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First record of *Saemundssonia australis* Timmermann, 1955 (Mallophaga: Phthiraptera) from Lesser Sheathbill, Chionis minor (Charadriiformes: Chionididae) in the Prince Edward Islands

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Abstract: The object of the study was to devise a quick and reliable method for the collection and study of lice present in birds without harm or stress being inflicted on the birds. Described is the feather ruffling collection of parasitic lice *Saemundssonia australis* from *Chionis minor* and microscopic observations thereof. A random selection of 10 free-flying Lesser Sheathbills were caught on Marion Island (46°54´S, 37°45´E) with the aid of a hand net. Approximately 10 lice from each bird were collected. Examination of microphotographs of male and female lice was made. The sex ratio of parasites was approximately equal. All collected lice were adult. All 10 birds were parasitised.

Key words: *Chionis minor,* Mallophaga, *Saemundssonia australis*, Marion Island

Birds, migratory species and island favouring animals for nesting purposes, are often parasitised by a variety of ectoparasites, including lice and mites. The Lesser Sheathbill, *Chionis minor* (Hartlaub 1841) (Charadriiformes: Chionididae), is an aberrant charadriid, and, by virtue of its gregarious nature, may potentiate the multiplication and spread of ectoparasites by unequivocally acting as a brood parasitic host. Habitat selection and feedings of all age groups of sheathbill are similar with characteristic expansions of niches to tap the food reserves in the island (Burger, 1982). Flocking of sheathbills probably facilitates habitat selection and feeding success increases following additions to a flock, but will decrease in flocks greater than 15 birds (Burger, 1982).

Opportunity is facilitated for the dispersal of louse populations via hosts that share similar ectoparasitic faunas (Balakrishnan and Sorenson, 2007). The richness of louse populations in the feathers of diving

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parents is reduced (Felso and Rozsa, 2006), possibly reinforcing significant horizontal transmission between chick-chick contacts. Vertical transmission between parents and nestlings is likely less frequent (Darolova et al., 2001). Indeed, physical contact between birds may contribute towards homogenising symbiotic assemblages within populations (Proctor and Jones, 2004). Although it is possible for co-speciation and host switching by lice (Johnson et al., 2005) the current study was restricted to determining distribution in one species, the Lesser Sheathbill, and the ectomorphology of these parasites ensuring adaptation to their environment. A study of host switching suggests host-parasite coevolution, facilitating spread of ectoparasites between hosts of similar sizes (Bush and Clayton, 2006). One study demonstrated that body lice are more host specific than wing lice, reinforcing the notion of cospeciation in the former (Clayton and Johnson, 2003). Host defence mechanisms, including preening, reinforce cospeciation in birds and feather lice by preventing lice from switching between hosts of differing sizes (Clayton et al., 2003). Additionally, the optimisation of host defence and parasite evasion strategies may select parasites for site segregation (Reiczigel and Rozsa, 1998) and isolate them to areas like the head and torso. Birds and lice have cospeciated synchronously and lice have evolved at approximately 5.5 times the rate of seabirds (Paterson et al., 2000). Ecomorphological adaptation of lice via whole-body insertion, tarsal claw use, and mandible use allows effective attachment to feather barbules (Bush et al., 2006). In a study of lice on swans, mouth parts were equipped to penetrate skin: mandibules were robust and asymmetric and the maxillae had serrated intercutting surfaces (Cohen et al., 1991).

Ebels (2002) suggests the potential transatlantic vagrancy of Palaearctic species. Descriptions of lice collected will hopefully assist in the determination of lice fauna in birds permanently resident in local areas. The object of the present study was to devise a quick and reliable method for the collection and study of lice present in birds without harm or stress being inflicted on the birds. The study was not aimed at making a species comparison between parasites but to emphasise the importance of a rapid and efficient method in the field.

At present, 3 species of lice are known from this shorebird, of which only 2 have been reported from the Prince Edward Islands (Séguy, 1953; Timmermann, 1955; Timmermann, 1963; Clay and Moreby, 1970). Here we give the first record of the third species, *Saemundssonia australis* Timmermann, 1955, from the Prince Edward Islands.

Ten free-flying Lesser Sheathbills were caught on sub-Antarctic Marion Island (46°54′S, 37°45′E) with the aid of a hand net. Following weighing and sexing, notes on the condition of the bird (feathers and health) were made. Confirmation that the birds lacked feather abnormalities was carried out by comparing lice-infected feathers with non-infected feathers. Length, width, quality of barbs, appearance of chewed sections, and colour of the feathers was noted. Careful feather ruffling techniques of the primary wing feathers assisted the location of lice, of which notes were made. The density and/or presence of lice on the head and neck were insignificant. Approximately 10 lice from each bird were collected. A random sample of birds was selected from a group of about 30 individuals. In this group it was impossible to determine how many birds were parasitised in the entire group. Forceps were used to remove the lice, which were then preserved in 10% ethanol. Subsequently, 25 lice were mounted in oil and examined microscopically using a photographic optical microscope Olympus CH30, at ×100, ×400, and ×1000 magnifications. In identifying the species of louse it was essential to obtain a full view of the parasite and details of its head, abdomen, antennae, and appendages. Additionally the precise identification of the male and female reproductive structures, in addition to leg and antennae features was important. Confirmation of the species identity was achieved by comparing the photographs against several males and females of *S. australis* – ex *Chionis minor* from Kerguelen Island – previously identified and kept in the collection of the Museum of New Zealand Te Papa Tongarewa.

All birds examined were free of disease or any physical or feather abnormalities. The length, width, quality of barbs, and colour of the primary wing feathers in lice infected birds did not differ in any way from those not infected. The lice infestation was not significant enough to result in or promote damaged or chewed sections of the feathers. Detailed examination

of microphotographs of male and female lice was made, sexing being confirmed via head (Figure 1) and genitalia (Figures 2 and 3) morphology, in particular the configuration of the ventral pigmented plates of the female terminalia. The sex ratio of parasites was approximately equal [5(mean) ± 1(sd) male vs. 4.5 ± 1 female]. All collected lice were adult. All 10 birds were parasitised.

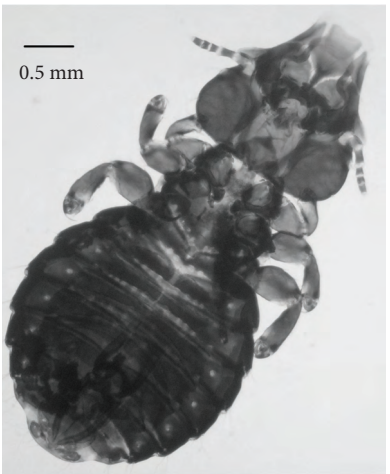

Figure 1. Microscopic image of dorsal aspect of male *Saemundssonia australis,* 100×, total body length 3 mm.

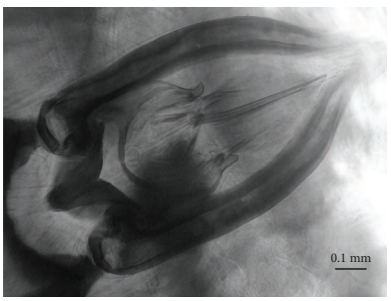

Figure 2. Microscopic image of dorsal aspect of male *Saemundssonia australis*, sexual orifice, 1000×, total length of reproductive structure 1 mm.

Although notes on appendages (Figure 4) and antennae (Figure 5) of this species can be made in order to distinguish species of louse, details thereof are usually inadequate for identifying sex. The microphotographs of the male legs and antennae were included for viewing in detail their particular morphological structures.

Saemundssonia australis has previously been recorded from the Lesser Sheathbill (its only known host species) from the Crozet Islands, Kerguelen Islands, and Heard Island (Clay and Moreby, 1970). Its presence at Marion Island means that the species occurs at all 4 island groups in the Kerguelen

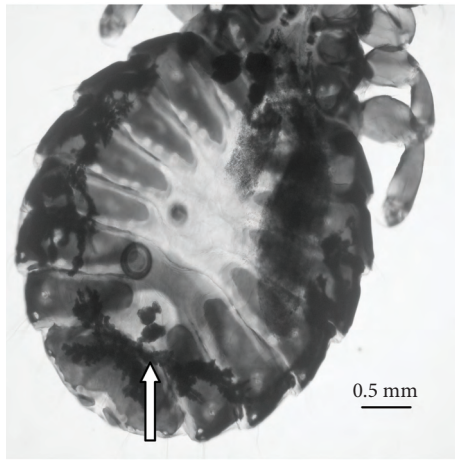

Figure 3. Microscopic image of ventral aspect of female *Saemundssonia australis* showing genitalia (arrow), 400×, total length of louse 3 mm.

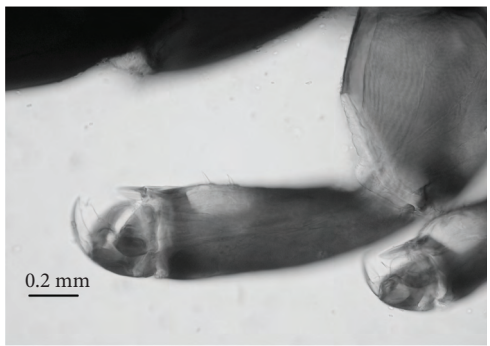

Figure 4. Microscopic image of legs I and II of male *Saemundssonia australis*, 1000×, total length of leg 1 mm.

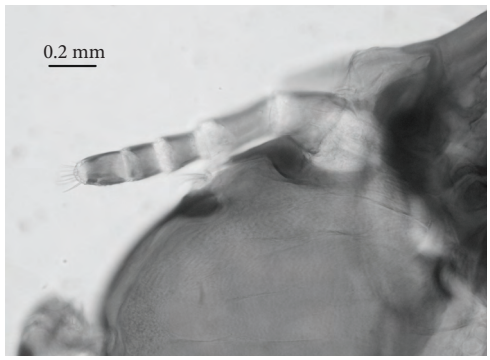

Figure 5. Microscopic image of dorsal aspect of antennae segments in male *Saemundssonia australis*, 1000×, total length of antenna 0.5 mm.

Biogeographical Province. The complete parasitism of all examined birds is an important finding. However, previous studies do not clearly state the precise numbers of lice per feather type or indeed the parasite load per bird.

There remains a need to undertake a systematic collection of lice from birds occurring at the Prince Edward Islands, so that knowledge of these ectoparasites may be on a level of that for other southern oceanic islands, allowing taxonomic and biogeographical studies to be undertaken. Collection of more data thereof would be useful and recording thereof in competent ornithological institutes useful. Forms of louse studied may be categorised according to ecological niche: head and neck regions; the wing and back regions; and the rapid running forms that seldom attach to feathers. Distributions of lice on sick, young, and adult birds would be useful. A better understanding of the role of possible disease transmission by these ectoparasites would be interesting.

Contact between birds and other species, both in cities (e.g. gulls) and coastal areas (e.g. sheathbills), may require further investigation to determine ectoparasite transmission, population densities, disease ecology, and health.

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