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NOTES ON AUSTRALIAN SIPHONAPTERA.

By W. J. RAINBOW, F.L.S., F.E.S., Entomologist.

(Plate xxiii, and figs. 25-29).

Family RHYNCHOPRIONIDÆ.

Genus ECHIDNOPHAGA, Olliff.

Only one species of this genus is known, namely *E. ambulans*, Olliff. This extraordinary flea was obtained from a Porcupine Ant Eater—(*Tachyglossus aculeatus*, Shaw = *Echidna hystrix*). Olliff in his paper "Description of a New Aphanipterous Insect from New South Wales," says that it "was found in large numbers on a Porcupine Ant Eater (*Echidna hystrix*) which was recently added to the collection of the Australian Museum."<sup>1</sup> As a matter of fact I only know of three specimens, and these are in our cabinet. They are probably the only specimens in any collection. Our specimens are mounted on one slide and labelled "*Echidnophaga ambulans*, Olliff, on *Echidna hystrix*, N.S.W. TYPE."

ECHIDNOPHAGA AMBULANS, Olliff.

(Plate xxiii, and figs. 25, 26).

This insect was described by the late Mr. A. S. Olliff in the paper referred to above, but it was not figured. An examination and study of the type specimens reveal the fact that some corrections and amplifications (aided by figures) to the original description are necessary. The description below should therefore be read in conjunction with Olliff's. In this species the body is globose, smooth, free from hairs and bristles except in the region of the genital aperture.

*Antennæ* capitate, three-jointed (not four-jointed as stated by Olliff). *Eyes* prominent. *Caput* convex above. On the dorsal line, the pro-thorax is very short; the meta- and meso-thorax are longer and of equal length to each other.

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<sup>1</sup> Olliff—Proc. Linn. Soc. N. S. Wales, (2), i., 1886, p. 172.

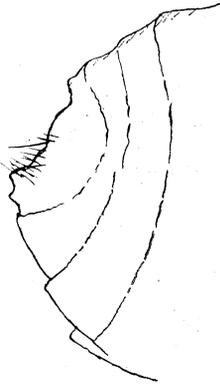


Fig. 25.

*Echidnophaga ambulans.*

*Legs.*—Rather long; femora smooth, and furnished with two moderately long apical spines or bristles; each tibia is notched on the upper surface, but this character is not constant in point of number of notches, one of the types having two notches and another three; from each notch two long bristles project; apical extremities broad and furnished with six long bristles; tarsal claws exceedingly long, smooth.

*Abdomen.*—Globose, convex. Of the three type specimens the posterior extremity of the abdomen in two of them is rounded (Pl. xxiii., fig. 1), and the genital aperture is not visible; in the third example the posterior tergite is excavated; and the genital aperture distinct (figs. 25, 26).

*Obs.*—This species has aroused much interest amongst students who have devoted special attention to the Siphonaptra, and it has generally been regarded as “practically unknown.” Some correspondence has recently passed between Mr. Carl Baker and myself in respect of this species, in the course of which I have supplied that gentleman with rough sketches of the type. This with a view to settling the exact systematic position of *E. ambulans*. In acknowledging my communication and sketches Mr. Baker says:—“The sketches were of the utmost service to me for one thing at least. They enabled me to definitely place *Echidnophaga* in its proper family. Its greatly shortened thoracic segments proclaim it of the Rhynchoprionidæ (Sarcopsyllidæ), unmistakably. It is very near to the common chicken flea (*Argopsylla gallinacea*) and indeed I very much suspect that it may belong to the same genus.”



Fig. 26.

*Echidnophaga ambulans.*

Family, PULICIDÆ.

Genus CERATOPHYLLUS, Curtis.

Some time ago I published a short paper entitled “Notes on

Fleas Parasitic on the Tiger Cat;”<sup>2</sup> in which I pointed out that the form described by Skuse as the male of his *Stephanocircus dasyuri*<sup>3</sup> was referable to another genus, and that in all probability it was *Pulex fasciatus*, Bosc. In arriving at this conclusion I was guided by Carl Baker’s “Preliminary Studies in Aphaniptera,”<sup>4</sup> the only work at that time accessible to me. It now appears that the form is distinct from *P. fasciatus*, and that it is a species of the genus *Ceratophyllus*, Curtis. The Hon. N. C. Rothschild, commenting upon this species as described and figured by Skuse remarks: “One of the species, of which Skuse possessed both sexes is probably the one described by us under the name of *Ceratophyllus hilli*.”<sup>4</sup> Unfortunately the figure of the *Ceratophyllus* (male) on Skuse’s plate is not a good one. The clasper is not defined, and the finger instead of being sickle-shaped stands prominently out like a big tubercle or horn-like process.

*C. hilli* is described and figured by Rothschild in his characteristically thorough manner,<sup>5</sup> and with this work I have carefully compared Skuse’s types of his so-called male *Stephanocircus*. The result of this study has convinced me that they are distinct from the male and female of Rothschild’s species, *C. hilli*, and as they also appear distinct from other known forms, I herewith append a description, naming the species in honour of the Hon. N. C. Rothschild who has done such admirable work in connection with the *Siphonaptera*.

CERATOPHYLLUS ROTHSCHILDI, *sp. nov.*

(Figs. 27, 28, 29.)

♀ *Caput*.—The front of the head bears a row of six fine bristles between the antennal groove and the maxillary palpus; immediately below this there are a number of fine hairs scattered irregularly over the side of the head; again, below the row referred to above, but situated towards the front, there are two pairs of long fine bristles, one pair being below the other; below these again, there is a larger and stronger bristle than the foregoing. The hinder part of the head bears three rows of bristles;

<sup>2</sup> Rainbow—Rec. Austr. Mus., v., 1903, pp. 53-55.

<sup>3</sup> Skuse—Rec. Austr. Mus., ii., 1893, p. 78, pl. xvii.

<sup>4</sup> Rothschild—Ent. Monthly Mag., (2), xvi., 1905, p. 60.

<sup>5</sup> Rothschild—Novit. Zool., xi. 1904, pp. 622-3, pl. xi., figs. 43, 44

the sub-apical row extending from the antennal groove to the vertex, is oblique, and is composed of six, of which the first four are of equal length or nearly so, and the other two distinctly smaller, the sixth being shorter than the fifth; in the second row there are five bristles, of which the first two are very long, the third somewhat shorter, and the fourth and fifth much smaller still; the third row fringes the basal angle of the head, and consists of five; the bristle nearest the antennal groove is not only the longest of the series, but is widely separated from its nearest neighbour; of the others constituting the third or posterior row, the three median bristles are of equal length, or nearly so, and the fifth is much the smallest; below the antennal groove, and immediately before the first of the basal row of bristles, there is an irregular group of short, stiff hairs or bristles, and again between the first and second bristles, a row of three short,



Fig. 27.  
*Ceratophyllus*  
*rothschildi*.

fine hairs. In front of the antennal groove there are two long bristles placed one beneath the other, though somewhat widely apart. The first row of six fine bristles in front of the head is divided into two series of three each by the interception of two short but exceedingly robust horn-like bristles, of which the anterior one is not only much the longest, but gently curved (fig. 3). The second segment of the maxillary palpus is longer than the fourth, and the rostrum reaches beyond the end of the fore coxa. Apical extremities of the first and second joints of the antennæ are fringed with a row of short stiff black hairs or bristles.

*Thorax.*—The pro-notum has a comb of about 18 teeth, and two rows of bristles, those of the posterior row being much the longest, widely separated from each other individually, and overlapping the comb; there are also a number of short fine hairs scattered over the surface. The meso-notum has three recurved rows of bristles and a few fine, scattered hairs; the bristles constituting the posterior row are much the longest, and those of the anterior row much the shortest; the meso-thoracical epimerum has two vertical though somewhat oblique rows of two bristles each, and beyond these one single bristle, all of which are very long; besides these there are a few shorter ones present. The meta-notum is also provided with a few scattered fine hairs, and three rows of bristles similar to those on the meso-notum; the meta-thoracical epimerum has two pairs of long and a few short, fine bristles.

*Abdomen.*—The first abdominal tergite bears three rows of bristles and a few short hairs in front; the bristles constituting the posterior row are very long, those of the median row are individually about one-half the length of their posterior neighbours, and double the length of those of the anterior row. Tergites 2 to 4 have each one row of extremely long bristles, and another in which each individual is about one-half the length of the latter; each of these tergites has, in addition, a few fine hairs. Tergite 5 has only one row of bristles (each individual of which is very long) and a few short hairs, whilst tergite 6 has three slightly recurved rows, the first of which consists of four very short bristles, the second, ten, about twice the length of the latter, and the posterior row, twelve exceedingly long bristles. Tergite 7 has three rows of four, six, and eight respectively, and a few fine hairs; there are also two pairs of long and heavy bristles seated at the apex, and of these each outer one is longer than its inner neighbour. The posterior tergite has four short heavy bristles, and a number of long and short fine hairs. On sternite 1, there is one long bristle on each side, and no lateral ones, whilst in respect of the others there is on each a ventral patch of bristles, of which the posterior ones are much the longest and strongest. Pygidium much deeper than wide, and clothed with long coarse bristles and fine hairs (fig. 28).

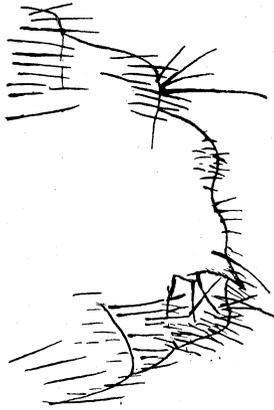


Fig. 28.  
*Ceratophyllus rothschildi.*

*Legs.*—Long. Fore coxa furnished with long strong bristles and short, fine hairs. Median coxa smooth on the upper angle and outer side; lower angle clothed in its entire length with short hairs or bristles which are exceedingly fine at the base, but become gradually stronger towards the apex, which is completely encircled by them. The hind coxa is also smooth on the upper angle; the outer side is smooth at the base, and for about one-half its length, from whence it is moderately hairy, and provided with bristles which become gradually stronger towards the apex; lower angle clothed with short fine hairs at the base, but becoming gradually stronger towards the apex which is encircled with fine hairs and coarse bristles. The fore femur has a number of shorter and longer fine hairs scattered over its outer surface, and one very long bristle on its inner angle near the apex. The median femur

has the inner angle furnished with short stiff hairs, and the outer side smooth, except at the apex where there are three moderately long bristles; lower angle smooth also, except at apex where there are two moderately long bristles, and a few short fine hairs. Posterior femur has its inner angle similarly clothed to the foregoing, but its lateral apical extremity is furnished with six moderately strong bristles; outer angle smooth. The fore tibia has six notches on its upper angle, from each of which a pair of stout bristles proceeds, the upper one of each pair being the longest; in addition to these there are on the outer side, and near the notched angle, two rows of strong hairs, the lower ones being somewhat the longest; lower angle smooth, but furnished at the apex, on the outer angle, with a pair of stout bristles. Median tibia has also six notches on its upper angle, and is similarly clothed with bristles and hairs to the foregoing; the outer side is also similar to that of the fore tibia, but its lower angle is clothed with fine hairs; apex as in fore tibia. The posterior tibia has seven notches on its upper angle, from each of which a pair of stout spines proceeds; of these the first pair is very short, otherwise the clothing and armature are similar to the median tibia. Of the first and second tarsi, the fourth joint is much the shortest, and the fifth the longest; all the joints are clothed with fine hairs and a few stout bristles; the fifth joint of the first and second tarsi have each four pairs of bristles on the under side. Of the posterior tarsi, the first joint is much the longest, and the fourth much the shortest; the second joint is longer than the third, and the latter rather longer than the fifth; all the joints of the posterior tarsi bear a number of lateral bristles, between which there is, both on the upper and under sides, two rows of stiff hairs.

♂ *Caput*.—The front bears a row of seven fine bristles between the antennal groove and the maxillary palpus; below this there are a number of smaller hairs scattered over the side of the head. Again, below this row there are two long bristles, and further down two more placed closely together. The subapical row forms a complete series, being, unlike that of the female, not interrupted by short, horn-like bristles. The hinder part of the head bears two oblique rows of bristles, those of the second row being much the longer; below the latter row there is another series of bristles, which form an uneven row and follow the posterior angle of the head. Rostrum rather shorter than that of the female.

*Thorax*.—Similar to female.

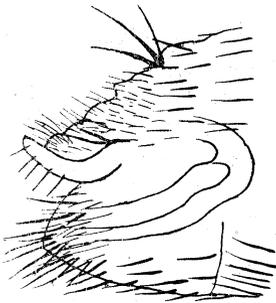


Fig. 29.  
*Ceratophyllus rothschildi*.

*Abdomen*.—Similar in vestiture to female. In the modified segments the clasper is produced into rather a long process, bearing one long bristle, and a few short hairs scattered over the sides. The finger is scythe-shaped, moderately long, pointed at apex, and furnished with a few moderately stiff bristles and short fine hairs. Sternite 9 broad, not divided ventrally, and having the apex densely clothed with long fine hairs, and long stout bristles. Spiral of penis consists of two coils (fig. 29).

*Legs*.—Similar to female.

*Hab*.—New South Wales. Host, *Dasyurus maculatus*, Kerr. I have also collected this species from the body of a tiger, *Felis tigris*, Linn., which died in the Zoological Gardens, Sydney.

Family CTENOPSYLLIDÆ.

Genus STEPHANOCIRCUS, Skuse.

It is interesting to note that although up to 1903, three additional species of *Stephanocircus* had been described by the Hon. N. C. Rothschild, all, including Skuse's species, were only known to us by female examples. Rothschild has, however, further extended our knowledge of the species constituting the genus, and has during the present year described not only the male of *S. dasyuri*, Skuse, but also the male and female of *S. simsoni*, Roths.<sup>6</sup>

All Rothschild's material was obtained from Launceston, Tasmania, the hosts being for *S. dasyuri*: *Mus velutinus*, Thomas, a Tasmanian Native Rat; *Peremeles gunni*, Gray, Striped Bandicoot; and *Dasyurus maculatus*, Kerr, Tiger Cat. *S. simsoni* was obtained from *M. velutinus* and *D. maculatus*.

We thus now know of five species of this interesting genus, namely:—

*S. dasyuri*, Skuse—Rec. Austr. Mus., ii., 1893, p. 78, pl. xvii., figs. 2, 2a, 2b, 2c, 2d, 2e.

„ Baker—Canadian Entomologist, xxvii., 1896, p. 63.

<sup>6</sup> Rothschild—Ent. Monthly Mag., xvi., 1905, pp. 61-62, pl. i.

- S. dasyuri*, Skuse—Rec. Austr. Mus., ii., 1896, p. 110.  
 „ Rainbow—Rec. Austr. Mus., v., 1903, pp. 53-55.  
 „ Baker—Proc. U. S. Nat. Mus., xxvii., 1904,  
 pp. 430-431.  
 „ Rothschild—Ent. Monthly Mag., xvi., 1905,  
 pp. 60-61, pl. 1., figs. 1, 4.

*Hab.*—New South Wales, and Launceston, Tasmania.

- S. mars*, Rothschild—Novit. Zool., v., 1898, p. 544,  
 pl. xvi., fig. 11.  
 „ Baker—Proc. U. S. Nat. Mus., xxvii., 1904  
 p. 431.

*Hab.*—Argentina.

- S. thomasi*, Rothschild—Novit. Zool., x., 1903, pp. 318-319,  
 pl. ix., figs. 4, 5.

*Hab.*—Barrow Island, N. W. Australia. Host—*Mus ferculinus*,  
 Thomas.

- S. minerva*, Rothschild—*Loc. cit.*, p. 319, pl. xi., figs. 6, 7.

*Hab.*—Paraguay (near Sapucay).

- S. simsoni*, Rothschild—Ent. Monthly Mag., xvi., 1905,  
 pp. 61-62, figs. 2, 3.

*Hab.*—Launceston, Tasmania.

In his generic diagnosis, Skuse says:—"Antennæ capitate, four-jointed."<sup>7</sup> In respect of this Baker remarks: "The matter of four-jointed antennæ must certainly be re-examined. If such a character is presented, then this species must be made the type of a new family differing from all other fleas. But in the description of the apparently congeneric *Stephanocircus mars*, Rothschild says nothing about four-jointed antennæ, and his drawing does not show four joints."<sup>8</sup> The point raised is an important one, and a careful examination of the types discloses the fact that the antennæ are normal—*three-jointed*.

<sup>7</sup> Skuse—Rec. Austr. Mus., ii., 1893, p. 78.

<sup>8</sup> Baker—Proc. U. S. Nat. Mus., xxvii., 1904, p. 431.

*Genus* CTENOPSYLLUS, Kol.

Among some fleas forwarded to Mr. Carl Baker, of which duplicates are in the Museum collection, there were specimens of *C. musculi*, Duges. These were from Brisbane and Dunedin—localities which constitute a new record for this species ; indeed, according to Mr. Baker, who has made a specialty of the Siphonaptera, this is the first recorded appearance of this species in Australia. They were collected from rats.

EXPLANATION OF PLATE XXIII.

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ECHIDNOPHAGA AMBULANS, *Olf.*

- Fig 1 Showing posterior abdominal segments rounded.  
" 2. " " " " " excavated.