

# On some Mallophaga of Sea-Birds from the Tristan Da Cunha Group and The Dyer Island

By

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Through the kindness of Dr. F. Zumpt, South African Institute for Medical Research, Johannesburg, South Africa, I received a small collection of Mallophaga from the Tristan da Cunha Group in the South Atlantic (leg. Mrs. M. K. Rowan) and from the Dyer Island (leg. Mr. R. W. Rand). I wish to thank Dr. F. Zumpt for entrusting me with these specimens, and members of the Entomology Department of the South African Institute for Medical Research for making the translation into English of my German text.

The author (1951) described two new species of this collection, namely *Pseudomenopon rowani* Kéler and *Parricola zumpti* Kéler, both found on the flightless Tristan Rail, *Atlantisia rogersi* Lowe. These two species are mentioned in this paper in order to give a full account.

As far as I know, only two species of Mallophaga have been recorded (Waterson, 1914) from the Tristan da Cunha Group. These are *Eurymetopus taurus* N. off the Wandering Albatross (*Diomedea exulans* L.), and the Yellow-nosed Albatross (*Thalassarche chlororhyncus* Gmelin), Inaccessible Isl.; and *Lipeurus ferox* Gbl. off the Wandering Albatross, Tristan da Cunha. Enderlein (1917) recorded some Mallophaga collected from petrels on the way from Tristan da Cunha to South Africa.

In the present paper, I am giving a survey of all Mallophaga received from the Tristan da Cunha Group adding a description of a new *Austrogoniodes* subspecies from the penguin of Dyer Island, *Spheniscus demersus* L. This is advisable because I want to compare it with another new *Austrogoniodes* species from the penguin *Eudyptes cristatus cristatus* Miller, of Tristan da Cunha,

A single unidentifiable nymph\* taken from *Diomedea chlororhyncus* Gmelin is not discussed here.

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\* I believe that the term "nymph" is more suitable for the preimaginal instars of Mallophaga than the term "larva". I formerly used this generally accepted term but, nevertheless, it is only suitable for holometabolic insects.

It is, however, not advisable to designate the nymphs as "juvenile" or "immature" as is very often done in literature. In future, I shall call "juvenile" only those adults which are not fully matured.

I prefer accurate drawings which replace a great deal of the description. The drawings published in this paper have been made after a careful study of the specimens and, therefore, those features which are clearly visible, have not always been mentioned in the text. The greater part of the text consists of discussions of features which are important in taxonomic and morphological respects.

**Pseudomenopon rowani** Kéler, 1951.

The type specimens consist of 22 males, 23 females and 85 nymphs. Later, I received a further 10 nymphs and 1 female from the same host, *Atlantisia rogersi* Lowe and locality, Inaccessible Isl.

In the original description, I mentioned the great similarity of this species with *P. tridens* (Nitzsch) from *Fulica atra* L. and a few other coots in Europe. However, nothing can be said at present about the phylogenetic relations of these two species because the descriptions of the other species are too inadequate for comparing the finer details. This is also true for a South African species described by Bedford (1919). Furthermore most of the Rallids have not yet been checked in respect to their Mallophags, so that the true relationship of *P. rowani* cannot be assessed on present knowledge. It is, therefore, not correct to unite at the moment *P. rowani* and *P. tridens* in a polytypic species ("Rassenkreis" sensu Rensch). I believe, it is better to list these Mallophags as distinct species than to degrade them to subspecies thus deceiving a near phylogenetic relationship.

**Parricola zumpti** Kéler (1951).

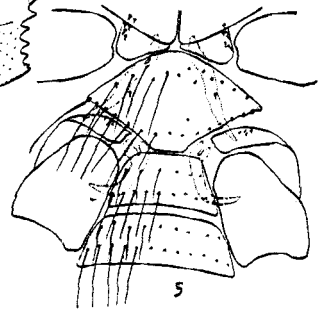
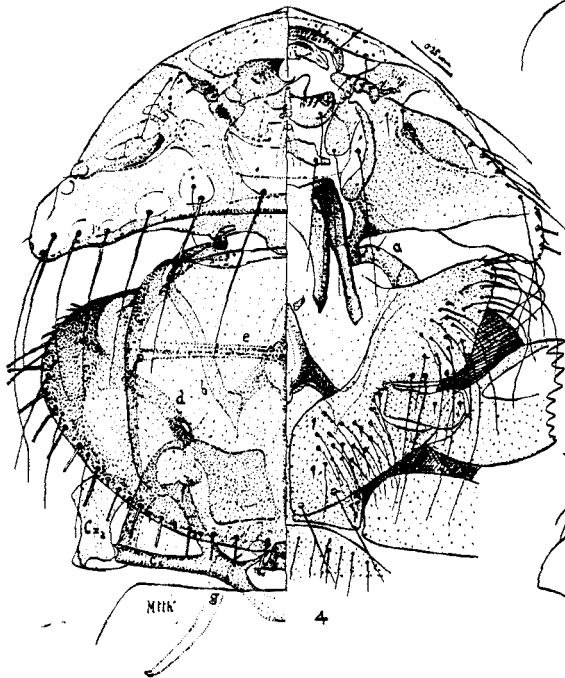
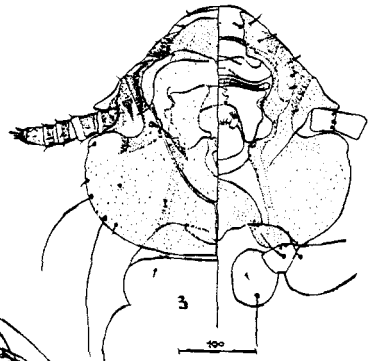
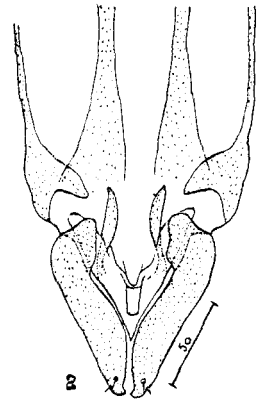
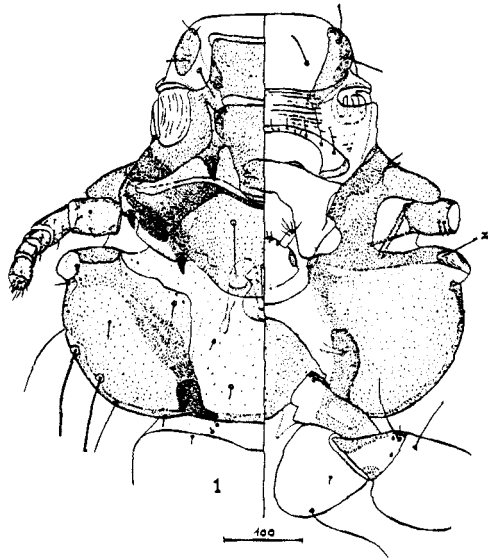
The type specimens consist of 10 males, 6 females and 10 nymphs, collected from *Atlantisia rogersi* on Inaccessible Isl. Later, I received a further 3 females and 1 male from the same host and locality.

**Giebelia hexakon** Waterston (1914) (figs. 1-3).

One male and one nymph of this species from Nightingale Isl. are before me. The male was collected on May 7th, 1949, from *Puffinus gravis* O'Reilly, the nymph on July 16th, 1949, from *Pterodroma incerta* (Schlegel).

As far as I am aware, *G. hexakon* has been recorded only four times. Waterston based this species on 1 male and 4 females which he had received from the South African Museum, Cape Town. The host was *Procellaria aequinoctialis* Lin., but the locality was not given. Bedford (1932) found some specimens on *P. gravis* O'Reilly near Cape Town. Harrison (1937) collected 1 female and 1 nymph from *Pachyptila desolata* (Gmel.) on Macquarie Isl. Guimarães (1943) recorded males, females and nymphs from *Puffinus griseus stricklandi* Ridgw. (St. Cruz, Argentina and *Pterodroma acroptera* (Smith) (Santos, Est. São Paulo, Brazilia).

Bedford (1932) and Harrison (1937) did not give any descriptions of their specimens. Waterston's description is rather detailed, but there are not enough accurate drawings to give the reader a clear picture of the species. The good drawing of the penis by Guimarães coincides with that



of my specimen. The parameres in his figure are parallel whereas they converge terminally in my specimen, but this does not mean anything because the parameres are movable and fixed only to the basal plate. The distance between the joints of the parameres in Guimarães' figure and that in my specimen are equal but different from the drawing of *G. mirabilis* Kellogg.

The differences in the measurements of the specimens recorded to date are very striking. I am only discussing the males because I have no female before me.

The male forwarded to me is 1.413 mm. long, that of Waterston's was 1.770 mm. long and those measured by Guimarães 1.13-1.26 mm. The male of *G. mirabilis* Kellogg seen by Guimarães has a body-length of 1.280 mm. Kellogg himself saw 4 males but he gives for the body length only one measurement of 1.28 mm. Of *G. fuscoclypeata* Johnst. and Harr. probably a *Trabeculus* only one female is known which measures 1.38 mm. The females of *Giebelia mirabilis* being longer than the males, the male of *fuscoclypeata* will probably show a total length of about 1 mm. The striking differences in the body-length ♂ min. 1.13 mm., max. 1.77 mm. cannot at present be taken as an important specific feature, because they are based on single specimens.

Guimarães writes that he at first inclined to identify his specimens as *G. fuscoclypeata* but a careful comparison of his "especimes imaturos" with the original description was against this identification. The specimen given as a female in the original description was damaged (hind legs and many bristles were missing), but it was certainly a fully matured female and not a nymph. I believe that *G. fuscoclypeata* represents a good species (? = *Trabeculus heteracanthus* Wat.) being different from the specimens seen by Guimarães and also being different from the specimen before me. The reason for this conclusion lies chiefly in the number of the basinodal spines of which only one pair is present in the female of *G. fuscoclypeata* and *T. heteracanthus* but 2 pairs (the clypeal and basinodal in the females of Guimarães' specimens as described by Waterston for *G. hexakon*, *mirabilis* and *Trabeculus dimorphus*).

According to the structure of the penis, it is quite probable that the specimens mentioned by Waterston and Guimarães and that before me belong to one and the same species, namely *G. hexakon* Waterston.

Guimarães does not give measurements of the different parts of the body. In the male before me, the head measures 0.507 x 0.489 mm. (*mirabilis*: 0.45 x 0.45 mm.; *hexakon* according to Waterston: 0.57 x 0.57

#### LEGEND TO FIGURES

- (1) *Giebelia hexakon* Wat. — Head of male.
- (2) *Giebelia hexakon* Wat. — Apical part of male genitalia.
- (3) *Giebelia hexakon* Wat. — Head of nymph.
- (4) *Ancistrona vagelli* (Fabr.) — Head and prothorax of female.
- (5) *Ancistrona vagelli* (Fabr.) — Ventral view of thorax and base of abdomen.

mm.: female of *fuscoclypeata*: 0.42 x 0.50 mm.), width of the prothorax 0.344 mm., of the metathorax 0.426 mm. and of the abdomen 0.643 mm. The corresponding measurements given by Waterston are 0.400, 0.514 and 0.700 mm.

Waterston saw the paratypes of *G. mirabilis* Kell. (1 pair) and found them different from *G. hexakon*. Apart from the body-length and the measurements of the head (see above) both species are to be separated from each other by the number of the dorsal spines of the head of the ♂, *hexakon* having 3 pairs and *mirabilis* only 2 pairs. This is in accordance with Kellogg's (1896) description who checked 4 males. The ventral, conical shaped orbital protrusion (x in fig. 1) is, according to Waterston (cf. p. 298: "we imagine this feature is less pronounced in *mirabilis*), stronger developed in *hexakon* than in *mirabilis*. Furthermore, the shape of the basal plate is different in both species being longer and narrower in *hexakon* than in *mirabilis* (cf. Waterston p. 291). The parameres of *hexakon* are widened only at the base, whereas they are deeply emarginated in the middle of the inner margin in *mirabilis*, so that they appear to be widened terminally too. (See below.)

Waterston believes that the differences in the measurements of the head are decisive but this is certainly not sure because they have not been based on a sufficient number of specimens. The differences in the measurements of the heads of both species is about 20%, but we really know nothing of the variability of these parasites.

More important is, I believe, the total absence of the basinodal spine in the male of *mirabilis*, and this feature is more in favour of a specific difference in these two forms than the measurements of the head. The basinodal spine seems to represent a constant feature, for Kellogg (1896) does mention it in his 4 males and I myself must state that this spine has in the male before me the same size as in Waterston's male of *hexakon*.

It is very difficult to come to a definite conclusion in respect to the specific value of the two *Giebelia* because Waterston did not give good drawings. He only reproduced the outlines of the parameres of the two species, in which differences may be meaningless and may perhaps be due to the different positions taken up by the parameres. It is also not mentioned whether the parameres were drawn *in situ* or from the extracted penes. Comparing my slide with Kellogg's drawing, I have to state that the penis in *mirabilis* is broader than in *hexakon*, the parameres being more widely separated at the base and forming a triangle, the base of which is longer than the height. The contrary is true in the male before me, the parameres being approached basally and forming a triangle of which the base equals the height. The same is true in Guimarães' drawing.

An interesting feature in the genera *Giebelia* and *Traboculus* is a membranous protrusion at each side of the forehead. Waterston saw in them the main feature for his family Giebelliidae. In my specimens I at first could not find these protrusions, but very soon I detected them in

small pockets in which they were withdrawn and folded. They are, therefore, protrusive organs of the clypeomembrane, and represent lateral portions of the pulvinus.

The figures 1 and 3 show the heads of the male and the nymph respectively. The latter is 0.870 mm. long and the head measures 0.317 x 0.344 mm. being a little broader than long. According to size, this nymph must belong to the second instar. The differences in the shape of the head in the nymph and the imago may be seen from the drawings. The above mentioned pockets of the head are not yet developed in the nymph, but they are indicated by a break in the nodal margin. It is interesting that the basinodal pair of spines in the nymph is fully developed whereas the clypeal and the postnodal ones are wanting, this arrangement corresponding with the females of *fuscoclypeata* and *heterocanthus*. This seems to be a further proof that the basinodal spine represents a constant feature in *G. hexakon*. Guimarães' "especimes imaturos" have two pairs of spines on the head, namely "um par anterior" and "e outro lateral", i.e. the clypeal and basinodal pairs.

The rudiments of the anterior arms of the tentorium are very distinct in the nymph whereas the posterior arms are difficult to detect. In my figure 3, only the former are shown by a dotted line which arises from a rounded fenestra of the antennal arc.

*Ancistrona vagelli* (Fabricius, 1787) (figs. 4 - 5).

I have before me one female from *Puffinus gravis* O'Reilly, Nightingale Isl., 4th May, 1949.

This is a new host to be added to a long list of hosts recorded up to now.

*Ancistrona vagelli* F. (= *gigas* Piaget, ? = *procellariae* Westw.) has been recorded from the following petrels:

*Fulmarus glacialis* (Lin.), Iceland, Greenland, The Faeroes, Orkney Isl. (*vagelli, gigas*).

*Fulmarus glacialis rogersi* Cassin, California (*gigas*).

*Puffinus griseus* Gmelin, California, Cape (*vagelli, gigas*).

*Puffinus creatopus* Coues, California, Juan Fernandez Isl. (*vagelli, gigas*).

*Puffinus opisthomelas* Coues, California (*gigas*).

*Pachyptila desolata mittingleyi* Math. (= *macquariensis* Math.) Macquarie Isl. (*vagelli*).

*Pterodroma neglecta* Schlegel, Juan Fernandez Isl. (*vagelli*).

*Pterodroma leucoptera hypoleuca* (Salvin), Laysan Isl. (*gigas*).

*Pterodroma mollis* (Gould), S. Atlantic. (*gigas*).

*Pterodroma incerta* (Schlegel), S. Atlantic (*gigas*).

*Pelagodroma marina maoriana* Math., Kermadec Isl. (*procellaria*).

*Oceanites oceanicus* (Kuhl) from the S. African Museum, Cape Town, leg. Bonomi (*procellariae*).

*Daption capensis* (Lin.), S. Atlantic, N.S. Wales (*procellariae, gigas*), Unknown host, Galapagos Isl. (*gigas*).

In spite of these numerous records, this species is still insufficiently known. It remains to be proved, whether all the specimens recorded from the many petrels are really conspecific, and whether the above accepted synonymy is correct. The following description of the specimen before me may facilitate future comparison.

My female shows the following measurements: Body length 6.16 mm., head  $1.05(0.85^*) \times 2.06$  mm., prothorax  $1.17 \times 1.92$ , metathorax  $0.45 \times 1.90$  mm., abdomen  $3.44 \times 2.41$  mm., hind femur 0.99 mm., hind tibia 1.00 mm., hind-tarsus 0.45 and 0.50 mm. incl. claws.

Piaget's (1885) female of *A. gigas* was 6.00 mm. long. The head of it measured  $0.95^* \times 1.60$  mm. and was therefore longer and narrower than that of my female. Perhaps, the length of the head of my specimen is a little too short, because the head is, in my slide, bent downwards, but the width of the head must be correct, and it is, in any case much greater than in Piaget's specimen.

The measurements of the prothorax are, according to Piaget,  $1.00 \times 1.55$  mm., therefore much less than in my specimen. Also Piaget's measurements of the metathorax ( $0.50 \times 1.51$ ) are less. The abdomen with  $3.60 \times 2.50$  mm. is about the same size as in my female. Furthermore, the hind-femur in Piaget's specimen is 0.86 mm., the hind-tibia 0.80 mm. and the hind-tarsus 0.30 mm. long, all of them are shorter than in my female.

Piaget's description is undoubtedly faulty in some respects. He described, for instance, the temporal corner as bare of bristles, but indicated them in his drawing; furthermore, the mandibula is said to have a bristle, a feature never found in Mallophaga. Apart from this, I find the following difference which may be of specific value. According to Piaget, there is one long bristle at the base of the gular hook, but two each in my specimen.

The partly reduced mesothorax as shown in Piaget's drawing has a strong triangular, dark-brown coloured platelet lying in the median emargination of the hind margin of the prothorax. In my specimen, this platelet is trapezoidal.

The "deux petites bordes obliques" in Piaget's description are to be explained by the optical combination of two, morphologically different elements, namely the sclerotized clasps (f, fig. 4) of the mesothorax crossing the strongly developed and extended mesofurca which reach the metathorax.

I cannot detect a "petite bande ondulée" between the first coxae, but there is a small, slender-oval prosternal piece extending backwards and forming a blunt, weakly sclerotized tongue with a lateral protrusion which reaches the base of the profurca. This plate is

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\* The length of the mid-line.

elevated and forms a bridge between the enormously enlarged first coxae which strongly diverge anteriorly. Such a prosternal bridge is also found in other genera of Liotheidae. Lateral to the foretip of the prosternal bridge there are two small oval sclerites on each side which bear a short spicula.

Piaget probably did not find a bipartite mesosternum which is mostly hidden beneath the posterior protrusions of the first coxae.

In my specimen, I find a crescent-shaped sclerite between the large rhomboidiform metasternum and the hind coxae on each side, Piaget too, distinctly figured it in his drawing (fig. 8a, 1885). According to the position, it corresponds with the sternopleurite or at least to its anterior part and, in the lower insects, to the praecoxa.

As may be seen in fig. 4 the front margin of the head is bent ventrally forming an arched-shaped fold. This fold is closely approached to the arched-shaped margin of the clypeus. Consequently the marginal bristles and the premarginal hairless sensilla have been moved to the venter. In other Amblycera, both these structures are visible in the dorsal view. The small, triangular osculum\* is, I believe, a result of the modified anterior part of the head.

The buccal or pharyngeal sclerite is similar to that of other Liotheidae. The dorsal wall of this sclerite is weakly sclerotized in the hind and lateral parts and shows the usual two small "openings" which have a rounded triangular shape. The posterior angles of the buccal sclerites are more strongly sclerotized. As in all Amblycera, the large fan-shaped clypeobuccal dilatator is attached to the dorsal wall of the bucca.

The tentorium is complete and consists, as in all Amblycera, of a transverse bridge protruding anteriorly into two slender, hyaline armshaped pieces. These arms are bent laterally and ventrally and end in a V-shaped orifice on the ventral side of the head, lateral to the palpi maxillares. I could not determine if this orifice is open or closed in the specimens before me, but I found it open in a few nymphs of Amblycera by testing it with a fine hair.

In this species, unlike the Ischnocera, a well developed nodus trabecularis is wanting. The sclerotized rudiments of the VTA lie free in the lumen of the head and are not united with the weakly developed nodal ridges.

In the distinctly tripartite thorax, the prothorax is strongly developed, but the metathorax is small and similar to an abdominal segment.

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\* I originally created the term "osculum" for the median emargination of the anterior part of the head in the Trichodectidae. But I think it is advisable to use the same term for all formations of the median anterior part of the head. An osculum, therefore, can be straight, emarginated or protruded.



Between both, we find the greatly reduced mesothorax. The latero-cervicalia are well developed and united anteriorly with the strongly protruding condyli occipitales and posteriorly with the front part of the propleural ridge (c, fig. 4). The episternal plates have here been lost, so that the latero-cervicalia, the propleural ridge, the propleural apodemes and the dorsal joint of the first coxa meet in one point. The propleural apodemes (b, fig. 4) are, as in all Mallophaga, united with prosternal apodemes (furca) thus forming a clavacula.

According to Cope (1941, *Tetrophthalmus*), the episternes of the prothorax are united on the dorsal side behind the prophragma (e, fig. 4). This explanation of the complicated nature of the structure of the prothorax of the Amblycera is very plausible, but needs confirmation. In this connection, I want to mention another part of the prothorax which has perhaps some taxonomic value compared with other *Ancistrona* species. This is the ridge "d" in fig. 4, protruding backwards from the rounded corners of the epimeres and forming terminally a joint together with the strongly reduced mesothorax. This ridge is the posterior, apically folded margin of the proepimere articulating with the anterior margin of the mesoepisternum. In this margin of the proepimere the spiracle of the prothorax is to be found (see fig. 4, beneath d). Its position is important for detecting the proepimere.

In *Ancistrona*, the scutellum, the mesopleural ridge ( $C_2$ , fig. 4) the mesofurca (g, fig. 4) and the bipartite sternal plate of the mesothorax are well developed. In fig. 4, the right side of the sternal plate is covered for the greatest part by the enormously enlarged forecoxa, whereas the left side is distinct.

The apodemes of the metasternum (metafurca) are not shown in figure 4. They are only about half as long as the apodemes of the mesosternum and, in the middle, bent outwards at nearly right angles.

The metatergum and the abdominal tergites 1-10 each has a row of premarginal bristles which are, on the average,  $1\frac{1}{2}$  times as long as the segment. Lateral to the anterior segments and to the metatergum, there are a few short spines between the bristles.

On each abdominal tergite, including the tenth, a transverse band is seen, extending from the one side margin to the other and is separated from the pleurite by a narrow hyaline interstice. The spiracles are very small, but nevertheless quite distinct. There are eight pairs of spiracles belonging to segments 1-8. The first two are smaller than the others, but are open and connected with a normal trachea. In the cuticula, lateral to each spiracle, is a small hyaline "opening" which has the general appearance of an additional stigma. Behind the tenth segment a small eleventh segment is to be seen having a perianal crown of short spines.

Abdominal sternites 1-9 are each provided with two transverse rows of bristles. The tenth sternite lacks such bristles. The 9th

sternite is kidney-shaped and forms the sub-genital plate. It is distinguished by minute intercalary setae between the bristles. The wall of the genital chamber is furnished with dense, microscopically small teeth of which 2-3 mostly lie close together. They form a rough sculpture.

It is still to be mentioned that *Puffinus gravis* O'Reilly, the host of *Ancistrona vagelli*, only nests on Tristan da Cunha, but it migrates northwards up to the Northern Atlantic. On the other hand, *Fulmarus glacialis* L. nesting in the Northern Atlantic, has been found southwards as far as the 43° N.

*Naubates pterodromi* Bedford, 1930 (figs. 6-10).

Three males, 3 females and 6 nymphs from *Pterodroma incerta* (Schlegel), Tristan da Cunha, 16th and 18th July, 1949.

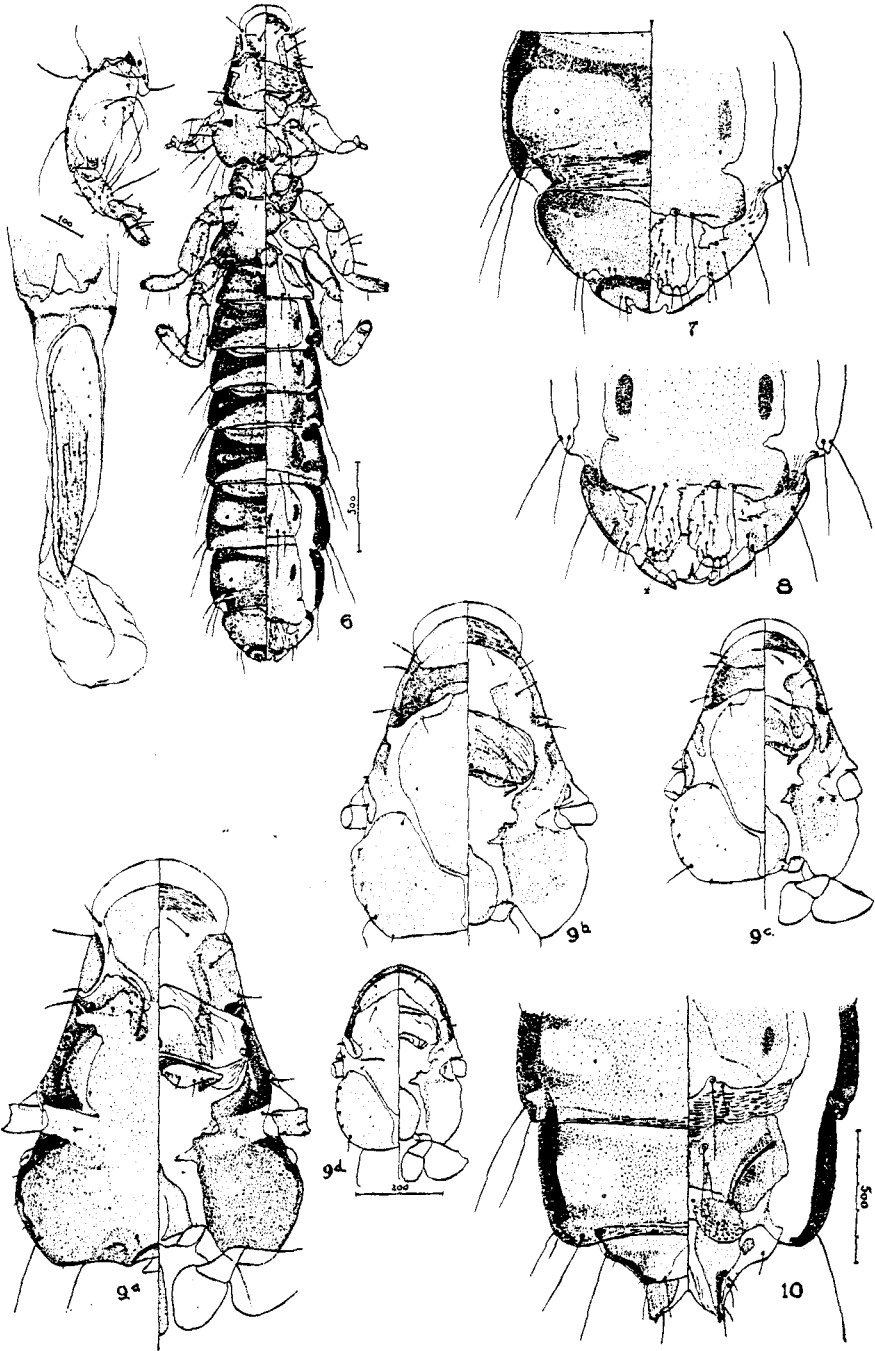
Bedford described this species from *Pterodroma macroptera macroptera* (Smith), Cape Town, and based it on three females, the male sex being unknown or not described up to now. Thompson (1938) recorded this species from *Pterodroma externa* Salvin, Masatierra, Juan Fernandez Isl.

**Male** (figs. 6-8). Body-length 3.68 mm. (1 specimen), head-length 0.888 mm. (in all three specimens), head-width 0.589 mm. (2 specimens) and 0.598 mm. (1 specimen). Index of head for the first two specimens 1:0.663, for the last 1:0.673. In the female, the head between the temples is strikingly wider than in the male and, therefore, the head-index is higher, namely 0.68 according to Bedford, 0.70 (2 specimens) and 0.69 (1 specimen) in my females. The female of this species has the head also bigger than the male, namely 0.89 x 0.61 mm. after Bedford, 0.906 x 0.634 (2 specimens) and 0.879 x 0.607 (1 specimen) in my females. The body-length, however, is less than in the males, namely 3.59 after Bedford and 3.44 or 3.5 mm. respectively in two of my specimens.

The colour of my specimens, mounted in Canada balsam, is chestnut-brown, head and thorax are lighter coloured than the abdomen, being black-brown on the side-margins of segments IV-VIII and in tergites IV and V. Fig. 6 represents the relative colour of the parts of the species.

The important features in respect to the taxonomy may be seen in figures 6-8. Further details are as follows:—

In the male, the pleural plates of segments III and VII-VIII are ventrally sharply separated from the sternites, whereas those of segments IV-VI do not show a distinct border but are sclerotized up to the side-margin of the corresponding sternal plates. This specialization of segments IV-VI, which also comprises the tergites, seems to be connected with the mode of copulation and the ventral position of the male genital opening. In the female, all pleural plates are distinctly separated from the sternites and all segments are equal.



Between the 8th and the 9th tergite, there is in the male a narrow, collar-shaped sclerotized band which looks like a rudimentary segment. It is, however, only a secondary sclerotization of the large intersegmental membrane. We find in the female a similar, but much weaker, sclerotized band which is distinctly connected with the 9th segment forming a neck-shaped protrusion within the 8th segment.

Ventrally the male genital region seems also to have an additional segment between the 8th and 9th segments. In some specimens, the 9th sternite shows a suture in front of the anterior macrochaetae, and its original border to the 8th sternite is only indicated by a lateral emargination. Furthermore, the suture in front of the macrochaetae is more or less asymmetrical and the sclerotization of the 9th sternite unequal (c.f. fig. 8) which may indicate that a process of modification is still going on. Probably, a secondary separation of the posterior part of the 9th sternite from the segment is developing to form an independent subgenital plate.

The opening of the penis-pouch is normally not visible. The anus being apical, the opening of the penis-pouch must be ventral. This opening could be detected by means of the phase contrast microscope (r, fig. 8).

The shape of the penis drawn from a dissected specimen, is as shown in figure 8. The outline of the basal plate is dotted.

**Female** (figs. 9a, 10) — Bedford (1930) gave a good figure of the head and also indicated the indistinct nodal plates of the frons which remind one of a similar structure in *Pelmatocerandra*. I am giving a supplementary figure which especially shows the transition of the clypeal signature to the postclypeus and the formation of hook-shaped, postclypeal side-margins. Behind these margins, there is in the drawing a lighter dotted band which indicates a depression. It can only be detected in specimens preserved in alcohol. A similar depression is also to be seen between the antennae. I think that the "anterior excavation" embodies the epistomal suture, whereas the posterior corresponds to the frontal suture. (cf. below under *Pelmatocerandra setosa*).

The genital region of the female is represented in fig. 10. Bedford also gave a general sketch of it. In the right half of the figure, the outline of the genital chamber is dotted, the wall being covered with sparse, flat, scale-like teeth.

#### LEGEND TO FIGURES

- (6) *Naubates pterodromi* Bedf. ♂  
 (7) *Naubates pterodromi* Bedf. — Apical part of male abdomen, dorsal view.  
 (8) *Naubates pterodromi* Bedf. — Apical part of male abdomen, ventral view.  
 (9) *Naubates pterodromi* Bedf. — (a) head of a female; (b) head of 3rd nymph;  
 (10) *Naubates pterodromi* Bedf. — Apical part of female abdomen.

The margin of the subgenital plate, that is the opening of the genital chamber, is to be detected only with difficulty. The two wedge-shaped anal plates, having evolved from the united 9th and 10th sternites, are covered anteriorly by the subgenital plate because the 9th sternite belongs to the dorsal wall of the genital chamber.

The figures 9b, c and d show the heads of the three nymphal stages of *N. pterodromi*. The transformations from the circumfasciate type of the 1st instar to the imaginal head in fig. 9a is clearly visible.

#### *Pelmatocerandra setosa* (Giebel, 1876) (figs. 11-13).

I have only 1 female and 1 nymph of this species before me, both from *Pelacanoides urinatrix dacunhae* Nicoll., Nightingale Isl., 22nd September, 1949. The female is conspecific with those specimens from *Pelacanoides urinatrix* Gmel, and *Prion desolatus* Gmel. described and figured by Enderlein (1909).

Enderlein saw 13 specimens from *urinatrix*, but only one nymph of this batch is still present in the Berlin Museum. Apart from the nymph, there is still the single female from *desolatus*, but probably this record is due to a contamination.

The fully matured female is 2.664 mm. long. Its head is 0.660 mm. long and 0.534 mm. wide (index = 0.81). The nymph is 1.540 mm. long, its head 0.453 mm. long and 0.380 mm. wide (index = 0.84).

Enderlein's matured female is 2.446 mm. long and has the head 0.670 mm. long and 0.552 mm. wide (index = 0.82). The nymph is 1.748 mm. long, its head 0.571 mm. long and 0.453 mm. wide (index = 0.80). Enderlein described the body-length as 2.3-2.4 mm. and the head-length as 0.65 mm.

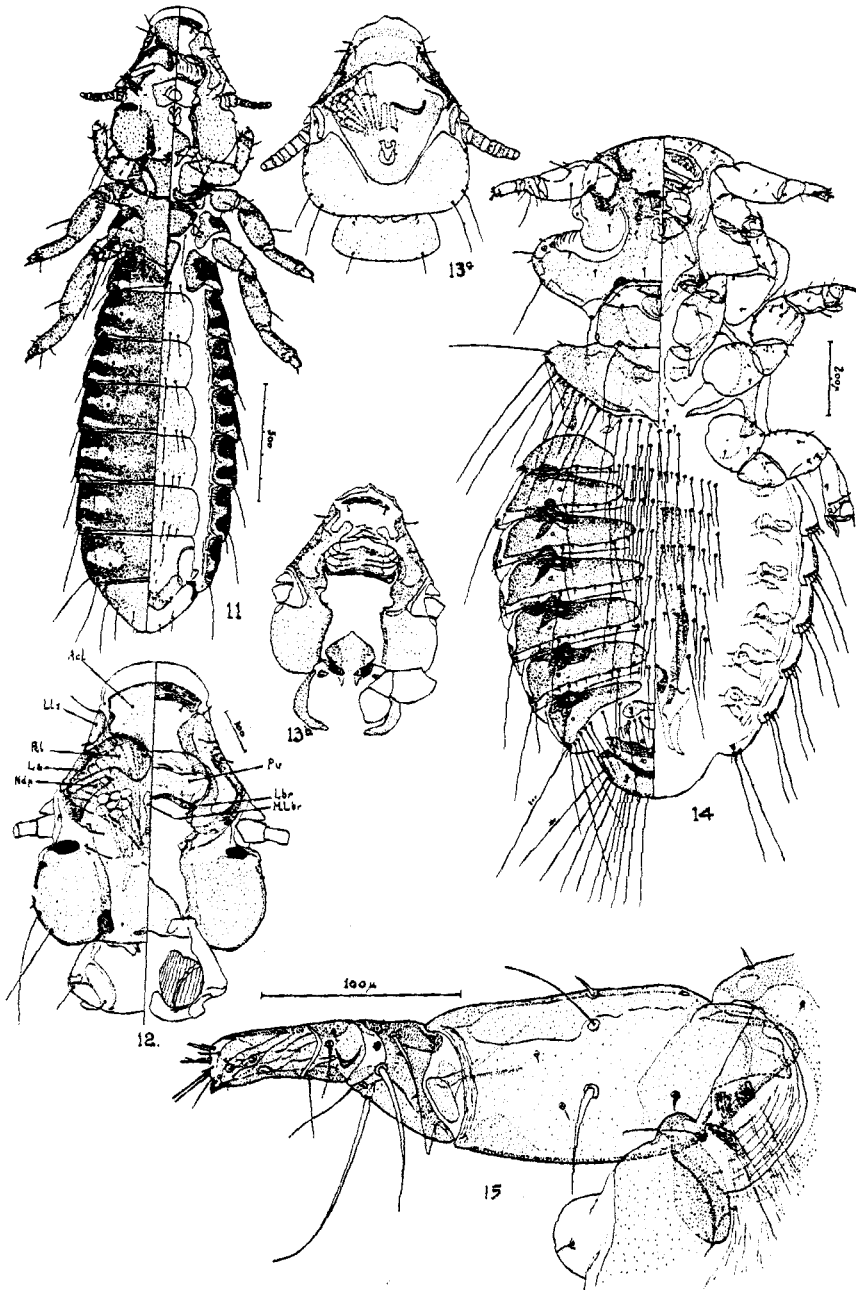
The taxonomically important features of the female are to be seen in fig. 11, but it is necessary to discuss some details.

The narrow triangular nodal plate protruding median-anteriorly is of special significance for the interpreting of the head of Mallophaga. This plate seems to be very characteristic for *Pelmatocerandra* but, nevertheless, Enderlein neither mentioned it in the diagnosis of the genus nor in the description of *P. setosa*. This is not the place to discuss the complicated structures which are only interesting morphologically, but I want to add at least a few remarks which are important for clarifying the taxonomic morphological terms of the head of Mallophaga.

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#### LEGEND TO FIGURES

- (11) *Pelmatocerandra setosa* (Giebel) ♀
- (12) *Pelmatocerandra setosa* (Giebel) — Head of female.
- (13) *Pelmatocerandra setosa* (Giebel) — Head of nymph, dorsal (a) and ventral
- (14) *Cesareus concii* n.sp. ♂
- (15) *Cesareus concii* n.sp. — Left antenna of male, dorsal view.



In fig. 12, I have indicated some of the most important muscle-bands. They have the same position as in other mallophags. Especially important is the median pair of the fronto-labral muscles which extend, as in all insects, from the middle of the frons to the labrum where they are attached to its outer wall. This pair of muscles is not difficult to find in the typical position in specimens not cleared in potash. In *Physostomum* I found it enormously stretched and basally broadened like a fan. It may be mentioned that also in other mallophags the base of the fronto-labral bundle of muscles is usually more or less spread out. The position of these muscles, as seen in longitudinal sections of *Trichodectes melis* F., etc., is peculiar because they run in a more or less narrow arch from the frons to the labrum and are normally swollen half-way. This is so in *Pelmatocerandra*, too.

According to my comparative-morphological studies, the signature is to be homologized with the anteclypeus. In larval series of certain Mallophaga (comp. e.g. *Parricola zumpti* Kéler), a progressive formation of the anteclypeus out of the clypeal plate is to be detected.

Limbellus (Lls) and Limbus (Ls) as well as those parts designated as Pcl in fig. 12 are derived from the postclypeus which is bent to the ventral side of the head forming the median margins of Piaget's so-called "bandes internes." These "bandes internes" are posteriorly connected with the arches of the mandibles (pleurostoma) there forming the anterior articulation of the mandible. This is proof that we are dealing with the postclypeus (Pcl).

The depression between Pcl and the nodal plate (Ndp) represents a trace of the epistomal suture. There are no muscle-insertions at this point. On the Pcl, however, the large, fan-shaped clypeobuccal dilatator is inserted. It is to be found in the same place in the *Copeognatha*. This muscle is so characteristic for the postclypeus that its demonstration does not leave any doubt about the significance of the insertion-spot.

Like the depression in front of it, the Ndp is free of muscle insertion, but close to its posterior margin, another fan-shaped, but smaller muscle is inserted. It is probably homologous with the anterior frontobuccal dilatator (dilatator pharyngis frontalis of Snodgrass). Normally, this muscle is inserted in insects on the anterior part of the frons. It is not shown in fig. 12, in order not to hide the other two frontobuccal dilatators.

There is a further distinct muscle-bundle connected with the Limbellus (Lls) showing that this part is also derived from the postclypeus.

From this discussion the following conclusions may be drawn :

- (1) The signature, which always lacks muscle-insertions represents the anteclypeus;
- (2) The limbellus and the large limbus-plate (Pcl) are derived from the postclypeus;
- (3) The light-coloured depression behind the Pcl is a remnant of the epistomal suture;
- (4) The nodal plate and the whole area behind it up to the antennal groove belong to the frons.

The epistomal suture is easily detected in the alcohol-specimens by direct light. It follows the posterior margin of the Pcl up to the median line, so that the border between the frons and postclypeus is well marked.

The border between frons and vertex however, is indistinct. According to the findings in the nymphs (fig. 13), I believe, that the posterior border of the frons is situated further back than it is to be detected from the continuation of the antennal groove (fig. 12).

The pulvinus between labrum and anteclypeus is probably a secondary formation of the large clypeo-labral membrane. Such structures are very common in Mallophaga and are variously differentiated as e.g. in the above discussed *Giebelia mirabilis* where their lateral parts can be withdrawn into special pockets or in *Physostomum*, where the pulvinus is doubled. It remains to be proved, whether in all cases this organ is derived from the clypeo-labral membrane, or whether it is sometimes a secondary modification of the post-clypeus.

*Pelmatocerandra setosa* (Giebel) has, to date, only been recorded a few times in the literature as listed above.

In fig. 13, I give a drawing of the head of the nymph before me. The pattern of the muscles have been taken from Enderlein's nymph which is identical with my specimens from Tristan da Cunha.

### **Austrogoniodes** Harrison, 1915.

I have before me 10 specimens of this genus collected from *Eudyptes cristatus* Miller on Tristan da Cunha. They belong to two species of which the one is represented by 2 males, and the other by 7 nymphs and one male. Furthermore, I add the large number of specimens of one species from *Spheniscus demersus* L., Dyer Isl.



Before dealing with this material, I wish to give a list of the species of this genus already described, together with a few general remarks:

1. *A. brevipes* (Giebel, 1876) off *Aptenodytes patagonica halli* Math. (= *A. longirostris* Coues), Kerguelen. Studer (1879) mentioned this species from the same host and locality; Enderlein (1903) (Valdivia-Expedition Kerguelen) (1909) (German South Polar Expedition) from *Aptenodytes pennanti* Gray. Since that time, it has not been recorded. It is not known whether all records really refer to the same species. Giebel described the species from a single female which is probably lost because Taschenberg (1882) did not mention the type and I have not found it in the collection of the Museum of Halle. Enderlein (1909) only talks of females without mentioning the number of specimens.

2. *A. bifasciatus* (Piaget, 1885). Piaget based his description on males and females off *Spheniscus magellanicus* (J. R. Forster). Later, Mjöberg (1910) recorded several specimens from the same host in Africa; but *S. magellanicus* does not occur there. Waterson (1914) possessing a good series of this species from the South African *Spheniscus demersus* (Linne) doubts the correctness of Mjöberg's host identification and/or the locality.

Bedford, who collected many years in Africa, curiously enough, never found this species. More recently, it was recorded by Guimarães (1938, 1943) from Argentina and by Thompson (1938) from Masatierra (Juan Fernandez), the host being in all cases *Spheniscus magellanicus*.

Piaget (1885) recorded as host "*Spheniscus magellanicus (demersus)*". The specimens had been received from Hyslop. Miss Clay kindly informed me about the types in the British Museum as follows: "Three of Piaget's slides are labelled: *Spheniscus magellanicus* and two: *S. demersus (magellanicus)*. Three slides in the Hyslop collection (probably part of the original material sent to Piaget by Hyslop (see 1885:48) are labelled only *S. magellanicus*. These specimens may anyhow have come from a Zoo bird and the host possibly contaminated by another species of penguin."

3. *A. waterstoni* (Cummings, 1914) was described from *Eudyptula minor novaehollandiae* (Steph.), Furneaux Isl. Later on, Harrison (1937) found one female of this species on *Eudyptes sclateri* Bull., Macquarie Isl.

4. *A. strutheus* Harrison (1915) was described from *Eudyptes sclateri*, but without any locality. In 1937, Harrison recorded this species from *Eudyptes sclateri* Bull. and *E. schlegeli* Finsch, Macquarie Isl., and also identified as this species some specimens sent in by Ferris from *Spheniscus mendiculus* Sund., Galapagos Isl. Clay and Rothschild (1938) found the species in the London Zoo on *Eudyptes chrysolophus* (Brandt), *E.c.cristatus* (Miller) and *Spheniscus demersus* (Lin.).

Thompson (1938) compared specimens identified by Harrison as this species with Piaget's types of *bifasciatus* and found both conspecific.

5. *A. macquariensis* Harrison (1937) described from *Eudyptes chrysocome* (= *cristatus* Miller\*) and *E. schlegeli* Finsch, Macquarie Isl. Eichler (1941) identified some specimens from *Eudyptes chrysocome* Fireland, as belonging to this species (ex. Zool. Mus. Hamburg). According to his very good drawing, these specimens certainly did not belong a *A. macquariensis*.†

6. *A. antarcticus* Harrison (1937) was based on 1 male and 2 females from *Pygoscelis adeliae* Hombr. and Jacquinot, Adelie-Land, Antarctic. It has not been found again.

7. *A. mawsoni* Harrison (1937) was collected by the Australian Antarctic expedition from *Aptenodytes forsteri* G. R. Gray, locality not recorded. Only 1 male and 1 nymph are known, and this species has not been found again.

8. *A. hamiltoni* Harrison (1937) was based on several male and female specimens from *Eudyptes chrysocome* (= *cristatus* Miller\*) Macquarie Isl. Clay (1940) identified with a question mark 1 pair and 8 nymphs from *Eudyptes c. cristatus* (Miller), East Falkland Group, Kidney Isl.

Harrison (1937) stated that the above listed species are to be separated in two groups, the two last being more closely related to each other than to the others. Harrison, however, was reluctant to create a new genus on the antennal dimorphism alone. He was quite right in this respect but he overlooked other features which very well entitle us to create a new genus.

### Cesareus nov. gen.

Genotype: *C. concii* n.sp.

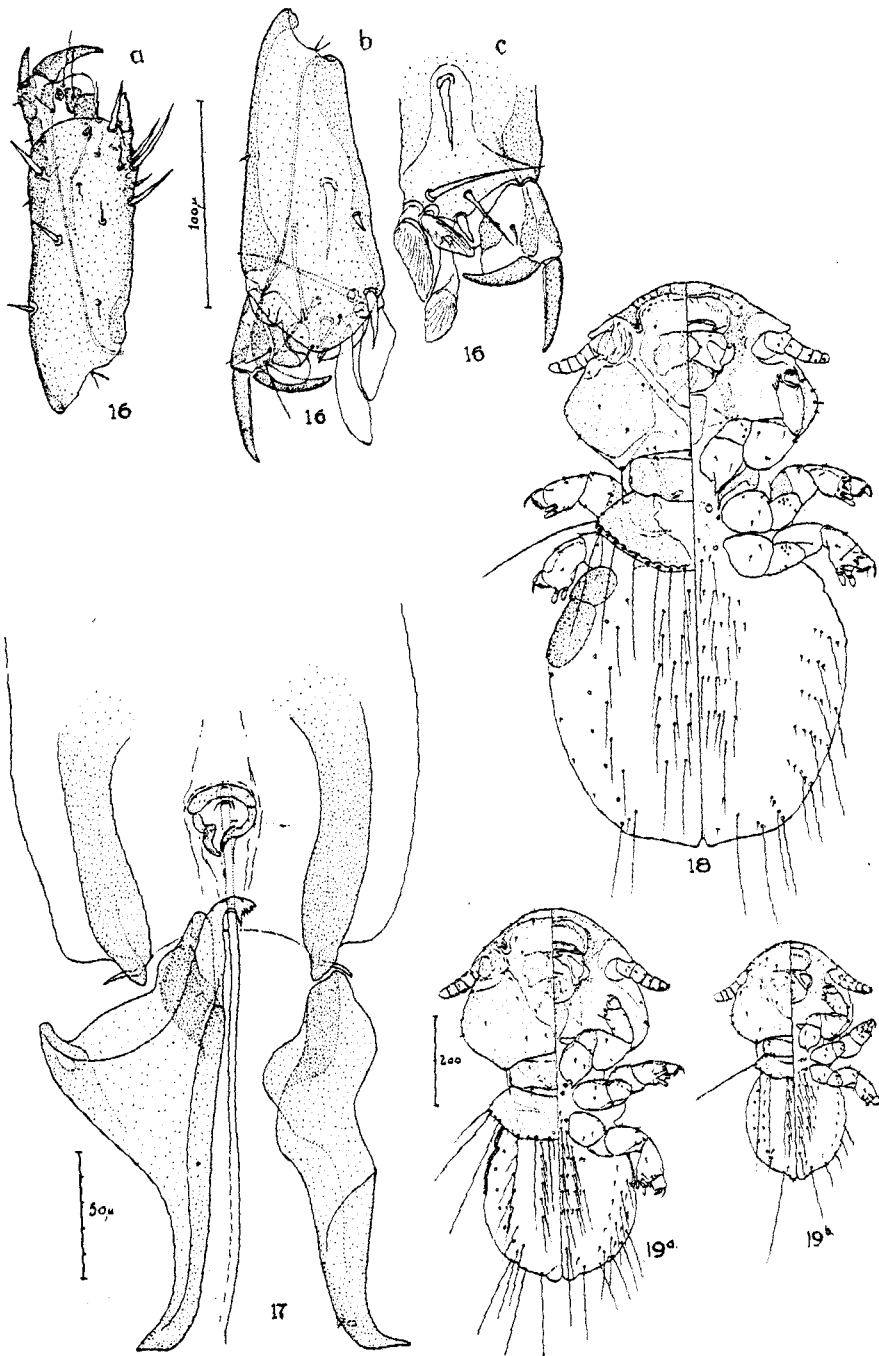
**Generic features:** Parasites of penguins; general appearance similar to *Goniodes*, antennae strongly dimorphous in both sexes. Conus in the male with a well developed appendix coni being up to now only known in *Chelopistes*. Conus united with the preantennal corners of the head.

Mid and hind tibiae in the male (female?) with 3 hyaline, pulvillilike spurs each of which is stiffened by more heavily sclerotized spots.

I transfer to the new genus also Harrison's two species: *Austrogoniodes mawsoni* Harr., *A. hamiltoni* Harr. as well as *A. waterstoni* Cummings. It is easy to see from Harrison's very good figures that they really belong to this genus.

\* Most probably *E. cristatus filholi* Hutton.

† Through the kindness of Prof. Eichler I was able to examine this slide. It contains 4 males and 2 females. One of the males only is *A. macquariensis*, while the rest of the males and both females belong to my new species *A. cristati* (see below). The male drawn by Eichler (l.c.) is one of the *crestati*-males, which Eichler labelled as immature *macquariensis*.



*Cesareus concii* n.sp. (figs. 14-19).

This new species is based on 2 males and 7 nymphs collected by Mrs. M. K. Rowan on Tristan da Cunha from *Eudyptes cristatus*, 28th August, 1950. Holotype (♂) no. 1321/1/1-1 and paratypes (7 nymphs) no. 1321/1/1-3 in the collection of the South African Institute for Medical Research, Johannesburg; paratypes (♂) no. 1321/1/1-2 in the Zoological Museum, Humboldt University of Berlin.

**Male** — Body-length 1.712 and 1.794 mm.; head-length 0.498 (0.389) and 0.489 (0.389) mm., head width 0.670 and 0.688 mm.; width of prothorax 0.335 and 0.360 mm., width of metathorax 0.589 and 0.607 mm.; width of abdomen in the middle 0.815 and 0.888.

The systematically important features may be deduced from figures 14-17. It is, therefore, not necessary to give a detailed description and I restrict the text to some morphologically interesting matters.

Striking is the soft suture between the anterior and posterior part of the head. It extends crescent-shaped anteriorly and has, probably as in *Trichodectes melis* F., the function of making the forehead movable vertically. In *melis*, however, it is situated in front of the eyes whereas in *Cesareus* it lies behind the eyes. Both sutures, therefore, cannot be homologous but are independently developed features. On the ventral side of the head this suture extends to the cushion-shaped membrane of the antennal groove.

The short and blunt conus trabecularis which is so characteristic for the Gonioididae, is provided on its ventral margin, behind the pointed corner (cf. fig. 1) with a hyaline, bristle-shaped, but difficult to detect, appendage (appendix coni, Zapfenanhang) of about 45 $\mu$  length. A similar appendage is only known to me in the male of *Chelopistes meleagridis* (Lin.). In both species, the appendage rises directly from the cuticula and is not, like a bristle, inserted in a socket. The function of this appendage is not known.

The "occipital carina," that is the longitudinal beam between the posterior articulation of the mandible and the talus, is narrowed backwards but suddenly broadens interiorly just in front of the talus. In this emargination a cord arises which is directed obliquely and forwardly and which terminates freely in the head cavity. It is the rudimentary posterior arm of the tentorium (HTA). I have found this rudiment in all Ischnocera, but sometimes it is moved far behind

## LEGEND TO FIGURES

- (16) *Cesareus concii* n.sp. — (a) left fore tibia, (b) left hind tibia, dorsal view,  
 (17) *Cesareus concii* n.sp. — Apical part of male genitalia, dorsal view. On the  
 (18) *Cesareus concii* n.sp. — 3rd nymph.  
 (19) *Cesareus concii* n.sp. — (a) 2nd nymph, (b) 1st nymph.

into the thick collar-ring (i.e. between the tali) where it is difficult to see. Most probably these rudiments have become bearers of tendons which originally arose from the transversal beam of the tentorium (corpus tentorii = HTA) which is wanting in all Ischnocera.

The "occipital carina" consists morphologically of two parts, namely the hypostomal margin in front of the posterior tentorial fenestra and the sclerotized occipital suture behind it. The submentum is in this species, as in almost all Mallophaga, sharply separated from the mentum but the border is very fine and quite indistinct (fig. 14). The whole submentum-gulacomplex is represented by a cushion-like, yellowish, elevation of the postoral floor of the head-capsule.

Lateral to the membranous mentum and close to the posterior joint of the mandible is a small, hook-shaped, sclerotized platelet, which, on lowering the tubus, is seen to be the basal part of those mouth-parts formerly designated as the lacinia. Prof. Weber, however, informs me that without any doubt it must be homologized with the galea. This base of the galea which is very often strikingly distinct, is found regularly in other Mallophaga, too.

The pleurostoma is well developed and is connected with the nodus trabecularis by a short and broad phyle. On the phyle, I cannot see the light-coloured, oval opening of the rudiments of the anterior arm of the tentorium (VTA) which normally can be seen very easily. Phyle and nodus trabecularis represent the sclerotized and thickened side parts of the epistomal suture bent to the venter of the head. It separates the clypeus from the frons.

A semicircle-shaped zygoma connecting the two anterior articulations of the mandibles is typically developed as in all Gonioididae. It comprises a soft round cushion which is probably homologous with the strongly enlarged suture of the clypeus and labrum.

The mandibles are provided with strong and sharply pointed teeth, the number of which is not clearly seen in the slides. Probably, there are at least three teeth present on each side.

Each hemispherical eye has a short bristle dorsally.

The antennae (fig. 15) are composed of three segments, but the third shows a very narrow suture which may be interpreted as a rudiment of the suture between the 3rd and 4th antennal segments. It is remarkable, that this suture is angled dorsally, and poorly marked ventrally. Harrison mentioned 4 antennal segments in *marusoni* but states that the 3rd and 4th segments are only weakly separated from each other. In *hamiltoni*, this rudiment of a suture is totally wanting. Probably a fusion of these antennal segments is going on in this genus. The same feature occurs in females of the genus *Eutrichophilus*.

As in *hamiltoni* (but not in *marusoni*), the 3rd antennal segment shows dorsally a flat and broad backwardly directed tooth. It seems to be much

smaller than in *hamiltoni*, where the tooth greatly surpasses the margin of the antennae. But it is possible that this difference is caused by the position of the antennae on the slide.

In *C. concii* the posterior corner of the last antennal segment is provided with a strong tooth which is not mentioned in the description of *hamiltoni* and *marsoni*. This tooth is easily overlooked because it contrasts but little with the antennal tip under a weak magnification.

The antennal chaetotaxy of *C. concii* may be taken from fig. 15, in which the bristles and sensilla of the ventral side are dotted. I want to draw attention to the bristleless sensilla which may possibly be taken for sockets of missing bristles.

The bristle-shaped sense-organs of the apical sensorial plate of the antenna are similar to those in *Gonocephalus* (cf. Kéler, 1939, fig. 7). There are 5 different types of sense-organs to be distinguished, namely 2 long and rod-like with a blunt tip, 3 shorter, and bristle-like with a blunt tip, 3 long and 2 short which are sharply pointed and 2 short conical spurs. Furthermore, there are 3 circle-shaped sensilla, without bristles, on the sensorial plate. Outside this plate, there is ventrally, on the sclerotized part of the last joint, a big oval sensillum, which is shaped like a sensillum placodeum. The chitin of the terminal segment is wrinkled, and the fourth segment partly so.

The basal margin of the first antennal segment is dorsally provided with a strong cone which articulates with a corresponding pit in the margin of the head-capsule. A similar, but shallower, dorsal pit in the anterior basal-margin lies behind the bump-like protrusion of the conus trabecularis.

The soft antennal groove is very spacious dorsally and ventrally. It is ventrally and posteriorly extended leaving much space for the moving antennae. The posterior bump of the antennal groove represents a part of the gemma, that is a sclerotization between eye and antennal groove commonly found in the Mallophaga. Probably, it originated from the uniting of a part of the orbital margin with the adjacent margin of the antennal groove (the so-called antennal suture). The protrusion of the articulation is, I believe, to be homologized with the antennifer of other insects. The gemma is ventrally connected with the mandibular suture.

The gemmula is wanting in this species. It is a thickening of the head-capsule corresponding to the hind part of the orbital ring and is frequently found in many Mallophaga.

The tali are small, but well developed. Between them, the occiput or postocciput tapers posteriorly and bifurcates producing two converging rods which extend into the prothorax. They are connected basally by a very strong transverse bridge. A backwardly extending bump of the ventral occipital margin (fig. 14, right) articulates with the laterocervical. These bumps have originated from the postocciput

and represent the pair of postoccipital condyli articulating with the laterocervicalia. They are regularly found in insects. In the Mallophaga, the laterocervicalia are provided with 2 proprioceptorial setae each.

The pronotum is membranous in its anterior third, and shows in the middle a round sclerotized plate which fits in the emargination of the pronotal sclerite. In the anterior corners of the membranous part is a pair of proprioceptorial setae commonly found in all Mallophaga. They probably control the position of the head.

The abdominal vertebrae (Kéler, 1939) are wanting, a weak nodus vertebra is developed only on the 8th segment. The abdominal ribs are instead very well developed, forming a strong and thick loop on all abdominal segments except the last. The ribs continue along the anterior margin of the tergopleurites as their more thickly sclerotized border.

The strongly sclerotized semicircular, and broadly bordered, terminal segment of the abdomen is to be homologized with the 9th sternite. The 9th tergite is greatly reduced, but the remains of the sclerite is still quite distinct on the dorsal side. The segmental parts of the genito-anal region are numbered in fig. 14. In front of the ninth sternum between it and the sickle-shaped 10th sternum is the narrow, slit-like opening of the genital chamber (black in fig. 14). The 10th tergite is only detectable as a small, membranous lobe behind the 9th tergite. In front of the 10th tergite, between it and the paired lobes of the 11th segment (paraproct), is the slit-like anal opening which is enlarged backwards into a spacious excavation.

The three pairs of sternal apodemes (pro-, meso- and metafurca) of the endothorax are, as in all Mallophaga, very distinct in this species. The profurca is connected with the propleural-apodemes forming the clavacula, whereas meso- and metafurca protrude freely into the body-lumen.

The fore coxa is extended posteriorly into a long, flat and pointed spine. A similar spine, which is, however, not as long as in this species, is found in *Austrogoniodes*. Harrison did not mention these spines but it must be stated that they are not easily detected.

The construction of the tarsi may be taken from fig. 16. The 3 apical spines of the mid- and hind tibiae in *C. concii* have been modified to big, hyaline, pulvilli. A long tendon of the unguis tractor and one of the ventral muscle of the tibio-tarsus (flexor or adductor metatarsi) are well developed.

The inner margin of the straight claw, that is the ventral or inner one, is for a short distance, membranous and hyaline. If not carefully checked, the claw, therefore, seems to be provided with a tooth terminally.

The details of the genitalia are clearly visible in fig. 17. The right endomere is omitted in order to show the paramere. The basal

plate is outlined, but I could not detect its exact anterior border. I did not dissect the genitalia having only two male specimens of this species.

In *C. hamiltoni*, the apices of the parameres are bifurcate and bent inwards, whereas they are simple and bent outwards in *C. concii*. The broad inner tooth before the tip is not shown in *C. hamiltoni*.

Nymphs — They show the typical shape of *Goniodes* (figs. 18, 19). The important measurements in mm. may be taken from the following table:

Specimen	body-length	head-length	head-width	metathorax-width	instar
1	1.241	0.417	0.552	0.417	III (fig. 5a)
2	0.870	0.344	0.417	0.308	II
3	0.824	0.353	0.417	0.317	II (fig. 5b)
4	0.598	0.272	0.317	0.226	I
5	0.670	0.281	0.326	0.235	I
6	0.534	0.250	0.267	0.190	I (fig. 5c)
7	0.534	0.218	0.272	0.190	I

Having no females, but only one specimen of the 3rd nymphal instar, I cannot give any features for the identification of this sex in the nymphal stage. Harrison studied females of *C. hamiltoni*, but he gave no drawing of this sex.

In all nymphs, the antennae have 5 segments which are well separated from each other; but segments III—V are closer together and form an antennal part distinctly separated from the second segment.

The apical spurs of the mid and hind tibiae of the nymph are large, but not so strongly lobe-shaped as in the male. They are similar to those in *A. cristati* or *A. bifasciatus*.

The "sutura frontalis" and "sutura metopica" are quite distinct in all nymphs. The frontal suture terminates at the dorsal, that is the inner, margin of the antennal groove.

#### Comparison of *C. concii* with *C. hamiltoni* and *C. mawsoni*

Body-length: *C. concii* 1.71 and 1.80 mm., *C. hamiltoni* 1.916 mm., *C. mawsoni* 2.00 mm.

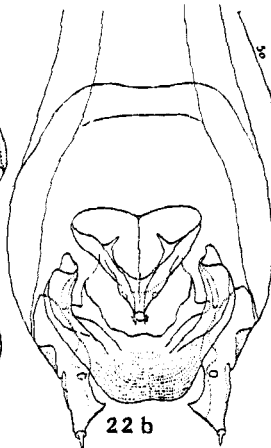
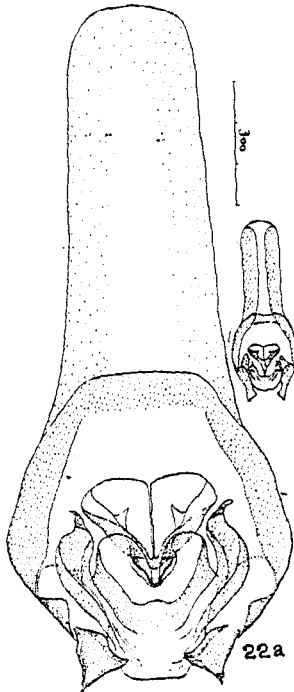
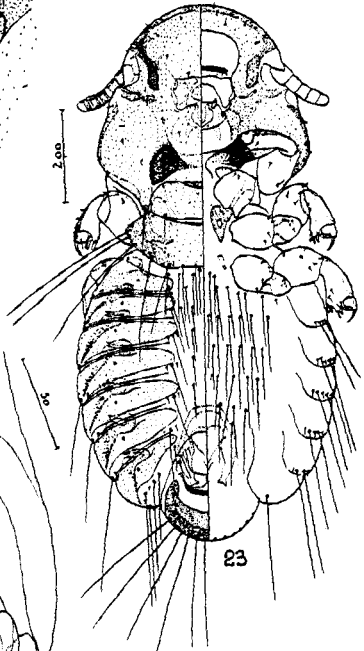
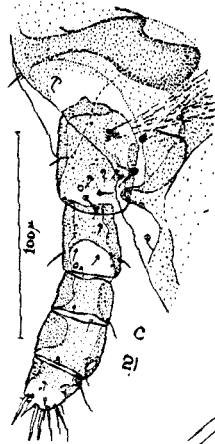
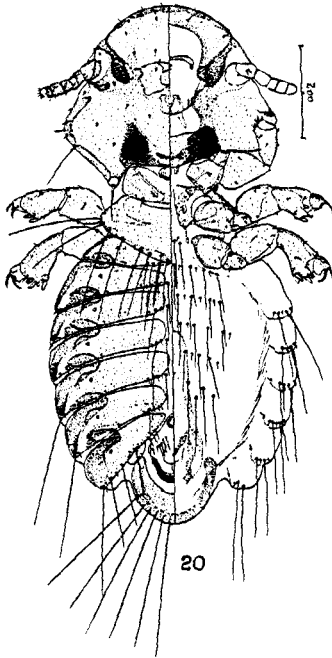
Head-indices\*: *C. concii* 1.72 and 1.77; *C. hamiltoni* 1.62, *C. mawsoni* 1.1.

Clypeus in *C. concii* and *C. hamiltoni* flatly rounded (1:8), in *mawsoni*, according to the figure, more strongly arched (1:3).

The flat tooth of the 3rd antennal segment seems to be bigger in *C. mawsoni* than in *C. hamiltoni* and *C. concii*.

\* Counted for head-length in mid-line.





The chaetotaxy of the head is, in its general pattern, the same in all three species, differences in the number of the setae are difficult to state without studying the original specimens. Harrison, for instance, mentioned 12 short sensilla on the front margin of the head in *mawsoni*, whereas I count 20-24 in *concii*. These sensilla arise from large and shallow, dish-like pits and are situated beneath, on and behind the margin of the head. They cover each more or less and are, therefore, difficult to count.

The prothorax is parallel posteriorly in *mawsoni* and *concii*, slightly diverging in *hamiltoni*. Its hind margin is, according to Harrison, arched in *mawsoni* and *hamiltoni*, but it is straight in *concii*. It is, however, possible that Harrison confused it with the round emargination of the front margin of the metanotum.

There is in all three species a long bristle on each side of the hind margin of the pronotum, but it is longer in *hamiltoni* and *concii*, than in *mawsoni*. In both specimens of my *concii*, this bristle is only present on the right side of the holotype, the others are broken off.

The antero-lateral margin of the metathorax is concave in *hamiltoni* and s-shaped in *concii*. In *mawsoni*, it has not been described. The hind margin of the metathorax is rounded in *hamiltoni*, blunt between the meta-pleural ridges in *mawsoni*, and in *concii* it is laterally emarginated and shows a triangular protrusion at the middle line.

The chaetotaxy of the hind margin of the metanotum is similar in *hamiltoni* and *concii*; in *mawsoni*, however, there are 3 long bristles on each side and 6 long ones on the blunt median part. Intercalary spinules are present in all three species on the sides of the hind margin.

The sclerotization of the first abdominal segment has totally disappeared, but the dorsal and ventral transverse row of spines is still present.

The second tergo-pleurite is distinct in *concii* and *hamiltoni*, but a little smaller than the succeeding ones in *mawsoni*.

In *hamiltoni* and *concii*, the pleurites have one long bristle each level with the spiracles, the seventh pleurite has two in *hamiltoni* but none at all in *mawsoni*. The median rows of bristles, except the rudimentary one, consist of 4 bristles each in *mawsoni*, of 6 each in *hamiltoni* (according to the drawing) and of 12-14 (counted from the second segment to the last)

#### LEGEND TO FIGURES

- (20) *Austrogoniodes cristati* n.sp. ♂  
 (21) *Austrogoniodes cristati* n.sp. ♂ — (a) left hind leg, (b) left fore leg, (c) left antenna, all in dorsal view.  
 (22) *Austrogoniodes cristati* n.sp. — Male genitalia, dorsal view.  
 (23) *Austrogoniodes bifasciatus* (Piaget) — Male specimen from *Spheniscus magellanicus*, London Zoo, compared with the type. (No. 15 946 in Meinertzhagen's collection.

in *concii*. On the ventral side, there are median transverse rows of 4 each in *mawsoni*, and 2-3 in *concii*. In *hamiltoni*, the ventral median part of the abdomen is bare, except for a few odd bristles. The pleurites are provided ventrally with 2-3 bristles in *mawsoni* and 2-4 in *hamiltoni*, furthermore, they have 3-4 intercalary spinules on each pleurite, except the second segment, which has setulae as in *concii*.

The notum of the 8th segment has a row of 30 bristles in *hamiltoni*, 18 in *concii*, whereas it seems to be bare in *mawsoni* except for the median bristles.

A short transverse row of bristles in front of the anal opening is present in *hamiltoni* and *concii*, but not mentioned in *mawsoni*.

The terminal segment is conical in *hamiltoni*, but slightly rounded in *mawsoni* and nearly semicircular in *concii*. Its sclerotized margin is of equal width in *concii*, crescent-shaped in *hamiltoni* and *mawsoni*, but in the latter, the crescent has rounded tips and a large light spot on each side. The hind margin has 22 hairs in *hamiltoni*, 20-21 in *concii* and 10 in *mawsoni*.

The genitalia are of the same type in all three species, but the parameres are terminally weakly bifurcate and bent inwards in *mawsoni*, strongly bifurcate and bent inwards in *hamiltoni*, simple and bent outwards in *concii*. Ventrally in the latter species, I found a short, but sharp tooth in front of the apical bend of the parameres, and just in front of a round alveole, which probably represents a sensillum. The endomeres are pointed and bent outwards in *hamiltoni* and *concii*, but not described in *mawsoni*.

In conclusion we can say that *C. concii* is more closely related to *C. hamiltoni* than to *C. mawsoni*. The most important differences lie in the shape of the genitalia and in the median chaetotaxy of the abdominal sternites.

#### *Austrogoniodes cristati* n.sp. (figs. 20-22).

**Material:** One male off *Eudyptes cristatus*, Tristan da Cunha, 20th Aug. 1950 (leg. Mrs. M. K. Rowan), 3 males and 2 females off *E. cristatus* (= *Catarrhactes chrysocome*), Uschuaia, 10th March 1893 (Mus. Hamburg), 3 males and 2 females off *E. cristatus*, Macquarie, 9th June 1949 (British Museum), 4 males and 5 females off *E. cristatus*, 30.11.1949, Heard Isl., 6 males and 4 females off *E. chrysolophus*, 26.12.1949, Heard Isl. (British Museum).

**Holotype:** The male from Tristan da Cunha, slide nr. 1321/1/2, in the South African Institute for Medical Research, Johannesburg.

**Paratypes** in Zoological Museum, Hamburg, Zoological Museum, Berlin, and in British Museum.

**Description:** Small gold-coloured species with the clypeus in both sexes semicircularly rounded (1:3). Limbus nodalis very narrow, in males and females 0.006 mm. broad just before nodus; anteriorly very uniformly

dilated, with only slightly waved inner margin; just before the oscular dilatation 0.010-0.015 mm. broad. Oscular dilatation irregular, 0.015-0.024 mm. broad, sometimes not distinctly detached from the limbus. In juvenile females (without or with unripe eggs in the abdomen) the limbus is as above, but lighter in colour and with a very small oscular dilatation.

## MEASUREMENTS

	Tristan da Cunha	Ushuaia					Macquarie Isl.			
	Male	Males		Females			Males		Females	
KL*	0.435	0.448	0.448	0.434	0.470	0.460	0.434	0.448	0.440	0.440
KL	0.380	0.385	0.378	0.378	0.400	0.380	0.370	0.385	0.392	0.385
KB	0.490	0.490	0.476	0.455	0.520	0.504	0.483	0.490	0.511	0.504
PB	0.200	0.224	0.210	0.210	0.220	0.224	0.224	0.230	0.238	0.230
MB	0.326	0.343	0.336	0.330	0.360	0.357	0.336	0.336	0.350	0.350
AB	0.471	—	0.602	0.602	0.680	0.665	0.602	—	0.672	0.672
T	1.160	—	1.170	1.150	1.400	1.280	1.150	—	1.232	1.225
I	1.14	1.10	1.06	1.05	1.11	1.10	1.11	1.10	1.16	1.14
I	1.30	1.30	1.26	1.20	1.30	1.33	1.31	1.30	1.30	1.31

All other characters are represented in the accompanying figures.

Up till now only two species of the genus *Austrogomiodes*, namely *A. struthes* Harri. and *A. macquariensis* Harr. were known off *Eudyptes cristatus*. A third species, *A. hamiltoni* Harr. belongs to the new genus *Cesareus* (s.o.).

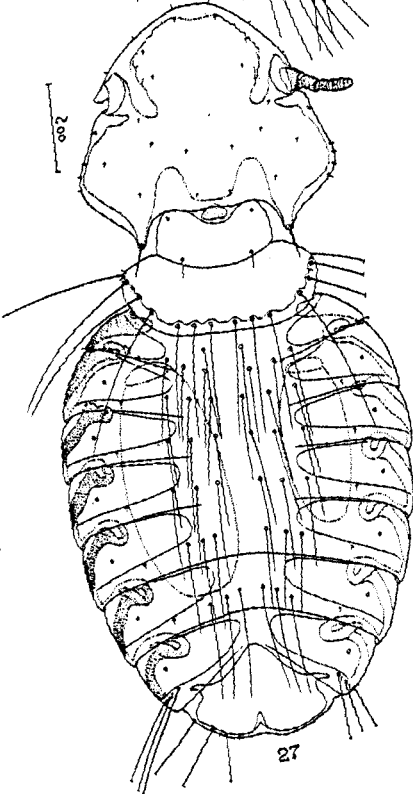
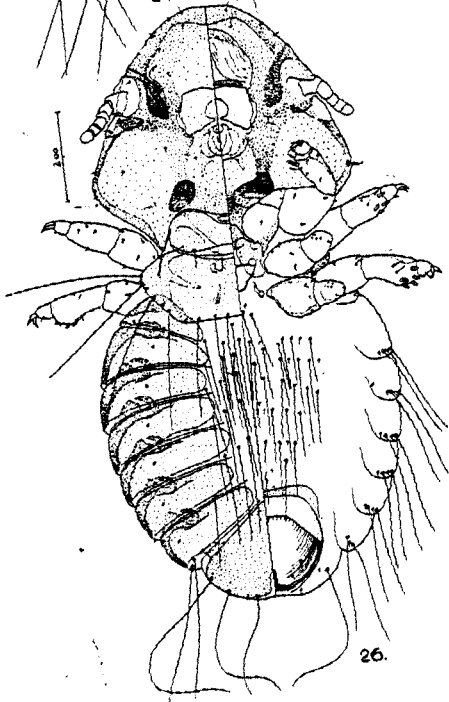
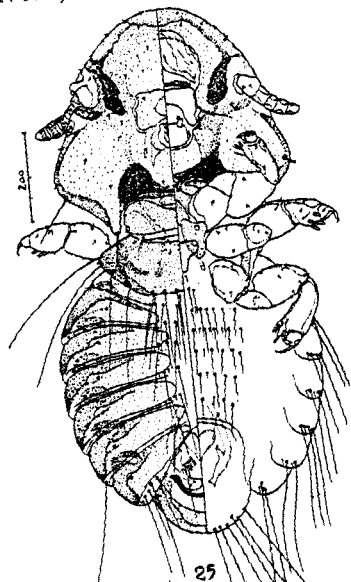
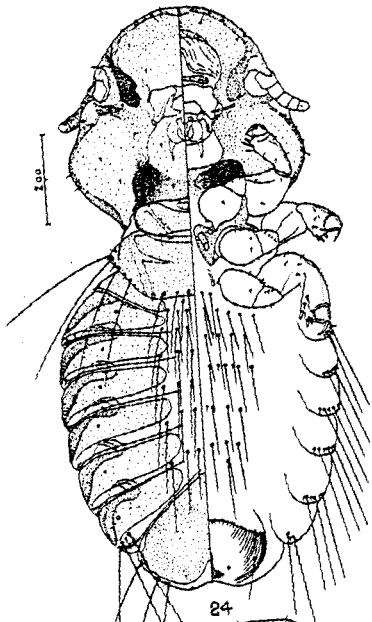
*A. struthes*, described off *Eudyptes sclateri* Buller (Macquarie Isl.) has been later found by Clay and Rothschild (1938) on *E. cristatus*, *E. chrysolophus* and *Spheniscus demersus* in the Zoological Garden, London. I am not sure whether these specimens are all conspecific and identical with *A. struthes*. I will possibly return to these specimens on another occasion.

*A. struthes* is as large as *cristati*. According to Harrison (1915) the males are 1.16 and the females 1.51 mm. in length. The head is longer than broad, 0.50 (0.38) x 0.47 in the male, distinctly parabolic, and laterally constricted. Its index is 0.94 for the whole and 1.24 for the medium length. The penis, in Harrison's drawing, is only diagrammatic. A heart-shaped endomeron is distinct. The parameres are "curved with bifid tips". The general type of the penis is as in *cristati*.

*A. cristati* can at present be distinguished from *struthes* by the shape of the head, which is in the former broader than long, in the latter longer than broad.

*A. macquariensis* can be distinguished from *cristati* through its typical flatly rounded clypeus, and besides, through the penis, which has no heart-shaped endomeron. Also parameres and basal plate are different in both.

\* KL — head length, total and at the middle line; KB — head breadth; PB, MB, AB — pro- meso- and metathorax, breadth; T — total length of body; I — head-index for total and mid-line — length resp.



*A. crestati* differs from *A. bifasciatus* in the regularly rounded clypeus, the limbus, which is rather broadened anteriorly, the very small and mostly irregular oscular dilatation, the shorter and broader head, the chaetotaxy of the female genital segment, and in the male genital armature.

In the females of *A. bifasciatus* off *Spheniscus magellanicus* (Guimarães' specimens) the subgenital plate has on its posterior margin 40-50 bristles, the 5-7 externals being long, reaching beyond the margin of the last segment. The lateral one of the three ventral bristles of the last segment is in *bifasciatus* long, reaching to or beyond the margin of the last segment, as in my fig. 24. Miss Clay was kind enough to inform me, that "all Piaget's specimens have the three setae as shown at x on C" (C was the photocopy of my fig. 24, sent to Miss Clay).

On *A. cristati* off *Eudyptes cristatus* (Macquarie Isl.) and *E. chrysolophus* (Heard Isl.) there are 26-37 bristles on the hind margin of the subgenital plate, and their externals are much shorter, never reaching the margin of the last segment. The three ventral bristles of the last segment are all equal, short spicules.

The male copulatory organ of *cristati* is very similar to that of *bifasciatus* but its endomeral plate is provided with a very distinct (on extracted penis)\* dense fine dentation, which is extraordinarily small and inconspicuous in *bifasciatus* (non-extracted penis). The funnel-shaped mouth-piece of the penis is in *bifasciatus* much more sharply pointed than in *cristati*, the round mouth itself being in the first 0.0015 and in the latter 0.0025 (Holotype) to 0.0030 mm. in diameter.

*Austrogoniodes bifasciatus demersus* n.ssp. (figs. 25-29).

Material: 79 males, 126 females and 65 nymphs off *Spheniscus demersus*, Dyer Isl., 28th July, 1946 (leg. R. W. Rand). For comparison I have before me 14 males and 11 females of *A. bifasciatus* off *Spheniscus magellanicus* from Brazil (leg. L. R. Guimarães) and 4 males, 9 females and a nymph of the same species off *Sph. magellanicus*, Zoological Garden in London (coll. Meinertzhagen, slide Nr. 15946).

\* I had overlooked this dentation in the holotype, and it is therefore not drawn in fig. 22a. After having received more specimens of *cristati*, I was able to study extracted penes and then found the dentation also in the holotype. In the latter and other non-extracted penes of *cristati* the dentation is not as clear as in extracted penes, but much more distinct than in non-extracted penes of *bifasciatus* or *demersus*.

#### LEGEND TO FIGURES

- (24) *Austrogoniodes bifasciatus* (Piaget) — Female specimen from *Spheniscus magellanicus*, London Zoo, compared with the type. (No. 15 946 in Meinertzhagen's collection).  
 (25) *Austrogoniodes bifasciatus demersus* n.ssp. ♂  
 (26) *Austrogoniodes bifasciatus demersus* n.ssp. ♀ (juvenile).  
 (27) *Austrogoniodes bifasciatus demersus* n.ssp. ♀ (frequent).

**Holotype:** One female in the South African Institute for Medical Research, Johannesburg, slide Nr. 1301/5-9, together with 9 paratype-females. The holotype is marked on the slide.

**Allotype:** One male in the South African Institute for Medical Research, Johannesburg, slide Nr. 1301/6-1 together with 16 paratypes. The allotype is marked on the slide.

**Paratypes:** 78 males, 125 females and 65 nymphs partly in the South African Institute for Medical Research, Johannesburg, partly in the Zoologisches Museum, Berlin. Slides Nr. 1301/5, 1301/6 and 1301/7.

**Description:** Males 1.105 — 1.413 mm. in length (73 spec.). Head 0.462 (0.380) — 0.507 (0.435) long and 0.489 — 0.562 broad.

Females 1.359 — 1.722 mm. long (60 specimens). Head 0.507 (0.417) to 0.571 (0.489) long and 0.571 — 0.625 mm. broad.

The figures 25-29 all show important characters of this subspecies.

It is very similar to *A. bifasciatus* off *Sph. magellanicus* from which it differs in the length of the body, size of the head, colour, shape of the limbus nodalis and chaetotaxy.

*A. b. demersus* is in both sexes larger on the average than *A. bifasciatus*. The latter (in all specimens before me) measured 1.092-1.211 mm. (males) and 1.410—1.582 (females) in length. The head is very similar to that of *A. bifasciatus*, but larger; in *bifasciatus* — the males are 0.406 to 0.448 long and 0.441 to 0.497 broad, and in the females 0.470 — 0.497 long and 0.511 to 0.570 broad. This difference is striking in comparing the specimens of both forms, as the head of *demersus*, relative to the whole body, is greater than it is in *bifasciatus*. In females of *demersus*, which are not yet in gestation (fig. 26) the head, relative to the whole body, is still greater. The head-index in both, *demersus* and *bifasciatus*, which is the same in both sexes, is 1.05 — 1.12 (15 specimens of each counted).

A very important and constant difference lies in the structure of the limbus nodalis. This is in *A. b. demersus* broader (0.020 just before nodus) and straightens anteriorly very distinctly until 0.015 mm. just lateral to the osculum. In *A. bifasciatus* the limbus nodalis is 0.015 just before the nodus and does not straighten anteriorly, being 0.015 lateral to the osculum. The osculum-dilatation of the limbus is in *demersus* distinctly greater than in *bifasciatus*.

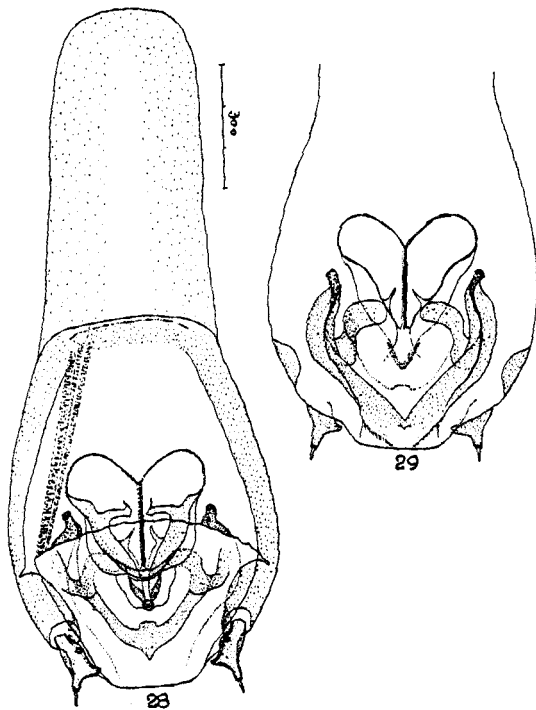
In mature specimens of *demersus* the body is yellow-brown, darker than in *bifasciatus*, which is gold-coloured. The head of *demersus* is, with the exception of the mouth- and gular-circles, yellow-brown with darker chestnut-brown coloured borders (limbus). The nodi and tali are black at the centre. The limbus nodalis is, at the nodi, darkest and clears up anteriorly. Its oscular dilatation is posteriorly light brown and anteriorly yellowish.

Thorax and sclerites of abdomen yellow-brown, their endoskeletal parts dark brown.

Immature specimens of *A. b. demersus*, which are gold-coloured may easily be distinguished from *bifasciatus* through the broader limb nodalis, greater oscular dilatation and the dimensions of the head.

In the chaetotaxy, *A. b. demersus* differs from *A. bifasciatus* in having a few more dorsal and a few less ventral bristles on the fore and median abdominal segments. This difference is striking when specimens of both are carefully compared. For proof of which I counted the bristles shown in *demersus* and *bifasciatus*; I found 6-8 and 6-7 bristles respectively in a dorsal row, and 7-10 and 9-11 bristles respectively in the sternal rows.

The structure of the copulatory organ shows no qualitative differences. The endomeron is in both of the same heart shape and the parameres are also of the same shape. The basal plate is, as far as can be seen on undissected penes, practically the same in all specimens. It is tongue-shaped and straightens gradually anteriorly, reaching into the 5th abdominal segment. It is noteworthy, that the basal plate in *demersus* seems to be posteriorly, somewhat broader than in *bifasciatus*.



(28) *Austrogoniodes bifasciatus demersus* n.ssp. ♂ — Ventral view of genitalia.  
 (29) *Austrogoniodes bifasciatus demersus* n.ssp. ♂ — Dorsal view of genitalia.



The female genital region is in both species the same. There are 40-50 ciliae on the hind margin of the subgenital plate, the lateral 6-9 being as long as in *bifasciatus*. On the ventral side of the last segment there are as a rule 2 spiculae and a bristle as in *bifasciatus*, but in many specimens there are some more spiculae (see fig. 26). The long bristle is sometimes concealed under the lateral bristles of the subgenital plate and may easily be overlooked.

Through the kindness of Miss Th. Clay, British Museum, I was able to examine some specimens (s.a.) of coll. Meinertzhagen, which were compared with the Piaget types of *bifasciatus*. The specimens are off *Spheniscus magellanicus*, Zoological Garden, London. Besides, Miss Clay was kind enough to compare some of my *demersus*-specimens with the Piaget's types of *bifasciatus*. She writes me that "all Piaget's specimens seem to be the same, but differs from yours in having the band round the anterior margin of the head considerably narrower".

This statement agrees also with my comparison of *demersus* with specimens of *bifasciatus* sent to me by Guimarães, and confirms my opinion, that the difference in the limbus nodalis is a good subspecific character.

In studying the Meinertzhagen specimens of *bifasciatus* (fig. 23 and 24) I was much surprised to find all the heads rounded anteriorly. In some specimens only, I was aware of a very slight compression on the sides of the forehead, which was not great enough to make its outline as distinctly parabolic as in all my specimens of *demersus* and Guimarães' specimens of *bifasciatus*. As the Meinertzhagen specimens agree perfectly in the copulatory organ with my *demersus* and *bifasciatus*, I can only suppose, that their heads have been deformed by the pressure of the cover glass.

## A PRELIMINARY LIST OF THE HITHERTO KNOWN PENGUIN MALLOPHAGA

### Genus *Austrogoniodes* Harrison.

1. *A. brevipes* (Giebel).  
*Aptenodytes patagonica* Forst., Kerguelen, four records.
2. *A. bifasciatus bifasciatus* (Piaget).  
*Spheniscus magellanicus* (Forster), Zoo birds, Argentina, Masatierra.  
*A. bifasciatus demersus* n.ssp.  
*Spheniscus demersus* (Lin.), South Africa, three records.
3. *A. strutheus* Harrison.  
*Eudyptes sclateri* Bull., two records, one from Macquarie Isl.  
*Eudyptes schlegeli* Finsch, Macquarie Isl.  
*Eudyptes chrysolophus* (Brandt), London Zoo.  
*Eudyptes cristatus* (Miller), London Zoo.  
*Spheniscus demersus* (Lin.), London Zoo.  
*Spheniscus mendiculus* Sund., Galapagos.

4. *A. macquariensis* Harrison.  
*Eudyptes cristatus* (Miller), Macquarie Isl., Fireland.  
*Eudyptes schlegeli* Finsch, Macquarie Isl.
5. *A. antarcticus* Harrison.  
*Pygoscelis adeliae* Hombr. et Jacq., Adelle land.
6. *A. cristati* n.sp.  
*Eudyptes cristatus* (Miller), Tristan da Cunha, Fireland, Macquarie Isl., Heard Isl.

Genus *Cesareus* n.gen.

1. *C. waterstoni* (Cummings).  
*Eudyptula minor* (Forster), Furneaux Isl.  
*Eudyptes sclateri* Bull., Macquarie Isl.
2. *C. mawsoni* (Harrison).  
*Aptenodytes forsteri* G. R. Gray, one record, no locality.
3. *C. hamiltoni* Harrison.  
*Eudyptes cristatus* (Miller), Macquarie Isl., East Falkland. (Determination of the last record with " ? " in Clay 1940.)
4. *C. concii* n.sp.  
*Eudyptes cristatus* (Miller), Tristan da Cunha.

Genus *Nesiotinus* Kellogg.

1. *N. demersus* Kellogg.  
*Aptenodytes patagonica* Forst., Kerguelen, three records.

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