

STUDIES ON THE FAUNA OF SURINAME  
AND OTHER GUYANAS: No. 23.

**SURINAM DRAGON FLIES OF THE GENUS APHYLLA**

with a description of a new species

by

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(Paramaribo)

The genus *Aphylla* was proposed by DE SELYS in 1854, when he divided the *Gomphoides* Complex into the three genera *Gomphoides*, *Aphylla* and *Cyclophylla* (= *Phyllocycla*; Zoologica 33, Part 2, p. 62, 1948, *Cyclophylla* preoccupied). However, the differentiating venational characters drawn up by DE SELYS (1854), by DE SELYS-HAGEN (1858), and by NEEDHAM (1940) for the genera *Aphylla* and *Phyllocycla* are not sharp, as was discussed by CALVERT in his description of *Aphylla alia* from Kartabo (Zoologica 33, part 2, p. 66-67, 1948). The males of the Surinam dragon flies which have been referred to the genus *Aphylla* differ from *Phyllocycla* in that the postero-lateral angles of the tenth abdominal segment are prolonged in a sharp point; the lateral margins of the eighth and ninth abdominal segments are not leaf-like but extremely reduced, to narrow strips; and the distal portion of vein A2 is not strongly convergent with vein A3 but diverges somewhat from it and from vein A1. I believe that these characters place beyond doubt the generic status of the Surinam material in question, which is represented in my collection by adults of three species. Of these species, one is *Aphylla producta* Selys 1854, already recorded as occurring in Surinam and one is the little known species *Aphylla dentata* Selys 1859, which has not previously been recorded from this country. The third species is closely allied to the latter and is apparently new; in the present paper it is described under the specific name *simulata*.

### *Aphylla producta* Selys

- Aphylla producta* DE SELYS 1854, Bull. Acad. Belg. (2) 21, p. 79.  
*Aphylla producta*, DE SELYS-HAGEN 1858, Monogr. Gomphines, p. 230-233.  
*Gomphoides producta*, HAGEN 1861, Neur. N. Amer., p. 113.  
*Aphylla producta*, KIRBY 1890, Catalogue, p. 74.  
*Aphylla producta*, NEEDHAM 1944, Trans. Amer. Ent. Soc. 69, p. 193.

The species *Aphylla producta* is very well described and illustrated in the "Monographie des Gomphines". DE SELYS (1854) recorded it from Guyana, and NEEDHAM (1944) from Surinam. It has again been collected in the course of my researches in Surinam, but only in the swampy areas of the coastal region. The adults in my collection have been obtained in December, January, June and July, but they seem to occur in every month of the year except perhaps in February, March and April (see larva).

### *Aphylla dentata* Selys

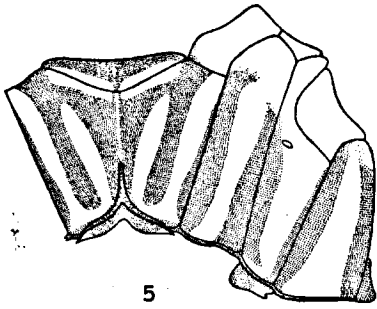
Figs. 5-6

- Aphylla dentata* DE SELYS 1859, Bull. Acad. Belg. (2) 7, p. 547-548.  
*Aphylla dentata?*, DE SELYS 1894, Ann. Soc. Ent. Belg. 38, p. 178.  
*Gomphoides dentata*, CAMPION 1920, Ann. Mag. Nat. Hist. (9) 6, p. 130-131.

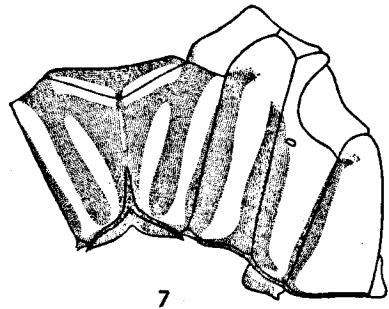
In the collection of the Brussels Museum the male specimen placed under *Aphylla dentata* Selys carries at the pin the labels "35", "Amazonas", "Bates", "Aphylla dentata De Selys ♂ à renvoyer", "141 dentata Bates" and "Gomphoides dentata Selys Rev. H. Campion 1920". As already pointed out by CAMPION (1920), this is unquestionably the holotype of *Aphylla dentata* Selys 1859, in view of the identification labels "Amazonas" and "Bates" when taken in conjunction with the indications of locality and collector in DE SELYS' original description: "Les bords de l'Amazone, par M. Bates".

Of the Surinam dragon flies which were referred to the Selysian species *Aphylla dentata*, one of the males has been carefully compared with the holotype and, although the caudal appendages are not identical, the two specimens seem to be conspecific.

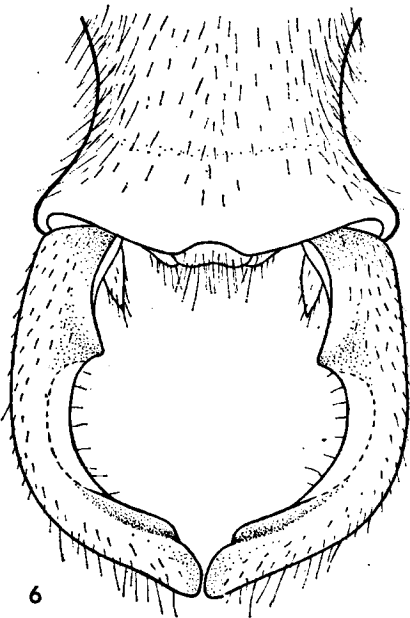
The following morphological differences in the caudal appendages have been noticed: In dorsal view the superior appendage of the



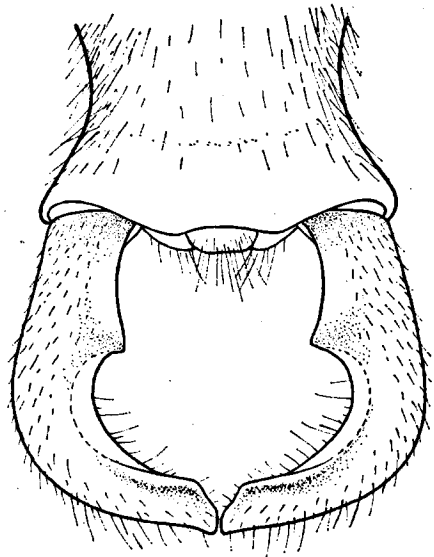
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6



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Fig. 5. *Aphylla dentata* Selys from Surinam. Diagram of synthorax pattern.

Fig. 6. *Aphylla dentata* Selys from Surinam. Dorsal view of male caudal appendages.

Fig. 7. *Aphylla simulata* nov. spec. Diagram of synthorax pattern.

Fig. 8. *Aphylla simulata* nov. spec. Dorsal view of holotype male caudal appendages.

Surinam example is more slender in the basal half, the width before the internal tooth is nearly three-fourths of that of the holotype; the incurving tip of the superior appendage is somewhat broader in the Surinam example and its ante-apical border is more or less strip-like expanded, but in the holotype not noticeably strip-like expanded. In side view the superior appendage of the Suriname example seems stouter, and the internal tooth is partly visible at the upper side, whereas it is not visible in the holotype.

Between the Surinam examples of *Aphylla dentata* little differences in the conformation of the male caudal appendages also occur, and CAMPION (1920) has noticed suchlike differences in the examples from Santarem, Brazil, for he says (loc. cit.): "Another male in the same collection, labelled "35" and "Santarem, 54/63" (Bates), may also belong to the same species, although the anal appendages are not identical with those of the holotype . . .". However, I have not seen his example, which is in the collection of the British Museum.

The venational features noticed in the wings of the holotype male are: antenodal and postnodal cross veins of first series 14:19-20:14/14:15-14:16 in front and hind wings respectively; first and sixth antenodals strengthened, except in right hind wing where the first and fifth antenodals are strengthened; intermedian cross veins 12-11/7-7 in front and hind wings respectively; one cross vein in supratriangle; sequence of cells between veins A1 and A2 behind the two-celled anal loop 1,2,3 (left) and 1,2,2 (right); triangle in front wing three-celled, in hind wing two-celled; subtriangle in front wing two-celled; hind wing 35 mm; costal edge of pterostigma of front wing 4.5 mm.

One of the males, labelled "Surinam, Zanderij, Weg naar Matta, 15.I.1957" has the following venational features: antenodal and postnodal cross veins of first series 14:22-20:13/14:14-17:15 in front and hind wings respectively; first and sixth antenodals strengthened in both right wings, in left wings the first and seventh (front) and the first and fifth (hind) antenodals; intermedian cross veins 10-11/7-7 in front and hind wings respectively; one cross vein in supratriangle; sequence of cells between the veins A1 and A2

behind the three-celled anal loop 2,2,3; discoidal triangle in front wing three-celled, in hind wing two-celled; subtriangle in front wing two-celled; discoidal field in front wing starts with three cells against the triangle, followed by an irregular row of two and three cells to the level of the middle fork; discoidal field in hind wing starts with three cells against the triangle, followed by two rows of cells three cells long; hind wing 37 mm; width of hind wing at middle fork 10 mm; costal edge of pterostigma of front wing 4.5 mm.

In other specimens the supratriangle has sometimes two cross veins; the anal loop is two- or three-celled; the sequence of cells between veins A1 and A2 behind the anal loop in the male specimens is generally 2,2,3. The wings of the females are larger and relatively broader than those of the males, and correlated with these relatively broader wings there are four postanal cells behind the anal loop in the hind wings of the females.

In 1894 DE SELYS recorded a female specimen from adjoining British Guiana, which he doubtfully referred to *Aphylla dentata*. The description is insufficient to make possible its specific recognition; but the measurements and the venational characters are in agreement with those of the females of the Surinam examples of *Aphylla dentata*, although in the female specimens before me the three rows of cells in the front wing triangular interspace are not regular.

All the specimens of *Aphylla dentata* have been collected in the savannah zone, along sunny and partly shady bush paths, except one female which was collected hovering close above the water of a creek (upper part of the Coropina River). Squatting on the dead leaves of the paths the specimens are hardly noticed by the collector because of their camouflage pattern, and if disturbed they flush into the trees or fly close to the ground over short distances. In general the species is difficult to approach, except in mating time; then it is sometimes possible to find several males together with a female, and the specimens can almost be captured with the hand. Adults have been collected from the months of December until April.

***Aphylla simulata* nov. spec.**

Figs. 7-10

This species is very closely allied to *Aphylla dentata*, but is distinguished from it by colour differences and by differences in the

conformation of the male anal appendages. Most striking is the difference in the coloration of the metepimeron, which is largely green in this species; the green marking extends rearwards to the aslant hind border. In *Aphylla dentata* a well defined green stripe passes through the central part of the metepimeron; the stripe widens towards the sub-alar carina. The superior anal appendages of the male are more stoutly produced than in *Aphylla dentata*, as clearly appears in the accompanying figures of the conventional dorsal views of these appendages. In this new species slight differences between specimens were also noticed as regards the conformation of the male superior anal appendages; these appendages are a little more or less stout in some specimens than in the holotype male.

Male (holotype). – Total length 64 mm; abdomen 49 mm; hind wing 34 mm; width of hind wing at middle fork 9.6 mm; costal edge of pterostigma of front wing 4 mm.

Compound eyes and ocelli green. Vertex nearly black, with a yellowish median spot in the depressed area between the prominences behind each of the paired ocelli. Front slope of occiput smooth, at middle a transverse band of yellow which is about twice as wide as the black bands at anterior and posterior borders. Hind margin of occiput a straight line, forming there a cross ridge fringed with stiff blackish hairs. Scape, pedicel and first distalium of antenna black and narrowly ringed with yellow at their upper edges; other distaliae paler at end of antenna. Vertical part of frons dark brown. A broad transverse yellowish band runs over the entire width of the antero-superior surface of the frons; this band largely occupies the superior surface and is clear yellow along the usual frontal ridge. At base the superior surface bears a blackish band which is sinuous on front. Frons provided with brown hairs. Postclypeus dark brown, with greenish upper part and yellow facial lobes. Frontal part of postclypeus nearly bare, but the sides provided with stiff yellowish hairs. Upper part of anteclypeus largely greenish, extreme lower part brown. Labrum brown with a symmetric pair of oblong yellow areas. Border of labrum yellow and fringed with forwardly directed, long, stiff, yellowish hairs. Outer surface of mandibles black at tip,

yellowish at middle and brown at base. Labium one and a half times wider than long, its frontal margin convex and fringed with forwardly directed, stiff, yellowish hairs. Rear side of head largely dark brown, but rear slope of occiput with a yellowish spot and temporae yellowish below middle of eye border.

Prothorax smashy brown; frontal side of first lobe paler; middle lobe with green dorsal and lateral markings.

The dark brown stripes of the synthorax nearly black on the front, the green stripes tinged with yellow. Middorsal thoracic carina with a green streak. A green stripe (mesothoracic collar) anteriorly crosses both mesepisterna. The green stripes on front of synthorax diverge anteriorly, not united below with the transverse mesepisternal stripe, nor forming a figure 7; at upper part barely connected with the green stripe along the humeral stripe. A broader green stripe runs over the mesepimeron and another one, almost equal in width, over the metepisternum behind and against the meta-stigma. The green stripes on the sides of the synthorax are isolated at their upper ends, and border on the sub-alar sinus. Inter alar tergites on middorsal scutellae green. The synthorax is covered with very soft pale hairs which are longest on the front and along the ventral borders.

Legs very short; length of hind femur 6 mm. Femora brown; first pair of femora with green inner sides. Ventral sides of femora provided with black denticles. Tibiae black; first pair of tibiae with a green ventral ridge running from lower joint to two-fifths the length of the tibia. Outer spines of first pair of tibiae near the lower joint flat and transparent. Tarsi and claws black.

Wings clear. Veins nearly black including costa, but nodus with yellow. Pterostigma brown-yellow; covering 5.5-7 cells. Antenodal and postnodal cross veins of first series 11:18-19:12/15:15-15:13 in front and hind wings respectively. First and sixth antenodals thicker. Intermedian cross veins 11-10/6-7 in front and hind wings respectively. Front wing triangle three-celled, a little longer to rear, frontal side as long as that of the two-celled subtriangle. Discoidal triangle in hind wing two-celled, longer in axis of wing. Subtriangle in hind wing more or less equilateral. The single cubito anal cross vein at or nearly at the level of the first strengthened antenodal.

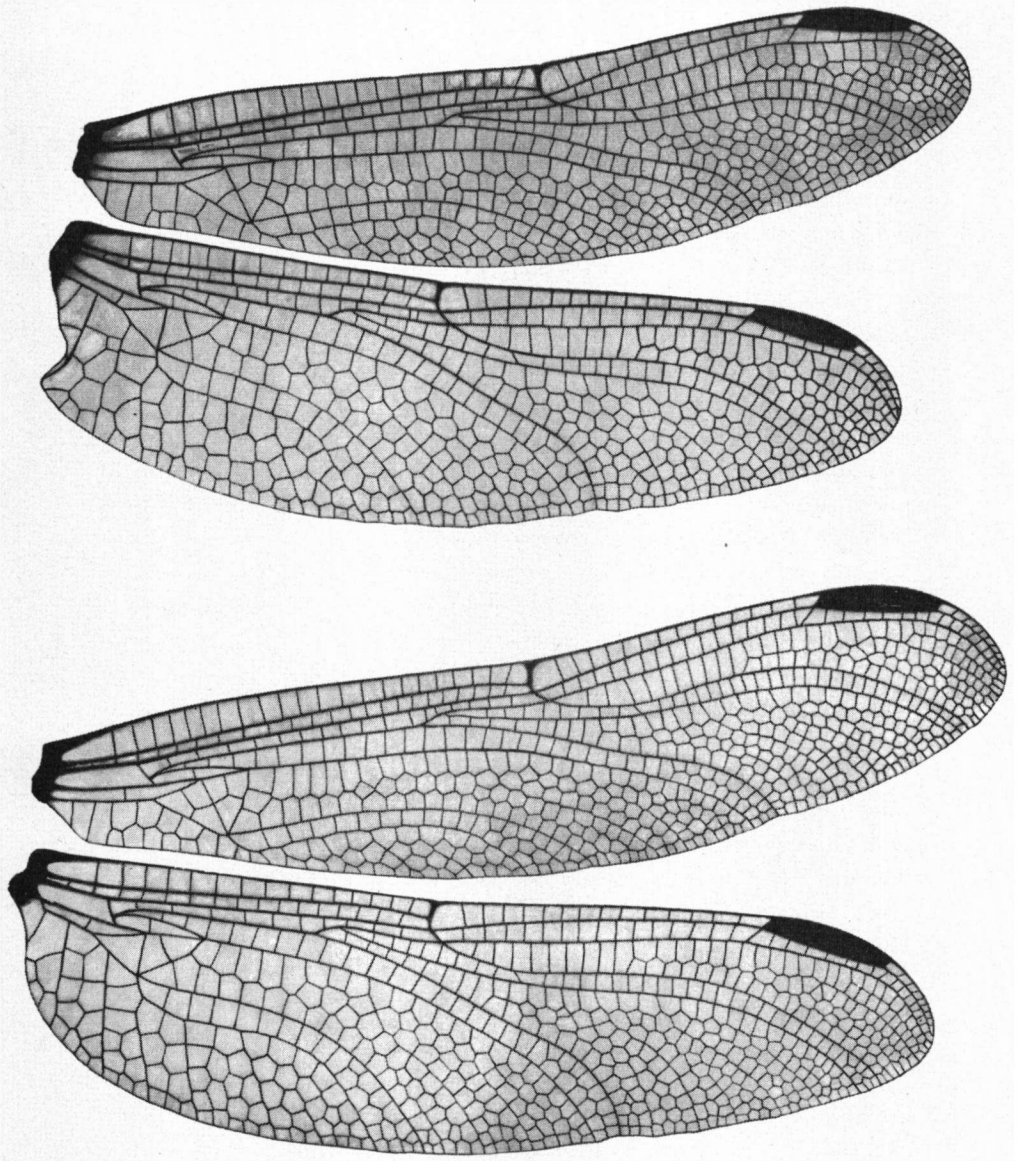


Fig. 9. *Aphylla simulata* nov. spec. Right pair of wings of holotype male.  
Fig. 10. *Aphylla simulata* nov. spec. Right pair of wings of allotype female.



Supratriangle with one cross vein. Discoidal field in each wing starting with three cells against triangle, followed by two rows of cells to the level of the middle fork. There are four paranal cells in each hind wing, the first two of which are the proximal cells of the four-celled anal triangle. The two-celled anal loop is formed by slight convergence of veins A1 and A2. These veins are nearly straight behind the anal loop, and diverge slightly therefrom to hind wing margin. Sequence of cells between veins A1 and A2 behind the anal loop: 1,2,3 (left) and 1,1,3 (right).

Abdomen very slender, thicker at both ends. Hind dorsal margin of segments one, two and ten not armed with denticles. Auricles armed with about fifteen (left) and ten (right) denticles. Abdomen dark brown, nearly black at middle, segment ten lighter on its basal five-sevenths. Sides of segments one and two greenish-yellow including auricles. Segments two to seven with a narrow middorsal line of greenish yellow over the entire length of the segment. These stripes are wider on segment two and at apex of segment three. Ventral sides of segments eight, nine and ten including prolonged apical hind angles of segment ten, orange obscured by brown. Pleural membrane on dorsum between segments 3-4,4-5,5-6 and 6-7 black, between 7-8,8-9 and 9-10 yellowish, and provided on each side with a black spot. Segment ten constricted at middle; it is wider at apex than at base; the hind dorsal margin is slightly concave.

Appendages of genital pocket of segment two, small. Anterior and posterior hamules in profile view almost equally prominent. Anterior hamule strongly curved caudad and dorsad. Posterior hamule thick, its acute apex directed mesad. Seminal vesicle widening to apex, the apical margin with two sharply-pointed appendages. Hind lobe V-shaped notched.

Superior anal appendages about as long as segment ten; they bend sharply inwards with round side edges just beyond midlength; the internal upper border bears a strong triangular tooth at two-fifths the length of the superior appendage. Ante-apical border of superior appendage more or less strip-like expanded. Superior appendages externally dark brown, lighter internally and on inner upper borders just beyond tooth. The vestigial inferior appendage dark brown; its hind margin with round corners and medially emarginate.

Female (allotype). – Total length 62 mm; abdomen 48 mm; hind wing 37.5 mm; width of hind wing at middle fork 10 mm; costal edge of pterostigma of front wing 4.8 mm.

Similar to male as regards general coloration. Vertex dark brown, yellowish at middle and behind ocelli. Front slope of occiput dark brown, with an ill-defined yellowish spot at middle; rear slope of occiput nearly black, and lacks a yellowish spot. Superior surface of frons largely dark brown, the yellow antero-superior band nearly confined to the frontal ridge.

The first pair of tibiae lacks the ventral ridge at lower joint.

Abdomen stouter than that of male. Segments one to seven less dark than in male, the submedian transverse scars black; tergites of segments eight and nine darker, nearly black; segment ten coloured as in male. Side-strips of segments eight and nine hardly produced, much narrower than in male. Segment ten wider at base than at apex; postero-lateral angles not prolonged; hind dorsal border convex and armed with denticles. Anal appendages conic, as long as segment ten.

Wings and pterostigmata larger than in male. Wing membrane slightly tinged with brown. Pterostigma covering 6.5–8 cells. Antenodal and postnodal cross veins of first series 14:21–22:14/15:15–15:14 in front and hind wings respectively. In front wings first and seventh (left) and first and eighth (right) antenodal thicker, in hind wings first and sixth antenodals thicker. Intermedian cross veins 10–11/7–7 in front and hind wings respectively. Discoidal triangle in front wing three-celled, in hind wing two-celled. Subtriangle in front wings two-celled (left) and three-celled (right). Supratriangle with one cross vein. The single cubito anal cross vein at or nearly at the level of the first thickened antenodal. Discoidal field in each wing starting with three cells against triangle, two cells long in left front wing, then followed by two rows of cells to the level of the middle fork in right hind wing, to one cell before it in left wings, and to four cells before it in right front wing. Hind wings with five paranal cells. Veins A2 and A3 running nearly straight to hind wing margin. The two-celled anal loop is formed by slight convergence of vein A1 to vein A2. Behind anal loop vein A1 diverges slightly from vein A2 to hind wing margin. Sequence of cells between veins A1 and A2

behind anal loop in right hind wing 1,2,2,3; in left hind wing beginning with one cell against anal loop, then followed by an irregular group of five cells and a row of three cells at hind wing margin.

Holotype ♂: Surinam, Boven Coropina, Dauwdropkamp, 14.X.1956. Allotype ♀: Surinam, Boven Para, 4.I.1959. – The type specimens are in the author's collection.

Other material (paratypes): Boven Coropina, Dauwdropkamp, 24.I.1957, 1 ♂, 1 ♀ (both specimens collected during copulation); Boven Para, 5.I.1959, 1 ♂; 11.I.1959, 1 ♀; 21.X.1959, 1 ♂; 30.I.1960, 2 ♂♂; 11.II.1960, 1 ♀; 25.III.1962, 1 ♂; 1.IV.1962, 1 ♂; 24. III. 1963, 2 ♀♀; Kabel, 4.I.1960, 3 ♀♀. – Specimens were sent to the Brussels Museum, to the British Museum (Natural History), London, and to the Museum of Natural History, Leiden, Holland.

The species generally lives in trees, and is mostly encountered near the creeks which run through the forests.

In older specimens the wing membrane becomes brownish, and the green stripes on the synthorax become greyish green.

#### IMMATURE STAGES

Seventeen exuviae of *Aphylla* have been obtained during my researches in Surinam; they seem to represent three species which may be the three known from this country. There is no reared specimen to hand. Of the exuviae, fourteen apparently belong to *Aphylla producta* because eleven of them have been collected in the coastal region in which area adults of only this species have been encountered hitherto. One exuvia is probably *Aphylla simulata*; the cast-off skin was collected at the Para River, in whose immediate vicinity adults of only this species have been found (see Imagines). The two remaining exuviae have been referred to *Aphylla dentata* by exclusion of its allies as far as known.

In 1944 NEEDHAM described an exuvia from Surinam which he referred by supposition to *Aphylla producta*. But the skin is specifically distinct from the new material from the coastal region, and its locality (Coropina River) is far enough in the interior of the country to justify presuming that it might be *Aphylla dentata*.

The larvae of the Surinam *Aphylla* species are of very uniform shape, but they are easily distinguishable on closer inspection of the labium under the magnifying glass. The labia are peculiar in exhibiting the following combination of characters:

- a) the mentum is parallel-sided or nearly so;
- b) the median lobe is low and distinctly recessed in the front border of the mentum;
- c) the end hook is long and sinuous;
- d) there are long recurved teeth before the end hook of the lateral lobe.

The characters above lettered *b*), *c*) and *d*) tally with those of the larva from Ceara (Brazil) described by NEEDHAM under No: 6 in his 1940 Gomphine paper (Trans. Amer. Ent. Soc. 65, p. 376, 1940).

***Aphylla producta* Selys (supposition)**

Fig. 11

Of the exuviae, *Aphylla producta*'s are the smallest; the length of the specimens before me ranges from 38 mm to 42 mm. The labial armature is the most slender in this species. The median lobe is not so very deeply recessed in the front border of the mentum as in the two other species. There are five or six teeth before the end hook of the lateral lobe; they decrease in size successively to the base and the proximal tooth is sometimes obsolete. The middle lobe is evenly convex and covers a third of the breadth of the mentum; the border is fringed with seventeen to twenty upcurving sharply-pointed scales. The hooks on the middorsal line of the abdomen are somewhat more produced than in the other two species; the one on segment two is erect, the tip posteriorly reclined; the one on segment three is broader, and the highest; those on the other segments diminish sharply in size towards the end, and on the end segments are hardly more than low humps. The length of the abdomen is 2.8 to 3.0 times the length of the tenth segment. The caudal appendages are as long as segment ten is wide at its apex.

A cast-off skin of a male, left behind at transformation, measures in total length 39 mm; abdomen 30 mm, of which segment ten measures 10 mm; width of abdomen 6 mm; of head 5 mm; length of hind femur 4 mm. The locality data are: Paramaribo, Charlesburg, 2.VIII.1957.

Eleven exuviae are from an artificial pond of relatively recent construction at Charlesburg (outskirts of Paramaribo); two exuviae are from ponds of the same kind at Rijdsdijkweg and Overtoom and one exuvia is from the upper part of the Coropina River (Republiek).

The cast-off skins were found in every month of the year, except in February, March and April.

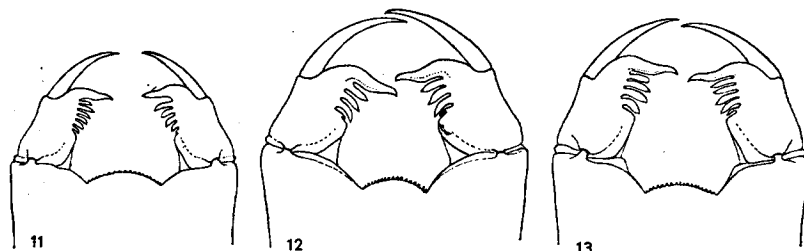


Fig. 11. *Aphylla producta* Selys (supposition). Labium of the exuvia (♂).

Fig. 12. *Aphylla simulata* nov. spec. (supposition). Labium of the exuvia (♀).

Fig. 13. *Aphylla dentata* Selys (supposition). Labium of the exuvia (♀).

*Aphylla simulata* nov. spec. (supposition)

Figs. 12-13

This larva differs from *Aphylla producta* in having a much stouter labial armature. The median lobe is very deeply recessed in the front border of the mentum. Before the end hook of each of the lateral lobes there are three huge teeth of equal length, preceded by a much smaller and more strongly recurved tooth. The convex middle lobe covers distinctly less than a third of the breadth of the mentum; the border is margined with fifteen upcurving sharply-pointed scales. The movable hook is relatively a trifle longer than in the preceding species. The abdomen is 2.8 times the length of the tenth segment. The caudal appendages are somewhat longer than segment ten is wide at tip.

The cast-off skin, which bears the label "Surinam, Para River (upper part), 3.VIII.1960," was found on the stem of a small palm tree on the muddy shore of a creek. It is of a female, and was left behind at transformation. It measures in total length 44 mm; abdomen 34 mm, of which segment ten measures 12 mm; width of abdomen 6 mm; of head 5 mm; length of hind femur 4 mm.

*Aphylla dentata* Selys (supposition)

Fig. 14

*Aphylla producta*, NEEDHAM 1944, Trans. Amer. Ent. Soc. 69, p. 193-194.

I do not know what allowance should be made regarding the number of huge teeth before the end hook of the lateral lobe in *Aphylla simulata*, because there is only one specimen available to which I can refer this species with some confidence. The other two exuvia in my collection differ from the skin described under *Aphylla simulata* in having before the end hook of the lateral lobe, four huge teeth instead of three, in three cases out of four preceded by a much smaller fifth tooth, and in having caudal appendages which are nearly as long as the tenth segment is wide at the tip. The skins seem otherwise similar to that specimen. I can refer these two remaining exuviae to *Aphylla dentata* by exclusion.

One of the exuviae, labelled "Surinam, Remoncourt (Surinam River), 30.IX.1956" is of a female, left behind at transformation and measures in total length 43 mm; abdomen 32 mm, of which segment ten measures 11 mm; width of abdomen 6 mm; of head 5 mm; length of hind femur 4 mm.

The second specimen, labelled "Surinam, Troelinde Creek, 23.VIII.1958, differs from that from Remoncourt in having 17 upcurving sharply-pointed scales along the border of the middle lobe; there are 21 upcurving sharply-pointed scales in the Remoncourt specimen. In both specimens the abdomen is 3.0 times the length of the tenth segment.

The larval cast-off skin from Surinam described by NEEDHAM (1944) may also belong to *Aphylla dentata* because of the presence of four huge teeth before the end hook of the lateral lobe. I have had for comparison this exuvia kindly loaned me from the collection of the Cornell University, Ithaca, New York. The tenth abdominal segment measured 12 mm, not 8 mm as stated in the description.

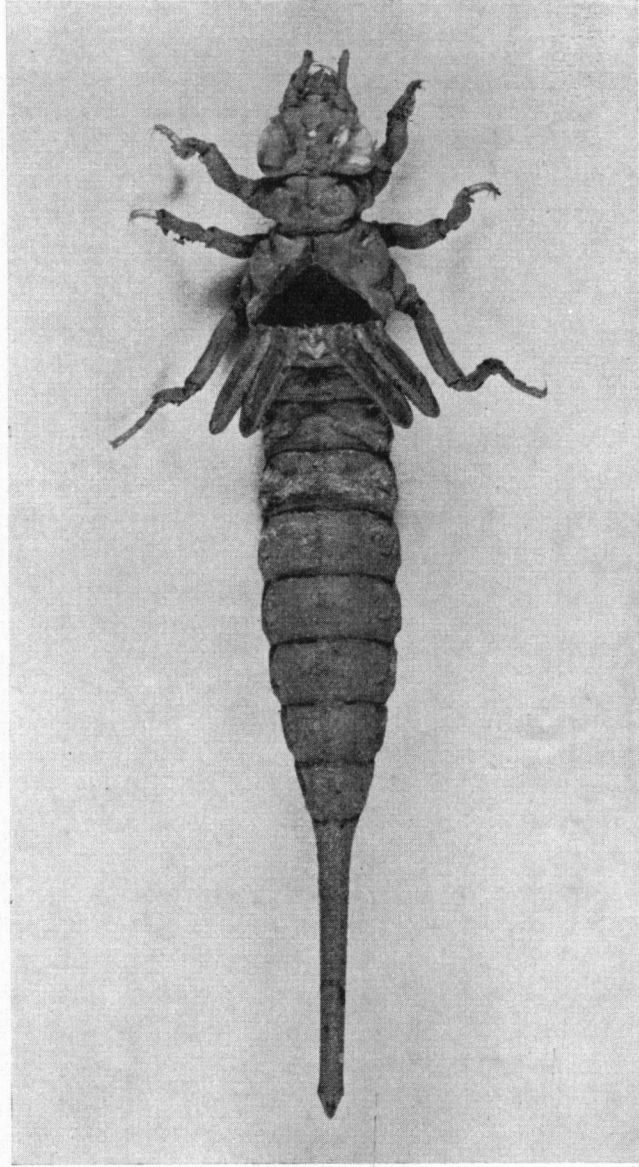


Fig. 14. *Aphylla simulata* nov. spec. (supposition). Photograph of the larval exuvia (♀).