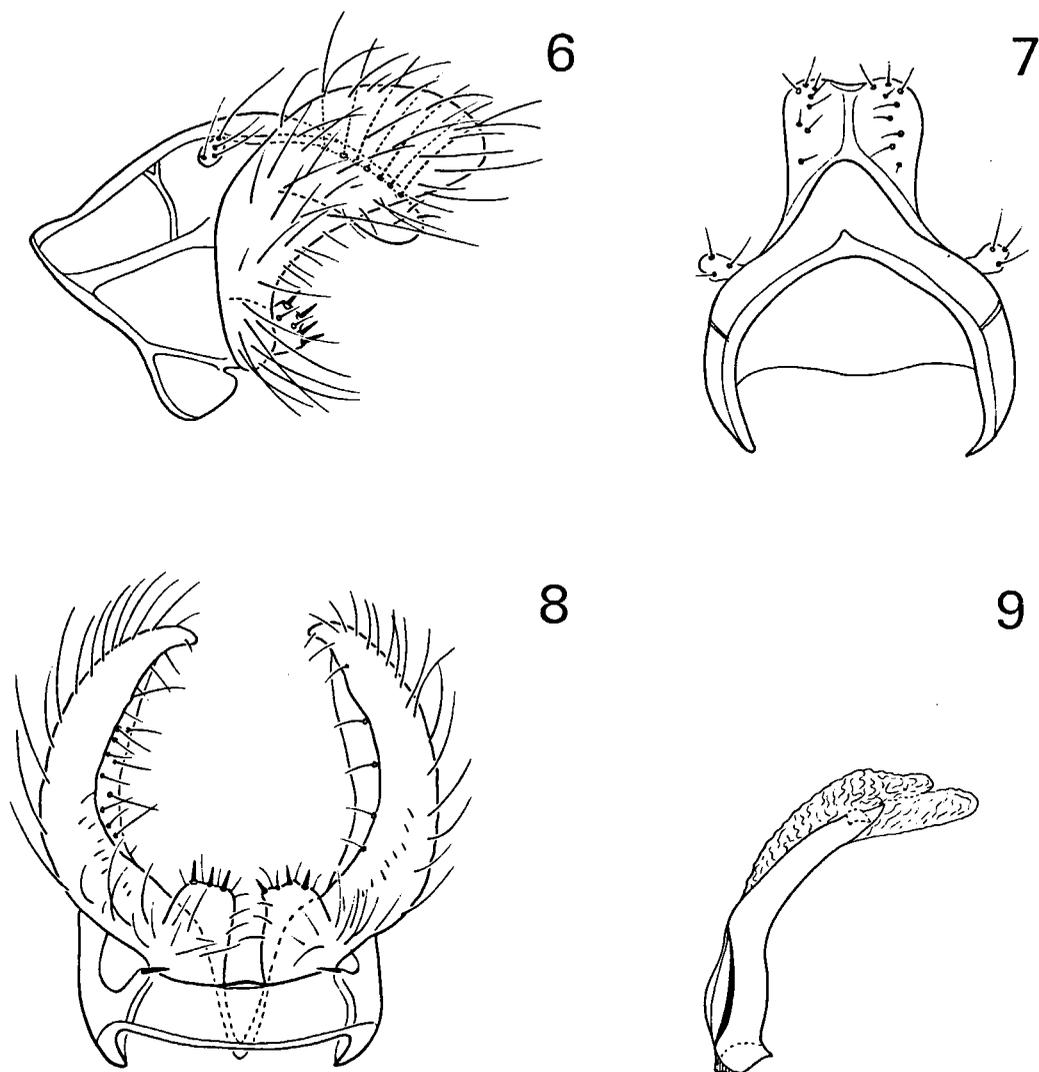


Fig. 6-9. *H. hageni* Bks. (lectotype), ♂ genitalia; 6. lateral; 7. dorsal; 8. ventral; 9. phallus, lateral.

that in most West-Indian species (e.g. with the dorsal part of the membranous endotheca strongly extending basad).

H. hageni is related to *H. dominicana* n. sp. (see details under this last species).

Helicopsyche dominicana n. sp.

Figs. 10-16

Material examined

All from the Dominican Republic. - La Vega Province, Convento, 12 km S. of Constanza, 6-13 June 1969, O.S. Flint, Jr. & J. Gomez: male holotype, 9♂ paratypes, female allotype, 5♀ paratypes, 2 specimens without abdomen (pinned; holotype and allotype USNM, paratypes USNM & ZMA), 7♂, 1♀ paratypes (alcohol, USNM); Jarabacoa, 3-4

June 1969, O.S. Flint, Jr. & J. Gomez: 1♂, 1♀ paratypes (pinned, USNM); Jarabacoa, Rio Jimenoa, 13 Nov. 1984, P. & P. Spangler & R. Faitoute: 4♀ paratypes (pinned, USNM); Rio Camu, 19 km NE of Jarabacoa, 12 June 1969, O.S. Flint, Jr. & J. Gomez: 1♂, 2♂ paratypes (pinned, USNM), 2♂ paratypes (alcohol, USNM); La Palma, 12 km E of El Rio, 2-13 June 1969, O.S. Flint, Jr. & J. Gomez: 1♀ paratype (pinned, USNM). La Estrelleta Province, 4 km SE Rio Limpio, ca. 760 m., 24-25 May 1973, Don & Mignon Davis: 1♂, 2♀ paratypes (pinned, USNM), 38♂, 28♀ paratypes (alcohol, USNM & ZMA). Pedernales Province, Bano, 22 March 1967, E. de J. Marcano F.: 1♂ paratype (pinned, USNM).

Description

Length of forewing: ♂ 3.2 - 4 mm, ♀ 3.5 - 4.2 mm. Color of forewing very uniform, membrane brownish with very dense golden setae, fringes somewhat darker.

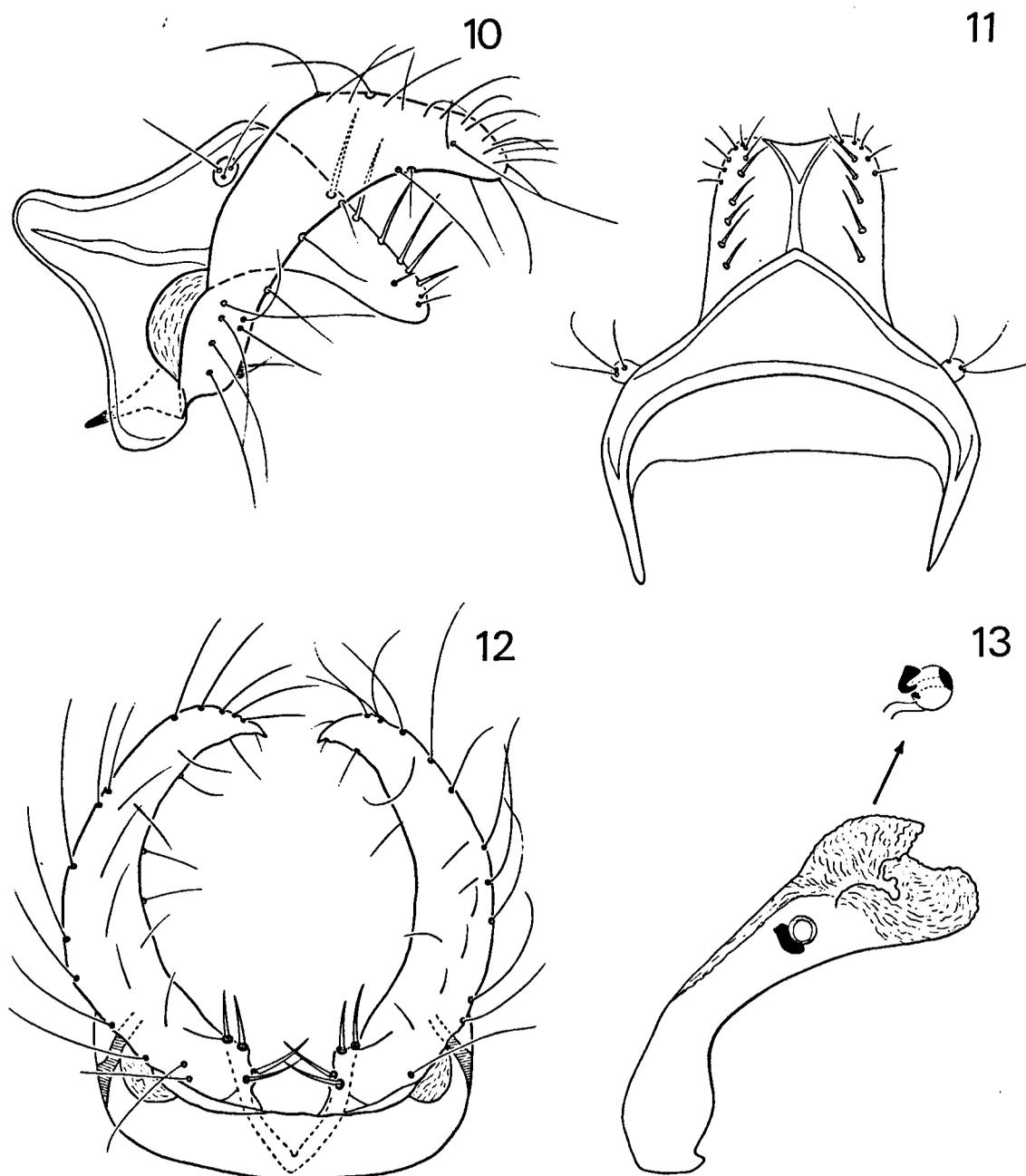


Fig. 10-13. *H. dominicana* n. sp., ♂ genitalia; 10. lateral; 11. dorsal; 12. ventral; 13. phallus, lateral (with another view of the internal structure).

Male

Reticulation developed on sternite III, especially laterally; very well developed reticulation on sternites IV and V (large meshes), no appendage on sternite VI. Segment IX in lateral view strongly and bluntly produced anteriorly in its middle. Superior appendages quite dorsally and distally placed (they cannot be ob-

served in ventral position). Segment X greatly shortened, almost quadrangular, slightly emarginate apico-medially, with two lateral rows of strong setae (and a few small setae near the apical angles), dark stripes forming an Y. Lateral branch of the gonopod, in lateral view boomerang-shaped, relatively narrow also distally, rather strongly curved, ending bluntly (but, in

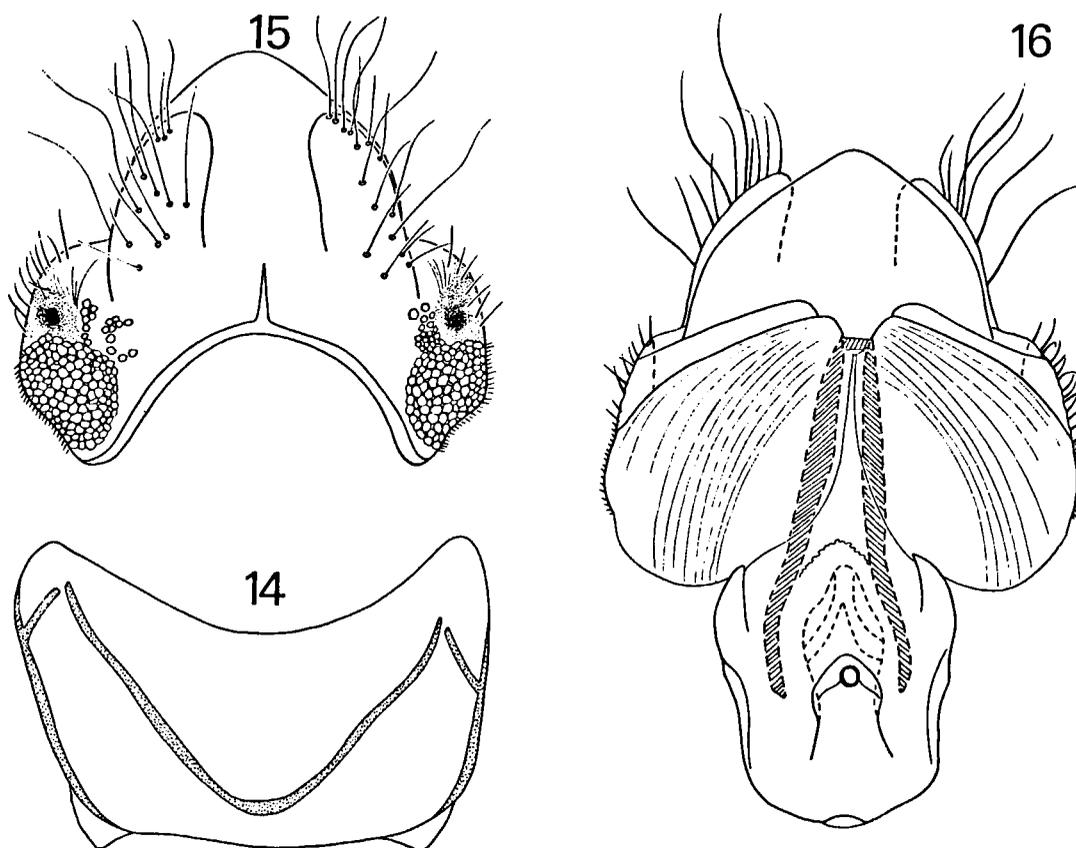


Fig. 14-16. ♀ *H. dominicana* n. sp.; 14. sternite VII; 15-16. genitalia (dorsal, ventral).

ventral view, it shows a sharp point directed medially). Basomedian branch of the gonopod scarcely developed, not protruding beyond the lateral branch in lateral view; its armature consists of two pairs of strong setae: one on the distal, scarcely salient angle, one inserted on (or near) the middle of the median margin. Phallic apparatus with two peculiarities: its membranous part (endotheca) strongly extends basad along its dorsal side, and its internal sclerotized structure apparently has a characteristic shape.

Female

Sternites III-V (but especially IV and V) with very well developed reticulation; on sternite VI a small "tooth" almost concealed in a broad fan of long setae (a similar fan on sternite V). Sternite VII with extremely distinctive - although narrow and simple - sclerotized stripe forming a V widely opened posteriad. Segment IX dorsolaterally on each side with a well developed sensillar area, and - contiguous with it and placed

slightly more distally - a large and relatively deep fossa. Segment X with a strongly protruding, ogival, median lobe, and with two lateral setose lobes which are relatively narrow, ending bluntly, and shorter than the median lobe. Spermathecal neck relatively long, widened proximally; spermatheca without strong shoulders.

Comments

H. dominicana n. sp. is apparently related to *H. hageni* Banks from the Oriente province of Cuba, these being perhaps sister-species, as shown by all parts of the ♂ genitalia (the ♀ of *hageni* remains unknown). But the following characters of *dominicana* will enable it to be distinguished from *hageni*: segment IX in lateral view more distinctly produced anteriorly in its middle; lateral branch of the gonopod more slender; and, especially, the basomedian branch of the gonopod is scarcely developed, with a characteristic armature of 2 pairs of strong setae, and not protruding, in lateral view, be-

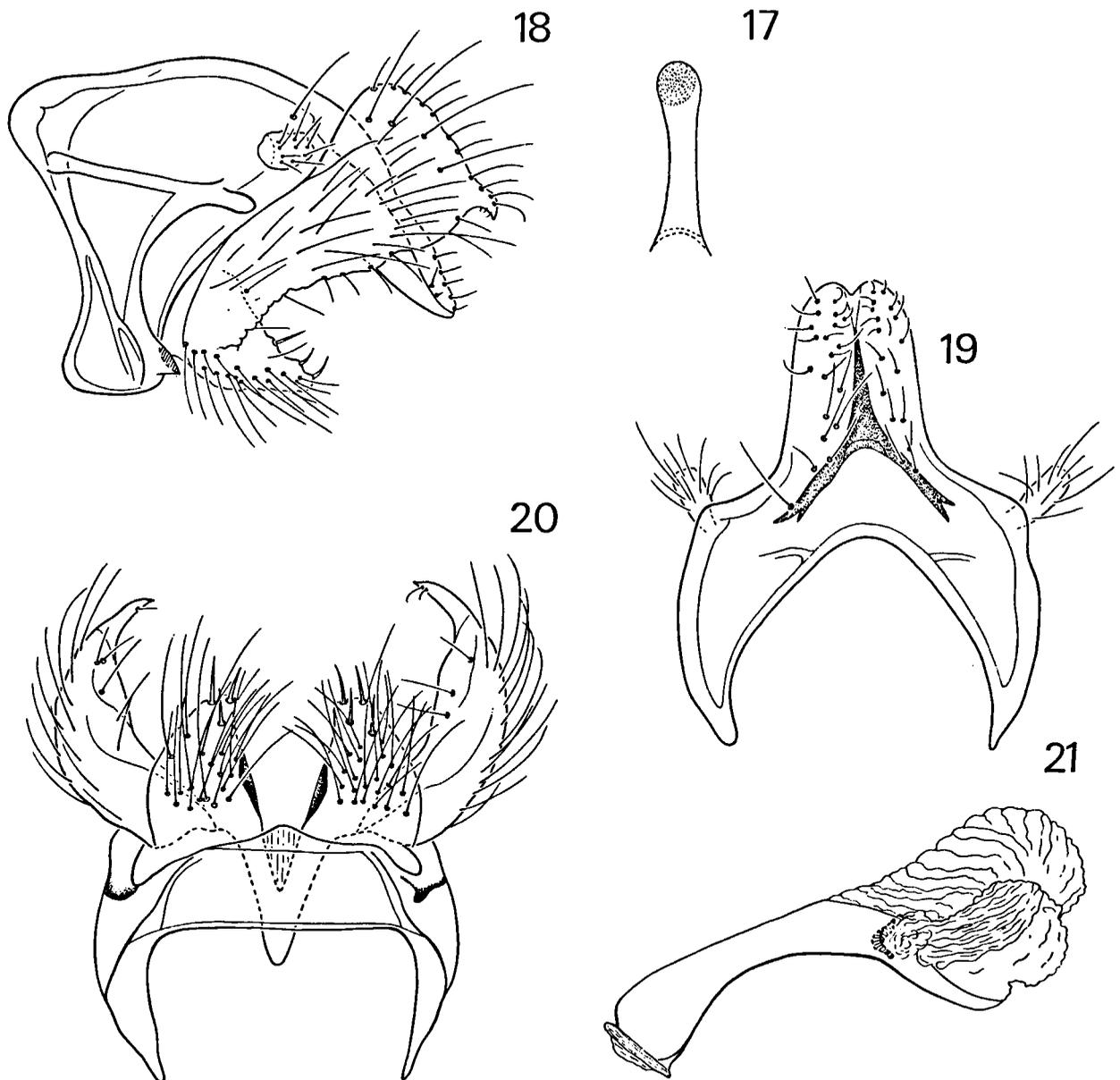


Fig. 17-21. ♂ *H. haitiense* Bks. (lectotype); 17. appendage of sternite VI; 18-21. genitalia (18. lateral; 19. dorsal; 20. ventral; 21. phallus, lateral).

yond the lateral branch.

Helicopsyche haitiense Banks, 1938

Figs. 17-21

Described by Banks (1938). Ross (1956) gave figures of ♂ genitalia of this species in lateral view, and of the gonopod in ventral view. The lectotype (♂) was designated by Flint (1967); this pinned specimen is

labelled "*Helicopsyche haitiense* Bks. Lectotype ♂ by Flint 64"; "M.C.Z. Type 22106"; "Haiti 1934 M. Bates"; "La Visite & vic(inity), La Selle Range, 5-7000 ft., Sept. 16-23". The present description and figures are prepared from it.

One male with genitalia practically identical to those of the lectotype, but with length of the forewing only 3.8 mm (!) was also examined. The locality is: Haiti, near Ville Bonheur (not far from Mirebalais), waterfall "Le Saut d'Eau", 27 Nov. 1979, L. Botosaneanu (alco-

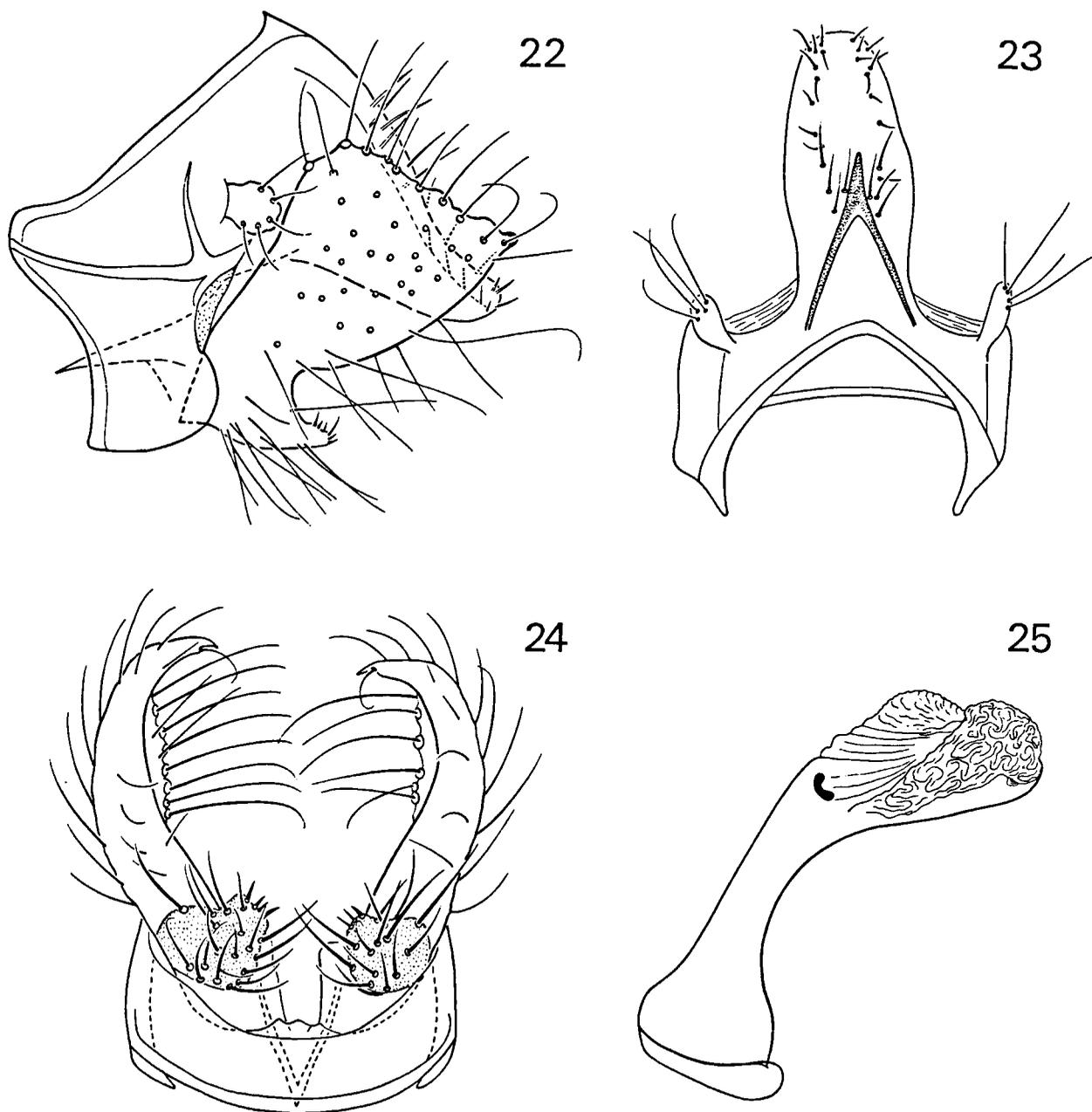


Fig. 22-25. *H. ramosi* Flint, ♂ genitalia; 22. lateral; 23. dorsal; 24. ventral; 25. phallus, lateral.

hol, Z.M.A.).

Forewing 7 mm long, brownish. The most distinctive character of the *H. haitiensis* ♂ genitalia is the very strongly developed basomedian branch of the gonopod; in ventral view it is massive, its lateral margin regularly rounded, merging into a rather pointed apex with very few spines, and its surface is extremely setose; in lateral view the basomedian branch is

strongly protruding, conical, and very well separated - about at right angles - from the lateral branch of the gonopod; the lateral branch is relatively narrow basally, then broadened - but not excessively -, the apico-dorsal angle prominent and rounded, the distal point directed mediad. Another distinctive character is the relatively short segment X, with most of its numerous dorsal setae on its distal part (this segment apically

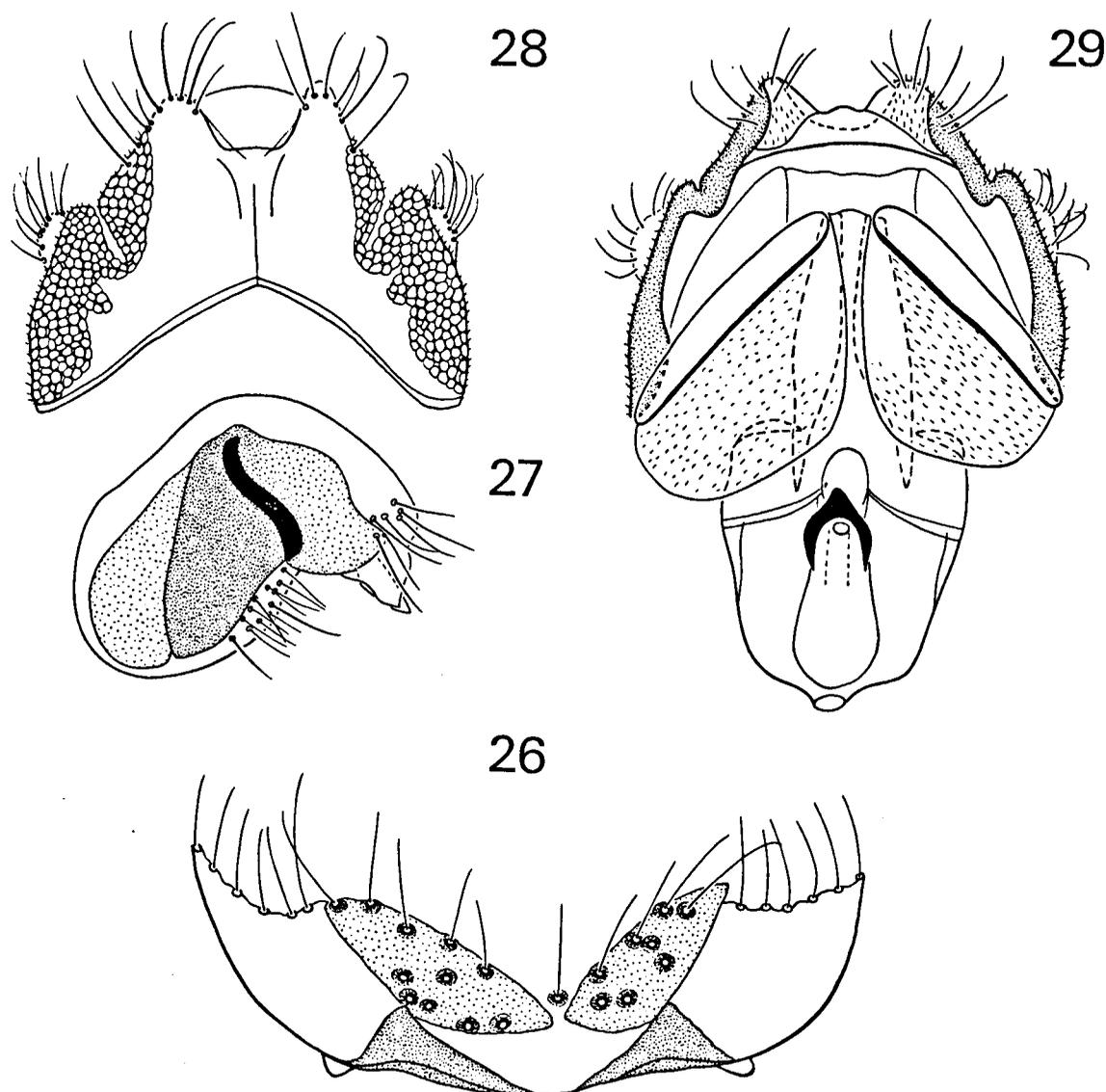


Fig. 26-29. ♀ *H. ramosi* Flint; 26. sternite VII; 27-29. genitalia (27. the sensillar areas, lateral; 28-29. dorsal and ventral).

with central indentation; dark stripes forming an Y).

H. haitiense is related to *H. ramosi* Flint, from Puerto Rico (see details under this last species).

Helicopsyche ramosi Flint, 1964

Figs. 22-29

This species was described from Puerto Rico by Flint (1964), and never redescribed. For the present study 2♂ and 2♀ specimens were examined, from Puerto Rico: Caribbean National Forest, Rt. 988 1 mi E Catalina Ranger Station, U.V. light, 9 Feb. 1990, O.S. Flint, Jr. (pinned, Z.M.A.).

Length of forewing: 4 to 5 mm. (according to Flint, 1964). Forewing uniformly covered with golden-brown setae. In both sexes, a well developed reticulation on sternite III, and especially on sternite IV; there is some reticulation also on sternite V, but only medio-proximally; on sternite VI the examined specimens have only a small (pointed or blunt) tooth (there is variability, the type specimens having a longer appendage).

Male

Segment IX in lateral view with dorsal margin straight (not convex), and with a complicated system of lateral thickenings. Segment X, dorsally, elongate, ending

bluntly without excision or emargination, dark stripes forming a reversed V, with two rows of spines (proximal spines distinctly longer than distal ones); in lateral view, the segment has a slight dorsal depression, the tip being slightly upturned. Lateral branch of gonopod very broad, with apico-dorsal point strongly directed mediad. Basomedian branch of gonopod in lateral view very well separated by a large sinus from the lateral branch, triangular; in ventral view (it is darkened in fig. 24 but is not darker than the lateral branch!) also well separated from the lateral branch, although not strongly produced mediad (it has a rather stout shape, with angular, rounded, or pointed tip,

according to the observational angle, with a few short spines on this tip and many long setae on the surface). Phallus with crescentic internal sclerotized structure.

Female

Sternite VII with a characteristic pattern of dark areas, roughly looking like a butterfly with expanded wings. The sensillar area is well developed, not only on segment IX but also on segment X; that on segment IX is, in lateral view (fig. 27), distinctly divided by a diagonal line into a less dark proximal and a very dark distal zone, this last (apparently) separated by a sinuous

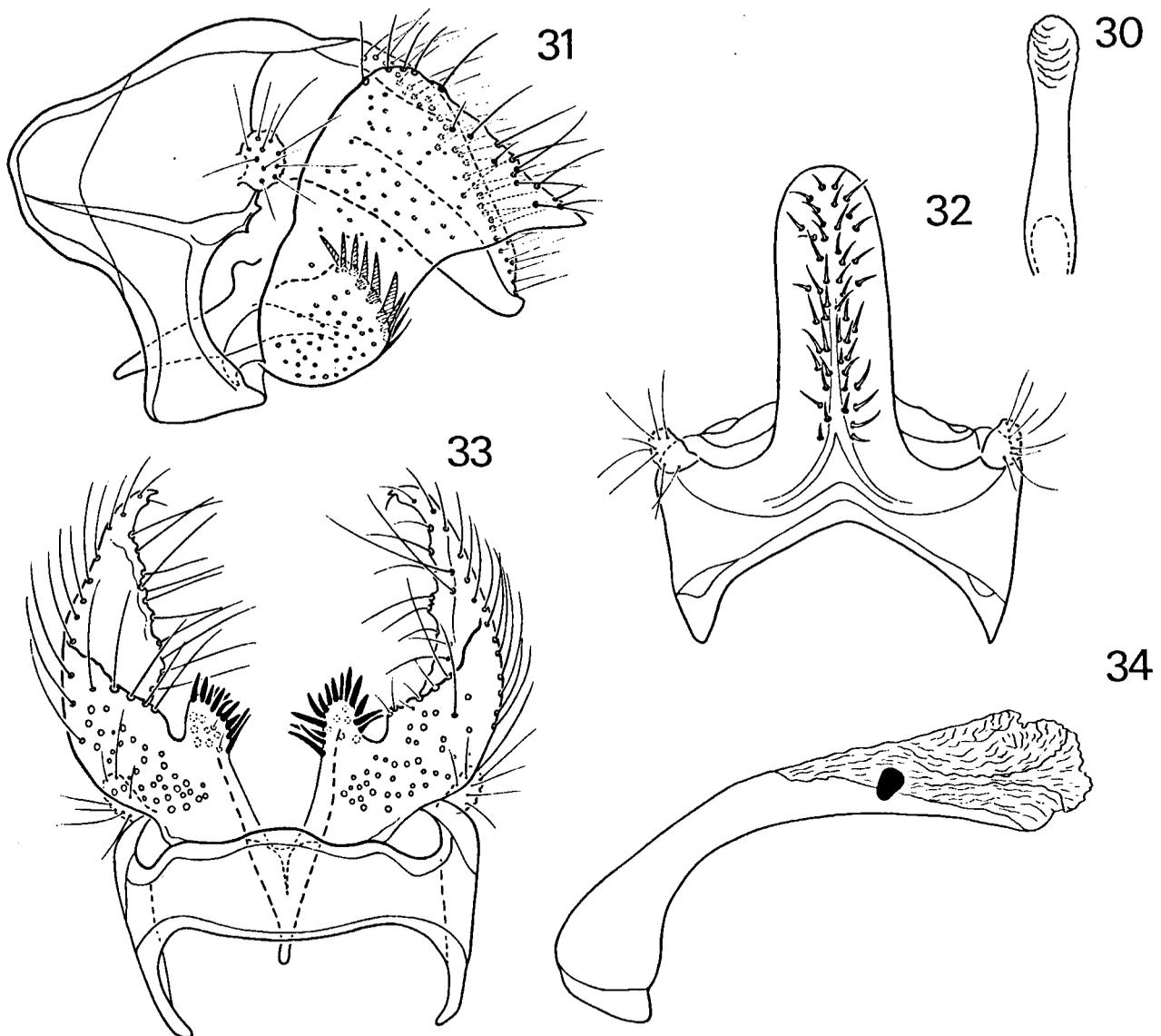


Fig. 30-34. ♂ *H. cubana cubana* Kingsolver; 30. appendage of sternite VI; 31-34. genitalia (31. lateral; 32. dorsal; 33. ventral; 34 phallus, lateral).

black stripe from the sensillar area of segment X. Spermathecal neck about as long as spermatheca, this last without distinct shoulders. There are also other details in the structure of segments IX and X making them easily recognized.

Comments

H. ramosi Flint is certainly close to *H. haitiense* Banks, as shown by several male genitalic details (the ♀ of *haitiense* remains unknown). The following peculiarities of *ramosi* easily allow separation from *haitiense*: presence of some reticulation on sternite V; straight (not convex) dorsal margin of segment IX in lateral view; longer and narrower segment X, not indented apically, and with quite different pattern of setation and of dark stripes; basomedian branch of gonopod, in ventral view, somewhat less strongly protruding.

Helicopsyche cubana cubana Kingsolver, 1964
Figs. 30-34

Helicopsyche cubana was described by Kingsolver (1964). Flint (1968) redescribed this species based on specimens from Jamaica, practically identical to the type from the Oriente Province of Cuba (Moa). For the present study the following specimens from Cuba, Oriente Province, were examined: Mayari, Seboruco, Arroyo Seboruquito, 28 Feb. 1973, L. Botosaneanu: 2 ♂ (alcohol, Z.M.A.); Baracoa, Rio Sabanilla, 22 Feb. 1973, L. Botosaneanu: 1 ♂ (alcohol, Z.M.A.). Figs. 30-34 were prepared from one of the specimens from Arroyo Seboruquito.

Forewing length of the 3 specimens: 4.7, 5.6, and 5.8 mm. Male with reticulation very well developed on sternites III and IV (longer on IV); appendage on sternite VI slender, widened at apex. Segment X, in dorsal view, distinctly elongate, parallel-sided, with very many spines mostly placed near median line, and with the dark stripes forming a reversed Y; no distal emargination or indentation; in lateral view, remarkably high basally, then strongly lowering to an obtuse tip. The gonopods are characteristic: lateral branch in lateral view very broad at base, where it completely conceals the basomedian branch, then still strongly

broadened, distal margin oblique, ending in a very strong prong clearly directed distad (not mediad). In ventral view, the basomedian branch of the gonopod is strongly developed, clearly separated from the lateral branch by a deep sinus, distal margin oblique, with a large number of strong spines (the strong basomedian branch is well distinct also in dorsal view: fig. 32).

Helicopsyche cubana occidentale n. subsp.
Figs. 35-42

Material examined

All from Cuba, Pinar del Rio Province. - Soroa, Rio El Manantiales, 3 May 1973, L. Botosaneanu: male holotype (alcohol, Z.M.A.), 35 ♂ paratypes (alcohol, Z.M.A. and U.S.N.M.); Soroa, 27-29 Apr. 1983, P.J. Spangler & Iliana Fernandez G.: 1 ♂ paratype (alcohol, USNM).

Description of ♂

Forewing length varying between 3.7 and 4.3 mm. Well developed reticulation on sternite III; stronger on sternite IV; on sternite V there is, in some specimens, almost no reticulation, whereas in some others this is better developed, although loose. Appendage on sternite VI always strong basally, much more slender in its middle, then suddenly widening to a distinct "head". Male genitalia very similar to those of *H. cubana cubana* (compare with figs. 30-34); there is, of course, some variability, but most of the differences between figs. 36-39 and 40-42 can be explained by slightly different angles of observation. The more or less reliable characters enabling distinction from *H. cubana cubana* are the following: smaller size; stronger appendage on sternite VI; segment X less high at base in lateral view, its dorsal spines more laterally placed; basomedian branch of the gonopod, in lateral view, partly protruding from behind the lateral branch; median margin of this basomedian branch, in ventral view, not simply obliquely convergent anteriorly (as in fig. 33), but with a characteristic "two steps" shape (as in figs. 39 and 42).

Comments

This form restricted to the westernmost province of Cuba, Pinar del Rio, is either a vicariant geographic

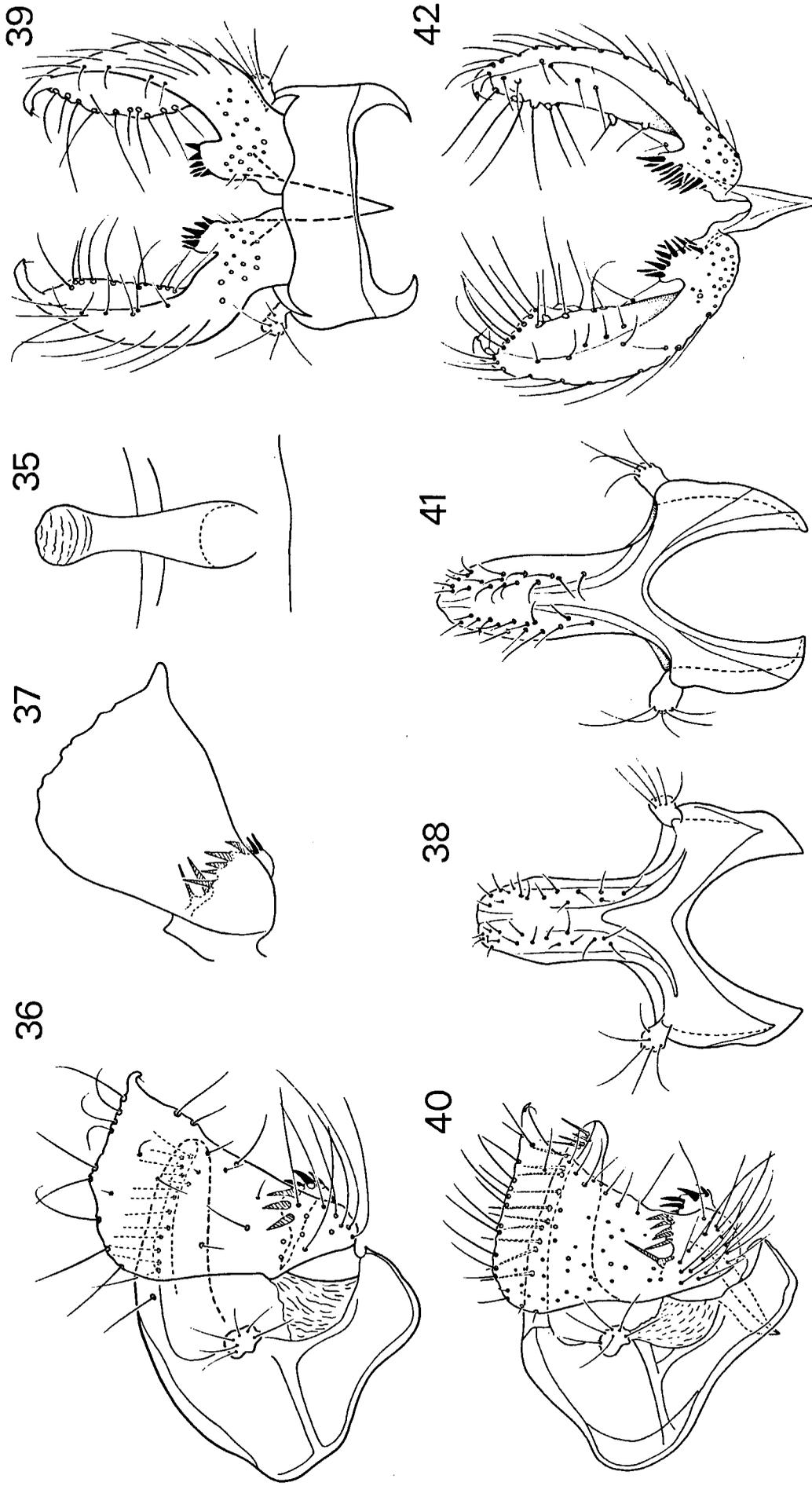


Fig. 35-42. ♂ *H. cubana occidentalis* n. subsp.: 35. appendage of sternite VI; 36-42. genitalia of three different specimens and under slightly different angles (specimen a: 36, 38, 39 - lateral, dorsal, ventral; specimen b: 37 - gonopod in lateral view, without setation; specimen c: 40, 41, 42 - lateral, dorsal, ventral).

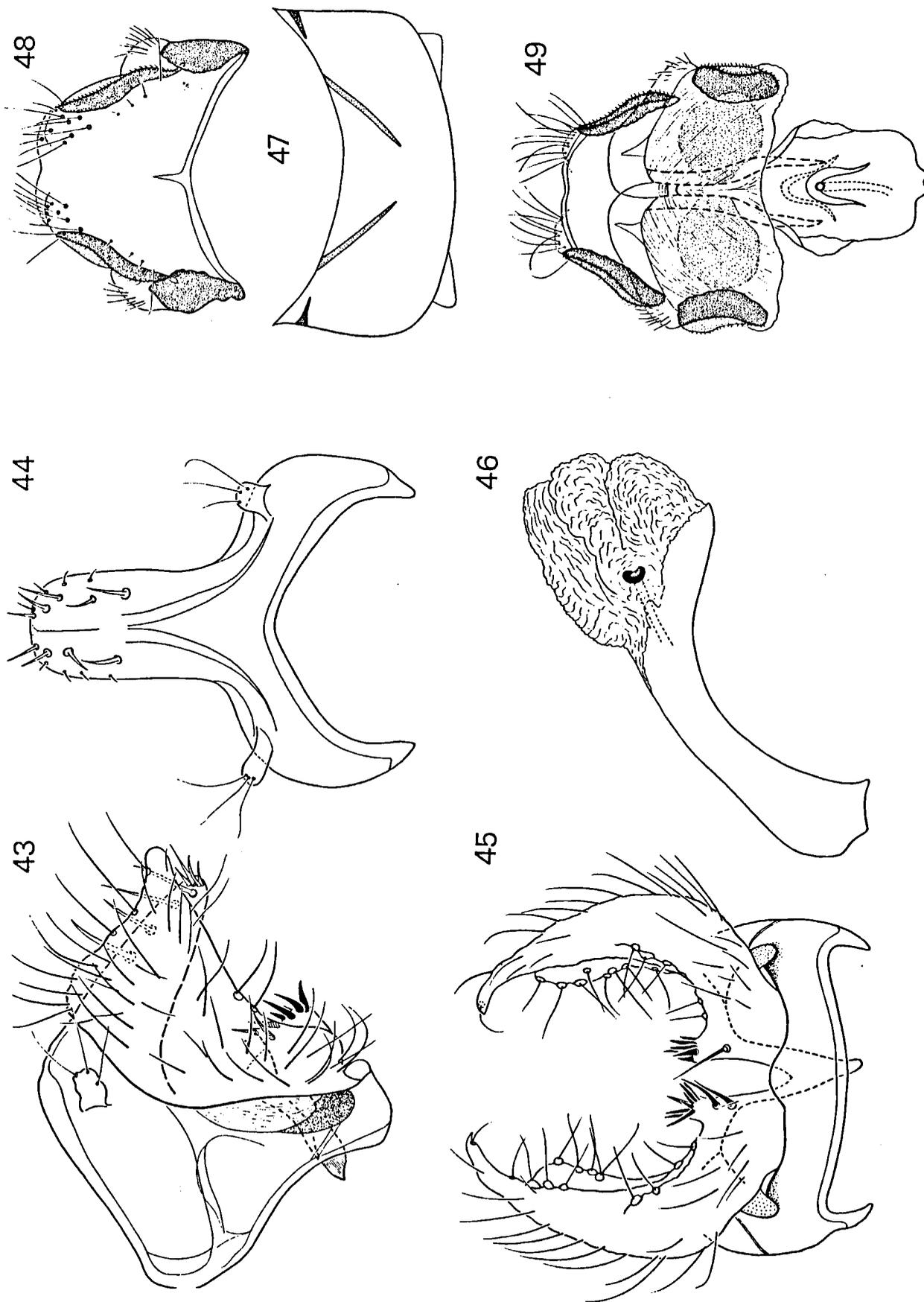


Fig. 43-46. *H. nigrisensilla* n. sp.; ♂ genitalia, 43. dorsal; 44. lateral; 45. ventral; 46. phallus, lateral.

Fig. 47-49. ♀ *H. nigrisensilla* n. sp.; 47. sternite VII; 48-49. genitalia (dorsal, ventral).

race of the Oriental *H. cubana*, or a vicariant species. For the time being, the first solution seems preferable. In some respects (segment X, and especially the gonopod in lateral view) the ♂ of this form resembles that of *H. nigrisensilla* n. sp.

Helicopsyche nigrisensilla n. sp.

Figs. 43-49

Material examined

Dominican Republic, La Vega Province, 20 km S. of Constanza, 3-7 June 1969, O.S. Flint, Jr. & J. Gomez: male holotype, 10 ♂ paratypes, female allotype, 7 ♀ paratypes, 2 specimens without abdomen (pinned; holotype and allotype USNM, paratypes USNM & ZMA).

Description

Length of forewing ♂ 4.2 - 4.6 mm, ♀ 4.8 - 5.5 mm. Color of forewings distinctive: the main, central area is darker brown, and circumscribed by much paler (golden) areas-costal, apical, and especially postcostal; in the middle of the postcostal fringe, a small tuft of black setae.

Male

Reticulation on the lateral parts of sternite III, and on sternite IV (large meshes); there is no reticulation on sternite V, and no appendage on sternite VI. Segment IX in lateral view massive; sternite IX with a strong, rounded posteromedian lobe, and with two posterolateral distinctly blackened areas. Superior appendage quite dorsally and distally placed (it cannot be observed in ventral position). Segment X elongate, and also rather broad, parallel-sided, with apex obtuse without emargination, and only with a small number of setae forming 4 rows (two of large and two of small, fine setae) restricted to its distal half; dark stripes long, strongly converging distad. Lateral branch of gonopod strongly developed, in lateral view dorsal margin convex, apical prong blunt, mainly directed posteriad (in ventral view, this branch is pointed apically). Basomedian branch of gonopod well developed - although not very broad -, in ventral view distinctly separated from lateral branch, with a compact tuft of apical spines and one or two longer, strong setae near its median margin; laterally this branch is rather strongly protruding beyond the lateral one.

Female

Sternites III and IV with very well developed reticulation (meshes small, very regular); there is reticulation also on sternite V, but less distinct, meshes looser; no appendage on sternite VI. Sternite VII in its distal half with two not very dark, oblique stripes, converging posteriorly but still widely separated there. The ♀ genitalia are easily recognized by the presence of four (instead of two) lateral sensillar areas - one pair on segment IX, one on segment X - which are concave (especially those of segment IX) and completely blackened (this is easily seen also in dry, uncleared specimens). Moreover, there is a large darkened, almost round area on each half of sternite IX. Spermathecal neck somewhat bottle-shaped; spermatheca with distinct shoulders.

Comments

The ♂ genitalia show that this species also belongs to the "*haitiense* complex"; they are not very distinctive (for instance, they are in several respects similar to those of *H. cubana occidentale* n. ssp.), although the absence of an appendage on sternite VI, some peculiarities of sternite IX, the position of the superior appendages, and the sparse dorsal armature of segment X (inserted on its distal half only) will allow distinction from other species in this complex. On the other hand, the ♀ is highly distinctive, with its two pairs of blackened, concave sensillar areas (having given the name of the new species).

Helicopsyche falcigona n. sp.

Figs. 50-52

Material examined

All from Cuba. - Isla de Pinos, Santa Fé, Arroyo La Talega, 22 April 1973, L. Botosaneanu: male holotype (alcohol, Z.M.A.), 11 ♂ paratypes (alcohol, Z.M.A. and U.S.N.M.). Pinar del Rio Province, Pinar de Viñales, no collecting date, P. Alayo: 2 ♂ paratypes (alcohol, Z.M.A.). "Cuba Ch. Wright" (no collecting date): this ♂ paratype specimen (pinned, M.C.Z.) is very probably also from Pinar del Rio. The present figures were prepared from this last specimen, which is practically identical to those from Arroyo La Talega and Pinar de Viñales.

Description of ♂

Forewing length: in specimens from Arroyo La Talega 4 - 4.6 mm., in specimens from Pinar de Viñales 5.2 -

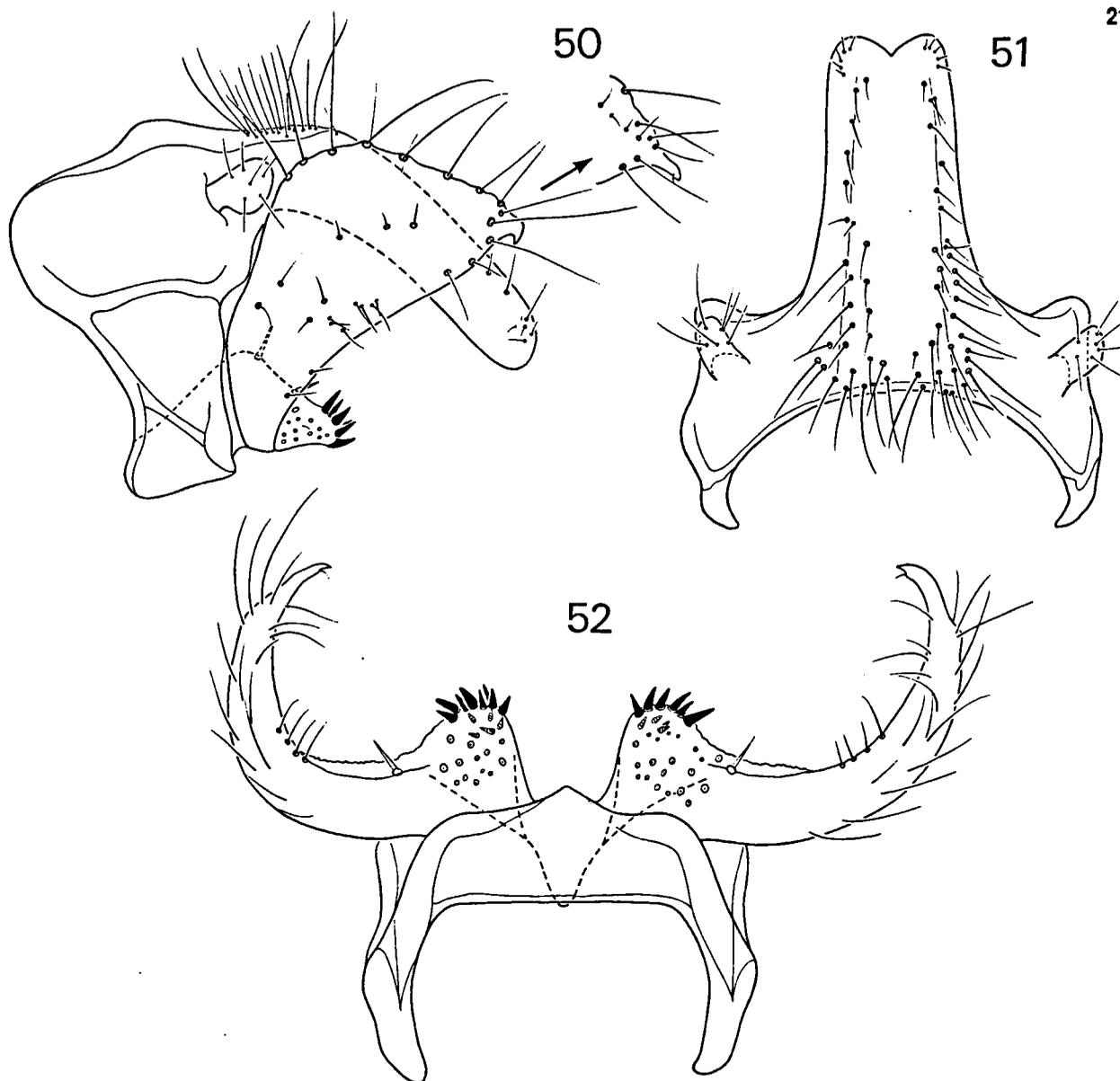


Fig. 50-52. *H. falcigona* n.sp., ♂ genitalia; 50. lateral, with slightly different view of distal point; 51. dorsal; 52. ventral.

5.3 mm. Sternites III and IV with loose, equally well developed reticulation. Appendage of sternite VI parallel-sided, tip rounded. Segment X relatively slender throughout its length in lateral view, with apex blunt; in dorsal view elongate, almost parallel-sided, apex clearly bilobed; the spines on its dorsum have a distinctly lateral position; a very characteristic group of longer setae is inserted not only "at the root" of the segment, but also on the central parts of tergite IX; no distinct dark stripes. Lateral branch of gonopod very broad, with distal point directed medially; in ventral view this branch is strongly falciform - although not always as strongly laterally directed as in fig. 52. The characteristic basomedian branch of the gonopod

is, in ventral view, distinctly rounded, widely distant from the lateral branch but not separated from it by a sinus, with rather numerous spines along the distal margin, and numerous setae on the ventral face; in lateral view it is conical and strongly protrudes from behind the lateral branch - which is narrow at its base.

Comments

Although quite distinctive in several respects (segment X, gonopods) this species also belongs to the "*haitiense* complex". The name was coined from *falx* (Lat.: sickle) and gonopod.

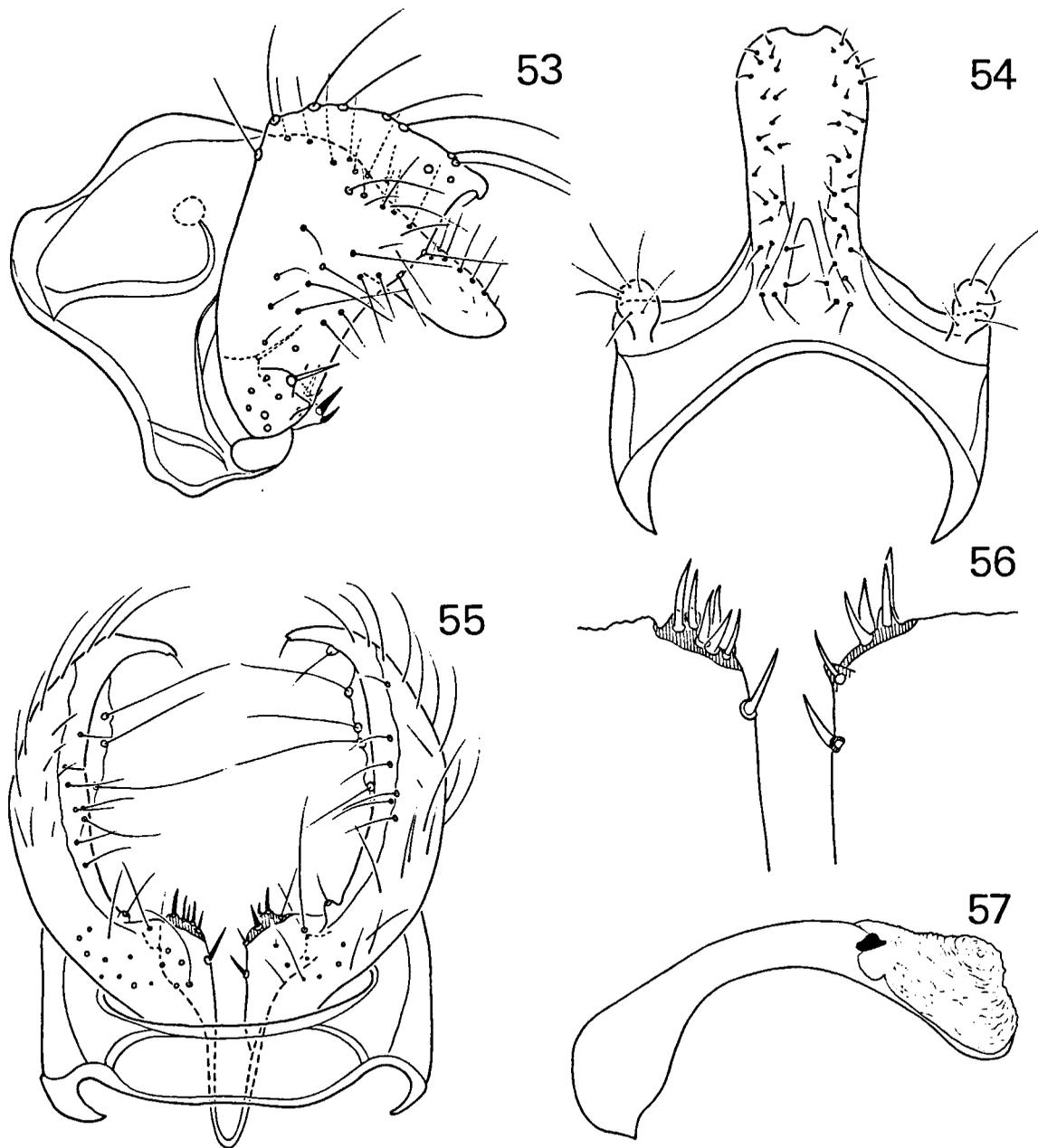


Fig. 53-57. *H. centrocubana* n. sp., ♂ genitalia; 53. lateral; 54. dorsal; 55. ventral; 56. ventral view of medio-basal branches of gonopods, more strongly enlarged; 57. phallus, lateral.

Helicopsyche centrocubana n. sp.

Figs. 53-57

Material examined

All from Cuba. - Province Matanzas, Cuabales de Galindo, Valle de Yumuri, June 1970, P. Alayo: male holotype, 1 ♂ paratype (alcohol, Z.M.A.). Province Habana, Guines, March 1966, P. Alayo: 1 ♂ in bad condition, very probably belonging to this species, but not designated as paratype (alcohol, Z.M.A.). Province Las Villas, Escambray, Jibaro, March 1974, collector unknown: 1 ♂ in bad condition, very probably belonging to this species, but not designated as

paratype (alcohol, Z.M.A.).

Description of ♂

Forewing length: 4.4 - 4.5 mm. (5 mm in the specimen from Jibaro). On sternite III a rather vague and loose reticulation; reticulation present or absent on sternite IV; appendage on sternite VI slender, feebly broadened apicad. Segment X in lateral view with a rather accentuated basodorsal swelling, and with apex obtuse; in dorsal view relatively elongate (with

rounded distal emargination, which cannot be distinguished in some specimens); most of the numerous spines laterally placed, but also with many spines at its root; the dark stripes form a characteristic pattern: fig. 54. Lateral branch of gonopod broad, relatively broad also at base; in lateral view it conceals most of the basomedian branch (but this can protrude somewhat more than represented in fig. 53); with apical point directed distinctly medially. Most characteristic is the basomedian branch of the gonopod in ventral view: protruding very feebly, angular (median margin vertical, distal margin horizontal); not separated by a sinus or indentation from the lateral branch, but by a seta with strongly inflated alveole; its apicomedial angle is strongly sclerotized, and the spines are placed on this thickened zone; there is also one spine inserted on the median margin of the branch. Phallus relatively strongly curved.

Comments

Figs. 53-57 were prepared from a specimen from Matanzas: Cuabales de Galindo. The genitalia of the specimens from the two other localities, in spite of their bad condition, were found to be similar to those of the holotype and paratype in most details. Although readily distinguished in the ♂ sex (especially by several details of segment X and by the structure of the basomedian branch of the gonopod) this species, too, belongs to the "haitiense complex".

Helicopsyche paucispina n. sp.

Figs. 58-60

Material examined

All from Cuba. - Pinar del Rio Province, Vifales, San Vicente, Arroyo del Aqueducto, June 1965, P. Alayo: male holotype (alcohol, Z.M.A.). Province Matanzas, Cuabales de Galindo, Valle de Yumuri, June 1970, P. Alayo: 1 ♂ paratype (alcohol, Z.M.A.).

Description of ♂

Length of forewing: 3.4 - 3.85 mm. Sternites III and IV with well developed reticulation; there is a loose reticulation also on sternite V; appendage of sternite VI more or less parallel-sided, with rounded tip. Segment X elongate, in lateral view very high basally but suddenly tapering to the pointed and slightly upturned

apex; dorsally only with few spines, distal ones in two lateral rows, proximal ones forming a central group (apparently no apical emargination or indentation); dark stripes forming an inverted Y. Lateral branch of gonopod in lateral view with clearly depressed dorsal margin, apical prong clearly directed posteriad (not medially), and with a long axillar seta. The basomedian branch of the gonopod is very characteristic: it is feebly produced (in lateral aspect not protruding beyond the lateral branch), somewhat angular, not separated from the lateral branch by a sinus, and with a simple armature on two distinct levels: two short spines on a ventral level, two setae from inflated alveolae on a more dorsal level.

Comments

The ♂ of this species belonging to the "haitiense complex" is readily distinguished, e.g., by the shape of segment X in lateral view, and by the interesting basomedian branches of the gonopods (which show some similarity to those of *H. dominicana* n. sp. - a typical convergence). The name was formed from (Lat.) pauci = few, and spina = spine, alluding to the scarce armature of the basomedian branch of the gonopod.

Helicopsyche minima von Siebold, 1856

Figs. 61-67

The complex nomenclatorial history of this Puerto Rican species was unravelled by Flint (1964: 71) who also gave the first illustrated description of the ♂ and ♀. For the present study 1 ♂ and 1 ♀ were examined, from Puerto Rico: El Verde Field Station, Quebrada Prieta, 370 m, Malaise trap, 6-10 Feb. 1990, O.S. Flint, Jr. (pinned, Z.M.A.).

Length of forewing: 3-4 mm (according to Flint, 1964). Forewing covered with (golden) brown setae, but with paler, golden areas along fore- and hind margins. In both sexes, sternite III with well developed reticulation in its central area; sternite IV with reticulation better developed laterally; sternite V with feebly developed reticulation, only medio-proximally. Sternite VI in the ♂ with a long, very slender, capitate appendage; in the ♀ this appendage is pointed, not capitate.

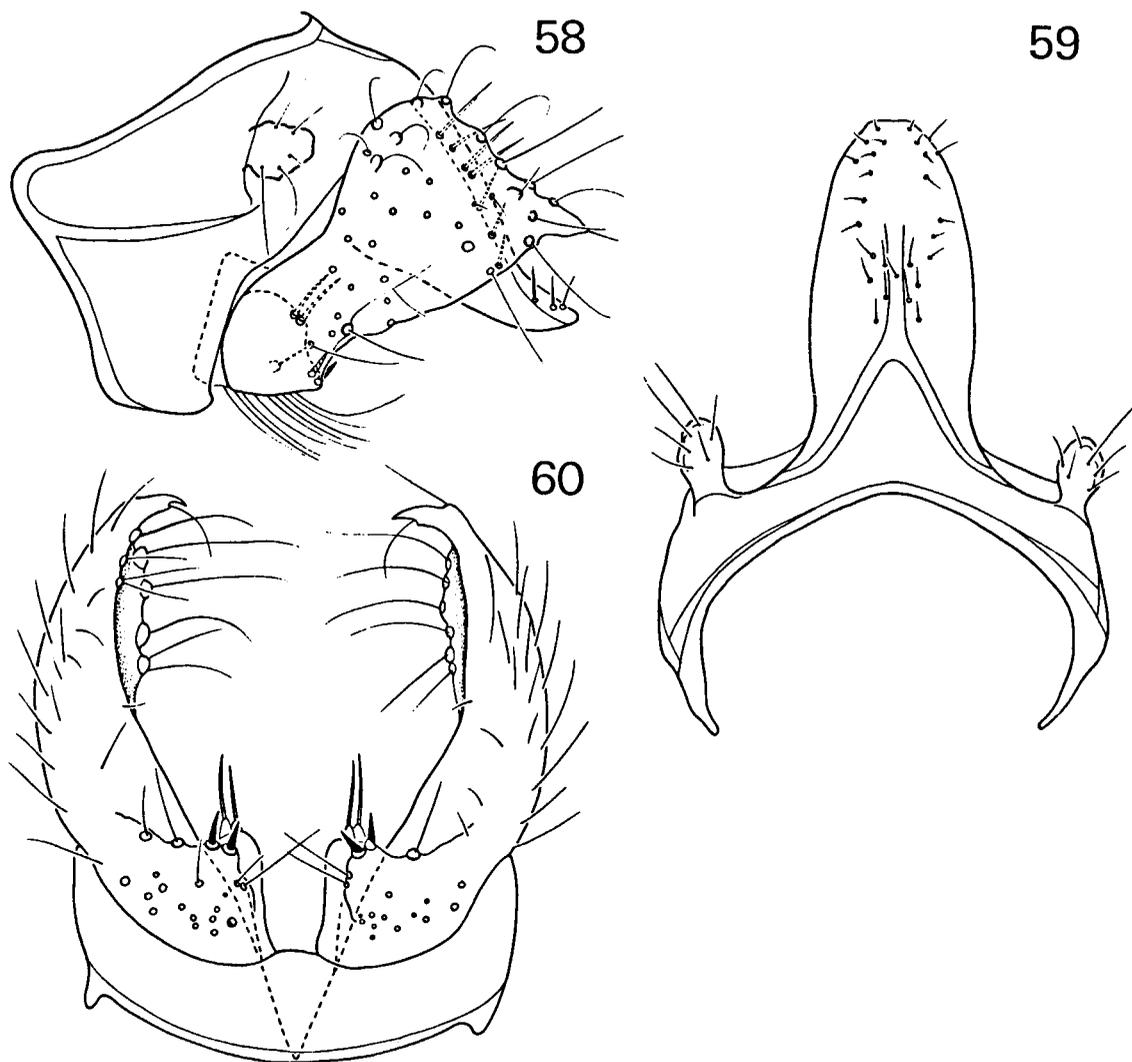


Fig. 58-60. *H. paucispina* n. sp., ♂ genitalia; 58. lateral; 59. dorsal; 60. ventral.

Male

Segment IX laterally with simple oblique thickening separating tergite and sternite. Segment X relatively short, very distinctly bilobed at apex, almost all spines on these two lobes or somewhat more basally, dark stripes forming an inverted Y; in lateral view this segment is characterized by its truncate apex and by the rough distal part of its dorsal margin, owing to the strong alveolae of the spines. Lateral branch of gonopod relatively narrow, with dorsal and ventral margins almost parallel, apicodorsal angle rounded, distal margin irregular, distal point directed distad as well as mediad. The basomedian branch of the gonopod is completely lacking (there is not even a slightly protruding medial lobe here); between the gonopods, at

their root, a very slight projection. Phallus only slightly curved, with a club-shaped internal sclerotized structure.

Female

Pattern of sternite VII very distinctive, not easy to describe (fig. 65). The posterolateral angles of tergite VIII have well developed sensillar areas - a quite unusual situation. Other sensillar areas on segments IX and X. A very broad plate is present below the apical lobes of segment X. Spermathecal neck very short; spermatheca with relatively well developed shoulders.

Comments

Although probably belonging to the "*haitiense* com-

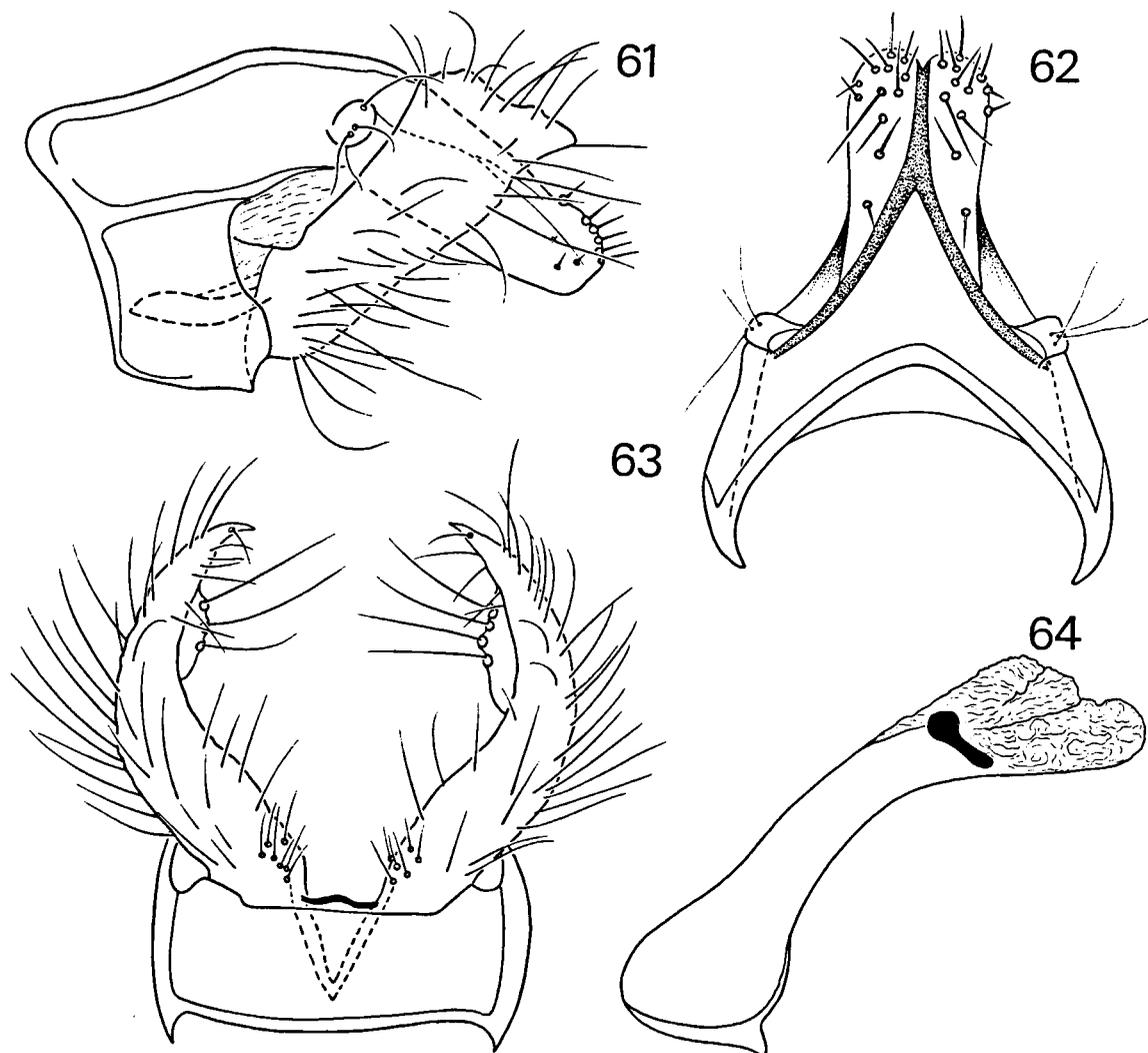


Fig. 61-64. *H. minima* von Siebold, ♂ genitalia; 61. lateral; 62. dorsal; 63. ventral; 64. phallus, lateral.

plex", this is a species quite distinct from all other West Indian *Helicopsyche*, excepting *H. propinqua* n. sp. It is present throughout Puerto Rico, and some variability was observed: male specimens from the eastern end of the island do have some slightly developed protuberances in the area of the basomedian gonopodial branch, whereas those from the western end have no sign of such (but the females of all seem identical).

Helicopsyche propinqua n. sp.

Figs. 68-71

Material examined

Puerto Rico, Toro Negro Forest, Doña Juana creek, 23-24

June 1969, O.S. Flint, Jr.: male holotype (pinned, U.S.N.M.).

Description of ♂

Length of forewing: ca. 4 mm; forewing brown to the naked eye (membrane dark-beige, setae golden). Sternites III and IV with very well developed reticulation forming transverse belts; on sternite V only a small medio-proximal area with reticulation; no appendage on sternite VI. Segment IX laterally with a complex system of thickenings. Segment X relatively short, very distinctly bilobed at apex; all the dorsal spines forming two regular rows; dark stripes very strongly developed and forming approximately an A. Lateral branch of gonopod relatively narrow basally, but then strongly dilated, dorsodistal angle broadly

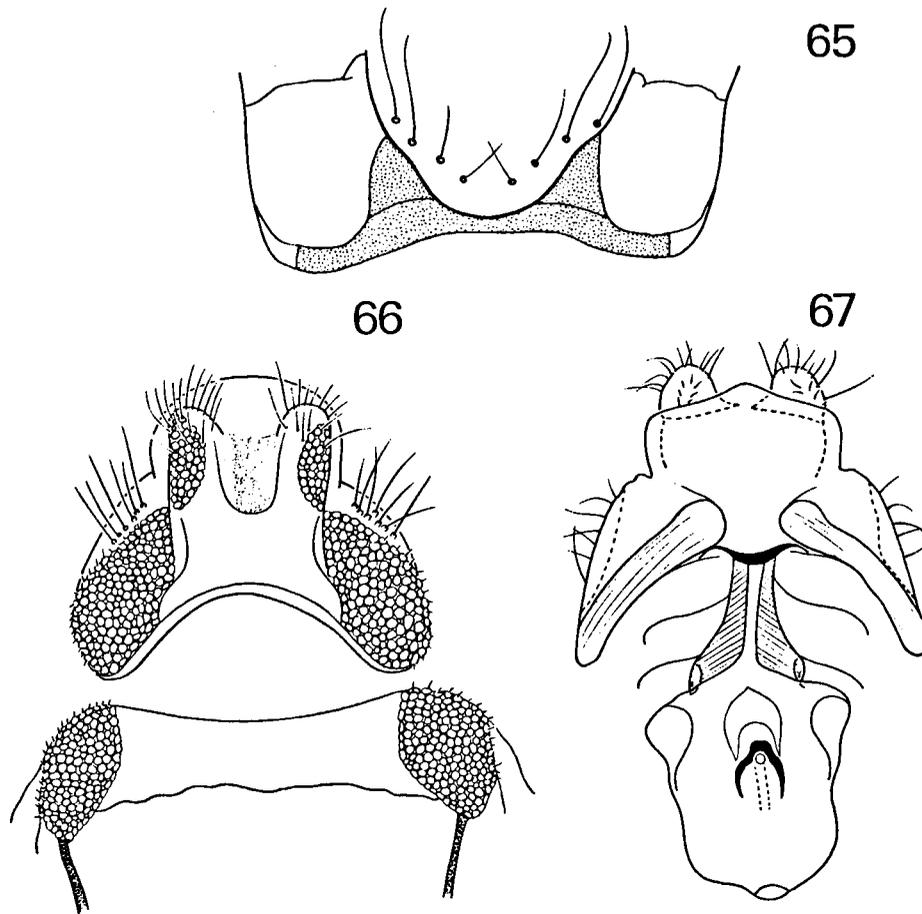


Fig. 65-67. ♀ *H. minima* von Siebold. 65. sternite VII; 66-67. genitalia (dorsal, ventral).

rounded, distal margin convex, distal point directed posteriorly and also medially. The basomedian branch of gonopod is lacking, but a slightly protruding, setose lobe is present medially; between the gonopods, at their base, a small triangular projection. Phallus strongly curved, with club-shaped internal sclerotized structure.

Comments

H. propinqua n. sp. is certainly the sister species of *H. minima* Flint; this is shown by several characters of the ♂ genitalia, and especially by the lack of a basomedian branch of the gonopod. It is, nevertheless, clearly distinct from *minima*, as shown, e.g. by the different pattern of dorsal spines and dark stripes of segment X, by the much broader distal half of the lateral branch of the gonopod, and by the strongly curved phallus; several other distinguishing characters could be added, including the slightly protruding setose lobe in the area where a basomedian branch

is present in most West Indian species. The species name was coined from propinquus (Lat.: similar, neighbouring, related).

DISTRIBUTION AND AFFINITIES OF THE GREATER ANTILLEAN HELICOPSYCHE

Helicopsyche is represented in Cuba by a surprisingly high number of described taxa. In the chronological order in which they were described, these are: *hageni* Banks, 1938 (known only from the higher parts of Sierra Maestra: Pico Turquino); *cubana cubana* Kingsolver, 1964 (probably widely distributed in Oriente; *cubana* was discovered also in Jamaica); *comosa* Kingsolver, 1964 (Pinar del Rio); *granpiedrana* Botosaneanu & Sykora, 1973 (known only from the Gran Piedra massif, Oriente); *sigillata* Botosaneanu & Flint, 1991 (known only from Monte Iberia, Oriente); *cuba-*

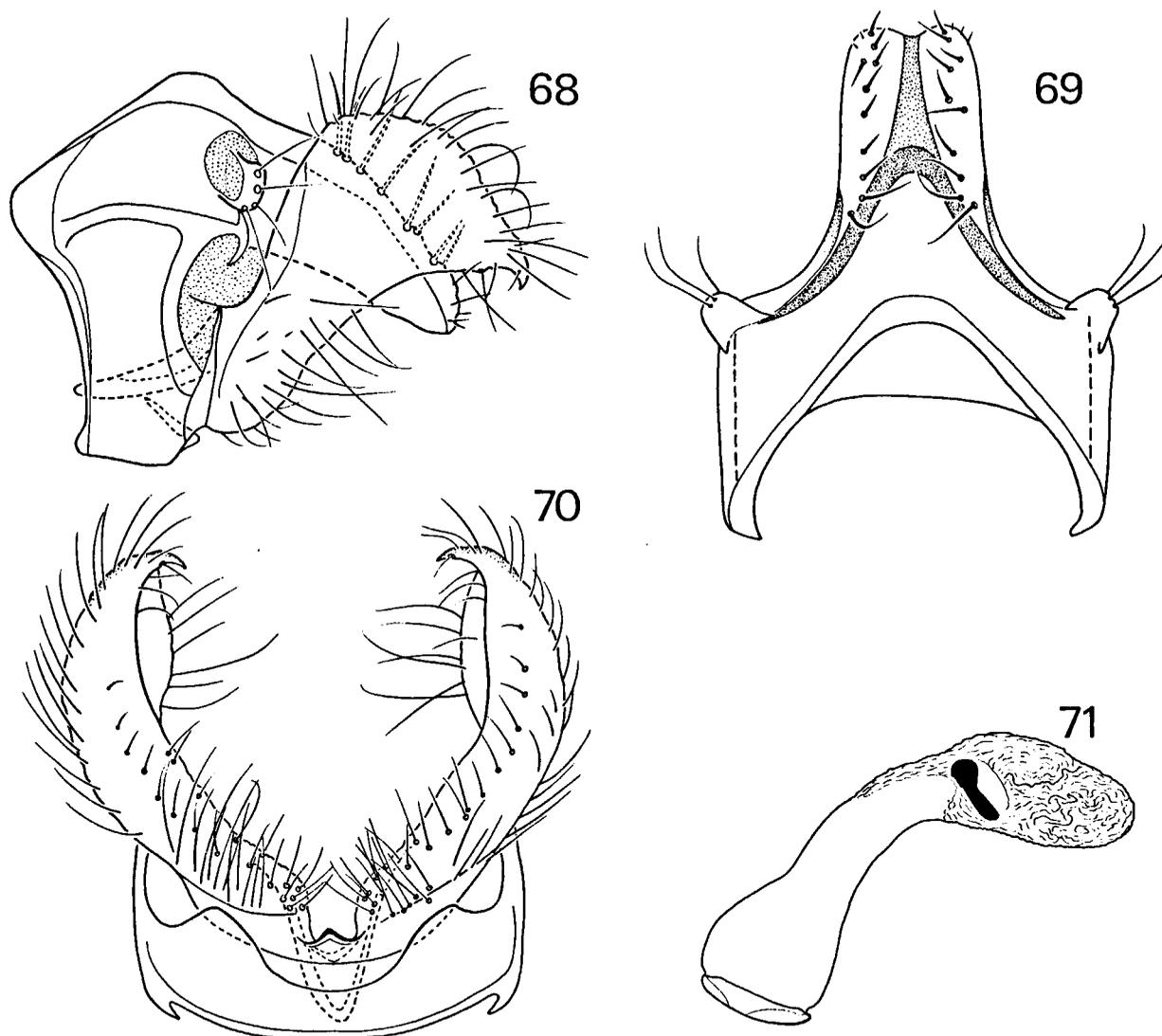


Fig. 68-71. *H. propinqua* n. sp., ♂ genitalia; 68. lateral; 69. dorsal; 70. ventral; 71. phallus, lateral.

na occidentale n. ssp. (Pinar del Rio); *falcigona* n. sp. (Isla de Pinos and Pinar del Rio); *centrocubana* n. sp. (Matanzas, Habana, Las Villas: probably widely distributed in the central provinces of Cuba); *paucispina* n. sp. (Pinar del Rio, Matanzas). An additional species with very long setae on the gonopods is known from Oriente but could not as yet be described. This represents a total of 10 taxa.

The following *Helicopsyche* are described from Hispaniola: *lutea* (Hagen, 1861), unfortunately known only as ♀ (mentioned both from the Dominican Republic and from Haiti - but is this true for Haiti?); *haitiense* Banks, 1938 (Haiti, possibly widely distributed); *altercoma* Botosaneanu & Flint, 1991 (apparently

well distributed in the Dominican Republic); *dominicana* n. sp. (apparently well distributed in the Dominican Republic); *nigrisensilla* n. sp. (La Vega Province of the Dominican Republic). A total of 5 taxa.

As for Puerto Rico, the four known species are: *minima* von Siebold, 1856, and *ramosi* Flint, 1964, both distributed throughout the island; *propinqua* n. sp. (central massif); and *singulare* n. sp. (eastern massif).

Finally, from Jamaica three species are known: *umbonata* Hagen, 1864 (widespread; there is a simple - and thus somewhat doubtful - record of this species from Cuba, Sierra Maestra, in Naranjo Lopez, 1987); *cubana* Kingsolver, 1964 (north coastal region; de-

scribed from Cuba); and *ochthephila* Flint, 1968 (central mountains).

If male genitalic morphology is considered, the following could be said about possible affinities between Greater Antillean *Helicopsyche*.

H. granpiedrana is a very isolated species, although we no longer consider its original description and illustration adequate. If the larva with a remarkable case described in Botosaneanu & Sykora (1973) as "*Helicopsyche* sp. γ " is really that of *granpiedrana*, the plesiomorphic nature of this species would be brilliantly demonstrated.

Another extraordinary species is the Puerto Rican *H. singulare*. Its affinities cannot be established for the time being; the complex structure of its segment X with its armature of spatulate spines shows some similarity with the situation found in several species described by H.H. Ross from New Caledonia; but it is almost beyond doubt that we are concerned here merely with convergence.

The Cuban *H. hageni* and the Hispaniolan *H. dominicana* are probably sister-species, certainly not belonging to the main complex of Greater Antillean *Helicopsyche*. There seems to be some similarity (e.g. in the lateral shape of the gonopod) with the Jamaican *H. ochthephila*; but this species is probably not really related to the two already named.

In our opinion all the remaining Greater Antillean species belong to one species complex, here called the "*haitiense* group". Several more or less evident affinities may be observed between various species (*haitiense* and *ramosi*; *cubana* and *nigrisensilla*; *minima* and *propinqua*), whereas several other species (*falcigona*, *centrocubana*, *paucispina*, *umbonata*) seem to be more or less isolated inside this complex.

It is a quite interesting fact that even species with remarkable androconial systems (on forewings, on genitalia, or on both), like *comosa*, *altercoma*, or *sigillata*, almost indubitably belong to this same complex, if δ genitalic morphology is considered as deci-

sive; and it may even be suspected that such androconial systems were selected as compensation for the monotony of male genitalia.

We suppose that the "*haitiense* complex" will be found to be only part of a larger, mainly Neotropical and West Indian species group. Finally, it may be said that the West Indian *Helicopsyche* represent one of the richest (almost 25 known species) species assemblages of this genus in the world fauna.

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