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## A NEW GENUS (*DISCAPSEUDES* n.g.) AND THREE NEW SPECIES OF APSEUDIDAE (CRUSTACEA, TANAIIDACEA) FROM THE NORTHEASTERN COAST OF SOUTH AMERICA

by

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With 6 textfig. and 1 plate

### ABSTRACT

On the basis of an abundant material from the north-eastern coast of South America, viz., from the mouth of the Suriname River and a few other localities, the authors describe a new genus, *Discapseudes*, with the species *D. surinamensis* and *D. holthuisi* as well as a new species, *Halmyrapseudes spaansi*.

### INTRODUCTION

We have recently described, from the waters of the Antilles, two species of brackish-water apseudids which we have referred to a new genus, *Halmyrapseudes* (Băcescu & Guțu, 1974).

Through the kindness of Dr. L. B. Holthuis and Mr. A. L. Spaans — to whom we express our warmest thanks — we received abundant material of Monokonophora collected by Messrs. A. L. Spaans, P. van der Wielen and P. G. E. F. Augustinus during their ecological and sedimentary studies conducted along the Suriname coast and sponsored by the Netherlands Foundation for the Advancement of Tropical Research (WOTRO).

The examination of this material discloses the presence of three distinct species, one of which belongs to the above-mentioned genus; the other two proved to be distinctly different from all known monokonophores by many morphological characters, the most striking of which was the discoidal shape of the telson, which led us to decide to include them in a new genus, *Discapseudes*, described below.

### ***Discapseudes* n.g.**

Type species: *D. surinamensis* n. sp.

Diagnosis. — Carapace provided with a rostrum, without lateral or antero-lateral spines. Peraeonites with rounded margins, without spinose

apophyses. First pleonite with a transverse border of setae. Pleotelson ovate, almost round, very flat, discoidally shaped. Mandibles and maxillules provided with palps, bi- and tri-segmented, respectively. Chelipeds and peraeopods II with exopodites; chelipeds normal in females, but very strong and modified in males. Peraeopods II without spinose apophyses on coxae; carpus very broad. Five pairs of pleopods, with strong rami.

Chelipeds and antennules with marked sexual dimorphism.

***Discapseudes surinamensis* n. sp.** (figs. 1, 2)

Material. — 1. Hundreds of specimens, males, females, and juveniles of different ages, originating from the mouth of the Suriname River, 10 km N.W. of Paramaribo, collected by Mr. A. L. Spaans on 21 January 1972, in a soft mudflat which is exposed at low tide near the road named "Weg naar Zee" (= road to the sea). The specimens were almost always accompanied by *Halmyrapseudes spaansi* n. sp. (see p. 107) as a biotope companion. The January samples were made at 100 m, 200 m, 400 m, 500 m, and 750 m, respectively, from the narrow sandy beach that bordered the mud-flat on the land side; they were taken just after the water had receded during the outgoing tide.

2. A sample of 260 specimens from the same area, collected on 22 May 1969 by Mr. P. van der Wielen.

3. Six samples from the stomach contents of 3 species of North American wading birds shot by Mr. A. L. Spaans in October 1972 on the above mentioned mud-flat near "Weg naar Zee"; each sample containing numerous specimens of this species.

4. A sample from Caroni Swamp, Trinidad, with 7 specimens collected by Peter F. Bacon in 1966, submitted to us by Dr. Thomas E. Bowman, U. S. National Museum, Washington, D. C., U. S. A.

Description. — Male. The body (fig. 1 A) is stout; it is about 5.5 times as long as its maximum width; the tegument is glabrous.

The carapace (fig. 1 A) has the rostrum broad at the basis, abruptly tapering anteriorly. The carapace itself is narrower before the respiratory chambers than behind; at the level of these chambers it abruptly broadens. Its length, together with that of the rostrum, is equal to the maximum width. The eye-lobes have no spinose apophyses, and do not present visual elements. The epistoma does not have a spine (fig. 1 E).

The second (= first free) peraeonite (fig. 1 A) is widest, but it is not as wide as the carapace. The third is of about the same length as the second. The next four peraeonites are longer. Each peraeonite is wider than long with the outlines rounded, without a spiniform process. No hyposphenium is present. The seventh peraeonite has a strong genital cone.

The pleonites (fig. 2 F) number 5 and are short and wide. Together they are shorter than the carapace or the pleotelson. The first pleonite presents dorsally a transverse row of setae over its full width. All pleonites have numerous lateral setae. Each pleonite presents a median, ventral tubercle. These tubercles progressively decrease in size posteriorly (fig. 2 G, H).

The pleotelson (fig. 1 A, O) is very characteristic, having a discoidal

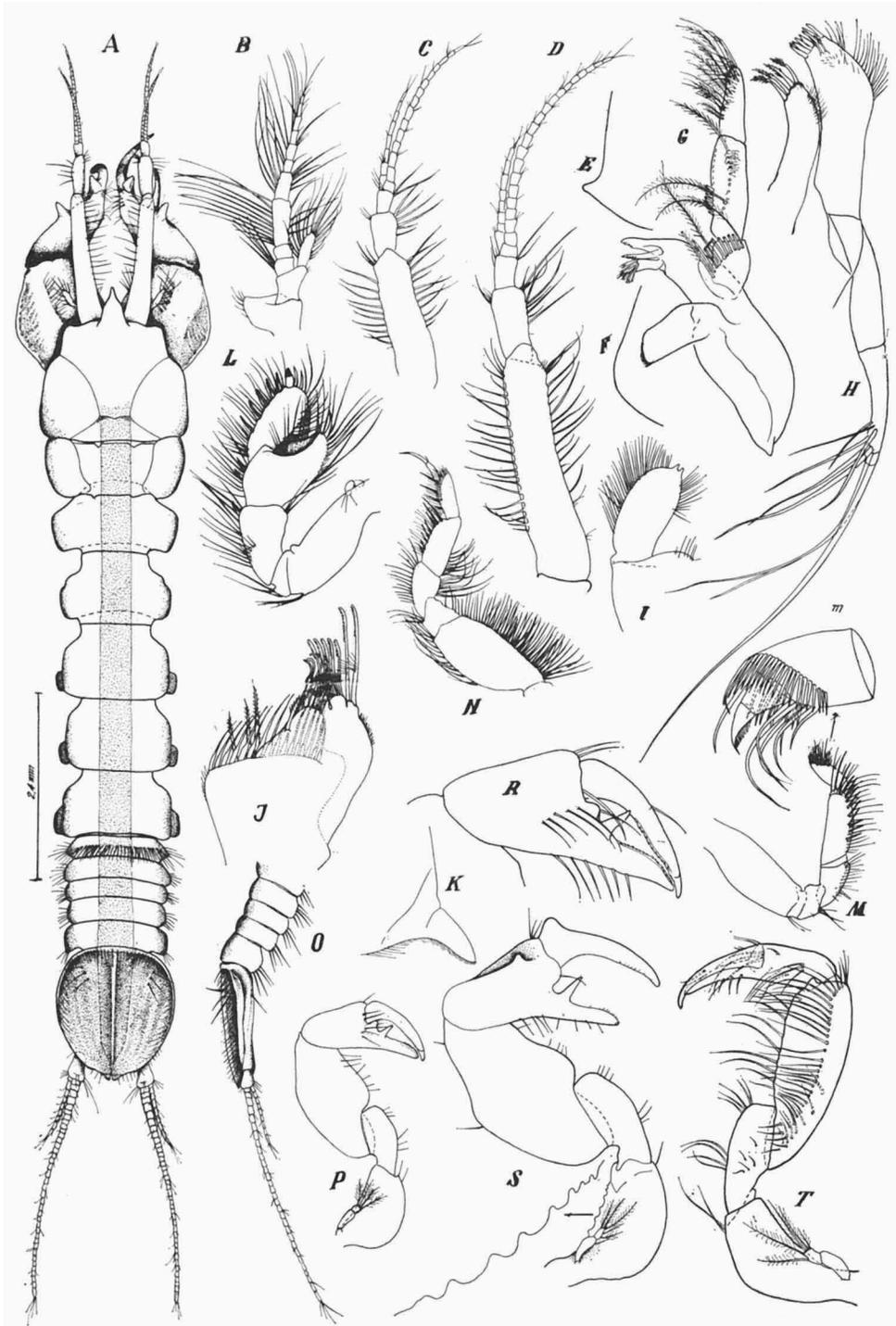


Fig. 1. *Discapseudes surinamensis* n. g. n. sp., ♂. A, general appearance, dorsal view; B, antenna; C, antennule (♀); D, antennule (♂); E, epistoma; F, ditto in ♀; G, left mandible; H, maxillule; I, labium, terminal view; J, maxilla; K, spine of epignathus; L, peraeopod II; M, peraeopod V; m, dactylus, detail; N, peraeopod VII; O, pleotelson and uropods; P, cheliped ♂, preadult; R, chela ♂, preadult; S, cheliped ♂ adult; T, cheliped ♀.

oval shape (fig. 2 E); in dorsal view it is scarcely longer than wide. Numerous setae are placed on the margins, a few also dorsally (fig. 2 C).

The antennule (fig. 1 D) has the proximal segment of the basis long almost equal in length to the carapace; it bears setae on both the inner and the outer edge. The inner flagellum consists of 9 segments; it is half as long as the outer flagellum, which consists of 20 segments.

The antenna (fig. 1 B) has a large expansion on the inner part of the first basal segment; it consists of 12 segments, the fifth being the longest. The squama bears numerous long setae all around.

The labrum is shown in fig. 2 A.

The mandible (fig. 1 G) bears a 3-segmented palp. The processus molaris ends in a border of spines. The pars incisiva and the lacinia mobilis at the left mandible bear 4 teeth each. The spiniferous lobe of the right mandible shows 2 rather short but strong spines towards the pars incisiva.

The labium (fig. 1 I) is characterized by the presence of two small spine-like protuberances apically, situated on the last segment, which bears numerous setae on its margins.

The maxillule (fig. 1 H) bears a palp consisting of two long segments; the last segment ends in 9 setae, one of which, an apical seta, is very long, being about 1.5 times as long as the palp. The inner endite ends in 4 phanera, the outer in 10 strong spines; subterminally, the outer endite also presents 2 setae and numerous long hairs.

The maxilla is shown in fig. 1 J.

The maxilliped is well developed, with a border of 5 sparsely pennate setae on the first segment of the palp. The second segment of the palp bears setae on the outer part at the level of contact with the next segment. On the inner part of the second segment of the palp, the numerous setae agglomerate toward the distal end. The next two segments are also provided with numerous setae. The epignathus (fig. 1 K) bears a thick spine.

The cheliped (fig. 1 S) has sharply edged segments. The basis is provided with an exopodite, and presents 2 rostral edges, the inner of which has a row of tubercles (fig. 1 S). The carpus is strong; it is the best developed segment. Sternally it ends in a very thin edge; latero-tergally there are two other, diverging edges which give it a very peculiar shape. Externally, near the articulation with the dactylus, the propodus is provided with a strong tubercle. The "digitus" bears a long digitiform apophysis. The claw of the propodus is reduced to a tubercle of brown colour. The dactylus is long and has a strong rostral hunchback-like expansion situated next to the articulation with the propodus. The claw of the dactylus, like that of the propodus, is reduced to a brown tubercle. Because of this

particular morphology the cheliped has a monstrous appearance, so far not encountered in any other Monokonophoran described.

Peraeopod II (fig. 1 L) does not substantially exceed the size of the following legs. The coxa does not have a spinose apophysis. The basis is provided with an exopodite. Very striking, even at first sight, is the shape of the carpus, which is flattened and broadened, forming a sort of triangle at the level of contact with the propodus. This triangle ends in a spine and presents an excavation in which the propodus can be partially retracted with its tergal edge (like a sword in its sheath). The propodus bears a very short dactylus with a thick, brown claw. The dactylus and the claw together do not exceed the length of the propodal spines. The arrangement and the number of setae and spines can be seen in fig 1 L.

The carpus of peraeopod V (fig. 1 M) presents sternally long, fine setae, alternating with long, fine spines. The propodus terminally bears a border of short setae and a few longer ones, which form a rosette around the dactylus (m, fig. 1 M). The dactylus is short and thick at the basis, with a pointed claw provided with a row of fine setae on the sternal face.

From the basis up to the carpus, peraeopod VII (fig. 1 N) presents, both sternally and tergally, numerous long setae. On the propodus these setae are only present sternally and terminally; among them, as well as on the carpus, there are a few fine spines. The dactylus is comparatively long, and is provided with a strong claw.

Five pairs of pleopods (fig. 2 B) are present; they consist of two wide, ovate rami, which are unisegmented and unequal, and bear long pennate setae.

The uropod (figs. 1 A, O, 2 D) has a strong peduncle (fig. 2 C). The exopodites consist of 9 segments and are shorter than the endopodites, which consist of 40 segments.

Female. — The female has the body generally somewhat less stout than the male, which it otherwise resembles, except for the dimorphic appendages.

The cheliped (fig. 1 T) bears numerous fine setae along the edges of the carpus. Neither the propodus nor the dactylus shows the tubercles which are so characteristic of the males. The claw of the propodus is extremely reduced, as in the males; the claw of the dactylus is slightly larger.

The antennule (fig. 1 C) has the proximal segment of the basis shorter than in the males, being three times as long as the maximal width. The inner flagellum consists of 7 segments, the outer flagellum of 14 segments.

The antenna is as in the males, except for the sixth segment, which is somewhat shorter.

The females carry 18 to 26 golden coloured eggs in their transparent marsupium.

Size. — The males are 10.5-12 mm in standard length; including antennae and uropods, their length is 16-21 mm. Females are somewhat shorter and more slender than the males.

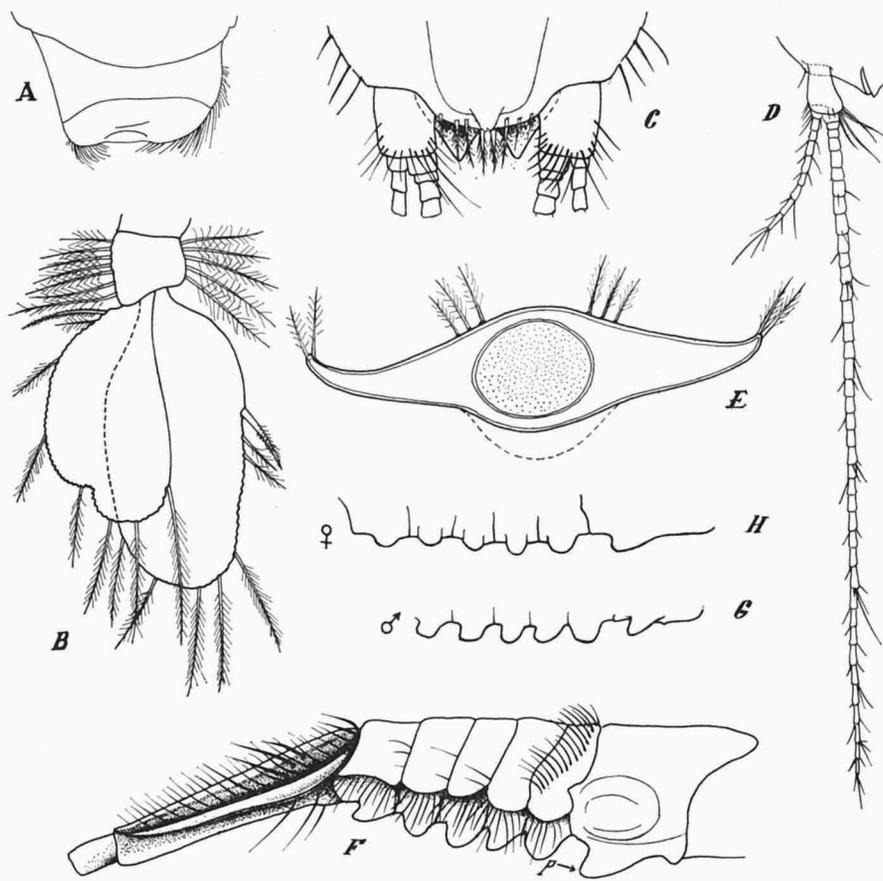


Fig. 2. *Discapseudes surinamensis* n. g. n. sp., ♂. A, labrum; B, pleopod I; C, posterior end of pleotelson; D, left uropod; E, transverse section through pleotelson; F, pleon and pleotelson, in lateral view, p = genital cone; H and G, pleonic hyposphenium in ♀ and ♂.

Colour. — The males are chalk-white. According to Mr. Spaans the integument of the females is more or less translucent, both in live and preserved material.

Types. — The holotype ♂ is kept in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands, under Reg. No. Crust.

I. 3758. The allotype ♀ is in the collection of the Museum of Natural History "Gr. Antipa", Bucharest, under Reg. No. 260. Of the hundreds of paratypes, 50 specimens, males, females and juveniles, are in the collection of the Museum of Natural History "Gr. Antipa", Bucharest, under reg. no. 261, and the other specimens in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, under reg. no. Crust. I. 3763 and I.3764.

Remarks. — In young males, the chelipeds are similar to those of the females; the dimorphism is only found in adult material (fig. 1 P, R). The extreme width of the carpus of pereopod II and the characteristic articulation of the propodus in a groove of the carpus, gives a strong support to the propodus. This is presumably an adaptation, permitting the animal to live in the semifluid mud of its habitat, as it enlarges the supporting surface of the animal. This feature is also encountered in the genus *Halmyrapseudes* Băcescu & Guțu. The very wide pleotelson seems to indicate the same adaptation, enlarging the supporting surface in the liquid mud.

The number of segments of the inner and outer antennular flagella, of the antennal flagellum, and of the branches of the uropods slightly varies from the figures given in the description. Also the shape of the pleopods may be different in different specimens. Thus, sometimes the endo- or exopodite presents but one ramus, sometimes there is a deep incision (fig. 2 B).

According to quantitative data supplied by Mr. Spaans, the populations of *Discapseudes surinamensis* may reach the remarkable figure of 14203 specimens/m<sup>2</sup>. The maximal density occurs in the mud flat at about 100 m from the shore, whereas the minimal density is at 750 m from the shore, where on the same day and under similar conditions, only 1017 specimens/m<sup>2</sup> were found.

Owing to their large size and remarkable density, as well as to the fact that they remain at the surface of the mud — in the first centimeter — these *Discapseudes* represent an important and much appreciated food for the wading birds, migrants from North America, which at low tide are found in considerable numbers on the mud flats of the shore of Dutch Guiana.

#### ***Discapseudes holthuisi*<sup>1</sup>** n. sp. (figs. 3, 4)

Material. — 12 specimens (2 females with embryos, 3 females with oostegites, 2 adult males, 2 preadult males and 3 juveniles), N. W. coast of Suriname near the mouth of Bucklebury Creek, Coronie District, Suriname, about 5°56'N, 56°34'W, collected on 16 March 1972 by P. G. E. F. Augustinus.

1) Dedicated to the distinguished carcinologist and friend, Dr. L. B. Holthuis.

Description. — Female. The body (fig. 3 A) is stout, being about 5.3 times as long as its maximal width.

The carapace (fig. 3 A) is about as long as broad, and is provided with a strong rostrum, which is wide at its basis, and is about half as long as the first segment of the antennule. The eye-lobes are rounded, they are without visual elements anteriorly. The epistoma does not have spines.

Each of the peraeonites (fig. 3 A) is wider than long, smooth, rectangular in outline, and has rounded angles; the lateral margins are almost parallel. The second (= first free) peraeonite is almost equal in length to the third, the fourth is equal to the seventh and the fifth is approximately equal to the sixth, the last peraeonites are the longest.

There is no hyosphenium. Only the seventh peraeonite presents a ventral tubercle.

The pleonites (fig. 3 A) are short and wide, with tufts of pennate setae along their edges. The first pleonite presents a row of setae over its full width. The last pleonite is the longest (fig. 3 K).

The pleotelson (fig. 3 A, K) is strongly flattened; in dorsal view it appears almost round, like a disk, with a border of short setae along its margin. It is somewhat longer than the pleon.

The antennule (fig. 3 D) has the first segment of the basis wide, with long pennate setae along the two edges. This first segment is half as long as the carapace. The inner flagellum consists of 7 segments and the outer of 12 segments.

The antenna (fig. 3 C) has a large expansion on the inner edge of the first basal segment, and bears there 5 spinose setae. The next segment is short and thick, provided with a squama bearing numerous pennate setae all around.

The labrum (fig. 4 F) presents along the medial, caudal margin a tuft of small bristles, and two rows of spinules on either side of the central tuft. Laterally, fine hairs can be seen.

The mandible (fig. 4 B) has a tri-segmented palp; numerous setae are present on each segment. The processus molaris ends in a concavity which shows a fine denticulation. The pars incisiva of the right mandible bears 5 strong teeth, that of the left mandible has 4 strong teeth; the lacinia mobilis also presents 4 teeth. The spiniferous lobe, in addition to the different phanera located terminally, presents a long bristle, which is placed subterminally on the edge towards the pars incisiva.

The labium (fig. 4 G) presents two small terminal bristles on the last segment.

The maxillule (fig. 4 A) has 10 spines on the outer endite and 5 setae

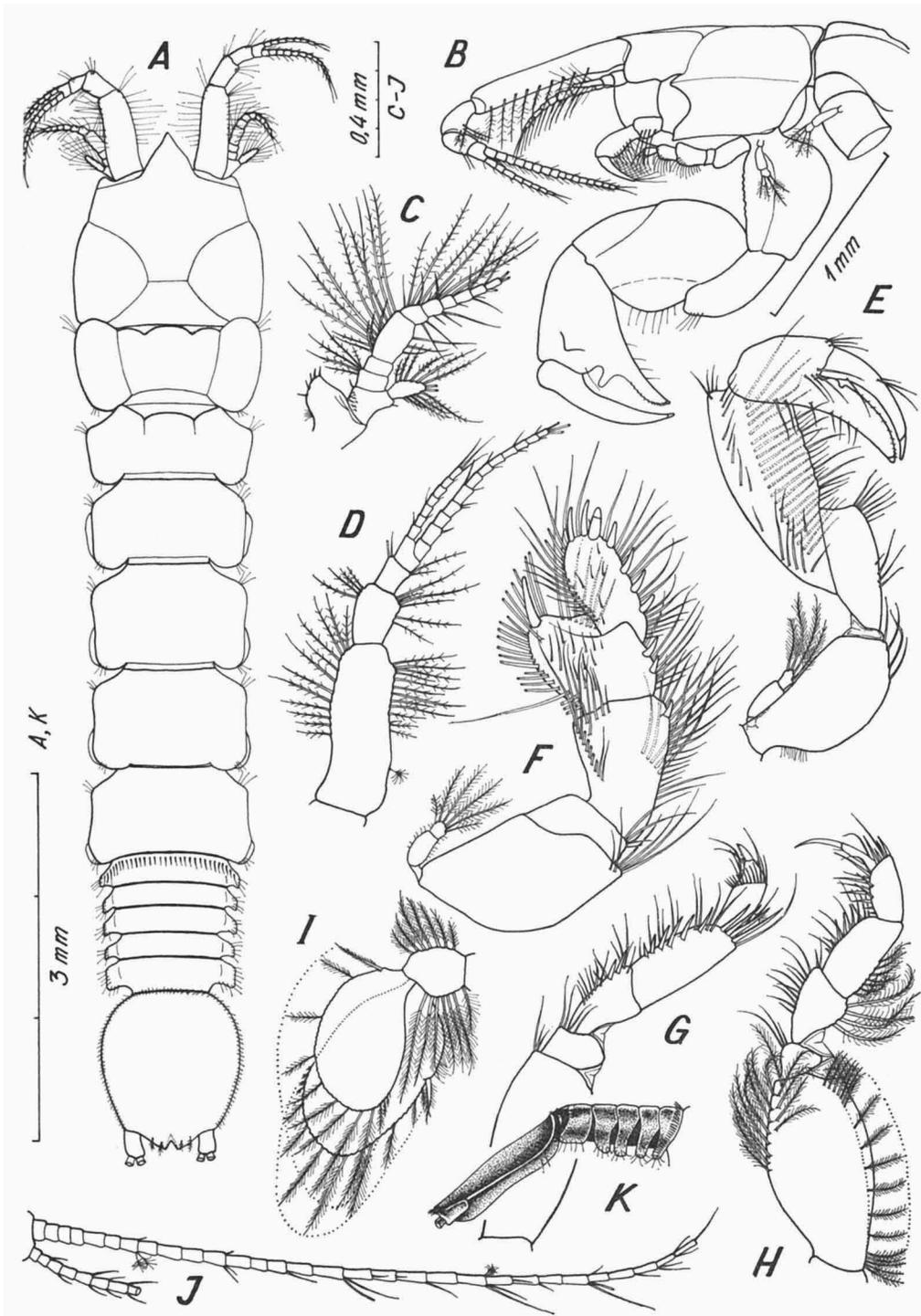


Fig. 3. *Discapseudes holthuisi* n. sp., ♀. A, general appearance, dorsal view; B, anterior portion of body, lateral view (♂); C, antenna; D, antennula; E, cheliped; F, peraeopod II; G, peraeopod V; H, peraeopod VII; I, pleopod I; J, uropod; K, caudal end, lateral view.

on the inner one (as shown in the figure). The palp is bi-segmented, the last segment has 6 terminal setae which increase in length from the last subterminal to the terminal.

The maxilla is lamellar, as shown in fig. 4 D.

The maxilliped (fig. 4 C) is very characteristic by the presence of 4 sparsely pennate setae along the inner edge of the first segment of the palp. The second segment of the palp bears numerous setae along its inner edge, and is also provided with outer setae along the edge of the articulation with the next segment. The third segment also bears such long setae. The epignathus of the maxilliped (fig. 4 E) is provided with a strong spine covered with bristles.

The cheliped (fig. 3 E) is provided with an exopodite. The carpus bears long setae. The claw of the dactylus is longer than that of the propodus. The dactylus together with its claw is equal in length to the "digitus" of the propodus with its claw.

Peraeopod II (fig. 3 F) has the coxa without a spinose apophysis. The basis bears an exopodite, and is relatively short and wide. The merus, which also is wide, bears long setae along the tergal and sternal edges; sternally, next to the articulation with the carpus, there is a strong spine. The carpus regularly widens towards the propodus, forming at the level of their contact a sort of groove for the reception of the tergal edge of the propodus. Numerous long setae cover the two edges of the carpus, presenting in addition two sternal spines and one strong and long tergal spine. The propodus also bears many setae along its edges; it has 4 sternal and 2 tergal spines behind the dactylus. The dactylus is very short, together with its claw it is about as long as the sternal spines of the propodus.

Peraeopods V and VII (fig. 3 G, H) are very characteristic. As to peraeopod III, its basis is narrower than that of peraeopod V, but the length of the two is about the same; the merus, carpus and propodus are of approximately equal length, all have numerous spines along the sternal edge.

The pleopods (fig. 3 I) have the two rami very wide, non-segmented, ovate, with the endopodite longer than the exopodite; they bear numerous pennate setae. The peduncle consists of a small coxa and a short basis, provided with many long pennate setae.

The uropods (fig. 3 J) show a long endopodite consisting of 30 segments, whilst the exopodite is shorter, presumably consisting of 9 or 10 segments. We are not able to give the precise number of segments forming the exopodite of the uropods because we never found these complete in females; the number mentioned above is based on that found in juveniles.

Males. — The males show a marked sexual dimorphism in the antennules and the chelipeds.

The antennule has the first segment of the basis longer than in the females, being of about the same length as the carapace; the inner and outer flagella have 1 or 2 segments more (fig. 3 B).

The cheliped in its general morphology resembles that of *D. surinamensis* (fig. 3 B).

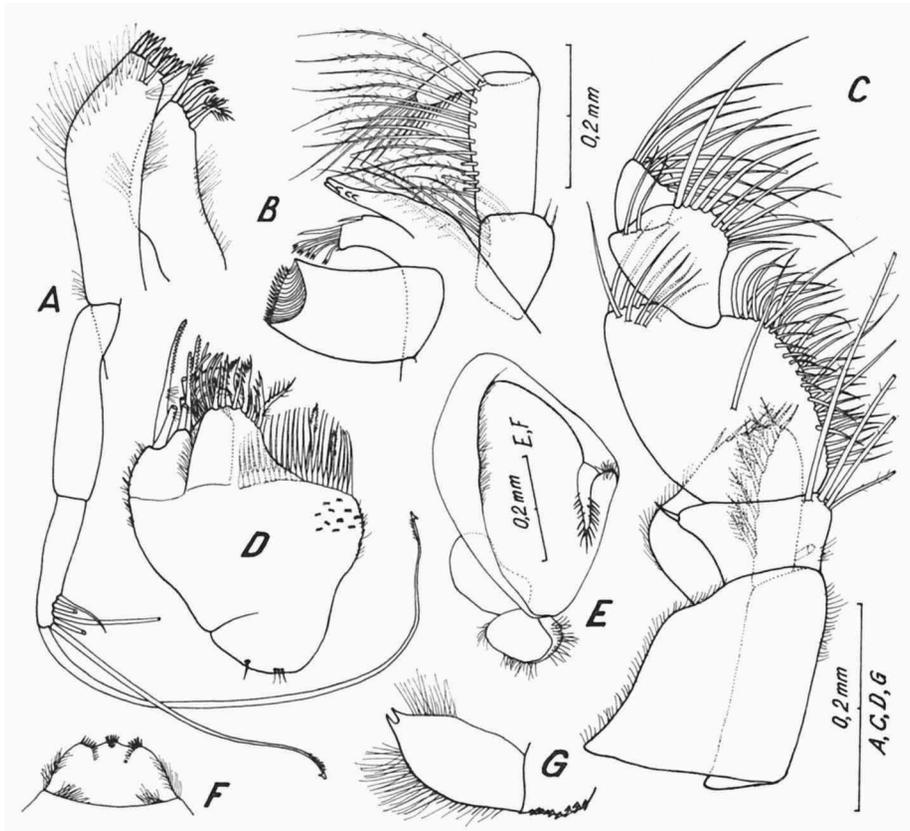


Fig. 4. *Discapseudes holthuisi* n. sp., ♀. A, maxillule; B, right mandible; C, maxilliped; D, maxilla; E, epignathus; F, labrum; G, labium, terminal view.

Size. — The males are 9.5 mm, the females 8.3 mm long, not including the antennae and uropods.

Colour. — The specimens are yellowish-white.

Types. — The holotype ♀ is preserved in the Rijksmuseum van Natuurlijke Historie, Leiden (reg. no. Crust. I.4105). The allotype ♂, is placed in the collections of the Museum of Natural History "Gr. Antipa",

Bucharest, under no. 282. Of the 9 paratypes (males, females, juveniles), 5 specimens (1♀ with oostegites, 1 adult ♂, 1 preadult ♂ and 2 juveniles) are in the Leiden Museum (no. Crust. I.4106) and 4 specimens (1♀ with embryos, 1♀ with oostegites, 1 preadult ♂ and 1 juvenile) in the Museum of Natural History "Gr. Antipa" Bucharest, no. 283.

Ecology. — The specimens were found in a small muddy lagoon between the mean high tide level coastline of Suriname and a 4 km long sandy barrier. At low tide the lagoon, which was about 400 m wide at the place of collecting, is almost completely drained. The sediments of the muddy surface, that is exposed during ebb tide, consists in the upper 7 cm of an interlayered sand/mud bedding, in which the clay content far dominates. Below this set of strata the deposit shows flaser bedding. The clay probably settled as "slingmud".

*Discapseudes* was observed here by Mr. Augustinus in U-shaped burrows, with an average depth of 40 mm in the above described clayey topsediments, just above a reduction zone (pl. 1 fig. A). In the area no other organisms were found that could be held responsible for these U-shaped burrows.

Some representatives of Tanaidacea are mentioned as burrowing in the substrate or even as leading a tubicolous life (*Leptocheilia*, *Kalliapseudes*), but none so far were known to make burrows as deep as those made by the present species. Such deep burrows perhaps are a characteristic ecological feature of the new genus *Discapseudes*.

We are most indebted to Mr. Augustinus for providing us with these highly important and interesting details and for his permission to publish in the present paper some of his photographs of the burrows of *Discapseudes*.

Remarks. — Apart from the difference in size, the two species of *Discapseudes* can be readily distinguished (the males as well as the females) by the fact that the basis of peraeopod II is much shorter in *D. holthuisi* (fig. 3 F), than in *D. surinamensis* (fig. 1 L).

At the same time, in *D. holthuisi* the dactylus of peraeopod II, together with its claw, is scarcely longer than the spines of the propodus, whereas in *D. surinamensis* these spines are longer.

Other differentiating characters are found in the length of segments 6 and 7 of the antennae of the females: in *D. holthuisi* these segments are as long as wide (fig. 3 C) whereas in *D. surinamensis* they are about twice as long as wide, each having the same length as segment 6 of the male antennae (fig. 1 B).

As to the adult males, these can be identified by size of the tubercle

at the basis of the dactylus of the cheliped, which is much larger in *D. surinamensis* (fig. 1 S) than in *D. holthuisi* (fig. 3 B).

We found that these features are constant both in *D. surinamensis* originating from Suriname and in that from Trinidad, which represents an additional evidence concerning the specific validity of *D. holthuisi*.

### ***Halmyrapseudes spaansi* n. sp. (fig. 5,6)**

Material. — Four lots from the northeastern coast of South America as follows:

1. Five km west of Oranje Kreek, halfway between the mouths of the Suriname and Marowijne Rivers, Suriname, at about 5°56'N 54°36'W, collected by Mr. A. L. Spaans, 22 October 1970 on sandy mud in three samples: 40 specimens (11 ♂♂, 25 ♀♀ and 4 juveniles), 182 specimens (74 ♂♂, 88 ♀♀ and 20 juveniles) at 100 m off shore at low tide, 40 specimens (11 ♂♂, 25 ♀♀, and 4 juveniles), and 222 specimens (202 ♂♂ and only 20 ♀♀), the latter two samples with less precise data than the first.

2. Mudflat off the mouth of the Suriname River near "Weg naar Zee" (a road leading to the sea), 10 km N. W. of Paramaribo, Suriname, collected by Mr. A. L. Spaans on 21 January 1972, together with *Discapseudes surinamensis* n. sp. (see there, p. 96): a, 100 m off shore, 24 specimens, all females, of which 4 with marsupium, together with hundreds of specimens of *Discapseudes surinamensis*; b, 200 m from the shore line, 106 specimens (6 ♀♀, 22 ♂♂ and 78 juveniles) together with 107 specimens of *D. surinamensis*; c, 400 m off shore, 115 specimens (10 ♀♀, 27 ♂♂, the rest subadults) along with 124 *D. surinamensis*; d, 500 m off shore, 56 specimens of which 35 ♀♀ (5 with eggs), 16 ♂♂ adults and 5 juveniles together with over 100 specimens of *D. surinamensis*; e, at 750 m, only 3 specimens (2 ♀♀ and 1 ♂) along with 15 specimens of *D. surinamensis*.

3. N. W. of Paramaribo, mud flat at the mouth of the Suriname River near "Weg naar Zee", same area as lot 2, collected by Mr. P. van der Wielen on 22 May 1969. Only 4 specimens of *H. spaansi* and over 200 of *D. surinamensis*.

4. The fourth lot forms part of the stomach contents of some migratory wading birds shot by Mr. A. L. Spaans, in October 1972 on the mud-flat near "Weg naar Zee".

Description. — Female. The body (fig. 5 A) is about six times as long as its maximal width. The carapace (fig. 5 A, B) has an acute rostrum and is somewhat longer than wide. The eye-lobe is anteriorly rounded, visual elements are present (fig. 5 B). There are no lateral or antero-lateral spines. The epistoma has no spine.

The second (= first free) peraeonite (fig. 5 A) is of the same length as the next. Peraeonites IV, V and VI are of about equal length, they are longer than the other peraeonites. Peraeonite VII is the shortest of all. All peraeonites have rounded outlines, without spinose apophyses and without a hypospheum.

The pleonites (fig. 5 A, C) are short and of about equal length, bearing dorsally a transverse row of setae across their full width.

The pleotelson (fig. 5 A, C, D) is slightly flattened dorso-ventrally, it

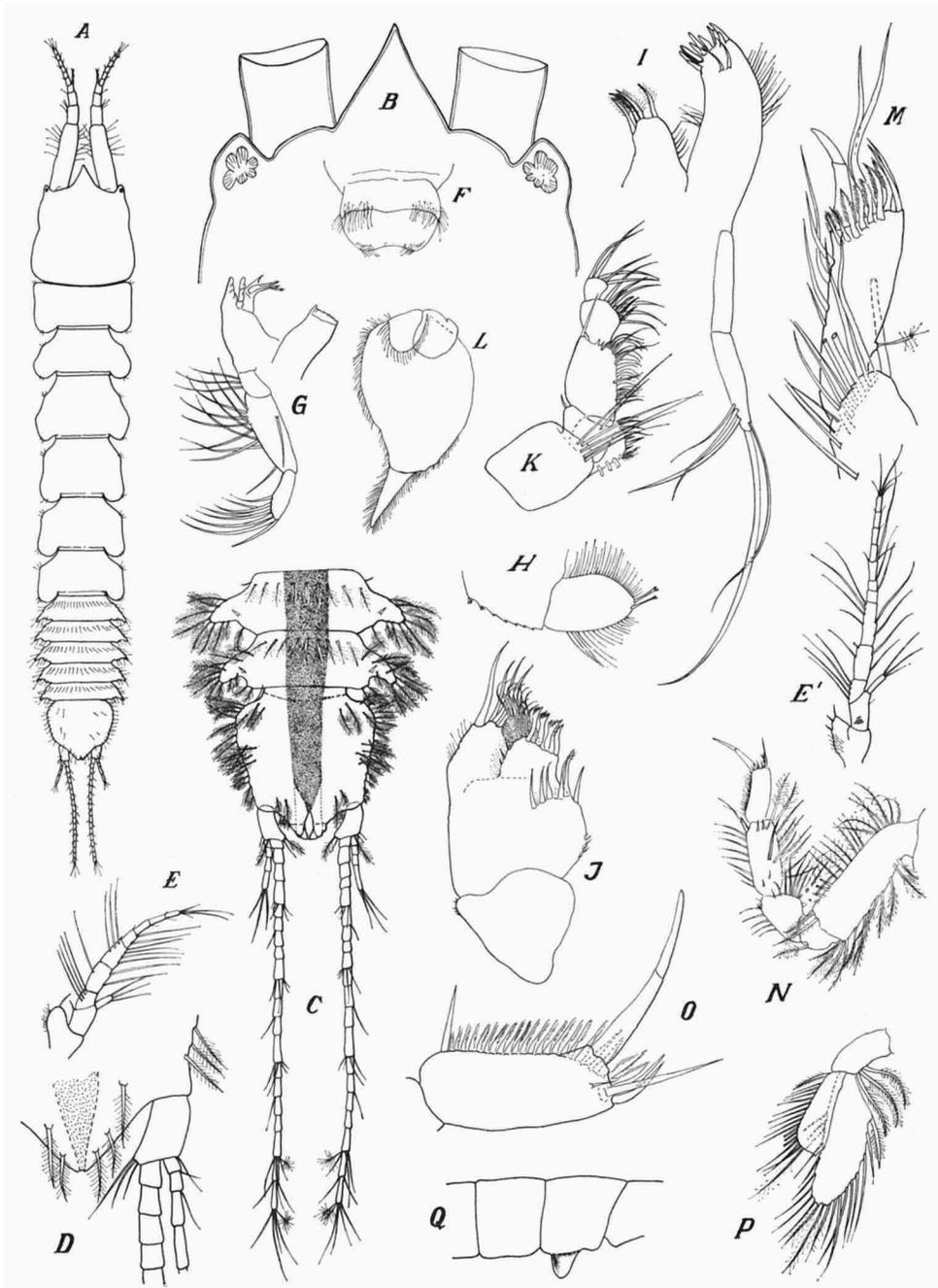


Fig. 5. *Halmyrapseudes spaansi* n. sp., ♀. A, general appearance, dorsal view; B, anterior portion of carapace; C, caudal end of ♂; D, terminal end of pleotelson; E, antenna; E', ditto of ♂; F, labrum; G, left mandible; H, labium, terminal end; I, maxillule; J, maxilla; K, maxilliped; L, epignathus; M, propodus and dactylus of peraeopod V; N, peraeopod VII; O, propodus and dactylus of peraeopod VII; P, pleopod I; Q, peraeonite VII with genital cone.

is more or less triangular, and almost as long as wide distally, bearing numerous pennate setae on the lateral margins; also a few dorsal and terminal setae are present. The tip of the telson is pointed and reaches to or slightly beyond the basis of the uropod.

The antennule (fig. 6 F) is not much longer than the carapace, it has the first segment of the basis about 4 times as long as wide, bearing fine setae on the margins. The inner flagellum consists of 2 segments, the outer of 6 segments.

The antenna (fig. 5 E) has the first segment of the basis very wide, on the inner side forming a foliaceous expansion which bears an apical spine and numerous fine hairs. The next 4 segments are comparatively short and thick, followed by another 4, but much smaller segments. The squama is small and has 3 long terminal setae.

The labrum is shown in Fig. 5 F.

The mandible (fig. 5 G) has a 3-segmented palp and a common processus molaris; the pars incisiva has 4 strongly chitinized teeth; the lacinia mobilis of the right mandible has also 4 teeth. The spiniferous lobe shows no particular features.

The labium (fig. 5 H) is characterized by the presence of some spines on the outer part of the basis and by the numerous long and very fine setae situated laterally on the last segment, which apically also bears 2 strong trifurcate setae.

The maxillule (fig. 5 I) has the inner endite provided with 4 strong pennate setae and the outer with 11 terminal spines and 2 subterminal setae. A palp is present consisting of 2 segments, the distal of these bears 5 long setae.

The maxilla is shown in fig. 5 J.

The basal segment of the maxilliped (fig. 5 K) bears on its distal margin a row of 5 long setae. The first segment of the palp is short and wide, the next is rather long, bearing numerous setae agglomerated in the distal inner half. The endite bears phanera of different types. The epignathus is scoop-like, with a strong spine (fig. 5 L).

The cheliped (fig. 6 A) is rather slender and of about the same size as pereopod II. The basis is provided with an exopodite and also bears several groups of fine setae. The carpus bears 3 rows of long setae (tergal, median and sternal). The propodus has a tapering "digitus", it ends abruptly in a pointed, brown spine. The dactylus including the claw scarcely exceeds the length of the "digitus" of the propodus.

Pereopod II (fig. 6 E) has the basis very broad, and provided with an exopodite. The ischium is short. The merus broadens towards the carpus,

and shows tergal and sternal setae as well as a distal sternal spine. The carpus is very wide and bears numerous setae, 2 sternal spines and one distal tergal spine. The propodus also is wide, it bears numerous setae, 3 strong sternal spines and 2 tergal spines. The dactylus including the claw is hardly longer than the juxtaposed sternal spine.

The fifth peraeopod (fig. 5 M) is characterized by its short dactylus, which is provided with a short claw; in the other peraeopods the dactylus and the claw are much longer. The seventh peraeopod (figs. 5N, O) has very abundant pennate setae on both sides of the basis. The merus and carpus also are provided with abundant pennate setae tergally and with simple setae sternally. The propodus is shown in fig. 5 O, the long dactylus ends in a strong claw. Peraeopods III to V show oostegites in females of 3 mm length and larger.

The pleopods (fig. 5 P) number 5 pairs, consisting of two uni-segmented rami. Numerous pennate setae are present.

The uropods (fig. 5 A, C) have the exopodites short, constantly consisting of 4 segments; the endopodite consists of 18 segments.

Male. — Adult males have the body similar to that of the females. The appendages also are similar except for the dimorphic ones (chelipeds, antennule and antenna).

The cheliped (fig. 6 B) is much more strongly developed than in the females. The basis bears a short and thick exopodite. The carpus, the longest segment, has a linguiform-digitiform expansion in its proximal half; this expansion is directed obliquely anteriorly and ventrally. The propodus has pennate setae on the sternal edge; the long "digitus" terminates in a very pointed claw. At the articulation with the dactylus, the propodus presents, on the inner side, a sort of gap. The dactylus is very long, with a hunchback like prominence on the mid-sternal portion. This prominence is provided with spines and lies close to the end of the propodal "digitus" when the chela is closed. The distal half of the dactylus abruptly narrows and curves, forming a right angle with the claw. The cheliped seems to represent a climbing device rather than a grasping one.

The antennule (fig. 6 G) is very long, the first segment of the basis is much longer than in the female, this segment is almost twice as long as the outer flagellum, and consists of 10 segments. The inner flagellum has constantly 2 segments.

The antenna (fig. 5 E) also is somewhat longer than in the females, consisting of 12 segments.

Other slightly dimorphic characters are: the better marked outlines of the rows of setae on the pleonites in the males, and the higher number

of the segments forming the endopodites of the uropods, also in the males.

Size. — The total length of the males is 4.2 to 4.7 mm, that of the females varies between 4.6 and 6.5 mm.

Colour. — The animals are dirty yellowish white.

Types. — The holotype ♀ is deposited in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden under reg. no. Crust. I. 3757.

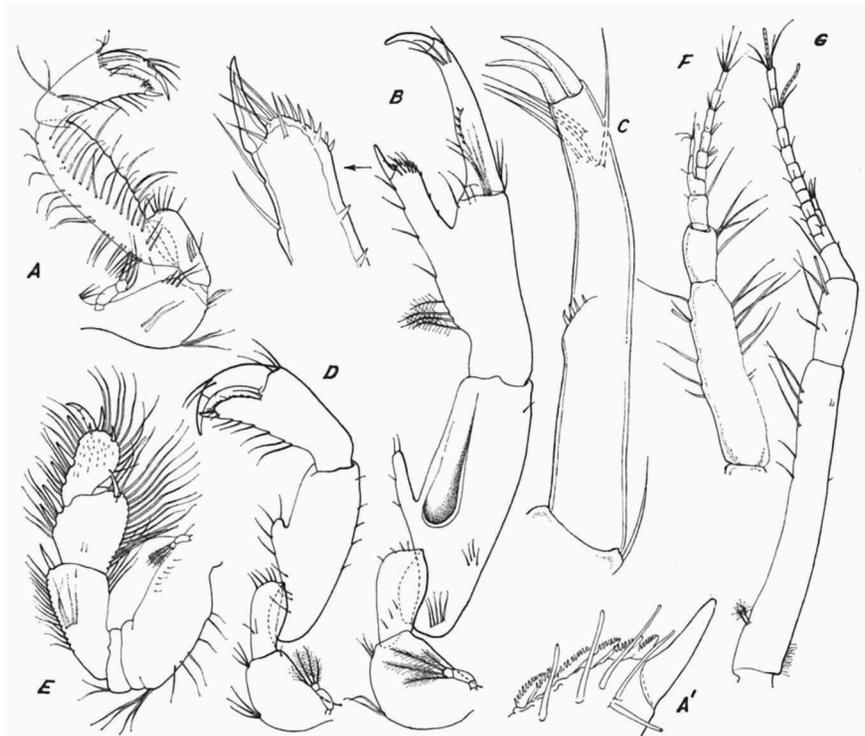


Fig. 6. *Halmyrapseudes spaansi* n. sp. A, cheliped (♀); A', distal end of propodus of cheliped of ♀; B, cheliped (♂); C, dactylus of cheliped ♂ ending with two claws; D, cheliped ♂ preadult; E, peraeopod II (♂); F, antennule (♀); G, ditto ♂.

The allotype ♂, is in the collections of the Museum of Natural History "Gr. Antipa", Bucharest, under reg. no. 262.

The paratypes number 120, of which 20 (♂♂, ♀♀ and juv.) are in the collection of the Museum of Natural History "Gr. Antipa", Bucharest, under reg. no. 263 and the rest in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, under no. Crust. I. 3765 — 3768.

Remarks. — *Halmyrapseudes spaansi* perfectly shows the characters of the genus *Halmyrapseudes* that we recently described (Băcescu & Guțu, 1974). These characters show special adaptations to the particular life

of the animals, viz., the occurrence in the mud of brackish and estuarine waters or in mud intermittently covered by the tides. This is also indicated by the decrease of the density of the populations with increasing distance from the shore, as is readily shown by the data mentioned in the chapter "Material".

Individual variability occurs in the number of segments in the antenna, in the outer flagellum of the antennule and in the uropodal endopodites; these numbers may be 1 or 2 higher or lower than the figures mentioned in our descriptions.

The most striking feature of *H. spaansi*, as in all species belonging to the genus *Halmyrapseudes*, is the strong dimorphism of the chelipeds, as well as the extreme asymmetry between the "digitus" of the propodus and the dactylus, in the males. The dimorphic features of the chelipeds occur in two stages corresponding to at least two moults. This enabled us to distinguish in the populations of *H. spaansi* besides the juveniles of both sexes, 3 kinds of adults. The young males do not differ from females of the same age, as far as the chelae are concerned. The sexual dimorphism — so characteristic of the genus — occurs only when the animals approach adulthood; even then one is able to distinguish an adult male in stage I, perfectly reproductive but only with an incipient heterochely (the dactylus scarcely exceeds the "digitus" of the propodus, and the carpal apophysis is not longer than wide) from a male in stage II, which has reached the end of the dimorphic transformation.

The peculiarities mentioned above form a typical case of unisexed dimorphism affecting only the male (Kosswig, 1965), which we could name developmental polymorphism, which in the present case is distinctly composed of 3 steps. As a matter of fact, such a heterochely is also achieved within other genera of Tanaidacea, e.g., in *Heterotanais oerstedti* (Kröyer) and *Tanais dimorphus* Beddard; it would be of great interest to determine whether or not this dimorphism represents an adaptation, and in which way.

As already mentioned by us (Băcescu & Guțu, 1974) the genus *Halmyrapseudes* certainly includes other species such as: *H. thaumastocheles* (Monod, 1935) and *H. killaiyensis* (Balasubrahmanyam, 1962); some others, as *Apseudes cooperi* Brown, 1954, *A. digitalis* Brown, 1956 and *A. mussauensis* Shiino, 1965, probably also belong to the genus *Halmyrapseudes*. *Apseudes estuarius* Boesch, 1973, *A. caeruleus* Boesch, 1973 and other species despite the very marked dimorphism of their chelipeds, do not belong to the genus *Halmyrapseudes*. Also worth mentioning is the constant biotope association between species of *Halmyrapseudes* and those of the amphipod *Grandidierella* Coutière, already observed by Monod

(1935). *Grandidierella* presumably originates, just like *Halmyrapseudes* from the old Tethys Sea, it extends from the Caribbean Sea to Madagascar, Tanzania and India and — according to some authors (Myers, 1970) — it is represented there by the same species.

We may also mention here that, apart from the populations of *H. spaansi* from the mouth of the Suriname River, we possess material from the eastern part of Suriname, viz., from the mouth of the Oranje Kreek. The Oranje Kreek material at first sight appears to present some small differences from that of the Suriname River, without, however, belonging to another species.

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Galleries burrowed in the mud by *Discapseaudes holthuisi* n. sp. in the upper layer of the mud above the reduction zone; depth of the burrows about 4 to 5 cm. Left figure showing the reduction zone (black) with above it the mud zone with *Discapseaudes* burrows. Right figure, close-up of the mud layer with burrows. Photographs P. G. E. F. Augustinus.