THE COCKROACHES (BLATTARIA) OF CHRISTMAS ISLAND (INDIAN OCEAN)

LOUIS M. ROTH
Museum of Comparative Zoology, Harvard University,
Cambridge, MA 02138, U.S.A
Correspondence: 81 Brush Hill Road, P. O. Box 540,
Sherborn, MA 01770, U.S.A.

ABSTRACT. The following species of cockroaches have been recorded from Christmas Island: Balta notulata (Stål), Blattella lituricollis (Walker), Margattea nimbata nimbata (Shiraki), Metanocticola christmasensis Roth, Panesthia angustipennis angustipennis (Illiger), Periplaneta americana (Linnaeus), Pycnoscelus surinamensis (Linnaeus), Supella (Supella) longipalpa (Fabricius) (with a query), Temnopteryx fulva (Brunner) (with a query). Lobopterella dimidiatipes (Bolivar) and Scabina latiusvittata (Brunner) are recorded from Christmas Island for the first time. Keys are given for adults and nymphs.

Key words: Cockroach, Blattaria, Taxonomy, Christmas Island, Indian Ocean.

Introduction

Christmas Island (10°30'S 105°40'E) lies 360 km south of Java in northeastern Indian Ocean. Five species of cockroaches, two with a query, were reported by Kirby (1900: 145). In April, 1999, Professor Sam Lake of Monash University, Victoria, Australia sent me some cockroach specimens for identification that were collected by Dr. P. G. Green near Murray Hill on Christmas Island in rain forest litter using modified Berlese funnels. The litter was sampled during a land crab exclosure experiment (Green, O'Dowd & Lake, 1997; Green, Lake & O'Dowd, 1999). Four cockroach species were found, two of which had not been recorded before from Christmas Island.

Regarding the Orthoptera, Kirby (1900: 141) stated "...it is remarkable how many important groups appear to be represented in Christmas Island only by a single conspicuous species, generally peculiar to the island, as far as it is at present known. Most of the species in the following list which have been previously described from other countries, are wide-ranging species of Blattidae." Since Kirby's work, the number of species recorded for Christmas Island have doubled (Table 1); most of them are wide ranging (except Metanocticola), and found in Indonesia. This paper summarizes our knowledge of the species of Blattaria on Christmas Island.

Specimens are housed in the Museum of Comparative Zoology, Harvard University, Cambridge, MA, U.S.A. (MCZ), and Monash University, Victoria, Australia (MUVA).
Table 1. Cockroaches reported from Christmas Island

Blattidae
Blattinae
*Periplaneta americana* (Linnaeus)

Nocticolidae
*Metanocticola christmasensis* Roth

Blattellidae
Pseudophyllodromiinae
*Balta notulata* (Stål)
*Margattea nimbata nimbata* (Shelford)
*Supella (Supella) longipalpa* (Fabricius) (?)

Blattellinae
*Blattella lituricollis* (Walker)
*Lobopterella dimidiatipes* (Bolívar)
*Scalida latiusvittata* (Brunner)

Blaberidae
Pycnoscelinae
*Pycnoscelus surinamensis* (Linnaeus)

Panesthiinae
*Panesthia angustipennis angustipennis* (Illiger)

*Species incertae sedis*
*Temnopteryx fulva* (Brunner) (?)

Key to adult cockroaches on Christmas Island

1. Cavernicolous. Small (about 4-4.5 mm long), whitish, eyeless. Male: tegmina reduced, veins absent, hind wings absent; metanotum with a setal gland (Fig. 1A in Roth, 1999). Female apterous.................................
   .....................*Metanocticola christmasensis*
   -- Epigean. Larger, with eyes. Tegmina and wings present .................2

2(1). Cerci elongated extending well beyond the hind margin of the supra-anal plate (e.g., Fig. 9) .........................................................3
   -- Cerci reduced, not reaching beyond the hind margin of the supra-anal plate .................................................................9

3(2). Large (body length 27-34 mm). Pronotum yellowish with 2 large reddish brown blotches (Fig. 1). Supra-anal plate largely unsclerotized, hind margin with a V-shaped emargination (both sexes). Domiciliary pest. ...........................................*Periplaneta americana*
   -- Smaller. Pronotum not as above ............................................4

4(3). Tegmina hyaline with a pair of dark maculae, one proximal in the anal vein region and the other towards the middle (Pl. I, Fig. 25 in Hebard, 1917); female tegmina and wings somewhat reduced (Pl. 25A, B in Roth and Willis, 1960). Pronotum with browinsh disk, markings absent (Fig. 4). Domiciliary pest .......... *Supella (Supella) longipalpa*
   -- Tegmina and pronotum not as above ......................................5
5(4). Tegmina reduced reaching about the end of the metanotum, hind wings vestigial. Second abdominal tergum with a pair of narrow rectangular pale maculae (Fig. 9) .................. Lobopterella dimidiatipes
-- Tegmina and wings more developed extending well beyond the metanotum. Second abdominal tergum not as above ........................................... 6

6(5). Pronotum with a black U-shaped macula (Fig. 6)... Scalida latiusvittata
-- Pronotum not as above ............................................................................. 7

7(6). Pronotum with a pair of black longitudinal stripes (Fig. 5). Male: abdominal terga 7 and 8 specialized, the one on the eighth segment with a median mound that tapers posteriorly to a narrow ridge (Fig. 26A in Roth, 1985) .................................................. Blattella lituricollis
-- Pronotum pictured with lines, dots, and blotches (Figs. 2, 3). Tergal specializations, if present, not as above .................................................. 8

8(7). Pronotum as in Fig. 3. Tarsal claws asymmetrical. Interstylar margin of subgenital plate concavely excavated with a small, projecting medial lobe (Figs. 6A-C in Roth, 1990); Male abdominal terga unspecialized ........................................ Balta notulata
-- Pronotum as in Fig. 2. Tarsal claws symmetrical. Male: Eighth abdominal tergum with a setal specialization. Interstylar margin of subgenital plate convexly rounded (Figs. 18, 24 in Roth, 1989) ........... Margattea nimbata nimbata

9(2). Pronotum with anterior margin not excised, dark with a yellow band anteriorly and anterolaterally (Fig. 7). Parthenogenetic, females only. .............................................................................................................. 9
-- Pronotum with anterior margin widely excised and with or without large, curved hornlike processes, and with a mesal triangular elevation (these characters may be variably reduced) (Fig. 8). Hind margin of supra-anal plate toothed (Figs. 3A-F, 4A-C, G, H in Roth, 1979). Lives in and feeds on rotting logs ................................................................. Panesthia angustipennis angustipennis

Key to cockroach nymphs on Christmas Island

-- Epigean. Color variable. Eyes present .............................................. 2

2(1). Cerci extending beyond hind margin of supra-anal plate (e.g., Figs. 11, 15) .......................................................... 3
-- Cerci not reaching beyond supra-anal plate hind margin (Figs. 17, 18) .......................................................... 9

3(2). Uniformly pale or dark brown, darker markings may be weakly indicated. Pronotum without distinct markings (Fig. 10). Domiciliary pest .................................................. Periplaneta americana
-- Thorax and abdomen not as above .......................................................... 4

4(3). Pronotal disk with a pair of dark longitudinal lines that extend along the meso-, metanotum, and abdomen (Fig. 11) ....... Blattella lituricollis
-- Pronotum and abdomen without longitudinal stripes ............................. 5

5(4). Pronotum pictured with lines and dots, meso-, metanotum, and abdominal terga mottled (Fig. 14) .................. Margattea nimbata nimbata
-- Pronotum not pictured with lines and dots ........................................... 6
Figs. 1-9. Adult cockroaches from various localities but all species have been recorded on Christmas Island. 1-6, pronota: 1. *Periplaneta americana*, male, Margarita, Venezuela; 2. *Margattea nimbata nimbata*, male, Christmas Island; 3. *Balta notulata*, male, near Usini Village, Madang Province, Papua New Guinea; 4. *Supella (Supella) longipalpa*, male, Miami, Florida, U.S.A.; 5. *Blattella lituricollis*, male, Pak Thong Chai, Thailand; 6. *Scalida latiusvittata*, male from Christmas Island; 7. *Pycnoscelus surinamensis*, female habitus, St. Augustine, Florida, U.S.A. (from Hebard, 1917, Pl. VIII, Fig. 1; pronotum length x width (mm), 5.0 x 7.0); 8. *Panesthia angustipennis angustipennis*, pronotum, male, Surat Thani, Thailand; 9. *Lobopterella dimidiatipes*, male habitus, Sumatra (from Hanitsch, 1932, Fig. 13, as *Scabina transversa* Hanitsch; total length, 8mm).
6(5). Pronotum with a dark macula on the anterior two-thirds, background whitish. Abdomen mottled with dark spots on whitish background (Fig. 12) .......................................................Balta notulata

7(6). Mesonotum with a broad transverse whitish band; second abdominal tergum with a pair of narrow transverse rectangular pale stripes (Fig. 15) ....................................................... Lobopterella dimidiatipes

8(7). Mesonotum with a broad distinct concave pale area, metanotum mostly pale (Fig. 13). Anteroventral margin of front femur with a row of stout spines that decrease in length distally (Type A). Domiciliary pest species.................................Supella (Supella) longipalpa

8(7). Mesonotum and second abdominal tergum not as above..........................8

9(2). Pro-, meso-, metanotum, and first three abdominal terga black, polished, shiny, smooth, remaining terga dull shagreenous (Fig. 17).................................Pycnoscelus surinamensis

...........................................................................

-- Pronotum with a pair of oblique grooves on the anterior half. Mesonotum and metanotum uniformly brown or with a pair of yellow maculae. Abdomen without dull shagreenous terga (Fig. 18). Lives in and feeds on rotting wood. ..................Panesthia angustipennis angustipennis

Family BLATTIDAE
Subfamily Blattinae

1. Periplaneta americana (Linnaeus) (Figs. 1, 10)


Comments: Only one specimen has been reported (Kirby, 1900: 145) of this widely distributed, cosmopolitan pest species.

Family NOCTICOLIDAE

2. Metanocticola christmasensis Roth

Metanocticola christmasensis Roth, 1999: 328, Figs. 1A, B.

Comments: This is a very small (about 4 mm long), eyeless, cavernicolous species, collected in Jedda Cave. The veinless tegmina are reduced (♂) or absent (♀), and hind wings are absent in both sexes. The males have a setose gland on the metanotum, which is unique among cockroaches.

Family BLATTELLIDAE
Subfamily Pseudophyllodromiinae

3. Margattea nimbata nimbata (Shiraki) (Figs. 2, 14)

Specimens examined: Christmas Island: Near Murray Hill, 5♂, 3 ♀, more than 200 nymphs, rain forest litter in modified Berlese funnels; some specimens retained in MCZ and MUVA.

Comments: This species was known previously on Christmas Island by 1♂, 2 ♀, and 3 nymphs (Roth, 1989: 215). It apparently is well established. The early to late instar nymphs have dark (specimens in alcohol) symmetrical, reddish or light brown lines and the abdomen is mottled (Fig. 14); the top of the head has a transverse reddish band, succeeded below by 1 or 2 light brown interocellar stripes.

4. Balta notulata (Stål) (Figs. 3, 12)


*Balta* sp.: Roth, 1990: 371, Fig. 81 (nymph).

Comments: The face and pronotum are pictured (Figs. 6A, B, in Roth, 1990). The face of the nymph resembles that of the adult but its pronotum has a dark brown macula (Fig. 12) whereas in the adult there is a symmetrical pattern of lines, and small blotches (Fig. 3).

The species has been reported on Christmas Island from a single female (Roth, 1999: 334). It is a very widely distributed taxon, and has been trapped in houses in Papua New Guinea (Beccaloni, 1991: 507). It has been suggested that its wide distribution is due to their association with humans because individuals or oothecae could be carried to various islands in the Pacific and Indian Oceans (Beccaloni, 1991: 508; Kevan & Kevan, 1995: 227).

5. *Supella (Supella) longipalpa* (Fabricius) (Figs. 4, 13)


*Supella (Supella) longipalpa* (Fabricius): Princis, 1969: 917 (literature and synonymy); Roth, 1999: 330, Figs. 2A-G (redescription).

Comments: This record, based on a single specimen, was listed with a query and belonged "...to this or an allied species." (Kirby, 1900: 145). The species is an important cosmopolitan domiciliary pest. The tegmina and wings are fully developed in males and somewhat reduced in females (Pl. 25A, B in Roth & Willis, 1960).

Subfamily Blattellinae

6. *Blattella lituricollis* (Walker) (Figs. 5, 11)

*Blattella lituricollis* (Walker): Princis, 1969: 841 (literature and synonymy); Roth, 1985: 54, Figs. 25-31 (redescription).

Comments: This Christmas Island record is based on 3♂ and 9 ♀ (Roth, 1985: 64). It is very widely distributed (Roth, 1985: 14). Immatures and adults may be recognized by the pair of longitudinal stripes on the pronotum (Figs. 5, 11).
7. *Lobopterella dimidiatipes* (Bolivar) (Figs. 9, 15)

*Lobopterella dimidiatipes* (Bolivar): Princis, 1969: 856 (literature and synonymy); Roth, 1988: Fig. 6A (habitus); 1990: 372, Fig. 10C (redescription).

*Scabina transversa* Hanitsch, 1932: 72, Fig. 13.

*Specimens examined*: Christmas Island: Near Murray Hill, 5♂, 3♀, more than 100 nymphs of different instars; specimens in MCZ and MUVA.

*Comments*: This is a widely distributed species and the first record from Christmas Island. It is easily recognized by the reduced tegmina and vestigial wings, and markings: the tegmina have a pair of pale maculae anteriorly and the second abdominal tergum has a pair of narrow rectangular pale maculae (Fig. 9). In nymphs the mesonotum has a broad transverse white stripe and the second abdominal tergum has a pair of rectangular pale maculae (Fig. 15) as in the adult.

Hanitsch (1932: 72) described "*Scabina transversa*" from Padang, Sumatra, stating that the unique specimen was an "immature?". However, obviously it is an adult because it has tegmina, as seen in Hanitsch's Fig. 13 (reproduced here in Fig. 9) and his description ("Tegmina sub-quadrate... Wings minute."). In spite of the presence of tegmina and vestigial wings, Princis (1969: 857) incorrectly listed Hanitsch's species as a "juv." male.

8. *Scalida latiusvittata* (Brunner) (Figs. 6, 16)

*Scalida latiusvittata* (Brunner): Princis, 1969: 800 (literature); Roth, 1991: 2, Figs. 1A-G, 2A-C (redescription).

*Specimens examined*: Christmas Island: Near Murray Hill, 7♂, 8♀, more than 150 nymphs; specimens in MCZ and MUVA.

*Comments*: The species was originally described from Buitenzorg [=Bogor], Java, but is more widely distributed having been recorded from Sumatra, Mentawai Islands, Singapore, and the Celebes [=Sulawesi]. This is the first record from Christmas Island.

The adults can be recognized by the black U-shaped macula on the pronotum (Fig. 6). The nymphs are dark brown and their pronota lack the U-shaped pattern; their meso- and metanotum have weak or distinct pale areas that blend into the surrounding region (Fig. 16).

Family BLABERIDAE
Subfamily Pycnoscelinae

9. *Pycnoscelus surinamensis* (Linnaeus) (Figs. 7, 17)

*Pycnoscelus surinamensis* (Linnaeus): Princis, 1964: 264 (literature and synonymy); Roth and Willis, 1960: Pl. 24B) (habitus); 1961 (Figs. 4A-D; nymphal habitus); Roth, 1998: 96 (redescription).

*Specimens examined*: Christmas Island: Near Murray Hill, 2 nymphs. The following were collected by P. S. Lake: The Dales, 2 nymphs, 2.xii.1998; Greta Beach car park, 1 nymph, 4.xii.1998; Martin Point car park, 1 ♀.
Comments: The initial record (as *Leucophaea surinamensis*) was based on a single specimen found in rotting wood (Kirby, 1900: 146). Roth (1998: 98) recorded 6 and 2 nymphs from the Island. This is a widely distributed parthenogenetic thelytokous species. The habitus of its close bisexual relative *Pycnoscelus indicus* (Fabricius) (Figs. A, C in Roth & Willis, 1960) is similar to *surinamensis*, but it cannot reproduce parthenogenetically.

Subfamily Panesthiinae

10. *Panesthia angustipennis angustipennis* (Illiger) (Figs. 8, 18)

*Panesthia angustipennis angustipennis* (Illiger): Princis, 1965: 310 (literature and synonymy); Roth, 1979: 24, Figs. 2-18 (redescription).

Comments: Kirby (1900: 146) recorded this species (as *Panesthia javanica*) from West End and Flying Fish Cave. I (Roth, 1979: 28) examined Kirby's specimens, as well as others from Christmas Island, and reported it from: Ross Hill, Phosphate Hill, The Dales, Tom's Ridge, and Anderson's Dale. This species burrows into and lives in rotting logs; they feed on wood, and intestinal bacteria digest the cellulose.

Species incertae sedis

11. *Temnopteryx fulva* Brunner

*Temnopteryx fulva* Brunner, 1865: 85; Princis, 1969: 1005 (sp. incertae sedis).

Comments: Kirby's (1900: 145) original record was based on a single specimen that possibly belonged to this species, but was "...smaller than the Javanese specimen described by Brunner." Brunner's description based on a unique male is: "Parva, tota fulva. Elytris apice rotundatis. Pedibus hirsutis."

Measurements (mm): body length, 10; pronotum length x width, 3.0 x 3.8; tegmen, 3.5. Brunner also stated that the species is distinguished by its uniform tawny, yellowish brown color. The tegmina are more narrow and more rounded than the extremity of *Temnopteryx inconspicua* Brunner (from Africa) (which Princis, 1969: 964, listed under *Xosablatta*).

Brunner's specimen was supposed to be in the "Musée de Bruxelles". According to Jacques Cools, Chief Technician in the Institut Royal des Sciences Naturelles de Belgique, Bruxelles, it is not in that Museum (personal correspondence, 18 May, 1999).

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References


