

xxxvi, p. 143), also the extraordinary disproportion in size and appearance between the male and female moths. The larva is between 4 and 5 inches long; excessively shaggy; black or brown-black, covered with tufts of similar hairs; along the sides are larger tufts of hair—yellow in the male, white in the female—and depressed so as to form long fringes; similar but shorter tufts projecting over the face, and much larger tufts, curved forward, on each side of the head.]

(To be continued)

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## NEW SPECIES OF *SIPHONAPTERA* FROM EGYPT AND THE SOUDAN (WITH TWO PLATES).

BY THE HON. N. CHARLES ROTHSCILD, M.A., F.L.S.

In the present paper six new species are named. The first five are all described from specimens taken in Egypt and the Soudan by the author and Mr. A. F. R. Wollaston in 1901. For the last-named species, *Pulex Witherbyi*, the author is indebted to Mr. Harry F. Witherby, who secured it from *Erinaceus albiventris* near Gebel Auli, in May, 1900. The author and Mr. Wollaston, however, subsequently found it near Shendi (see p. 87). The features of the present article are the first mention of the very curious developments of the male posterior segments in the new species of the genus *Pulex*, and also the first record of a comb-like organ appearing on the meta-thoracic epimera of a flea. Further references to the hosts from which these specimens were secured is given in "Novitates Zoologicae vol. viii, pp. 397-401 (1901).

### 1.—*CERATOPSYLLA AEGYPTIUS*, *n. sp.*

(Plate I, Fig. 1).

The head is strongly rounded in front, the frontal outline (side-view) forming almost a semicircle. The ante-oral flaps are longer than in any other member of the genus that has come under our notice. The second flap being rather longer than half the vertical diameter of the head, measured from just in front of the antennal groove. The anterior portion of the head bears a series of short hairs parallel to the frontal outline. The more dorsal hairs of this row gradually increase in length and become more strongly chitinised, the last six being spine-like. Below these spine-like hairs are a few more of the same size. The genal process is very long and slender, being strongly chitinised. The post antennal portion of the head is densely covered with fine hairs on its dorsal surface, This portion also bears a row of hairs near the hinder edge, and one long hair towards the centre. The prothoracic comb consists of eighteen teeth. The mesonotum is clothed above with numerous hairs, and bears on each side two short spine-like projections. The metanotum is somewhat shorter than the mesonotum, appearing in side-view to be acuminate in shape, and bearing at the apex on each side a short spine. The



metathoracic epimeron is very characteristic. It is very large and pentagonal in shape, the posterior edge being the longest. This is somewhat rounded, and bears a series of fourteen strongly chitinated spines arranged in the form of a comb. They differ, however, from those of the prothorax in being genuine spines and not processes of the chitin. The first abdominal tergite is greatly reduced in size, presumably on account of the large development of the metathoracic epimeron. The first, second, third, and fourth tergites bear on each side one short spine\*. The seventh tergite bears on each side one long apical bristle and two very short hairs close to it. The sternites of segments three to seven bear four hairs on each side. The hairs of the fore coxa are rather stout. The first protarsal segment is nearly three times as long as it is broad. The length = 2.86 mm.

A single ♀ specimen of this very distinct species was secured near Cairo from an example of *Taphozous perforatus* on January 24th, 1901.

## 2.—PULEX NUBICUS, *n. sp.*

(Plate II, Figs. 10 and 16).

The palpus reaches to the end of the fore coxa. The hind femur bears two bristles beneath near the apex, a tooth towards the base, and a subventral row of hairs. The first segment of the mid tarsus is about two-thirds of the length of the second. The first segment of the hind tarsus is almost a third longer than the second segment, the long apical spine of this tarsal segment almost reaching to the end of the fifth, excluding the claw. The fourth hind tarsal segment is half as long again as it is broad. The two processes of the clasper are slender (fig. 10a). The ninth sternite of the male is narrow, curved, and somewhat lanceolate (fig. 10b). The plate of the penis is broad, its dorsal edge being straight, and the end obliquely rounded. The female closely resembles that sex of *cheopis*, but is smaller. It has, moreover, the same long spine to the second hind tarsal segment and the long rostrum so conspicuous in the male. The eighth abdominal sternite bears somewhat fewer and rather longer bristles than those of *cheopis*. The subventral row of bristles on the eighth sternite of this last-named species consists of more bristles, and is better defined than that of *nubicus*. The ventral angle of the hinder edge, moreover, does not project so far in the present species. The length = 1.86 mm.

Twenty-one ♂♂ and one ♀ of this species were secured near Shendi in February and March, 1901, from *Arvicanthis testicularis*, 4 specimens; *Gerbillus robustus*, 15 specimens; *Herpestes albicauda*, 1 specimen; *Genetta dongolana*, 2 specimens.

## 3.—PULEX CLEOPATRÆ, *n. sp.*

(Plate I, Figs. 4, 8; Plate II, Figs. 13, 17).

A very pale species, with long and slender bristles. The head is strongly rounded, the palpus not reaching to the end of the fore coxa. The abdominal

\* These spines probably represent vestigial combs, and are present to a greater or lesser degree in at least three other species of this genus: *Ceratopsylla unipectinata* (Tschb.), *C. dictactenus*, (Kol.), and *C. incerta*, Roths.



sternites of the male bear two hairs on each side, while those of the female have four. The seventh tergite in both sexes bears one long and two extremely short apical bristles. The hind femur has ventrally at its base a tooth, and in addition to this, an internal subventral row of three to five hairs along its entire length, with a solitary external subventral bristle before the apex. The first segment of the mid tarsus is three-fourths the length of the second. The first segment of the hind tarsus is the same length as the second, the long apical hair of this segment reaching to the base of the claw (fig. 4). The fourth segment, however, is more than twice as long as it is broad.

The three processes of the clasper of the male (fig. 13a) are very slender, bearing hairs only at the apex. The 9th sternite is broader than the processes of the clasper, and rounded at its end (fig. 13b). The plate of the penis is broad and rounded at the apex (fig. 13). The position and number of the hairs of the eighth tergite of the female can best be made out from the figure (fig. 8). The length = 1.42 mm.

A very large series of over a hundred specimens of this species were secured in February and March, 1901, near Shendi, the hosts being as follows:--*Gerbillus pygargus*, 75 specimens; *Gerbillus robustus* 11 specimens; *Lepus æthiopicus*, 16 specimens; *Dipodillus Watersi*, 2 specimens; *Dipus jaculus*, 1 specimen; *Erinaceus æthiopicus*, 1 specimen; *Arvicanthus testicularis*, 1 specimen.

#### 4.—PULEX CHEOPIS, *n. sp.*

(Plate I, Figs. 3, 9; Plate II, Figs. 12, 19).

This species is larger than *P. nubicus*, the palpus being shorter than the rostrum and not reaching to the end of the coxa. In the male, sternites three to seven inclusive bear four bristles, while those of the female have five. The hind femur bears in addition to the lateral series of hairs two subventral bristles before the apex (fig. 3). The first segment of the mid tarsus is rather less than two-thirds the length of the second, while that of the hind tarsus is about three-quarters as long again as the second segment. The long apical bristle of the second segment of the hind tarsus reaches to the middle of the fifth segment in the ♂, and not quite so far in the ♀. The fourth segment is as in *P. nubicus*. The eighth sternite bears two long bristles before the end on each side, and numerous short ones besides. The anterior process of the clasper of the male is compressed, being asymmetrical in shape (fig. 12a). The upper or anterior edge is convex, bearing along this edge a number of rather long bristles. The second process is slender, with a few short hairs at its end. The ninth sternite (fig. 12b) gradually widens towards the apex. The plate of the penis (fig. 19) is curved upwards and pointed at the end. The shape of the eighth tergite in the female can best be made out from the figure (fig. 9). The length = 2.3 mm.

A very large series of both sexes of this species was secured near Shendi in February and March, 1901. We also received a single example from Mr. W. E. de Winton, which he took from a spirit specimen of *Mus gentilis*, taken near Suez on the 17th of October,



1900. The hosts from which the examples from Shendi were taken are *Acomys Witherbyi*, 3 specimens; *Gerbillus robustus*, 20 specimens; *Arvicanthis testicularis*, 20 specimens; *Dipodillus Watersi*, 1 specimen; *Dipus jaculus*, 1 specimen; *Genetta dongolana*, 1 specimen.

5.—*PULEX CHEPHRENIS*, *n. sp.*

(Plate I, Fig. 7; Plate II, Figs. 14, 18).

The bristles and hairs of this species are extremely stout, a good character for its determination. The head is strongly rounded in front, the posterior portion bearing two oblique series of bristles, besides a row on the hinder edge. The palpus is a little longer than the maxilla, not reaching to the middle of the fore coxa. The metathoracical epimeron bears two rows of bristles, while the abdominal tergites have one only. The seventh tergite bears one long and two very short apical bristles. In the male all the abdominal sternites have one bristle, while in the female there are four, except on the first, where there is one. None of the femora bear complete rows of hairs. The hind femur has two subventral bristles on the outside, and one lateral bristle on the inside, and in addition a few bristles on the back. There is a prominent row of lateral bristles on the hind tibia, and between this row and the hinder edge there are from three to four more bristles stretching from the middle to the apex. The long apical bristle of the second segment of the hind tarsus reaches almost to the tip of the fourth segment. This segment is almost triangular in shape, and scarcely half as long again as it is broad. The fifth segment of the hind tarsus is as long as the third. In the male the clasper (fig. 14*a*) bears two slender dorsal processes. The anterior one is the shorter, and bears a very long apical bristle. The ninth sternite (fig. 14*b*) is lanceolate in shape, and somewhat curved upwards, with a few fine hairs near the end. The shape of the plate of the penis is shown in the figure (19). In the female the seventh sternite is triangular when viewed from the side, and somewhat truncate at its extreme end. The eighth tergite (fig. 7) bears two stout bristles below the stigma, and another one somewhat lower down. Further back it bears a subapical series of from five to seven less strongly chitinised bristles, and a few small hairs at the apex.

We secured four specimens of this interesting species at Cairo in January, 1901, two (♂ ♀) from *Dipus jaculus*, and two (♂ ♀) from *Acomys cahirinus*.

6.—\**PULEX WITHERBYI*, *n. sp.*

(Plate I, Figs. 2, 5, 6; Plate II, Figs. 11, 15).

A very distinct species. The palpus is but little shorter than the rostrum, reaching to the end of the fore coxa. The abdominal sternites bear two hairs on each side in both sexes. The hind femur has a row of eight or nine lateral bristles, one ventral bristle near the apex, and a tooth near the base. The hind tibia is very long, being four times as long as it is broad at the apex, and the hairs on it are somewhat reduced in number (fig. 2). The fifth segment of the fore



tarsus is very long, being nearly as long as the second, third and fourth segments together. The first segment of the mid tarsus is less than half the length of the second, while that of the hind tarsus is about the same length as the second, the longest apical bristle of the latter reaching nearly to the claw. The fourth segment of the hind tarsus is triangular, being but little longer than it is broad. In the male, the clasper (fig. 11*a*) bears three slender cylindrical processes, and the ninth sternite (fig. 11*b*) is narrow, pointed, and with the extreme end curved upwards. The plate of the penis (fig. 15) is broad and rounded at the end; the distal armature bearing a kind of brush. In the female, the eighth tergite (fig. 16) is very distinctive, it bears about ten rather thin and short hairs at the apical edge, and in addition three more on the proximal portion. The length = 1.86 — 2.86 mm.

We received sixteen specimens of this species from Mr. Harry F. Witherby, who took them from *Erinaceus albiventris*, near Gebel Auli, on the White Nile, in May, 1900. In addition to these, we secured twenty-nine specimens from Shendi: — *Erinaceus æthiopicus*, 9 specimens; *Vulpes niloticus*, 19 specimens; *Hyæna hyæna*, 1 specimen.

#### EXPLANATION OF PLATES.

##### PLATE I.

Fig. 1.—*Ceratopsylla ægyptius*; *as*<sup>1</sup>, *as*<sup>2</sup> = first and second abdominal tergites; *ep* = metathoracic epimeron.

- „ 2.—*Pulex Witherbyi*. Hind femur, tibia, and first tarsal segment, from outside.
- „ 3.—*Pulex cheopis*. Hind tibia, and first tarsal segment, from outside.
- „ 4.—*Pulex cleopatræ*. Second to fifth hind tarsal segments
- „ 5.—*Pulex Witherbyi*. Hind coxa from inner side.
- „ 6.—*Pulex Witherbyi*. Eighth abdominal tergite of ♀.
- „ 7.—*Pulex chephrenis*. „ „ „ „
- „ 8.—*Pulex cleopatræ*. „ „ „ „
- „ 9.—*Pulex cheopis*. „ „ „ „

##### PLATE II.

Fig. 10.—*Pulex nubicus*, ♂; *a*, clasper; *b*, ninth sternite.

- „ 11.—*Pulex Witherbyi*, ♂; „ „ „ „
- „ 12.—*Pulex cheopis*, ♂; „ „ „ „
- „ 13.—*Pulex cleopatræ*, ♂; „ „ „ „
- „ 14.—*Pulex chephrenis*, ♂; „ „ „ „
- „ 15.—*Pulex Witherbyi*, ♂; penis.
- „ 16.—*Pulex nubicus*, ♂; plate of penis.
- „ 17.—*Pulex cleopatræ*, ♂; „ „ „
- „ 18.—*Pulex chephrenis*, ♂; „ „ „
- „ 19.—*Pulex cheopis*, ♂; „ „ „

Tring Park, Tring:

January, 1903.

\* This species was mentioned by name, although not described, in "Bird Hunting on the White Nile," p. 60, by Harry F. Witherby. London: Office of Knowledge, 1902.



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