

## NOTES ON THE MALLOPHAGA OF PROCAVIIDAE <sup>1</sup>

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(With 3 figures)

The monograph on the Mallophaga of the Procaviidae by my friend Dr. F. L. WERNECK,<sup>2</sup> is of such an excellent standard that he has left very little for other authors to add with reference to the species studied by him. My only regret is that he did not find it possible to reproduce the original descriptions and figures of the few species which he was unable to see.

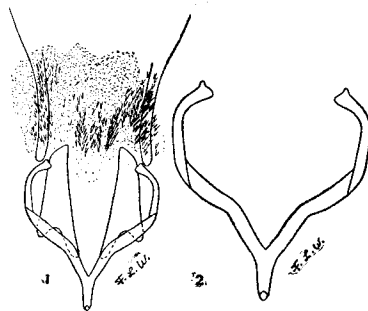
After Dr. WERNECK had completed his study of these parasites I was able to obtain material of one of the described forms which he had not seen, to re-examine certain type-material in the BEDFORD collection, and to obtain determinations of several hosts which were previously unidentified. The present paper, which should be regarded as a supplement to Dr. WERNECK's monograph, is written at his request to deal with these new facts.

All page-references and references to figures in the notes which follow are to Dr. WERNECK's monograph. The figures published in this paper are the work of Dr. WERNECK, to whom I wish to express my gratitude.

*Eurytrichodectes paradoxus* Stobbe  
(pp. 448-542)

This species occurs on many individuals of *Dendrohyrax arboreus adolfi-friederici*, but always in small numbers. It is not improbable that STOBBE's material may have come from this form of hyrax.

My specimens from this host unfortunately reached Dr. WERNECK too late



*Eurytrichodectes paradoxus* Stobbe  
— Fig. 1: Male genitalia; fig. 2: pseudopenis.

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<sup>2</sup> WERNECK, F. L., 1941, Os Malófagos dos Procaviídeos. *Mem. Inst. Oswaldo Cruz*, 36 (4): 445-576, figs. 1-149, ests. 1-2.

to be included in his work. They agree precisely with his description and figures except that in the genitalia of the type male (figs. 6, 7) the parameral ring is in an abnormal position. Normally the pseudopenis (figs. 1 and 2, in this paper) which forms the apical portion of this ring is directed posteriorly, not anteriorly as in the type.

*Procavicola (Procavicola) eichleri* Werneck (pp. 455-459)

The record of this species from *Procapra capensis* (p. 456) is certainly erroneous. The specimens in this batch were from a stuffed hyrax-skin in the United States of America, and included three species, all of which are entirely confined to *Dendrohyrax* (p. 505). I have not the smallest doubt that the skin was wrongly determined.

*Procavicola (Procavicola) mokeetsi* Bedford (pp. 459-461)

The male paratype examined by WERNECK was not in very good condition, but I have recently had an opportunity to examine BEDFORD's type and two more males of this species. These not only confirm all the differences between *eichleri* and *mokeetsi* mentioned by WERNECK, including the two (the greater breadth of the basal plate and greater curvature of the parameres in *mokeetsi*) of which he was doubtful, but show a more striking difference between the two species, not visible in the male paratype: in *eichleri* the spines on the copulatory sac are all small and rounded whereas in *mokeetsi* a number of them near the attached end of the sac are very much larger, elongate and arranged in four almost regular rows. The peculiar blunt ends of the endomeres are also shown by this new material to be characteristic of the species, for in one specimen the endomeres are well retracted into the abdomen and could hardly have been damaged, yet they are of exactly the same form as in the others.

*Procavicola (Procavicola) brucei* Werneck (pp. 461, 462)

I believe the pair of this species from *Dendrohyrax arboreus crawshayi* to be stragglers, as I have examined large numbers of *Procavicola* from many individuals of the various subspecies of *D. arboreus* including *crawshayi*, without encountering this form.

*Procavicola (Procavicola) sternatus* (Bedford) (pp. 470, 471)

WERNECK has omitted to state that the specimens examined by him are paratypes.

*Procavicola (Procavicola) subparvus* Bedford (pp. 472-474)

The specimen examined by WERNECK was determined by BEDFORD, but was compared with the type by myself.

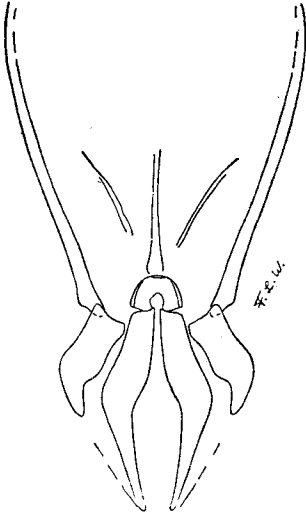


Fig. 3 — *Procavicola (Procavicola) natalensis* Bedford, male genitalia.

*Procavicola (Procavicola) natalensis* Bedford (pp. 476-478)

Examination of stained specimens verifies WERNECK's belief that the three small sclerites in the male genitalia proximal to the bases of the endomeres are not really separate (fig. 3, in this paper) and also shows the presence of a median "hair-like sclerite" in addition to the lateral ones shown in fig. 26. This median sclerite is often invisible in unstained specimens.

*Procavicola (Acondylocephalus) congoensis* (Ferris) (pp. 478-481)

The record of this species on *Procavia capensis* is erroneous (see note on *P. eichleri*, above).

*Procavicola (Acondylocephalus) neumanni baculatus* (Ferris) (pp. 484, 485)

I have recently collected a very large number of specimens of this form from *Dendrohyrax validus schusteri* Brauer. These specimens confirm that the differences between *P. neumanni neumanni* (Stobbe) and *P. neumanni baculatus* are constant.

*Procavicola (Acondylocephalus) angolensis* Bedford (pp. 488-491) and *Procavicola (Acondylocephalus) jordani* Bedford (pp. 491-494)

I have prepared a note on the hosts of these two species for publication elsewhere. In the circumstances it will be sufficient to note that Dr. JORDAN, who collected the type material of both species, kindly informs me that *Procavia "angolensis"* was a *lapsus calami* for *bocagei*. There is no hyrax, in any of the three genera (not only in *Dendrohyrax*), with the name *angolensis*.

*Procavicola (Condylocephalus) bedfordi* Werneck (pp. 498-505)

The record of this species on *Procavia capensis* (pp. 498, 499) is certainly erroneous (see note on *P. eichleri*, above). For the host re-

corded as *Dendrohyrax angolensis*, *D. bocagei* should be substituted. The undetermined Procaviid from Uganda has since been determined as *D. arboreus adolfi-friederici*, and that from Kenya as *D. a. bettoni*.

*Procavicola (Condylocephalus) univirgatus* (Neumann) (pp. 506-509)

WERNECK tell me that the length assigned to the female (p. 506) is a misprint. The correct measurement is 2,37 mm.

*Procavicola (Condylocephalus) hopkinsi* Werneck (pp. 509-513)

There was a most unfortunate error over the specimens collected by Mr. VAN SOMEREN, and they were sent to Dr. WERNECK incorrectly labelled. The batch mentioned in the description of *P. hopkinsi* was collected at Molo, not Ngong, nor near Nairobi, and was from *Dendrohyrax arboreus bettoni*.

*Procavicola (Condylocephalus) lindfieldi* (Hill) (pp. 513-516)

I now think that I was wrong when I suggested that the type-host of this form was *Procavia capensis natalensis*, and consider that BEDFORD's suggestion that it was an undescribed hyrax is much more probably correct.

When Dr. WERNECK returned the specimen from *Procavia capensis schultzei* (T. M. skin no. 8339) described on pages 514 and 515 I stained and re-examined it, and found that it is a *Procavicola s. str.* and presumably the female of *Procavicola (Procavicola) affinis* Werneck. Dr. WERNECK has seen the specimen again since it has been stained and agrees with this opinion. The specimen is indistinguishable from other females of *Procavicola s. str.* and I designate it as neallotype of *Procavicola affinis* Werneck. It will be deposited in the BEDFORD collection.

*Dasyonyx (Dasyonyx) validus* Bedford (pp. 519-524)

Re-examination of the material in the BEDFORD collection shows that specimens from *Dendrohyrax arboreus arboreus* and *D. arboreus scheelei* are *Dasyonyx validus validus*. All the bibliography, except BEDFORD's paper of 1939, refers to this subspecies.

*Dasyonyx (Dasyonyx) ovalis* Bedford (pp. 533-539)

I have recently had an opportunity to re-examine the type-series of *D. ovalis*, and find that the series unquestionably consists of two species. The entire series contains six specimens, of which three are males, two females and the sixth a last-stage nymph which appear (from its size) to be almost certainly a female. The holotype and allo-

type are *ovalis* and the nymph appears to be conspecific with them, the remaining specimens are undoubtedly *Dasyonyx* (*Neodasyonyx*) *transvaalensis* Bedford, which appears to be the normal *Dasyonyx* on *Procapra capensis coombsi* Roberts.

The opportunity has also been taken to examine the possibility that *Dasyonyx ovalis* Bedford and *D. windhuki* Bedford are the same, as suggested by WERNECK (p. 533). Comparing the holotype male of *ovalis* with males of *windhuki* from the type-host (including paratypes), the ring formed by the parameres and proximal rami of the pseudopenis is more open in the former, the terminal ramus of the pseudopenis is slenderer and usually longer in *windhuki* than in *ovalis*, the basal plate is slightly narrower in proportion in *windhuki*, and I can find no trace in *ovalis* of the preputial sac, studded with a mixture of spicules and larger spines, which is so conspicuous a feature in *windhuki*. I can find no differences between the females except for the truncate external ends of the sternite of the 8th. abdominal segment of *ovalis*, and this is not sufficiently clear in the allotype for me to feel any certainty that it is genuine.

As regards the differences in the male genitalia, the more open ring of *ovalis* might well be due to a difference in position, the terminal ramus of the pseudopenis and the basal plate are both somewhat variable in shape in undoubted *windhuki* and their shape in *ovalis* is certainly not sufficiently different to be beyond the probable range of variation. WERNECK has disposed of the supposed absence of the processes on the posterior margin of the temples in *windhuki*. The apparent absence of the preputial sac in *ovalis* is, if confirmed, a very important character, but it seems quite likely that the sac has been lost in mounting. My own belief is that this is the case and that *windhuki* is a synonym of *ovalis*. That the sac may be lost in mounting is proved by the fact that I recently mounted a series of males of *D. dendrohyracis*, one of which lost its preputial sac and endomeres during the process of removing the soft contents of the abdomen. The collection of more male *Dasyonyx* resembling *windhuki* except for the absence of the sac would immediately refute my belief that *ovalis* and *windhuki* are the same.

In either case WERNECK's treatment of *windhuki* as a subspecies of *ovalis*, though entirely justified on the facts available to him, is not correct. It is either an excellent species or a synonym of *ovalis*.

The occurrence of *ovalis* on *Procapra capensis coombsi* requires confirmation. A *Dasyonyx* s. str. and a *Neodasyonyx* have never been taken on the same host except in the case of museum skins and the numbers have invariably been extremely small, which suggests very strongly that the records are due to artificial straggling.

Pending the obtaining of further evidence I regard *Dasyonyx windhuki* as a synonym of *Dasyonyx ovalis* and the original specimens of the latter as stragglers.

*Dasyonyx (Neodasyonyx) nairobiensis* Bedford (pp. 555-559)

The undetermined Procaviid from Ngong was *Procavia mackinderi zelotes*.

*Procaviphilus serraticus* (Hill) (pp. 560-564)

I now consider that the type-host of this species is probably an undescribed subspecies of *Procavia capensis*, and not *P. capensis natalensis*.

Under the heading "Especímenes examinados" (p. 561), the specimens from Leuukoppie were from *Procavia capensis* ssp., not *capensis* s. str., and Dr. AUSTIN ROBERTS informs me that Transvaal Museum skin no. 8336 is *Procavia capensis windhuki*, not *reuningi*.

*Procaviphilus ferrisi* Bedford (pp. 566-569)

WERNECK was of the opinion that *Procaviphilus granuloides* Bedford, of which he had paratypes, was a synonym of *P. ferrisi* Bedford, of which neither BEDFORD nor WERNECK had seen actual specimens. I have recently had the opportunity to examine specimens of *ferrisi* and to check this opinion, which proves to be incorrect.

The material drawn and described by FERRIS was collected from *Heterohyrax pumila rudolfi*, Marsabit Road, Kenya, and *H. brucei bakeri*, Nimule, "Uganda" (now in the Sudan). Since he believed himself to be redescribing *P. serraticus* (Hill), he did not specify which of the two batches were the specimens drawn, nor did BEDFORD (1932, p. 727) designate a type-host when he renamed the species, but *H. pumila rudolfi* has been assumed to be the type-host of *P. ferrisi*. This assumption now becomes an established fact, for my specimens, collected from two skins of *H. p. rudolfi* (Thomas) at Marsabit Road in January and February 1911 by Mr. A. B. PERCIVAL, agree perfectly with the drawings and description of *ferrisi*, and not with paratypes of *granuloides*. There appears to be very little doubt, however, that the series described by FERRIS included both forms. The host of *P. granuloides* was determined at the British Museum as *H. b. brucei* (Gray), while FERRIS records *ferrisi* from *H. b. bakeri* at Nimule. Since the type-locality of *granuloides* (Umi Rocks, East Madi, Uganda) is only about 17 miles from Nimule, on the same side of the Nile and in ecologically similar country, it seems extremely probable that the hosts from Umi Rocks and from Nimule belong to the same subspecies; on geographical grounds it is altogether unlikely that they were *H. b. brucei* and perhaps *H. b. thomasi* (Neumann) is geographically more probable than either of the determinations quoted.

My oecotypical and topotypical specimens of *ferrisi* differ from *granuloides* only in rather small characters, but the differences appear

to be constant; they are subspecific rather than specific. In *ferrisi* the endomerall plate is much more distinctly double, the endomeres are longer, more tapered, and distinctly convex on the outer side, with a wider gap between them near their apices; the basal plate is somewhat longer (extending almost to the base of the 5th. abdominal segment), rather narrower apically and more expanded basally. The plate of the eighth abdominal tergite is entire. The degree of asymmetry of the head is somewhat variable in both forms and I can find no difference between them in this respect. I am unable to separate the females.

WERNECK'S description and figures refer to *Procaviphilus ferrisi granuloides* Bedford, the specimens of *P. ferrisi ferrisi* Bedford which I sent to him having unfortunately arrived too late to be utilised in his monograph.

*Procaviphilus granulatus* (Ferris) (pp. 571-574)

The undetermined Procaviid from Kenya was *Dendrohyrax arboreus bettoni* and was from Molo, not Ngong (see note on *Procavicola hopkinsi*).

*Procaviphilus dubius* Werneck (pp. 574-576)

The same remarks about the undetermined Procaviid from Kenya apply here, also.

RESUMO

O presente trabalho deve ser considerado um suplemento à monografia sobre os malófagos dos procaviídeos publicada, em 1941, pelo Dr. F. L. WERNECK nas Memórias do Instituto Oswaldo Cruz, (vol. 36, págs. 445-576), pois contém a determinação de vários hospedeiros que não haviam sido identificados e algumas correções resultantes do exame de material mais apropriado.

Entre estas, cumpre salientar a referente a *Procaviphilus granuloides* que, baseado no estudo de oco e topotipos, o autor considera subespécie de *Procaviphilus ferrisi* e não sinónimo deste último. Também a questão da identidade entre *Dasyonyx ovalis* e *Dasyonyx windhuki* é objeto de discussão, terminando o autor por aceitar a sugestão feita por WERNECK sobre a identidade dos referidos parasitos e recusando-se a aceitar o último como subespécie do primeiro.