THE FEATHER LICE OF THE LEVANTINE SHEARWATER *PUFFINUS YELKOUAN* AND ITS TAXONOMIC STATUS

VEERLUIZEN VAN DE YELKOUANPIJLSTORMVOGEL PUFFINUS YELKOUAN EN DE TAXONOMISCHE STATUS DAARVAN

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Four species of feather lice (Insecta: Phthiraptera) *were found on one fresh dead and five museum skins of Levantine Shearwaters* Puffinus yelkouan *from various localities in the Mediterranean. Two of them,* Halipeurus diversus *(Kellogg, 1896) and* Saemundssonia (Puffinoecus) kosswigi *Timmermann, 1962 (unique to* P. yelkouan*), had been recorded previously from this host; the other two,* Austromenopon paululum *(Kellogg & Chapman, 1899) and* A. echinatum *Edwards, 1960, represent new host-louse records. One bird collected fresh in Cyprus yielded the most lice, including 20 specimens of* A. echinatum. *The taxonomic position of the Levantine Shearwater is discussed briefly and the opinion that it be regarded as a distinct species is supported.*

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INTRODUCTION

Two species of feather lice (Insecta: Phthiraptera) have been recorded from *Puffinus* shearwaters in the Mediterranean. The Levantine Shearwater *Puffinus yelkouan* is host to *Halipeurus diversus* (Kellogg, 1896) and a unique louse, *Saemundssonia (Puffinoecus) kosswigi* Timmermann, 1962 (on the status of *Puffinoecus*, see Palma 1994). Palma *et al.* (1997) recorded only a single species of feather louse (*H. diversus*) on 19 systematically deloused specimens of Balearic Shearwater *Puffinus mauretanicus* Lowe, 1821 from the Balearic archipelago. Those records contrast with eight louse species collected by Fowler & Shaw (1990) from the Manx Shearwater *Puffinus puffinus* Brünnich, 1764 from 230 birds systematically deloused in Wales. These included an unidentified species of *Saemundssonia.* Compared with the other two shearwaters, there have been no collections of lice made systematically from *P. yelkouan.*

The phylogenetic relationships and the taxonomic status of these three closely related shearwaters from the North Atlantic Ocean and the

Table 1. Feather lice from a Levantine Shearwater collected in Cyprus.
Tabel 1. Veerluizen van een op Cyprus verzamelde Yelkouanpijlstormvogel.

	Males man	Females vrouw	Nymphs pop
Austromenopon echinatum	3	12	5
Halipeurus diversus	12	34	20
Saemundssonia (P.) kosswigi	2	1	0

Table 2. Feather lice from the Levantine Shearwater collected from five museum skins.
Tabel 2. Veerluizen van vijf museumexemplaren van de Yelkouanpijlstormvogel.

	Males man	Females vrouw	Nymphs pop
Austromenopon paululum	1	0	0
Halipeurus diversus	13	12	5
Saemundssonia (P.) kosswigi	2	2	3

Mediterranean Sea have been a matter of controversy for many years (Bourne *et al.* 1988; Walker *et al.* 1990). Although originally described as a full species, the Levantine Shearwater has been variously regarded as a subspecies, either as *P. p. yelkouan* (see Jouanin & Mougin 1979) or as *P. yelkouan yelkouan* (see Bourne *et al.* 1988). Knowledge of its ectoparasites, especially feather lice, may help to elucidate its true relationships. In this paper we report on the lice found on a fresh corpse of *P. yelkouan* collected recently in Cyprus, and from five other birds preserved as skins in museum collections.

METHODS AND MATERIALS

On 14 July 1996, A. Kelly picked up a fresh dead *P. yelkouan* from the roadside near Çatalky, northern Cyprus. The bird appeared to have been struck by a car on an open road some distance inland. The specimen, an emaciated juvenile male, was preserved frozen and taken to Glasgow where it was skinned and systematically deloused. Five skins of *P. yelkouan* from the collection of the Royal Museum of Scotland, Edinburgh, were also deloused. All lice were slide-mounted and identified, and have been deposited in the collection of the Museum of New Zealand, Wellington, New Zealand.

RESULTS

Four species of feather lice were collected from the six *P. yelkouan* individuals. The names and numbers of these are shown in Table 1 (fresh dead) and Table 2 (museum study skins).

DISCUSSION

P. yelkouan breeds on several islets in the Mediterranean Sea from France to Yugoslavia (Jouanin & Mougin 1979). It has not been recorded breeding in Cyprus (Sultana 1993) but has been collected dead on beaches there (a juvenile male found in Akrotiri on 26 August 1969 is in the collection of the Royal Museum of Scotland, Edinburgh) and is regularly seen offshore.

The first records of lice from *P. yelkouan* were published by Balát (1958); they were "*Halipeurus hanáki* n. sp." (now a junior synonym of *H. diversus*) and "*Saemundssonia* sp." (now *Saemundssonia (P.) kosswigi*). In addition to these, we have collected two species of *Austromenopon.*

H. diversus parasitises several species of *Puffinus*, including *P. yelkouan, P. mauretanicus* and *P. puffinus* (see Edwards 1961). *Austromenopon paululum* (Kellogg & Chapman, 1899) has been recorded from an even wider range of *Puffinus* species, including *P. puffinus* (see Price & Clay 1972). In contrast, the other two louse species have previously been recorded only as parasitic on single host species: *Austromenopon echinatum* Edwards, 1960 on the three subspecies of Cory's Shearwater, *Calonectris diomedea* (Scopoli, 1769), and *Saemundssonia (P.) kosswigi* on *P. yelkouan*.

The louse sample from Cyprus is notable when compared with those taken from *P. mauretanicus* (Palma *et al.* 1997) and from *P. yelkouan* skins held by museums. Firstly, three species were present on a single bird specimen whereas only one species was found on 19 *P. mauretanicus* individuals. Secondly, *A. echinatum* is a new louse record for *P. yelkouan*, although this shearwater may not be a regular host because we have also found *A. paululum.* It might be argued that a single male *A. paululum* from an old skin of *P. yelkouan* is not adequate to establish a host-louse association, but from the wide host range of *A. paululum*, we believe this to be the regular *Austromenopon* species parasitic on *P. yelkouan.*

Our collection of 20 *A. echinatum* specimens from an unexpected host species is unusual. Feather lice are flightless and therefore permanent residents on the host and so can be transferred only by physical contact. Given that the *P. yelkouan* from Cyprus was at no stage in contact or close to a specimen of *C. diomedea* after it was recovered dead, we must conclude that all the specimens of *A. echinatum* are either natural stragglers that must have transferred from a *C.*

diomedea host to the *P. yelkouan*, perhaps while the latter bird was prospecting a burrow occupied by the former, or alternatively, are regular parasites of *P. yelkouan*, but with an unexpected host distribution. Although we believe that the first scenario is the more likely, further sampling is required to clarify the status of *Austromenopon* lice on the Levantine Shearwater.

In contrast, *Saemundssonia (P.) kosswigi* is unique to *P. yelkouan* and has not been found on any other species of bird, even as a straggler. Fowler & Shaw (1990) reported one female and six nymphs of a *Saemundssonia* sp. from *P. puffinus*, but in the absence of a male specimen a definite species identification was not possible. However, if indeed *P. yelkouan* proves to be the only host of *S. (P.) kosswigi,* it would suggest several possible scenarios. Among these are:

1) *Saemundssonia (P.) kosswigi* or its ancestor parasitised all three closely related shearwaters - *P. yelkouan, P. mauretanicus* and *P. puffinus* - but became extinct on *P. mauretanicus* and *P. puffinus*;

(2) *Saemundssonia (P.) kosswigi* or its ancestor parasitised all three closely related shearwaters, became extinct on *P. mauretanicus* but evolved into a different species on *P. puffinus*;

(3) *Saemundssonia (P.) kosswigi* is an indicator of a closer relationship between *P. yelkouan* and the Persian Shearwater, *P. persicus* Hume, 1873, than had previously been realised. *Puffinus persicus* is the unique host of *Saemundssonia (P.) persica* Timmermann, 1962, a distinct species but morphologically closely related to *Saemundssonia (P.) kosswigi.*

It is clear that the two sympatric shearwaters in the Mediterranean Sea, *P. mauretanicus* and *P. yelkouan*, do not interbreed, have different feather louse faunas, are osteologically separable (Walker *et al.* 1990), have different post-breeding dispersal patterns, and have consistent plumage differences (i.e. axillary patterns; B. Zonfrillo, pers. obs.) . Their calls, although superficially similar, are different in frequency (sonogram analyses; B. Zonfrillo, pers. obs.). In addition, the Balearic Shearwater has a larger mean wing length. Wink *et al.* (1993) showed the Cytochrome-*b* gene clearly separates *P. yelkouan* from *P. puffinus* (*P. mauretanicus* was not examined). The above differences suggest that these two shearwaters should be treated as distinct species - the Levantine Shearwater as *P. yelkouan* and the Balearic Shearwater as *P. mauretanicus*.

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