

acute hairs; marginal sclerites large, becoming smaller towards hind end of abdomen. Siphunculi circular, ± 0.075 mm. in diameter, slightly elevated on narrow sclerotic cones. Eighth tergite with a median, elongate-oval transverse sclerotic patch covered with a pattern of lines of fine spinules and bearing 3 of the 5 long (0.080 mm.) fine hairs on the segment. Cauda (upturned in this specimen) with 20 fine hairs of varying lengths. Longest hair on the bilobed anal plate 0.220 mm.

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REVIEW

Bulletins of the British Museum (Natural History). Entomology, Vol. 16, No. 2. A systematic revision of the Ameniinae (Diptera: Calliphoridae). R. W. Crosskey, 1965. pp. 33-140, 50 text-figures, £1 15/-.

The subfamily Ameniinae has been placed in the family Tachinidae by a number of previous authors, but the present author shows that the subfamily has no real affinities to the Tachinidae and should be included in the family Calliphoridae.

This is a full revision of the subfamily, which now includes 7 genera, of which 1 is new, and 31 species, of which 9 are new. 37 previously described species of the subfamily have been examined; the holotypes or syntypes of 35 of these have been studied by the author, and a paratype of another has been examined by a colleague. The type of the remaining species, *Amenia imperialis* R.D., is lost, and a neotype is designated.

Only 22 of the 37 previously described species have been found to be valid, which with the 9 new species results in the present total of 31. Of the 14 previously described genera of the subfamily, only 6 are regarded as valid.

The subfamily is divided into two tribes, the Ameniini with 6 genera, and the Parameniini with one genus. A summary of the revised classification is included, and keys to all the genera and species are given.

The text-figures illustrate heads, genitalia, and other taxonomic characters, and include two maps, one of which shows the distribution of the genera of the Ameniini, whilst the second shows the approximate limits of distribution of the Ameniini and the Parameniini.

An extensive bibliography is given.

A. BRINDLE.

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TWO NEW SPECIES OF *Nesciothemis* LONGFIELD, 1955
(ODONATA) FROM NIGERIA

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The genus *Nesciothemis* was created by Miss Longfield in 1955. Earlier Barnard (1937), referring to the structure of the penis as a guide to the classification of the various species of *Orthetrum* Newman, 1833, called attention to the way in which that of *O. farinosum* Forster, 1898, differed from the others, saying that this was almost sufficient to justify its removal to a separate genus. No-one appears to have paid any attention to this pointer until Miss Longfield's 1955 revision of the African species of *Orthetrum*, when she made a new genus for *O. farinosum*, showing certain affinities with *Hadrothemis*, *Aethiothemis*, and *Oxythemis*, and owing to the doubtful nature of its exact systematic position called it *Nesciothemis*. Into this genus, as well as *O. farinosum*, she also placed Pinhey's *O. fitzgeraldi* (Pinhey, 1955).

In her account of *N. farinosa*, Miss Longfield called attention to there being two distinct forms of this insect, the large typical form which—in Nigeria at least—breeds only in stagnant water, and a smaller variety breeding in flowing streams. She failed to find any structural difference between the two, apart from their size, and considered them to be probably no more than physiological varieties of the same species. However, with field experience of both forms, the present writer became convinced that he was dealing with two separate species. After a close study, he found sufficient difference in both the structure of the genitalia and the pattern of the face and abdomen to warrant description of the smaller form as a new species, *N. minor*.

He also found another *Nesciothemis* closely resembling *N. fitzgeraldi* beside the Agulu Lake, eight miles South of Awka in Eastern Nigeria in 1961. Like *fitzgeraldi*, but unlike *farinosa*, *minor*, or the species of *Orthetrum sens. strict.*, this species had the thorax and anterior part of the abdomen pruinosed blue and the posterior part red. It was, however, distinct and rather more slenderly built than *fitzgeraldi*. It is described below as *N. nigeriensis*, *sp. nov.*

Nesciothemis minor sp. nov.

Male (holotype).—Head: central lobe of labium and medial third of each lateral lobe dark blackish-brown, lateral parts

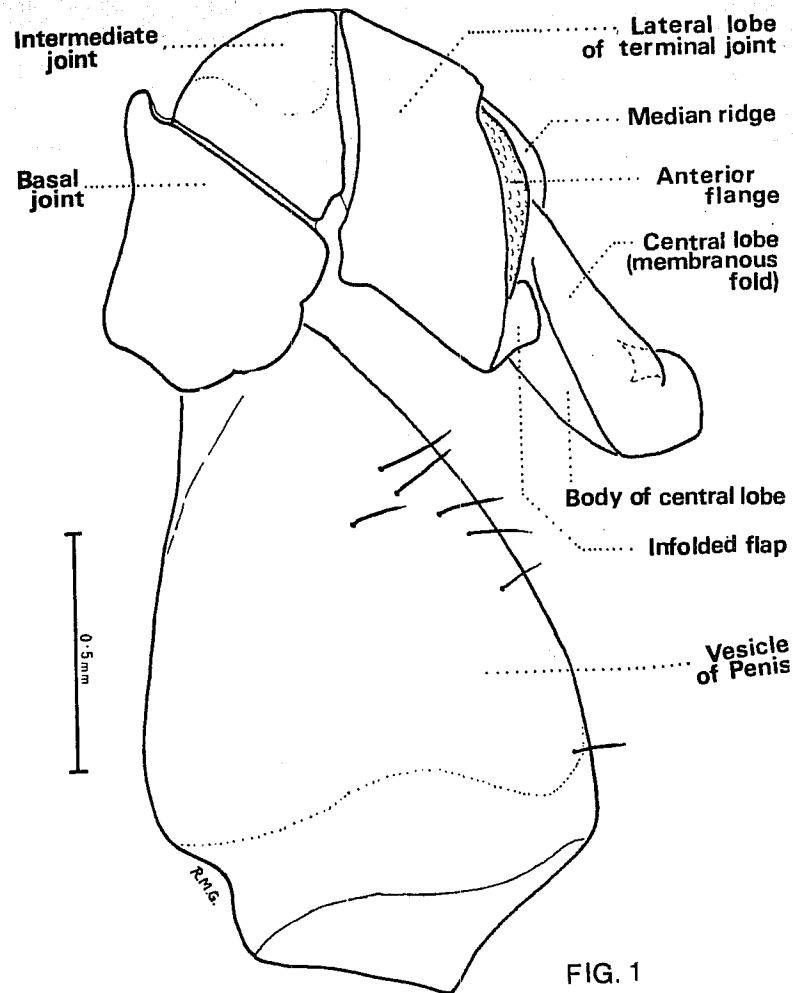


FIG. 1

FIG. 1.—Penis of *N. farinosa*, from the right.

greyish-yellow; labrum greyish yellow; whole clypeus bluish-grey; sides of frons and a narrow band where it joins clypeus yellowish; vertex and remainder of frons metallic bluish-black; occipital triangle dark brown; dorsum of frons grooved centrally, anterior surface with two very ill-defined but roughly oval flattened areas.

Thorax: prothorax blackish-brown, anterior lobe with a narrow yellow border in front, central lobe with a mid-dorsal yellow spot, hind lobe erect and fringed with long whitish hairs;

pterothorax pruinosed light blue; legs brown, a yellow stripe along the extensor surface of the tibiae for their whole length (this is a constant feature in this species, however mature; in *farinosa* the tibiae darken with maturity); flexor surface of fore-femora pale proximally, darkening distally with slight pruinescence.

Abdomen: triquetral, unconstricted, and tapering gradually, segments 1-6 heavily pruinosed with pale blue, which ends abruptly to leave the remainder dark; segment 8 with a pair of oval yellow spots anteriorly, both 7 and 8 with a faintly indicated pair of pale spots posteriorly; 9 wholly dark, 10 with a transverse yellow mark posteriorly; appendages dark.

Wings: nodal formula $\frac{11}{10} | \frac{14}{10} || \frac{12}{10} | \frac{10}{10}$ upper series of Ax brown, lower series yellow; arculus three quarters the distance between 1st and 2nd Ax; four cells doubled in the radial supplement of all wings; discoidal field commencing with three rows of cells; 18 cells in anal loop in both hindwings; ptero-stigma yellow, dark brown at costal border, and surrounded on all sides by dark-brown veins, 3.3×0.7 mm. in forewings, 3.6×0.7 in hindwings.

Genitalia: accessories generally similar in shape to those of *farinosa* but the cleft between the inner and outer hooks of the hamules is rather deeper, the inner is almost straight, and not sinuous as in *farinosa*, and the outer has a small projecting lip where it bounds the cleft instead of being rounded away smoothly (figs. 5 and 6); the structure of the penis is shown in fig. 2 (from a paratype) and is similar in all specimens studied; that of the holotype has been left *in situ* and has not been examined.

Length of abdomen (excluding appendages) 21.5 mm. Hindwing 28 mm. Collected beside flowing stream in open country near Jal, N. Nigeria, 25.v.52.

Female (allotype).—Head: Labium and labrum cream-yellow, ante-clypeus greyish white, post-clypeus creamy white, frons vertex and occipital triangle pale yellowish brown; anterior surface of frons with two narrow oval flattened areas.

Thorax: a broad mid-dorsal yellow stripe running the whole length of prothorax and pterothorax, bordered by black sub-median stripes from anterior lobe of prothorax to ante-alar sinuses, sharply defined on their medial borders, less clearly laterally and only vaguely separated from shorter black ante-humeral stripes; remainder of pterothorax pale yellowish brown, the dorsum studded with black dots; legs as in holotype, except that the whole flexor surface of fore-femora is pale yellowish.

Abdomen: yellowish brown, with a fine longitudinal mid-dorsal black line running from middle of 2nd segment to dorsal carina of 9th; transverse carinae also black; longitudinal dorso-lateral black stripes on all segments from 4th to 10th, not quite reaching the anterior border on segments 4 and 5, but forming a continuous stripe from 6 to the end; dorsum of 10th segment pale with two black dots; appendages black.

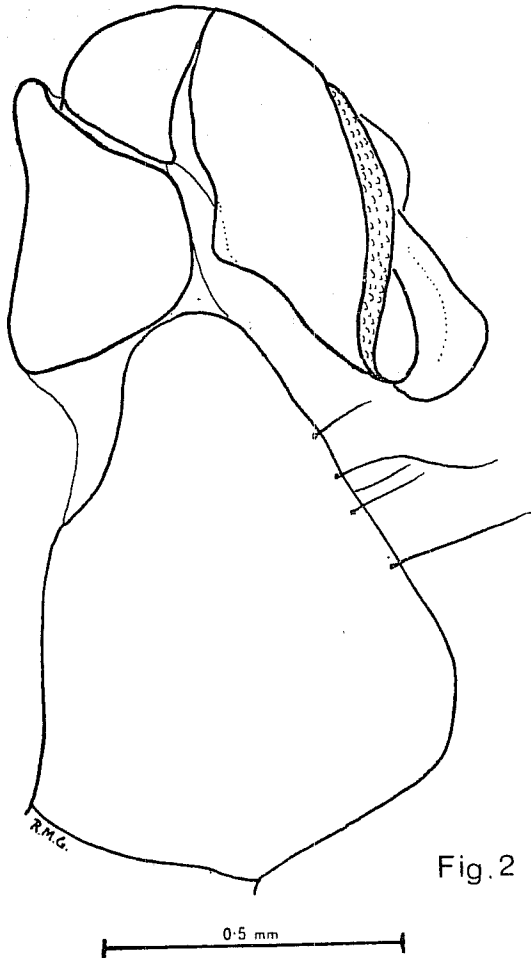


Fig. 2

FIG. 2.—Penis of *N. minor*, from the right.

Wings: nodal formula $\frac{9 \mid 13 \parallel 12^* \mid 9}{11 \mid 10 \parallel 10 \mid 11}$ (*11½ in lower row, as one of them is Y-shaped and meets two in the upper row); arculus in forewing $\frac{2}{3}$ to $\frac{3}{4}$ distance between 1st and 2nd Ax; 5 cells doubled in radial supplement of forewings, 3 doubled in hind; 19 cells in anal loop of left hindwing, 23 in right; pterostigma 3.6 × 0.75 mm. in forewings, 3.75 × 0.8 in hind; colour of veins and pterostigma as in holotype.

Length of abdomen (excluding appendages) 22.5 mm. Hindwing 29 mm. Collected in open country near Kuru, N. Nigeria, 28.vi.62.

The following specimens are designated as paratypes:— 2♂♂, 1♀ from Ka Yima, Sierra Leone, 25.vi.1912 (J. J. Simpson), and a ♂ from Kuru, Nigeria (R.M.G.), in the British Museum Collection; and various specimens in the writer's own collection, 1♂, 1♀ from Jal, v.52, 1♂, 1♀ from near Vom, v.49, 2♂♂ bred from larvae, Vom, v and vii.52, 3♂♂, Kuru, 10.vi.54, and 1♂ from Ogoja, E. Nigeria (800 ft.), 19.xii.61. Apart from the last-named, all these Nigerian localities are in Plateau Province at approximately 4000 ft.

The difference in the penis is the final distinction between *N. farinosa* and *N. minor*, but it is usually possible to separate them on characters more readily seen. In general, the size of each species tends to be very uniform, but the occasional extra large *minor* may just overlap with an extremely small *farinosa*. When males are fully mature, they can be told apart by the extent of pruinosity on the abdomen, the colours of the face, and the yellow stripe on the extensor surface of the tibiae, but immature males of *farinosa* are coloured like those of *minor*. Immature males of both species are coloured like the females. The differences between the species may be tabulated as follows:—

N. farinosa

1. Size larger, ♂ hindwing usually 31-35 mm., occasionally as small as 29.5; ♀ hindwing 33-36 mm. (occasionally 31).

2. Darker face pattern; in mature males the whole labium, labrum, and postclypeus become dark.

3. Mature males with pruinosity seldom extending beyond middle of 4th segment (occasionally on 5th, but never in Nigerian specimens).

4. Mature males losing the yellow stripe on extensor surface of tibiae.

5. Cleft of hamule shallower, inner hook more sinuous, outer hook rounded off smoothly without a lip (fig. 5). (The sinuous inner hook shows clearly in Nigerian specimens, but this character is rather variable in wider collections; specimens from Abyssinia and Somaliland in the B.M. Coll. have it straighter, and approximating to the condition seen in *N. minor*.)

N. minor

1. Size smaller, ♂ hindwing usually 27-29 mm., occasionally up to 30.5; ♀ hindwing 28-29.5 mm.

2. Paler face pattern; never more than middle third of labium dark, labrum and post-clypeus remaining pale in the most mature specimen.

3. Mature males with pruinosity extending to end of 6th segment (but specimens in collections may have some of this destroyed by grease!).

4. Mature males retaining the yellow stripe on extensor surface of tibiae.

5. Cleft of hamule deeper, inner hook straighter, outer hook with a raised lip at edge of cleft (fig. 6).

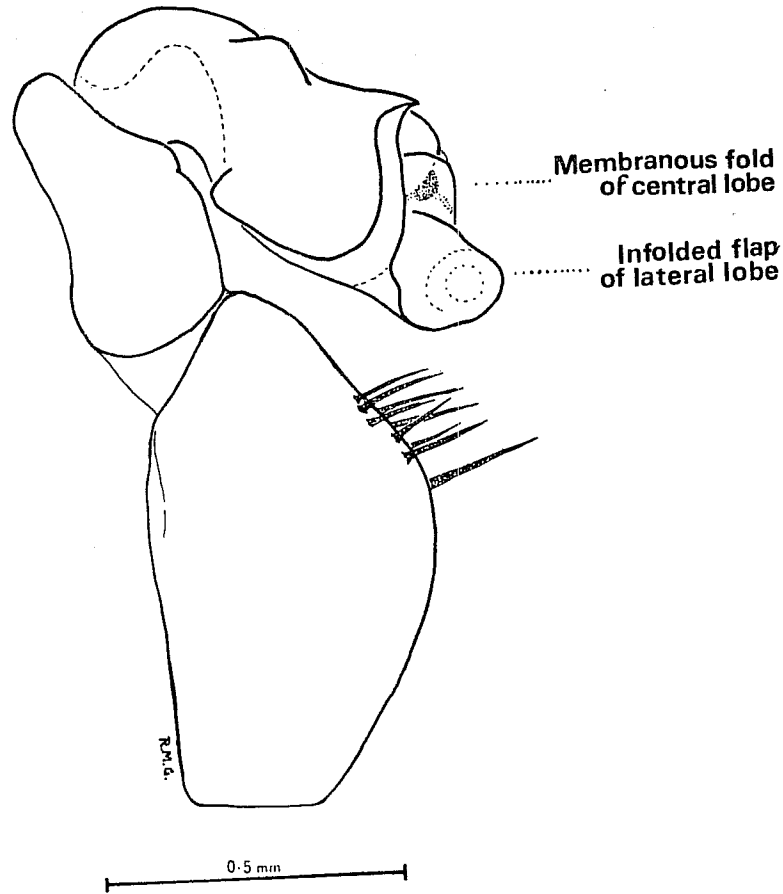


Fig. 3

FIG 3.—Penis of *N. nigeriensis*, from the right.

Apart from odd specimens which have strayed right away from water, all the Nigerian specimens of *N. minor* taken by the present writer have been by running streams where they were sometimes very common, frequently pairing, and several have been bred from larvae collected in these streams. Most of the *farinosa* have been by stagnant ponds, sometimes by marshy pools which were overflows or dilations of nearby streams. On one occasion, however, a male *farinosa* was seen to fly across a small stream which was a regular breeding-place of *minor*, swoop down, seize a female

farinosa, and assume the *in copula* position. The pair were immediately netted to confirm the identity of this unexpected species, so it could not be seen whether they would have remained to oviposit or fly off to find some stagnant water. Another male was taken flying beside an apparently stagnant pool that was a dilatation of a small flowing stream where *minor* was known to breed. The water of this pool was sufficiently lotic to contain larvae of *Anax speratus*, a species normally breeding in running streams.

Previous authors have mentioned dwarf forms of *farinosa*, which may have been *minor* or possibly genuine dwarfs. Ris (1909) found Nigerian examples of *farinosa* abnormally small, and Fraser (1951) reporting on a collection from Dahomey says that specimens of *farinosa* were so remarkably small that he was at first doubtful of his determination until he noted Ris's comments on Nigerian material. Pinhey (1958) found both dwarf forms (hindwing 27-29 mm.) and a normal-sized *farinosa* beside the Zambezi at Katimbora. The normal form was taken by channels created by flood water, and the small ones by the banks of the river. Fraser's Dahomey specimens were part of a collection from the Sudan Savannah, in strips of forest fringing streams and over the streams themselves. Ris gives no details of the habitat of his Nigerian specimens, but in the present writer's experience *minor* is a much more abundant species in Nigeria than the true *farinosa*. It therefore seems quite possible that these authors were actually dealing with *minor* and not *farinosa*, although dwarf specimens of *farinosa* do exist. (The B.M. collection contains a male *farinosa* from Somaliland and one from Uganda with hindwings measuring 29.5 and 30 mm. respectively, but otherwise with all the characters of true *farinosa*).

Nesciothemis nigeriensis sp. nov.

Male (holotype).—Head: labium and labrum blackish brown, the latter with a pair of yellowish brown dots at the base; anteclypeus reddish brown, post-clypeus with lower part dark, reddish brown in centre and dark brown at sides, and upper part yellow; frons shining metallic black, the dorsum grooved centrally and the anterior surface with two narrow oval flattened areas; vertex and occiput dark brown.

Thorax: whole thorax dark and pruinose with light blue; prothorax with posterior border notched centrally; legs black.

Abdomen: narrow, slightly constricted between segments 3 and 4, then of uniform width until segment 7; 8 appears slightly narrower, but this may be due to slight squashing; thereafter tapering; segments 1-3 dark and pruinose with light blue; 4 with faint pruinosity and a deep reddish brown showing through, darker brown dorsally and redder laterally; 5-9 bright red; 10 black with central red spot; appendages black.

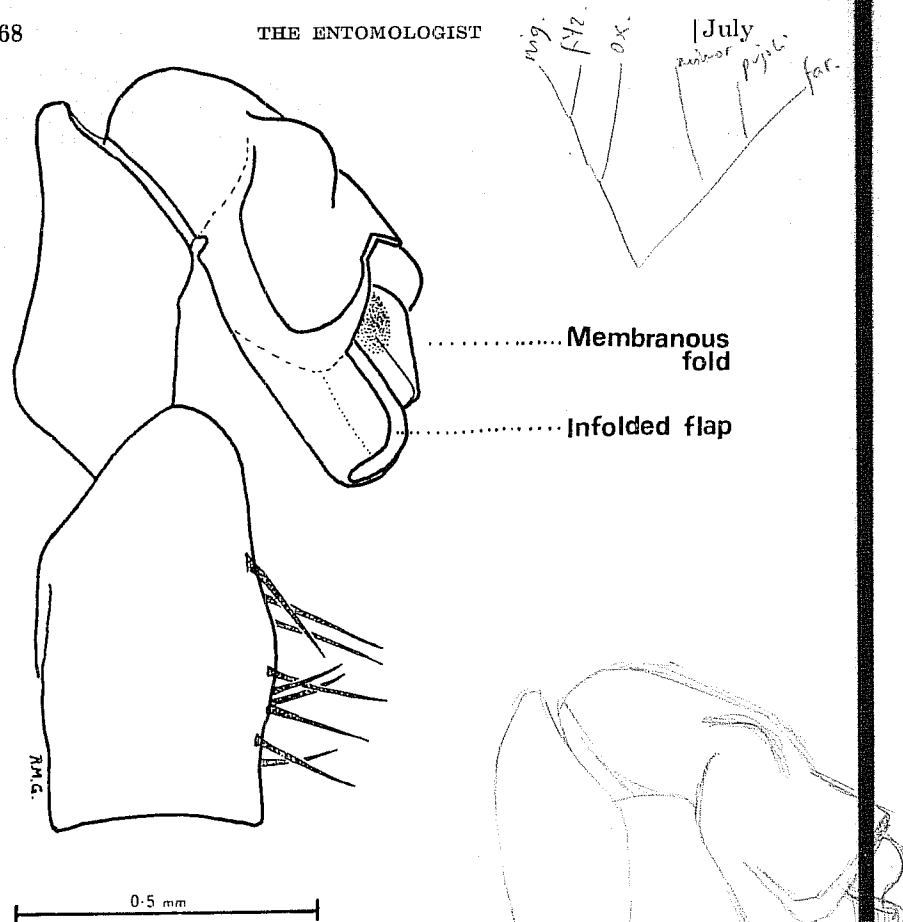


Fig. 4

FIG. 4.—Penis of *N. fitzgeraldi*, from the right.

Wings: nodal formula $\frac{9 \ 12 \ 11 \ 12 \ 9}{9 \ 9 \ 11 \ 9 \ 9}$; Ax yellowish; arculus just over half-way between 1st and 2nd Ax; two cells doubled in radial supplement of both forewings, half a cell in left hindwing, and only a single row in the right; discoidal field of forewing commencing with three rows of cells; anal loop with 16 cells on the left side and 18 on the right; pterostigma yellow, turning brown at costal margin and framed by dark brown veins, 3.25 × 0.7 mm. in forewings, 3.35 × 0.6 in hind.

Genitalia: generally similar in shape to those of *N. fitzgeraldi* but the inner hook of the hamule is less humped at its base (fig. 7);

the penis is as in fig. 3 and resembles that of *fitzgeraldi* (fig. 4) in having the lateral lobes projecting beyond and hiding the tip of the central lobe. Both *nigeriensis* and *fitzgeraldi* have the setae on the vesicle of the penis twice as stout as in the other species. In general, the genitalia of *nigeriensis* and *fitzgeraldi* are closer to those of *Oxythemis* than are those of *farinosa* and *minor*, although *Oxythemis* has the setae on the vesicle slender as in *farinosa* and *minor*. Details of the structure of the penis, and the differences between it and those of the other species are given below.

Length of abdomen (excluding appendages) 26.5 mm.; hindwing 31.5 mm. Collected beside the Agulu Lake, near Awka, E. Nigeria, 17.xii.61, a single male. Female unknown.

The new species is most obviously distinguished from *fitzgeraldi* by its narrower build, paler blue of the pruinosity when mature, and more extensive red coloration of the abdomen, segment 5 being bright red, and a reddish brown showing through the faint pruinosity of 4. In *fitzgeraldi* the red portion extends from the middle of 6 to the end of 9. In *nigeriensis* not only does the red extend to the end of 9 but there is also a red mark on 10. Otherwise apart from a slight difference in the hamules and the very distinct penis referred to later, there are few points for separating the two species.

The penis of *farinosa* has been figured by Barnard (*loc. cit.*, p. 243, fig. 26a), but the specimen appears to have been drawn in the erect position, or else after treatment with potash or some other reagent which has led to considerable unfolding of the parts. The general shape is therefore very different from that seen when the organ has been dissected out and remains in the resting position, as figured here.

In all species of the genus the structure of the penis is basically similar, and the main differences are found in the 3rd (terminal) joint. This is closely attached to the intermediate joint, so closely in *nigeriensis* and *fitzgeraldi* that it is hard to see where they join, and the two joints appear like one. These two joints together have a shape which may fancifully be compared with the head of a dog, the intermediate joint forming the occipital region. A darkly pigmented chitinous band covers the top and sides of the terminal joint, and represents the pendulous ears of the dog (the "two feebly chitinised minutely scabrous lobes" mentioned by Barnard). These meet underneath, each ending in a flap which is folded inwards. The amount of this flap which is visible in lateral view varies with the species. The "ears" themselves are hard and firm and of a smooth polished chitin, but in *farinosa* and *minor* there is a flange attached to the anterior margin with a more scabrous and tuberculated surface. The infolded flaps are softer and more membranous, and in the case of *nigeriensis* thickened and fleshy (fig. 3). These structures form a lateral lobe which is free at its distal extremity. In *fitzgeraldi* the anterior margin of the lateral lobe instead of running in a more or less smooth curve

as in the other species, is expanded and overlaps most of the infolded portion, so that the extremity of the lateral lobe takes the form of a flattened sheet folded in two longitudinally (fig. 4). Between the two lateral lobes is a central lobe which projects

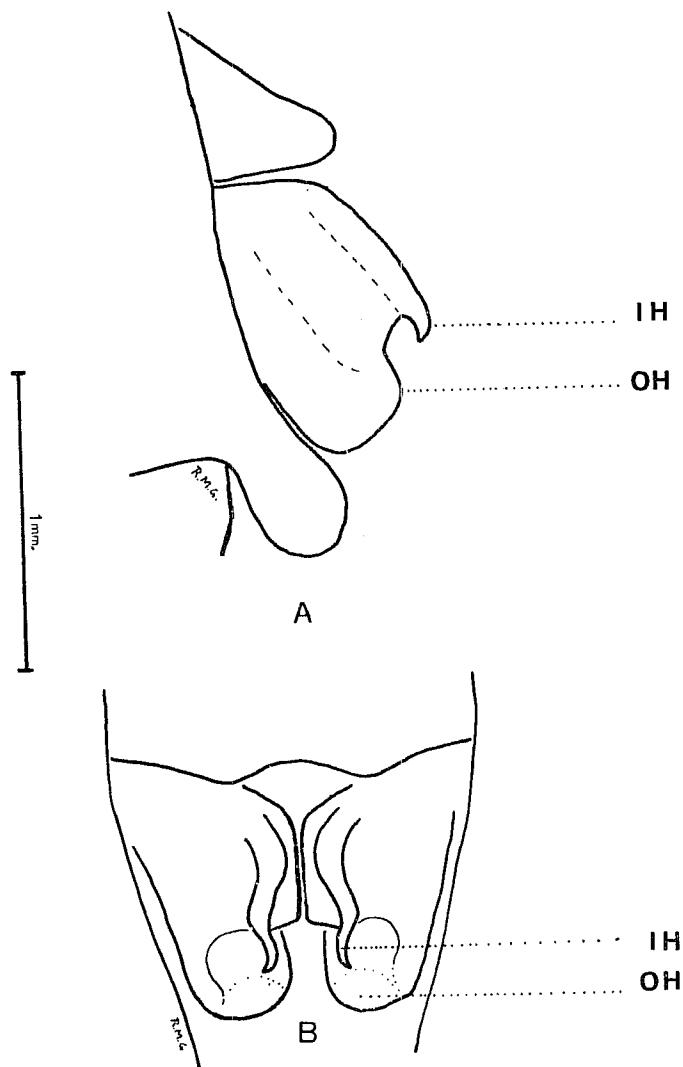


Fig. 5

FIG. 5.—Accessory genitalia of *N. farinosa*, A from the right, B in antero-ventral view.

(O.H.=Outer hook of hamule, I.H.=Inner hook.)

beyond them in *farinosa* and *minor*, but which in *fitzgeraldi* and *nigeriensis* is much shorter and not visible in lateral view except at its base, the extremity being hidden by the lateral lobes. The central lobe consists of two membranous folds which are variable in shape according to the species, attached to a central body and supported by an internal skeleton of darkly coloured chitin. There is a median ridge of firm but pale and transparent chitin running down the frontal region of the "dog's head" and disappearing

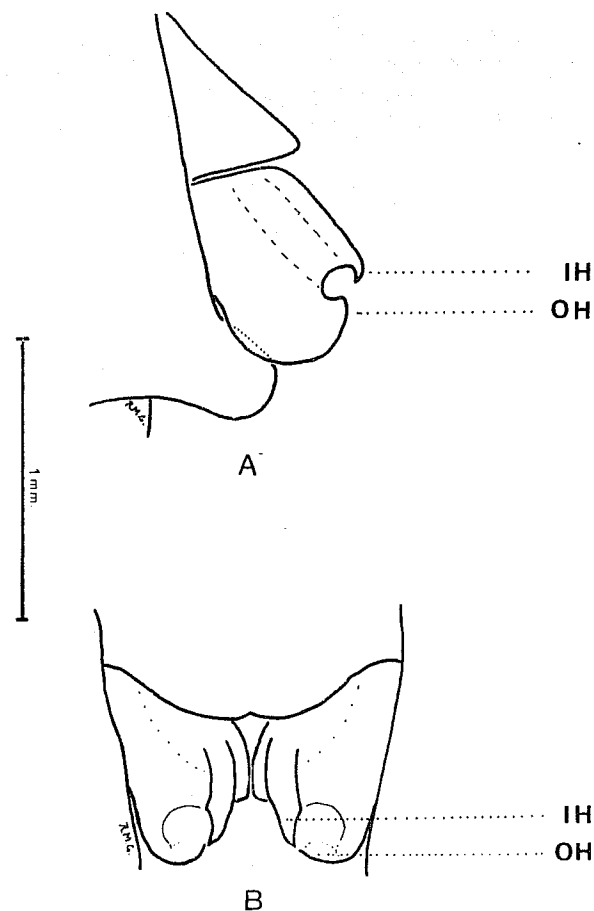


Fig. 6

FIG. 6.—Accessory genitalia of *N. minor*, A from the right, B in antero-ventral view.

(O.H.=Outer hook of hamule, I.H.=Inner hook.)

between the two membranous folds of the central lobe. This ridge is actually a double lamina and there is a cleft between the two halves, but these are so closely apposed, especially in *farinosa*, that the cleft is often difficult to see. These laminae are covered with fine chitinous scales.

In *farinosa* and *minor* (figs. 1 and 2), very little of the infolded flap of the lateral lobes is visible, and the anterior flange is smaller in *farinosa* than in *minor*. The central lobe of *farinosa* is very prominent and the membranous folds have a complicated structure. The end of the "dog's snout" is folded upwards, and the tip of each fold is turned back and tucked in under the border of the same fold higher up. In *minor* the structure of the folds is much simpler. The "snout" is rounded in lateral view and the two folds are more or less flat laminae, loosely apposed, and fused

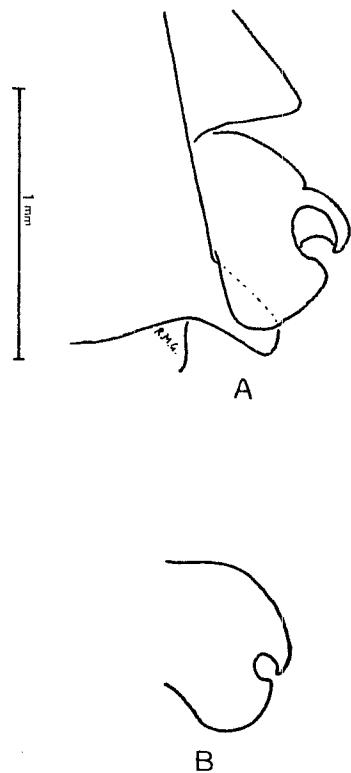


Fig. 7

FIG. 7.— A: Accessory genitalia of *N. nigeriensis*, from the right. B: Outline of right hamule of *N. fitzgeraldi* for comparison.

below to the body of the central lobe. The free edges of these laminar folds are thickened, and there is a cleft between them at the extremity and above, into which the thin transparent laminae of the median ridge disappear.

In *nigeriensis* the anterior edge of the "ear-flaps" is turned outwards like the lip of a bell, with a broad shallow groove behind the lip. In front of the "ears", the "dog's head" narrows abruptly, consisting merely of a small central lobe and the fleshy infolded flaps of the lateral lobes which in this species form the dog's snout. In *fitzgeraldi* the front of the "ear-flaps" are not turned outwards but are closely applied to the parts in front, and there is no abrupt narrowing in front of the "ears". The membranous folds of the central lobe are turned outwards so that the part which disappears into the cleft between the lateral lobes has a hollowed-out appearance. In both *nigeriensis* and *fitzgeraldi* the dark chitinous endoskeleton of the membranous folds is visible through them, forming a dark patch where the dog's eyes would be and thus completing the illusion.

The last two joints of the penis of *farinosa* are longer and more slender than those of *minor*. In ventral view, in typical specimens of the former they measure approximately 1.25 mm. in total length with a maximum transverse width of 0.6 mm, compared with 0.85 × 0.5 mm. in *minor*. Smaller specimens of *farinosa* have a smaller penis, but the length/breadth ratio remains approximately 2 (an Abyssinian specimen in the B.M. measures 1.13 × 0.54) whereas in *minor* it is about 1.7. There is very little difference in proportion between *fitzgeraldi* and *nigeriensis* (only one specimen of each examined), both measuring approximately 0.75 × 0.4 mm.

The holotypes of both species and the allotype of *N. minor*, are in the writer's collection and will ultimately be bequeathed to the British Museum (Nat. Hist.) in London.

Acknowledgment. The writer wishes to thank Mr. D. E. Kimmins of the Entomological Department of the British Museum (Natural History) who so kindly afforded facilities for the detailed examination of specimens in the National Collection.

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