

Dermaptera of the Socotra Archipelago, with the description of a new species

Fabian Haas, Hans Pohl and Wolfgang Wranik

Abstract: The Dermaptera fauna of the Socotra Archipelago is reviewed on the basis of recently collected material and a literature survey. Nine species have been found, three of which are new to the archipelago and one is new to science. This species is described as *Marava socotrana* n. sp. Haas. It differs from all other species of *Marava* by its uniquely shaped and ornamented pygidium, which has two lobes separated by a groove, the lobes being supplied with short and blunt denticles and the groove being closed ventrally by a triangular plate. It is the second endemic species to be found on the islands of the archipelago. On the basis of the available data, the Dermaptera fauna of the Socotra Archipelago includes taxa with cosmopolitan and wider Afrotropical and Oriental distributions, in addition to the endemic species.

جلديات الأجنحة في أرخبيل سقطرى، مع وصف نوع جديد

فايان هاس وهانز بول وفولفغانج فرانك

خلاصة: تمت مراجعة مجموعة جلديات الأجنحة في أرخبيل سقطرى اعتماداً على عينات جمعت حديثاً وعلى المسوحات الموثقة في مراجع علمية سابقة. عشر على تسعة أنواع، ثلاثة منها تسجل لأول مرة في الأرخبيل، إضافة إلى نوع جديد تم وصفه وهو *Marava socotrana* Haas، الذي يختلف عن الأنواع الأخرى من جنسه *Marava* بالشكل المميز وبزخرفة الذيل، إذ يتألف من فصين منفصلين بوساطة أخدود، وللفصين أسنان قصيرة متلّمة، كما أن الأخدود مغلق من الناحية البطنية بوجود قرص مثلث الشكل. يمثل هذه النوع الجديد ثاني نوع متوطن يعيش في جزر الأرخبيل. وبناء على المعلومات المتوفرة، فإن مجموعة جلديات الأجنحة في أرخبيل سقطرى تتضمن أنواعاً ذات توزيع عالمي وإفريقي إستوائي واسع وشرقي، بالإضافة إلى الأنواع المتوطنة.

Authors' addresses:

Dr Fabian Haas, Staatliches Museum für Naturkunde Stuttgart, Rosenstein 1, 70191 Stuttgart, Germany;

e-mail: haas.smns@naturkundemuseum-bw.de

Dr Hans Pohl, Universität Rostock, Fachbereich Biowissenschaften, Institut für Biodiversitätsforschung, Allgemeine und Spezielle Zoologie, Universitätsplatz 2, 18055 Rostock, Germany; e-mail: hans.pohl@biologie.uni-rostock.de

Dr Wolfgang Wranik, Universität Rostock, Fachbereich Biowissenschaften, Institut für Aquatische Ökologie, Meeresbiologie, Albert-Einstein-Straße 3, 18051 Rostock, Germany; e-mail: wolfgang.wranik@biologie.uni-rostock.de

INTRODUCTION

Insects were collected from the Socotra Archipelago by various scientists and expeditions, such as Balfour in 1880, Schweinfurth & Riebeck in 1881, Bent in 1896/1897, Ogilvie-Grant & Forbes in 1898, the Vienna Academy of Sciences Expedition in 1898, Popov in 1954, the Oxford University Expedition in 1956 and the Middle East Command Expedition in 1967 (see WRANIK 1999). However, the most recent detailed information on the Dermaptera fauna dates back to the early 20th century (BURR 1903, 1905; KRAUSS 1931).

This paper presents the most recent species list of Dermaptera from the Socotra Archipelago, with nine species of which three are new to the archipelago and one is new to science.

Morphologically and ecologically, the Dermaptera constitute a rather uniform taxon. Insects are easily identified as Dermaptera, but identification at the lower taxonomic levels is often difficult. Dermaptera are of medium size, mostly around 10-15 mm in length including the cerci, although sizes range from 4 mm to 70 mm. They are generally omnivorous, but exclusively carnivorous or herbivorous species as well as saprophage species are known. Members of the Dermaptera are rarely pests.

There are no records of Dermaptera from Yemen and Oman, and only a few records from Saudi Arabia (STEINMANN 1988) and Somalia (BRINDLE 1973).

MATERIALS AND METHODS

The specimens were collected by Wolfgang Wranik and Hans Pohl, mainly during field trips to the Socotra Archipelago in 1998-2000. The collecting localities are shown in Fig. 1. The geographical coordinates were taken from the NIMA Geonet Name Server (National Imagery and Mapping Agency, <http://www.nima.mil/gns/html/index.html>) in those cases where the collectors did not record the coordinates with hand-held GPS. The specimens were collected manually, by pitfall traps and at light traps.

Identifications have been made with a stereo-microscope, using the identification keys produced by BURR (1903, 1905), BRINDLE (1973, 1978) and STEINMANN (1989). The genitalia were removed, transferred to a microscope slide, and photographed with a digital Polaroid DMC Ie camera on a Zeiss Axiophot microscope. The habitus images, and details thereof, were photographed with the same camera on a Leitz MZ-12 stereo-microscope.

Parts of the collection made by W. Wranik will be deposited in the NHCY, once the museum is established. In the meantime, these specimens are deposited in the ZMB (see the species account for further information on depositories).

Abbreviations:

BMNH	The Natural History Museum, London, UK
HLMD	Hessisches Landesmuseum Darmstadt, Germany
NHCY	Natural History Collection of Yemen
ZMB	Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany

Key to species

Dermaptera show sexual dimorphism in the length and shape of the cerci. As a rule, the cerci of the females are shorter, straighter and less ornamented than those of the males. They resemble

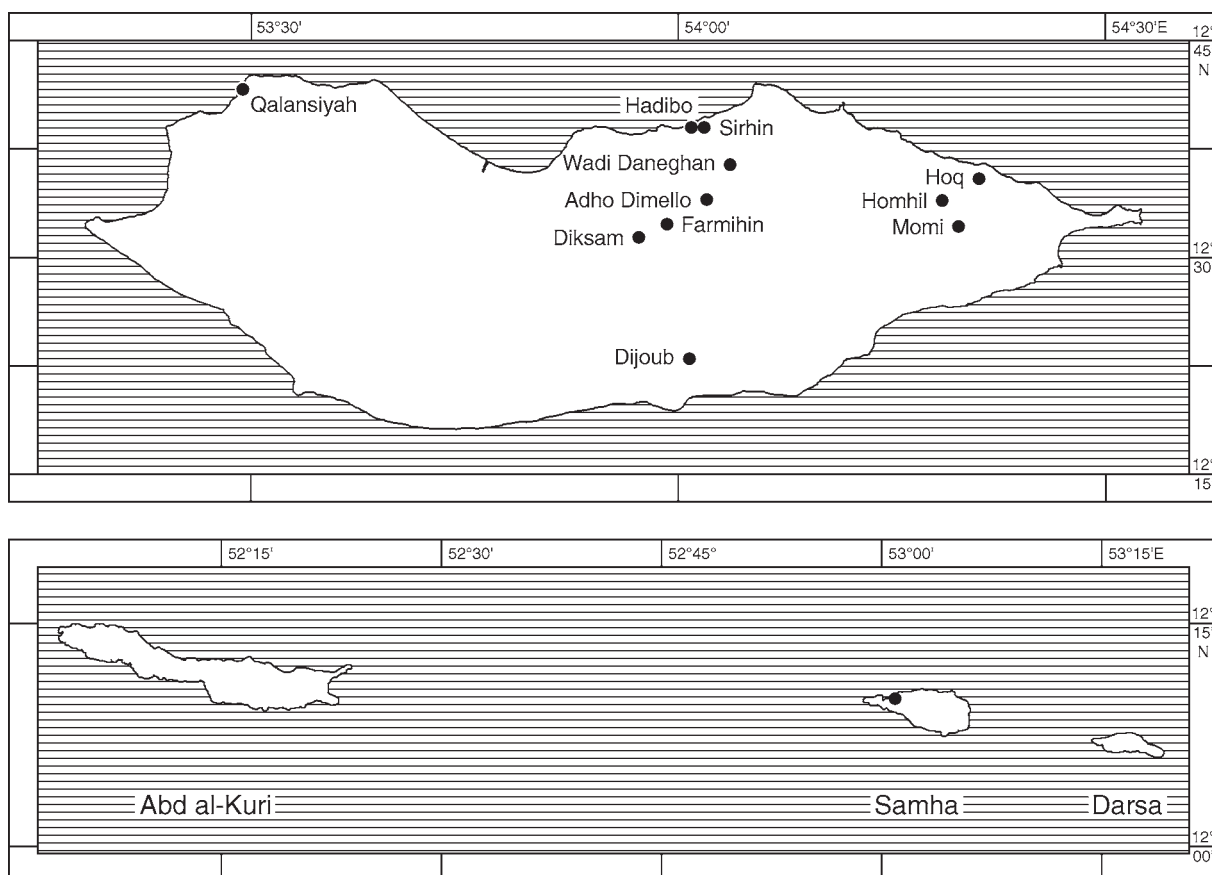


Fig. 1: Map of Socotra Island (above) and the neighbouring islands (below), showing collecting localities.

those of the nymphs. Female cerci are usually very similar among species, whereas those of the males are species-specific.

In the following identification key, cercal characters refer only to males, whilst all other characters are applicable to both sexes.

- | | | |
|---|--|-----------------------------|
| 1 | Second tarsomere of all legs without attachment pads | 2 |
| – | Second tarsomere with broad, heart-shaped attachment pads (Fig. 4 g) | 6 |
| 2 | Tegmina small, reduced to lateral flaps, or completely absent | 3 |
| – | Tegmina present, longer than pronotum and meeting medially (Fig. 4 a) | 5 |
| 3 | Tegmina and wings completely absent | 4 |
| – | Tegmina present as small lateral flaps; femora yellow, with broad, dark stripes | |
| | | <i>Euborellia femoralis</i> |
| 4 | Lateral keels on abdominal tergites 7-9 present | <i>Euborellia annulipes</i> |
| – | Lateral keels on abdominal tergites 7-9 absent | <i>Anisolabis maritima</i> |
| 5 | Length including forceps about 20 mm or more; wings longer than tegmina, visible; cerci long | <i>Labidura riparia</i> |
| – | Length including forceps about 10 mm, wings short or invisible, i.e. shorter than tegmina (Fig. 4 a) | <i>Marava socotrana</i> |

- | | | | |
|---|--|-----------------------------|---|
| 6 | Cerci without a broad, median flange; cerci widely separated at base; pygidium visible, short and broad (Fig. 2) | <i>Anechura sokotrana</i> | |
| – | Similar to <i>Forficula auricularia</i> (Linnaeus, 1758), the European earwig; cerci with a broad, median flange at their proximal quarter; cercal bases close to each other (Fig. 3); pygidium small, not obvious | | 7 |
| 7 | Cerci with a long median flange that is about half as long as the cerci; spots absent or not clearly marked | <i>Forficula lucasi</i> | |
| – | Cerci with a short median flange that is about a fifth of the cercal length; with one clear pair of white spots on tegmina | | 8 |
| 8 | Length of body including forceps: 18-25 mm | <i>Forficula smyrnensis</i> | |
| – | Length of body including forceps: 13 mm | <i>Forficula redempta</i> | |

SPECIES ACCOUNT

Family Labiduridae

Labidura riparia (Pallas, 1773)

Forficula riparia Pallas, 1773. — Reise Provinz. Russ. Reich. 2: 727.

Labidura bengalensis Dohrn, 1863. — Entomol. Zeitung, Stettin 24: 312.

Labidura riparia. — BURR 1903; In: Forbes, H.O. (ed.). The Natural History of Sokotra and Abd-el-Kuri: 413.

Labidura riparia erythrocephala. — KRAUSS 1931; Akad. Wiss. Wien 71: 17.

Specimens examined: Yemen, Socotra Island: 1 ♂, Sirhin, 12°39'N 54°02'E, 04.III.1999, W. Wranik, ZMB; 1 nymph, Hadibo, 12°39'N 54°01'E, 11.II.2000, W. Wranik, ZMB; 3 ♂♂, 1 ♀, 1 nymph, Homhil, 12°34'N 54°19'E, 21.IX.1998, W. Wranik, ZMB; 3 ♀♀, 1 nymph, Hadibo, 12°39'N 54°01'E, III.1985, W. Wranik, ZMB; 1 ♂, Hadibo, 12°39'N 54°01'E, XII.1982, W. Wranik, ZMB; 1 ♂, 3 ♀♀, 1 nymph, upper part of Wadi Zeewef, Homhil Plain and western part of the mountains, 12°35'N 54°18'E, 320-640 m, 07-08.II.1999, H. Pohl, HLMD-Derm-13 (1 ♂, 1 ♀), NHCY (2 ♀♀, 1 nymph); 1 nymph, hilly grassland east of Homhil Plain, 12°34'N 54°20'E, 540 m, 09.II.1999, H. Pohl, NHCY; 1 nymph, Dijoub, near cave, 12°23'N 54°01'E, 90 m, 24.X.2000, H. Pohl, NHCY; 1 ♂, Wadi Daneghan, 12°36'N 54°03'E, 19.II.2000, W. Wranik, ZMB. — Yemen, Samha Island: 4 ♂♂, 3 ♀♀, 1 nymph, 12°09'N 53°00'E, 08.II.2000, W. Wranik, ZMB; 4 ♀♀, 1 nymph, 12°10'N 53°00'E, 19.II.1999, W. Wranik, ZMB; 1 nymph, 12°10'N 53°00'E, 15.II.1999, W. Wranik, ZMB; 1 nymph, 12°10'N 53°00'E, 23.II.2000, W. Wranik, ZMB; 1 ♂, west coast, surrounding base camp, 12°10'N 53°02'E, 15-16.II.1999, H. Pohl, HLMD-Derm-14.

Remarks: *Labidura riparia* prefers sandy substrates and is found on beaches and river banks, even far from the coastline. Carnivorous; its biology and physiology are well studied (ALBOUY & CAUSSANEL 1990).

Length with cerci: Less than 40 mm.

Distribution: Cosmopolitan; first record for Socotra in DIXEY et al. (1898).

Family Anisolabididae

Anisolabis sp.

Specimens examined: Yemen, Socotra Island: 1 nymph, Di Melo, 26.IX.1998, W. Wranik, ZMB; 2 nymphs, Diksam, 12°31'N 53°58'E, 01.III.1999, W. Wranik, ZMB; 1 nymph, Dimere, 25.IX.1998, W. Wranik, ZMB; 1 nymph, Momi, 12°33'N 54°18'E, 12.II.2000, W. Wranik, ZMB; 1 nymph, Hagghier summit, 12°34'N 54°00'E, 23.II.1999, K. Van Damme, NHCY; 1 nymph, Homhil, 12°34'N 54°19'E, 09.II.1999, K. Van Damme, HLMD-Derm-23; 2 nymphs, eastern part of Homhil Plain, 12°34'N 54°19'E, 500 m, 08.II.1999, H. Pohl, HLMD-Derm-20, NHCY; 2 nymphs, Hoq, coastal plain near cave entrance, 12°36'N 54°21'E, 50-320 m, 05-06.II.1999, H. Pohl, HLMD-Derm-19, NHCY; 1 nymph, Diksam Plateau, near Hagghier, 12°33'N 54°01'E, above 1200 m, wadi, 24.II.1999, H. Pohl; 1 nymph, Hoq, 12°36'N 54°21'E, 03.II.1999, H. Pohl, HLMD-Derm-21; 1 nymph, campsite Adho Dimello, 12°34'N 54°02'E, 940 m, granite, backwoods and

pasture, 03.II.1999, H. Pohl, HLMD-Derm-22; 1 nymph, Hoq, coastal plain near cave entrance, 12°36'N 54°21'E, 50-320 m, 05-06.II.1999, H. Pohl, NHCY; 1 ♀, route from Hadibo to Diksam Plateau, 12°32'N 53°56'E, 800 m, 22.II.1999, H. Pohl, HLMD-Derm-24; 2 nymphs, Qalansiyah, 12°40'N 53°28'E, 14.II.2000, W. Wranik, ZMB; 5 nymphs, Haggier summit, 12°34'N 54°00'E, 23.II.1999, K. Van Damme, HLMD-Derm-18 (2 nymphs), NHCY (3 nymphs); 3 nymphs, Farmihin, 12°32'N 53°56'E, 23.II.1999, W. Wranik, ZMB; 1 nymph, Farmihin, 12°32'N 53°56'E, 22.II.1999, W. Wranik, ZMB; 1 nymph, Farmihin, 12°32'N 53°56'E, 22.II.1999, W. Wranik, ZMB.

Remarks: Species of this genus can only be identified as adult males; females and nymphs are too similar to be determined with certainty. Unfortunately, no adult males were collected.

Anisolabis maritima (Bonelli, 1832)

Forficula maritima Bonelli, 1832. — In: Gené, G., Ann. Sci. Regn. Lomb.-Veneto 2: 224.

Anisolabis maritima. — BURR 1903; In: Forbes, H.O. (ed.). The Natural History of Sokotra and Abd-el-Kuri: 414.

Specimen examined: Yemen, Socotra Island: 1 ♀, Socotra, BM 1900-234, BMNH.

Length with cerci: 17-28 mm.

Distribution: Cosmopolitan.

Remarks: The sparse label data are supplemented by further information in the accessions register of the BMNH, which states “Sokotra 1900-234, 42 Orthoptera, including types described by M. Burr, Sokotra. Presented by the Royal Society”. However, it has not so far been possible to correlate this information with any of the expeditions mentioned in the Introduction.

Euborellia femoralis (Dohrn, 1863)

Labidura femoralis Dohrn, 1863. — Entomol. Zeitung Stettin 24: 321.

Psalis femoralis Dubrony, 1879. — Ann. Mus. Civ. Stor. Nat. Genova 14: 352.

Anisolabis stali. — BURR 1903; In: Forbes, H.O. (ed.). The Natural History of Sokotra and Abd-el-Kuri: 414.

Length with cerci: 13-17 mm.

Distribution: Comoro Islands, India, Madagascar, Malaysia, Myanmar, Seychelles, Socotra Island, Sri Lanka, Tanzania, Vietnam (BORMANS 1888, BURR 1912).

Euborellia annulipes (Lucas, 1847)

Forficesila annulipes Lucas, 1847. — Anns Soc. Ent. France (2) 5: 84.

Specimen examined: Yemen, Socotra Island: 1 ♀, Hadibo, 13.VIII.1956, Oxford Expedition, BM 1957-25, BMNH.

Length with cerci: 9-14 mm.

Distribution: Cosmopolitan.

Family Forficulidae

Anechura sokotrana Burr, 1905

Fig. 2

Anechura sokotrana Burr, 1905. — Ann. Mag. Nat. Hist. (7) 16: 493.

Anechura bituberculata Brindle, 1966. — Rev. Zool. Bot. Africaine 74: 43.

Forficula bituberculata. — BRINDLE 1973; Ann. Mus. R. Afr. Cent. 205: 261.

Guanchia bituberculata. — STEINMANN 1993; Das Tierreich 108: 560.

Specimen examined: Yemen, Socotra Island: 1 ♂, Hadibo, 12°39'N 54°01'E, III.1985, W. Wranik, ZMB.

Distribution: Democratic Republic of the Congo (formerly Zaire), Socotra Island, Uganda (BRINDLE 1973).

Remarks: A close comparison of the original description, photos from the BMNH, and the available material suggests that *Anechura sokotrana* and *Guanchia bituberculata* are indeed the same species. The type of *G. bituberculata* is in the Musée royal de l'Afrique centrale, Tervuren, Belgium,

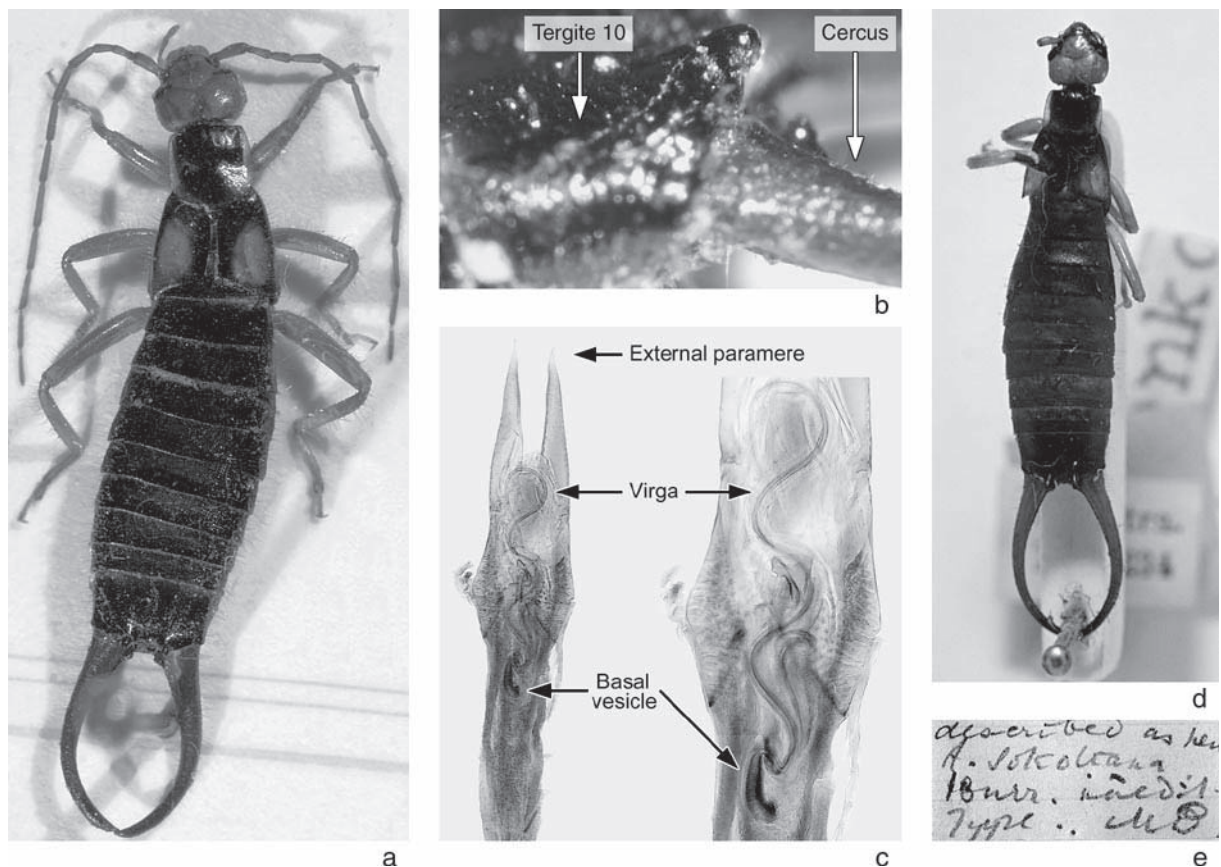


Fig. 2: *Anechura sokotrana* (*Guanchia bituberculata* n. syn.); a: specimen collected on Socotra Island by W. Wranik; b: last tergite and cerci in lateral view; c: microscopic images (with enlarged detail) of the genitalia; d: specimen from the collection of the BMNH, labelled as *A. fedtchenkoi* but misidentified by Burr as *Anechura sokotrana*; e: original label, revealing Burr's misidentification.

but the type deposition of *Anechura sokotrana* is unknown according to STEINMANN (1993: 478) and was not clearly stated in the original description by BURR (1905). The latter author, however, states (p. 493) that he misidentified *A. sokotrana* as *Anechura fedtchenkoi* Saussure, 1874 [now *Oreasiobia fedtchenkoi* (Saussure, 1874)]. This note has proved to be very helpful, because the specimen labelled as *A. fedtchenkoi* (and placed under *Anechura japonica*) in the BMNH collection has an additional label (Fig. 2 e) stating: "described as new [new line] *A. sokotrana* [new line] Burr inedit [new line] Type. MB". We therefore suggest that the specimen labelled as *A. fedtchenkoi* is indeed the (holo-?) type of *A. sokotrana*.

Based on the available data, we consider *Guanchia bituberculata* to be a synonym of *Anechura sokotrana*.

Forficula lucasi Dohrn, 1865

Forficula lucasi Dohrn, 1865. — Entomol. Zeitung Stettin 26: 98.

Forficula barroisi Bolivar, 1893. — Rev. Biol. Nord France 5: 477.

Forficula escherichi Krauss, 1895. — Entomol. Nachrichten 21: 97.

Forficula lucasi. — BURR 1903; In: Forbes, H.O. (ed.). The Natural History of Sokotra and Abd-el-Kuri: 413.

Specimen examined: Yemen, Socotra Island: 1 ♂, Homhil, 1500-2500 ft, BM 1900-234, BMNH.

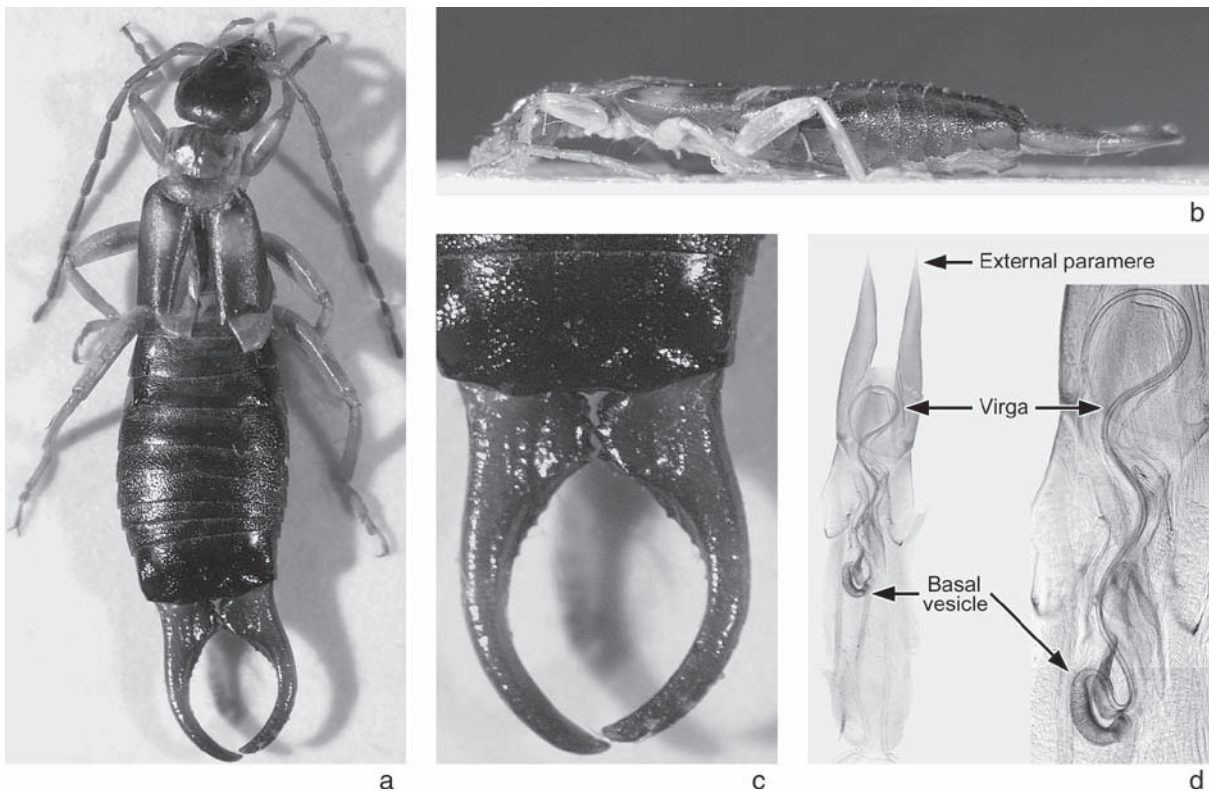


Fig. 3: *Forficula redempta*, ♂ specimen; a: habitus in dorsal view; b: habitus in lateral view; c: last tergite and cerci in dorsal view; d: microscopic images (with enlarged detail) of the genitalia.

Length with cerci: 16-25 mm.

Distribution: Algeria, Canary Islands, Cape Verde Islands, Chad, Egypt, India, Iran, Lebanon, Madeira, Myanmar, Nepal, Palestine, Saudi Arabia, Socotra Island, Sudan, Syria, Tanzania, Tunisia, Turkey.

Forficula redempta Burr, 1905

Fig. 3

Forficula redempta Burr, 1905. — Ann. Mag. Nat. Hist. (7) 16: 494.

Specimens examined: Yemen, Socotra Island: 1 ♂, Hadibo, 12°39'N 54°01'E, 03.I.1999, W. Wranik, ZMB; 2 nymphs, Qalansiyah, 12°40'N 53°28'E, 14.II.2000, W. Wranik, ZMB; 1 ♀, Farmihin, 12°32'N 53°56'E, 23.II.1999, W. Wranik, ZMB; 1 ♀, 1 nymph, Haggier summit, 12°34'N 54°00'E, 23.II.1999, K. Van Damme, HLMD-Derm-15; 2 ♂♂, 2 ♀♀, 1 nymph, Homhil, 12°34'N 54°19'E, source with *Ficus*, at light, 29-30.X.2000, H. Pohl, HLMD-Derm-16 (1 ♂, 1 ♀, 1 nymph), NHCY (1 ♂, 1 ♀).

Length with cerci: 13 mm.

Distribution: Socotra Island.

Remarks: Another remarkable species from the Socotra Archipelago, besides *Anechura sokotrana*, is *Forficula redempta* (Fig. 3), which has not been recorded from Socotra since BURR's (1905) original description. It was again mentioned in BURR's Genera Insectorum in 1911, but was not listed either in BRINDLE's work on African Dermaptera (1973, 1978) or in STEINMANN's volume on Eudermaptera (1993). It was SAKAI (1996: 9360) who mentioned this species again, though he gave no further information beyond its existence on Socotra. However, BURR (1905) gave no indication as to where the type was deposited. BURR gave (most of?) his specimens to the BMNH

(accession no. "Burr Collection 1914-384" and "Burr Collection 1915-120", which include 4500 specimens, 55 types and 390 co-types, according to the register in the BMNH), but so far we have been unable to locate the type specimen.

Forficula smyrnensis Audinet-Serville, 1839

Forficula smyrnensis Audinet-Serville, 1839. — Hist. nat. Insectes, Orthoptères: 38.

Forficula smyrnensis. — BURR 1903; In: Forbes, H.O. (ed.). The Natural History of Sokotra and Abd-el-Kuri: 413.

Specimens examined: Yemen, Socotra Island: 2 ♀♀, route from Hadibo to Diksam Plateau, 12°32'N 53°56'E, 800 m, 22.II.1999, H. Pohl, HLMD-Derm-17, NHCY.

Length with cerci: 18-25 mm.

Distribution: Albania, Armenia, Bulgaria, Corsica, Cyprus, Georgia, Greece, Hungary, Lebanon, Palestine, Romania, Russia, Socotra Island, Syria, Turkey, Ukraine, Yugoslavia.

Family Spongiphoridae

Marava socotrana n. sp. Haas

Fig. 4

Holotype: ♂, Yemen, Socotra Island, Diksam, 12°29'N 53°59'E, 01.III.1999, W. Wraniak, ZMB. — Paratypes: Yemen, Socotra Island: 3 ♂♂, 4 ♀♀, same data as holotype, ZMB; 1 ♀, 1 nymph, Wadi Daneghan, 12°36'N 54°03'E, 19.II.2000, W. Wraniak, ZMB.

Diagnosis: This species, with a body length including cerci of 9-10 mm, is clearly distinct from all other known species of the genus *Marava* because of its uniquely shaped and ornamented pygidium (Fig. 4 b-d): this consists of two lateral lobes separated by a deep median groove. The lobes are supplied with short and blunt denticles. Ventrally, the median groove is closed by a triangular plate, which is large enough to be clearly visible in dorsal aspect. The pygidium is reddish brown.

Description: Colour brown to dark brown with surface structure uniformly glabrous, shiny; antennae brown to yellow; head and abdomen darker than thorax; wings, if surpassing the tegmina at all, yellow, as well as the distal third of the femora; tibiae and tarsi uniformly yellow; abdominal sternites, pygidium and cerci reddish brown.

Head tumid, rather triangular; coronal sutures faint but distinct; antenna with up to 13 annuli, annuli distinctly conical; first segment much shorter than distance between the antennal basis; second segment short; fourth shorter than third and fifth antennal annulus respectively (Fig. 4 f). Eyes small to medium-sized, in lateral view about half the length of the malar space. Head as wide as pronotum.

Pronotum almost square-like, but slightly widened posteriorly; lateral margins straight; posterior margin somewhat rounded but almost straight (Fig. 4 a, e). Mesonotum completely covered by pronotum. Tegmina long and well developed, also in wingless specimens; no lateral keels; posterior margin straight but oblique to the longitudinal body axis, so that the tegmina form a median tip; some specimens with wings clearly surpassing the tegmina, others without visible wings. Legs short, tarsi simple, first and third tarsomeres equal in length; the second tarsomere about one third as long as these; arolium absent (Fig. 4 g).

Abdomen parallel-sided; lateral tubercles (glandular folds) on third tergite weak; abdominal tergite laterally without carina (Fig. 4 a). Pygidium characteristic (Fig. 4 b-d); two lateral lobes with short and blunt denticles, divided by a deep median groove; at the ventral end of the groove lies a triangular plate, which is large enough to be visible in dorsal view.

Genitalia with short, stout and gently curved external parameres; apices a little pointed; preputial sac with 2-3 denticles; virga almost straight (Fig. 4 h).

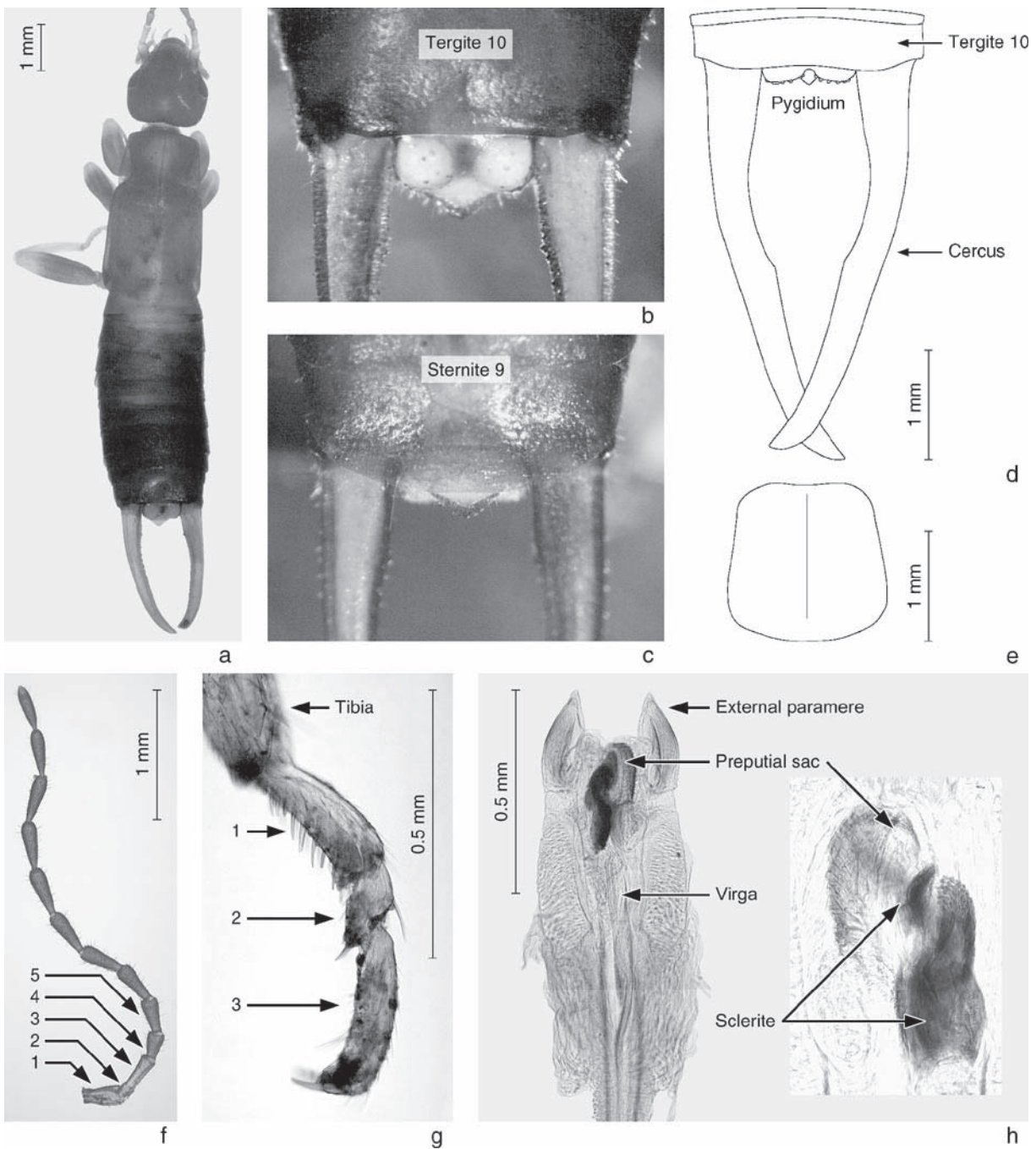


Fig. 4: *Marava socotrana* n. sp.; a: habitus of unwinged holotype, ♂; b: pygidium of holotype in dorsal view; c: same in ventral view; d: abdominal tergite 10, pygidium and cerci drawn from the holotype; e: pronotum drawn from the holotype; f: right antenna of a non-type specimen; g: metatarsus of a non-type specimen; h: microscopic images of the genitalia of the holotype, with enlarged detail showing sclerites and denticles on preputial sac.

Measurements: Body length with cerci 9-10 mm, head length 1.4 mm, pronotum length 1.4 mm, pronotum width 1.5 mm, tegmina length 1.8-1.9 mm, cerci length 2-3 mm.

Distribution: Socotra Island.

Etymology: The species name refers to Socotra Island, as the locality of its first discovery.

Remarks: This new species belongs to the genus *Marava* Burr, 1911, because it possesses all the diagnostic characters of this genus: conical antennal joints, comparatively small eyes, short tarsal joints, more or less straight forceps, and the shape of the male genitalia.

This species is clearly distinct from all other known species of the genus *Marava* because of its uniquely shaped and ornamented pygidium. Closer relationships to any of the other *Marava* species cannot be established, but it probably has affinities with species from the Oriental and Afrotropical regions.

DISCUSSION

Faunal composition: The species found in the Socotra Archipelago are not a representative cross-section of all Dermaptera. The Pygidicranidae, Diplatyidae and Karschiellidae are completely absent, as well as the Chelisochidae and Apachyidae (for a review of the phylogeny of the Dermaptera see HAAS & KUKALOVÁ-PECK 2001). These taxa have a high species number in tropical regions, and only a few members occur in the colder and drier regions of the Palearctic and Asia Minor. We assume that this is one reason for their absence on Socotra. The other reason is probably rather accidental: we assume that most of the species from the mainland are tramp species, transported with human travel, as Dermaptera generally lack the capacity for sustained flight over water and for unaided long-distance dispersal. *Labidura riparia*, seemingly an exception, was probably transported by floating logs and timber from the rivers and shore. This does not, however, exclude the possibility of human transport.

The rather low number of species found in the region, with no records of Dermaptera from Yemen and Oman, and only few from Saudi Arabia and Somalia, is probably due to the unfavourable hot and dry climate. Dermaptera prefer a warm and humid to wet climate, and so the centres of dermapteran diversity lie in the tropics.

Faunal relations: The earwig fauna consists of a mixture of cosmopolitan, Oriental, Afrotropical and endemic species. Clearly *Labidura riparia* is a cosmopolitan species, distributed worldwide on beaches and riverbanks. *Euborellia femoralis* is rather widely distributed through the Oriental Region. The only species known to occur in the Afrotropical Region is *Anechura sokotrana* (of which *Guanchia bituberculata* is a synonym, and so the distribution records for this species are included).

The endemic species *Forficula redempta* belongs to a genus which is rather widely distributed in the Old World. The genus *Forficula* is very well represented by many species in the warmer climates of Asia Minor and the Afrotropics, and so the occurrence of at least three species of *Forficula* on Socotra Island is not surprising.

ACKNOWLEDGEMENTS

These studies were conducted with partial financial support from the GEF-funded project "Conservation and Sustainable Use of Biodiversity of Socotra Archipelago", overseen by the United Nations Office for Project Services (UNOPS YEM/96/G32) in conjunction with the Environmental Protection Council (EPC) of Yemen. We thank the HLMD for its support of Dr Hans Pohl.

Mrs Judith Marshall (Natural History Museum London) is thanked for her support with regard to use of the BMNH collections. This contribution was supported through a SYST-RESOURCE grant from the BMNH (funded by the EU's 'IHP Access to Research Infrastructures Programme'), and we are grateful to these organizations.

REFERENCES

- ALBOUY, V. & CAUSSANEL, C. 1990. Dermaptères ou Perce-oreilles. *Faune de France* 75: 1-245.
- BORMANS, A. DE 1888. Viaggio di Leonardo Fea in Birmania e regioni vicine. *Annali del Museo Civico di Storia Naturale di Genova* (2) 26: 431-448.
- BRINDLE, A. 1973. The Dermaptera of Africa. Pt I. *Annales du Musée Royal de l'Afrique Centrale Tervuren, Sciences Zoologiques*, 205: 1-335.
- BRINDLE, A. 1978. The Dermaptera of Africa. Pt II. *Annales du Musée Royal de l'Afrique Centrale Tervuren, Sciences Zoologiques*, 225: 1-204.
- BURR, M. 1903. Earwigs, crickets and grasshoppers. In: *The Natural History of Sokotra and Abd-el-Kuri: Being the Report Upon the Results of the Conjoint Expedition to These Islands in 1898-9*. Forbes, H.O. (ed.): 409-427. [Earwigs, grasshoppers and crickets: 411-413. I. Earwigs, grasshoppers and crickets of Sokotra: 413-423. II. Grasshoppers from Abd-el-Kuri: 424-425. Colour Plate XXV – Orthoptera from Sokotra.] Special Bulletin of the Liverpool Museums.
- BURR, M. 1905. Notes on the Forficularia. IX. One new species with synonymic notes. *Annals and Magazine of Natural History* (7) 16: 486-496.
- BURR, M. 1911. Dermaptera. *Genera Insectorum* 122: 1-112.
- BURR, M. 1912. Die Dermaptera des k.k. naturhistorischen Hofmuseums in Wien. *Annalen des Naturhistorischen Hofmuseums* 26: 63-108.
- DIXEY, F.A., BURR, M. & PICKARD-CAMBRIDGE, O. 1898. On a collection of insects and arachnids made by Mr. E.N. Bennet in Socotra with descriptions of new species. II. Orthoptera by M. Burr. *Proceedings of the Zoological Society of London* 3: 384-385.
- HAAS, F. & KUKALOVÁ-PECK, J. 2001. Dermaptera hindwing structure and folding: New evidence for familial, ordinal and superordinal relationships within Neoptera (Insecta). *European Journal of Entomology* 98: 445-509.
- KRAUSS, H.A. 1931. Orthopteren aus Südarabien und von der Insel Sokotra. *Akademie der Wissenschaften in Wien, mathematisch-naturwissenschaftliche Klasse* 71: 1-30.
- SAKAI, S. 1996. Dermapterorum Catalogus XXXI. A basic survey for integrated taxonomy of the Dermaptera of the world. *Bulletin of the Daito Bunka University (Natural Sciences)* 34: 1 (9303) - 132 (9440).
- STEINMANN, H. 1988. A revision of the Oriental *Forficula* Linnaeus, 1758 species (Dermaptera: Forficulidae). *Acta zoologica Academiae Scientiarum Hungaricae* 34 (1): 1-26.
- STEINMANN, H. 1989. Dermaptera: Catadermaptera II. *Das Tierreich* 105: 1-505.
- STEINMANN, H. 1993. Dermaptera: Eudermaptera II. *Das Tierreich* 108: 1-709.
- WRANIK, W. 1999. Die Tierwelt der Insel Sokotra. In: *Sokotra. Mensch und Natur*. Wranik, W. (ed.): 81-181. *Jemen-Studien* 14. Kopp, H. (series ed.). Wiesbaden; Dr. Ludwig Reichert Verlag.

Manuscript submitted: 12 July 2002

Manuscript accepted: 14 October 2003