

Cockroaches in French Guiana Icteridae birds nests

by

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Abstract

We present here the cockroaches found in 55 nests of Icteridae birds in French Guiana in July 1998. Five species of cockroaches were found, *Schultesia nitor* (Zetoborinae), *Phoetalia pallida* (Blaberinae), *Pelmatosilpha guianae* (Blattinae), *Chorisoneura* n.sp. aff. *gatunae* (Pseudophyllodromiidae) and *Epilampra grisea* (Epilamprinae). The two dominant species, *S. nitor* and *P. pallida*, were found together in the same nests, and seem to be scavengers. The ecology of *S. nitor* was compared with those of *S. lampyridiformis*, a sister species found in the same type of habitat in Brazil.

Key words: **Bird nest, cockroach, *Schultesia*, Zetoborinae, *Phoetalia*, Blaberinae.**

Resumo

Apresentamos aqui as baratas encontradas em 55 ninhos de pássaros Icteridae na Guiana Francesa em Julho de 1998. Cinco espécies de baratas foram encontradas: *Schultesia nitor* (Zetoborinae), *Phoetalia pallida* (Blaberinae), *Pelmatosilpha guianae* (Blattinae), *Chorisoneura* n.sp. aff. *gatunae* (Pseudophyllodromiidae) e *Epilampra grisea* (Epilamprinae). As duas espécies dominantes, *S. nitor* e *P. pallida* foram encontradas juntas nos mesmos ninhos e parecem ser necrófagas. A ecologia de *S. nitor* foi comparada com a de *S. lampyridiformis*, uma espécie irmã encontrada no mesmo tipo de hábitat no Brasil.

Introduction

The ecology of non-domestic cockroaches is generally still poorly known, particularly for Neotropical families. In Neotropical rain forests, Blattaria species inhabit ground litter where they found abundant but scattered resources, and also patchy habitats like loose bark of dead or living trees, mould, tree holes, epiphytes, birds nests and ants nests (GRANDCOLAS 1998, 1999). There are very few records of cockroaches taken from nests of birds (ROTH & WILLIS 1960, ROTH 1973 and PEREIRA TORRES 2001 for South America, VIDLICKA 1999 for Europa). ROTH (1973) found 10 cockroach species in pendulous nests of *Cacicus* birds in a Brazilian tropical forest. He described a new species placed in a new genus, *Schultesia lampyridiformis*, whose male

genitalia supported its belonging to the Zetoborinae subfamily, but whose nondeplanate form and marked resemblance to winged adult fireflies separated it from other genera in this family. The genus *Schultesia* appeared to be specialised in pendulous nests of Icteridae birds because two species were found respectively in such nests, one in Brazil (*S. lampyridiformis*, ROTH, 1973) and the other in French Guiana (*S. nitor*, GRANDCOLAS 1993), and nowhere else since then. Recent investigations by Pereira Torres (2001) tend to confirm this fact, *Schultesia lampyridiformis* having been found in nests of the Icteridae bird *Psarocolius decumanus* but not in nests of eleven non-icterid bird species. The pendulous Icteridae nests are located in forest edges (HAVERSCHMIDT 1968), which are typically short-lived young environments (REMSEN & PARKER 1983).

The aim of this paper is to document the diversity of Blattaria species found in one colony of pendulous Icteridae nests in French Guiana and discuss their habitat preferences with a particular attention to *Schultesia* and *Phoetalia*.

Material and methods

Collecting was carried out during July 1998, at the end of the rainy season, when reproduction of birds was low, and in the middle of the day when cockroaches should be resting. The bird colony was settled on a big isolated *Terminalia guyanensis* tree EICHL., heavily covered with epiphytes and containing hundreds of nests of two species of Icteridae birds, the crested oropendola *Psarocolius decumanus* (PALLAS 1769) and the yellow-rumped cacique *Cacicus cela* (LINNE 1758). On a palm tree thirty meters away stood another colony of both species of birds, a much smaller and visibly newly settled group of seventeen nests. Both trees grew in a rather open area, near the French Guiana coast, close to the Counamama creek, emerging high over scrubby vegetation. Thirty eight nests were collected from the biggest colony, and 17 from the smallest colony, all hanging from the same branch or palm. The nests were individually packed in closed plastic bags and were soon carefully inspected, each cockroach found was measured (total length) and its species and sex identified. The content of each nest, besides cockroaches, was also noted.

The nests could be attributed to each of the two bird species because of their different structure. Nests of crested oropendola had their opening on top of the nest, while nests of yellow-rumped caciques had a lateral opening, about 15 cm below the top. Nests of both species were between 60 to 100 cm long, and had walls about 0.5 cm thick. They consisted of long and thin woven blades of grass. The bottom was framed with an accumulation of short blades of grass, about five cm thick, looking like a "nest in the nest". Some nests lacked this kind of thick bottom.

Results

The five species of cockroaches found in these nests were: *Epilampra grisea* DE GEER 1773 (Blaberidae, Epilamprinae), *Schultesia nitor* GRANDCOLAS 1991 (Blaberidae, Zetoborinae), *Pelmatosilpha guianae* HEBARD 1926 (Blattidae), *Chorisoneura* n.sp.aff. *gatunae* HEBARD 1921 (Pseudophyllodromiidae), and *Phoetalia pallida* BRUNNER VON WATTENWYL 1865 (Blaberidae, Blaberinae) (Table 1).

Among the 17 nests collected from the small colony, all were uninhabited by birds, but two of them contained a mouse nest (one with a pregnant female mouse of undetermined species). One yellow-rumped cacique nest contained one adult female of *Epilampra grisea*. One nest of crested oropendola contained a rotten egg, with maggots, and two adult males of *Schultesia nitor*.

Among the 38 nests collected from the largest colony, 13 were from crested oropendola, five of them contained cockroaches, and two of the latter contained also fragments

of rotten eggs and young birds dead a long time ago. The 25 other nests were from yellow-rumped cacique, ten of them contained cockroaches, and three of the latter contained fragments of addled eggs and old corpses of young birds, a fourth one containing fleshless remains of a dead adult bird with two eggs, all completely dried. Four species of cockroaches were found in this sample. First, two individuals of *Pelmatosilpha guianae* were found, one last instar nymph in a crested oropendola nest and one adult female in a yellow-rumped cacique nest, occurring in both cases with other species of cockroaches in the same nest. Second, *Chorisoneura* n.sp.aff. *gatunae* was found in one crested oropendola nest (six individuals together) and in six nests of yellow-rumped cacique (only one individual in each, and some oothecae attached to the walls of the nests). Although they were generally found in the same nests with other species of cockroaches (five observations out of seven), they did not occur on the bottom with the other species, but higher on the walls of the nests.

The third species, *Phoetalia pallida*, was found in one nest of crested oropendola and in four nests of yellow-rumped cacique, always in the bottom part of the nest and associated with individuals of *S. nitor*. The number of individuals found per nest was highly variable, respectively two nymphs; one nymph; four nymphs; one adult female with her 26 newly born first instar nymphs; and two adult females together with ten nymphs. In the latter case the ten nymphs were different sizes, ranging from 6 to 17mm, and thus could not come all from the same oothecae.

The fourth species, *S. nitor*, was found in five nests of crested oropendola and in nine nests of yellow-rumped cacique (thus this species was found in 37 percent of the nests from this big bird colony, and in all but one nests containing other cockroach species) (Table 1). The number of individuals per occupied nest was 2.6 ± 0.3 , with no significant difference between nests of crested oropendola and yellow-rumped cacique (Student t-test: $t = 1.17$, $P = 0.27$). Thirty five nymphs were found, whose lengths ranged from 5 to 14 mm. There was no difference in cockroach sex ratios between nests, with 1.4 ± 0.2 males and 1.1 ± 0.3 females in each nest (Student t-test: $t = 0.77$, $P = 0.45$). In most nests with three or more larvae, the high differences in length indicated that all the individuals could not come from the same oothecae. The smallest nymphs were generally found closer to the top of the nest than were the biggest ones. One adult male was found alone in a nest, and 1 adult female was found with two last instar nymphs.

The nest of yellow-rumped cacique containing remains of a dead female bird and two eggs contained the most cockroaches. Some *S. nitor* and *P. pallida* occurred completely inside the dry skin of the dead bird, and all of them were last instar nymphs. A Chi-square test showed that the cockroaches were significantly more numerous in nests containing remains of birds or eggs ($\chi^2_{(1)} = 13.12$, $P < 0.0001$). Nests without thick bottoms were empty of cockroaches.

Discussion

ROTH (1973) found cockroaches belonging to ten different species (and 6 different genera) in pendulous nests of *Cacicus* birds in Brazil. In our study, we found only five species belonging to five different genera, three of them different from those found by ROTH (1973). Only two genera, *Schultesia* and *Chorisoneura*, were found in both studies (Table 1).

We found two individuals of *Pelmatosilpha guianae* in nests of the largest bird

colony. *P. guianae* and other species of the same genus had already been found in epiphytic plants (ROCHA E SILVA & RODRIGUES LOPES 1976; DELEPORTE, GRANDCOLAS unpubl. data; DEJEAN pers. comm.), under loose bark and in decaying logs (ROTH & WILLIS 1960). In our study, the two *P. guianae* likely came from surrounding epiphytes, which were abundant in the *Terminalia* tree supporting the big bird colony and absent from the palm tree supporting the smaller one.

In our study, two species, *P. pallida* and *S. nitor*, seemed to be more abundant in the nests. Very little is known from other studies about *P. pallida*. GRANDCOLAS (1998) placed this species in the family Blaberinae, in a phylogenetically non resolved group with the genera *Hormetica*, *Parahormetica*, *Brachycola* and *Bionoblatta*. In this group, only the habitat of *Hormetica* is known and consists in epiphytes and palms, like that of the recently described *Lucihormetica fenestrata* ZOMPRO & FRITZSCHE, 1999. It is likely that *P. pallida* inhabits epiphytes and comes occasionally in *Cacicus* nests. Nothing is known about the social life or the anti-predator behaviour of *P. pallida*. Our data suggest that this species is gregarious, because all 46 individuals (among which 26 first instar nymphs) were found in only five nests among 55 inventoried ones. Moreover, more than one individual were found together even in nests lacking evident attractive food resources like remains of birds or eggs. The facts that significantly more cockroaches were found in nests with remains of birds or eggs, and that some individuals were found inside the remains of a dead bird indicate that this species could be a scavenger, occasionally found in *Cacicus* nests when they happen to offer some food resource, VIDLICKA (1999) found young larvae of two species of Ectobiinae cockroaches in birds nest in Slovakia and supposed that they looked for remains of bird food and probably protection during winter).

Little information is available about *S. nitor*. The description of the species was made from individuals collected with light traps. The only previous observations of *S. nitor* in its natural habitat were GRANDCOLAS (1993) and Deleporte (unpubl. data) who analysed respectively in July and September 1991 the content of pendulous nests (4 nests each time) from the same abandoned colony of *Cacicus haemorrhous* in French Guiana. The nests were located at ten meters height on an isolated tree and were empty of birds. No *S. nitor* were found on the surrounding epiphytes. Only one to two adult or larvae were found inside two of the four collected nests each time. The only other known species of the same genus, *S. lampyridiformis*, is morphologically very similar (GRANDCOLAS 1991) and colonises the same habitat, which seems specific to this genus. ROTH (1973) analysed the *S. lampyridiformis* individuals found in three colonies of *Cacicus* sp. birds and noted that most of the nests were apparently abandoned and a few had the remains of dead young birds. He concluded that the cockroaches were probably scavengers and may have inhabited the nests while the birds occupied the colony. ROTH (1973) found in the first colony 4 males, 8 females and 29 nymphs of *S. lampyridiformis* in one nest, one nymph alone in a second nest, four males, three females and seven nymphs in a third nest and six nymphs alone in a fourth nest. All of the nests containing *S. lampyridiformis* individuals contained also *Chorisoneura* sp. In the second colony, 5 males, 2 females and 19 nymphs of *S. lampyridiformis* were found in eight nests with three blattellid nymphs, one of them belonging to *Chorisoneura inversa* HEBARD. In the third colony (60 feet from the ground), in several nests two males, three females and one nymph of *S. lampyridiformis* were found with individuals of *Dendroblatta cnephaia* Hebard and *Chorisoneura* sp. ROTH (1973) concluded that

the bird nest habitat is undoubtedly a normal habitat for the genera *Schultesia* and *Chorisoneura*, which our study tends to confirm.

In conclusion, our new data about *S. nitor* suggest that the whole genus *Schultesia* is strictly linked to pendulous bird nests. Recent studies by PEREIRA TORRES (2001) tend to confirm this fact: non-icterid bird nests contained no *Schultesia* cockroaches but harboured different Epilampridae, Blattellidae, Pseudophyllodromiidae, Polyphagidae and Blattidae cockroaches, while one blattellid cockroach and 111 *Schultesia lampyridiformis* were found in icterid bird nests. Not only this habitat presents a particular physical structure (an interwoven network of grass fibres), but the nests systematically stand in isolated or emergent trees, being thus more exposed to climatic factors than comparable habitats standing inside the continuous forest canopy. Some strong morphological differences between *Schultesia* and other genera of the same lineage (GRANDCOLAS 1991) could be linked to the colonisation of this particular habitat. This is particularly likely for the slender general body shape and for the colour pattern: to the human eye, the light yellowish longitudinal stripes render the individuals difficult to discern among the interwoven fibres.

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Table 1: Cockroaches found in birds nests in our study and in that of ROTH (1973).

Our study

ROTH's study (1973)

Cockroach genera found in birds nests

Schultesia

Schultesia

Chorisoneura

Chorisoneura

Epilampra

Alphelixia

Pelmatosilpha

Amazonina

Phoetalia

Dendroblatta

Lophoblatta

Data concerning the genus *Schultesia* only

Small bird colony: 2 adult males.

First colony:

Large bird colony:

Nest 1: 4 adult males, 8 adult females,
29 nymphs.

- *S. nitor* was found in 37 % of the
38 studied nests.

Nest 2: 1 nymph.

- Total number of individuals:

Nest 3: 4 adult males, 3 adult females,
7 nymphs.

1 adult male, 1 adult female, 35 nymphs.

Nest 4: 6 nymphs.

- Mean number per nest: 2.57 ± 0.32 ind.,
 1.43 ± 0.23 males and 1.14 ± 0.30 females.

Second colony (8 nests): 5 adult males,

- Maximum number in a nest: 5 individuals.

2 adult females, 19 nymphs.

Third colony (several nests): 2 adult males,
3 adult females, 1 nymph.
