

Tropical Biomedicine 29(1): 180–186 (2012)

Research Note

Domiciliary cockroaches found in restaurants in five zones of Kuala Lumpur Federal Territory, peninsular Malaysia

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Received 19 July 2011; received in revised form 18 August 2011; accepted 20 August 2011

Abstract. The following domiciliary cockroaches were collected from restaurants in five zones of Kuala Lumpur Federal Territory, Malaysia using 1L glass beaker traps baited with ground mouse-pellets: *Periplaneta americana* (Linnaeus) (n = 820), *Periplaneta brunnea* Burmeister (n = 46), *Blattella germanica* (Linnaeus) (n = 12504), *Supella longipalpa* (Fabricius) (n = 321), *Symptloce pallens* Stephens (n = 29) and *Neostylopyga rhombifolia* (Stoll) (n = 5). The following bacteria were isolated from 10 cockroach specimens: *Enterobacter cloacae*, *Klebsiella pneumoniae* ssp. *pneumoniae*, *Klebsiella pneumoniae* ssp. *rhinoscleromatis* and *Serratia liquefaciens* from 5 *B. germanica*; *Acinetobacter calcoaceticus* var. *anitratus*, *Citrobacter diversus/amalonaticus*, *Escherichia vulneris* and *K.p. pneumoniae* from 3 *P. brunnea*; and *Citrobacter freundii*, *Enterobacter agglomerans* 4, *Escherichia adecarboxylate*, *E. vulneris*, *K. p. pneumonia*, *K. p. rhinoscleromatis* and *Proteus vulgaris* from 2 *P. americana*.

Cockroaches are a primitive and highly successful form of insect life (Cochran, 1999). They have exploited a variety of habitats in the tropics and subtropics (Cornwell, 1968). About 35 species, termed as domiciliary pest species, have established varying degrees of association in human dwellings and premises, and in peninsular Malaysia, 13 species have been collected in such situations (Oothuman *et al.*, 1984; Yap *et al.*, 1991; Lee *et al.*, 1993; Vythilingam *et al.*, 1997; Jeffrey *et al.*, 1999, 2003a, 2003b; Lee & Lee, 2000; Sulaiman *et al.*, 2003).

Cockroaches have been collected from several places including Klang (Oothuman *et al.*, 1984), Penang (Yap *et al.*, 1991; Lee *et al.*, 1993) and Kuala Lumpur (Vythilingam *et al.*, 1997; Sulaiman *et al.*, 2003). However, the collection from Kuala Lumpur was confined to the Chow Kit area, Taman Ibu Kota and Setapak Jaya.

Here cockroaches from 5 out of 6 zones of Kuala Lumpur Federal Territory and isolation of bacteria from 10 cockroach specimens are reported.

Cockroaches were trapped from the kitchen and other vantage areas of restaurants in 5 out of 6 zones of the Kuala Lumpur Federal Territory. Two beaker-traps baited with ground mouse-pellets (Jeffery *et al.*, 1984) were set up at each selected restaurant in the following areas: Taman Tun Dr. Ismail and Bangsar (Zone Damansara); Taman Wahyu, Kepong Baru and Jalan Kok Lian (Zone Kepong); Jalan Genting Klang and Jalan Tun Abdul Razak/Jalan Semarak (Zone Setapak); Jalan Peel and Taman Maluri (Zone Cheras); and 4 1/4 mile Jalan Klang Lama, Jalan Mega Mendung, Jalan Tun Sambanthan and 6th mile Jalan Puchong (Zone Klang Lama).

Weekly, trapped cockroaches were transferred into plastic bags and brought back to the laboratory for recording and identification. Cockroaches, except *Symploce pallens*, were identified using descriptions and keys in Cochran (1999) and compared with reference specimens maintained in the department. *Symploce pallens*, reported earlier by Jeffery *et al.* (1997), was initially identified by the late Roth, L.M. of Massachusetts, USA.

Ten cockroach specimens (5 *Blattella germanica*, 3 *Periplaneta brunnea* and 2 *Periplaneta americana*) were processed for the presence of bacteria. Isolation and identification were done according to the methods mentioned in Oothuman *et al.* (1989). Guts of the cockroaches were dissected out, under sterile conditions, and emulsified in petri dishes containing sterile normal saline. A small amount of the emulsion was transferred into sterile peptone water and a loopful of the suspension was inoculated on to Oxoid blood agar base containing 5% blood and MacConkey medium. The plates were incubated aerobically for 24-28 h at 37°C. Bacterial identification was carried out according to Cowan & Steel (1970).

A total of 13725 specimens (3204 females, 4337 males and 6184 nymphs) of 6 species of cockroach were trapped (Table 1). The dominant species trapped was the German cockroach, *B. germanica* (Linnaeus) (n = 12504, 91.10%); followed by

the American cockroach, *P. americana* (Linnaeus) (n = 820, 5.97%); the brown-banded cockroach, *Supella longipalpa* (Fabricius) (n = 321, 2.34%); the large brown cockroach, *P. brunnea* (Burmeister) (n = 46, 0.34%); the smooth cockroach, *S. pallens* (Stephens) (n = 29, 0.21%); and the harlequin cockroach, *Neostylopyga rhombifolia* (Stoll) (n = 5, 0.04%). *Blattella germanica*, *P. americana*, *P. brunnea* and *S. longipalpa* were trapped from all 5 zones; whereas *N. rhombifolia* and *S. pallens* were not trapped from the Setapak and Kepong zones, respectively.

Blattella germanica is prevalent in food outlets in peninsular Malaysia (Lee, 1998). In this study, it was trapped from all the zones. It was not reported from residential premises in earlier studies (Jeffery *et al.*, 1982; Oothuman *et al.*, 1984; Yap *et al.*, 1991; 1997; Lee *et al.*, 1993), until Vythilingam *et al.* (1997) found 2 females and 27 nymphs in a residence in Setapak Jaya in Kuala Lumpur and Lee & Lee (2000) trapped 2 specimens in a suburban apartment in Penang. In a study conducted in the animal facility of the Medical Faculty, University of Malaya, Sulaiman *et al.* (1993) trapped 1 female in the staff-resting area and 1 nymph in the food storage area, of this species. In a later study in the same faculty but conducted in the store and kitchen of the Clinical Student's Hostel, Jeffery *et al.* (2003b) trapped 878 *B. germanica*, followed by *P. americana* (n = 113) and *P. brunnea* (n = 12).

In peninsular Malaysia, *P. americana* is the largest domiciliary species. It is widely distributed but is rarely found or absent from Orang Asli (local aborigines) villages (Oothuman *et al.*, 1984; Sulaiman *et al.*, 1995; Jeffery *et al.*, 1999). *Periplaneta americana* was the dominant species in several surveys (Oothuman *et al.*, 1984; Yap *et al.*, 1991; Lee *et al.*, 1993; Lee & Lee, 2000). However, in the present and Jeffery *et al.* (2003) studies, it was superseded in dominance by *B. germanica*. *Periplaneta americana* has been seen entering in large numbers into human premises from the outside (unpublished observation). It has been recorded in large numbers in septic tanks in peninsular Malaysia (Anon, 1939 cited in Cornwell,

Table 1. Domiciliary cockroaches from restaurants in five zones of Kuala Lumpur Federal Territory, peninsular Malaysia

| Species stages | Damansara (104) | | | Kepong (89) | | | Setapak (98) | | | Cheras (24) | | | Jalan Klang Lama (146) | | | Total (461) |
|---------------------------------|--------------------|------|------|----------------|------|------|-----------------|-----|------|----------------|----|----|---------------------------|------|------|--------------------|
| | f | m | n | f | m | n | f | m | n | f | m | n | f | m | n | |
| <i>Blattella germanica</i> | 673 | 972 | 2006 | 799 | 1033 | 969 | 651 | 821 | 1382 | 4 | 3 | 8 | 798 | 1088 | 1297 | 12504 [91.104%] |
| <i>Neostylopyga rhombifolia</i> | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 5 [0.036%] |
| <i>Periplaneta americana</i> | 18 | 18 | 24 | 34 | 48 | 104 | 25 | 65 | 26 | 13 | 5 | 20 | 84 | 73 | 263 | 820 [5.974%] |
| <i>Periplaneta brunnea</i> | 13 | 12 | 5 | 3 | 3 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | 3 | 46 [0.335%] |
| <i>Supella longipalpa</i> | 0 | 0 | 2 | 62 | 180 | 47 | 4 | 2 | 1 | 0 | 0 | 1 | 12 | 0 | 10 | 321 [2.339%] |
| <i>Symptloce pallens</i> | 3 | 4 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 1 | 1 | 3 | 5 | 6 | 29 [0.211%] |
| | 707 | 1006 | 2039 | 898 | 1265 | 1121 | 683 | 889 | 1413 | 18 | 10 | 31 | 898 | 1167 | 1580 | 13725 |

f- female; m-male; n-nymph; ()-traps with cockroaches

1968). Predation of *P. americana* by the house shrew, *Suncus murinus* has been observed twice by one of us (JJ), and in one instance, the cockroach was completely consumed in less than 3 minutes. On another occasion, a toad, *Bufo melanostictus*, was observed at night in the same house. The next morning faeces believed to belong to the toad was seen and was collected and examined under a dissecting microscope. Large numbers of cockroach wings, estimated to belong to more than 10 individuals, was seen. The wings were considered to belong to *P. americana*, as this species was the only domiciliary species in that house at that time.

Supella longipalpa, a small sized domiciliary cockroach is generally found in drier areas of the household, particularly in bedroom, furnitures, television, etc. (Cornwell, 1968). Adults and nymphs have been trapped, on 3 occasions, from a booth of a car. Recently, a nymph was found in a cardboard box obtained from a provision shop.

Periplaneta brunnea in the past had been confused with *P. americana*, in peninsular Malaysia. Both these large *Periplaneta* spp. share superficial morphological similarities in the adult stages; however, are very distinct in the oothecal stage (Jeffery *et al.*, 1982). It is widespread but generally occurs in small numbers, except once, was the dominant species collected by Vythilingham *et al.* (1997), in Taman Ibu Kota and Setapak Jaya in Kuala Lumpur. *Periplaneta brunnea*, so far, has not been collected from aborigine villages (Oothuman *et al.*, 1984; Sulaiman *et al.*, 1995; Jeffery *et al.*, 1999).

Symploce pallens, a widely distributed species (Roth, 1984, 1996) was reported as a domiciliary pest species in peninsular Malaysia (Jeffery *et al.*, 1997; Lee *et al.*, 2000) and Singapore (Lee & Ng, 2009). In this study it was found in small numbers in all the 5 zones of the Kuala Lumpur Federal Territory. Vythilingham *et al.* (1997) collected it in

large numbers (identified as Blattellidae) in Taman Ibu Kota and Setapak Jaya, Kuala Lumpur. They isolated the following bacteria from this species: *Acinetobacter calcoaceticus*, *Enterobacter cloacae*, *Klebsiella p. pneumoniae* and *Klebsiella p. rhinocleromatis*.

Only 5 specimens of *N. rhombifolia* was collected from Kepong, Cheras and Jalan Kelang zones. Previously, it was found to occur together with *P. americana* and *P. brunnea* in the same niche (Jeffery *et al.*, 1982; Oothuman *et al.*, 1984; Yap *et al.*, 1991). Yap *et al.* (1991) hardly found them in rural areas. Jeffery *et al.* (2003a) collected them in small numbers in a rice-growing village in Kedah, where they were dominant over *Periplaneta australasiae*, *P. brunnea* and *S. longipalpa*. *Neostylopyga rhombifolia* was also collected from an aborigine resettlement in jungle at Pos Betau in Pahang state (Jeffery *et al.*, 1999). An important nosocomial pathogen, *Serratia marcescens* has been isolated from this species (Jeffery *et al.*, 1984).

Cockroaches have been reported as potential mechanical vectors of human diseases, shown to cause household allergy and entomophobia (Lee, 1997; Cochran, 1999). In this study 11 species of bacteria were isolated from *B. germanica*, *P. americana* and *P. brunnea* (Table 2).

In this study conducted in 5 zones of the Kuala Lumpur Federal Territory, 6 species of cockroaches were collected, mainly from the kitchen area of restaurants. The study areas were essentially urban with sparse vegetation. The species trapped were *B. germanica*, *N. rhombifolia*, *P. americana*, *P. brunnea*, *S. longipalpa* and *S. pallens*.

The following domiciliary species known from peninsular Malaysia, namely *Balta* (= *Lupparia*) *notulata*, *Nauphoeta cinerea*, *P. australasiae* and *Pycnoscelus surinamensis*, were not collected in this study.

Table 2. Bacteria isolated from domiciliary cockroaches collected from restaurants in Kuala Lumpur Federal Territory, peninsular Malaysia

| Cockroach species | Bacteria species |
|-------------------------------------|--|
| <i>Blattella germanica</i> | |
| Specimen no. 1 | <i>Enterobacter cloacae</i> <i>Klebsiella pneumoniae</i> ssp. <i>pneumoniae</i> |
| Specimen no. 2 | <i>Enterobacter cloacae</i> <i>Klebsiella pneumoniae</i> ssp. <i>pneumoniae</i> |
| Specimen no. 3 | <i>Enterobacter cloacae</i> <i>Klebsiella pneumoniae</i> ssp. <i>pneumoniae</i> |
| Specimen no. 4 | <i>Enterobacter cloacae</i> <i>Klebsiella pneumoniae</i> ssp. <i>pneumoniae</i> |
| Specimen no. 5 | <i>Serratia liquefaciens</i> <i>Klebsiella pneumoniae</i> spp. <i>rhinoscleromatis</i> |
| <i>Periplaneta brunnea</i> | |
| Specimen no. 1 | <i>Acinetobacter calcoaceticus</i> var. <i>anitratus</i> <i>Klebsiella pneumoniae</i> ssp. <i>pneumoniae</i> |
| Specimen no. 2 | <i>Escherichia vulneris</i> |
| Specimen no. 3 | <i>Citrobacter diversus</i> / <i>amalonaticus</i> |
| <i>Periplaneta americana</i> | |
| Specimen no. 1 | <i>Escherichia adecarboxylate</i> <i>Citrobacter freundii</i> <i>Proteus vulgaris</i> |
| Specimen no. 2 | <i>Escherichia vulneris</i> <i>Klebsiella pneumoniae</i> ssp. <i>pneumoniae</i> <i>Klebsiella pneumoniae</i> ssp. <i>rhinoscleromatis</i> <i>Enterobacter agglomerans</i> 4 |

Acknowledgement. We gratefully acknowledge the support of our respective departments.

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