

Two bird lice (Insecta: Phthiraptera) collected during Captain Cook's 2nd voyage around the world

by RICARDO L. PALMA

National Museum of New Zealand,
Wellington,
New Zealand.

One male and one female of the feather louse *Harrisoniella hopkinsi* Eichler, 1952, collected in October 1772 from a Wandering Albatross (*Diomedea exulans* Linnaeus, 1758) by J.R. Forster and G. Forster during Captain J. Cook's 2nd voyage, have been found in the Invertebrate Unit of the Macleay Museum, University of Sydney, Australia. The history of these lice and the published references to them are discussed. Photographs of the two specimens as they were found and after their slide-mounting are included.

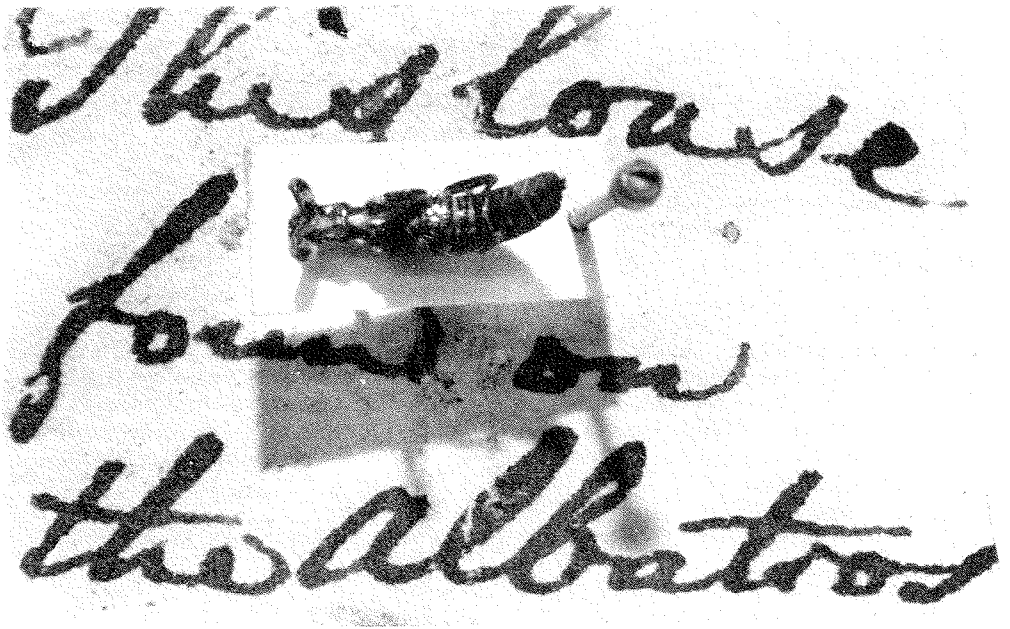
INTRODUCTION

The recent publication (Hoare, 1982) of Johann Reinhold Forster's journal of his voyage on board H.M.S. *Resolution* under the command of Captain James Cook, has made available a large amount of information related to the zoological work done by J.R. Forster and his son George during the three years (1772–1775) which the voyage lasted. References to ornithological observations are numerous and spread through the whole journal. They cover many different topics from purely morphological descriptions of the birds captured or seen at sea, to discussions on the impropriety of certain bird names. Most of these observations are full of details and enriched with comments and references to the work of other naturalists. Thus, it is not surprising that such a meticulous observer would have found and recorded some of the parasites living upon the birds he studied.

It is perhaps fortunate that the publication of J.R. Forster's *Resolution* journal coincided with the appointment of Dr Donald S. Horning as Curator of Invertebrates at the Macleay Museum, University of Sydney, Australia. Dr Horning noticed that two insects—chewing lice—in the collection appeared to be very old, and the information attached to one of them made him suspect that it might have been in some way connected to the voyages of Captain James Cook. To corroborate his suspicion, Dr Horning sent the two lice to me for identification. Subsequent research showed that he was correct: the specimens had been collected by J.R. Forster and his son, as naturalists on Captain Cook's second voyage, while sailing through the South Atlantic Ocean in 1772. This paper is an account of all the information, references and history relating to the "Forster lice" (as I will call them herein), which I have been able to compile.

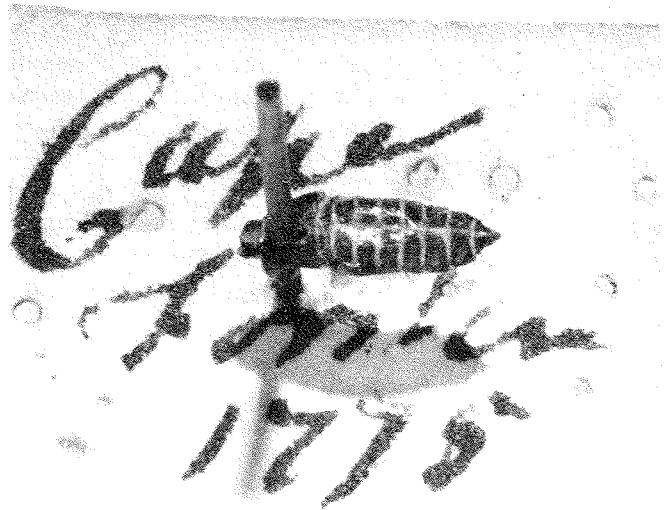
MATERIALS AND METHODS

The two Forster lice are the property of the Macleay Museum, University of Sydney, Australia. Both specimens were dry and pinned through the thorax. The male was



1

5 mm



2

Figure 1. Forster louse (male) pinned on card and label as found in Macleay Museum collection in January 1984.

Figure 2. Forster louse (female) pinned on label as found in Macleay Museum collection in January 1984.

double-mounted (Figure 1) i.e. pinned to a small card which in turn was pinned to the label. The female (Figure 2), with its head missing, was pinned directly to the label. The antennae of the male were folded over the head, and in both specimens the body was markedly bent. After so many years substantial amounts of dust and lint had accumulated over them. In addition, the female had been attacked by fungi which had left a large number of hyphae attached to its body and legs. These hyphae were easily removed by dipping the entire specimen in pure "Exit Mould"® (Sodium hypochlorite—30g/l available chlorine) and rinsing it with water at room temperature. The cleaning was monitored under a stereoscopic microscope to ensure complete removal of the hyphae.

Although it was possible and simple to identify the generic status of the two lice as they were received, their condition made impossible an identification at the species level. Therefore, they were processed following the Canada Balsam slide-mounting technique as described in Palma (1978), but without staining them and with an alteration to step two of this technique; i.e. instead of leaving the specimens for 15–35 hours at room temperature in 20 per cent solution of potassium hydroxide, they were placed, while still pinned, inside a test tube and treated for approximately five minutes in the same solution, within a simmering water bath; this treatment relaxed the lice to such an extent that the pins were easily removed without exerting any tension and thus not causing any damage to the specimens other than the hole made by the pins (Figures 3, 4).

The two lice were mounted on separate slides. The original labels were "sandwiched" between two layers of "Mylar"®¹ (a polyester film commonly used to conserve paper) glued to each other with a frame of "3M"® No. 4152 double-sided adhesive tape; this tape was also used to stick each "sandwich" onto a blank label previously glued onto the right side of the glass slides. Another label, containing the data referring to the lice, was placed on the left side of the slides (Figure 5). Finally, a third label was glued onto the reverse side with additional collecting data, i.e. host name, locality, date and collector's name.

SYSTEMATIC IDENTIFICATION AND DATA

After slide-mounting the Forster lice were readily identified as *Harrisoniella hopkinsi* Eichler, 1952 (family Philopteridae) by comparison against the holotype of that species and many more specimens identified as such in the revision of the genus *Harrisoniella* by Palma & Pilgrim (1984: 157). The male (Figure 4) is 9.40 mm long, while the female (Figure 3), without its head, measures 6.95 mm. The original label of the male reads "This louse/found on/the albatros" and measures 18 × 27 mm (Figure 1); that of the female reads "Cape/Forster/1775" with dimensions 13 × 16 mm (Figure 2). One, at least, is in George Forster's handwriting (see below).

The above information was obtained from the specimens and labels only. Further data, found in publications (see below) are: the host was the Wandering Albatross (*Diomedea exulans* Linnaeus, 1758); the locality was at sea, South Atlantic Ocean,

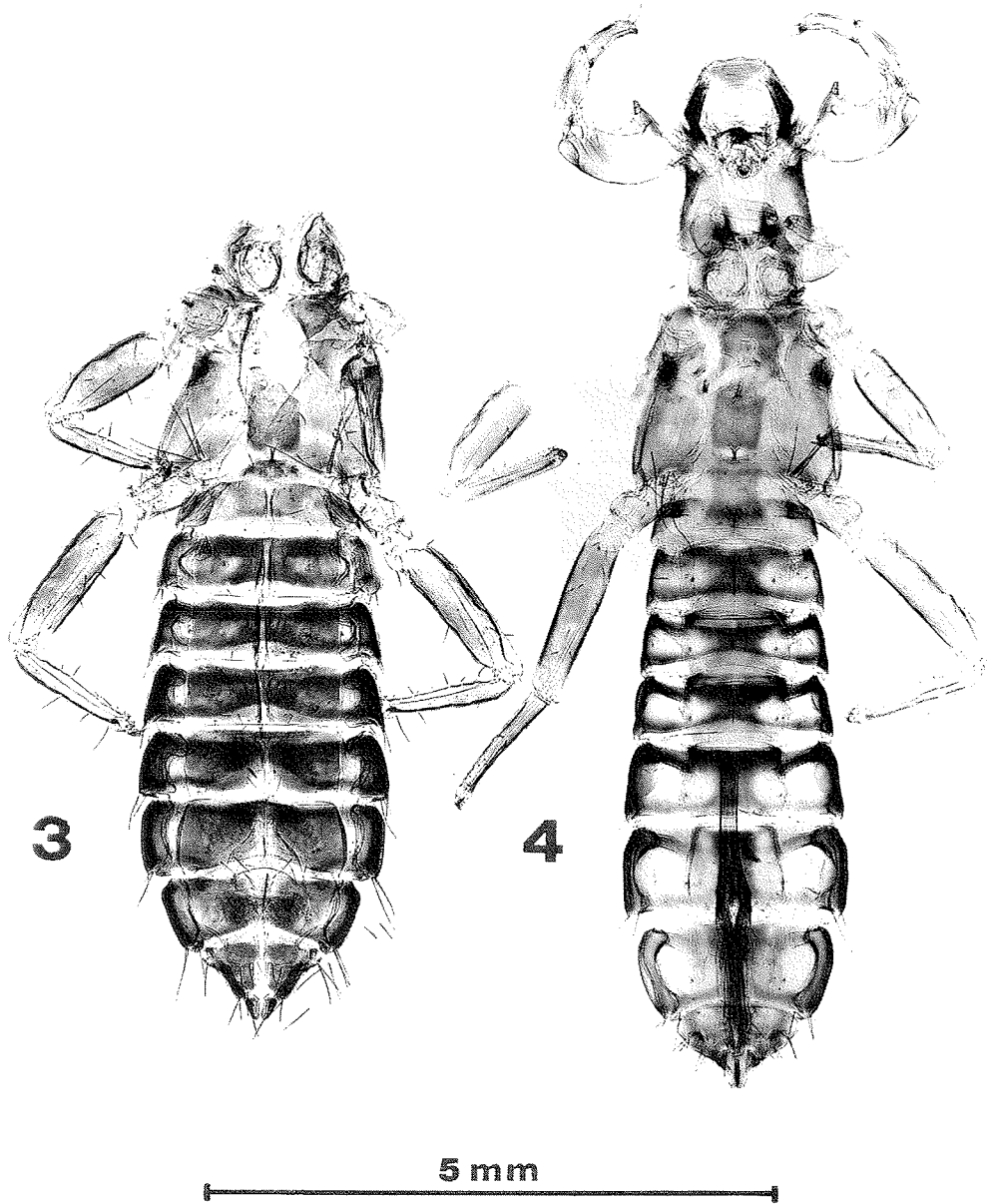


Figure 3. Forster louse (female, head missing) as seen under the compound microscope.

Figure 4. Forster louse (male) as seen under the compound microscope. Note the "two hornlike Antennae" as described by J.R. Forster (see text).

MACLEAY MUSEUM

Harrisoniella
hopkinsi
Eichler, 1952

det. { R. Palma ♂
R. L. C. Pilgrim



see reverse

This louse
found on
the Albatross

MACLEAY MUSEUM

Harrisoniella
hopkinsi
Eichler, 1952

(Head missing; crop
dissected) R.L.C.P.O
det. R. Palma ♀



Cape
Forster
1775

see reverse

50 mm

Figure 5. Forster lice mounted on glass slides and labelled as described in the text.

near Cape of Good Hope (about 36° 50'S, 11°E); the date of collection was 24 October 1772; the collectors were Johann Reinhold Forster and his son George, naturalists on Captain James Cook's 2nd voyage on H.M.S. *Resolution*.

INTERPRETATION OF LABELS AND PUBLISHED REFERENCES

Although the probability of finding published references to the Forster lice was not high, Dr Horning and I felt that, if available, they would confirm the suspected origin of these specimens and perhaps they would contain additional collecting data.

The key information we had to start our search was on the label attached to the female louse, and it was initially misinterpreted: we read it as a locality "Cape Forster", and a collecting date "1775". The total absence of such a Cape anywhere along the itinerary of Captain Cook's 2nd voyage (and which agreed with the date) clearly showed that we were wrong. (A search in the Geography Library at the University of Sydney, revealed a Forster Strait in the South Sandwich Islands which

Captain Cook discovered and named.) Perhaps there was a Cape Forster somewhere else, totally unrelated to Cook's voyages, but the fact that the lice belonged to the genus *Harrisoniella*, a group found regularly on species of albatrosses and mollymawks (genus *Diomedea*; see Palma & Pilgrim, 1984) which mainly live in the Southern Ocean, was a further indication that Cape Forster could not be a locality, but a combination of both a locality "Cape", albeit uncertain, and a collector "Forster". At this stage we learnt of the publication by Michael E. Hoare (1982) of J.R. Forster's *Resolution* journal, and a search through its Natural History Index soon revealed the exact information we were looking for: on pages 178–179, corresponding to the entry for 24 October 1772, J.R. Forster gave an account of the killing and examination of two kinds of albatrosses, and from one of them, *Diomedea exulans*, he cited two species of lice as follows: "The Albatross had two kinds of lice one oval short with a round broad head & black, & another kind brown half an inch long with four long & two short feet & two hornlike Antennae in one sex, in the other *setiform*."

The two Forster lice almost exactly fit the description of the latter kind; the only discrepancy being their length, which is about 3 mm less than half an inch, an insignificant difference considering the conditions under which J.R. Forster and his son must have worked on board the *Resolution*.

Upon finding this key reference I consulted Dr Michael E. Hoare (then of the Turnbull Library, Wellington, New Zealand) who assisted me to clear three further important points about the Forster lice. Firstly, the apparent discrepancy between the year written on one of the labels: "1775" and the year given in Forster's journal for the collection of the lice: "1772". Dr Hoare pointed out that in those times it was common practice to label properly all the material collected during an expedition at the end of the journey. Thus, it seems logical to assume that the Forsters did this during their stay at Cape Town from 22 March to 26 April 1775. Secondly, it became obvious that the locality given on the label as "Cape" referred either to Cape Town as being the place where the lice were labelled, or to Cape of Good Hope as being an important geographical reference nearest to the position of the *Resolution* when the albatross was captured and deloused at sea on 24 October 1772. Thirdly, Dr Hoare was able to identify the handwriting on the two labels attached to the Forster lice (Figures 1, 2) as that of George Forster's, by comparing it against copies of letters written by him, and by his father. Mr David G. Medway, a scholar of the ornithology of Captain Cook's voyages, agrees with Dr Hoare in that *one* of the labels (see Figure 1) is in George Forster's handwriting. Medway (pers. comm., 1990) thinks that the label attached to the female (see Figure 2): "Cape Forster 1775, in an unknown handwriting, was completed at the time of the receipt by Lever of the specimens from Forster". If this opinion is correct, then that date refers to both the year of labelling and the year of accession to the Leverian Museum, while the word "Forster" would refer to the name of both the collector and the donor of the specimens.

The information obtained from Forster's *Resolution* journal, especially the date when the Forster lice were collected, opened the possibility of finding further references to them in several publications relating to the natural history of Cook's 2nd voyage. The first account of that journey was published by G. Forster (1777) in English. Although he mentioned (p. 53) the shooting of seabirds "which gave us a

fresh opportunity of examining the two sorts of albatrosses, . . .” there is no record of the lice they collected from one of them.

The first publication containing a reference to the Forster lice is an excellent account of albatrosses written in French by J.R. Forster (1785). On page 569 he wrote:

Nous trouvâmes sur les *Albatros* deux différentes espèces de poux. L'une étoit longue, étroite, noire, avec quatre longs pieds, & deux qui étoient extrêmement courts; l'un des sexes avoit des cornes, & l'autre des antennes à soie, avec des articulations globuleuses. La seconde espèce étoit moindre, noirâtre, d'une figure plus arrondie, & la tête en étoit ronde, & tronquée par-derrière.

These descriptions are more detailed than those in the *Resolution* journal, and sufficiently accurate from which to recognise two genera and to infer the species. However, Forster did not name them; perhaps he (correctly) considered that naming insect taxa in a paper dealing primarily with birds was improper. Apart from the host, there are no collecting data for the Forster lice in this publication.

Johann R. Forster's most important zoological contribution resulting from his work during Cook's 2nd voyage was his *Descriptiones Animalium*, an extensive monograph edited and published by Lichtenstein (1844) many years after Forster's death. A reference to the Forster lice appears in Latin on page 29 at the end of a lengthy description of the host, *Diomedea exulans* (as *Diomedea Albatrus* F.). It reads:

Pediculorum duo genera in eis observavi: unum ovatum nigrum capite postice truncato, antice rotundato, minus, alterum elongatum majus atrum, pedibus 4 longis, 2 brevissimis, capite in altero sexu cornuto, in altero antennis setaceis moniliformibus.

This reference is almost an exact translation from that in English in the *Resolution* journal quoted above. The two “genera” still remain unnamed, a surprising fact considering the large number of new taxa described and named in *Descriptiones Animalium*. George Forster also commenced a journal during the voyage, but it is not known if he completed it. The available portion covers the journey until 1 January 1773 and has been published by Kahn *et al.* (1972). The entry for 24 October 1772 also records the Forster lice but only very briefly and less accurately than in J.R. Forster's accounts. The younger Forster wrote: “The large Albatros was full of two species of Lice, one very long the other oblong & smaller . . .”. These features are not sufficient to recognise either of the two species.

Early in 1984, the rediscovery of two specimens of the lice mentioned in the four publications discussed above, created considerable interest resulting in at least three further references: Knox & Palma (1984) reported the finding to the New Zealand public in a Wellington newspaper; Horning (1984: 173) released the news with a short statement to the entomological community; and Palma & Pilgrim (1984: 157) included the Forster lice in their revision of the louse genus *Harrisoniella*. This latter was a rather timely inclusion as the manuscript of the paper was already in press at the time of the rediscovery.

It is remarkable that 212 years elapsed between collection and rediscovery of the Forster lice, and 180 years passed before the species they represented was properly named. It is tempting to speculate that if Forster had named and figured the species in his 1785 paper, the confusion involving the genus *Harrisoniella* which lasted well over 100 years may have been avoided (see Palma & Pilgrim, 1984: 145–146, 156).

HISTORY

In this history of the Forster lice I have tried to reconstruct the chronological sequence of events since their arrival in England, on board of H.M.S. *Resolution* at the end of July 1775, until their rediscovery in the Macleay Museum Invertebrate Unit in January 1984. This reconstruction is based on all the written evidence which I have been able to accumulate with the assistance of several colleagues. Like many other histories, it contains uncertainties which may be cleared should additional information become available. Perhaps we can be certain about only two events in the history of the Forster lice: that they were collected by the Forsters and that they are presently held in the Macleay Museum. What did happen in between?

Because of its importance in the late eighteenth century, the Leverian Museum is perhaps the best place to begin. This museum, founded by Sir Ashton Lever (1729–1788), was known to possess a considerable number of artifacts and biological specimens collected during Cook's voyages (Donovan, 1806; Whitehead, 1969), which were acquired by various routes (Whitehead, 1978: 76). Evidence that Lever may have received insects collected by Forster can be found in a letter from D.C. Solander to J. Banks dated 5 September 1775 (Dawson, 1958: 772). In this, Solander wrote that Forster had brought insects to him to be distributed among the British Museum, the Royal Society, Banks, Tunstall, and Lever. The Leverian Museum collection, including the Forster lice, was eventually disposed of in a lottery which was won by James Parkinson in 1786. Ultimately, the Leverian collection was split and auctioned in lots in 1806 (Whitehead, 1969: 168).

The connection between the Leverian collection and that of Alexander Macleay is well documented. Some of the available copies of the sale *Catalogue of the Leverian Museum* (Donovan, 1806) are annotated with the names of the buyers beside the descriptions of the lots. Macleay's name appears as the purchaser of 37 lots, including various shells, one rock and many insects. Several specimens from the insect lots have recently been found in the Macleay Museum (Horning, pers. comm. 1984). Although there is no mention of "lice" in any of the descriptions given for those 37 lots (nor in any of the 7,878 lots described in the entire *Catalogue!*), it is possible that the Forster lice were included with other insects. For instance, lot 3521, bought by Macleay on the 30th day of the sale, contained "*Carabus nitens*, and a variety of small insects of the locusta leptura, cimex, and other genera". To group large lice together with bedbugs (*Cimex*) would not have been an illogical association.

Alternatively, Macleay may have acquired the Forster lice when he bought insects from other buyers of the Leverian Museum collection. For example, those of Edward Donovan (see Fletcher, 1921: 574), whose name is written as the purchaser of many lots in the sale *Catalogue*, include lot 2803 which contained "A great variety of small insects of the cimex, silpha, curculio, and other genera".

On the other hand Dr Adrienne Kaepler has suggested (pers. comm., 1984) that the Forster lice may have been obtained by Macleay through another collection, not that of Lever's, especially because she had not been able to isolate any Forster specimen in the Leverian collection during her extensive research work on it. However, David G. Medway (in Hoare, 1982: 98–99) gave a definite example of a bird collected by the Forsters in New Caledonia "which was in the Leverian Museum at the time Latham described it . . .". This discrepancy of opinions among contemporary

scholars is an example of the difficulties faced by anyone trying to unravel the history of many of the objects taken to England by Captain Cook and his subordinates.

The fate of the Forster lice after their inclusion in the Macleay insect collection followed the history of the latter, of which good accounts have been published by Horning (1983; 1988).

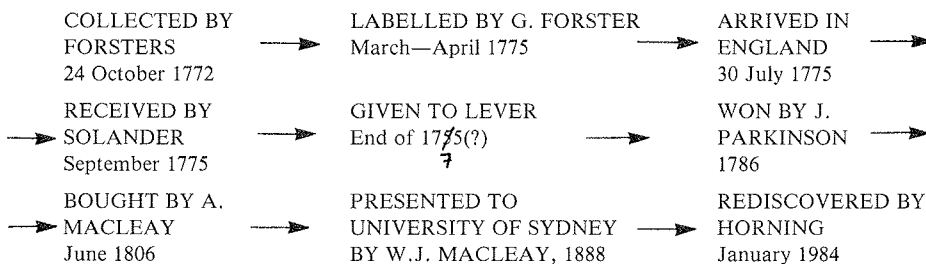
Whitehead (1969; 1978) published useful accounts of the history and fate of many zoological specimens collected during Cook's voyages. He pointed out (1969: 161) the difficulties confronting those interested in animal groups other than birds and shells, in view of "the devious routes taken by the Cook material, as well as the numerous small museums and collections that must be investigated before a particular specimen (sometimes a type) can be written off as definitely lost." This remark is relevant to the rediscovery of insects from Cook's 2nd voyage in the Macleay Museum, and it is not surprising that neither that museum nor its founder, Alexander Macleay, are mentioned by Whitehead in the papers cited above. Among the institutions listed by Whitehead (1969: caption to Figure 1) as having extant zoological specimens from Cook's voyages, the British Museum (Natural History) is the only one reported as holding insects. The Macleay Museum should now be added to that list.

The finding of extant entomological specimens collected during Cook's voyages is of both scientific and historical interest. Insects from the 2nd voyage are even more significant in view of their scarcity in collections (Whitehead, 1969). The original number of arthropods collected by the Forsters may have been relatively small since their effort was directed towards "birds, plants, fish and shell-fish; . . ." (Medway, 1979: 13, in his English translation of Forster & Forster, 1776: *Praefatio* iii). The rediscovery of the Forster insects is therefore an unusual event.

Besides their celebrated origin and arguable history, the Forster lice bear the title of being among the oldest, if not *the* oldest, feather lice still extant in scientific collections. Clay & Hopkins (1950; 1951; 1954; 1960), in their excellent review of the feather lice literature published between 1758 and 1818, found the original specimens of only three species from a total of approximately 250 louse names published during that period. The three species were described by J.C. Fabricius in 1798 and 1805, and the extant lice are in the collection of the Universitetets Zoologiske Museum, Copenhagen, Denmark (Clay & Hopkins, 1960: 10, 21).

During Cook's 1st voyage, at least two species of feather lice were collected from seabirds: *Halipeurus procellariae* (J.C. Fabricius, 1775) from a petrel, and *Paraclisis diomedea* (J.C. Fabricius, 1775) from a mollymawk. Regrettably, the original specimens of these species, cited by Fabricius (1775: 808) as in "*Mus. Banks*", are now lost (Zimsen, 1964: 496).

SUMMARY OF RECONSTRUCTED EVENTS IN THE HISTORY OF THE FORSTER LICE



ACKNOWLEDGEMENTS

I am indebted to several people who, in various ways, assisted me in the preparation of this paper. They are: Dr Michael E. Hoare (Wellington, N.Z.); Mr David G. Medway (New Plymouth, N.Z.); Professor Robert L.C. Pilgrim (Christchurch, N.Z.); Mrs Manuela Angelo (Wellington, N.Z.); Dr Adrienne L. Kaeppler (Washington, D.C., U.S.A.); Ms Gillian Watt (Wellington, N.Z.); Dr Peter J. Whitehead. The photographs were kindly prepared by Mr Warwick Wilson (Wellington, N.Z.) and Mr Terry P. Williams (Christchurch, N.Z.). I specially thank my friend and colleague Dr Donald S. (Woody) Horning (Sydney, Australia) for making the specimens available, and for continued assistance and encouragement throughout the preparation of this paper.

NOTES

1. "Mylar"® is a clear polyester film, free from plasticizers, surface coatings and ultraviolet inhibitors. Dimensionally stable and tested to withstand 500 years of artificial heat ageing at 105°C, and heat plus humidity ageing at 90°C and 50% R.H.
2. "3M"® No. 415 double-sided adhesive tape has a transparent polyester film base coated with an acrylic adhesive which have been tested in the same way as described for "Mylar" above.

REFERENCES

- CLAY, T. and HOPKINS, G.H.E., 1950 The early literature on Mallophaga (Part I). *Bulletin of the British Museum (Natural History) Entomology* 1(3): 221–272, 2 pls, 63 figs.
- CLAY, T. and HOPKINS, G.H.E., 1951 The early literature on Mallophaga (Part II). *Bulletin of the British Museum (Natural History) Entomology* 2(1): 1–37, 3 pls, 45 figs.
- CLAY, T. and HOPKINS, G.H.E., 1954 The early literature on Mallophaga (Part III). *Bulletin of the British Museum (Natural History) Entomology* 3(6): 221–266, 2 pls, 68 figs.
- CLAY, T. and HOPKINS, G.H.E., 1960 The early literature on Mallophaga (Part IV, 1787–1818). *Bulletin of the British Museum (Natural History) Entomology* 9(1): 1–61, 6 pls, 94 figs.
- DAWSON, W.R. (ed.), 1958 *The Banks letters: a calendar of the manuscript correspondence of Sir Joseph Banks*. Trustees of the British Museum, London. Pp xlii + 965.
- DONOVAN, E., 1806 *Catalogue of the Leverian Museum*. Parts I–VII + Appendix. London. Pp 348.
- FABRICIUS, J.C., 1775 *Systema entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Flensburg & Leipzig. Pp xxxii + 832.
- FLETCHER, J.J., 1921 The Society's heritage from the Macleays. *Proceedings of the Linnean Society of New South Wales* 45(4): 567–635.
- FORSTER, G., 1777 *A voyage round the world, in His Britannic Majesty's Sloop, Resolution, commanded by Capt. James Cook, during the years 1772, 3, 4, and 5*. Vol. I. White, Robson, Elmsly & Robinson, London. Pp xviii + 602, 1 map.

- FORSTER, J.R., 1785 Mémoire sur les albatros. *Mémoires de mathématique et de physique. Présentés à l'Académie Royale des Sciences, par divers savans, et lus dans ses assemblées (Paris)* 10: 563-572, 3 pls.
- FORSTER, J.R. and FORSTER, G., 1776 *Characteres generum plantarum, quas in itinere ad insulas maris australis, collegerunt, descripserunt, delinearunt, annis MDCCLXXII-MDCCLXXV*. White, Cadell, & Elmsly, London. Pp x + x(Praefatio) + 153, 75 pls.
- HOARE, M.E. (ed.), 1982 *The Resolution journal of Johann Reinhold Forster 1772-1775*, 4 vols. The Hakluyt Society, London. Pp xvii + 831, 46 figs.
- HORNING, D.S., 1983 The history and significance of the Macleay insect collection. In Borchardt, D.H. (ed.), *Some sources for the history of Australian Science*. History Project Incorporated, Kensington, N.S.W. *Historical bibliography monograph* 12: 23-32.
- HORNING, D.S., 1984 The Macleay insect collection. *Antenna, Bulletin of the Royal Entomological Society of London* 8(4): 172-175, 1 fig.
- HORNING, D.S., 1988 Entomology. Chapter 6, pp 126-130. In Stanbury, P. and Holland, J. (eds), *Mr Macleay's celebrated cabinet. The history of the Macleays and their museum*. The Macleay Museum, Sydney. Pp 171, 64 figs.
- KHAN, R.L., STEINER, G., FIEDLER, H., POPP, K.G. and SCHEIBE, S. (eds), 1972 *Georg Forsters Werke. Sämtliche Schriften, Tagebücher, Briefe, Streitschriften und Fragmente zur Weltreise*. Vol. 4. Deutschen Akademie der Wissenschaften, Berlin. Pp 513, 3 pls.
- KNOX, E. and PALMA, R., 1984 Lice spark National Museum investigation. *The Evening Post*, Wellington, 16 May, page 25.
- LICHTENSTEIN, H. (ed.), 1844 *Descriptiones animalium quae in itinere ad maris australis terras per annos 1772, 1773 et 1774 suscepto collegit observavit et delineavit Joannes Reinoldus Forster*. Dümmler, Berlin. Pp xvi + 424.
- MEDWAY, D.G., 1979 J.R. and G. Forster and the ornithology of Cook's second voyage. Pp 13-16. In Hoare, M. E. (ed.), *Enlightenment and New Zealand 1773-1774*. National Art Gallery, Wellington. Pp iii + 32.
- PALMA, R.L. 1978 Slide-mounting of lice: a detailed description of the Canada balsam technique. *The New Zealand entomologist* 6(4): 432-436, 1 fig.
- PALMA, R.L. and PILGRIM, R.L.C., 1984 A revision of the genus *Harrisoniella* (Mallophaga: Philopteridae). *New Zealand journal of zoology* 11(2): 145-166, 28 figs.
- WHITEHEAD, P.J.P., 1969 Zoological specimens from Captain Cook's voyages. *Journal of the Society for the bibliography of natural history* 5(3): 161-201, 3 pls, 1 fig.
- WHITEHEAD, P.J.P., 1978 A guide to the dispersal of zoological material from Captain Cook's voyages. *Pacific studies* 2(1): 52-93, 1 fig.
- ZIMSEN, E., 1964 *The type material of I.C. Fabricius*. Munksgaard, Copenhagen. Pp 656, 2 pls.