Zootaxa 3478: 38–48 (2012)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Article

urn:lsid:zoobank.org:pub:C5F8A237-FC1C-45D7-9776-A1E460F73A97

Three new species of the louse genus *Saemundssonia* (Insecta: Phthiraptera: Philopteridae)

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Abstract

I describe and illustrate three new species of chewing lice in the genus *Saemundssonia*, collected from seabirds in New Zealand, the Galápagos and other islands of the Pacific Ocean. They are: *Saemundssonia* (*Saemundssonia*) *albatrossa* **n. sp.** from *Phoebetria palpebrata*, *Thalassarche chrysostoma*, and *Thalassarche impavida*; *Saemundssonia* (*Saemundssonia*) *creagrusa* **n. sp.** from *Creagrus furcatus*; and *Saemundssonia* (*Saemundssonia*) *gygisa* **n. sp.** from *Gygis alba candida*.

Key words: *Saemundssonia*, Philopteridae, Phthiraptera, lice, new species, Procellariiformes, Charadriiformes, albatrosses, gulls, terns, New Zealand, Galápagos Islands, Pacific Ocean

Introduction

The genus *Saemundssonia* Timmermann, 1936 includes over 100 species and subspecies (Price *et al.* 2003a: 232). They are round, stout-bodied chewing lice of medium size (adult length 1.5–3.0 mm), found regularly on the head and neck of most species of the orders Procellariiformes (albatrosses and petrels) and Charadriiformes (plovers, waders, gulls and terns), as well as on all species of Phaethontiformes (tropicbirds), several species of Gruiformes (cranes), and on one species of Anseriformes (pink-eared duck) (Price *et al.* 2003a: 281, 285, 333, 363, 369).

Perhaps due to the large number of species and subspecies included in *Saemundssonia*, there is no single publication covering them all. Most species from the Procellariiformes have been described or revised by Timmermann (1956, 1959, 1962, 1965) and Martín-Mateo (1996, as *Puffinoecus*). The species of *Saemundssonia* from the Charadriiformes have been treated by several authors, usually following the pattern of dealing with the species from one or two host families per paper, such as Clay (1949: Sternidae), Timmermann (1951a: Laridae; 1951b: Scolopacidae and Charadriidae); Ward (1955: Sternidae); Martens (1974: Scolopacidae); Palma (2000: Stercorariidae); Price *et al.* (2003b: Alcidae).

In the course of my research on lice from seabirds from New Zealand, the Galápagos and other islands of the Pacific Ocean, I have recognised three new, undescribed species of *Saemundssonia*. The aim of this paper is to name and describe these new taxa.

All the specimens examined are permanently deposited either in the collection of the Museum of New Zealand Te Papa Tongarewa (MONZ) or in the Essig Museum of Entomology, University of California, Berkeley, California, U.S.A. (EMEC); they were slide-mounted following the technique described by Palma (1978). For the nomenclature of the hosts, I follow the Checklist Committee (2010) for New Zealand birds, and Dickinson (2003) for birds from the Galápagos Islands. In the sections listing material examined, "N.Z." stands for "New Zealand".

Systematics

Order Phthiraptera

Suborder Ischnocera

 Accepted by K. Johnson: 2 Aug. 2012; published: 11 Sept. 2012

Family Philopteridae Burmeister, 1838

Genus *Saemundssonia* Timmermann, 1936

Subgenus *Saemundssonia* Timmermann, 1936

***Saemundssonia* (*Saemundssonia*) *albatrossa* new species**
(Figs 1–4, 11, 18)

Saemundssonia sp.; Pilgrim & Palma 1982: 6–7.
Saemundssonia sp.; Murray, Palma & Pilgrim 1990: 1368.
Saemundssonia sp. M; Palma 2010: 409.

Type host. *Phoebetria palpebrata* (Forster, 1785).

Type locality. Muriwai Beach, Auckland, North Island, New Zealand

Holotype: ♂ in MONZ.

Diagnosis. Male: habitus as in Fig. 1. Clypeal signature as in Fig. 3. Genitalia as in Fig. 11. Eight long submarginal metanotal setae on each side (occasionally 6 or 7 on one side).

Female: habitus as in Fig. 2. Clypeal signature as in Fig. 4. Ventral pigmented plates of the last abdominal segments as in Fig. 18. Eight long submarginal metanotal setae on each side (occasionally 6 or 7 on one side).

Measurements of both sexes as in Table 1.

TABLE 1. Measurements (in mm) of *Saemundssonia* new species (means; ranges in parentheses).

Species number & sex	Head width (at temples)	Head length (including hyaline margin)	Total length (including hyaline margin)	Genitalia length
Saemundssonia (*S.*) *albatrossa*				
Holotype ♂	0.54	0.51	1.53	0.56
20 ♂	0.541 (0.51–0.56)	0.507 (0.49–0.52)	1.516 (1.50–1.56)	0.545 (0.51–0.57)
20 ♀	0.642 (0.61–0.66)	0.580 (0.56–0.60)	1.901 (1.74–2.04)	–
Saemundssonia (S.) creagrusa				
Holotype ♂	0.60	0.60	1.80	0.66
20 ♂	0.600 (0.58–0.62)	0.603 (0.59–0.63)	1.786 (1.74–1.84)	0.659 (0.64–0.70)
15 ♀	0.669 (0.66–0.69)	0.645 (0.63–0.66)	2.098 (2.05–2.19)	–
Saemundssonia (S.) gygisa				
Holotype ♂	0.49	0.55	1.58	0.44
6 ♂	0.496 (0.49–0.50)	0.546 (0.54–0.55)	1.558 (1.54–1.58)	0.434 (0.42–0.45)
10 ♀	0.549 (0.54–0.56)	0.574 (0.56–0.59)	1.765 (1.74–1.95)	–

Etymology. The species epithet *albatrossa* is a noun in apposition referring to the vernacular name of the hosts.

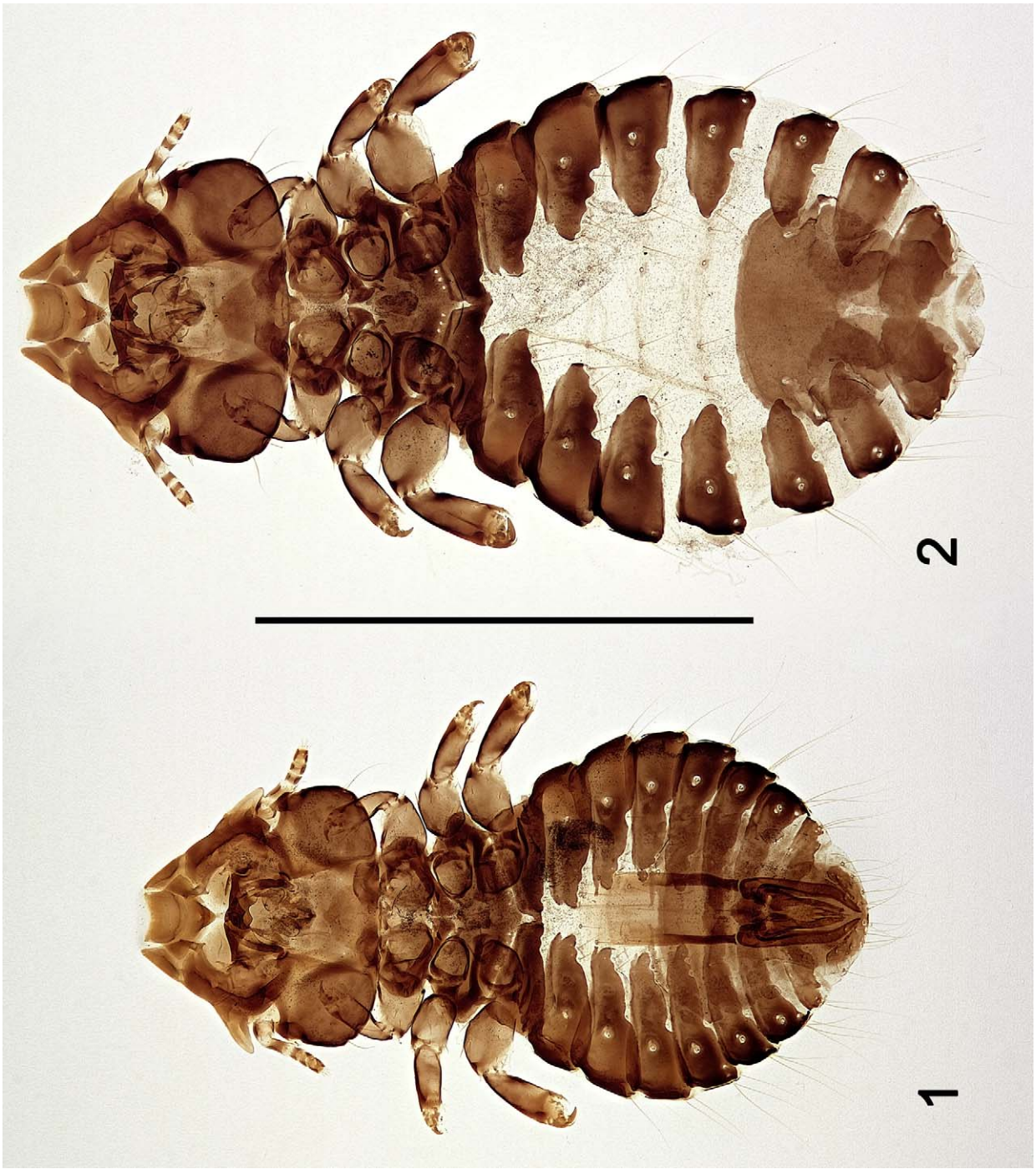
Material examined. Types. Ex ***Phoebetria palpebrata* (Forster, 1785)**: **Holotype** ♂, Muriwai Beach, Auckland, N.Z., 11 Dec. 1978, S.M. Reed (MONZ, AI.023782). Paratypes: 11♂, 12♀, same data as for holotype (MONZ, AI.023783–023784); 5♂, 5♀, Manawatu, N.Z., 15 Aug. 1964, L.L. McMillan (MONZ, AI.023778–779); 1♀, at sea, 59º 04' S – 161º 46' E, 13 Feb. 1965, P.C. Harper (MONZ, AI.023780); 1♂, 5♀, Urenui Beach, Taranaki, N.Z., 14 Sep. 1976, J. Castle (MONZ, AI.023781).

Non-types. Ex ***Thalassarche chrysostoma* (Forster, 1785)**: 1♀, Kapiti Island, N.Z., 21 Mar. 1959, B.D. Jones (MONZ, AI.023787); 1♂, 2♀, Otaki Beach, N.Z., 24 May 1959, D.M. 9236 (MONZ, AI.023788); 5♂, 11♀, Hokio Beach, Manawatu, N.Z., 13 Jun. 1965, P.C. Harper, D.M. 11837 (MONZ, AI.023789–791); 1♂, 4♀, Dargaville, Northland, N.Z., 22 Sep. 1974, D.E. Crockett (MONZ, AI.023792); 3♂, 5♀, Himatangi Beach, Manawatu, N.Z.,

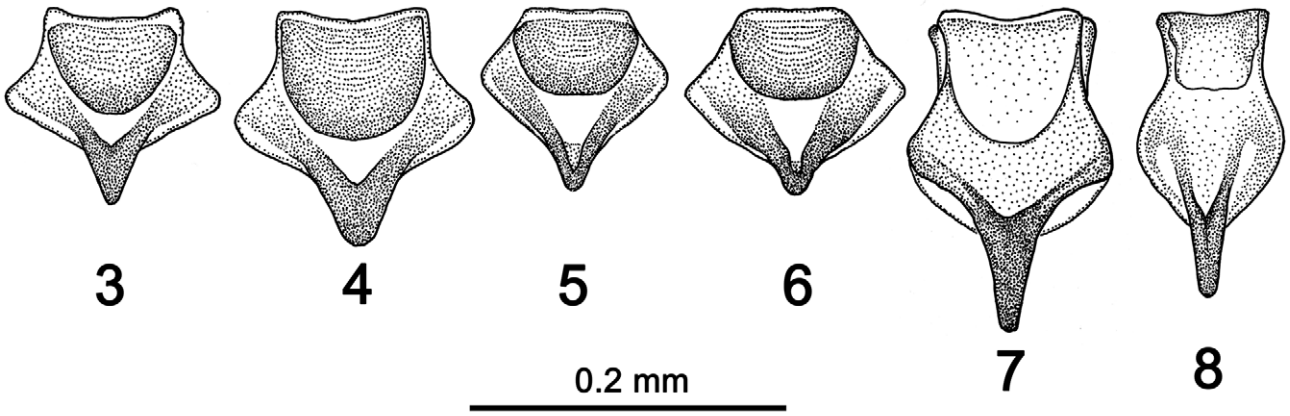
30 Aug. 1978, H. Eastcott (MONZ, AI.023793); 7♂, 5♀, Peka Peka Beach, Kapiti Coast, North Island, N.Z., 26 Sep. 1987, M. Hurst (MONZ, AI.023794).

Ex ***Thalassarche impavida*** **Mathews, 1912**: 2♂, 1♀, Campbell Island, N.Z., 2 Dec. 1975, C.J. Robertson (MONZ, AI.023785).

Remarks. *Saemundssonia* (*Saemundssonia*) *albatrossa* is morphologically closest to *S*. (*S*.) *gaini* (Neumann, 1913), which parasitises giant petrels, *Macronectes giganteus* (Gmelin, 1789) and *M. halli* Mathews, 1912. However, *S.* (*S.*) *albatrossa* differs from *S*. (*S*.) *gaini* in the male genitalia (Fig. 11 and Fig. 12, respectively), especially in the relative length of the parameres and in the configuration of the endomeres and mesosome, and in the shape of the clypeal signatures in both sexes (Figs 3–4 and Figs 5–6, respectively).



FIGURES 1–2. ***Saemundssonia*** **(*Saemundssonia*)** ***albatrossa***: **1,** habitus of male holotype. **2,** habitus of female allotype. Scale = 1 mm.



FIGURES 3–8. Clypeal signatures: **3,** *Saemundssonia* (*Saemundssonia*) *albatrossa* male. **4,** *Saemundssonia* (*S.*) *albatrossa* female. **5,** *Saemundssonia* (*S.*) *gaini* male. **6,** *Saemundssonia* (*S.*) *gaini* female. **7,** *Saemundssonia* (*S.*) *creagrusa*. **8,** *Saemundssonia* (*S.*) *gygisa*.

The finding of a species of *Saemundssonia* on albatrosses closely related to the species parasitising giant petrels is congruent with other associations between giant petrels and their lice. Palma & Pilgrim (1988: 585) discussed these host-louse associations in regard to the louse genera *Docophoroides* Giglioli, 1864, *Perineus* Thompson, 1936 and *Paraclisis* Timmermann, 1965, with species living on all members of the Diomedeidae and on the two species of *Macronectes*. Lice of those three genera living on giant petrels are morphologically closest to species living on albatrosses of the genera *Thalassarche* Reichenbach, 1853 and *Phoebetria* Reichenbach, 1853 (Timmermann 1965: 87, 100; Palma & Pilgrim 1988: 584). *Saemundssonia* (*S.*) *albatrossa* and *S.* (*S.*) *gaini* show the same close association between these host groups. Considering the unanimously accepted position of *Macronectes* within the family Procellariidae, and not in the Diomedeidae, the unusual host-louse associations of the two species of giant petrels are likely to be the result of four louse lineages host-switching from a diomedeid host to an early giant petrel, with the loss of the latter's ancestral philopterid lice. The only louse species which shows affinities between *Macronectes* and other members of the Procellariidae is the menoponid *Austromenopon ossifragae* (Eichler, 1949) (see Price & Clay 1972: 491).

Saemundssonia (*Saemundssonia*) *creagrusa* new species

(Figs 7, 9–10, 13, 19)

"*Docophorus lari*" Kellogg & Kuwana 1902: 463. Not *Docophorus lari* Denny, 1842 = *Saemundssonia* (*Saemundssonia*) *lari* (O. Fabricius, 1780).

"*Docophorus peristictus*" Kellogg 1906: 316. Not *Docophorus peristictus* Kellogg & Kuwana, 1902 = *Saemundssonia* (*Saemundssonia*) *platygaster* (Denny, 1842).

"*Docophorus melanocephalus*" Kellogg 1906: 316. Not *Docophorus melanocephalus* Burmeister, 1838 = *Saemundssonia* (*Saemundssonia*) *melanocephalus* (Burmeister, 1838).

"*Docophorus lari*" Kellogg 1906: 317. Not *Docophorus lari* Denny, 1842 = *Saemundssonia* (*Saemundssonia*) *lari* (O. Fabricius, 1780).

"*Saemundssonia gonothorax*" Thompson 1939: 73. Not *Docophorus gonothorax* Giebel, 1874 = *Saemundssonia* (*Saemundssonia*) *lari* (O. Fabricius, 1780).

"*Saemundssonia melanocephala*" Thompson 1939: 73. Not *Saemundssonia melanocephalus* (Burmeister, 1838).

"*Saemundssonia peristictus*" Thompson 1939: 73. Not *Saemundssonia peristicta* (Kellogg & Kuwana, 1902) = *Saemundssonia* (*Saemundssonia*) *platygaster* (Denny, 1842).

"*Saemundssonia lari*" Clay *in* Linsley & Usinger 1966: 132. Not *Saemundssonia* (*Saemundssonia*) *lari* (O. Fabricius, 1780).

Type host. *Creagrus furcatus* (Neboux, 1846).

Type locality. Bahía Darwin, Isla Genovesa (= Tower Island), Galápagos Islands.

Holotype: ♂ in MONZ.

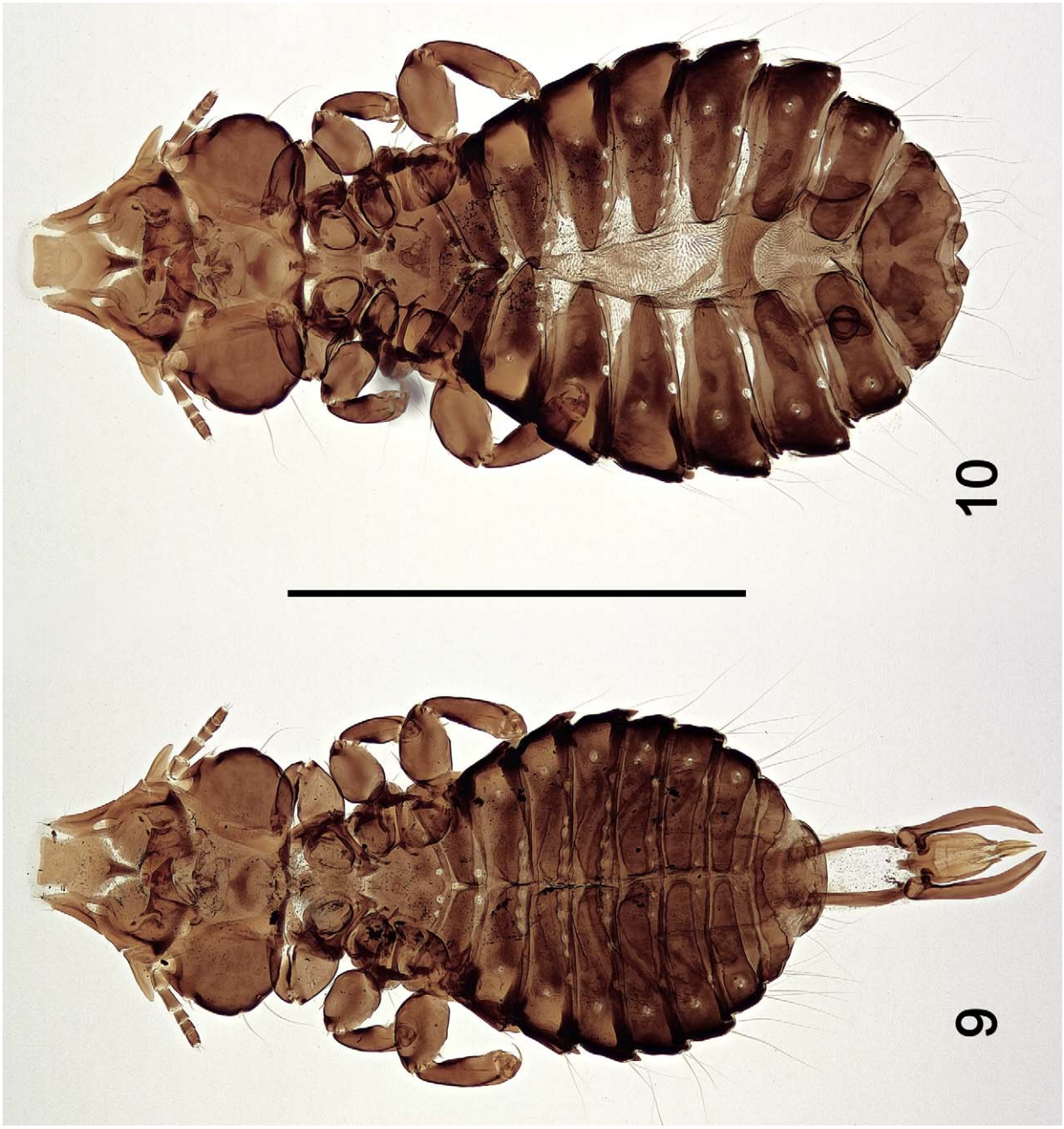
Diagnosis. Male: habitus as in Fig. 9. Clypeal signature as in Fig. 7. Genitalia as in Fig.13. Six long submarginal metanotal setae on each side (occasionally 7 or 8 on one side).

Female: habitus as in Fig. 10. Clypeal signature as in Fig. 7. Ventral pigmented plates of the last abdominal segments as in Fig. 19. Six long submarginal metanotal setae on each side (occasionally 7 on one side).

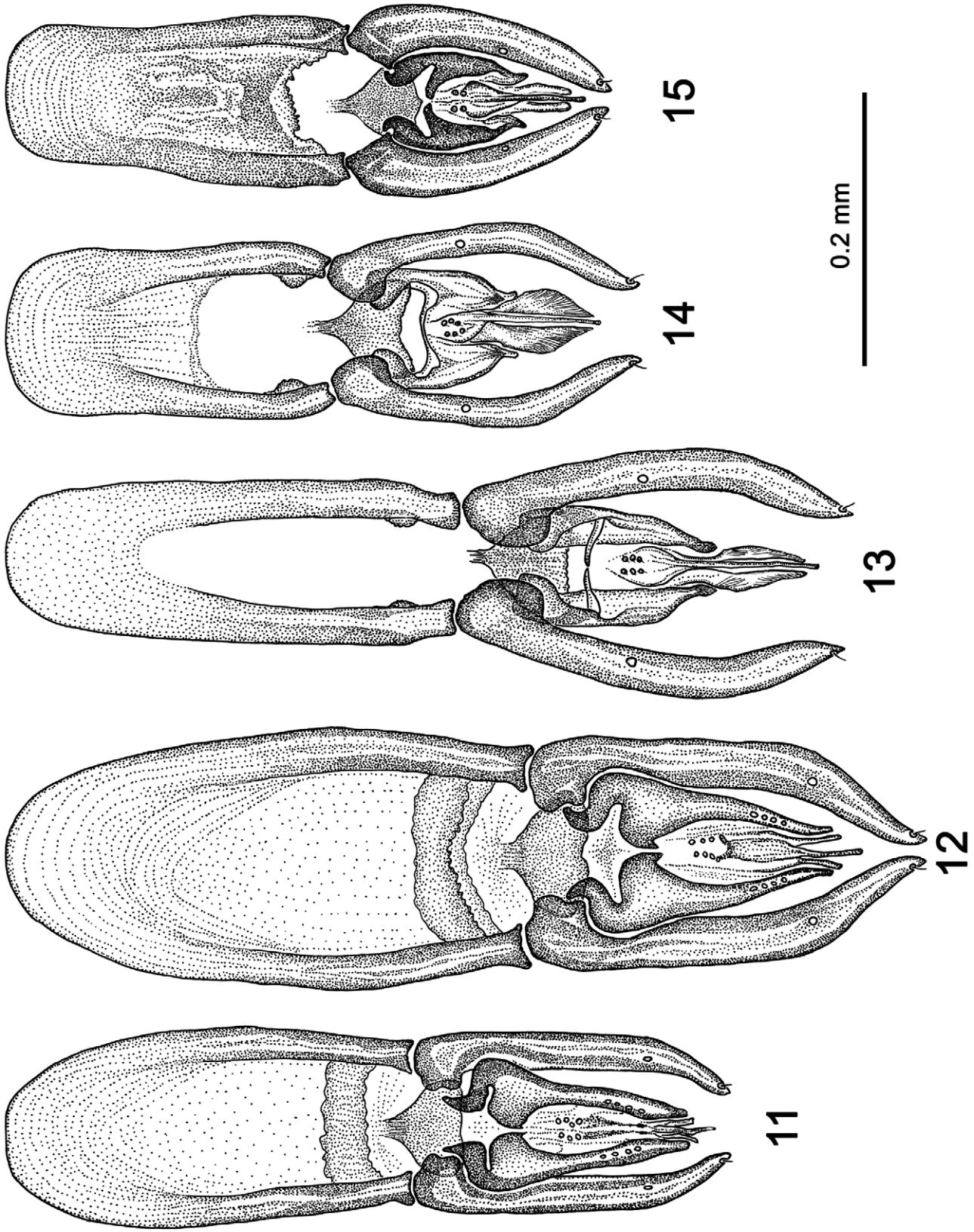
Measurements of both sexes as in Table 1.

Etymology. The species epithet *creagrusa* is a noun in apposition referring to the generic name of the host.

Material examined. Types. Ex ***Creagrus furcatus*** **(Neboux, 1846): Holotype** ♂, Bahía Darwin, Isla Genovesa, Galápagos Is, 25 Mar. 1992, R.L. Palma & E.M. Inca (MONZ, AI.020531). Paratypes: 9♂, 8♀, same data as for holotype (MONZ, AI.020345); 8♂, 2♀, Bahía Darwin, Isla Genovesa, Galápagos Is, 10 Mar. 1992, R.L. Palma & E. Vilema (MONZ, AI.020309); 8♂, 3♀, Isla Seymour Norte, Galápagos Is, 29 Mar. 1992, R.L. Palma & E. Vilema (MONZ, AI.020346); 1♂, 1♀, Isla Champion, near Isla Floreana, Galápagos Is, 22 Apr. 1992, R.L. Palma & E. Vilema (MONZ, AI.020347); 1♂, Culpepper Island [= Isla Darwin], Galápagos Is, no date (EMEC, Kellogg Collection 1043b); 1♂, 3♀, 1ºN – 93ºW [near Isla Wolf], Galápagos Is, no date, A.M.B. (EMEC, Kellogg Collection 1456, Beck 85).



FIGURES 9–10. ***Saemundssonia*** **(*Saemundssonia*)** ***creagrusa***: **9,** habitus of male holotype. **10,** habitus of female allotype. Scale = 1 mm.



FIGURES 11–15. Male genitalia, ventral view: **11,** *Saemundssonia* (*Saemundssonia*) *albatrossa*. **12,** *Saemundssonia* (*S.*) *gaini*. **13,** *Saemundssonia* (*S.*) *creagrusa*. **14,** *Saemundssonia* (*S.*) *lari* (ex *Larus novaehollandiae scopulinus* Forster, 1843). **15,** *Saemundssonia* (*S.*) *gygisa*.

Non-types. Ex *Puffinus lherminieri subalaris* Ridgway, 1897: 1♂, 1♀, Culpepper Island [= Isla Darwin], Galápagos Is, no date (EMEC, Kellogg Collection 1382, Beck 189). CONTAMINANTS from *Creagrus furcatus*.

Remarks. *Saemundssonia* (*Saemundssonia*) *creagrusa* is morphologically close to *S.* (*S.*) *lari* (O. Fabricius, 1780). Considering that *S.* (*S.*) *lari* parasitises a large number of hosts (Price *et al.* 2003a: 234) and consequently exhibits a variable morphology, the only reliable features to distinguish the males of these two species are the male genitalia (compare figs 13 and 14). Females can be separated by the configuration of the ventral pigmented plates of the last abdominal segments (Fig. 19), and by the number of long submarginal metanotal setae: 6 on each side (occasionally 7 on one side) in *S.* (*S.*) *creagrusa*, but 8 (occasionally 7 or 9 on one side) in *S.* (*S.*) *lari*.

Specimens listed above from the Kellogg Collection were collected by R.E. Snodgrass during the *Hopkins Stanford Galápagos Expedition* in 1898–1899, and by Rollo Beck in 1901 (Kellogg 1906: 315). These specimens were misidentified by Kellogg & Kuwana (1902), Kellogg (1906) and Clay *in* Linsley & Usinger (1966) as shown in the synonymy above. The two lice from *Puffinus lherminieri subalaris* are, without any doubt, contaminants arising from the collecting process (see Palma 1994: 269, 272). The natural regular species of *Saemundssonia* living on *Puffinus lherminieri subalaris* is *S.* (*Puffinoecus*) *minor* (Kellogg & Kuwana, 1902) (see Price *et al.* 2003a: 235).

Saemundssonia (*Saemundssonia*) *gygisa* new species

(Figs 8, 15–17, 20)

Saemundssonia (*Saemundssonia*) sp.; Palma 1999: 381.
Saemundssonia (*Saemundssonia*) sp.; Murray, Palma & Pilgrim 2006: 1965.
Saemundssonia sp. M; Palma 2010: 409.

Type host. *Gygis alba candida* (Gmelin, 1789), the white tern.

Type locality. Peka Peka Beach, Kapiti Coast, North Island, New Zealand.

Holotype: ♂ in MONZ.

Diagnosis. Male: habitus as in Fig. 16. Clypeal signature as in Fig. 8. Genitalia as in Fig.15. Six long submarginal metanotal setae on each side (occasionally 7 on one side).

Female: habitus as in Fig. 17. Clypeal signature as in Fig. 8. Ventral pigmented plates of the last abdominal segments as in Fig. 20. Six long submarginal metanotal setae on each side (occasionally 7 or 8 on one side).

Measurements of both sexes as in Table 1.

Etymology. The species epithet *gygisa* is a noun in apposition referring to the generic name of the host.

Material examined. Types. Ex ***Gygis alba candida* (Gmelin, 1789): Holotype** ♂, Peka Peka Beach, Kapiti Coast, North Island, N.Z., 23 Apr. 1988, R. Powlesland (MONZ, AI.024057). Paratypes: 1♂, 3♀, same data as for holotype (MONZ, AI.018931); 3♂, 7♀, Atiu, southern Cook Islands, 24 Aug. 1977, A. Black (MONZ, AI.018929); 1♂, 2♀, Raoul I., Kermadec Islands, N.Z., 10 Jul. 1983, A.W. Blundell (MONZ, AI.018930); 1♀, Muriwai Beach, Auckland, N.Z., 6 May 1990, N. Rothwell (MONZ, AI.018932).

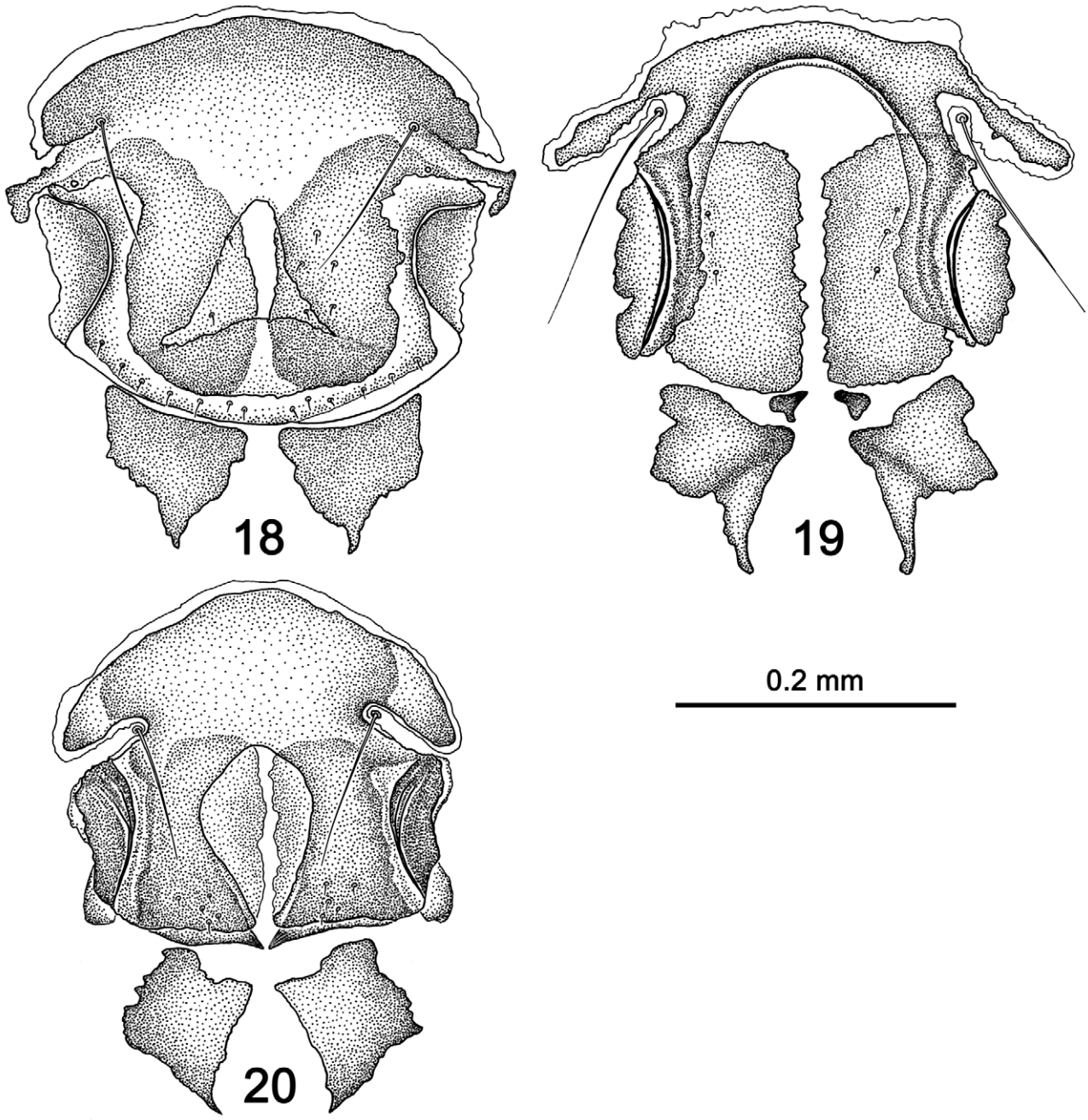
Remarks. As expected from its host association, *Saemundssonia* (*Saemundssonia*) *gygisa* is morphologically close to a group of about a dozen species (see Price *et al.* 2003a: 290–293) parasitic on members of the bird family Sternidae (Checklist Committee 2010: 230), sometimes referred to as Sterninae, a subfamily of the Laridae (Dickinson 2003: 149). The closest morphological species to *S.* (*S.*) *gygisa* are: *S.* (*S.*) *lobaticeps* (Giebel, 1874), *S.* (*S.*) *hopkinsi* Clay, 1949, and *S.* (*S.*) *melanocephalus*. (Burmeister, 1838).

The male genitalia of *Saemundssonia* (*Saemundssonia*) *gygisa* are extremely different from those of *S.* (*S.*) *melanocephalus*, but similar to those of *S.* (*S.*) *lobaticeps* and *S.* (*S.*) *hopkinsi*. However, males of *S.* (*S.*) *gygisa* can be distinguished from *S.* (*S.*) *lobaticeps* and *S.* (*S.*) *hopkinsi* by the configuration of the genitalia (Fig. 15) with wider, shorter parameres, and differences in the mesosome and endomeres (compare Fig. 15 with figs 20–21, 30–31 in Clay 1949). In addition, the shape and proportions of the head (Fig. 16) and the clypeal signature (Fig. 8) may assist in the identification of males. As with most species of *Saemundssonia* (see Discussion below) females are more difficult to separate, but *S.* (*S.*) *gygisa* can be identified by the following combination of characters: shape and proportions of the head (Fig. 17) and clypeal signature (Fig. 8); configuration of the ventral pigmented plates of the last abdominal segments (Fig. 20); and the shape of thoracic sternal plates. However, females of *S.* (*S.*)

gygisa are very similar to those of *S.* (*S.*) *lobaticeps*, *S.* (*S.*) *hopkinsi*, and *S.* (*S.*) *melanocephalus* in most features, and can only be separated by subtle details in the shape of the ventral plates of the last abdominal segments.

The key to species of *Saemundssonia* from the Sternidae in Clay (1949: 4) includes six species only, and therefore it is not relevant to attempt placing *S.* (*S.*) *gygisa* in it. However, in the key to species by Ward (1955: 84), males of *S.* (*S.*) *gygisa* key out to couplet 2 by having a "Basal plate with distal sclerotized crossbar". That couplet includes *S.* (*S.*) *lobaticeps* (Giebel, 1874) and *S.* (*S.*) *hopkinsi* Clay, 1949, which can be distinguished from *S.* (*S.*) *gygisa* by features of the genitalia. Unfortunately, the first character used by Ward (1955: 85) in his key to females is ambiguous and unreliable, making this key not particularly useful.

FIGURES 16–17. ***Saemundssonia* (*Saemundssonia*) *gygisa***: **16,** habitus of male holotype. **17,** habitus of female allotype. Scale = 1 mm.



FIGURES 18–20. Female ventral plates of last abdominal segments: **18,** *Saemundssonia* (*Saemundssonia*) *albatrossa*. **19,** *Saemundssonia* (*S.*) *creagrusa*. **20,** *Saemundssonia* (*S.*) *gygisa*.

Saemundssonia (*Saemundssonia*) *gygisa* is the second louse species recorded from all subspecies of *Gygis alba* (Sparrman, 1786), and the first in the suborder Ischnocera (Price *et al*. 2003a: 290). The subspecies of *Gygis alba* breed within the tropical belt of the Pacific, Indian and Atlantic Oceans (Dickinson 2003: 153). In particular, *G. alba candida* breeds on tropical islands of the Indian and Pacific Oceans, straggling south to the New Zealand region, with several records dating from 1883 until 2002 (Checklist Committee 2010: 234).

Discussion

Palma (2000: 126) discussed the difficulties to identify species of *Saemundssonia* from characters other than the male genitalia. In some cases, the size and shape of the head and of the clypeal signature may assist in the

separation of morphologically close species in both sexes. If these characters are not sufficient to distinguish females, the configuration of the ventral pigmented plates of the last abdominal segments is the only means to identify them. However, there are groups of *Saemundssonia* species where the ventral plates are still not suitable to distinguish between close species, such as those from the Stercorariidae (Palma 2000: 126). The chaetotaxy and morphology of tergites may be useful to diagnose species within a particular group, such as the *Saemundssonia* from the Alcidae (Price *et al.* 2003b), but those characters are not diagnostic in other groups. Therefore, descriptions of species of *Saemundssonia* are most useful when they include illustrations of several key characters, and not long wordy descriptions.

The wider ranges in the total length of females observed for the three new species described in this paper are in contrast with the narrower ranges in the total length of males (see Table 1). The reason for these discrepancies is that the female abdomen is much more flexible than the male's. Therefore, female abdomens distend to different lengths during the slide-mounting process, thus affecting the total length of slide-mounted specimens.

Acknowledgements

I am grateful to: Cheryl B. Barr (EMEC) for the loan of specimens from the Kellogg Collection; the authorities of the Galápagos National Park Service and the Charles Darwin Research Station (Isla Santa Cruz, Galápagos Islands, Ecuador) for their assistance in facilitating fieldwork in the Galápagos Islands; Stewart B. Peck (Carleton University, Ottawa, Canada) and the '*Grupo Peck*', especially Eduardo Vilema (Puerto Ayora, Galápagos Islands, Ecuador), for their most valuable assistance in collecting louse samples from live gulls during the *1992 Galápagos Expedition*; Jean-Claude Stahl and Raymond Coory (MONZ) for the photographs and for preparing the final plates; and all the collectors listed above in the Material Examined, without their keen interest and effort there would be no louse collections for me to describe.

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