

CHECKLIST OF THE MALLOPHAGA OF MIDWAY ATOLL, PACIFIC OCEAN

By Ronald A. Ward¹ and John C. Downey²

Abstract: Forty-two species of Mallophaga are listed from 25 species of birds on Midway Atoll. These records summarize earlier information, including Pacific Ocean Biological Survey Program collections, collated with extensive collections made during ornithological studies from 1959 through 1962. Host records include breeding species, migrants and visitants. The taxon *Docophoroides niethammeri* Timmermann is clarified and *D. niethammeri exiguus* Timmermann is placed as a synonym of the nominate subspecies; it is host-restricted to *Diomedea immutabilis*. *Docophoroides ferrisi* Harrison is considered a distinct species, restricted to *Diomedea nigripes*. *Saemundssonina lobaticeps*

remota Timmermann is elevated to specific status. Host specificity is briefly discussed, with emphasis on the albatrosses.

Midway Atoll is situated in the central Pacific, at 28°15'N and 177°20'W, about 150 km west of Pearl and Hermes Reef near the end of the north-western Hawaiian Islands, and approximately equidistant from the main Hawaiian Islands (ESE) and the Marshall Islands (SW). The atoll, which contains 2 small islands, Eastern and Sand Island, is under the administrative jurisdiction of the U.S. Navy. Due to the isolated position of the atoll, studies of the biota are of particular interest to

¹Department of Entomology, Walter Reed Army Institute of Research, Washington, D.C. 20012, U.S.A.

²Department of Biology, University of Northern Iowa, Cedar Falls, Iowa 50613, U.S.A.

biogeographers.

In an enumeration of the arthropods of Midway Atoll, Suehiro (1960) recorded representatives of 4 genera of Mallophaga from the atoll based upon collections of the Bishop Museum. Specific identification of the specimens was not possible due to insufficient material. In 1958, K. C. Emerson submitted specimens collected by C. F. Clagg to S. von Kéler for identification. Of the 4 species, one (*Perineus tenuipennis* Kéler, 1958) from *Diomedea immutabilis* was described as a new species. Additional material collected on albatrosses was examined and described by Timmermann (1969). This included *Harrisoniella copei* Timmermann and *Dacophoroides niethammeri* Timmermann from *Diomedea nigripes* and *D. niethammeri exiguus* Timmermann from *Diomedea immutabilis*.

Under the auspices of the Pacific Ocean Biological Survey Program (POBSP) of the Smithsonian Institution, Mallophaga were collected from 1693

birds between 1963–1969. From this survey, 11 species of Mallophaga were reported from Midway Atoll by Amerson & Emerson (1971). These species are designated by an asterisk (*) in the present checklist.

Thirty species of birds, belonging to 7 orders are known from Midway. This number is based both on records in the literature and sightings by reliable observers. In 1959, an opportunity arose to collect ectoparasites from Midway on a bird salvage expedition between 2–16 December. During this period, 127 individuals of 17 bird species were carefully examined for parasites (Downey 1960). Birds were individually removed from the path of a bulldozer which was grading an area near the beach and sacrificed by injection of an anesthetic. Ectoparasites were collected by hand with forceps and preserved in 70% ethanol. Attempts were made to collect all ectoparasites from each bird and observations on the site of attachment of lice were made on the larger birds, especially the albatrosses. Approximately 1000 lice were collected during 1959. Further collections were made from 11 species by H. I. Fisher and E. D. Klimstra during 1960 and 1962. Details of these collections are summarized in TABLE 1. With the addition of 5 species from the POBSP, which were not collected by Downey or Fisher and Klimstra, a total of 42 species of Mallophaga are known from this atoll. Taxonomic notes are provided when there is a change in the status of a species or when a new host is recorded.

TABLE 1. Bird specimens examined for Mallophaga on Midway Atoll, 1959 and 1962.

BIRD HOST	YEAR	No. BIRDS EXAMINED	No. MALLOPHAGA COLLECTED
1. <i>Diomedea nigripes</i> Audubon	1959	24	>316
2. <i>Diomedea immutabilis</i> Rothschild	1959	27	292
3. <i>Puffinus pacificus chlororhynchus</i> Lesson	1959	1	9
	1962	3	18
4. <i>Puffinus nativitatis</i> Street	1962	3	34
5. <i>Pterodroma leucoptera hypoleuca</i> (Salvin)	1959	18	77
6. <i>Phaethon rubricauda rothschildi</i> (Mathews)	1959	8	27
	1962	3	3
7. <i>Phaethon lepturus dorotheae</i> Mathews	1959	1	0
8. <i>Sula dactylatra personata</i> Gould	1959	6	35
9. <i>Sula leucogaster plotus</i> (Forster)	1959	1	10
10. <i>Sula sula rubripes</i> Gould	1959	1	3
11. <i>Fregata minor palmerstoni</i> (Gmelin)	1959	6	90
12. <i>Anser albifrons</i> (Scopoli)	1962	1	8
13. <i>Pluvialis dominica fulva</i> (Gmelin)	1959	2	0
	1962	2	0
14. <i>Arenaria i. interpres</i> (Linnaeus)	1959	6	1*
15. <i>Numenius tahitiensis</i> (Gmelin)	1959	1	>51
16. <i>Larus hyperboreus</i> Gunnerus	1962	1	5
17. <i>Sterna lunata</i> Peale	1962	2	18
18. <i>Sterna fuscata oahuensis</i> Bloxam	1962	3	40
19. <i>Anous stolidus pileatus</i> (Scopoli)	1959	7	17
	1962	3	33
20. <i>Anous minutus melanogenys</i> Gray	1959	4	10
	1962	2	21
21. <i>Gygis alba rothschildi</i> Hartert	1959	7	0
	1962	3	0
22. <i>Columba livia</i> Gmelin	1959	7	19

*Many immature lice observed.

Order MALLOPHAGA

Suborder AMBLYCERA

Family MENOPONIDAE

1. *Actornithophilus bicolor* (Piaget, 1880) ex *Arenaria interpres interpres* (Linnaeus), Midway Atoll, J. C. Downey, 2–16.XII.1959, 1 ♂.
2. *Actornithophilus ceruleus* (Timmermann, 1954) ex *Anous minutus melanogenys* Gray, Sand Island, H. I. Fisher, 26–30.VII.1962, 4 ♂♂, 5 ♀♀.
3. *Actornithophilus incisus* (Piaget, 1880) ex *Anous stolidus pileatus* (Scopoli), Midway Atoll, J. C. Downey, 2–16.XII.1959, 1 ♂, 1 ♀; Eastern Island, H. I. Fisher, 20.VII.1962, 9 ♂♂, 5 ♀♀.
4. **Actornithophilus umbrinus* (Burmeister, 1838) ex *Erolia acuminata* (Horsfield), Midway Atoll. (Not collected by Downey or Fisher.)
5. *Austromenopon beckii* (Kellogg, 1906) ex *Phaethon rubricauda rothschildi* (Mathews), Midway Atoll, J. C. Downey, 2–16.XII.1959, 1 ♀; Eastern Island, H. I. Fisher, 20.VII.

- 1962, 1 ♀.
6. *Austromenopon paululum* (Kellogg & Chapman, 1899)
ex *Puffinus nativitatis* Streets, Eastern Island, H. I. Fisher, 26.VII.1962, 1 ♂, 1 ♀.
 7. **Austromenopon pinguis* (Kellogg, 1896)
ex *Diomedea nigripes* Audubon, 2 ♂♂, 1 ♀ and
ex *D. immutabilis* Rothschild, 1 ♀; both from
Midway Atoll, J. C. Downey, 2-16.XII.1959.
Amerson & Emerson (1971) identified this
species as *Procellariophaga affinis* (Piaget, 1890),
a synonym of *A. pinguis* (Kellogg) (Price &
Clay 1972).
 8. *Colpocephalum angulaticeps* (Piaget, 1880)
ex *Fregata minor palmerstoni* (Gmelin), Midway
Atoll, J. C. Downey, 2-16.XII.1959, 1 ♀.
 9. **Trinoton querquedulae* (Linnaeus, 1758)
ex *Anser albifrons* (Scopoli), Eastern Island,
W. D. Klimstra, 5-7.XII.1962, 4 ♂♂. The
POBSP collected this species on Midway
from *Anas carolinensis* Gmelin, *Anas acuta*
Linnaeus, *Anas querquedula* Linnaeus and *Aythya*
fuligula (Linnaeus).
- Suborder ISCHNOCERA
Family PHILOPTERIDAE
10. *Anaticola anseris* (Linnaeus, 1758)
ex *Anser albifrons* (Scopoli), Eastern Island,
W. D. Klimstra, 5-7.XII.1962, 1 ♂, 1 ♀.
 11. **Anatoecus* sp.
ex *Aythya fuligula* (Linnaeus), Midway Atoll.
(Not collected by Downey or Fisher).
 12. *Campanulotes bidentatus compar* (Burmeister, 1838)
ex *Columba livia* Gmelin, Sand Island, J. C.
Downey, 2-16.XII.1959, 1 ♀.
 13. **Carduiceps zonarius* (Nitzsch, 1866)
ex *Erolia acuminata* (Horsfield), Midway Atoll.
(Not collected by Downey or Fisher).
 14. *Columbicola columbae* (Linnaeus, 1758)
ex *Columba livia* Gmelin, Sand Island, J. C.
Downey, 2-16.XII.1959, 1 ♀.
 15. **Docophoroides ferrisi* Harrison, 1937
ex *Diomedea nigripes* Audubon, Midway Atoll,
J. C. Downey, 2-16.XII.1959, 7 ♂♂, 9 ♀♀.
This species was listed by Amerson & Emerson
(1971) as *Docophoroides pacificus ferrisi* Harrison.
The record of *Docophoroides niethammeri* Tim-
mermann, 1969 from this host on Sand
Island is in error and will be discussed as the
next species.
 16. *Docophoroides niethammeri* Timmermann, 1969
ex *Diomedea immutabilis* Rothschild, Midway
Atoll, J. C. Downey, 2-16.XII.1959, 10 ♂♂,
10 ♀♀. The type host of this species was

designated as *Diomedea nigripes* by Timmermann (1969: 245). An examination of numerous series of specimens from Midway and the Pacific area indicates that 2 different species of *Docophoroides* occur on the 2 Midway albatross species; 1 species is restricted to each host.

The species differ from one another in terms of sexual dimorphism of the male antennae and in size. The antennae of *Docophoroides ferrisi* Harrison are highly dimorphic with a markedly elongate 3rd segment while those of *D. niethammeri* Timmermann exhibit only slight dimorphism. In most body measurements, *D. ferrisi* is significantly larger than *D. niethammeri* (TABLE 2). With the use of any 2 measurements an individual may be definitely assigned to 1 of the 2 species.

The host of *Docophoroides niethammeri* Timmermann apparently was misidentified in the original collection made by C. F. Clagg, thus giving the erroneous impression that 2 species of *Docophoroides* occur on *Diomedea nigripes*. The identity of this species is further confused by the description of a new subspecies, *Docophoroides niethammeri exiguus* Timmermann, 1969 on p. 246. This subspecies was recorded from *Diomedea immutabilis*. Measurements (in mm) of *D. niethammeri exiguus* Timmermann are: 1 ♂, head width, 0.95; head length, 0.91; total length, 3.08; paramere length, 0.33; 3rd antennal segment length, 0.07 and 2 ♀♀, head width, 0.95-0.98; total length, 3.05-3.19. These measurements fall within the range of variation of specimens of *Docophoroides niethammeri* that we have examined (TABLE 2). Thus, *Docophoroides niethammeri exiguus* Timmermann becomes a synonym of *D. niethammeri* Timmermann. Emerson (1972) has pointed out that these 2 albatross species harbored different subspecies of *Docophoroides pacificus*. At that time he considered the population on *Diomedea immutabilis* intermediate to the 2 subspecies of *Docophoroides pacificus* (Kellogg, 1914) and noted that it probably represented a new subspecies. In view of the differences in sexual dimorphism of the male antennae and measurements of both sexes, *Docophoroides ferrisi* Harrison and *D. niethammeri* Timmermann should be considered distinct species rather than as subspecies of *D. pacificus* (Kellogg).

17. *Episbates pederiformis* (Dufour, 1835)
ex *Diomedea nigripes* Audubon, Midway Atoll,

TABLE 2. Measurements (in mm) of *Docophoroides* species from albatrosses on Midway Atoll.

STRUCTURE	<i>D. niethammeri</i> TIMMERMANN*		<i>D. ferrisi</i> HARRISON**	
	Mean	Range	Mean	Range
♂				
Head width	1.01	0.92-1.06	1.24	1.10-1.32
Head length	0.93	0.82-0.98	1.03	0.98-1.07
Total length	3.30	2.80-3.56	4.10	3.77-4.75
Paramere length	0.37	0.34-0.38	0.47	0.41-0.50
3rd antennal segment length	0.11	0.09-0.15	0.23	0.17-0.26
♀				
Head width	1.07	1.03-1.15	1.23	1.16-1.31
Total length	3.40	3.26-3.65	3.93	3.55-4.22

*10 ♂♂ and 7 ♀♀ measured.

**6 ♂♂ and 9 ♀♀ measured.

- J. C. Downey, 2-16.XII.1959, 5 ♂♂, 4 ♀♀.
18. *Halipeurus leucophryna* Timmermann, 1960
ex *Pterodroma leucoptera hypoleuca* (Salvin), Midway Atoll, J. C. Downey, 2-16.XII.1959, 3 ♂♂, 6 ♀♀.
19. *Halipeurus mirabilis* Thompson, 1940
ex *Puffinus pacificus chlororhynchus* Lesson, Midway Atoll, J. C. Downey, 2-16.XII.1959, 1 ♂; Eastern Island, H. I. Fisher, 15.VII.1962, 2 ♀♀.
20. **Halipeurus spadix* Timmermann, 1961
ex *Puffinus nativitatis* Street, Eastern Island, H. I. Fisher, 26.VII.1962, 11 ♂♂, 1 ♀.
21. *Harrisoniella copei* Timmermann, 1969
ex *Diomedea nigripes* Audubon, Midway Atoll, J. C. Downey, 2-16.XII.1959, 5 ♂♂, 6 ♀♀.
22. *Harrisoniella densa* (Kellogg, 1896)
ex *Diomedea immutabilis* Rothschild, Midway Atoll, J. C. Downey, 2-16.XII.1959, 1 ♂, 5 ♀♀.
23. **Luniceps hopkinsi* Timmermann, 1954
ex *Numenius tahitiensis* (Gmelin), Midway Atoll, J. C. Downey, 2-16.XII.1959, 1 ♂, 1 ♀.
24. *Naubates harrisoni* Bedford, 1930
ex *Puffinus nativitatis* Street, Eastern Island, H. I. Fisher, 26.VII.1962, 2 ♂♂, 1 ♀.
- 24a. *Naubates* sp.
ex *Puffinus pacificus chlororhynchus* Lesson, Eastern Island, H. I. Fisher, 15.VII.1962, 2 ♀♀. This species is probably *Naubates harrisoni* Bedford.
25. **Paraclisis confidens* (Kellogg, 1899)
ex *Diomedea nigripes* Audubon, Midway Atoll, J.C. Downey, 2-16.XII.1959, 17 ♂♂, 28 ♀♀.
26. *Paraclisis giganticola* (Kellogg, 1896)
ex *Diomedea immutabilis* Rothschild, Midway Atoll, J. C. Downey, 2-16.XII.1959, 1 ♂, 16 ♀♀.
27. *Pectinopygus annulatus* (Piaget, 1880)
ex *Sula sula rubripes* Gould, Midway Atoll, J. C. Downey, 2-16.XII.1959, 1 ♂.
28. *Pectinopygus gracilicornis* (Piaget, 1880)
ex *Fregata minor palmerstoni* (Gmelin), Midway Atoll, J. C. Downey, 2-16.XII.1959, 4 ♂♂, 11 ♀♀; ex *Sula dactylatra personata* Gould, same locality, collector and date, 1 ♂, 1 ♀. This record represents contamination from *Fregata minor* specimens which were collected during the same period.
29. *Pectinopygus sulae* (Rudow, 1869)
ex *Sula leucogaster plotus* (Forster), Midway Atoll, J. C. Downey, 2-16.XII.1959, 1 ♂, 1 ♀; ex *Sula dactylatra personata* Gould, same locality, collector and date, 3 ♂♂, 1 ♀.
30. *Perineus tenuipennis* Keler, 1958
ex *Diomedea immutabilis* Rothschild, Midway Atoll, J. C. Downey, 2-16.XII.1959, 3 ♀♀; ex *Diomedea nigripes* Audubon, same locality, date and collector, 2 ♀♀.
31. *Quadriceps birostris* (Giebel, 1874)
ex *Sterna fuscata oahuensis* Bloxham, Sand Island, H. I. Fisher, 20.VII.1962, 8 ♂♂, 5 ♀♀; ex *Sterna lunata* Peale, Sand Island, H. I. Fisher, 27.VII.1962, 4 ♂♂, 7 ♀♀. Specimens from *Sterna lunata* are slightly smaller than the series on *Sterna fuscata* (TABLE 3). The male genitalia of *Quadriceps* from both hosts are similar except for a slight variation in the mesosome. Examination of additional series may indicate that the population on *Sterna lunata* merit separate taxonomic status.
32. *Quadriceps hopkinsi* Timmermann, 1953
ex *Anous minutus melanogenys* Gray, Midway Atoll, J. C. Downey, 2-16.XII.1959, 2 ♂♂, 1 ♀; Sand Island, H. I. Fisher, 26-30.VII.1962, 5 ♂♂, 7 ♀♀.

TABLE 3. Measurements (in mm) of *Quadriceps birostris* (Giebel) from terns of Midway Atoll.

STRUCTURE	Host			
	<i>Sterna fuscata oahuensis</i> *		<i>Sterna lunata</i> **	
	Mean	Range	Mean	Range
♂				
Head width	0.41	0.39-0.41	0.38	0.37-0.38
Head length	0.59	0.59-0.60	0.57	0.56-0.59
Total length	1.99	1.95-2.03	2.01	1.95-2.06
Paramere length	0.16	0.16-0.17	0.17	0.17
♀				
Head width	0.43	0.42-0.44	0.40	0.39-0.41
Head length	0.67	0.66-0.67	0.61	0.60-0.63
Total length	2.42	2.35-2.49	2.26	2.21-2.37

*4 ♂♂ and 2 ♀♀ measured.

**4 ♂♂ and 7 ♀♀ measured.

33. **Quadriceps obscurus* (Burmeister, 1838)
ex *Tringa glareola* Linnaeus, Midway Atoll.
(Not collected by Downey or Fisher).
34. *Quadriceps ornatus striolatus* (Nitzsch, 1866)
ex *Larus hyperboreus* Gunnerus, Sand Island,
H. I. Fisher, 14.XI.1960, 2 ♂♂.
35. *Quadriceps separatus* (Kellogg & Kuwana, 1902)
ex *Anous stolidus pileatus* (Scopoli), Eastern
Island, H. I. Fisher, 20.VII.1962, 4 ♂♂, 9 ♀♀.
36. *Saemundssonina albemarlensis* (Kellogg & Kuwana,
1902)
ex *Sterna fuscata oahuensis* Bloxham, Sand
Island, H. I. Fisher, 20.VII.1962, 10 ♂♂,
9 ♀♀.
37. *Saemundssonina hexagona* (Giebel, 1874)
ex *Phaethon rubricauda rothschildi* (Mathews),
Midway Atoll, J. C. Downey, 2-16.XII.1959,
1 ♀; Eastern Island, H. I. Fisher, 20.VII.
1962, 1 ♂.
38. *Saemundssonina lari* (O. Fabricius, 1780)
ex *Larus hyperboreus* Gunnerus, Sand Island,
H. I. Fisher, 14.XI.1960, 2 ♂♂, 1 ♀.
39. *Saemundssonina remota* Timmermann, 1951
ex *Anous stolidus pileatus* (Scopoli), Eastern
Island, H. I. Fisher, 20.VII.1962, 2 ♂♂, 1 ♀.
Saemundssonina lobaticeps remota Timmermann,
1951 was described from one male collected
from *Anous stolidus stolidus* (Linnaeus) in
Nigeria. The original description of this
subspecies was extremely brief, consisting
of several measurements and designation of
a type host.
- Specimens taken on *Anous stolidus pileatus*
from Midway Atoll and other Pacific localities
have been compared with *Saemundssonina lobati-*
ceps (Giebel, 1874) from *Chlidonias nigra*
(Linnaeus), the type host of the nominate
subspecies. Males from *Anous* have a greater
head width (HW = 0.68-0.71 mm) than males
from *Chlidonias* (HW = 0.54-0.60 mm). Simi-
larly, the cephalic index in the former group
is 1.10-1.13, in the latter 0.95-1.03. The
male genitalia in the former resemble *S.*
lobaticeps in possessing a basal plate with a
distal sclerotized crossbar. The length of
the parameres is 0.20-0.21 mm, similar to
that of *S. lobaticeps*. Females resemble both
S. lobaticeps (Giebel) and *S. hopkinsi* Clay,
1949 in having the hyaline anterior margin
of the head emarginate. The female head
width is greater (0.72-0.74 mm) in *Anous*
material compared to *S. lobaticeps* (0.65-
0.69 mm). Three setae are present lateral
to the last abdominal sternite of females from
Anous, while 5-7 setae are present in females
of *S. lobaticeps*. In this respect females re-
semble *S. hopkinsi*. Since these differences
appear to be constant and do not show an
overlap, *Saemundssonina lobaticeps remota* Tim-
mermann is considered a distinct species.
40. **Saemundssonina scolopacisphaeopodis* (Schrank,
1803)
ex *Numenius tahitiensis* (Gmelin), Sand Island.
(Not collected by Downey or Fisher).
41. *Saemundssonina snyderi* (Kellogg & Paine, 1910)
ex *Sterna lunata* Peale, Sand Island, H. I.
Fisher, 27.VII.1962, 2 ♂♂, 1 ♀.
42. *Trabeculus hexakon* (Waterston, 1914)
ex *Puffinus pacificus chlororhynchus* Lesson, Eastern
Island, H. I. Fisher, 15.VII.1962, 3 ♂♂,
3 ♀♀; ex *Puffinus nativitatis* Street, Eastern
Island, H. I. Fisher, 26.VII.1962, 1 ♂, 5 ♀♀;
ex *Pterodroma leucoptera hypoleuca* (Salvin), Mid-
way Atoll, J. C. Downey, 2-16.XII.1959,
1 ♂, 1 ♀.

DISCUSSION

The taxonomic study of Mallophaga collected by Downey and associates from Midway Atoll indicates that normal restriction to particular host species is maintained even when the hosts are confined to a limited geographical area. When certain species, such as *Trinoton querquedulae*, occur on several host species on Midway, this reflects the usual host spectrum. Throughout its range, *T. querquedulae* is found on numerous species of ducks and geese with little or no indication of differentiation on various host populations.

The lice of the 2 species of albatross are of special interest as the behavior of the birds offers an opportunity for parasite interchange between the 2 host species. During December 1959 Black Albatrosses were observed waddling through the nesting sites of the Laysan Albatrosses and vice versa. Different species of *Harrisoniella*, *Docophoroides* and *Paraclisis* are found on each host species, while *Austromenopon pinguis* and *Perineus tenuipennis* occur on both *Diomedea nigripes* and *D. immutabilis*. Since these 2 species also occur on these albatross species in other areas, we believe that this represents the normal host distribution of these lice. One species, *Episbates pederiformis*, was only found on *D. nigripes* on Midway Atoll. However, it does occur on both hosts in the Pacific area.

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