Mallophaga and Anoplura

BY

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The Icelandic Mallophaga, being parasites i.a. on some domestic animals, early attracted attention. The first records were given by Olafsen & Povelsen (1772), who knew two species: *Bovicola bovis* and *Bovicola equi*. Besides they mention a "*Pediculus capite fusco, abdomine glauco*" from *Uria grylle* and a "*Pediculus (Alcæ arcticæ) e cinereo cærulescens*" from *Fratercula arctica*. Lindroth (1931) supposes that both of them are Mallophaga; however, this is impossible, they are no doubt *Ixodes* spp., as shown by Fristrup (1942).[1]

The "*Pediculus Procellariae*" Mohr (1786) from *Fulmarus glacialis* cannot be identified with certainty. Probably it is a *Docophorus* sp.

Mjöberg 1910 records one new species, *Philichthyophaga longicornis*, and 1913 further three species: *Trinoton anserinum*, *Ornithobius bucephalus*, and *Lipeurus* sp. from *Larus hyperboreus*.

Thoroddsen (1919) mentions a disease caused by lice (lúsasótt) among the Icelandic cattle. It can hardly be due to any other parasite than to *Bovicola bovis*.

Lindroth (1931) adds the following eleven species:

Colpocephalum subaequale,
C. importunum,
Docophorus ocellatus,
D. cordiceps,
D. icterodes,
D. pustulosus,
D. lari,
Nirmus furvus,
N. triangulatus,
N. lineolatus, and
Lipeurus sp. from *Anas platyrhyncha*.

[1] Olafsen & Povelsen's records were copied by Gliemann (Geogr. Beschr. von Island 1824 p. 165), his list, again, by Gaimard (Voyage en Islande 1851 p. 165), Hagen (Zur Fauna Islands, Stett. Ent. Z. 1857 p. 381), and Breddin (Fauna Arctica II 1902 p. 556); and Gaimard's list by Paijkull (A summer in Iceland. London 1868 p. 355). Jacobson (Zool. Unters. auf Nowaja Semlja im Jahre 1896. Mem. Acad. Sci. St. Pétersbourg (8) No. 1 1899 p. 233) added no original records, either, of Icelandic Mallophaga or Anoplura. Such reprinted records are not cited here under "Iceland records".

The material accessible to me consists of three collections, one belonging to the Zoological Museum of Copenhagen, while the other two have been borrowed from the Zoological Museum of Hamburg and from Mr. Geir Gígja, Reykjavík. In the text they are marked (H.M.) and (G.G.) respectively. The examination showed 29 species new to the Icelandic fauna, viz.:

Menopon pallidum,
M. brevithoracicum,
M. numerosum,
M. ambiguum,
M. nigropleurum,
M. sp. from *Uria aalge*,
M. sp. from *Arenaria interpres*.
Menacanthus chrysophaeus,
M. stramineus,
Myrsidea anaspila,
Colpocephalum grandiceps,
C. bicolor,
C. spinulosum,
Docophorus semisignatus,
D. acanthus,
D. alpinus,
D. semivittatus.
D. melanocephalus,
D. fraterculae.
D. celedoxus,
D. subflavescens,
D. sp. from *Arenaria interpres*,
Nirmus ochropygus,
N. phaeopi,
N. citrinus,
N. sp. from *Troglodytes troglodytes islandicus*,
Anaticola anseris.
Pectinopygus bassani,
Lipeurus celer.

As far as possible the names of the hosts are those used in Hartert: Die Vögel der paläarktischen Region (1910—1938).

Only three species of Icelandic Anoplura are known, viz. *Pediculus humanus humanus*, *P. humanus corporis*, and *Phthirus pubis*. All of them are recorded by Olafsen & Povelsen (1772). None of the more recent investigators have added any new species.

I. Synopsis of the Species.

A. Mallophaga.

1. *Menopon pallidum* Nitzsch.

Menopon pallidum Piaget 1880 p. 459 pl. XXXVII fig. 7.

Occurrence in Iceland: *N.W.*: Hagi, Barðaströnd; Ísafjörður.—*S.*: Bíldsfell (G.G.).—(All from *Gallus domesticus*).

Distribution: Denmark, Sweden, Finland, England, Holland, Germany, U.S.A., Mexico, Japan.

Host: *Gallus domesticus.*

Remarks: It is the commonest species of Mallophaga occurring on fowl.

2. *Menopon ambiguum* Nitzsch.

Menopon ambiguum Giebel 1874 p. 295.

Occurrence in Iceland: *S.:* Bildsfell (*Numenius phaeopus*) (G.G.).

Distribution: Germany ?

Host: *Numenius phaeopus.*

Remarks: Only one specimen is present. It agrees very well with Nitzsch's diagnosis, so I do not hesitate to refer it to this species. As far as known to me, it has not been figured anywhere. However, on account of the sparse material I give no figure or description.

3. *Menopon brevithoracicum* Piaget.

Menopon brevithoracicum Piaget 1880 p. 495 pl. XLI fig. 2.

Occurrence in Iceland: *Centr.:* Nauthagi at Hofsjökull (*Cygnus cygnus*).

Distribution: Holland.

Hosts: *Cygnus nigricollis* (type ?), *C. cygnus.*

4. *Menopon numerosum* Kellogg.

Menopon numerosum Kellogg 1896 p. 159 pl. XV fig. 1.

Occurrence in Iceland: *S.:* Ingólfshöfði (host unknown) (G.G.).

Distribution: California, the Faroes.

Host: *Fulmarus glacialis* subspp.

Remarks: Kellogg (l.c.) records it as a very common species on *F. glacialis rodgersii.*

5. *Menopon nigropleurum* Denny.

Menopon nigropleurum Denny 1842 p. 224 pl. XX fig. 1.

Occurrence in Iceland: *W.:* Reykjavík (*Alca torda*) (H.M.).

Distribution: England.

Host: *Alca torda.*

Remarks: Denny records the species from *Alca torda, Rissa tridactyla, Philomachus pugnax, Totanus totanus,* and *Numenius arquatus.* I refer the specimens to *M. nigropleurum* because Thompson (1937a),

having examined the Denny collection, mentions *Alca torda* as the type host. However, the species is badly in need of a more detailed description, and this is aimed at by the following lines: Apart from the size, male and female are much alike: length of male 1.1—1.2 mm, length of female 1.4—1.5 mm. The dorsal chaetotaxis is seen in fig. 1a. That of the head

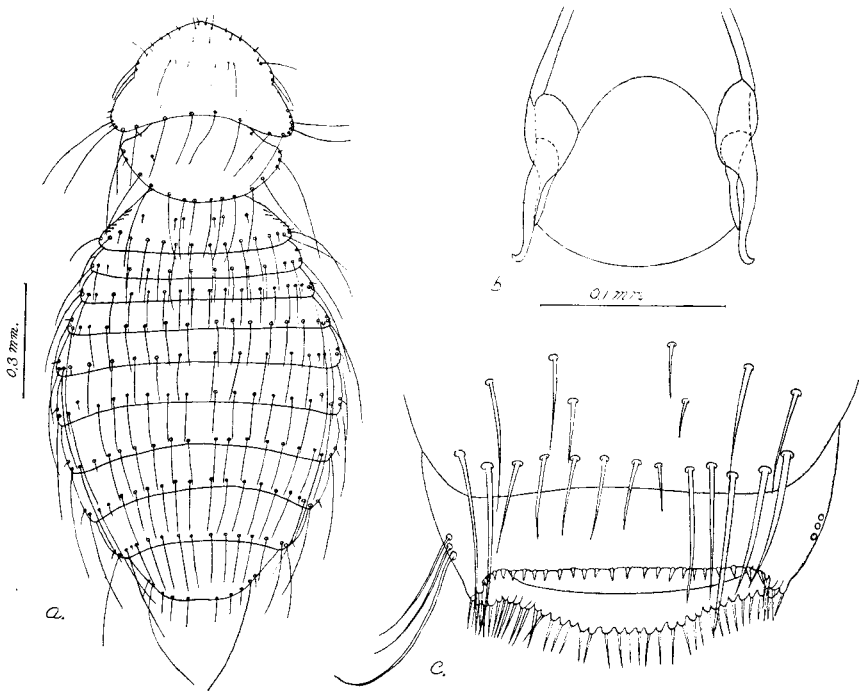

Fig. 1. *Menopon nigropleurum* D. a. Dorsal aspect of female, b. male genitalia, c. ventral aspect of apex of female abdomen.

as well as that of the metanotum are very characteristic. The hairs of the abdominal segments are arranged ventrally in two fairly regular transverse rows. There are no spinous processes on the ventral side of the head, no oesophageal gland, no chitinous plates in the gular region, no combs of spines on the ventral side of the third femora, but only three rather long spines. This in connexion with the extremely characteristic male genitalia (fig. 1b) shows that the species cannot be placed in any of the about one dozen genera into which the old genus *Menopon* has been divided by Uchida (1926). The female subgenital plate carries many long spines (fig. 1c).

6. *Menopon sp.*

Occurrence in Iceland: *W.:* Reykjavík (*Uria aalge)* (H.M.).

Remarks: Only larvae are present in the material, consequently the species cannot be determined. From *Uria aalge* Mjöberg (1910) records *Menopon lutescens* Nitzsch; Kéler (1936), however, compared the type specimens with other specimens collected by Nitzsch himself on *Alca torda*, and came to the result that they were not identical. Consequently Mjöberg's record of *M. lutescens* must be considered as doubtful.

7. *Menopon* sp.

Occurrence in Iceland: *W.:* Reykjavík (*Arenaria interpres*) (H.M.).

Remarks: Only a larva is present.

8. *Menacanthus chrysophaeus* (Kellogg).

Colpocephalum chrysophæum Kellogg 1896 p. 520 pl. LXXI fig. 1.

Occurrence in Iceland: *W.:* Reykjavík (*Plectrophenax nivalis insulae*) (H.M.).

Distribution: Germany, Japan, California.

Hosts: *Melospiza fasciata samuelis* (type), *Carduelis spinus, Chloris sinica, Emberiza cioides, Plectrophenax nivalis.*

9. *Menacanthus stramineus* (Nitzsch).

Menopon biseriatum Piaget 1880 p. 469 pl. XXXVII fig. 2.

Occurrence in Iceland: *N.W.:* Ísafjörður (*Gallus domesticus*).

Distribution: Denmark, Finland, England, Holland, Germany, France, Russia, Japan, U.S.A.

Hosts: *Meleagris gallopavo* (type), *Gallus domesticus, Phasianus colchicus, Numida* sp., *Pavo cristatus, Columba domestica* (stragglers).

10. *Myrsidea anaspila* (Nitzsch).

Myrsidea anaspila Kéler 1937 p. 320 fig. 3.

Occurrence in Iceland: *N.W.:* Ísafjörður (*Corvus corax*).— *W.:* Reykjavík (*Corvus corax islandicus*) (H.M.).

Distribution: Germany, Latvia.

Hosts: *Corvus corax* (type), stragglers known from *Nyctea scandiaca* and *Athene noctua.*

11. *Colpocephalum subaequale* Nitzsch.

Colpocephalum subæquale Giebel 1874 p. 265 pl. XIII fig. 13, 14.

Iceland record:

Colpocephalum subæquale Lindroth 1931 p. 144.

Occurrence in Iceland: *N.*: Without special locality (*Corvus corax*) (Lindroth).

Distribution: Germany, Greenland.

Hosts: *Corvus corax* (type), *C. frugilegus.*

12. *Colpocephalum importunum* Nitzsch.

Colpocephalum importunum Piaget 1880 p. 548 pl. XLV fig. 8.

Iceland record:

Colpocephalum importunum Lindroth 1931 p. 144.

Occurrence in Iceland: *N.*: Without special locality (*Tringa totanus*) (Lindroth).

Distribution: England, Germany.

Host: *Ardea cinerea.*

13. *Colpocephalum grandiceps* Piaget.

Colpocephalum grandiceps Piaget 1880 p. 558 pl. XLVI fig. 7.

Occurrence in Iceland: *W.*: Reykjavík (*Haematopus ostralegus*) (H.M.).

Distribution: Holland ?, the Faroes, Greenland.

Hosts: *Haematopus ostralegus* (type), *Calidris maritima.*

14. *Colpocephalum bicolor* Piaget.

Colpocephalum bicolor Piaget 1880 p. 561 pl. XLVII fig. 1.

Occurrence in Iceland: *W.*: Reykjavík (*Arenaria interpres*) (H.M.).

Distribution: Holland ?

Host: *Arenaria interpres.*

15. *Colpocephalum spinulosum* Piaget.

Colpocephalum spinulosum Piaget 1880 p. 563 pl. XLVII fig. 3.

Occurrence in Iceland: *N.W.*: Ögurhólmar (*Tringa totanus*).

Distribution: Holland ?

Host: *Limosa limosa.*

16. *Trinoton anserinum* (J. C. Fabricius).

Trinoton conspurcatum Piaget 1880 p. 588 pl. XLIV fig. 2.

Iceland records:

Trinoton conspurcatum Mjöberg 1913 p. 24.
Trinoton conspurcatum Lindroth 1931 p. 144.

Occurrence in Iceland: *N.:* Húsavík (*Cygnus cygnus*) (Mjöberg).—*Centr.:* Hvannalindir N. of Vatnajökull (host unknown) (G.G.).

Distribution: Sweden, Denmark (unpublished), England, Holland, Germany, Greenland.

Hosts: *Anser cinereus* (type), *A. domesticus, A. albifrons, Branta ruficollis, Cygnus cygnus, C. olor.*

17. *Bovicola ovis* (Linné).

Bovicola ovis Kéler 1938 p. 56 fig. 33.

Iceland records:

Pediculus capite & thorace rubris [partim] Olafsen & Povelsen 1772 p. 606.
Tricodectes sphærocephalus Thoroddsen 1919 p. 412.
Trichodectes sphærocephalus Lindroth 1931 p. 142.

Occurrence in Iceland: Widely distributed, but not as common as *Melophagus ovinus* (*Ovis aries*) (Thoroddsen).

Distribution: Europe, Africa, N. and S. America.

Host: *Ovis aries.*

18. *Bovicola bovis* (Linné).

Bovicola bovis Kéler 1938 p. 58 fig. 34.

Iceland records:

Lúsasótt á kúm Thoroddsen 1919 p. 277.
Trichodectes scalaris Lindroth 1931 p. 142.

Occurrence in Iceland: *W.:* Blikastaðir, Kjósasýsla (G.G.); Korpúlfsstaðir, Mosfellssveit (G.G.) (both from *Bos taurus*).

Distribution: Europe, Africa, N. and S. America.

Host: *Bos taurus.*

19. *Bovicola equi* Denny.

Bovicola equi Kéler 1938 p. 58 fig. 35, 36.

Iceland records:

Pediculus capite & thorace rubris [partim] Olafsen & Povelsen 1772 p. 606, 712.
Hestelusen Mohr 1786 p. 102.
Trichodectes parumpilosus Lindroth 1931 p. 142.

Occurrence in Iceland: *N.*: Mælifell, Skagafjörður; Eyjafjörður (Mohr).—*S.*: Bíldsfell (G.G.).—(All from *Equus caballus*).—Widely distributed and often in great abundance on horses (Olafsen & Povelsen).

Distribution: Denmark, Sweden, England, Holland, Germany, Java, U.S.A.

Hosts: *Equus caballus* (type), *E. burchelli.*

20. *Docophorus semisignatus* Nitzsch.

Docophorus semisignatus Giebel 1874 p. 80 pl. XI fig. 9, 14.

Occurrence in Iceland: *N.W.*: Ísafjörður (*Corvus corax*).—*S.*: Reykjavík (*Corvus corax islandicus*) (H.M.).

Distribution: Sweden, Germany, Latvia, the Faroes, Greenland.

Hosts: *Corvus corax* (type), *C. cornix* ?

Remarks: See *D. ocellatus* Nitzsch.

21. *Docophorus ocellatus* Nitzsch.

Docophorus ocellatus Giebel 1874 p. 81 pl. IX fig. 7, 8.

Iceland record:

Docophorus ocellatus Lindroth 1931 p. 143.

Occurrence in Iceland: *N.*: Without special locality (*Corvus corax*) (Lindroth).

Distribution: Germany, Latvia, the Faroes.

Hosts: *Corvus cornix* (type), *C. corax* (occasional).

Remarks: It must be considered rather doubtful whether the specimens mentioned really belong to *D. ocellatus* Nitzsch, the nomenclature of the *Docophori* of the *Corvidae* being much confused. *D. ocellatus* Nitzsch (syn. *Pediculus ocellatus* Scopoli [partim], *Pediculus cornicis* J. C. Fabricius [partim], *D. atratus* Piaget (nec Nitzsch!)) is an obligate parasite of *Corvus cornix. D. semisignatus* Nitzsch (syn. *Pediculus ocellatus* Scopoli [partim], *Pediculus cornicis* J. C. Fabricius [partim], ? *D. rotundatus* Piaget) is an obligate parasite of *Corvus corax.* Probably the confusion is due to Giebel (1874), who regards *D. ocellatus* Nitzsch as identical with *D. ocellatus* (Scop.), while he gives no synonyms at all for *D. semisignatus* Nitzsch.

22. *Docophorus icterodes* Nitzsch.

Docophorus icterodes Giebel 1874 p. 115; Piaget 1880 pl. X fig. 1.

Iceland record:

Docophorus icteroides Lindroth 1931 p. 143.

Occurrence in Iceland: *N.:* Aðaldalur (host unknown); without special locality (*Anas crecca*) (Lindroth).

Distribution: Denmark, Sweden, England, Holland, Germany, Greenland, U.S.A., California.

Hosts: *Anas crecca, A. platyrhyncha, A. carolinensis, A. acuta, Nyroca americana, N. affinis, N. marila, Bucephala clangula, Oidemia nigra, O. fusca, O. perspicillata, Somateria mollissima, Polysticta stelleri, Erismatura rubida, Tadorna tadorna, Anser albifrons, Mergus serrator, Colymbus stellatus.*

23. *Docophorus pustulosus* Nitzsch.

Docophorus pustulosus Piaget 1880 p. 106 pl. IX fig. 4.

Iceland record:

Docophorus pustulosus Lindroth 1931 p. 143.

Occurrence in Iceland: *N.:* Without special locality (*Stercorarius parasiticus*) (Lindroth).

Distribution: Germany ?, Greenland.

Hosts: *Stercorarius pomarinus, S. longicauda, S. parasiticus.*

24. *Docophorus lari* Denny.

Docophorus lari Piaget 1880 p. 111 pl. IX fig. 7.

Iceland record:

Docophorus lari Lindroth 1931 p. 143.

Occurrence in Iceland: *N.W.:* Ísafjörður (*Larus marinus*); Aðalvík (*Rissa tridactyla*).— *N.:* Without special locality (*Rissa tridactyla*) (Lindroth).—*S.:* Reykjavík (*Larus marinus, L. hyperboreus, Pagophila eburnea, Rissa tridactyla*) (H.M.).

Distribution: Sweden, Denmark (unpublished), England, Germany, the Faroes, Greenland, U.S.A., California.

Hosts: *Xema sabini, Rhodostethia rosea, Rissa tridactyla, Pagophila eburnea, Larus ichthyaëtus, L. ridibundus, L. canus, L. argentatus, L. fuscus, L. marinus, L. occidentalis, L. glaucescens, L. delewarensis, Stercorarius parasiticus, Sula bassana, Numenius phaeopus.*

25. *Docophorus cordiceps* Giebel.

Docophorus cordiceps Piaget 1880 p. 80 pl. VI fig. 2.

Iceland record:

Docophorus cordiceps Lindroth 1931 p. 143.

Occurrence in Iceland: *N.:* Without special locality (*Tringa totanus*) (Lindroth).

Distribution: Sweden, Germany.

Hosts: *Vanellus vanellus, Tringa erythropus, T. totanus, T. hypoleucos, Calidris arenaria.*

26. *Docophorus acanthus* Giebel.

Docophorus acanthus Piaget 1880 p. 84 pl. VI fig. 6; Hastaephorus acanthus Kéler 1936 fig. 2 b, d.

Occurrence in Iceland: *W.:* Reykjavík (*Haematopus ostralegus*) (H.M.).

Distribution: England, Germany, the Faroes.

Host: *Haematopus ostralegus.*

27. *Docophorus alpinus* Giebel.

Docophorus alpinus Giebel 1874 p. 105; Hastaephorus alpinus Kéler 1936 p. 262 fig. 2 a, c.

Occurrence in Iceland: *W.:* Reykjavík (*Calidris maritima*) (H.M.).

Distribution: Germany.

Host: *Tringa alpina.*

28. *Docophorus semivittatus* Giebel.

Docophorus semivittatus Piaget 1880 p. 82 pl. VI fig. 4.

Occurrence in Iceland: *W.:* Reykjavík (*Charadrias hiaticula psammodromas*) (H.M.).

Distribution: Germany.

Host: *Charadrius morinellus.*

29. *Docophorus melanocephalus* Nitzsch.

Docophorus melanocephalus Piaget 1880 p. 109 pl. IX fig. 5.

Occurrence in Iceland: *W.:* Reykjavík (*Sterna paradisaea* (albino)) (H.M.); Elliðaá (*Sterna* sp.) (G.G.).

Distribution: Sweden, England, Germany, Greenland, Siberia, California.

Hosts: *Sterna hirundo, S. sandvicensis, S. maxima, Hydroprogne tschegrava, Larus ridibundus, Stercorarius pomarinus.*

30. *Docophorus fraterculae* n. sp.

Occurrence in Iceland: *S.:* Vestmannaeyjar (*Fratercula arctica*) (H.M.).

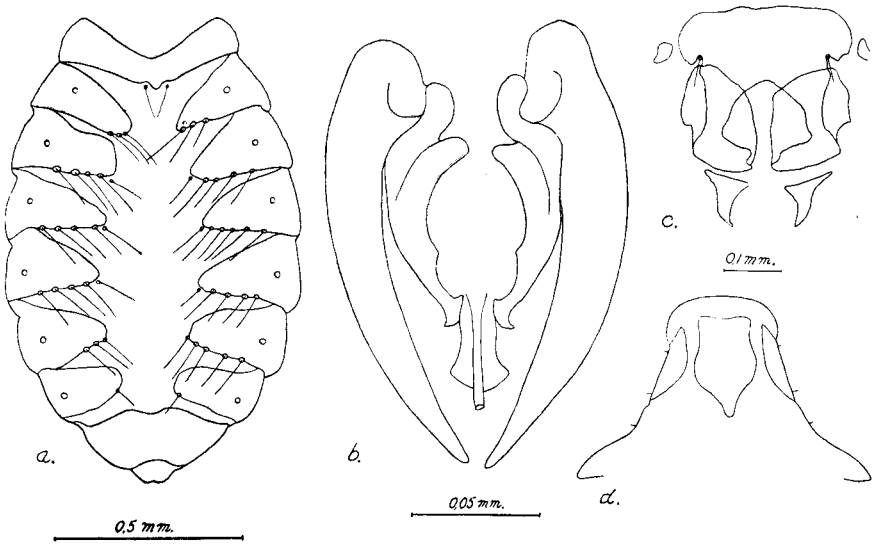

Fig. 2. *Docophorus fraterculae* n. sp. a. Dorsal view of female abdomen, b. male genitalia, c. female genital plate, d. clypeus (female).

Description: Habitually it somewhat ressembles *D. melanocephalus*, but its colour is much lighter.

Clypeus is convex anteriorly and somewhat protruding laterally (fig. 2 d). The shape of the postclypeal part of the head is as in *D. celedoxus*. The dorsal chaetotaxis of the abdomen is very characteristic: 5—6 hairs are found on the hind margin of the chitinous plates of segments 3—6. The chitinous plates are rather broad and evenly rounded (fig. 2 a).

Male genitalia with short, stout and evenly rounded parameres (fig. 2 b). Female genital plate (fig. 2 c) more complicated than that of *D. celedoxus*.

Remarks: 4 ♂♂, 4 ♀♀ and 3 juvv. are present in the material. See further remarks under *D. celedoxus*.

31. *Docophorus celedoxus* Nitzsch.

Docophorus celedoxus Piaget 1880 p. 113 pl. IX fig. 8.

Occurrence in Iceland: *W.*: Reykjavík (*Alca torda, Uria aalge, U. grylle*) (H.M.).

Distribution: Sweden, England, Germany, Greenland.

Hosts: *Alca torda* (type), *U. aalge, U. grylle, Fratercula arctica ?*

Remarks: As an important character of this species Piaget and others mention the anteriorly concave clypeus (fig. 3 d). However

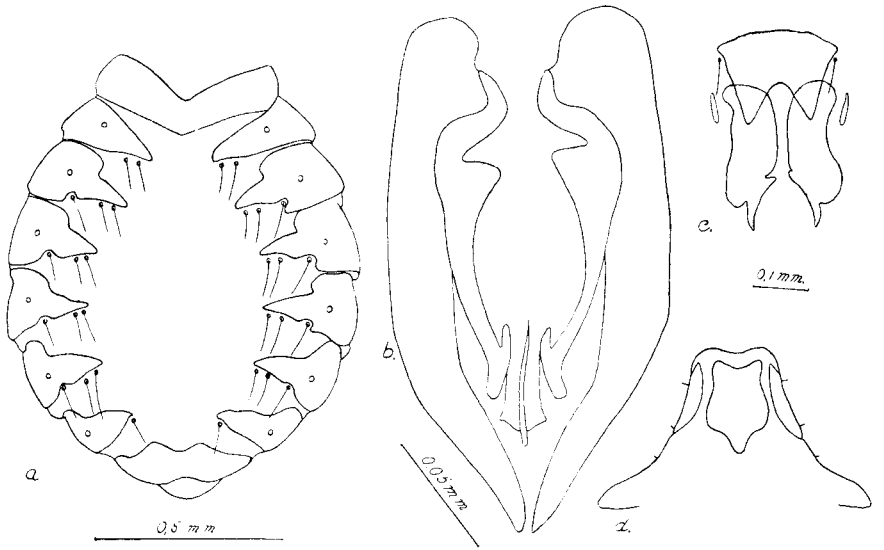

Fig. 3. *Docophorus celedoxus* (from *Alca torda*). a. Dorsal view of female abdomen, b. male genitalia, c. female genital plate, d. clypeus (female).

Mjöberg (1910) writes about *D. celedoxus:* "Zwar stimmen die Angaben Piagets 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." During the examination of the fairly good material I came to the following result: The type host of *D. celedoxus* is *Alca torda.* My specimens from this host agree very well with Piaget's description, the front border of the clypeus being deeply concave. The specimens from *Uria aalge* and *U. grylle* agree with those from *Alca torda* in the very characteristic shape of the dorsal chitinizations of the abdomen (fig. 3 a), the male genitalia (fig. 3 b), and the female genital plate (fig. 3 c); but while the clypeal front border of the specimens from *Alca torda* is constantly concave. it is slightly concave or transverse in those from *U. aalge* and slightly or distinctly convex in those from *U. grylle.* It is very likely, therefore. that Mjöberg's material has the same composition. As, however, the genitalia and dorsal chitinizations of the abdomen of both sexes show quite constant characters, I propose to define the two species *D. celedoxus* and *D. fraterculae* on the basis of these facts. The *D. celedoxus* recorded from *Fratercula arctica* by Mjöberg probably belongs to *D. fraterculae.* Perhaps the examination of a larger material may justify the establishment of constant races or species

from other *Alcidae*, however, it would seem that *D. celedoxus* and *D. fraterculae* have no close generic relations to each other.

32. *Docophorus subflavescens* Geoffroy.

cf. Docophorus communis Piaget 1880 p. 54 pl. IV fig. 5; D. c. var. Rubeculae ib. p. 57; D. c. var. Garrulae ib. p. 59 pl. IV fig. 7.

Occurrence in Iceland: *W.:* Reykjavík (*Turdus musicus coburni* (Redwing), *Oenanthe oenanthe schiöleri*, *Plectrophenax nivalis insulae*) (H.M.).

Distribution: Europe, Japan, America, Greenland.

Hosts: A great many *Passeres.*

Remarks: The species has been subdivided into several (sub)species, but only some few of them have been thoroughly described; the specimens from the two first-named hosts cannot be referred to any (sub)species known, while those from *Plectrophenax* seem to belong to *D. subflavescens hamatus* Packard.

33. *Docophorus* sp.

Occurrence in Iceland: *W.:* Reykjavík (*Arenaria interpres*) (H.M.).

Remarks: From *A. interpres D. cordiceps* has been recorded, however, the specimens do not belong to this species, but to the subgenus *Hastaephorus* Kéler.

34. *Nirmus ochropygus* Nitzsch.

Nirmus ochropygus Piaget 1880 p. 181 pl. XV fig. 5.

Occurrence in Iceland: *W.:* Reykjavík (*Haematopus ostralegus*) (H.M.).

Distribution: Sweden, England, Germany, the Faroes.

Hosts: *Haematopus ostralegus*, *Himantopus himantopus.*

35. *Nirmus phaeopi* Denny.

Nirmus phæopodis Giebel 1874 p. 166.

Occurrence in Iceland: *S.:* Bíldsfell (*Numenius phaeopus*) G.G.).

Distribution: Sweden, England, Germany, the Faroes, Greenland.

Hosts: *Numenius phaeopus* (type), *Calidris alpina.*

36. *Nirmus furvus* Nitzsch.

Nirmus furvus Piaget 1880 p. 169 pl. XIV fig. 3.

Iceland record:

Nirmus furvus Lindroth 1931 p. 143.

Occurrence in Iceland: *N.:* Without special locality (*Tringa totanus*) (Lindroth).

Distribution: Sweden, England, Germany.

Hosts: *Vanellus vanellus, Charadrius dubius, Arenaria interpres, Limosa lapponica, Tringa nebularia, T. erythropus, T. ochropus, T. hypoleucos, Calidris alpina, C. subarquata.*

37. *Nirmus triangulatus* Nitzsch.

Nirmus triangulatus Piaget 1880 p. 201 pl. XVI fig. 5.

Iceland record:

Nirmus triangulatus Lindroth 1931 p. 143.

Occurrence in Iceland: *N.:* Without special locality (*Stercorarius parasiticus*) (Lindroth).

Distribution: Sweden, Greenland, California, Siberia.

Hosts: *Stercorarius pomarinus, S. parasitica, Larus canus.*

38. *Nirmus lineolatus* Nitzsch.

Nirmus lineolatus Piaget 1880 p. 199 pl. XVI fig. 3.

Iceland record:

Nirmus lineolatus Lindroth 1931 p. 143.

Occurrence in Iceland: *N.:* Without special locality (*Rissa tridactyla*) (Lindroth).—*W.:* Reykjavík (*Rissa tridactyla, Larus marinus, L. hyperboreus*) (H.M.).

Distribution: Sweden, England, Germany, Greenland, California, Siberia.

Hosts: *Xema sabini, Rissa tridactyla, Larus canus, L. argentatus, L. occidentalis, L. glaucescens, L. californicus, L. delewarensis, L. hyperboreus.*

39. *Nirmus citrinus* Nitzsch.

Nirmus citrinus Piaget 1880 p. 190 pl. XVI fig. 8.

Occurrence in Iceland: *W.:* Reykjavík (*Alca torda, Uria aalge*) (H.M.).

Distribution: Sweden, England.
Hosts: *Alca torda, Uria aalge.*

40. *Nirmus* sp.

Occurrence in Iceland: *W.:* Reykjavík (*Troglodytes troglodytes islandicus*) (H.M.).

Remarks: Unfortunately this interesting species is only represented by some larvae, one female, and a fragment of an adult specimen, so I shall refrain from going into details regarding its identity. As far as can be seen, it does not belong to Kéler's genus *Brüelia*, of which several species are known from *Passeres*. No *Nirmus* at all has been recorded from *Troglodytes*.

41. *Anaticola anseris* (Linné).

Lipeurus jejunus Piaget 1880 p. 348 pl. XXX fig. 8.

Occurrence in Iceland: *S.:* Bíldsfell (*Anser* sp.) (G.G.).
Distribution: Sweden, England, Holland, Germany, Latvia, Greenland.
Hosts: *Anser fabalis, A. domesticus, A. albifrons, Branta bernicla, B. canadensis, Alopochen aegypticus, Anas penelope, A. platyrhyncha, Nyroca ferina, Somateria mollissima, Gallinula chloropus.*

42. *Philichthyophaga longicornis* (Piaget).

Lipeurus longicornis Piaget 1880 p. 334 pl. XXVII fig. 3.

Iceland records:

Lipeurus longicornis Mjöberg 1910 p. 91.
Lipeurus longicornis Lindroth 1931 p. 144.

Occurrence in Iceland: Without special locality (*Phalacrocorax carbo*) (Mjöberg).
Distribution: England, Holland, Germany.
Hosts: *Phalacrocorax c. carbo* (type), *Ph. a. aristotelis.*

43. *Pectinopygus bassani* (O. Fabricius).

Lipeurus pullatus Piaget 1880 p. 339 pl. XXVII fig. 9.

Occurrence in Iceland: *E.:* Berufjörður (*Sula bassana*).
Distribution: Denmark (unpublished), Sweden, England, Germany, the Faroes.
Host: *Sula bassana.*

Remarks: In O. Fabricius's original description (1780) the species is called *Pediculus bassani*, so I see no reason why Thompson (1937b) should call it *Pectinopygus bassanae*.

44. *Lipeurus celer* Kellogg.

Lipeurus celer Kellogg 1896 p. 117 pl. VII fig. 5, 6.

Occurrence in Iceland: *S.:* Ingólfshöfði (host unknown) (G.G.); Vestmannaeyjar (*Fulmarus glacialis*) (H.M.).

Distribution: California.

Host: *Fulmarus glacialis rodgersii.*

Remarks: Kellogg (l.c.) states that it is a very common species on *Fulmarus glacialis.*

45. *Lipeurus* sp.

Iceland record:

Lipeurus sp. Lindroth 1931 p. 144.

Occurrence in Iceland: *S.:* Breiðabólsstaður (Síða) (*Anas platyrhyncha*) (Lindroth).

46. *Lipeurus* sp.

Iceland records:

Lipeurus sp. Mjöberg 1913 p. 24.
Lipeurus sp. Lindroth 1931 p. 144.

Occurrence in Iceland: *S.:* Vestmannaeyjar (*Larus hyperboreus*) (Mjöberg).

47. *Ornithobius bucephalus* Giebel.

Ornithobius bucephalus Piaget 1880 p. 377 pl. XXI fig. 4.

Iceland records:

Ornithobius bucephalus Mjöberg 1913 p. 24.
Ornithobius bucephalus Lindroth 1931 p. 143.

Occurrence in Iceland: *N.:* Húsavík (Mjöberg) (*Cygnus cygnus*).

Distribution: Sweden, England, Ireland, Germany.

Hosts: *Cygnus cygnus, C. olor, C. bewicki.*

B. Anoplura.

48. *Pediculus humanus humanus* Linné.

Pediculus humanus humanus Ewing 1926 p. 22 fig. 1 A, 2, 3 A, 7, and pl. 3 fig. 8; P. capitis Jancke 1938 p. 51 fig. 1.

Iceland records:

Pediculus humanus [partim] Olafsen & Povelsen 1772 p. 606, 712.
Pediculus capitis Lindroth 1931 p. 144.

Occurrence in Iceland: It is reported to be widely distributed and, at any rate formerly, very common (Lindroth).

Distribution: Throughout the world.

Host: *Homo.*

49. *Pediculus humanus corporis* de Geer.

Pediculus humanus Jancke 1938 p. 51 fig. 2.

Iceland records:

Pediculus humanus [partim] Olafsen & Povelsen 1772 p. 606, 712.
Pediculus vestimenti Lindroth 1931 p. 145.

Occurrence in Iceland: Just as widely distributed as the preceding species (Lindroth).

Distribution: Throughout the world.

Host: *Homo.*

50. *Phthirus pubis* Linné.

Phthirus pubis Jancke 1938 p. 53 fig. 3.

Iceland records:

Pediculus ferus Olafsen & Povelsen 1772 p. 606.
Pediculus pubis O. F. Müller 1776 p. 184.
Phthirius pubis Lindroth 1931 p. 145.

Occurrence in Iceland: The species hardly occurs outside the harbours; it is especially common in fishing boats (Lindroth).

Distribution: Throughout the world.

Host: *Homo.*

II. General Remarks.

In the following list I give all the Mallophagan species known from Iceland arranged according to their hosts.

Homo sapiens.	Pediculus humanus humanus.
	Pediculus humanus corporis.
	Phthirus pubis.
Bos taurus.	Bovicola bovis.
Ovis aries.	Bovicola ovis.
Equus caballus.	Bovicola equi.
Anas crecca.	Docophorus icterodes.
Anas platyrhyncha.	Lipeurus sp.
Cygnus cygnus.	Menopon brevithoracicum.
	Trinoton anserinum.
	Ornithobius bucephalus.
Gallus domesticus.	Menopon pallidum.
	Menacanthus stramineus.
Numenius phaeopus.	Menopon ambiguum.
	Nirmus phaeopi.
Arenaria interpres.	Menopon sp.
	Colpocephalum bicolor.
	Docophorus sp.
Haematopus ostralegus.	Colpocephalum grandiceps.
	Docophorus acanthus.
	Nirmus ochropygus.
Charadrius hiaticula psammodromas.	Docophorus semivittatus.
Calidris maritima.	Docophorus alpinus.
Tringa totanus.	Colpocephalum importunum.
	Colpocephalum spinulosum.
	Docophorus cordiceps.
	Nirmus furvus.
Alca torda.	Menopon nigropleurum.
	Docophorus celedoxus.
	Nirmus citrinus.
Uria aalge.	Menopon sp.
	Docophorus celedoxus.
	Nirmus citrinus.
Uria grylle.	Docophorus celedoxus.
Fratercula arctica.	Docophorus fraterculae.
Rissa tridactyla.	Docophorus lari.
	Nirmus lineolatus.
Pagophila eburnea.	Docophorus lari.
Larus marinus.	Docophorus lari.
	Nirmus lineolatus.
Larus canus.	Lipeurus sp.

Larus hyperboreus.	Docophorus lari.
	Nirmus lineolatus.
Sterna paradisaea.	Docophorus melanocephalus.
Stercorarius parasiticus.	Docophorus pustulosus.
	Nirmus triangulatus.
Fulmarus glacialis.	Lipeurus celer.
Fulmarus glacialis ?	Menopon numerosum.
Phalacrocorax carbo.	Philichthyophaga longicornis.
Sula bassana.	Pectinopygus bassani.
Corvus corax.	Myrsidea anaspila.
	Colpocephalum subaequale.
	Docophorus semisignatus.
	Docophorus ocellatus.
Turdus musicus coburni.	Docophorus subflavescens.
Oenanthe oenanthe schiöleri.	Docophorus subflavescens.
Troglodytes troglodytes islandicus.	Nirmus sp.
Plectrophenax nivalis insulae.	Menacanthus chrysophaeus.
	Docophorus subflavescens.

Owing to the character of their habitat the Mallophaga and Anoplura are rather independent of the climate within the area of distribution of their hosts. Consequently, their purely geographical distribution is of less biological value than their host distribution.

Dealing with the zoogeography of the Mallophaga, we must necessarily take into consideration that only the following ways of dispersal can come into question:

1. Migration from an adult host-individual to the young ones during their stay in the nest or when otherwise under the protection of the parents. No doubt this is the commonest way of dispersal of the Mallophaga, although no distribution outside that of the hosts previously known will result from it. As regards Iceland, no new species can have been carried directly to the island in this way, for the stationary birds never leave Iceland, and the birds of passage do not copulate till arriving at the breeding grounds.

2. Migration from one adult host-individual to another during copulation or some other direct contact. Of course, this mode of dispersal is of less importance than the preceding one; still it must be taken into consideration, for the Mallophaga show a very marked tendency to leave a host-individual when an opportunity offers.

3. Migration from one individual to another belonging to the same or a different species during direct contact. This provides the first example of a way of dispersal in which new Mallophagan species may have

been carried to Iceland, for the birds of passage may have been infected not only in Iceland, but also during their winter sojourns in other parts of the world. Subsequently a dispersal within Iceland may take place in the same or a different way, the parasites being in this way transferred to other hosts. When, for instance ravens and gulls flock around a carcase, there is a fair chance of such an exchange of parasites. The same is true of the bird rocks where several host species are gathered. The infection of *Alca torda*, *Uria aalge*, and perhaps other *Alcae* with identical Mallophagan species may probably be explained in this way.

4. Migration from a bird caught by a bird of prey to the latter. The greatly heterogeneous Mallophagan fauna of the birds of prey proves that this factor should not be disregarded.

In all the preceding cases the dispersal is furthered by the tendency shown by the Mallophaga to leave one host-individual in favour of the other.

Indirect dispersal of adult Mallophaga must be considered impossible, as they live but a few hours outside their natural surroundings. Possibly the eggs, attached singly to the feathers, may be carried about, but nothing is known with certainty about their resistance to changes of temperature, humidity, or other factors.

It will be understood, that possibilities for dispersal are very often present; however, another factor is of great importance: Will a Mallophagan species, if transferred from an obligate host to a new host, be able to sustain life there? No general answer can be given to this question. Poultry-yards present excellent possibilities for straggling, and there is no doubt that e.g. fowl will very often be infected by Mallophaga from pigeons, ducks, geese, as well as from guinea-fowl, peacocks, and pheasants, and vice versa, but the result is very different to the hosts as well as to the Mallophaga. *Menopon pallidum*, the commonest species of Mallophaga occurring on fowl, does not occur on other species, while *Menacanthus stramineus* has been found on the species mentioned in the synopsis. Several species of gulls have the Mallophagan species *Docophorus lari* and *Nirmus lineolatus* in common, while *Pectinopygus bassani* has only been found on the gannet, where it may be extremely common. No explanation can be given except that some species are too specialized to live on a new host, while others have retained this ability.

Thus it will be seen that the distribution of a Mallophagan species is equal to the combined distribution of the hosts when a state of equilibrium has been reached. The Icelandic material presents two very interesting facts, of which, however, I am unable to give a satisfactory explanation: In Continental Europe *Oenanthe oenanthe* is a widely distributed species; the Mallophagan species *Menacanthus exilis* has only been found on it

twice and other species never. In Iceland *Docophorus subflavescens* has been found on it. Possibly it is due to the fact that the populations of this bird in Iceland and in Continental Europe belong to different races.

From *Troglodytes troglodytes islandicus* two Icelandic finds of a *Nirmus* sp. are included in the present paper. So far no *Nirmus* has been recorded from this bird, and the occurrence is even more inexplicable as the parasite in question does not probably belong to the genus *Brüelia*, which is characteristic of the *Passeres*.

The Mallophaga of the cattle and fowl have, of course, been carried to Iceland together with the imported individuals.

The Anoplura of man were probably introduced already by the ancient settlers.

Regarding the food of the Mallophaga it has been maintained to consist partly of feathers and partly of blood. Eichler (1937) went even so far as to draw the conclusion, from a—not quite convincing—material accessible to him, that feathers are more common as food elements in *Ischnocera* than in *Amblycera*, while as regards blood the opposite is the case (if this should at all be taken into consideration as a regular food element). A test whether blood is present in the alimentary canal would claim special methods which I have not been able to use on the present material. The presence of feathers, on the contrary, is easily seen, and I am quite certain that all the specimens examined of both the groups mentioned above had feathers in the alimentary canal. And the same could be observed in a large material of Mallophaga from gallinaceous birds lately examined by me (Overgaard 1943). So, if there is actually any difference between the groups, what I see no reason to assume, it must be due to the importance of blood as a food element.

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