

ODONATE FAUNA OF CAMIGUIN ISLAND, THE PHILIPPINES

R.J. VILLANUEVA

Biology Department, Ateneo de Davao University, 8000 Davao City, The Philippines; – reaganjoseph@lycos.com

Abstract – An annotated checklist is provided of the 35 spp. (12 zygoptera, 23 anisoptera) so far recorded from Camiguin Island, which is situated between Mindanao and Bohol. Of these, 25 are new records for the island. Of special interest is the new *Amphicnemis braulitae* Villanueva, 2005.

Introduction

Camiguin is a small island province of about 70 000 inhabitants, situated between the islands of Bohol and Mindanao. Biogeographically Camiguin Island belongs to the Mindanao sub-region. It is composed of five municipalities. Rugged volcanic terrain comprises much of the (approximately) 240 km² area of the island. There are seven volcanoes, of which Mt Mambajao (1600 m), Mt Timpo-ong (1580 m) and Mt Hibok-hibok (1332 m) are the highest. The latter is also considered one of the most active volcanoes in the Philippines; its latest eruption took place in 1951.

The tropical island receives a regular heavy rainfall that provides an abundant supply of

water to the rivers and springs. However, many of these springs, and occasionally also rivers, become dry or form stagnant pools along their course, especially during the dry season in March-May. Nipa (*Nipa fructican*) swamps and rice paddies hold much of the coastal freshwater. Despite its small size, several endemic species of plants and animals have been discovered in the island, suggesting a very rich biodiversity. The presence of these endemic species is due to the fact that the island remained isolated even during the Pleistocene period, when the sea level was 120 m lower than at present (WILDLIFE CONSERVATION SOCIETY OF THE PHILIPPINES, 1997). This also suggests that there are still many undiscovered species present in the island, possibly also new odonates. So far, the study of the Camiguin odonate fauna has been very limited. Aside from a few specimens of two common species, *Pseudagrion pilidorsum* and *Neurothemis terminata*, collected by G. Boettcher in July 1916, no other data were available until Alex Buenafe visited briefly Mt Hibok-hibok and Mt Timpo-ong in May 1995, collect-

ing 9 species (HÄMÄLÄINEN & MÜLLER, 1997). The objective of this study is to contribute to the knowledge of the odonate fauna in Camiguin Island by providing an updated checklist of the species existing in the island.

Methods

Irregular samplings and observations were randomly conducted at different sites during the months March-May, October and December in 2000-2002 and March-May and October in 2003. These months fall in the school-breaks, allowing the author to visit Camiguin. Kati-bawasan Falls, Tuasan Falls and Binangawan Falls were visited only twice each, but the other sites were surveyed more regularly, especially the sites in Guinsiliban. The main sampling sites were Nipa swamps, rice paddies, lowland streams, creeks and rivers in the coastal area and waterfalls, streams and springs in the highlands. An overview of the major sampling sites is given below. Odonates were collected using an insect net. Captured insects were placed in paper envelopes, killed; some were 'acetoned' and others were air dried for preservation. Usually, individuals of the species previously recorded were released. Identification was based on the relevant publications on the Philippine Odonata or by reference specimens provided by Dr Matti Hämäläinen, who also confirmed some identifications.

Localities visited

Guinsiliban Municipality:

- Dawis [D]. Altitude: 3 m. A clear, slow moving stream less than one meter wide. It has rich vegetation of varying height with muddy substrate. Nipa palm grows in the lower portion of its course.
- Guinsiliban creek [GC]. Altitude: 4-8 m. A shallow lowland creek in which the water dried up along its course in most of the months except after heavy rains. The water is slow moving and more turbid than in the previous stream. Laundry and other waste materials are dumped in the lower portions of the creek. Its course is mostly exposed to sunlight with a sandy to rocky substrate except for some muddy areas.
- Lilob [L]. Altitude: 2 m. A Nipa swamp ap-

proximately less than 3 hectares in area. In its eastern part it is separated from the sea during high tides by a bar of sand and gravel. In north and south it is adjacent to rice paddies and is bordered by the provincial road in west. This swamp was not converted to rice paddy due to its deep water and thick Nipa growth. Aside from the Nipa plant, several species of grass, shrubs and trees also grow.

- Ma-ac creek [MC]. Altitude: 4-8 m. A shallow lowland creek, which drains into the sea. The water is relatively faster than GC and much clearer. Its course is the under shade of trees and bushes with a muddy substrate.
- Tubig Liong [TL]. Altitude: 3-6 m. A small, richly vegetated pond with some growing Nipa palms. It has clear water and a muddy substrate. Local people use this pond also for washing.

Sagay Municipality:

- Alangilan river [AR]. Altitude: 20-40 m. A shallow, slow flowing river and about 4 m at its widest point except during heavy rains where it can extend up to 7 m. It has clear water with a sandy to rocky substrate. Large portion of the riverbed is exposed to sunlight and only some portions are under the shade of trees.
- Pamunglo spring [PS]. Altitude: 40-80 m. A fast flowing montane spring about 2 m wide except in a pooled area where it can be much broader. The water is clear and relatively cool. It has a sandy or rocky bottom though some portions are muddy. Most of its course is under the shade of trees and big bushes as it descends downhill before it joins with the Sagay River.
- Binangawan Falls, I & II area [BF]. Altitude: 1000-1200 m. These two waterfalls are nearly a kilometer apart and the second one is approximately 40 m higher in altitude. Both have clear, cool water. The substrate is mostly sand and gravel. The surrounding area is rich in forest trees and vegetations. As a remote place, this area has remained undisturbed and is only used by hunters. No sampling was done upstream of the falls, and this area could contain in-

teresting unknown species.

C a t a r m a n Municipality:

- Sto. Niño Spring [NS]. Altitude: 100-200 m. This is a tourist site. The spring was dammed to form a large pool used for swimming.
- Tuasan Falls [TF]. Altitude: 300-500 m. A low waterfall with strong current. The area is still surrounded by relatively rich vegetation. It has a slightly wider stream than Katibawasan Falls with similar substrate. Sampling was limited only in the downstream direction.

M a m b a j a o Municipality:

- Katibawasan Falls [KF]. Altitude: 500-700 m. As the highest waterfall in Camiguin, this is a local tourist attraction. Rich forest vegetation covers the surrounding area. The water falls on a small man-made pool, then drains into a stream more than 1m wide. The substrate is mostly gravel and fine sand with several boulders scattered along the way. Sampling was limited to the downstream direction.

For an informative site map of Camiguin Island, see for instance the Philippine travel guide in the Lonely Planet series (book or internet).

Annotated list of species

Species recorded from Camiguin for the first time are asterisked (*). The total number of male (♂) and female (♀) specimens collected is presented after the species name.

Platystictidae

- *Drepanostica* sp. - 9 ♂, 1 ♀. - Sagay: BF; Catarman: TF
This undescribed species has already been listed from Mindanao and Camiguin by HÄMÄLÄINEN & MÜLLER (1997); the Camiguin material comes from Katibawasan falls (Dr M. Hämäläinen, pers. comm.). In Camiguin it occurs only in elevated areas. The preferred habitat is shaded areas rich in vegetation and with plenty of moisture. Individuals collected in TF are relatively smaller than specimens from BF.

Protoneuridae

- *Prodasineura integra* (Selys, 1882) - 4 ♂.
- Guinsiliban: GC, MC, L, TL; Sagay: AR, PS; Catarman: NS, TF; Mambajao:

KF

This is a common species, usually found along streams under the shade of trees or shrubs, though some are seen flying in open areas near or along the stream. Newly emerged individuals were seen during the entire study period suggesting that this species emerges all year round.

Coenagrionidae

- **Agriocnemis pygmaea* (Rambur, 1842) - 5 ♂, 4 ♀. - Guinsiliban: D, GC, L, MC, TL; Sagay: AR, PS; Catarman: NS, TF; Mambajao: KF
This common species seems to prefer both open and shaded areas and is sometimes observed away from a water source. Eggs are laid on mud with rich decaying vegetations.
- **Argiocnemis rubescens intermedia* Selys, 1877 - 7 ♂, 4 ♀. - Guinsiliban: GC, MC, T; Sagay: AR
Locally common; abundant during the summer season.
- **Ischnura senegalensis* (Rambur, 1842) - 1 ♂. - Guinsiliban: L, MC, GC; Sagay: AR
In similar habitats as *A. pygmaea*, but less abundant.
- **Amphicnemis braulitae* Villanueva, 2005 - 5 ♂, 3 ♀. - Guinsiliban: L
A new species described in VILLANUEVA (2005). This species was found only at one location. It tends to prefer cool, moist shady areas. This is a coastal species that prefers Nipa swamp as habitat. Some pairs in tandem were seen ovipositing in the moist mud.
- **Pseudagrion microcephalum* (Rambur, 1842) - 3 ♂, 2 ♀. - Guinsiliban: D, L, TL
This coastal species prefers sunny spots at sites with clear and clean water, whereas *A. pygmaea*, *I. senegalensis* and its congener *P. pilidorsum* can be found also in rather contaminated waters.
- *P. p. pilidorsum* (Brauer, 1868) - 4 ♂, 2 ♀.
- Guinsiliban: D, GC, MC, TL; Sagay: AR, PS; Catarman: NS, TF; Mambajao: KF

A common species with a wide range of habitats ranging from cool shady forested areas in mountains to exposed open low-

land ones. Newly emerged individuals were seen during the entire study period suggesting an all-year flight season. The oviposition behavior is very interesting. The pair in tandem settles on exposed substrate, usually a projecting stem of water plants. The female immerses its appendage and deposits her eggs on the underside of the leaves of aquatic plants. The female then submerges itself completely after exhausting the available area and then finally drags the male underwater and keeps on laying eggs. This may last for up to five minutes.

Platycnemididae

- *Risocnemis appendiculata* (Brauer, 1868) – 7 ♂, 1 ♀. – Catarman: TF

This species was listed from Camiguin by HÄMÄLÄINEN & MÜLLER (1997), based on a female specimen collected at Katibawasan falls by A. Buenafe on 22-V-1995 (Dr M. Hämäläinen, pers. comm.). It is relatively common in TF, coexisting with *Drepanostica* sp. though the latter prefers to perch in shady areas just less than 30 cm from the ground.

Chlorocyphidae

- *Cyrano angustior* Hämäläinen, 1989
I did not find this species listed from Camiguin by HÄMÄLÄINEN & MÜLLER (1997). According to Dr M. Hämäläinen (pers. comm.), a male was collected at Katibawasan falls by A. Buenafe on 22-V-1995.
- **Rhinocypha colorata* (Hagen in Selys, 1869) – 8 ♂, 5 ♀. – Sagay: PS, AR; Catarman: NS, TF

This is a common chlorocyphid in the island. It has a much larger range of habitats, from “open” river to a shady spring than its congener *R. turconii*. There are two prominent variations present in the island. The first form is the typical variant seen in Mindanao and relatively larger. It is mostly found in well-lit areas. In the second variant, both wings of males have the typical metallic color in the apical part but the color in the forewing starts at the level of 7-10 cells distal to nodus. The apices of the convex shaped darkening in the hindwing extend to the level of the nodus or 1-2 cells proximal to it. The abdomen is en-

tirely black in the dorsal portion and lacks the small, paired basal spots mentioned by ASAHINA (1968). Among females of the second form, two variants are observed, one of which has hyaline wings and the other has shading on the sub-apical region of the hind wings. This variant prefers a shaded habitat.

- *Rhinocypha turconii* Selys, 1891 – 2 ♂. – Sagay: BF; Mambajao: KF

This species occurs in streams and springs in Mt. Timpo-ong and Mt. Mambajao areas. Based on observations both in Camiguin and Mindanao, *R. turconii* seems to prefer a much cooler montane environment than *R. colorata*, which exists in a broader range of habitat.

Corduliidae

- **Heteronaias heterodoxa* (Selys, 1878) – 3 ♂. – Sagay: BF

Prefers flying under the mist of the waterfall, but some individuals are observed also at small springs and pools. The Camiguin specimens are relatively smaller in size than those from Mindanao.

Libellulidae

- **Acisoma p. panorpoides* Rambur, 1842 – 1 ♂, 2 ♀. – Guinsiliban: L

A common species in rice fields and open grassy areas. Stays close to the ground surrounded by rich vegetation.

- **Agrionoptera insignis* (Rambur, 1842) – 3 ♂. – Guinsiliban: MC, GC, L; Sagay: AR, PS

A scarce species, usually found in shaded areas. Several males were seen far from a permanent water source, guarding a small pool of rainwater on rocks.

- **Brachydiplax c. chalybea* Brauer, 1868 – 8 ♂. – Guinsiliban: MC

This species was found only along a shaded stream, where it was the dominant species. Based on observations in Mindanao, this habitat is unusual. Males were seen along stream bank guarding their territories, while the females perched high on tree branches.

- *Diplacina bolivari* Selys, 1882 – 7 ♂, 2 ♀. – Guinsiliban: GC, MC; Sagay: PS, AR, BF; Catarman: NS, TF; Mambajao: KF

- A common species, rather variable in size.
- **Diplacina braueri* Selys, 1882 – 3 ♂, 1 ♀.
– Guinsiliban: GC; Sagay: AR
A common species in Sagay (AR). Some specimens are slightly larger than those from Mindanao.
 - **Diplacodes trivialis* (Rambur, 1842) – 5 ♂, 1 ♀. – Guinsiliban: D, GC, L, MC, TL; Sagay: AR, PS; Catarman: NS, TF
A common species.
 - **Lathrecista asiatica* (Fabricius, 1798) – 3 ♂. – Guinsiliban: GC, L; Sagay: AR
Locally common; very abundant during October and May.
 - **Macrodiplox cora* (Brauer, 1867) – 2 ♂, 1 ♀. – Guinsiliban: L
This tends to prefer coastal areas. However, since only juveniles of both sexes were seen, it is possible that mature individuals may go beyond the coastal habitat. Observations in Mindanao show that *M. cora* prefers open, windy areas.
 - **Neurothemis r. ramburi* (Brauer, 1866) – 7 ♂, 2 ♀. – Guinsiliban: D, GC, L, TL; Sagay: AR, PS; Catarman: NS, TF; Mambajao: KF
A more widespread and abundant species than *N. t. terminata*. There are several male wing color variants, ranging from the one described by NEEDHAM & GYGER (1937) to those that have hyaline wings at the edges extending as far as the angle of the wing base. Variation in size and details of wing venation is also observed.
 - *N. t. terminata* Ris, 1911 – 4 ♂. – Guinsiliban: GC, TL
Locally common
 - **Orthetrum pruinosum delia* (Selys, 1878) – 2 ♂, 1 ♀. – Guinsiliban: TL, L, GC, MC; Sagay: AR, PS; Catarman: NS
This species tend to be abundant in some areas. It is usually found in open areas near a body of water with a muddy substrate surrounded by rich vegetation.
 - **O. s. sabina* (Drury, 1770) – 3 ♂. – Guinsiliban: D, GC, MC, L, TL; Sagay: AR, PS; Catarman: NS, TF; Mambajao: KF
This is the most common anisopteran species in Camiguin, found both at water bodies and on dry land. Specimens from elevated localities tend to be slightly smaller than those in lower areas.
 - **O. t. testaceum* (Burmeister, 1839) – 1 m.
– Guinsiliban: GC
Rare species; only one specimen was seen.
 - **Pantala flavescens* (Fabricius, 1798) – 2 ♂. – Guinsiliban: GC, TL, D, MC; Sagay: AR, PS; Catarman: NS, TF
Common species occurring in large numbers from August to October. They prefer a wide range of water source from clear running water to pool of rainwater in the streets.
 - **Potamarcha congener* (Rambur, 1842) – 2 ♂, 1 ♀. – Guinsiliban: GC, L, MC, TL; Sagay: AR, PS; Catarman: NS
This is a common species. Some individuals are found in the habitat preferred by *M. cora*.
 - **Raphismia bispina* (Hagen, 1867) – 2 ♂, 2 ♀. – Guinsiliban: D, L
Occurs in the same swampy habitat as *Amphicnemis braulitae*, but is less restricted in its niche requirements there. Some individuals were observed flying in open well-lit areas, away from its usual shady perching grounds.
 - **Rhyothemis phyllis subphyllis* Selys, 1882 – 1 ♂. – Guinsiliban: GC
Rare species. Only one male was seen during the entire study period.
 - **Tholymis tillarga* (Fabricius, 1798) – 1 ♂, 1 ♀. – Guinsiliban: GC, L, TL, MC; Sagay: AR; Catarman: TF
Common species, which is active during early morning and late afternoon. There seems to be two wing color variants in both sexes, those found in forested areas have lighter wing markings compared with those observed in open areas.
 - **Tramea transmarina euryale* (Selys, 1878) – 1 ♀. – Guinsiliban: GC
Rare species. Only one female was captured while ovipositing on the surface of a pond with abundant algal growth.
 - **Trithemis aurora* (Burmeister, 1839) – 3 ♂, 2 ♀. – Sagay: AR, PS; Mambajao: KF
Locally common. Activity starts at 8 am and reaches its peak by 11 am. Several

males are still observed flying as late as 4 pm when most other odonates in the area start to perch for the night.

- *T. festiva* (Rambur, 1842) - 5 ♂, 3 ♀. - Guinsiliban: D, GC, MC; Sagay: AR, PS, BF; Catarman: NS, TF; Mambajao: KF
Common and more widespread than its congener. Activity is observed at the same time of day as in *T. aurora*. Usually, only two to three *festiva* males are seen "chasing" each other, but in *T. aurora* more than five males.
- **Zygomma petiolatum* Rambur, 1842 - 3 ♂, 1 ♀. - Guinsiliban: GC, L
Locally common species, which prefers stagnant water with a muddy substrate and plenty of vegetation. It is observed only during late afternoon around 5-6:30 pm, when it is difficult to spot due to dim light and its very fast flying pattern.

Discussion

This collection has considerably increased our knowledge of the odonate diversity of Camiguin Island, Philippines. The number of known species has grown from 10 to 35, representing 28 genera. Undoubtedly some other species will be discovered, when the remaining potential habitats are surveyed. Among the species listed by HÄMÄLÄINEN & MÜLLER (1997), only one - *Cyrano angustior* - remained uncollected during this study. With the exception of the corduliid *Heteronaias heterodoxa*, all recorded anisopteran species are libellulids. However, the discovery of a few species from the other families, especially aeshnids, is to be expected in the future.

Among the libellulids collected some species were found to be restricted to a few specific sites; while others are widely distributed. This is an interesting point to be investigated since some of these restricted libellulids occur in more diverse habitats in Mindanao. A rough distributional pattern of zygopterans can already be drawn from the present collection. It can be seen that some species like *Amphicnemis braulitae* (which is discussed by VILLANUEVA, 2005) and *Pseudagrion microcephalum* are limited to the coastal areas. The restricted distribution of *P. microcephalum* to coastal areas is

striking since it can be found in upland areas in Mindanao. *Rhinocypha* species are well distributed but do not extend to coastal areas, though *R. turconii* is restricted to forest habitat. *Agriocnemis pygmaea* and several other species cover a wide range habitat, from coastal to upland areas, but do not occur in primary forest areas, such as the Binangawan Falls area.

Most of the species are present all year round, though the numbers may vary from one season to another. This seasonal population variation is most striking in *Pantala flavescens* and *Argio-cnemis rubescens intermedia* of which conspicuous numbers are observed in some seasons.

In conclusion, though our knowledge of the odonata fauna of Camiguin Island has increased, there is still much to be learned on the distribution pattern, ecology and biology of different species. The rapid conversion of suitable Odonata habitats for human use makes these studies urgent.

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