THE DERMAPTERA OF THE AZORES AND MADEIRA[1]

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With 14 figures and 2 tables

The present paper is an extension of the short report given by the late Dr. W. D. Hincks (1961) on the Dermaptera collected by Professors Per Brinck, and Erik Dahl, in the Azores and Madeira in 1957. Additional specimens of *Euborellia annulipes* (Lucas) from locality 36 in the Azores have been examined by the present author, and the present paper forms a complete survey of the known Dermaptera of these islands, together with some discussion on the composition of the fauna; its possible origins and affinities; and a comparison between the fauna of the Azores, Madeira, and the Canary Islands.

No complete key to separate the species of Dermaptera found in the former islands has been published, so such a key is included, and ecological data for the various species are given. The most complete previous survey of the Dermaptera of the Azores is that of Chopard (1932), and his later paper on the Dermaptera of Madeira (Chopard, 1938) contains much useful information on the ecology of the species. Reference to earlier papers by Bolivar (1892, 1894) has not been made, but records from these earlier works are usually included in more recent papers. Details of the Dermaptera of the Canary Islands are taken from Brindle (1968 a).

I am grateful to Professor Per Brinck for the opportunity to study the additional specimens of Dermaptera from the Azores.

The order Dermaptera contains about 1200 World species and is characteristically tropical and sub-tropical, reaching its maximum richness in the humid tropical forests of the world. The numbers

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1) Report No. 54 from the Lund University Expedition in 1957 to the Azores and Madeira.

2) Manchester Museum, The University, Manchester 13. England.

of species of Dermaptera rapidly decrease in higher latitudes, and islands tend to have a relatively poor fauna, particularly oceanic islands. The fauna of continental islands which are close to continental areas may be richer, due to the spread of species from the continental areas, but such a spread is rapidly decreased with increasing distance of islands from continental areas. In many oceanic islands, a few endemic species are usually found, but in the majority of islands there has been some influx of cosmopolitan species which have been accidentally introduced, and which tend to reduce the number of endemic species.

The fauna of the Azores, Madeira, and the Canary Islands are particularly interesting in the relative proportion of endemic species; their taxonomic positions; and their possible origins.

KEY TO SPECIES (AZORES AND MADEIRA)

1. Elytra absent 2
— Elytra present 3
2. Head not widened behind eyes; lateral margins of pronotum not sinuate; femora entirely yellow or with dark rings; antennae with basal and some distal segments much lighter in colour than the others; smaller species, body length usually below 12 mm . . . . . *Euborellia annulipes* (Lucas)
— Head widened behind eyes; lateral margins of pronotum sinuate; femora entirely yellow; antennae uniformly brown; larger species, body length 16 mm or more . . . . *Anisolabis maritima* (Bonelli)
3. Second tarsal segment simple 4
— Second tarsal segment bilobed 6
4. Larger species, body length at least 12 mm; elytra glabrous . . . . . *Labidura riparia* (Pallas)
— Smaller species, body length 6 mm or less; elytra pubescent . . . 5
5. Head, pronotum elytra, and wings black; abdomen and forceps reddish; pronotum sometimes yellowish; male and female forceps short, strongly broadened at base. . . . *Labia curvicauda* (Motschul)
— Uniformly brown in colouration, or with head and pronotum darker; male and female forceps more slender, not strongly broadened at base . . . . . *Labia minor* (Linnaeus)
6. Wings present and visible 7
— Wings absent or at least not visible 9
7. Each elytron with a conspicuous yellow spot; wings partly yellow . . . . . *Forficula barroisi* (Bolivar)
— Elytra unicolorous or almost so; wings coloured as elytra. . . . 8
8. Male forceps with inner margins strongly dentated (figs. 13, 14); posterior margins of elytra squarely truncate . . . . . *Forficula auricularia* (Linnaeus)
— Male forceps with inner margin not dentated (fig. 8); elytra rather obliquely truncate. . . . . *Forficula laeviforceps* Chopard

9. Tarsus broad and short (fig. 11) . . . *Forficula brevitarsis* Chopard
— Tarsus longer, more slender (fig. 10). 10
10. Elytra squarely truncate posteriorly; male forceps with branches almost straight, pygidium large (figs. 6 & 7) . *Anechura schmitzi* (Borelli)
— Elytra obliquely truncate; male forceps with branches curved, pygidium small 11
11. Pronotum less transverse (fig. 5); male forceps with a dorso-median ridge near base (fig. 4); pygidium not concave posteriorly (fig. 4) . . . . . *Perirrhytus lundbladi* Hincks
— Pronotum strongly transverse (fig. 1); male forceps without a ridge near base, pygidium concave posteriorly or posterior margin sinuate 12
12. Male forceps smooth at base; pygidium with posterior margin sinuate (fig. 1) . . . . . *Perirrhytus edentulus* (Wollaston)
— Male forceps with a dorso-median tooth near base (fig. 3); pygidium with a deep excision on posterior margin (fig. 3) . . . . . *Perirrhytus madeirensis* (Borelli)

Carcinophoridae

Anisolabis maritima (Bonelli)

Forficula maritima Bonelli *in* Géné, 1832, *Ann. Sc. nat. Regn. Lomb. Venet.* 2: 224 (Mediterranean Region).
Anisolabis maritima (Bonelli), Chopard, 1932, *Annls ent. soc. Fr.* **101**: 62 (Azores — Faial, São Miguel).
Anisolabis maritima (Bonelli), Chopard, 1937, *Rev. Fr. d'Ent.* **4**: 220 (Madeira).
Anisolabis maritima (Bonelli), Chopard, 1942, *Soc. Scient. Fenn. Comm. Biol.* **8** (4): 10 (Azores — Terceira).
Anisolabis maritima (Géné), Hincks, 1961, *Bol. Mus. Mun. Funchal.* **14**: 17 (Madeira. Azores — Faial, Pico).

Shining black; antennae yellow or brown; legs yellow. Abdomen rather broad medially, somewhat depressed; forceps of male widely separated at base, branches strongly curved and assymetrical; those of female with branches more or less straight and contiguous.

Length: body 16-18 mm., forceps 2-2.75 mm.

Distribution: Madeira. Azores (Faial, Pico, Terceira, São Miguel).

World distribution: cosmopolitan; occurs in all faunal regions, but is restricted to south temperate, sub-tropical, and tropical areas. It is well distributed on isolated oceanic islands, including St. Helena in the Atlantic; and is recorded from Easter Island in the Pacific (Kevan, 1965b).

Ecology: apparently not common in Madeira and the Azores, but is found along the sea coasts, especially under stones and where streams enter the sea.

Euborellia annulipes (Lucas)

Forficesila annulipes Lucas, 1847 *Annls Soc. ent. Fr.* **15**: 84 (Jardin des Plantes, Paris, introduced).
Anisolabis annulipes (Lucas), Borelli, 1906, *Boll. Musei. Zool. R. Univ. Torino* **21**: 1 (Madeira).
Anisolabis annulipes (Lucas), Burr, 1912, *Entomologist's Rec. J. Var.* **24**: 30 (Madeira).
Anisolabis annulipes (Lucas), Chopard 1932, *Annls. Soc. ent. Fr.* **101**: 62 (Azores — Faial, Terceira, São Miguel).
Anisolabis annulipes (Lucas), Chopard, 1938, *Rev. Fr. d'ent.* **4**: 233 (Madeira).
Anisolabis annulipes (Lucas), Hincks, 1938, *Ark. zool* **30**: 3 (Madeira).
Anisolabis annulipes (Lucas), Chopard, 1942, *Soc. Scient. Fenn. Comm. Biol.* **8** (4): 9 (Madeira. Azores — Flores, San Jorge, Terceira, São Miguel; also Ilheo do Topa).
Euborellia annulipes (Lucas), Hincks, 1961, *Bol. Mus. Mun. Funchal* **14**: 18 (Madeira. Azores — Flores, Faial, Pico, São Miguel, Santa Maria).
Euborellia annulipes (Lucas), Kevan, 1965, *Entomologist's Rec. J. Var.* **77**: 40 (Azores — Santa Maria).

Small, shining black or dark brown; antennae brown, basal few segments yellow, and one or more distal segments white or yellow; legs yellow, femora with or without a broad dark ring; male forceps curved, sometimes only slightly at apices; those of female with branches almost straight and contiguous.

Length: body 8-10 mm (rarely larger), forceps 1.5-2 mm.

Distribution: Madeira. Azores (Flores, Faial, Pico, São Jorge, Terceira, São Miguel, Santa Maria).

World distribution: cosmopolitan; occurs in all faunal regions, but is restricted to south temperate, subtropical, and tropical areas. It occurs on many isolated oceanic islands, including St. Helena and Ascension in the Atlantic; Mauritius in the Indian Ocean; and the Galapagos Islands and Easter Island in the Pacific Ocean.

Ecology: common under stones, at least at lower altitudes, and apparently the dominant species of earwig in the islands. Burr (1912) records finding females with eggs in depressions under stones and notes that this species was found in numbers under stones in a dry river bed near Funchal, in September. Borelli (1906) records this species from Poiso, a locality which Chopard (1938) thought was doubtful on account of the altitude. This is 1500 metres, and the nights can be cold. Hincks (1938) refers to a large female of this species from Monte, the total length of which was 18 mm.; this size is most unusual.

There is a considerable difference in general appearance between the smaller and narrower specimens of this species which have yellow legs, and the larger, broader specimens in which the femora have dark rings. However, present studies suggest that they are conspecific.

Labiduridae

Labidura riparia (Pallas)

Forficula riparia Pallas, 1773, *Reise Russ. Reichs.* **2**: 727 (Siberia).
Labidura riparia (Pallas), Borelli, 1906, *Boll. Musei. Zool. Anat. comp. R. Univ. Torino* **21**: 1 (Madeira).
Labidura riparia (Pallas), Burr, 1912, *Entomologist's Rec. J. Var.* **24**: 30 (Madeira).
Labidura riparia (Pallas), Chopard, 1932, *Annls. Soc. ent. Fr.* **101**: 62 (Azores — Faial, São Miguel).
Labidura riparia (Pallas), Chopard, 1938, *Rev. Fr. d'ent.* **4**: 233 (Madeira, including Deserta Grande).
Labidura riparia (Pallas), Chopard, 1942, *Soc. Scient Fenn. Comm. Biol.* **8** (4): 10 (Azores — Terceira).
Labidura riparia (Pallas), Hincks, 1961, *Bol. Mus. Mun. Funchal* **14**: 18 (Azores — Faial, Terceira, São Miguel)

Large; yellowish variegated with dark brown, or almost entirely dark brown; antennae and legs yellow to brown; elytra always present, wings present or absent; branches of male forceps widely separated basally, each branch stout, only slightly curved, inner margin crenulate basally, and with one inner tooth about mid-point; those of female contiguous, branches straight except at apices.

Length: body 12-26 mm., forceps 3.5-10 mm. (forceps of male larger than those of female).

Distribution: Madeira. Azores (Faial, Terceira, São Miguel).

World distribution: cosmopolitan; occurs in all faunal regions, but restricted mainly to south temperate, subtropical and tropical areas, but it extends much further northwards in Asia. Occurs on some isolated oceanic islands, such as St. Helena, but is not recorded from Ascension, nor from the Galapagos Islands or Easter Island.

Ecology: apparently not common; occurs on the coast, under seaweed, and along sandy shores of streams or stream-courses.

This species is variable in the development of the elytra and wings, although elytra are always present; wings may be present or reduced, and possibly sometimes entirely aborted, but this has yet to be confirmed

Labiidae

Labia minor (Linnaeus)

Forficula minor Linnaeus, 1758, *Syst. nat.* **10**: 423 (Europe)
Labia minor (Linnaeus), Burr 1912, *Entomologist's Rec. J. Var.* **24**: 30 (Madeira — not taken, but specimens noted in Königberg Museum).
Labia minor (Linnaeus), Chopard, 1932, *Annls. Soc. ent. Fr.* **101**: 62 (Azores — São Miguel).
Labia minor (Linnaeus), Chopard, 1938, *Rev. Fr. d'ent.* **4**: 233 (Madeira).
Labia minor (Linnaeus), Chopard, 1942, *Soc. Scient. Fenn. Comm. Biol.* **8** (4): 10 (Azores — São Miguel).

A small, almost uniformly brown species, rather dull; sometimes the head and pronotum are darker; antennae and legs yellowish-brown; elytra and wings always fully developed; male forceps with branches widely separated basally, each branch almost straight, inner margins slightly crenulate basally; those of female short, branches straight and contiguous.

Length: body 4-5 mm., forceps 0.75-1.5 mm.

Distribution: Madeira. Azores (São Miguel).

World distribution: almost cosmopolitan; occurs in all faunal regions, except the Neotropical Region; in many cases it occurs as an adventive. It has not been recorded from any very isolated oceanic islands, and is probably mainly distributed in temperate and sub-tropical areas, although it does occur, rather sporadically, in Central Africa.

Ecology: this is the only species of earwig which is known to fly readily: numerous records exist of this species coming to light during the evening. Chopard (1932) records it from beneath rotten tree trunks and in flight during the evenings. Burr (1912) did not find this species at all during his stay in Madeira.

This species is possibly an adventive, which has not yet succeeded in establishing itself on the islands.

Labia curvicauda (Motschulsky)

Forficesila curvicauda Motschulsky, 1863, *Bull. Soc. nat. Moscou* **36**: 2 (Ceylon).
Labia curvicauda (Motschulsky), Borelli, 1906, *Boll. Musei. Zool. Anat. comp. R. Univ. Torino* **21**: 2 (Madeira).
Labia curvicauda (Motschulsky), Burr, 191, *Entomologist's Rec. J. Var.* **24**: 30 (Madeira).
Labia curvicauda (Motschulsky), Chopard, 1942, *Soc. Scient. Fenn. Comm. Biol.* **8** (4): 10 (Madeira).

A small, rather depressed species; head, pronotum, elytra, and wings blackish; abdomen and forceps reddish; pronotum sometimes yellowish; male forceps short, greatly broadened at base, each branch strongly curved; those of female short, very broad at base, narrowing distally, branches contiguous.

Length: body 4-5 mm., forceps 0.5-0.75 mm.

Distribution: Madeira.

World distribution: cosmopolitan; occurs in all faunal regions, except palaearctic; often as an adventive. It is not recorded from any very isolated oceanic islands.

Ecology: occurs beneath bark of trees and similar habitats, and appears to be local and uncommon in the island. Borelli (1906) records one specimen from Porto da Cruz in the north of Madeira, and one specimen from Funchal in the south. Burr (1912) remarks that Padre Barreto found this species in some numbers in the Seminaria, Funchal. Chopard (1942) records five female specimens from Funchal

Forficulidae

Perirrhytus edentulus (Wollaston)

Figs. 1 & 2

Forficula edentula Wollaston, 1858, *Ann. Mag. nat. Hist.* (3) **1**: 20 (Madeira).
Pseudochelidura edentula (Wollaston), Borelli, 1906, *Boll. Musei. Zool. Anat. comp. R Univ. Torino* **21**: 2 (Madeira).
Perirrhytus edentulus (Wollaston), Chopard, 1938, *Rev. Fr. d'ent.* **4**: 234 (Madeira).
Perirrhytus edentulus (Wollaston), Hincks, 1938, *Ark. zool.* **30**: 4 (Madeira).
Perirrhytus edentulus (Wollaston), Chopard, 1942, *Soc. Scient. Fenn. Comm. Biol.* **8** 4): 10 (Madeira).
Perirrhytus edentulus (Wollaston), Hincks, 1961, *Bol. Mus. Mun. Funchal* **14**: 20 (Madeira).

Reddish to yellowish-brown or darker brown. Head reddish; antennae and legs yellowish-brown; abdomen dark reddish-brown, strongly punctured, especially on tergites 6-9; forceps yellowish-brown. Head broad, eyes small, pronotum strongly transverse, widened posteriorly; elytra very short, posterior margin obliquely truncate; abdomen wider medially (fig. 1). Each branch of male forceps smooth, long, curved, sometimes with a narrow inner ridge medially; pygidium transverse, with a small tooth on each latero-posterior angle (fig. 1); forceps of female long, branches slender and contiguous (fig. 2).

Length: body 8-11 mm, forceps 4 mm. (males) 3 mm. (females).

Distribution: Madeira.

World distribution: Madeira.

Ecology: Apparently common but local in distribution. Occurs under stones above the cultivated fields from 600 metres upwards. Burr (1912) failed to find the species, and thought that it must be rare. However, Chopard (1938) records it from Encumiada and states «très commun sous les pierres, au col.» In the same paper the author records the species from Rabaçal under stones in «forêt de Bruyères et de Lauracées, vers 1000 metres». Other localities given are São Jorge; Camacha; Monte; and Ribeiro Frio. Hincks (1938) records 34 specimens from Rabaçal, but later (1961) recorded 1 ♂, 1 ♀ and 7 nymphs from Ribeiro Frio, and Ribeira das Cales, and thought that the endemic species of Madeira, such as *edentulus*, may be becoming rarer, as a result of the spread of cosmopolitan species and interference with their habitats.

Perirrhytus madeirensis (Borelli)

Fig. 3

Pseudochelidura madeirensis Borelli, 1908, *Boll. Musei. Zool. Anat. comp. R. Univ. Torino* **23**: 1 (Madeira).
Perirrhytus madeirensis (Borelli), Chopard, 1938, *Rev. Fr. d'ent.* **4**: 234 (Madeira — reported capture).
Perirrhytus madeirensis (Borelli), Hincks, 1961, *Ark. zool.* **30**: 5 (Madeira).

Larger and more robust than *edentulus*, and generally dark reddish-brown in colour; antennae and legs yellowish-brown; forceps yellow; abdominal tergites less strongly punctured than in *edentulus*; forceps of male similar to this species but each branch with a tubercle-like tooth near base, directed dorso-medially; pygidium with posterior margin excised (fig. 3); forceps of female as *edentulus*.

Length: body 13-14 mm., forceps 4-5 mm.

Distribution: Madeira.

World distribution: Madeira.

Ecology: much less common than *edentulus*, but found in similar habitats, that is under stones in the higher and less frequented parts of the island. Recorded from Funchal, Seixal, and Rabaçal. Chopard (1938) reports that R. P. Barreto has taken several specimens near Seixal, whilst Hincks (1938) records 16 specimens from Rabaçal.

Perirrhytus lundbladi Hincks

Figs. 4 & 5

Perirrhytus lundbladi Hincks, 1938, *Ark. zool.* **30**: 5 (Madeira).

Darker than either of the other two species of the genus when fully mature, but immature specimens are lighter; more slender and the abdomen is parallel-sided; pronotum less transverse (fig. 5); head blackish; pronotum dark brown to black; antennae dark brown, yellow basally; elytra dark brown; legs yellow; abdomen blackish; forceps yellow or brown; forceps of male similar to those of *edentulus*, but each branch with a basal longitudinal short ridge; pygidium transverse, with a short median projection (fig. 4); forceps of female as in *edentulus*.

Length: body 10-13 mm., forceps 4.5 mm (males), 3.5 mm (females).

Distribution: Madeira.

World distribution: Madeira.

Ecology: under stones; local. 17 adult specimens were recorded in Hincks (1938) mostly from Caramujo, but also one male from Ribeiro do Inferno, and one male from Feiteiras. 10 nymphs from Caramujo were also examined.

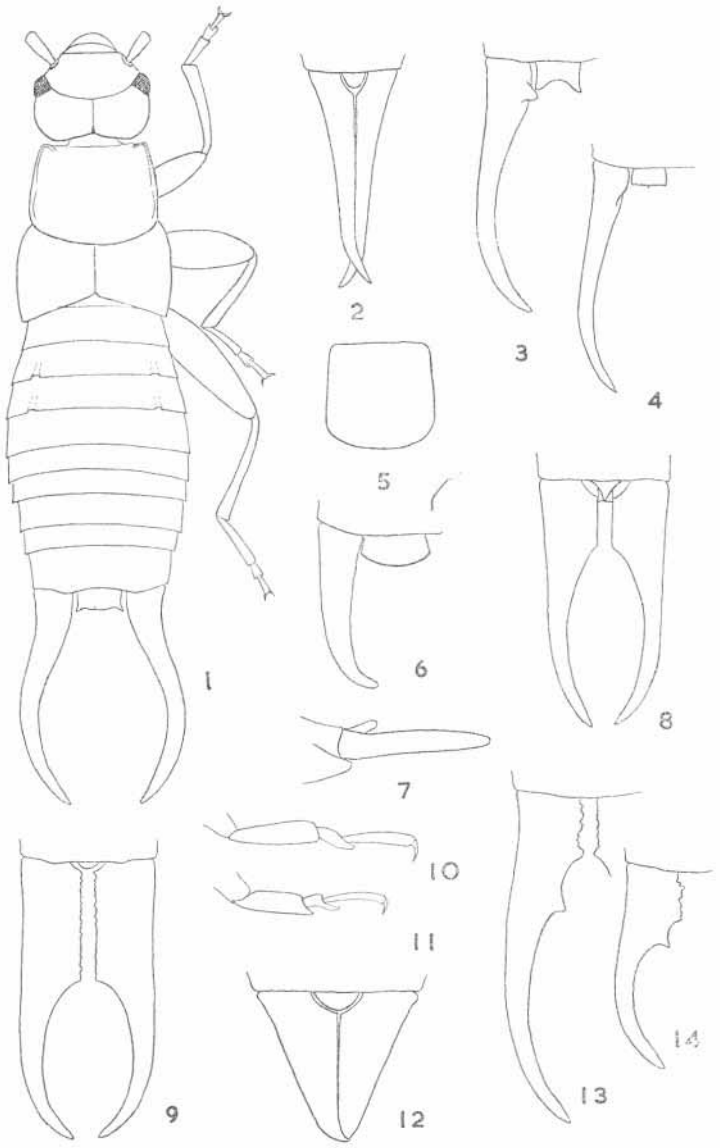
Anechura schmitzi (Borelli)

Figs. 6 & 7

Pseudochelidura schmitzi Borelli, 1906, *Boll. Musei. Zool. Anat. comp. R. Univ. Torino* **21**: 2 (Madeira).
Anechura schmitzi (Borelli), Chopard, 1938, *Rev. Fr. d'ent.* **4**: 234 (Madeira).
Anechura schmitzi (Borelli), Hincks, 1938, *Ark. zool.* **30**: 3 (Madeira).

Reddish to dark brown; antennae yellowish-brown, lighter basally; legs yellow; abdomen darker posteriorly, tergites fairly lightly punctured; forceps yellow, pygidium dark brown, posterior margin blackish; pronotum transverse; elytra squarely truncate posteriorly; each branch of male forceps almost straight, widely separated at base, smooth; pygidium very large, directed postero-dorsally, posterior margin convex (figs. 6 7); branches of female forceps shorter, broad at base, narrowed distally, contiguous, not unlike those of *Forficula brevitarsis* (fig. 12).

Length: body 7-8.5 mm., forceps 2.5 mm. (males), 1.5 mm. (females).



P. edentulus—fig. 1, male; fig. 2, female forceps. *P. madeirensis*—fig. 3, male forceps. *P. lundbladi*—fig. 4, male forceps; fig. 5, pronotum. *A. schmitzi*—figs. 6 & 7, male forceps, dorsal and lateral. *F. laeviforceps*—fig. 8, male forceps (after Chopard, 1937). *F. barroisi?*—fig. 9, male forceps. *F. auricularia*—fig. 10, tarsus; figs. 13 & 14, male forceps. *F. brevitarsis*—fig. 11, tarsus; fig. 12, female forceps (after Chopard, 1942).

Distribution: Madeira.

World distribution: Madeira.

Ecology: rare; under stones, possibly restricted to the highest ground. Chopard (1938) records one male which was taken from beneath a stone in a pine wood below Monte, on the road to Poiso. The original material consisted of one male and one female from Poiso with nymphs from Poiso and Funchal. Hincks (1938) records one male from Feiteiras. These appear to be the only recorded specimens. The male pygidium of this species is similar to that of *Forficula kaffir* (Burr) from South Africa, but the elytra in *kaffir* are reduced to lateral flaps.

Forficula auricularia Linnaeus

Figs. 10, 13 & 14

Forficula auricularia Linnaeus, 1758, *Syst. nat.* **10**: 423 (Europe).
Forficula auricularia Linnaeus; Borelli, 1906, *Boll. Musei. Zool. Anat. comp. R. Univ. Torino* **21**: 2 (Madeira).
Forficula auricularia Linnaeus; Burr, 1912, *Entomologist's Rec. J. Var.* **24**: 30 (Madeira).
Forficula auricularia Linnaeus; Chopard, 1932, *Annls. Soc. ent. Fr.* **101**: 62 (Azores — São Miguel).
Forficula auricularia Linnaeus; Chopard, 1938, *Rev. Fr. d'ent.* **4**: 234 (Madeira).
Forficula auricularia Linnaeus; Hincks, 1938, *Ark. zool.* **30**: 7 (Madeira).
Forficula auricularia Linnaeus; Chopard, 1942, *Soc. Scient. Fenn. Comm. Biol.* **8** (4): 10 (Madeira. Azores — Flores, Faial, São Jorge, Terceira, São Miguel).
Forficula auricularia Linnaeus; Hincks, 1961, *Bol. Mus. Mun. Funchal* **14**: 19 (Madeira. Azores — Faial, Pico, Terceira, São Miguel, Santa Maria).

Yellowish to dark brown; head and pronotum dark brown to black; pronotum with lateral margins yellow; elytra and wings yellowish-brown or brown; legs yellow; abdomen dark brown; forceps yellow or brown; each branch of male forceps broad at base, strongly dentated, but narrowing before the large distal tooth; distal half strongly curved; length varies (figs. 13 & 14); forceps of female short, each branch almost straight, broad at base, narrowed distally, contiguous.

Length: body 8-12 mm., forceps 4-7 mm. (males) 2.5-3 mm. (females).

Distribution: Madeira. Azores (Flores, Faial, Pico, São Jorge, Terceira, São Miguel, Santa Maria).

World distribution: almost cosmopolitan; basically Palaearctic but the species has been accidentally introduced into North and South

America, Africa, Australia, and New Zealand. It is an adventive, unless the climate is temperate or subtropical; not typical of tropical areas.

Ecology: very common and widely distributed, under dry cow dung, and other sheltered and dark habitats. Records exist from low altitudes of 300 metres or so up to 1700 metres. Next to *annulipes* this is the common earwig of the islands.

Forficula barroisi Bolivar

Fig. 9

Forficula barroisi Bolivar 1893, *Rev. Biol. Nord. Fr.* 5: 447 (Syria).
Forficula barroisi Bolivar; Chopard, 1938, *Rev. Fr. d'ent.* 4: 234 (Madeira).

Brown to dark brown; antennae and legs yellowish; elytra and wings brown, elytra with a large yellow patch; wings partly yellow, each branch of male forceps broad at base, this broad part being equal in width throughout; distal part of each branch curved (fig. 9); forceps of female with branches shorter, contiguous, and almost straight.

Length: body 10-12 mm., forceps 6-8 mm. (males) 3 mm. (females).

Distribution: Madeira.

World Distribution: Mainly Western Palaearctic, but is recorded from Mozambique; possibly centred on the Middle East and North Africa.

Ecology; not recorded; possibly an accidental introduction.

There seems to be some doubt about the identity of this species; the figure of the male forceps given by Chopard (1938) corresponds with the present figure 9, but this figure is taken from a specimen determined as *Forficula lucasi* (Dohrn) which was originally described from Egypt. A single specimen of *Forficula barroisi* from Syria in the Manchester Museum, has the male forceps much less broad basally, and the pronotum differs in shape. The general colouration of these specimens is similar. Bey-Bienko (1936) synonymized *barroisi* with *lucasi* and it is hoped that further studies will decide the status of these two species.

Forficula laeviforceps Chopard

Fig. 8

Forficula laeviforceps Chopard, 1938, *Rev. Fr. d'ent.* 4: 235 (Madeira).

Resembles *auricularia*, but the male forceps have the inner margin

Table 1. — Distribution of species of Dermaptera in the Azores (A); Madeira (M); and the Canary Islands (C), showing the endemic (end.) and the cosmopolitan (cos.) species. One species is western Palaearctic (pal.).

	A	M	C	Endemic or cosmopol.	Apterous or Winged
Pygidicranidae					
Anataelia canariensis Bolivar			X	end.	apterous
Carcinophoridae					
Anisolabis maritima (Bonelli)	X	X	X	cos.	apterous
Euborellia annulipes (Lucas)	X	X	X	cos.	apterous
Euborellia maxima (Brullé)			X	end.	apterous
Labiduridae					
Labidura riparia (Pallas	X	X	X	cos.	apterous or winged
Labiidae					
Labia minor (Linnaeus)	X	X		cos.	winged
Labia curvicauda (Motschulsky)		X		cos.	winged
Forficulidae					
Perirrhytus edentulus (Wollaston)		X		end.	apterous
Perirrhytus madeirensis (Borelli)		X		end.	apterous
Perirrhytus lundbladi Hincks		X		end.	apterous
Anechura schmitzi (Borelli)		X		end.	apterous
Guanchia guancharia (Heller)			X	end.	apterous
Guanchia uxoris (Heller)			X	end.	apterous
Guanchia cabrerae (Bolivar)			X	end.	apterous
Guanchia canariensis (Burr)			X	end.	apterous
Guanchia transversa Brindle			X	end.	apterous
Guanchia storai Chopard			X	end.	apterous
Forficula auricularia Linnaeus	X	X	X	cos.	winged
Forficula barroisi Bolivar		X		pal.	winged
Forficula laeviforceps Chopard		X		end.	winged
Forficula brevitarsis Chopard		X		end.	apterous
	5	13	12		

smooth, not dentated (fig. 8); the female is likely to be indistinguishable from *auricularia*.

Length: body 12.5 mm., forceps 3.5 mm.

Distribution: Madeira.

World distribution: Madeira.

Ecology: the single type male was found beneath dry cow dung on the plateau of Paul da Serra, at an altitude of 1600 metres.

Forficula brevitarsis Chopard

Figs. 11 & 12

Forficula ? brevitarsis Chopard, 1942, *Soc. Scient. Fenn. Comm. Biol.* **8** (4): 11 (Madeira).

Resembles a female of *Forficula pubescens* Gêné. Reddish-brown; legs yellow; pronotum transverse, widening posteriorly, posterior margin convex; elytra short, slightly longer than pronotum, posterior margin obliquely truncate; wings absent; tarsi short (fig. 11); forceps of female short, broad at base (fig. 12).

Length: body 12.4 mm., forceps 1.6 mm.

Distribution: Madeira.

World distribution: Madeira.

Ecology; not known.

Only known from the single type female, which was taken at Porto Novo.

GENERAL FEATURES OF THE FAUNA

With the single exception of *Forficula barroisi*, the species of Dermaptera found in the Azores, Madeira, and the Canary Islands, are either endemic species, or species with a world-wide distribution. Of the 21 recorded species, 14 are endemic and 6 are cosmopolitan. *F. barroisi* is West Palaearctic (Table 1).

The fauna of the Azores is poor, and entirely composed of cosmopolitan species, no endemic species being known. The fauna of Madeira and the Canary Islands are richer, that of the latter having a higher proportion of endemic species (about 63 %) than that of the former (about 40 %),

although the total number of species is relatively small, so that such comparisons are not necessarily significant. It is significant, however, that the Azores have a poor fauna of Dermaptera, since Lindroth (1960) showed that the Carabid fauna of the Azores is much poorer than that of Madeira, although there are some endemic species of Carabidae in the Azores.

Table 2. — Distribution of species of Dermaptera in the islands of the Azores.

	Flores	Corvo	Faial	Pico	São Jorge	Graciosa	Terceira	São Miguel	Santa Maria
Anisolabis maritima (Bonelli)			X	X			X	X	
Euborellia annulipes (Lucas)	X		X	X	X		X	X	X
Labidura riparia (Pallas)			X				X	X	
Labia minor (Linnaeus)								X	
Forficula auricularia Linnaeus	X		X	X	X		X	X	X

The only species common to all the three areas are the cosmopolitan species, and the endemic species of Madeira are generically distinct from those of the Canary Islands, and appear to have a different origin. Most of the endemic species of Madeira belong to an endemic genus, *Perirrhytus*, whilst those of the Canary Islands mostly belong to a genus, *Guanchia*, which is mainly based on these islands, but which also contains one species from North Africa, and also two species from the Oriental Region, although the affinities of these last two species may lie with other genera.

The fauna of the islands as a whole is unusual in that the family Forficulidae, the most specialized family, is so well represented. All the endemic species of Madeira belong to this family, and only two of the endemic species of the Canary Islands belong to other families.

THE STATUS AND DISTRIBUTION OF THE COSMOPOLITAN SPECIES

Although six species found in the islands are cosmopolitan in distribution, or almost so (Table 1), the status of each of these species is not identical. Both *Forficula auricularia* and *Labia minor* are basically of Palaearctic origin, and their present world-wide distribution appears to be largely due to accidental importation from Europe into other continents. In countries outside the Palaearctic Region, both these species appear to be adventives, unless the climate is temperate or sub-tropical, and sufficient specimens are introduced to form a viable population. On account of the restricted distribution and isolated records of *Labia minor* from the Azores and Madeira (Tables 1 & 2) this species would seem to be an adventive in these islands. *Forficula auricularia*, however, is so well distributed and common that it must be regarded as a long-established resident. *Labia curvicauda* is characteristic of tropical climates, and is evidently an adventive in Madeira, although a small local population may have become established. *Anisolabis maritima* is possibly basically of Mediterranean origin, and could be an old established resident, but if so the environment does not seem to be particularly favourable to the species, since the distribution is restricted and the recorded numbers of specimens are low (Tables 1 & 2).

It may be correct to regard both *Labidura riparia* and *Euborellia annulipes* as introductions. The former is possibly of Palaearctic origin, but it is common throughout the tropics, except in the Neotropical Region where it is mostly replaced by another species, apparently distinct, *L. xanthopus*. Its relative scarcity and distribution in the islands suggest that it is also not particularly well adapted for the environment. The origin of *Euborellia annulipes* is doubtful; it is distributed throughout the World except in north temperate climates, and appears to be very adaptive, being the dominant species of earwig in many oceanic islands. It is probably a very successful introduction to the islands of the Azores, Madeira, and the Canary Islands.

DISPERSAL OF COSMOPOLITAN SPECIES

Although wings are well developed in many species of Dermaptera, few records exist of actual flight in these insects, except in *Labia minor*, a species which seems to fly readily. Earwigs are nocturnal in general,

and recently records have been made of earwigs flying to light. J. A. Whellan (in litt.) has noted large numbers of *Forficula brolemanni* Borelli, which came to light for a few evenings in August, 1968, in Malawi, Africa, and Brindle (1968b) records five species of Neotropical earwigs which were taken at light by Dr. D. C. Geijskes in Surinam; four of these species have well developed wings.

It seems quite clear, however, that although most of the cosmopolitan species of Dermaptera have fully developed elytra and wings, the possession of these organs does not influence the distribution of these species. The most widely distributed of these species is *Euborellia annulipes* which lacks both elytra and wings; indeed this species was first described from a specimen introduced into the Jardin des Plantes, Paris, possibly from America. The wide distribution of the cosmopolitan species is not directly due to ability to fly, but from the general habit of earwigs in hiding by day in dark crevices, under bark of trees or amongst the basal leaves of plants, etc. Brindle (1966) records one specimen of *E. annulipes* introduced into Hamburg along with orchids from Sikkim. Both this and the first recorded specimen of this species were alive when captured. Shortly after the last War, when various timbers were imported as logs with the bark still adhering, into Britain, removal of the bark revealed numerous insects, including earwigs, all of which were alive. The earwigs mainly consisted of *Labia curvicauda*. Many species of earwig are not likely to be introduced into other countries on account of their actual habitat, and some species are more likely to be introduced than others because of their choice of a place of concealment; such species which prefer hiding in plants are likely introductions. This accidental introduction of Dermaptera is continuous and seems only to be restricted by any controls or inspection of imported material or other objects.

Whether such introductions will lead to the establishment of the species depends on the adaptability of the species itself. Although *E. annulipes* is a most successful coloniser, it cannot adapt itself to cold climates and can only exist under artificial conditions in Britain for example. *Forficula auricularia* is a mainly temperate or subtropical insect, and is unlikely to become established in tropical climates.

DISTRIBUTION AND AFFINITIES OF THE ENDEMIC SPECIES

As in other insects, the species of Dermaptera which occur on

mountains or oceanic islands tend to be wingless; the elytra are also usually reduced in size. This seems to be a general rule, even though flight amongst earwigs is so rarely recorded. All the endemic species of Madeira and the Canary Islands are apterous, with the possible exception of *Forficula laeviforceps* (Table 1). The position of this species is uncertain.

The affinities of the fauna of Madeira and the Canary Islands appear to be different; the endemic species of Madeira *(Perirrhytus)* are apparently most nearly related to the genus *Anechura* and related genera, typical of the mountains of Europe and Western Asia, whilst most of the endemic species of the Canary Islands *(Guanchia)* appear to be more related to the genus *Forficula*, which is a lowland genus in temperate countries and a montane genus in tropical countries; in particular *Guanchia* is more related to those species of *Forficula* from the Mediterranean area and other parts of the Palaearctic Region, than to those of the Ethiopian mountains.

The other two endemic species of the Canary Islands are interesting. *Anataelia canariensis* Bolivar, restricted to the single island of Teneriffe, belongs to the subfamily Anataelinae, the only other species of which is *Challia fletcheri* Burr, from Korea and China. The second endemic species is *Euborellia (Gelotolabis) maxima* (Brullé), which is widely distributed in the Canary Islands, and is very closely related to similar apterous earwigs of the same genus which occur on the mountains of Western and Central Africa.

Whilst the endemic species of Madeira, therefore, show affinities to the montane species of Europe and Western Asia, those of the Canary Islands show affinities to the species of the Mediterranean area and to those of the Ethiopian Region.

Anataelia is obviously one of the more ancient elements of the fauna of the Canary Islands, and its present wide separation from its relation, *Challia*, can only be explained by the disappearance of allied forms or species from the intervening part of the Palaearctic Region; it could therefore be regarded as a relict, and since it is confined to a single island, its future status must give rise to some concern. *Euborellia (G.) maxima* must also be an old member of the Canary Islands fauna; its long separation from related species in Africa has resulted in large differences between *maxima* and the related species.

The total absence of any representative of a family other than the Forficulidae in Madeira may suggest that some species of more primitive

earwigs previously occurred on the island, and that competition with the more adaptable Forficulids resulted in their extermination. The large endemic fauna of Forficulids in the Canary Islands and Madeira may have resulted from a comparatively recent (in geological terms) influx of immigrants from which developed the present apterous species. If so, the influx into Madeira apparently originated from a different source from the influx into the Canary Islands. Since the endemic Forficulids of the latter islands form two distinct groups, there may possibly have been two such influxes from which arose the present species. *Forficula auricularia* is probably a much more recent immigrant to the islands.

The poorer fauna of the Azores seems to be on account of its isolation, and greater distance from a continent a distance which has only been spanned in comparatively recent times by cosmopolitan species.

SUMMARY

The Dermaptera of the Azores, Madeira, and the Canary Islands are summarised and compared. A key to the species recorded from the Azores and Madeira is given, together with short descriptions of the species and some ecological details. The poor fauna of the Azores is thought to be a result of its isolation; no endemic species are known. The fauna of Madeira is thought to have had a different origin to that of the Canary Islands; both have endemic species. The purely Forficulid endemic fauna of Madeira is possibly due to extermination of more primitive species, and the two non-Forficulid endemic species of the Canary Islands are thought to be relicts. The distribution and dispersal of the cosmopolitan species are discussed.

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