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The lice of the Tristan da Cunha Archipelago

(Insecta: Phthiraptera)

With 1 plate, 1 map and 2 tables

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Summary

All the louse species reported in the literature from the Tristan da Cunha archipelago have been compiled, listed and discussed, including five additional species records based on material recently collected or identified in previous collections. A total of 54 louse species (including 6 records identified at the generic or subgeneric level only), belonging to 21 genera, have been listed together with their hosts: 20 bird species and one mammal. A brief discussion on the history of louse collections made on and around the archipelago, and detailed louse records from the four main islands are also given.

Zusammenfassung

In der Arbeit sind alle bisher in der Literatur erwähnten und fünf neu gesammelte bzw. in Sammlungen nachgewiesene Laus-Arten der Tristan da Cunha Inseln aufgelistet und diskutiert. Die Liste umfasst 54 Laus-Arten aus 21 Gattungen mit ihren Wirten, nämlich 20 Vogel-Arten und einem Säugetier und Angaben zu den vier Hauptinseln. Dabei konnten 6 Funde nur bis zur Art bzw. Unterart bestimmt werden. Die Geschichte der Sammlungen auf dem Archipel und der umgebenden Region ist ebenfalls aufgeführt.

Key words

Phthiraptera, Tristan da Cunha, Nightingale, Inaccessible, Gough, South Atlantic Ocean, seabirds, landbirds

Introduction

The Tristan da Cunha archipelago consists of four main islands and a few islets that lie in the central South Atlantic, approximately 2,800 km from South Africa and 3,200 km from the nearest point of South America. Three of the islands, Tristan da Cunha, Nightingale (with its associated Middle and Stoltenhoff Islets) and Inaccessible, lie within 40 km of each other around 37°S, 12°W, while the fourth, Gough Island, is positioned some 426 km further to the south-south-east of Tristan da Cunha, at 40°18' S, 09°56' W (Figure 1).

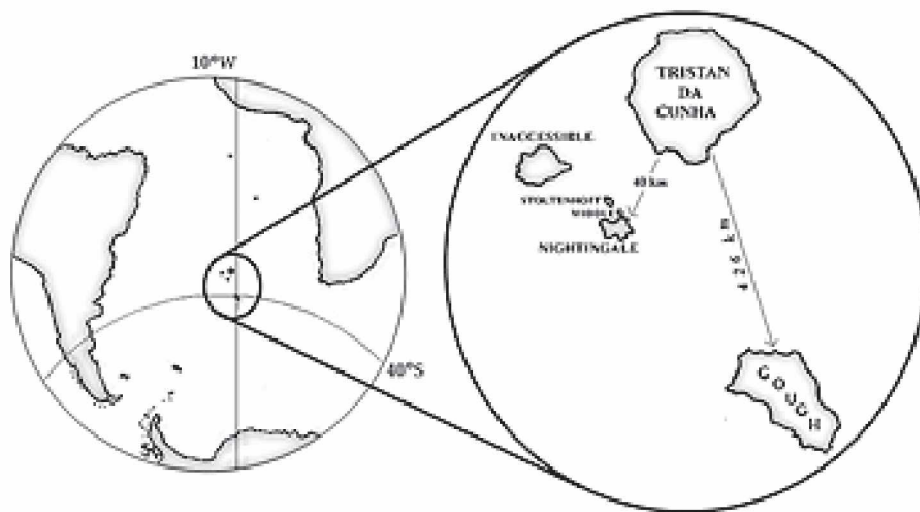


Fig. 1: The islands of the Tristan da Cunha archipelago and their position in the Atlantic Ocean. Map drawn by Christine Hänel.

The islands are all of volcanic origin, with Tristan da Cunha still being active; the most recent seismic event of significance having occurred in July 2004 as a result of a submarine eruption, some 25 km out to sea from the 1961 eruption at the Edinburgh settlement (BROCK, 2004). Tristan da Cunha is also the largest of the group, measuring close to 100 km² in area and 40 km around its conical perimeter, with the central peak rising to about 2060 m. It is the only island of the archipelago with a permanent human settlement of about 275 people, holding the status of being 'the most remote inhabited island on Earth'. The second largest of the islands is Gough with an area of 65 km², followed by Inaccessible (area 14 km²) and Nightingale (approximately 3 km²). Two of the islands are protected areas, Gough as a Wildlife Reserve, and Inaccessible as a Nature Reserve, both having been awarded World Heritage Site status. Accordingly, access to them is restricted, especially at Gough where it is principally limited to the personnel servicing the South African weather station, and the occasional group of scientists carrying out research projects (HÄNEL et al., 2005).

Birds and mammals

The islands are known primarily for their bird life, rating globally amongst the most important areas for breeding seabirds. As many as 28 breeding bird species, with at least 34 vagrant species arriving at the islands in varying degrees of abundance, have been recorded from the entire archipelago (see Appendices 2, 3). Among the breeding birds, 22 species are seabirds of which, the largest proportion are petrels and albatrosses (Order Procellariiformes). Four seabirds, the Atlantic yellow-nosed mollymawk (*Thalassarche chlororhynchos* (GMELIN, 1789)), the Tristan albatross (*Diomedea dabbenena* MATHEWS, 1929), the Spectacled petrel (*Procellaria conspicillata* GOULD, 1844), and the Atlantic petrel (*Pterodroma incerta* (SCHLEGEL, 1863)) are endemic to the archipelago. The remaining six species are all endemic landbirds. Except for poultry living at Tristan da Cunha, there is no other introduced species in the archipelago (HÄNEL et al., 2005;

RYAN & GLASS, 2001; GLASS & SANDERS, 2006). For this paper, we have extracted all bird records for the archipelago, as well as the nomenclature of bird taxa, from RYAN & GLASS, (2001) and HÄNEL et al. (2005).

The native mammals breeding on the islands consist of two marine species, the Subantarctic fur seal *Arctocephalus tropicalis* (GRAY, 1872) and the Southern elephant seal *Mirounga leonina* (LINNAEUS, 1758). Apart from humans that have settled on Tristan and visit the other islands of the archipelago, at least 10 other terrestrial species have been introduced which include vermin (mice and rats), domestic animals (dogs and cats) and livestock (cattle, sheep, pigs, donkeys and horses) (see Appendix 3), all of which are restricted to Tristan da Cunha, with the exception of mice that also occur on Gough Island.

Lice

Together, the birds and mammals of the Tristan da Cunha archipelago represent potential hosts for many louse species (Order Phthiraptera). Given that each seabird species is known to host lice belonging to several genera (CLAY & MOREBY, 1967; PILGRIM & PALMA, 1982; PRICE et al., 2003), the number of louse species represented at the islands can be expected to be high. However, besides a study conducted in 1985 on the louse fauna of Gough Island (FURNESS & PALMA, 1992), collections and information about the lice from the other three major islands of the Tristan da Cunha archipelago are still sparse and fragmented. Published records of lice from the Tristan da Cunha archipelago are scattered in several scientific publications dating from 1914 to 2002 (see Appendix 1).

In an attempt to fill some of the gaps about the invertebrate knowledge relating to Tristan da Cunha and Nightingale – the island more regularly visited – a brief project was initiated in 2005 that aimed at empowering the people of Tristan da Cunha with information and collecting techniques (HÄNEL, 2005). As part of that project, an insect collection was made at Nightingale Island, including lice from birds.

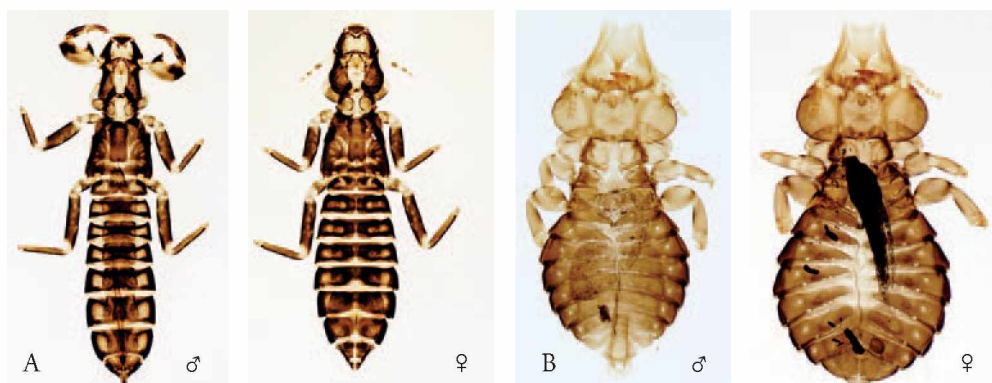


Fig. 2: Photographs of seabird lice from Tristan da Cunha. (A) *Harrisoniella hopkinsi*: male (left, total length 9.25 mm) & female (right, total length 8.95 mm) found on Tristan albatross. (B) *Saemundssonina marina*: male (left, total length 1.45 mm) & female (right, total length 1.68 mm) found on white-faced storm petrels. (Photographs taken by Jean-Claude Stahl, MONZ).

Collections of Tristan da Cunha lice

The following institutions (with their acronyms) are known to hold and care for louse material collected from hosts at the Tristan da Cunha archipelago:

- MONZ: Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand.
- NHML: Natural History Museum, London (formerly British Museum (Natural History)), England.
- NRTC: Natural Resources Department, Tristan da Cunha.
- NICD: National Institute for Communicable Diseases, Johannesburg, South Africa. (Formerly: South African Institute for Medical Research).
- SAMS: South African Museum, Cape Town, South Africa.
- ZMON: Zoologisk Museum, University of Oslo, Oslo, Norway.

Materials and methods

In this paper we have compiled all available information relevant to the lice found on hosts from the islands of the Tristan da Cunha archipelago. This is based on published and un-published information, and specimens from the 2005 collection as well as older material that was re-examined (principally housed in the MONZ).

The 2005 collection comprised 27 lice of seven different species. These were obtained from Nightingale Island by hand searches from three bird species, namely one dead Broad-billed Prion *Pachyptila vittata* (FORSTER, 1777), a pile of dead Great Shearwaters *Puffinus gravis* (O'REILLY, 1818), and two Yellow-nosed Albatrosses *Thalassarche chlororhynchos* (GMELIN, 1789), (one juvenile carcass and one live adult). All lice were preserved in 70% Ethanol, of which 22 specimens were subsequently mounted on glass slides following the technique in PALMA (1978), and positively identified by R.L.P. Among the 27 lice, 10 specimens were deposited in the University of Glasgow collection for DNA analysis, three specimens in the MONZ and the remaining material in the NRTC.

Results

Included in this paper are five new records of species for the archipelago, four new records of species for Nightingale Island, and three new records for Gough Island. Most of the new records are the result of brief collections made at Gough Island by Richard Cuthbert during 2000–2001 (see details under Collections of Tristan da Cunha lice), and at Nightingale Island during the invertebrate project conducted by C.H. in 2005 (see Appendix 1).

History of louse collections and publications

The history of the people who collected lice at the Tristan da Cunha archipelago and the fate of their collections, together with their repository institutions, have not been entirely unravelled. However, the information available is fascinating, showing that some of the earliest louse records from Southern Ocean islands may have been from or around Tristan da Cunha.

The earliest collection appears to be that made during October–November 1901 by the *Deutsche Südpolar-Expedition 1901–1903* and reported by ENDERLEIN, (1917). The records are all of lice collected from petrels and albatrosses at sea while the vessel travelled past Tristan da Cunha towards South Africa.

The next collection, the first made on the islands proper, was by a P. Bonomi, who took lice from albatrosses and petrels at Tristan da Cunha in 1904, and deposited them in the SAMS at Cape Town. In 1912, Dr. Péringuey submitted the louse material for identification to James Waterston in England. Subsequently, an account was published by WATERSTON, (1914) in which, amongst many other lice from elsewhere, he identified specimens from Inaccessible Island as belonging to two louse species (now known as *Docophoroides brevis* (DUFOUR, 1835) and *Paraclisis diomedea* (J.C. FABRICIUS, 1775)) parasitizing two species of albatrosses, *D. dabbenena* and *T. chlororhynchos* (see Appendix 1 & note 1). The report by WATERSTON, (1914) appears to be the first publication to document lice from the Tristan da Cunha archipelago.

The next louse collection known to us comprises five lice of the species *Paraclisis diomedea* extracted by R.L.P. from an Atlantic yellow-nosed mollymawk, *T. chlororhynchos*, collected at Tristan da Cunha by a certain M.J. Nicoll on 17 January 1906, and lodged in MONZ at Wellington, New Zealand (registration number N.M. 18652). Unfortunately, we have not been able to obtain further information about that albatross and its collector, but we have found that the Earl of Crawford (former President of the Royal Astronomical Society) called at Tristan da Cunha precisely on the 17 January 1906 with his yacht *Valhalla*. However "... Owing to the poor weather he was not able to land, but was met by the governor, Andrea Repetto, with eleven Islanders in two boats and the Earl gave the Islanders the mail and stores ..." (FAUSTINI, undated, before 1990).

In 1922, the *Quest* visited all the islands of the Tristan da Cunha archipelago and set ashore parties to investigate and collect specimens. Amongst them was the ship's naturalist George Hubert Wilkins who, on going ashore at Nightingale was described as follows (WILD, 1923): "... Mr. Wilkins kept shooting birds on the way up, but we had great difficulty in finding them in the grass. We were drenched to the skin ... sliding down the soaking rotten earth, stumbling blindly through the long grass and slipping into the holes". Whether purposefully or inadvertently, some louse specimens remained on the preserved skins made from that collection, including three specimens of *Perineus circumfasciatus* KÉLER, 1957 from a Sooty albatross, *Phoebetria fusca*, dated 25 May 1922, now lodged in MONZ (PALMA & PILGRIM, 1988: 583).

It was during 1937–1938 that the first and so far the only thorough entomological study was made of the three northern islands by the *Norwegian Scientific Expedition to Tristan da Cunha*. The terrestrial zoologist, Dr. Yngvar Hagen, made a collection of the invertebrates, which included lice from birds at Tristan da Cunha, Inaccessible and Nightingale. The specimens were deposited in ZMON, and some duplicates in NHML. Two publications on lice emanated from that collection, the first part being by CLAY, (1957) listing the identified specimens, and the second by TIMMERMAN, (1957) reviewing the genus *Longimenopon* THOMPSON, 1948. A specimen collected by Dr. Hagen was later included in the description of a new louse species from Giant petrels, *Macronectes giganteus* (GMELIN, 1789), by PALMA & PILGRIM, (1988: 584).

In 1949–1950, a collection of lice was made by Mrs. M. K. Rowan from birds at the three northern islands, later deposited in the NICD at Johannesburg, South Africa. KÉLER, (1951, 1952) published two accounts of the species included in that collection: the first paper contains the descriptions of two new louse species found on the flightless and endemic Inaccessible rail, *Atlantisia rogersi* LOWE, 1923, while the second includes detailed redescriptions of several louse species collected from petrels, and descriptions of two new species from penguins.

Hugh Francis Ivo Elliott, an officer of the British Colonial Service, assumed duty as Administrative Officer of Tristan da Cunha on 31 January 1950. He collected birds on the islands of the archipelago, including Gough Island, for the British Museum (Natural History) – now NHML – during 1951–1952. Several samples of lice were extracted from these birds, which are now deposited in the NHML, and most have been studied and reported in several publications (e.g. CLAY, 1957; KÉLER, 1957; TIMMERMANN, 1954, 1957; PALMA & PILGRIM, 1988, 2002), which include two species, *Austromenopon elliotti* TIMMERMANN, 1954 and *Longimenopon elliotti* TIMMERMANN, 1957, named after H.F.I. Elliott (see Table 1 & Appendix 1).

During the summer of 1955–1956, the focus shifted to Gough when a systematic study of the island was made by the *Gough Island Scientific Survey*. The expedition's leader, Martin W. Holdgate, was the entomologist who carried out the investigations concerning invertebrates. His collection of lice was also deposited in the NHML and reported in some publications (e.g. KÉLER, 1956; HOLDGATE, 1965; PALMA & PILGRIM, 2002). However, the most comprehensive collection of lice from the island group was made in 1985 by Robert W. Furness from birds at Gough Island. The results were published by FURNESS & PALMA, (1992), and the collection is deposited in MONZ.

The most recent invertebrate work of significance carried out at the archipelago was during 1999–2002, being the *Gough Island Terrestrial Invertebrate Survey* at Gough Island [*GITIS*] (JONES, 2001; JONES et al., 2003b). A small collection of lice from birds was made as part of that survey, but no report has hitherto been produced about them. Our attempts to study that collection and to include it in this paper failed despite repeated efforts to locate it in the NHML. This institution appears the most likely repository considering that JONES et al., (2003b) indicate that all *GITIS* samples were "... returned to the UK to be identified ..." and, in their acknowledgments, they list several of the NHML staff members for their help and advice.

Other collections have been made by volunteers as opportunities arose, including that made by R. Cuthbert in 2000–2001; these lice were used to extract DNA for phylogenetic studies carried out at the University of Glasgow and are now deposited in MONZ. The most recent contribution is that of C.H. who collected at Tristan da Cunha and Nightingale Islands in early 2005 during an invertebrate project that formed part of a larger program entitled *Empowering the People of Tristan da Cunha to Implement the CBD* that was run through the Royal Society for the Protection of Birds [RSPB] (HÄNEL, 2005).

Louse records

In this paper, we have added five new records of species for the archipelago: *Austromenopon paululum* (KELLOGG & CHAPMAN, 1899), *A. pinguis* (KELLOGG, 1896), *Philoceanus fasciatus* (CARRIKER, 1958), *Saemundssonina (Puffinoecus) peusi* (EICHLER, 1949) and *Pediculus humanus capitis* DE GEER, 1778; four new records of species for Nightingale Island: *Austromenopon paululum*, *A. pinguis*, *Paraclisis diomedae* and *Saemundssonina (Puffinoecus)* sp.; and three new records of species for Gough Island: *Docophoroides simplex* (WATERSTON, 1914), *Harrisoniella hopkinsi* EICHLER, 1952 and *Paraclisis diomedae*. Therefore, the number of louse species recorded from all the islands of the Tristan da Cunha archipelago now amounts to 54 – including one species which is believed to have been eradicated, four straggler or contaminant records, and 6 records which have been identified to generic level only – representing 21 louse genera (see Table 1 and

Appendix 1). One further species needs confirmation because, at present, it is an unidentifiable record (see *Colpocephalum furcatum* in Appendix 1).

The two larger islands, namely Tristan da Cunha and Gough, have been more thoroughly and frequently sampled and therefore, have the highest number of louse species recorded, i.e. 32 and 33 species each respectively. Nightingale and Inaccessible Islands being much smaller and less sampled, have 13 and 11 louse species recorded respectively (see Table 1).

Among the 54 louse species listed in this paper, three (5.5%) can be considered endemic to the archipelago: two species parasitic on the Inaccessible rail and one on the Tristan thrush. The great majority, 50 species (92.6%), are native to the archipelago, and one species was introduced by humans (see note 7). The level of endemism is related directly to the number of endemic terrestrial bird and mammal species represented at the island. The situation reflected by the louse fauna of the Tristan da Cunha Archipelago is no different from that at other oceanic islands (see HÖRNING et al., 1980; PILGRIM & PALMA, 1982; MARRIS, 2000; PALMA & JENSEN, 2005).

Hosts

In terms of louse hosts, the archipelago potentially has 77+ species, being 64+ birds (28 breeding, 34+ vagrants and two+ alien introductions); and 13+ mammals (two native and 11+ alien introductions) that occur on the islands (see Appendix 2 & 3). Among these, 21 host species have lice recorded from them, of which 19 are breeding birds (17 seabirds and 2 landbirds), one is a vagrant bird and one is a mammalian host. (see Table 2 and Appendix 2). The Black-browed mollymawk, *Thalassarche melanophrys* (TEMMINCK, 1828), counted here as the single vagrant host, is a frequent visitor that may have been a breeding species on Tristan da Cunha at the time that it was sampled (1937–1938). The single record of a mammal louse refers to human headlice, although it may now be absent from the islands (see note 7).

Surprisingly, apart from the single incident involving humans, there are no records of lice from the several mammal species of the archipelago, despite the fact that mice have been well established at Tristan da Cunha and Gough since early 1900, followed by rats at Tristan and farm animals (temporally at Gough between the 1950's and 1970's and permanently at Tristan) (see Appendix 3). The apparent absence of lice may be due to lack of collecting effort, or that the mammal populations are indeed free of lice because their ancestors arrived free of lice to the islands, an event called “missing the boat”, or that they had lice at their arrival but subsequently they became extinct (PATERSON et al., 2003).

In summary, there are 56+ potential louse hosts from which no lice have been recorded yet. These are: 11 native breeding host species (5 seabirds, 4 landbirds and 2 marine mammals), 33+ vagrant birds, and 12+ species introduced by human agency (2+ poultry and 10+ alien mammals). They represent 73% of the total potential number of louse hosts for the archipelago, all without any louse record (see Appendix 3).

Tab. 1: Lice recorded from the Tristan da Cunha archipelago. Louse species are grouped alphabetically, first by family, then by genera and species, with their respective hosts and island locations.

Order PHTHIRAPTERA – LICE			ISLANDS				HOSTS	
FAMILY	GENUS	SPECIES	Tri	Nig	Ina	Gou		
Menoponiidae	<i>Ancistrona</i>	<i>Ancistrona vagelli</i>	√			√	Broad-billed prion, <i>Pachyptila vittata</i>	
				√	√		Great shearwater, <i>Puffinus gravis</i>	
	<i>Austromenopon</i>	<i>Austromenopon elliotti</i>					√	Common diving petrel, <i>Pelecanoides urinatrix</i>
		<i>Austromenopon fuscofasciatum</i>					√	Tristan skua <i>Catharacta antarctica hamiltoni</i>
		<i>Austromenopon paululum</i>		√				Great shearwater, <i>Puffinus gravis</i>
		<i>Austromenopon pinguis</i>		√			√	Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
		<i>Austromenopon popellus</i>					√	Atlantic petrel, <i>Pterodroma incerta</i>
		<i>Austromenopon stammeri</i>					√	Soft-plumaged petrel, <i>Pterodroma mollis</i>
		<i>Austromenopon</i> sp.		√				Antarctic tern, <i>Sterna vittata</i>
	<i>Longimenopon</i>	<i>Longimenopon elliotti</i>		√				Atlantic petrel, <i>Pterodroma incerta</i>
		<i>Longimenopon galeatum</i>		√				White-faced storm petrel, <i>Pelagodroma marina</i>
		<i>Longimenopon</i> sp.					√	Kerguelen petrel, <i>Lugensa brevirostris</i>
	<i>Pseudomenopon</i>	<i>Pseudomenopon rowani</i>				√	Soft-plumaged petrel, <i>Pterodroma mollis</i>	
	<i>Inaccessibile rail, <i>Atlantisia rogersi</i></i>				√			
Pediculidae	<i>Pediculus</i>	<i>Pediculus humanus capitis</i>	√				Humans, <i>Homo sapiens</i>	
Philopteridae	<i>Austrogoniodes</i>	<i>Austrogoniodes concii</i>	√				Northern rockhopper penguin, <i>Eudyptes chrysocome moseleyi</i>	
		<i>Austrogoniodes cristati</i>	√				Northern rockhopper penguin, <i>Eudyptes chrysocome moseleyi</i>	
		<i>Austrogoniodes</i> sp. (<i>cristati</i> -group)	√				Northern rockhopper penguin, <i>Eudyptes chrysocome moseleyi</i>	
		<i>Austrogoniodes</i> sp. (<i>hamiltoni</i> -group)	√				Northern rockhopper penguin, <i>Eudyptes chrysocome moseleyi</i>	
	<i>Bedfordiella</i>	<i>Bedfordiella unica</i>				√	Kerguelen petrel, <i>Lugensa brevirostris</i>	
	<i>Brueelia</i>	<i>Brueelia</i> sp. ?				√	Tristan thrush, <i>Nesocichla eremita</i>	
	<i>Docophoroides</i>	<i>Docophoroides brevis</i>		√			√	Tristan albatross, <i>Diomedea dabbenena</i>
						√	Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>	
		<i>Docophoroides murphyi</i>	√					Southern giant petrel, <i>Macronectes giganteus</i>
	<i>Docophoroides simplex</i>		√				√	Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
							Black-browed mollymawk, <i>Thalassarche melanophrys</i>	
<i>Haffneria</i>	<i>Haffneria grandis</i>					√	Tristan skua, <i>Catharacta antarctica hamiltoni</i>	
<i>Halipeurus</i>	<i>Halipeurus (Halipeurus) abnormis</i>	√	√	√			Great shearwater, <i>Puffinus gravis</i>	
	<i>Halipeurus (H.) falsus pacificus</i>					√	Common diving petrel, <i>Pelecanoides urinatrix</i>	
	<i>Halipeurus (H.) gravis gravis</i>	√	√	√	√		Great shearwater, <i>Puffinus gravis</i>	
	<i>Halipeurus (H.) munda</i>					√	Little shearwater, <i>Puffinus assimilis</i>	
	<i>Halipeurus (Synnautes) pelagicus</i>					√	White-faced storm petrel, <i>Pelagodroma marina</i>	
						√	White-bellied storm petrel, <i>Fregatta gallearia</i>	

Order PHTHIRAPTERA – LICE			ISLANDS				HOSTS
FAMILY	GENUS	SPECIES	Tri	Nig	Ina	Gou	
Philopteridae	<i>Halipeurus</i>	<i>Halipeurus (H.) procellariae</i>	✓			✓	Atlantic petrel, <i>Pterodroma incerta</i>
							Soft-plumaged petrel, <i>Pterodroma mollis</i>
	<i>Harrisoniella</i>	<i>Harrisoniella ferox</i>	✓				Black-browed mollymawk, <i>Thalassarche melanophrys</i>
			✓			✓	Tristan albatross, <i>Diomedea dabbenena</i>
	<i>Naubates</i>	<i>Naubates (Naubates) harrisoni</i>	✓	✓	✓	✓	Great shearwater, <i>Puffinus gravis</i>
			✓			✓	Great-winged petrel, <i>Pterodroma macroptera</i>
			✓	✓		✓	Broad-billed prion, <i>Pachyptila vittata</i>
			✓			✓	Soft-plumaged petrel, <i>Pterodroma mollis</i>
	<i>Paraclisis</i>	<i>Paraclisis diomedea</i>			✓	✓	Atlantic petrel, <i>Pterodroma incerta</i>
			✓			✓	Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
							Sooty albatross, <i>Phoebastria fusca</i>
		<i>Paraclisis hyalina</i>	✓				Black-browed mollymawk, <i>Thalassarche melanophrys</i>
		<i>Paraclisis obscura</i>	✓				Tristan albatross, <i>Diomedea dabbenena</i>
	<i>Pelmatocerandra</i>	<i>Pelmatocerandra setosa</i>			✓	✓	Southern giant petrel, <i>Macronectes giganteus</i>
							Atlantic petrel, <i>Pterodroma incerta</i>
	<i>Perineus</i>	<i>Perineus circumfasciatus</i>				✓	Common diving petrel, <i>Pelecanoides urinatrix</i>
			✓				Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
				✓			Black-browed mollymawk, <i>Thalassarche melanophrys</i>
	<i>Perineus</i>	<i>Perineus macronecti</i>	✓				Sooty albatross, <i>Phoebastria fusca</i>
							Southern giant petrel, <i>Macronectes giganteus</i>
	<i>Philoceanus</i>	<i>Philoceanus fasciatus</i>				✓	White-bellied storm petrel, <i>Fregatta gularis</i>
	<i>Quadriceps</i>	<i>Quadriceps houri</i>	✓				Antarctic tern, <i>Sterna vittata</i>
	<i>Rallicola</i>	<i>Rallicola zumpti</i>			✓		Inaccessible rail, <i>Atlantisia rogersi</i>
<i>Saemundsonia</i>	<i>Saemundsonia (Saemundsonia) desolata</i>	✓			✓	Broad-billed prion, <i>Pachyptila vittata</i>	
					✓	Tristan skua, <i>Catharacta antarctica hamiltoni</i>	
	<i>Saemundsonia (S.) euryrhyncha</i>					✓	Antarctic tern, <i>Sterna vittata</i>
	<i>Saemundsonia (S.) lockleyi</i>	✓					White-faced storm petrel, <i>Pelagodroma marina</i>
	<i>Saemundsonia (S.) marina</i>				✓		Antarctic tern, <i>Sterna vittata</i>
	<i>Saemundsonia (S.) sterna</i>	✓					Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
	<i>Saemundsonia (Puffinoecus) peusi</i>					✓	Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
<i>Saemundsonia (P) sp.</i>		✓				Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>	
<i>Trabeculus</i>	<i>Trabeculus hexakon</i>	✓	✓	✓	✓	Great shearwater, <i>Puffinus gravis</i>	
					✓	Little shearwater, <i>Puffinus assimilis</i>	
	<i>Trabeculus schillingi</i>	✓			✓	Soft-plumaged petrel, <i>Pterodroma mollis</i>	
			✓			Atlantic petrel, <i>Pterodroma incerta</i>	
TOTALS: 3	21	54	32	13	11	33	

Tab. 2: Hosts and the louse species associated with them in the Tristan da Cunha archipelago.

Class Aves Order Procellariiformes (albatrosses and petrels)	LICE Class Insecta Order Phthiraptera	ISLANDS				Number of louse species per host
		Tri	Nig	Ina	Gou	
<i>Diomedea dabbenena</i> Tristan albatross	<i>Docophoroides brevis</i>	√		√	√	3
	<i>Harrisoniella hopkinsi</i>	√			√	
	<i>Paraclisis hyalina</i>	√				
<i>Phoebastria fusca</i> Sooty albatross	<i>Paraclisis diomedea</i>	√	√			2
	<i>Perineus circumfasciatus</i>		√			
<i>Thalassarche chlororhynchus</i> Atlantic yellow-nosed mollymawk	<i>Austromenopon pinguis</i>		√		√	4 + 3 stragglers
	<i>Docophoroides simplex</i>	√			√	
	<i>Paraclisis diomedea</i>	√	√	√	√	
	<i>Perineus circumfasciatus</i>				√	
	<i>Docophoroides brevis</i> [straggler]			√		
	<i>Saemundsonia (Puffinoecus) peusi</i> [straggler]				√	
	<i>Saemundsonia (P.)</i> sp. [straggler]		√			
<i>Thalassarche melanophrys</i> Black-browed mollymawk	<i>Docophoroides simplex</i>	√				4
	<i>Harrisoniella ferox</i>	√				
	<i>Paraclisis diomedea</i>	√				
	<i>Perineus circumfasciatus</i>	√				
<i>Macronectes giganteus</i> Southern giant petrel	<i>Docophoroides murphyi</i>	√				3
	<i>Paraclisis obscura</i>	√				
	<i>Perineus macronecti</i>	√				
<i>Puffinus assimilis</i> Little shearwater	<i>Halipeurus (Halipeurus) mundae</i>				√	2
	<i>Trabeculus mirabilis</i>				√	
<i>Puffinus gravis</i> Great shearwater	<i>Ancistriona vagelli</i>	√	√	√		6
	<i>Austromenopon paululum</i>		√			
	<i>Halipeurus (H.) abnormis</i>	√	√	√		
	<i>Halipeurus (H.) gravis gravis</i>	√	√	√	√	
	<i>Naubates (Naubates) harrisoni</i>	√	√	√	√	
	<i>Trabeculus hexakon</i>	√	√	√	√	
<i>Lugensa brevirostris</i> Kerguelen petrel	<i>Bedfordiella unica</i>				√	2
	<i>Longimenopon galeatum</i>				√	
<i>Pterodroma incerta</i> Atlantic petrel	<i>Austromenopon popellus</i>				√	5 + 1 straggler
	<i>Halipeurus (H.) procellariae</i>	√			√	
	<i>Longimenopon elliotti</i>	√				
	<i>Naubates (Guentherion) pterodromi</i>	√		√	√	
	<i>Trabeculus schillingi</i>		√		√	
<i>Paraclisis obscura</i> [straggler]	√					
<i>Pterodroma macroptera</i> Great-winged petrel	<i>Naubates (G.) heteroproctus</i>	√			√	1

Class Aves Order Procellariiformes (albatrosses and petrels)	LICE Class Insecta Order Phthiraptera	ISLANDS				Number of louse species per host
		Tri	Nig	Ina	Gou	
<i>Pterodroma mollis</i> Soft-plumaged petrel	<i>Austromenopon popellus</i>				√	5
	<i>Halipeurus (H.) procellariae</i>				√	
	<i>Longimenopon</i> sp.				√	
	<i>Naubates (G.) pterodromi</i>	√			√	
	<i>Trabeculus schillingi</i>	√			√	
<i>Pachyptila vittata</i> Broad-billed prion	<i>Ancistrona vagelli</i>	√			√	4
	<i>Austromenopon stammeri</i>				√	
	<i>Naubates (G.) prioni</i>	√	√		√	
	<i>Saemundsonia (Saemundsonia) desolata</i>	√			√	
<i>Fregatta grallaria</i> White-bellied storm petrel	<i>Halipeurus (Synnautes) pelagicus</i>				√	2
	<i>Philoceanus fasciatus</i>				√	
<i>Pelagodroma marina</i> White-faced storm petrel	<i>Halipeurus (S.) pelagicus</i>				√	3
	<i>Longimenopon galeatum</i>	√				
	<i>Saemundsonia (S.) marina</i>				√	
<i>Pelecanoides urinatrix</i> Common diving petrel	<i>Austromenopon elliotti</i>				√	3
	<i>Halipeurus (H.) falsus pacificus</i>				√	
	<i>Pelmatocerandra setosa</i>		√		√	
Order Charadriiformes (gulls, waders, etc.)						
<i>Catharacta antarctica hamiltoni</i> Tristan skua	<i>Austromenopon fuscifasciatum</i>				√	3
	<i>Haffneria grandis</i>				√	
	<i>Saemundsonia (S.) euryrhyncha</i>				√	
<i>Sterna vittata</i> Antarctic tern	<i>Austromenopon</i> sp.	√				4
	<i>Quadraceps houri</i>	√				
	<i>Saemundsonia (S.) lockleyi</i>	√				
	<i>Saemundsonia (S.) sterna</i>	√				
Order Sphenisciformes (penguins)						
<i>Eudyptes chrysocome moseleyi</i> Northern rockhopper penguin	<i>Austrogoniodes concii</i>	√				4
	<i>Austrogoniodes cristati</i>	√				
	<i>Austrogoniodes</i> sp. (<i>cristati</i> -group)	√				
	<i>Austrogoniodes</i> sp. (<i>hamiltoni</i> -group)	√				
Order Gruiformes (rails)						
<i>Atlantisia rogersi</i> Inaccessible rail	<i>Pseudomenopon rowani</i>			√		2
	<i>Rallicola zumpti</i>			√		
Order Passeriformes (perching birds)						
<i>Nesocichla eremita</i> Tristan thrush	<i>Brueelia</i> sp. ?			√		1
18 seabirds + 2 landbirds = 20						
Class Mammalia						
Order Primates						
<i>Homo sapiens</i> Humans	<i>Pediculus humanus capitis</i>	√				1
	Most likely eradicated (see note 7)					
1 mammal						
TOTAL: 21 host species						

Discussion

Generally, lice make up a significant portion of the total number of genera and species represented in the invertebrate fauna of oceanic islands, especially of those situated in the Southern Ocean, such as the Subantarctic islands. For example HORNING *et al.* (1980) recorded 53 species of lice from breeding and vagrant hosts collected in the Snares Islands, representing about a 30% of the estimated total fauna of terrestrial arthropods (D.S. HORNING *pers. comm.*, 2006), while PALMA & HORNING (2002) listed 47 louse species from Macquarie Island vertebrate hosts, representing a 31.5% of a total of 150 species of terrestrial invertebrates (excluding mites) recorded on that island, and MARRIS (2000) reports 40 louse species from Antipodes Island, representing a 23.5% total of the 170 terrestrial invertebrates recorded.

The louse fauna of the Tristan da Cunha archipelago is expected to be proportionally as high among the total native insect fauna as those of other oceanic islands, but a great amount of further collecting is still needed to confirm that statement. Despite the paucity of records, it is already apparent that, among native insects, lice make up a substantial portion of the fauna. HOLDGATE (1965: 366) records 82 species of native pterygote insects for the entire archipelago, excluding parasites. If we add the 13 species of apterygote orders (Thysanura and Collembola), two species of fleas (Siphonaptera) and one louse-fly (Diptera: Hippoboscidae) listed by HOLDGATE (1965: 394, 396), the total would be 98 species, a figure very close to the 100 species estimated by HOLDGATE (1965: 366). Therefore, the known native louse fauna amounts to about a third of the total native insect fauna.

Considering that (1) there are other species of lice known to parasitize the hosts listed in Appendix 2 in other parts of the world (PRICE *et al.*, 2003), which have not been found on Tristan da Cunha hosts yet, and (2) no lice have been recorded from 9 (32%) species of native breeding birds, the total number of louse species would increase considerably after a full ectoparasitic survey of the avifauna has been carried out. That number would be even greater if the remaining 33+ species of vagrant non-breeding birds that visit the archipelago were included in such a survey. The expectation that future collecting efforts are bound to produce additional new louse species records for that island and for the archipelago is further supported by the results of the 2005 collection which, despite the small number of birds sampled and the opportunistic collecting method used, produced three new records for Nightingale Island, and one new record for the entire island group, despite the fact that there have been previous collections made from Nightingale Island (see Appendix 1).

Once the total louse fauna of the archipelago is known, it could include over 100 species, that is more than 50% of the total native insect fauna.

The current knowledge gap regarding the invertebrate fauna and its role in the islands' ecosystems is a concern that has in recent years become more prevalent, particularly at Tristan da Cunha, where the introduction of alien species is a problem affecting the livelihoods of its inhabitants as well as posing a threat to the indigenous fauna and flora (WACE & HOLDGATE, 1976). During the last two decades, pest-related problems have become more prevalent with the increase in access and imports to the inhabited Tristan da Cunha Island. Such increase in traffic has also increased the chances of both the introduction of economically important louse species – in particular those which parasitize sheep and cattle – and a re-introduction of human lice with their consequential health risks (RSPB, 2004–2005; GLASS & SANDERS, 2006).

Conclusions

The importance of invertebrates and their role in ecosystem dynamics have become more and more prevalent, as well as their value as indicators, not only of environmental pattern changes (JONES et al., 2003a), but also of human health and well-being. On a global scale, the terrestrial biodiversity of the islands in the Tristan da Cunha archipelago ranks extremely high in importance, yet the role that the invertebrates play is still poorly understood.

A comprehensive study of the three northern islands' invertebrate fauna is urgently needed, if a sustainable human presence is to be maintained without the risk of losing native species, including those that may still remain to be discovered. In this regard, parasitic lice are expected to form a substantial component of the total invertebrate fauna. This knowledge gap should be filled sooner than later, as the fauna of the Tristan da Cunha archipelago is depauperate and highly susceptible to changes, either from introductions of alien species or by the extinction of native ones.

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Notes

1. WATERSTON (1914: 305) recorded *Docophoroides brevis* (as *Eurymetopus taurus*) from *Thalassarche chlororhynchos*. This host-lice association is most likely the result of a contamination from *Diomedea dabbenena*. The alternative possibility – i.e. a misidentification of *Docophoroides simplex* – is most unlikely because Waterston was familiar with the latter species, which he described as new on the previous pages to this record.
2. *Halipeurus abnormis* was originally described from *Puffinus gravis* by PIAGET (1885). Despite HOPKINS & CLAY (1952: 163) regarding this host-lice association as erroneous, CLAY (1957: 3) still believed that *H. abnormis* “... must be a true parasite of *P. gravis*, ...”. However, several subsequent louse collections made from *P. gravis* (see Foster et al., 1996) did not include any specimen of *H. abnormis* but, instead, contained a great number of *Halipeurus gravis gravis*.
3. KÉLER, (1957: 282) reported two females of *Paraclisis obscura* (as *Harrisoniella obscura*) from *Pterodroma incerta*, collected by H. Elliott at Tristan da Cunha, and deposited in the NHML. No species of *Pterodroma* is known to be a regular and natural host to any species of *Paraclisis* (see PRICE et al., 2003: 371). We regard the record of *P. obscura* from *P. incerta* as the result of natural or human contamination from a species of *Macronectes*.

4. The lice reported by FURNESS & PALMA (1992: 41) from *Fregatta grallaria* as "*Philoceanus* sp." have been further studied and identified as *Philoceanus fasciatus* by R.L.P.
5. A single male *Saemundssonina* (*Puffinoecus*) *peusi* collected by R. Cuthbert, and a single female *Saemundssonina* (*Puffinoecus*) sp. collected by C. Hänel, both from *Thalassarche chlororhynchos*, are either stragglers (resulting from a natural host-switch) or contaminants (resulting from a host transfer by human agency) from *Puffinus gravis* or *Calonectris diomedea*. There are no natural and regular records of any species of *Saemundssonina* (*Puffinoecus*) from any albatross species (see PRICE et al., 2003: 368).
6. KÉLER, (1952: 205) identified a single *Trabeculus* nymph from *Pterodroma incerta* as *Giebelia hexakon*. This is most likely a misidentification of *Trabeculus schillingi* because further records show that this latter louse is the natural and regular *Trabeculus* species parasitizing Atlantic petrels. At present, nymphs of *Trabeculus* are unidentifiable without associated adults; therefore, we regard the nymph in question to be *T. schillingi* only on the basis of its host association.
7. We are not aware of any published record of human lice from the Tristan da Cunha archipelago. However, from a discussion and follow-up investigations between C.H. and the islanders of Tristan da Cunha in 2005 and 2006, it became evident that at least one outbreak of what appears to have been headlice has occurred amongst the people of Tristan da Cunha during the last decade, and that previous outbreaks may also have occurred in the early 1900s with the arrival of sealers and ship-wrecked castaways.

The single traceable incident is dated March 1998, when the first patient, a young child, was taken to the doctor with nits in her hair. In total, 52 patients were infested, including 5 adults. With no supplies of appropriate medication in stock, a treatment was introduced based on paraffin and vinegar. Affected households were fumigated with insecticides. Patients were isolated until their heads were free of nits. Subsequent monitoring, in particular amongst the school children, was carried out by the doctor and the nursing staff. The community was kept informed by means of public posters. A talk was given to parents of the school children. Whether the lice were totally eradicated is not clear, but that appears to be the logical conclusion. The source of the headlice is believed to have been a person who visited and stayed on the island for a few months. It is not known where that person originated from, but the principal means of transport to Tristan da Cunha is via vessels coming from South African ports. Since no samples were kept or examined under a microscope, we cannot confirm the identity of the species. However, judging from the above report, we assume that the lice were *Pediculus humanus capitis*.

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APPENDIX 1.

Lice recorded from the Tristan da Cunha Archipelago

This list includes all the families, genera and species recorded from the four principal islands of the archipelago, i.e. Tristan da Cunha Island, Inaccessible Island, Nightingale Island and Gough Island.

Order **Phthiraptera** HAECKEL, 1896
 Suborder **Amblycera** KELLOGG, 1896
 Family **Menoponidae** MjöBERG, 1910
 Genus *Ancistrona* WESTWOOD, 1874

Ancistrona vagelli (J.C. FABRICIUS, 1787)

Ancistrona vagelli; KÉLER, 1952: 209 – Nightingale.

Ancistrona sp.; CLAY, 1957: 3 – Tristan da Cunha; Nightingale; Inaccessible.

Ancistrona sp.; FURNESS & PALMA, 1992: 39 – Gough.

Hosts: *Puffinus gravis*; *Pachyptila vittata*.

Genus *Austromenopon* BEDFORD, 1939

Austromenopon elliotti TIMMERMANN, 1954

Austromenopon elliotti (sic) TIMMERMANN, 1954: 205 – Gough.

Austromenopon elliotti; FURNESS & PALMA, 1992: 42 – Gough.

Host: *Pelecanoides urinatrix*.

Austromenopon fuscofasciatum (PIAGET, 1880)

Austromenopon fuscofasciatum; FURNESS & PALMA, 1992: 42 – Gough.

Host: *Catharacta antarctica hamiltoni*.

Austromenopon paululum (KELLOGG & CHAPMAN, 1899) New Record for the archipelago

Austromenopon paululum – Nightingale (NRTC).

Host: *Puffinus gravis*.

Austromenopon pinguis (KELLOGG, 1896) New Record for the archipelago

Austromenopon pinguis – Nightingale (MONZ); Gough (MONZ).

Host: *Thalassarche chlororhynchos*.

Austromenopon popellus (PIAGET, 1880)

Austromenopon popellus; FURNESS & PALMA, 1992: 40 – Gough.

Hosts: *Pterodroma incerta*; *Pterodroma mollis*.

Austromenopon stammeri TIMMERMANN, 1963

Austromenopon stammeri; FURNESS & PALMA, 1992: 39 – Gough.

Host: *Pachyptila vittata*.

Austromenopon sp.

Austromenopon sp.; CLAY, 1957: 4 – Tristan da Cunha.
Host: *Sterna vittata*.

Genus *Longimenopon* THOMPSON, 1948

Longimenopon elliotti TIMMERMANN, 1957

Longimenopon elliotti TIMMERMANN, 1957: 9 – Tristan da Cunha.
Host: *Pterodroma incerta*.

Longimenopon galeatum TIMMERMANN, 1957

Longimenopon galeatum n. sp.; CLAY, 1957: 4 – Tristan da Cunha.
Longimenopon galeatum TIMMERMANN, 1957: 9 – Tristan da Cunha; Gough.
Longimenopon galeatum; HOLDGATE, 1965: 397.
Hosts: *Pelagodroma marina*; *Lugensa brevirostris*.

Longimenopon sp.

Longimenopon sp.; FURNESS & PALMA, 1992: 41 – Gough.
Host: *Pterodroma mollis*.

Genus *Pseudomenopon* MJÖBERG, 1910

Pseudomenopon rowani KÉLER, 1951

Pseudomenopon rowani KÉLER, 1951: 34 – Inaccessible.
Pseudomenopon rowani; KÉLER, 1952: 205 – Inaccessible.
Pseudomenopon rowani; CLAY, 1957: 4 – Inaccessible.
Pseudomenopon rowani; HOLDGATE, 1965: 397.
Host: *Atlantisia rogersi*.

Suborder Ischnocera KELLOGG, 1896

Family Philopteridae BURMEISTER, 1838

Genus *Austrogoniodes* HARRISON, 1915

Austrogoniodes concii (KÉLER, 1952)

Cesareus concii KÉLER, 1952: 223 – Tristan da Cunha.
Austrogoniodes concii; CLAY, 1957: 2 – Tristan da Cunha.
Austrogoniodes concii (sic); CLAY, 1967: 154 – Tristan da Cunha; Gough.
Host: *Eudyptes chrysolome moseleyi*.

Austrogoniodes cristati KÉLER, 1952

Austrogoniodes cristati KÉLER, 1952: 230 – Tristan da Cunha.
Austrogoniodes cristati; CLAY, 1957: 2 – Tristan da Cunha.
Austrogoniodes cristati; HOLDGATE, 1965: 397.
Austrogoniodes cristati; CLAY, 1967: 154 – Tristan da Cunha.
Host: *Eudyptes chrysolome moseleyi*.

Austrogoniodes sp.

Austrogoniodes sp. (*crustati*-group); CLAY, 1957: 2. – Tristan da Cunha.
Host: *Eudyptes chrysocome moseleyi*.

Austrogoniodes sp.

Austrogoniodes sp. (*hamiltoni*-group); CLAY, 1957: 2 – Tristan da Cunha.
Host: *Eudyptes chrysocome moseleyi*.

Genus *Bedfordiella* THOMPSON, 1937

Bedfordiella unica THOMPSON, 1937

Bedfordiella simsi TIMMERMANN, 1961: 39 – Gough.
Bedfordiella unica; PALMA & PILGRIM, 1983: 146 – Gough.
Bedfordiella unica; FURNESS & PALMA, 1992: 39 – Gough.
Host: *Lugensa brevirostris*.

Genus *Brueelia* KÉLER, 1936

Brueelia sp.

Brueelia (sic) sp. ?; CLAY, 1957: 5 – Inaccessible.
Host: *Nesocichla eremita*.

Genus *Docophoroides* GIGLIOLI, 1864

Docophoroides brevis (DUFOUR, 1835)

Eurymetopus taurus; WATERSTON, 1914: 305 – Inaccessible.
Eurymetopus taurus (NITZSCH [in Giebel], 1866); ENDERLEIN, 1917: 241 – North of Tristan da Cunha.
Docophoroides brevis; CLAY, 1957: 2 – Tristan da Cunha; Inaccessible.
Docophoroides brevis; HOLDGATE, 1965: 397.
Docophoroides brevis; FURNESS & PALMA, 1992: 38 – Gough.
Docophoroides brevis – Gough (MONZ).
Hosts: *Diomedea dabbenena*; *Thalassarche chlororhynchos* [see note 1].

Docophoroides murphyi (KELLOGG, 1914)

Docophoroides hunteri; CLAY, 1957: 2 – Tristan da Cunha.
Docophoroides hunteri; HOLDGATE, 1965: 397.
Host: *Macronectes giganteus*.

Docophoroides simplex (WATERSTON, 1914)

Docophoroides simplex; CLAY, 1957: 2 – Tristan da Cunha.
Docophoroides simplex; HOLDGATE, 1965: 397.
Docophoroides simplex – Gough (MONZ). **New locality record**
Hosts: *Thalassarche chlororhynchos*; *Thalassarche melanophrys*.

Genus *Haffneria* TIMMERMANN, 1966

Haffneria grandis (PIAGET, 1880)

Haffneria grandis; FURNESS & PALMA, 1992: 42 – Gough.

Host: *Catharacta antarctica hamiltoni*.

Genus *Halipeurus* THOMPSON, 1936

Subgenus *Halipeurus* THOMPSON, 1936

Halipeurus (Halipeurus) abnormis (PIAGET, 1885)

Halipeurus abnormis; CLAY, 1957: 3 – Tristan da Cunha, Nightingale, Inaccessible [see note 2].

Halipeurus abnormis; HOLDGATE, 1965: 397.

Host: *Puffinus gravis* [see note 2].

Halipeurus (Halipeurus) falsus pacificus EDWARDS, 1961

Halipeurus falsus pacificus; FURNESS & PALMA, 1992: 41 – Gough.

Host: *Pelecanoides urinatrix*.

Halipeurus (Halipeurus) gravis gravis TIMMERMANN, 1961

Halipeurus sp. n.; CLAY, 1957: 3 – Tristan da Cunha, Nightingale, Inaccessible

Halipeurus gravis gravis; FURNESS & PALMA, 1992: 39 – Gough.

Halipeurus gravis gravis – Nightingale (NRTC).

Host: *Puffinus gravis*.

Halipeurus (Halipeurus) mundaе EDWARDS, 1961

Halipeurus mundaе; FURNESS & PALMA, 1992: 39 – Gough.

Host: *Puffinus assimilis*.

Halipeurus (Halipeurus) procellariae (J.C. FABRICIUS, 1775)

Lipeurus angusticeps; ENDERLEIN, 1917: 244 – South of Tristan da Cunha.

Halipeurus procellariae; FURNESS & PALMA, 1992: 40, 41 – Gough.

Hosts: *Pterodroma incerta*; *Pterodroma mollis*.

Subgenus *Synnautes* THOMPSON, 1936

Halipeurus (Synnautes) pelagicus (DENNY, 1842)

Halipeurus (Synnautes) pelagicus; FURNESS & PALMA, 1992: 41, 42 – Gough.

Hosts: *Fregatta grallaria*; *Pelagodroma marina*.

Genus *Harrisoniella* BEDFORD, 1929

Harrisoniella ferox (GIEBEL, 1867)

Harrisoniella ferox; CLAY, 1957: 2 – Tristan da Cunha.

Harrisoniella ferox; HOLDGATE, 1965: 397.

Host: *Thalassarche melanophrys*.

Harrisoniella hopkinsi EICHLER, 1952

- Lipeurus ferox*; WATERSTON, 1914: 311 – Tristan da Cunha.
Lipeurus densus; ENDERLEIN, 1917: 244 – North of Tristan da Cunha.
Lipeurus diomedae (sic); ENDERLEIN, 1917: 245 – North of Tristan da Cunha.
Harrisoniella hopkinsi; PALMA & PILGRIM, 1984: 157 – Tristan da Cunha.
Harrisoniella hopkinsi – Gough (MONZ). New locality record
 Host: *Diomedea dabbenena*.

Genus *Naubates* BEDFORD, 1930

Subgenus *Naubates* BEDFORD, 1930

Naubates (Naubates) harrisoni BEDFORD, 1930

- Naubates harrisoni*; CLAY, 1957: 3 – Tristan da Cunha, Nightingale, Inaccessible.
Naubates harrisoni; HOLDGATE, 1965: 397.
Naubates harrisoni; FURNESS & PALMA, 1992: 38 – Gough.
Naubates (Naubates) harrisoni; PALMA & PILGRIM, 2002: 21 – Tristan da Cunha; Gough.
 Host: *Puffinus gravis*.

Subgenus *Guentерion* PALMA & PILGRIM, 2002

Naubates (Guentерion) heteroproctus HARRISON, 1937

- Naubates (Guentерion) heteroproctus*; PALMA & PILGRIM, 2002: 52 – Tristan da Cunha; Gough.
 Host: *Pterodroma macroptera*

Naubates (Guentерion) prioni (ENDERLEIN, 1908)

- Naubates prioni*; CLAY, 1957: 3 – Tristan da Cunha.
Naubates prioni; HOLDGATE, 1965: 397.
Naubates prioni; FURNESS & PALMA, 1992: 39 – Gough.
Naubates (Guentерion) prioni; PALMA & PILGRIM, 2002: 38 – Tristan da Cunha; Nightingale; Gough.
Naubates (Guentерion) prioni – Nightingale (NRTC).
 Host: *Pachyptila vittata*.

Naubates (Guentерion) pterodromi BEDFORD, 1930

- Naubates pterodromi*; KÉLER, 1952: 213 – Tristan da Cunha.
Naubates sp.?; CLAY, 1957: 3.
Naubates sp.; CLAY, 1957: 3.
Naubates pterodromi; FURNESS & PALMA, 1992: 40 – Gough.
Naubates (Guentерion) pterodromi; PALMA & PILGRIM, 2002: 46 – Tristan da Cunha; Gough; Inaccessible.
 Hosts: *Pterodroma mollis*; *Pterodroma incerta*.

Genus *Paraclisis* TIMMERMANN, 1965

Paraclisis diomedea (J.C. FABRICIUS, 1775)

Lipeurus confidens; WATERSTON, 1914: 309 – Inaccessible.

Harrisoniella diomedea; KÉLER, 1956: 524 – Tristan da Cunha.

Perineus diomedea; CLAY, 1957: 2 – Tristan da Cunha.

Perineus diomedea; HOLDGATE, 1965: 397.

Paraclisis diomedea – Gough (MONZ). New locality record

Paraclisis diomedea – Nightingale (NRTC; MONZ). New locality record

Hosts: *Thalassarche chlororhynchos*; *Thalassarche melanophrys*; *Phoebetria fusca*.

Paraclisis hyalina (NEUMANN, 1911)

Lipeurus nigropunctatus ENDERLEIN, 1917: 243 – South of Tristan da Cunha.

Host: *Diomedea dabbenena*.

Paraclisis obscura (RUDOW, 1869)

Harrisoniella obscura; KÉLER, 1957: 282 – Tristan da Cunha [see note 3].

Perineus obscurus; CLAY, 1957: 2 – Tristan da Cunha.

Perineus obscurus; HOLDGATE, 1965: 397

Hosts: *Macronectes giganteus*; *Pterodroma incerta* [see note 3].

Genus *Pelmatocerandra* ENDERLEIN, 1908

Pelmatocerandra setosa (GIEBEL, 1876)

Pelmatocerandra setosa; KÉLER, 1952: 216 – Nightingale.

Pelmatocerandra setosa; FURNESS & PALMA, 1992: 42 – Gough.

Host: *Pelecanooides urinatrix*.

Genus *Perineus* THOMPSON, 1936

Perineus circumfasciatus KÉLER, 1957

Perineus circumfasciatus; PALMA & PILGRIM, 1988: 582 – Tristan da Cunha; Nightingale; Gough.

Hosts: *Thalassarche melanophrys*; *Thalassarche chlororhynchos*; *Phoebetria fusca*.

Perineus macronekti PALMA & PILGRIM, 1988

Perineus sp. n.; CLAY, 1957: 2 – Tristan da Cunha.

Perineus macronekti PALMA & PILGRIM, 1988: 584 – Tristan da Cunha.

Host: *Macronectes giganteus*.

Genus *Philoceanus* KELLOGG, 1903

Philoceanus fasciatus (CARRIKER, 1958) New Record for the archipelago

Philoceanus sp.; FURNESS & PALMA, 1992: 41 – Gough.

Host: *Fregatta grallaria* [see note 4]

Genus *Quadriceps* CLAY & MEINERTZHAGEN, 1939

Quadriceps houri HOPKINS, 1949

Quadriceps houri; CLAY, 1957: 4 – Tristan da Cunha.

Quadriceps houri; HOLDGATE, 1965: 397.

Host: *Sterna vittata*.

Genus *Rallicola* JOHNSTON & HARRISON, 1911

Rallicola zumpti (KÉLER, 1951)

Parricola zumpti KÉLER, 1951: 47 – Inaccessible.

Parricola zumpti; KÉLER, 1952: 205 – Inaccessible.

Rallicola zumpti (KÉLER, 1951); CLAY, 1957: 4 – Inaccessible.

Rallicola sumpti (sic); HOLDGATE, 1965: 397.

Host: *Atlantisia rogersi*.

Genus *Saemundssonina* TIMMERMANN, 1936

Subgenus *Saemundssonina* (*Saemundssonina*) TIMMERMANN, 1936

Saemundssonina (*Saemundssonina*) *desolata* TIMMERMANN, 1959

Saemundssonina sp.; CLAY, 1957: 3 – Tristan da Cunha.

Saemundssonina desolata; FURNESS & PALMA, 1992: 39 – Gough.

Host: *Pachyptila vittata*.

Saemundssonina (*Saemundssonina*) *euryrhyncha* (GIEBEL, 1874)

Saemundssonina (*Saemundssonina*) *euryrhyncha*; Palma, 2000: 125 – Gough.

Host: *Catharacta antarctica hamiltoni*.

Saemundssonina (*Saemundssonina*) *lockleyi* CLAY, 1949

Saemundssonina lockleyi; CLAY, 1957: 4 – Tristan da Cunha.

Saemundssonina lockleyi; HOLDGATE, 1965: 397.

Host: *Sterna vittata*.

Saemundssonina (*Saemundssonina*) *marina* TIMMERMANN, 1956

Saemundssonina marina; FURNESS & PALMA, 1992: 42 – Gough.

Host: *Pelagodroma marina*.

Saemundssonina (*Saemundssonina*) *sternae* (LINNAEUS, 1758)

Saemundssonina sternae; CLAY, 1957: 4 – Tristan da Cunha.

Saemundssonina sterna (sic); HOLDGATE, 1965: 397.

Host: *Sterna vittata*.

Subgenus *Puffinoecus* EICHLER, 1949

Saemundssonina (*Puffinoecus*) *peusi* (EICHLER, 1949) New Record for the archipelago

Saemundssonina (*Puffinoecus*) *peusi* – Gough (MONZ).

Host: *Thalassarche chlororhynchos* – straggler or contaminant, see note 5.

Saemundssonina (*Puffinoecus*) sp.

Saemundssonina (*Puffinoecus*) sp.–Nightingale (NRTC). New locality record

Host: *Thalassarche chlororhynchos* – straggler or contaminant, see note 5.

Genus *Trabeculus* RUDOW, 1866

Trabeculus hexakon (WATERSTON, 1914)

Giebelia hexakon; KÉLER, 1952: 205 – Nightingale.

Trabeculus sp.; CLAY, 1957: 3 – Tristan da Cunha, Nightingale, Inaccessible.

Trabeculus hexakon; FURNESS & PALMA, 1992: 39 – Gough.

Host: *Puffinus gravis*.

Trabeculus mirabilis (KELLOGG, 1896)

Trabeculus mirabilis; FURNESS & PALMA, 1992: 39 – Gough.

Host: *Puffinus assimilis*.

Trabeculus schillingi RUDOW, 1866

Cecalymenus oestrelatae ENDERLEIN, 1917: 243 – Northeast & south of Tristan da Cunha.

Giebelia hexakon; KÉLER, 1952: 205 – Nightingale [see note 6].

Trabeculus schillingi; CLAY, 1957: 3 – Tristan da Cunha.

Trabeculus schillingi; HOLDGATE, 1965: 397.

Trabeculus schillingi; FURNESS & PALMA, 1992: 40, 41 – Gough.

Hosts: *Pterodroma mollis*; *Pterodroma incerta*.

Suborder Anoplura

Family Pediculidae

Genus *Pediculus* LINNAEUS, 1758

Pediculus humanus capitis DE GEER, 1778 New record for the archipelago

Pediculus humanus capitis – Tristan da Cunha.

Host: *Homo sapiens* [see note 7].

Unidentifiable Record

Colpocephalum furcatum RUDOW, 1869

Colpocephalum furcatum; ENDERLEIN, 1917: 245 – South of Tristan da Cunha.

Colpocephalum furcatum; HOPKINS & CLAY, 1952: 79. “Probably does not even belong to the Mallophaga”.

Host: *Pterodroma mollis*.

APPENDIX 2.

Host-lice associations

Non-breeding species are marked with an asterisk.

CLASS AVES

Order Procellariiformes

- | | |
|--|---------------------------------|
| <i>Diomedea dabbenena</i> MATHEWS, 1929 | Tristan albatross |
| <i>Docophoroides brevis</i> (DUFOUR, 1835) | |
| <i>Harrisoniella hopkinsi</i> EICHLER, 1952 | |
| <i>Paraclisis hyalina</i> (NEUMANN, 1911) | |
| <i>Phoebetria fusca</i> (HILSENBERG, 1822) | Sooty albatross |
| <i>Paraclisis diomedeeae</i> (J.C. FABRICIUS, 1775) | |
| <i>Perineus circumfasciatus</i> KÉLER, 1957 | |
| <i>Thalassarche chlororhynchos</i> (GMELIN, 1789) | Atlantic yellow-nosed mollymawk |
| <i>Austromenopon pinguis</i> (KELLOGG, 1896) | |
| <i>Docophoroides simplex</i> (WATERSTON, 1914) | |
| <i>Paraclisis diomedeeae</i> (J.C. FABRICIUS, 1775) | |
| <i>Perineus circumfasciatus</i> KÉLER, 1957 | |
| <i>Docophoroides brevis</i> (DUFOUR, 1835) straggler or contaminant, see note 1 | |
| <i>Saemundssonina (Puffinoecus) peusi</i> (EICHLER, 1949) straggler or contaminant, see note 5 | |
| <i>Saemundssonina (Puffinoecus) sp.</i> straggler or contaminant, see note 5 | |
| * <i>Thalassarche melanophrys</i> (TEMMINCK, 1828) | Black-browed mollymawk |
| <i>Docophoroides simplex</i> (WATERSTON, 1914) | |
| <i>Harrisoniella ferox</i> (GIEBEL, 1867) | |
| <i>Paraclisis diomedeeae</i> (J.C. FABRICIUS, 1775) | |
| <i>Perineus circumfasciatus</i> KÉLER, 1957 | |
| <i>Macronectes giganteus</i> (GMELIN, 1789) | Southern giant petrel |
| <i>Docophoroides murphyi</i> (KELLOGG, 1914) | |
| <i>Paraclisis obscura</i> (RUDOW, 1869) | |
| <i>Perineus macronecti</i> PALMA & PILGRIM, 1988 | |
| <i>Puffinus assimilis</i> GOULD, 1838 | Little shearwater |
| <i>Halipeurus (Halipeurus) mundae</i> EDWARDS, 1961 | |
| <i>Trabeculus mirabilis</i> (KELLOGG, 1896) | |

- Puffinus gravis* (O'REILLY, 1818)** Great shearwater
Ancistrona vagelli (J.C. FABRICIUS, 1787)
Austromenopon paululum (KELLOGG & CHAPMAN, 1899)
Halipeurus abnormis (PIAGET, 1885) [see note 2]
Halipeurus (Halipeurus) gravis gravis TIMMERMANN, 1961
Naubates (Naubates) harrisoni BEDFORD, 1930
Trabeculus hexakon (WATERSTON, 1914)
- Lugensa brevisrostris* (LESSON, 1831)** Kerguelen petrel
Bedfordiella unica THOMPSON, 1937
Longimenopon galeatum TIMMERMANN, 1957
- Pterodroma incerta* (SCHLEGEL, 1863)** Atlantic petrel
Austromenopon popellus (PIAGET, 1880)
Halipeurus (Halipeurus) procellariae (J.C. FABRICIUS, 1775)
Longimenopon elliotti TIMMERMANN, 1957
Naubates (Guentерion) pterodromi BEDFORD, 1930
Trabeculus schillingi RUDOW, 1866
Paraclisis obscura (RUDOW, 1869) straggler or contaminant, see note 3
- Pterodroma macroptera* (SMITH, 1840)** Great-winged petrel
Naubates (Guentерion) heteroproctus HARRISON, 1937
- Pterodroma mollis* (GOULD, 1844)** Soft-plumaged petrel
Austromenopon popellus (PIAGET, 1880)
Halipeurus (Halipeurus) procellariae (J.C. FABRICIUS, 1775)
Longimenopon sp.
Naubates (Guentерion) pterodromi BEDFORD, 1930
Trabeculus schillingi RUDOW, 1866
- Pachyptila vittata* (FÖRSTER, 1777)** Broad-billed prion
Ancistrona vagelli (J.C. FABRICIUS, 1787)
Austromenopon stammeri TIMMERMANN, 1963
Naubates (Guentерion) prioni (ENDERLEIN, 1908)
Saemundssonina (Saemundssonina) desolata TIMMERMANN, 1959
- Fregetta grallaria* (VIEILLOT, 1817)** White-bellied storm petrel
Halipeurus (Synnautes) pelagicus (DENNY, 1842)
Philoceanus fasciatus (CARRIKER, 1958) [see note 4]
- Pelagodroma marina* (LATHAM, 1790)** White-faced storm petrel
Halipeurus (Synnautes) pelagicus (DENNY, 1842)
Longimenopon galeatum (TIMMERMANN, 1957)
Saemundssonina (Saemundssonina) marina TIMMERMANN, 1956

- Pelecanooides urinatrix* (GMELIN, 1789) Common diving petrel
Austromenopon elliotti TIMMERMANN, 1954
Halipeurus (Halipeurus) falsus pacificus EDWARDS, 1961
Pelmatocerandra setosa (GIEBEL, 1876)

Order Charadriiformes

- Catharacta antarctica hamiltoni* HAGEN, 1952 Tristan skua
Austromenopon fuscofasciatum (PIAGET, 1880)
Haffneria grandis (PIAGET, 1880)
Saemundssonina (Saemundssonina) euryrhyncha (GIEBEL, 1874)
- Sterna vittata* GMELIN, 1789 Antarctic tern
Austromenopon sp.
Quadriceps houri HOPKINS, 1949
Saemundssonina (Saemundssonina) lockleyi CLAY, 1949
Saemundssonina (Saemundssonina) sterna (LINNAEUS, 1758)

Order Sphenisciformes

- Eudyptes chrysochome moseleyi* MATHEWS & IREDALE, 1921 Northern rockhopper penguin
Austrogoniodes concii (KÉLER, 1952)
Austrogoniodes cristati KÉLER, 1952
Austrogoniodes sp. (*cristati*-group)
Austrogoniodes sp. (*hamiltoni*-group)

Order Gruiformes

- Atlantisia rogersi* LOWE, 1923 Inaccessible rail
Pseudomenopon rowani KÉLER, 1951
Rallicola zumpti (KÉLER, 1951)

Order Passeriformes

- Nesocichla eremita* GOULD, 1855 Tristan thrush
Brueelia sp.

CLASS MAMMALIA

Order Primates

- Homo sapiens* LINNAEUS, 1758 Humans
Pediculus humanus capitis DE GEER, 1778 [see note 7]

APPENDIX 3.

Potential host species with no records of lice	56
Breeding species	23
<u>Native seabirds</u>	5
<i>Puffinus griseus</i> (GMELIN, 1789)	Sooty shearwater
<i>Garrodia nereis</i> (GOULD, 1841)	Grey-backed storm petrel
<i>Procellaria conspicillata</i> (GOULD, 1844)	Spectacled petrel
<i>Procellaria cinerea</i> (GMELIN, 1789)	Grey petrel
<i>Anous stolidus</i> (LINNAEUS, 1758)	Brown noddy
<u>Native landbirds</u>	4
<i>Nesospiza acunhae</i> CABANIS, 1873	Tristan finch
<i>Nesospiza wilkinsi</i> LOWE, 1923	Wilkins' finch
<i>Rowettia goughensis</i> (CLARKE, 1904)	Gough bunting
<i>Gallinula comeri</i> (ALLEN 1892)	Gough flightless moorhen
<u>Native marine mammals</u>	2
<i>Mirounga leonina</i> (LINNAEUS, 1758)	Southern elephant seal
<i>Arctocephalus tropicalis</i> (GRAY, 1872)	Subantarctic fur seal
<u>Introduced landbirds</u>	2
<i>Gallus gallus</i> (LINNAEUS, 1758)	Domestic chickens
<i>Anas</i> sp.	Ducks
<u>Introduced land mammals</u>	10
<i>Felis catus</i> LINNAEUS, 1758	Cat
<i>Canis familiaris</i> LINNAEUS, 1758	Dog
<i>Sus scrofa</i> LINNAEUS, 1758	Pig
<i>Bos taurus</i> LINNAEUS, 1758	Cattle
<i>Ovis aries</i> LINNAEUS, 1758	Sheep
<i>Equus asinus</i> LINNAEUS, 1758	Donkey
<i>Equus caballus</i> LINNAEUS, 1758	Horse
<i>Mus musculus</i> LINNAEUS, 1758	House mouse
<i>Rattus rattus alexandrinus</i> (GEOFFROY, 1881)	Alexandrine rat
<i>Rattus rattus frugivorus</i> (RAFINESQUE, 1814)	Fruit rat

Beitr. Ent. 57 (2007) 1	133
Non-breeding species	33
Seabirds	22
<i>Phoebastria palpebrata</i> (FORSTER, 1785)	Light-mantled sooty albatross
<i>Thalassarche chrystostoma</i> (FORSTER, 1785)	Grey-headed albatross
<i>Thalassarche cauta</i> (GOULD, 1841)	Shy albatross
<i>Calonectris diomedea</i> (SCOPOLI, 1769)	Cory's shearwater
<i>Daption capense</i> (LINNAEUS, 1758)	Cape petrel
<i>Fulmarus glacialis</i> (SMITH, 1840)	Antarctic fulmar
<i>Oceanites oceanicus</i> (KUHLE, 1820)	Wilson's storm petrel
<i>Oceanodroma leucorhoa</i> (VIEILLOT, 1818)	Leach's storm petrel
<i>Fregetta tropica</i> (GOULD, 1844)	Black-bellied storm petrel
<i>Macronectes halli</i> MATHEWS, 1912	Northern giant petrel
<i>Procellaria aequinoctialis</i> LINNAEUS, 1758	White-chinned petrel
<i>Pterodroma lessonii</i> (GARNOT, 1826)	White-headed petrel
<i>Pachyptila belcheri</i> (MATHEWS, 1912)	Slender-billed prion
<i>Pachyptila desolata</i> (GMELIN, 1789)	Antarctic prion
<i>Stercorarius longicaudus</i> VIEILLOT, 1819	Long-tailed skua
<i>Larus dominicanus</i> LICHTENSTEIN, 1823	Kelp gull
<i>Sterna paradisaea</i> PONTOPPIDAN, 1763	Arctic tern
<i>Phalacrocorax olivaceus</i> (HUMBOLDT, 1905)	Olivaceous cormorant
<i>Aptenodytes patagonicus</i> MILLER, 1778	King penguin
<i>Pygoscelis antarctica</i> (FORSTER, 1781)	Chinstrap penguin
<i>Pygoscelis papua</i> (FORSTER, 1781)	Gentoo penguin
<i>Eudyptes chrysolophus</i> (BRANDT, 1837)	Macaroni penguin
Landbirds	11
<i>Porphyryla martinica</i> (LINNAEUS, 1766)	Purple gallinule
<i>Bubulcus ibis</i> (LINNAEUS, 1758)	Cattle egret
<i>Egretta intermedia</i> (WAGLER, 1829)	Yellow-billed egret
<i>Egretta alba</i> (LINNAEUS, 1758)	Great white egret
<i>Egretta thula</i> (MOLINA, 1782)	Snowy egret
<i>Ardea cocoi</i> LINNAEUS, 1766	Cocoi heron
<i>Calidris fuscicollis</i> (VIEILLOT, 1819)	White-rumped sandpiper
<i>Phalaropus fulicarius</i> (LINNAEUS, 1758)	Grey phalarope
<i>Chionis alba</i> (GMELIN, 1789)	Pale-faced or Snowy sheath-bill
<i>Hirundo rustica</i> LINNAEUS, 1758	Barn swallow
<i>Phylloscopus trochilus</i> (LINNAEUS, 1758)	Willow warbler

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105-133](#)