

XIX.—An Account of the Bird-lice of the Genus *Docophorus* (Mallophaga) found on British Auks. By James Waterston, B.D., B.Sc.

(MS. received 8th January 1914. Read 26th January 1914.)

A. HOSTS; COLLECTING; NORMAL PARASITISM; "STRAGGLING."

EXCLUDING the extinct *Alca impennis*, L., there are six species of Auk on the British list. One of these, however, *Uria bruennichi*, E. Sabine, is of extreme rarity in our waters. The present paper essays merely to define what species of *Docophorus* are normally to be found on the following—*Alca torda*, L., *Uria troile*, L., *Uria grylle*, L., *Mergulus alle*, L., and *Fratercula arctica*, L. For four years I have been well placed for examining these hosts, for in Shetland all are to be found in numbers at one season or another. Ollaberry lies on a bay off the west side of Yell Sound, some distance from the open sea. "Tysties," or Black Guillemots, are constantly with us; Little Auks come regularly towards the end of the year; Common Guillemots and Puffins are common at intervals; and only the Razorbill is infrequent in its appearances. During the period of investigation parasites have been taken or received by me from a sufficient number of the five host species to warrant the conclusions now put forward. Upwards of 1000 specimens of *Docophorus* from 44 hosts have been examined. Between 30 and 40 of the birds have been obtained locally. Most of the Guillemots, Razorbills, Little Auks and one of the Puffins have been found in a dying or dead condition after gales which, when prolonged, cause a heavy death roll among sea-birds. *Uria troile* is possibly the commonest victim one comes across, but I have never seen *U. grylle* succumb to stress of weather. To correspondents and others who have assisted in procuring material, my best thanks are due. These services are elsewhere acknowledged in detail. I also desire to thank the Carnegie Trustees for a grant in aid of the present research.

Some notes on collecting, etc., may be offered. Each host has been examined as soon after death as possible, and all parasites picked up with fine forceps and placed in preservative. For general purposes the strongest industrial methylated spirit (up to 95 %) has been employed, as my experience of the 70 % usually advocated for ectoparasites has been unsatisfactory. In the weaker solution discoloration and maceration sooner or later set in, presumably owing to the weakening of the spirit by dilution with the juices of the parasites, and through evaporation. This is no great disadvantage with males which, as a rule, may be identified in any state by

the genitalia, but it is an advantage to keep females in as lifelike a condition as possible. The only examples liable to be affected by the strong spirit are those which have newly moulted. Specimens intended for mounting in balsam may be put in a mixture of 3 parts of absolute alcohol to 1 part of glacial acetic acid. So treated they die with legs and other appendages extended, and a good deal of the internal fat is removed at the same time, so that a less prolonged treatment with caustic is required before mounting.

In collecting Mallophaga a diary should be kept of hosts examined, with under each entry a rough note of the genera and species found. After a time the insects may be separated and each lot labelled and card-indexed.

Before examining a bird it is well to plug up shot wounds (where Mallophaga, especially Liotheids, migrate and frequently get clogged up in blood), the nostrils, throat, and even the anus. Such precautions are very necessary in the case of the Auks. The oleaginous contents of their stomachs exuding, quickly soil the plumage in the region where the search for parasites is most likely to be rewarded. Owing to their short stiff feathers Auks may be thoroughly examined without recourse to the hand plucking so often necessary. If one's search is prolonged, the great bulk of the parasites present may be gathered from round the eyes and below the bill where, given time, they obligingly congregate.

During examination the birds should be isolated on white sheets, or kept in cotton bags. All hosts indeed should be separately packed from the first, and never allowed to lie indiscriminately in the game-bag. The aim of such precautions is to avoid misleading records of "stragglings." In this respect the diary may prove a useful check on the card-index.

Mallophaga can be kept either in alcohol or as slides. No card-mounted specimen should be tolerated in a collection. Each lot of a species may be placed, fully labelled, in a tube $1\frac{1}{4}'' \times \frac{3}{16}''$ or $\times \frac{1}{4}''$ as may be required. Each little tube is plugged with cotton wool, and 8-10 may be placed in a squat tube $1\frac{7}{8}'' \times \frac{7}{8}''$. These larger tubes may be housed, to the number of 8, in a glass-stoppered jar $3\frac{1}{4}'' \times 3\frac{1}{8}''$. Such sizes I have found most practically useful. Thus a jar of the collection will store from 60-80 lots of parasites, any one of which may be expeditiously inspected. The bugbear of corks is avoided, and the alcohol may be renewed in one operation. The system is also cheap, as 1000 or more insects may be housed permanently for an outlay of about 2s. 6d. As to the method of recording—the time-honoured path has been followed and stress laid on locality. But in reality the exact locality (though not the nature of it) is of secondary importance in elucidating the many problems connected with the distribution of these parasites. *The area of distribution is here no longer a geographical one, but primarily an individual*

organism and secondarily a species or group of species. As Prof. Kellogg in a recent brilliant resumé points out: "Each host individual is in a way a small island biologically considered, with its inhabitants more or less nearly completely isolated from the inhabitants of other islands" (V. L. Kellogg, *The American Naturalist*, vol. xlvii., March 1913, p. 134), and the comparison is just if we add that these islands have an almost unchanging climate, wander about in space and occasionally come into contact, and finally are subject to periodic cataclysms which, if they do not destroy the inhabitants directly, at least set very many adrift to shift for themselves. We want to know what is the average population of these "islands"? what is native in it? what and how derived is any alien element present? How far, again, does the population fluctuate seasonally? How far do individual birds carry what may be termed family strains of a particular species of parasite? and to what extent does the mixing of hosts lend towards uniformity in the characters of their parasites? What is the age of a species of *Docophorus*?—and so on. It is evident that an ideal record would comprise very many items. It would include a census of the parasites (species and numbers) found; and an exact analysis of the stages (egg; larva or immature; imago) represented; the state of the hosts' plumage, age and date of capture; a note on the hosts' habits and state of health, etc. It is only after much laborious spadework of the above description that anything may be expected of this field. But chiefly there is need at present of a more accurate definition of names, especially of the species of older authors. The host distribution of some of the commonest forms requires clearer determination. It is in the latter respect that it is hoped this contribution may prove of service to workers.

Some notes, relevant only to the present inquiry, may be given on the species of *Docophorus* which have been described or recorded from Auks.

Nitzsch named the parasite of *Alca torda*, *D. celedovus*. This species, mentioned by Burmeister in his "Handbuch" (1839), was again recorded by Denny (1842) from *Alca torda*, *Uria troile*, and *Fratercula arctica*. At the same time the English author described three new species—*D. platygaster* from *Uria troile*, *D. megacephalus* from *Uria grylle*, and *D. merguli* from *Mergulus alle*. Giebel (1874) adds little beyond describing more accurately than Denny the characters of Nitzsch's species, of which the types were before him. Piaget (1880), who remarks of *D. celedovus*, "Sur une *Alca torda*, une *Uria troile* et selon Giebel sur une *Fratercula arctica*," gives a good but very general account, and an excellent figure of the head of the species (he figures also the female genital mark), but his measurements seem to be taken from a small example. Lastly, in 1896, Kellogg described two new species, viz. *D. calvus* from a variety of the Common Guillemot, and

D. acutipectus from a Fraterculine host. He also with B. Chapman (1899) introduced *D. procax* from a close ally of *Uria grylle*. All three species were secured on Pacific hosts. Of these species (to which fuller references are given below) we may take first Denny's creations. His *D. megacephalus* and *D. merguli*, though neither was recorded for seventy years after their publication, are, I believe, perfectly valid and distinct species.

As to *D. platygaster*, I am inclined to think that it does not belong to the group of *Docophorus* now under review. I had hoped it might turn out to be the species commonly found on *Uria troile*, but my examination of the types failed to bring this conviction. I speak with hesitation, as at the time of my visit the Denny collection was mounted on cards and not really in a condition for critical working.

It is when one attempts to name material from Common Guillemot, Razorbill and Puffin that difficulty may be felt. Three species in all infest these hosts. A study of the male genitalia made this beyond dispute. But it was only through the kindness of Professor Kellogg, who sent the writer a male and female of his *D. calvus*, that the identity of the three species could be made reasonably sure. What I believe to be *D. acutipectus*, Kell., is not hard to distinguish from *D. celedorus* by a number of evident characters. But the differences between *D. celedorus* and *D. calvus* are somewhat critical, and might easily be considered to be only of varietal value if one had not examined the genitalia. For this reason, although *D. celedorus* occurs undoubtedly on *U. troile*, *A. torda* and *F. arctica*, it is so rare on the first named that records of the parasite from all three hosts should be received with reserve. So far as I am aware, the only recent European writer who has given expression to this feeling of hesitation is Eric Mjöberg ("Studien über Mallophagen und Anopluren," *Arkiv. för Zoologi*, Band 6, No. 13, p. 132, 1910), who remarks under *D. celedorus*, N.: "Von der Art liegen mir mehrere exemplare von sowohl *Uria troile* (*sic*), *Uria grylle* und *Mormon arcticus* vor (Mus. Gbg. Roth. Videll, *ipse*). Zwar stimmen die Ausgaben *Piaget's* nicht völlig mit den mir vorliegenden exemplaren ein; so ist Z. B. Clypeus nach vorn bei weitem nicht so tief ausgerandet und auch die Genitalflecke beim ♀ nicht völlig ähnlich, ich führe sie aber zu dieser Art, der sie sich jedenfalls am nächsten anschliessen." Mjöberg, from these remarks, appears to have had before him either *D. celedorus* and *D. calvus*, or *D. celedorus* and *D. megacephalus* female—or possibly all three.

To Messrs Bagnall and Hall belongs the credit of separating an unfamiliar *Docophorus* from among some examples of *D. celedorus* collected on Puffin (*F. arctica*), Farne Islands, Northumberland (*Journ. Econ. Biol.*, vol.

vii., No. 1, p. 9, Feb. 1912). The specimens so separated were determined by Prof. Kellogg as *D. acutipectus*. In October of the same year Mr Wm. Evans published, in his "List of Mallophaga taken in the Forth Area" (*Proc. Roy. Phys. Soc. Edin.*, vol. xviii., No. 4, p. 270, 1912), records of *D. celedoxus* (from *U. troile*, *A. torda* and *F. arctica*), and *D. merguli* (from *M. alle*); while in *Ent. Mo. Mag.*, p. 113, 1913, the writer drew attention to Denny's neglected *D. megacephalus*.

Assuming, as is done here, that *D. platygaster*, D., is not the normal parasite of *U. troile*, the records of *D. calvus* now given form an addition to the British, or for that matter to the European, list. A word of caution, however, as to the meaning of such "additions" is necessary. We are not signalling the introduction of an American element into our fauna in adding *D. acutipectus* and *D. calvus* to our lists. The case is not parallel say to the discovery of an American bird in Britain, or to the recent occurrences of the Plague Flea (*Xenopsylla cheopis*) in Portsmouth and London. We are simply recognising in Britain insects first described from American hosts. The five species of *Docophori* enumerated below might, I believe, have been collected in this country ever since there were Auks on our waters with *Docophori* upon them.

In the following list the symbol \odot = immature. I have given the names of all friends who have sent or secured hosts for this investigation. Where "leg." occurs after a name, the correspondent sent the parasites and vouched for the host. In other cases, the writer is personally responsible.

DOCOPHORUS ACUTIPECTUS, Kellogg (1896).

Docophorus acutipectus, V. L. Kellogg, New Mallophaga, pt. 1, p. 84, pl. iii. fig. 4 (1896).

From *Pratercula arctica*.—(1) Ollaberry, 5:vi:12, 4 ♂, 9 ♀, \odot : 17:v:13, 2 ♀: June 1913, 2 ♂, 2 ♀, with *D. calvus*, Kell. (2) Gluss Voe, 20:i:13, 5 ♂, 6 ♀, \odot , with *D. celedoxus*, N. (3) Off Little Roe, Yell Sound, 29:v:11, ♂, 2 ♀: 10:xi:13, 6 ♂, 7 ♀, 3 \odot , with *D. calvus*, Kell., and *D. celedoxus*, N.

DOCOPHORUS CALVUS, Kellogg (1896).

Docophorus calvus, V. L. Kellogg, New Mallophaga, pt. 1, p. 79, pl. iii. fig. 1 (1896).

From *Uria troile* (ringed form).—Dunbar, 1:ii:10, 9 ♂, 6 ♀, \odot , per H. M'Kay, leg., bird shot by Mr Inglis.

From *Uria troile* (typical form).—(1) Ollaberry, 8:xii:10, 15 ♂, 14 ♀, 4 \odot : 29:iv:11, 8 ♂, 10 ♀, 5 \odot , with *D. celedoxus*, N.: xii:12, 4 ♂, 13 ♀: 19:iii:13, 17 ♂, 27 ♀, \odot . (2) Gluss Voe, 22:iii:11, 18 ♂, 28 ♀, 5 \odot : 22:ii:12, 22 ♂, 13 ♀, 5 \odot , with *D. celedoxus*, N.: 2:iii:12, 11 ♂, 19 ♀,

- 4 ☉ : 7 : x : 12, 5 ♂, 8 ♀, 7 ☉. (3) Rönas Voe, 6 : iii : 11, 13 ♂, 30 ♀, 11 ☉, R. Jamieson : 23 : iii : 11, 3 ♂, 2 ♀, with *D. merguli*, D.
- From *Fratercula arctica*.—(1) Ollaberry, June 1913, ♂ with *D. acutipectus*, Kell. (2) Off Little Roe, 10 : xi : 13, 2 ♀, with *D. acutipectus*, Kell., and *D. celedoxus*, N.
- From *Larus (Rissa) tridactyla*.—Gluss Voe, 13 : iii : 11, ♀.

DOCOPHORUS CELEDOXUS,¹ Nitzsch (in MS. before 1839).

- Docophorus celedoxus*, Nitzsch, in Giebel Ins. Epiz., p. 117, pl. xi. figs. 1, 16 (1874).
- From *Alca torda*.—(1) Aberdour, Fifeshire, 3 : ii : 13, ♀, J. Skinner, leg. (2) Ollaberry, 26 : x : 10, 9 ♂, 27 ♀, 6 ☉, with *D. megacephalus*, D. : 5 : xii : 11, 3 ♂, 10 ♀. (3) Gluss Voe, 28 : xii : 12, 8 ♂, 11 ♀, ☉ : 30 : xii : 12, 10 ♂, 30 ♀, ☉. (4) Rönas Voe, 20 : iii : 11, 20 ♂, 20 ♀.
- From *Fratercula arctica*.—(1) Gluss Voe, 20 : i : 13, 4 ♂, 4 ♀, ☉, with *D. acutipectus*, Kell. (2) Off Little Roe, 10 : xi : 13, ♀, with *D. acutipectus*, Kell., and *D. calvus*, Kell.
- From *Uria troile*, in company with *D. calvus*, Kell.—(1) Ollaberry, 29 : iv : 11, ♂ and ♀. (2) Gluss Voe, 22 : ii : 12, 6 ♀.

DOCOPHORUS MEGACEPHALUS, Denny (1842).

- Docophorus megacephalus*, Denny, Monogr. Anopl. Brit., p. 86, pl. v. fig. 5 (1842).
- „ *procar.*, V. L. Kellogg and B. Chapman, New Mallophaga, pt. iii., p. 54, pl. v. fig. 1 (1899).
- From *Uria grylle*.—(1) Ollaberry, 3 : viii : 10, 5 ♂, 10 ♀, 20 ☉. (2) Gluss Voe, 22 : ii : 12, 3 ♀, 3 ☉ : 30 : iii : 12, ♂, 4 ♀, 6 ☉ : 24 : ix : 12, 15 ♂, 30 ♀, 24 ☉ : 7 : x : 12, 5 ♂, 4 ♀, 7 ☉ : 30 : xii : 12, ♂, 4 ♀, ☉. (3) Gluss Point, 20 : vi : 10, 2 ♂, ♀, ☉ : 21 : viii : 11, 6 ♂, ♀, 2 ☉ : 7 : v : 12, 34 ♂, 17 ♀, 24 ☉. (4) Near Lamba Is., Yell Sound, 6 : ix : 10, 3 ♂, 3 ♀, 17 ☉ : 25 : ix : 12, 25 ♂, 25 ♀, 70 ☉.
- From *Alca torda*, with *D. celedoxus*, N.—Ollaberry, 26 : x : 10, ♂.

DOCOPHORUS MERGULI, Denny (1842).

- Docophorus merguli*, Denny, Monogr. Anopl. Brit., p. 72, pl. iii. fig. 7 (1842).
- From *Mergulus alle*.—(1) Nr. Loughton, Staffordshire, England, Feb. 1912, Hon. N. C. Rothschild, leg., 2 ♀. (2) Scampston Hall, Rillington, Yorkshire, England, 2 : ii : 12, Hon. N. C. Rothschild, leg., 5 ♂, 5 ♀. (3) Firth of Forth, 9 : i : 11, Miss Baxter, per H. M'Kay, leg., 2 ☉ : Granton, 29 : i : 12, J. F. Cormack, leg., 2 ♂, 2 ♀ : Kirkcaldy, Jan. 1913, J. Skinner, leg., ♂ : Largo, 16 : i : 13, J. Skinner, leg., 3 ♀ : (4) Ollaberry, 16 : xii : 11, H. Williamson, ♂, 3 ♀, 3 ☉ : 30 : xii : 11, Dr Lovett, ♂, ♀, 4 ☉. (5)

¹ *Celedoxus* does not appear in Nitzsch's list of *Docophorus* spp. (p. 290, *Germer's Magazin*, 1818). I have simply followed Giebel, Piaget and Kellogg in retaining Nitzsch's authorship.

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Gluss Voe, 20:i:13, A. Williamson, 7 ♂, 11 ♀: Jan. 1913, 38 ♂. 34 ♀, 25 ☉.

From *Uria troile*, with *D. calvus*, Kell.—Rönas Voe, 23:iii:11, ♀.

Besides the above five species I have a single ♀, *D. cordiceps*, P. (not uncommon on various species of Charadriidæ), taken with *D. merguli* on *M. alle*, Gluss Voe, 20:i:13. Mr H. M'Kay has also sent me a ♂ example of *D. icterodes*, N (attached to Anatidæ chiefly) from *A. torda*, Aberlady, 29:i:10 (Ritchie).

These auk *Docophori* represent two types—(a) *acutipectus*, *calvus* and *celedorus*; (b) *megacephalus* and *merguli*. The above records enumerate 564 examples of class (a) from 23 hosts, and 526 examples of class (b) from 21 hosts. On such a basis it seems fair to compare the proportions of the sexes. It is interesting to note that in the first section the males aggregate about 40 % of the mature examples, in the second nearly 50 %, i.e. in the "*calvus*" group the females outnumber the males as 3:2, in the "*megacephalus*" group the sexes are approximately equally divided.

The number of Mallophaga to be expected on a host, as well as the regulating conditions of their occurrence, form an obscure subject. Of *Docophorus* alone, anything up to 50 specimens or rather over may be regarded as normal, and taking the concomitant *Nirmus* and *Menopon* into the reckoning, 100-120 may not be an excessive estimate of the mallophagous parasites of a bird before the moult. Many of the above records are exhaustive for the individuals to which they refer, but more than once hosts have been found covered with parasites, but unfortunately at times when a complete enumeration was impracticable. Young birds before the first moult appear to suffer most; next come those examples which float ashore to die. But after moulting, birds may be found as clean as the most fastidious small passerine.

Ill health and emaciation do not always mean a large mallophagous population. I have frequently noticed that where the tick (*Ixodes putus*, Cambr.) is present in force no Mallophaga can be found, though the presence of a few examples of *Ixodes* seems in no way deterrent. On 10:xi:13, a pair of young Puffins, evidently a late hatching, were secured in Yell Sound together. These birds were in extremely poor condition and much smaller than average birds of the year. One harboured *D. calvus*, *D. celedorus* and *D. acutipectus*; the other provided no Mallophaga, but the head in front of the eyes was, a few hours after death, covered with a scum of mites.

The following table summarises the results of the records given above:—

	<i>Uria troile.</i>	<i>Alca torda.</i>	<i>Fratercula arctica.</i>	<i>Uria (Cepphus) grylle.</i>	<i>Mergulus alle.</i>	<i>Rissa tridactyla.</i>
	11 birds.	6 birds.	6 birds.	11 birds.	10 birds.	1 bird.
<i>D. acutipectus</i> , Kell.	...	...	¹ { × (6)	...	...	...
<i>D. calvus</i> , Kell.	² { × (11)	...	¹ { × (2)	...	...	× (5)
<i>D. celedoxus</i> , N.	² { × (2)	¹ { × (6)	¹ { × (2)	...	...	Solitary ♀ with numerous examples of <i>D. larri</i> , D.
<i>D. megacephalus</i> , D.	¹ { × (1) (S)	...	...	× (11)	...	
<i>D. merguli</i> , D.	× (1) (S)	...	...	...	× (10)	
<i>D. icterodes</i> , N.	...	× (1) (S)	...	...	¹ { × (1) (S)	
<i>D. cordiceps</i> , P.	...	...	...	...	...

A × denotes the occurrence of *Docophorus* on bird sp. The number in brackets indicates how often the parasite has occurred on the host species.

The long brackets with their numbers show how often and how many species have occurred together on an individual host.

(S) = straggler.

Thus column one reads: "Of *Uria troile*, 11 birds have been examined and on all *D. calvus* has been taken. In two cases *D. calvus* has been found with *D. celedoxus*, and once with *D. merguli*. The last, however, seems a case of 'straggling.'"

1. From the above analysis, it will be seen that each of the five Auks found in British waters has a species of *Docophorus* peculiar to itself within that area.

2. It should not however be inferred that, apart from straggling, there is a constant connection between the parasite species and one host species, e.g. *D. acutipectus* and *F. arctica*, etc. *Docophorus* species as a rule attach themselves either to a group of birds, or to a genus, or to near relatives within the same genus; and the fact that we have five auk *Docophori* in Britain would indicate that the hosts represent as many genera. So far as it goes the evidence here is for the separation of *Cepphus* from *Uria*. Outside British waters the *Docophori* just recorded may be expected on closely allied species of the host genera. *D. calvus* was described from *Uria troile californica* (Bay of Monterey, California); *D. acutipectus* from *Ceratorhina monocerata* (Bay of Monterey, California); *D. procaev*, K. and C. (which seems to me indistinguish-

¹ On one individual also *D. acutipectus* and *D. celedoxus* were found associated.

able from *D. megacephalus*, D.) from *Cephus columba* (Bay of Monterey, California). I have not, however, had an opportunity of examining *D. procaax*.

3. While every host examined has yielded a peculiar species of *Docophorus*, "stragglers" of an interesting kind is also exhibited.

D. icterodes on *A. torda* and *D. cordiceps* on *M. alle* are entirely accidental. The former may have come from some duck or allied waterfowl, the latter from a wader—probably *Streptilas interpres* or *Tringa maritima*.

More important are the occurrences of these *Docophori* on Auks other than that to which respectively each is specially attached. One feels the limitations of the category "straggler" here. It has to be used so comprehensively from cases of the most accidental nature to others in which environment and life habits play an intelligible part.

D. merguli on *U. troile* and *D. megacephalus* on *A. torda* are probably as unusual and casual as the two cases noted above. Yet it is not wonderful that such instances should occur in Shetland where, on many a day in January, after a gale one may see in some sheltered voe all five species of Auk within gunshot.

D. calvus on *Rissa tridactyla* is easily understood. The Kittiwake is of all our gulls the most marine in habitat. It is closely associated with *Alca*, *Uria* and *Fratercula* both at the breeding season and subsequently.

The constant mingling of Puffins, Common Guillemots and Razorbills—especially on the nesting ledges—is naturally reflected in the records of their respective *Docophori*. Thus *U. troile* has yielded *D. calvus* and *D. celedoxus*, while on *F. arctica*, *D. acutiptectus* occurs as well. But it is noteworthy that *D. acutiptectus* has been met with so far only on Puffin, and it is surprising that *D. calvus* has not occurred on Razorbill which nests side by side with Guillemot, so that sometimes the two species literally rub shoulders. Possibly a sufficient number of Razorbills has not been examined. The really striking feature of the occurrences of *D. calvus* and *D. celedoxus* is their constant attachment to one host—a fact which shows through any other "stragglers" that may be noted. It is my impression that *D. celedoxus* has established itself on *F. arctica* as well as its regular host. But a good deal of collecting will be required before the status of *D. celedoxus* on *U. troile* or of *D. calvus* on *F. arctica* is intelligible. On *Uria grylle* only *D. megacephalus*, D., has occurred in my experience. More remarkable still, no other mallophagous species appears as a rule to infest this host. I have taken *Menopon* once on it, and on another occasion a solitary *Nirmus*, which is probably a straggler. However these facts may ultimately be explained, the absence of other auk *Docophori* on *U. grylle* is due probably to the

habits of the bird. It is an inshore feeder, breeds not on ledges but in holes, crevices, or under boulders, and, except under stress of weather, does not associate closely with other Auks. Possibly a similar explanation may hold of *M. alle*, which likewise has one *Docophorus* invariably present. The Little Auk, however, harbours a *Nirmus* and a *Menopon* as well.

D. merguli, D., and *D. megacephalus*, D., have important structural features in common, notwithstanding some superficial dissimilarity, and are somewhat apart from *D. acutipectus*, K., *D. calvus*, D., and *D. celedoxus*, N., which form a compact group. All five species may however be treated conveniently together, and this I hope to do in a later instalment dealing with the distinguishing features of the species and their known distribution in Britain.



(Issued separately, 27th June 1914.)

REPRINT FROM THE
PROCEEDINGS
OF THE
ROYAL PHYSICAL SOCIETY OF EDINBURGH
SESSION 1913—1914.

VOL. XIX.—No. 6.

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DOCOPHORUS (MALLOPHAGA) FOUND ON
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EDINBURGH:
PUBLISHED BY ROBERT GRANT & SON, 107 PRINCES STREET.

MDCCCXIV.

Price One Shilling.