ficaria), and even acorns. The bird is also credited with the destruction of enormous numbers of wireworms and craneflies, 1200 of the former having been on one occasion taken out of a single crop. Again, in a valuable paper on the food of birds published by Miss Laura Florence in the *Transactions of the Highland and Agricultural Society of Scotland* (5th series, vol xxiv., 1912, p. 210), analyses of the contents of four stomachs are given. These contained corn grains, grass, Indian corn, seeds of Birch or Alder, seeds of Hawthorn, and roots and tubers of the Lesser Celandine. There is no mention of any insect remains, so that the analysis given below shows a considerable contrast.

It should be noted that in enumerating the specimens I have not included mere fragments, such as wings, legs, or detached heads. In the case of the *Bibio*, I have only counted fairly complete specimens, while the Beetles enumerated had at least the thorax with the elytra attached. To the following numbers, therefore, it would be quite reasonable to add a small percentage:—

ANALYSIS OF CONTENTS.

INSECTS—Diptera: *Bibio lepidus*, Lw.	2,286	specimens.
Pollenia rudis, Fab.	1	,,
Coleoptera: *Lochmaea suturalis*, Thoms. (Heather Beetle)	508	,,
Hymenoptera: *Myrmica rubra*, L. (Ant)	2	,,
Orthoptera: *Stenobothrus* sp. (Grasshopper)	1	,,
MOLLUSCA—*Planorbis* sp.	2	,,
Total	2,800	

VEGETABLE REMAINS.—Numerous tubers of Lesser Celandine (*Ranunculus ficaria*), one seed-capsule of Mouse-Ear Chickweed (*Cerastium*), fragments of mosses and grasses, small stem with leaves of Heath Bed-straw (*Galium saxatile*), tiny shoot of Heather (*Calluna vulgaris*), many fragments of leaves of the Bulbous Crowfoot (*Ranunculus bulbosus*), and a few leaflets of the Cuckoo-flower (*Cardamine pratensis*).

On the evidence of the above figures I think we may fairly claim that the Pheasant is likely to be of use in the checking of the ravages caused by the Heather Beetle, and may be classed with the Blackcock as a beneficial visitor to our grouse moors.

ON *MACKAYIA DIMORPHA*, A NEW GENUS AND SPECIES OF MALLOPHAGA FROM THE MANX SHEARWATER.

By JAMES WATERSTON, B.D., B.Sc.

(*Read at the International Congress of Entomology, Oxford, 7th August* 1912.)

THE *Mallophaga* found on the various species of Tubinares—a group of birds including the Petrels, Fulmars, Albatrosses, Shearwaters, etc.—have furnished some of the most noteworthy ectoparasites hitherto investigated. Besides more ordinary forms, such as *Docophorus*, *Lipeurus*, and *Menopon*, there have been described from the hosts referred to, the peculiar genera *Giebelia*,[1] *Philoceanus*, *Ancistrona*, etc., which are not only morphologically very distinct, but of importance, alike for the phylogeny and for the distribution of the order. It was therefore with great interest that the writer, some two years ago, received from a correspondent a consignment of Philopteridæ taken on *Puffinus anglorum*. In this material two species were represented, viz., a single ♂ *Docophorus*, sensu stricto, and eight specimens of a form to which neither specific nor generic place could then be assigned. With two of the Philopterids hitherto reported from species of *Puffinus*, viz., *Giebelia mirabilis*, Kellogg, and *Docophorus coronatus*, Giebel,[2] comparison appeared to be necessary. Thanks to Professor V. L. Kellogg's excellent account of *Giebelia*, it was possible to decide at once that the insect now under discussion, though a close ally, could not be referred to that genus. Giebel's description of his parasite, as reported by Piaget,[3] is vague and insufficient. It is unac-

[1] GIEBELIA, Kellogg, *New Mallophaga*, pt. 1, p. 187 (1896) (Type: *G. mirabilis*).

[2] *D. coronatus*, Giebel, *Insect. Epiz.*, p. 116 (1874), from *Puffinus fuliginosus*.

[3] *Les Pédiculines*, p. 121 (1881).

companied by any figure. The host also is different. As was noted above, true *Docophorus* does occur on *Puffinus*, and this may be Giebel's insect. Failing that, if one wished to establish any connection between *D. coronatus* and the present parasite, one would have to suppose that characters obviously of generic value had been overlooked by Giebel in his diagnosis assigning the species *coronatus* to the genus *Docophorus*. This may be the case, as Giebel's species is founded on a single female, in which sex, of course, the antennæ are simple. Only the name *coronatus* makes one pause. It certainly suggests such projecting labral lobes as are found in *Giebelia*, *Philoceanus*, and the present insect. The point could be settled only by reference to Giebel's type. On the whole, however, it seems best to assume that we are here dealing with a new form. In any case, whatever a future comparison of types may reveal, a new genus is required for the reception of this remarkable insect.

MACKAYIA, gen. nov.

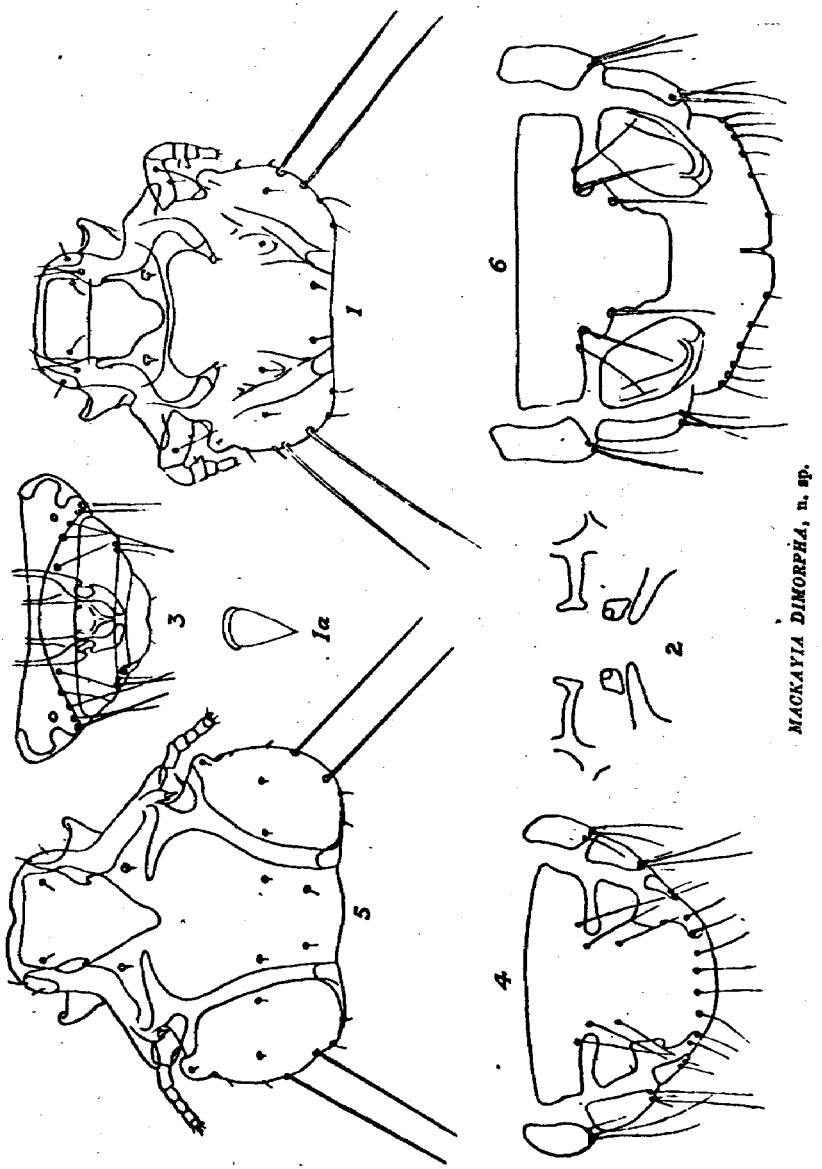
General characters those of *Docophorus*, with a broad transparent membranous collar or flap across the under surface of the forehead. In both sexes this flap projects clearly on either side of the head. The sexes are heterocerous, and the anterior angles of the temple are rather more rounded than in *Giebelia*, to which, except in the antennæ, this genus closely approaches.

Mackayia dimorpha, spec. nov.

♂. *Head.*—Clypeus straight or slightly rounded. Bands a little curved, with one short hair anteriorly and one or two minute hairs below. Of the latter, one projects underneath the edge. Above, between the bands and the edge of the signature, one longish hair on each side just before the suture. The signature advances beyond the clypeal suture to above the mandibles. Its clypeal portion bears one hair on each side. The termination of the signature is somewhat indistinct, as it nearly merges into a remarkable transverse internal band which stretches between and connects the antennals. On either side of the apex of the signature and in front of the internal band, is a short, heavy, peg-like spine directed backwards. The antennal bands, which are well developed, curve inwards both anteriorly and posteriorly.

At their posterior limit each bears a heavy spine like those near the apex of the signature. The square formed by the four spines is a conspicuous feature of the mid-region of the head. There is a dark, clearly limited spot before the eye, but inwards the ocular band is ill-defined. Occipital bands somewhat widely apart at base, where there is an intensely dark spot on each. These bands slant up to the oculars, which they do not quite reach, becoming indistinct in that neighbourhood. Before they become indistinct the occipital bands send off a short faint branch on the inner side. Antennæ: first joint, which bears one long hair on its upper surface, deeply inset in the head, long, though not equal to the other joints together; third joint transverse, with triangular appendage. Trabeculæ long, reaching to beyond the middle of the first joint. Eyes prominent, with one very short bristle. Across the posterior region of the head runs a row of four hairs, and there are two additional hairs near the occipital edge. Behind the eye the temples bear two spines followed by two very long hairs. Occipital edge nearly straight, with two short hairs on each side, placed outside the occiput proper. On the ventral surface of the head, at about the level of the clypeal suture, is an entire transverse membranous flap which is folded on itself at the sides, making there knobbed triangular projections. These projections, plainly seen from above, are characteristic of the genus.

Thorax.—The *prothorax* bears on the dorsum two minute hairs anteriorly. There is a short bristle at the angle and one hair at each side on the posterior edge. The *metathorax* bears two minute bristles anteriorly. The long bristles at the angle and posterior edge, which are about five to six in number, are placed in a row on each side with a clear space at and near the apex. On the sternum the chitinous bands between the posterior coxæ are specially well marked, four hairs on sternum, two between mid coxæ and two between hind coxæ. In colour the thorax is clear brown with darker margins. In the prothorax there are (according to the age of the individual) more or less indications of a clear median space in the dorsal spot. The thorax in both sexes is rounded over the abdomen.



MACKAYIA DIMORPHA, n. sp.

Abdomen.—The bands on segments 1, 2, and 8 are wide, but narrowed on segments 3-7. There are two median hairs on segments 1-8. In colour these bands, which are entire, are of a clear brown. The stigmata are large and prominent. On each band behind and inside the stigma, segments 2-6 show one fine hair and two or three stouter hairs near or at the angle. These hairs are longer on the hinder segments. Segment 7 has one or two extra hairs on the edge of the band and shows an almost complete transverse row save in the middle. Segment 9 has on the upper surface two patches of short hairs, five in each, symmetrically placed about the middle line. There are one or two terminal hairs and some at the sides. The lateral band of the segments is ⊣ shaped and there is only a slightly entrant appendix. The genitalia are figured. The development of the paramera is relatively great transversely. The penis is stout, with blunt apex. On the under surface the segmental bands are sharply limited and do not join the lateral bands. Each transverse band bears a row of about six hairs (3, 3). The genital mark results from a broad median connection of bands on segments 6, 7, 8. The lateral bands here bear one to two long hairs not visible from above. The colour of the abdomen is clear dark brown, on which the stigmata stand out distinctly. The lateral bands are much darker than the ground colour of the segments, being almost black.

Legs.—These are short, moderately stout, and docophoroid.

♀. *Head.*—The clypeal outline varies and may be even distinctly concave, as in the example figured. In general chætotaxy the sexes are alike. They differ, however, in the relation of the bands to one another. In the ♂, as already noted, the occipital band runs directly to the ocular spot, becoming indistinct there. Before it reaches this point it sends off an internal branch, which fades away in the direction of the hindmost heavy spine described. There is a distinct gap between the occipital band and its connections on the one hand and the antennal band on the other. In the female the occipital band does not join the ocular spot directly. It runs evenly to the base of the antennal and there fuses with (*a*) the ocular band (which is more than a spot in this sex), and (*b*) the heavy internal transverse band,

and (*c*) the hindmost part of the antennal band proper, which as in the male bears a heavy peg-like spine. This portion of the band is in the ♀ exceedingly short, with the result that the heavy spine is placed above the insertion of the antenna; so that the figure formed by the spines is not, as in the ♂, a square, but rather trapezoidal.

The internal transverse bands do not meet in the ♀, so that the rounded apex of the signature is distinctly seen.

First antennal joint rather shorter than the trabecula, and equal to the second; third and fourth short, fifth longer (see comparative lengths in table).

Abdomen.—The 1st segment much narrower than the others, with rounded angles. The following segments (2-7) strongly angulated. The 9th segment is fringed with hairs.

The genital mark covers segments 7 and 8. On the 7th it is entire while on the 8th it is tripartite, the median portion being joined on to the band on segment 7. The two lateral spots have a dark external margin, which seems to cover some internal chitinous structure.

Legs.—Femora short and broad. Tibiæ longer than femora.

Measurements of Mackayia dimorpha.

	♂.		♀.	
	Length.	Breadth.	Length.	Breadth.
	Mm.	Mm.	Mm.	Mm.
Head	·500	·478	·528	·542
Prothorax	·128	·335	·142	·357
Metathorax	·171	·457	·171	·471
Abdomen	·757	...	·971	...
1st segment	...	·428	...	·457
4th "	...	·607	...	·678
Total	1·55	·6	1·81	·67
Antennal joints—				
1	·1	·046	·05	·05
2	·05	·03	·05	·023
3	·023	·05	·023	·023
4	·023	·03	·023	·023
5	·043	·026	·046	·023
Length of antenna	·24	...	·19	...

The types of *M. dimorpha* are a pair in the writer's collection. Two ♂ ♂ and six ♀ ♀ were taken by Mr Hugh Mackay on a specimen of the Manx Shearwater (*Puffinus anglorum*), from the island of Eigg (Scotland). The host was sent to Mr Mackay by the Rev. J. M'William, on 30th May 1910.

Key to the genera Giebelia, Mackayia, Philoceanus.

Gen. characters.—Philopteridæ with broad transverse laterally projecting membranous flap on under side of forehead.

A. Antennæ differing in the sexes. A.A.
Antennæ simple in both sexes. *Giebelia.*

A.A. Form slender, nirmoid; metathorax with distinct backward-projecting postero-lateral angles. *Philoceanus.*
Form stout, Giebelia-like; metathorax continuously rounded behind. *Mackayia.*

It remains to note some points raised by this and the allied species.

1. *Mackayia*, *Giebelia*, and *Philoceanus* agree in having a well-marked labral collar or transverse lobe. The function of this laterally folded outgrowth of the under side of the clypeus may be to hold the food in position during detrition. This peculiar structure is possibly not strictly comparable with the similar outgrowth in the Liotheid Physostomum.
2. Systematically *Mackayia* falls between *Giebelia* and *Philoceanus*. With the former it agrees in general facies, structure, genus of host, but the antennæ connect it with *Philoceanus*. We have here, then, a true link between two somewhat isolated forms, which is precisely what one would expect in view of the marked tendency which the genera of this order (Mallophaga) show to run into one another.
3. *Giebelia*, up to the present, is a New World form of *Puffinus*-parasite. The range of the genus may be wider, but if not, *Mackayia* may be the Old World representative. The Shearwaters, however, are notorious wanderers, and without further evidence it would be rash to venture an opinion.

4. Most interesting of all is the question suggested as to the phylogenetic position of these three genera. *Mackayia*, *Giebelia*, and *Philoceanus* are complicated forms in a group where the general note is one of severe simplicity. Their respective hosts belong to an ancient stirps of the Bird Kingdom. The life conditions of these parasites must have been long unchanged, to a degree remarkable even in an order noted for the constancy of the environment of its members. *Giebelia*, *Mackayia*, and *Philoceanus* must therefore be first beginnings or amongst the last expressions of Philopterid evolution. According to Professor Kellogg's interpretation of the developmental history of the order, the latter alternative must be accepted.

EXPLANATION OF FIGURES.

1. Head of ♂.
2. Sternal marks of ♂.
3. Terminal segments, ♂.
4. Genital mark, ♂.
5. Head of ♀.
6. Genital mark, ♀.