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A brief odonatological survey in Palawan and in Cuyo Island, the Philippines

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Abstract

An odonatological survey, based on sighting and photographic documenting, was conducted in Palawan and in Cuyo Island. Ten species were found in Cuyo Island raising the number of known species from five to eleven. There are six additions to the Cuyo Island fauna: *Agrion f. femina*, *Ischnura senegalensis*, *Pseudagrion microcephalum*, *Brachydiplax c. chalybea*, *Neurothemis fluctuans* and *Neurothemis t. terminata*. The occurrence of *Coeliccia boettcheri*, known from Cuyo, but not recorded during this survey, is discussed in some detail. Forty species were recorded in Palawan. Four new additions to the Palawan fauna were recorded: *Lestes p. praemorsus*, *Pseudagrion microcephalum*, *Xiphiagrion cyanomelas*, and *Anax guttatus*. *Neurobasis daviesi*, a rare calopterygid damselfly endemic in Palawan, was encountered at the northern side of Cleopatra Needle during the survey.

Key words: Odonata, Cleopatra's Needle Forest Reserve, Puerto Princesa.

Introduction

Hämäläinen & Müller (1997) published the latest overview of the Philippine Odonata. They provided lists of species collected by Roland Müller himself or his collaborators and included previous publications by various authors. A total of 78 species was listed for Palawan Island and five species for Cuyo Island, and 92 species for the entire Palawan faunal region. Since this synopsis several papers has been published, adding new Odonata records for the Palawan region. Villanueva & Cahilog (2013) listed 41 species from Balabac Island, the southernmost island of the Palawan region. Villanueva (2012) described *Diplacina paragua* from eastern central Palawan. Gassmann & Hämäläinen (2008) described *Asthenocnemis linnaei* from Dumaran Island. Van Tol (2005) described *Drepanosticta paruatia* and *D. quadricornu* from Palawan. Dow & Orr (2012) transferred *D. paruatia*, to their newly erected genus *Telosticta*. The Palawan faunal region, despite being extensively studied, still has a lot of areas that remain poorly explored for Odonata; this applies also to the main island of Pala-

wan. The present survey is conducted to fill gaps from this areas and to revisit previously explored sites that have been degraded to assess the extent of diversity change.

Methods

The second author (HC) traveled to Palawan from Davao City on November 30, 2014. He then stayed for ten days in Palawan and explored Cuyo for five days. He visually surveyed the research site of the third author In eastern mangrove swamp of Puerto Princesa City. Odonata fauna in the area was not very rich comprising mostly oriental species and species expected to be present were not found.

HC and third author then moved to the research site of the fourth author in the western flank of Cleopatra's Needle. The fourth author has been active in the move for the protection of this mountain for several years already; he previously recorded several species including the elusive *Neurobasis daviesi* in 2010 in around Port Barton. Cleopatra's Needle is the highest mountain in the north of the island. The 38,693-hectare Cleopatra's Needle Forest Reserve (see Fig. 1) is part of the Cleopatra's Needle Mountain. The survey was limited around the camp in the lowland sections of the mountain. Stretches of Cabuyao, Nagmatong River and Magbabaw rivers were explored. There was recent strong flooding and riverine species were not so abundant. The largest part of the mountain remained unexplored. It is unfortunate that the collecting permit being requested by the third and fourth author from the authority did not arrived during the fieldwork period. Thus, all species were observed using visual detection

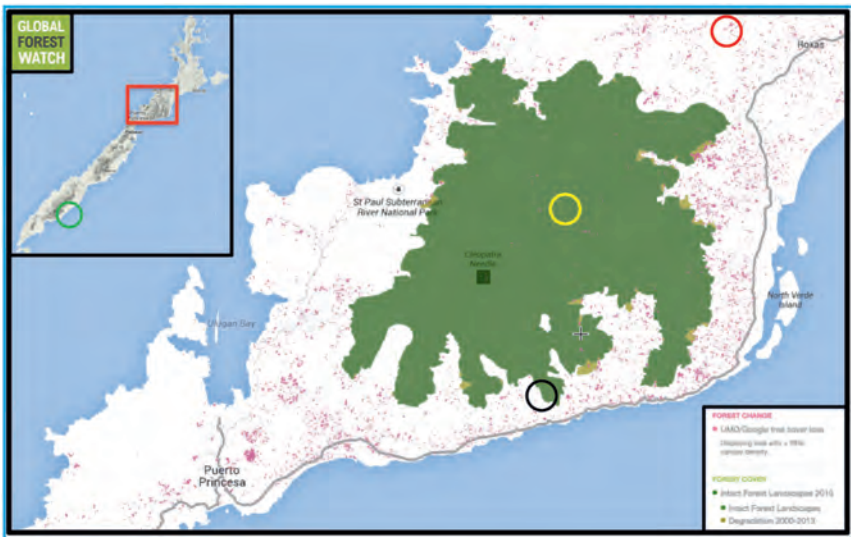


Figure 1: Cleopatra's Needle Forest Reserve with localities of *Neurobasis daviesi* (map taken from <https://mongabay-images.s3.amazonaws.com/14/1030-large-pal-intact-map.png>. For an additional map see Appendix.

methods only. Instead of voucher specimen, high resolution photographs were taken for further analysis of specimens in the laboratory. No specimens were taken from their habitat.

Annotated list of species

Locations and dates are given as follows: [C: Cuyo Island (December 11-15), P1: Palawan Island (Puerto Princesa: November 30 - December 2), P2: Palawan Island (Cleopatra's Needle: December 3 - December 10); *new island record]

Calopterygidae

Neurobasis daviesi Hämäläinen, 1993 [P2] (Figure 2)

This rare Palawan endemic species has earlier been recorded only from two locations: Brooke's Point (type locality, green circle in Fig. 1) in south Palawan and in Matalangao River (red circle in Fig. 1), between Roxas and Port Barton in central Palawan (Hämäläinen 1993, Orr & Hämäläinen 2007) which is located north east of Cleopatra's Needle. Sometime in 2010 the fourth author while doing ocular survey in the eastern flank of Cleopatra's Needle around Tanabag (black circle in Fig. 1), he found a good number of individual flying around.

The species was found on both Nagmatong and Magbabaw rivers (yellow circle), both part of headwater of Layongan River. However, the species is likely to be



Figure 2: *Neurobasis daviesi*.

present also in Cabuyao but was not found due to heavy flood affecting the explored part of the river. There were more than a couple dozen individuals seen along the entire stretch of surveyed river.

Chlorocyphidae

Rhinocypha humeralis Selys, 1873 [P2]

Euphaeidae

Cyclophaea cyanifrons Ris, 1930 [P2] (Figure 3)



Figure 3: *Cyclophaea cyanifrons*.

Lestidae

Lestes p. praemorsus (Selys, 1862) [*P1]

This species is widely distributed in the Philippines. It occurs in forested swamps to open grassy drenches in agricultural areas. Based on the available materials in the first author's collection, there are distinct geographical morphological variations noted for this species. Further study is needed to elucidate the proper placement of these variants.

The Philippine archipelago is inhabited by three *Lestes* species (see Hämäläinen & Müller 1997: *Lestes concinnus* Hagen in Selys, 1862, *L. p. praemorsus*, *L. quercifolia* (Selys, 1878). Hitherto, for the Palawan region, only *Lestes quercifolia* (Selys, 1878) - occurring at the island of Balabac - was known.

Platycnemididae

Asthenocnemis stephanodera Lieftinck, 1949 [P2]

Coelliccia boettcheri Schmidt, 1951 [P2]

Coelliccia palawana Lieftinck, 1940 [P2]

Coelliccia weneri Lieftinck, 1961 [P2]

Coelliccia sp. [P2]

There is a need to study the taxonomic details in *Asthenocnemis* and *Coelliccia* populations represented in the Palawan faunal region. Currently several new undescribed species from these genera are known and await description.

Prodasineura palawana Lieftinck, 1948 [P2] (Figure 4)

This species is the most abundant *Prodasineura* in the Palawan region. It can be found in partly disturbed partly pristine flowing fluvial systems. However, this species is rarely encountered in swampy areas unlike the undescribed species mentioned below.



Figure 4: *Prodasineura palawana*.

Prodasineura sp. n. [P2]

Presently the first author has examined undescribed species from this genus collected in Palawan based on the collections present in NCB-Naturalis, Leiden, Netherland and V.P. Gapud, University of the Philippines, Los Banos Campus. The present population is clearly distinct from *Prodasineura palawana* and the ad-

ditional two undescribed species in the authors collection by having a broad orange antehumeral stripe at thorax.

Hämäläinen & Müller (1997) mentioned a new species from Palawan. Further study is needed to check if the said population refers to the one mentioned.

Coenagrionidae

Agriocnemis f. femina (Brauer, 1868) [*C, P1, P2]

Archibasis viola Lieftinck, 1949 [P2]

Argiocnemis rubescens intermedia Selys, 1877 [P1, P2]

Ischnura senegalensis (Rambur, 1842) [*C, P1]

Pseudagrion microcephalum (Rambur, 1842) [*C, *P]

Pseudagrion p. pilidorsum (Brauer, 1868) [P1, P2]

Stenagrion petermilleri Hämäläinen 1997 [P2]

The species was described from material collected in Port Barton (Hämäläinen, 1997). However during the time of description the female sex of the species remained unknown hence was not described.

Teinobasis rubricauda Lieftinck, 1974 [P2] (Figure 5)



Figure 5: *Teinobasis rubricauda*.

Teinobasis samaritis Ris, 1915 [P1, P2]

Xiphiagrion cyanomelas Selys, 1876 [*P2]

This is the first record of this species in Palawan region, while the taxon is widely distributed in the Philippine archipelago and found in almost all faunal regions now except Mindoro. It can be seen in forested streams to lakes. In Palawan, it was found in a swampy pond at the edge of the forest.

Gomphidae

Ictinogomphus decoratus melaenops (Selys, 1858) [P2] (Figure 6)

Based on literature (Hämäläinen & Müller, 1997) and the database of the Roland Müller Philippine Odonata collection (provided by Matti Hämäläinen to the first author), there are only three specimens of this species known from the Philippines, one from northern Palawan and two from Dumaran Island.



Figure 6: *Ictinogomphus decoratus melaenops*.

Aeshnidae

Anax guttatus (Burmeister, 1839) [*P2]

This species has a wide distribution in the archipelago. The present finding in Palawan finally expands the distribution to all faunal regions of the Philippine archipelago.

Macromiidae

Epophthalmia v. vittigera (Rambur, 1842) [P2]

Synthemistidae

Macromidia asahinai Lieftinck, 1971 [P2]

Libellulidae*Agrionoptera insignis* (Rambur, 1842) [P1, P2]*Brachydiplax c. chalybea* Brauer, 1868 [*C]*Diplacina paragua* Villanueva, 2012 [P2] (Figure 7)

This species was described from materials collected in eastern central Palawan. Previous trips by the authors in the south and northern part of the island did not reveal this species. Finding of this species in Cleopatra's Needle represents the first record of this species from the northern part of island. There is a need to investigate the phenology of the species considering only two individual were found on this trip while it was so abundant when the type materials were collected.



Figure 7: *Diplacina paragua*.

Diplacina sp [P2]

The Müller collection include specimen of this population collected both in the south along Quezon, and in the north up to the island of Coron. This species clearly differs from *D. paragua* by having a lateral yellow streak on the abdomen. This character makes it closer to *D. bolivari* Selys, 1882 (occurring on most of the Philippine islands), *D. braueri* Selys, 1882 (likewise known from most of the Philippine islands) and *D. holgerhungeri* Villanueva, 2012 (Polillo Is.). Comparison with known species is highly needed to confirm the taxonomic identity of the present population.

Diplacodes trivialis (Rambur, 1842) [C, P1, P2]*Hydrobasileus croceus* (Brauer, 1867) [P2]*Lathrecista asiatica* (Fabricius, 1798) [C, P2]*Neurothemis fluctuans* (Fabricius, 1793) [*C]*Neurothemis* f. *terminata* Ris, 1911 [*C, P1]*Orthetrum chrysis* (Selys, 1891) [C]*Orthetrum* s. *sabina* (Drury, 1770) [C, P1, P2]*Orthetrum* f. *testaceum* (Burmeister, 1839) [P1, P2]

Raphismia bispina (Hagen, 1867) [P1]

Rhyothemis phyllis subphyllis Selys, 1882 [P2]

Rhyothemis triangularis Kirby, 1889 [P2]

Tetrathemis i. irregularis Brauer, 1868 [P2]

Tramea transmarina euryale (Selys, 1878) [P2]

Trithemis aurora (Burmeister, 1839) [P2] (Figure 8)

Zyxomma obtusum Albarda, 1881 [P2]



Figure 8: *Trithemis aurora*.

Remarks for Cuyo Island

The present survey significantly improved our knowledge of the Odonata fauna of Cuyo Island. Previous data from Cuyo Island give only five species (Hämäläinen & Müller, 1997); the present data increase the known species to eleven. Based on the Roland Müller database of Philippine Odonata (provided by Matti Hämäläinen to the first author), a single male *Coelliccia boettcheri* from Cuyo was collected in Mt. Bonbon, Rizal. It is interesting to note that the site presently harbours no present Odonata population at all. Although the said area still contains good tree cover and is locally protected as a watershed, the park's caretaker had meticulously cleaned the ground vegetation. This is a good point to emphasize the value of understory vegetation for the local insect population.

Presently there is a need to revisit the island during the rainy season to check the presence of more elusive species. It is also important to explore more sites to check the presence of *Coeliccia boettcheri* which was recorded in the island nearly two decades ago. This species thrives in shady forested fluvial ecosystem, a habitat type that is scarce to find in small karstic islands, and highly valued by human community for freshwater supply. Otherwise this would be another example of an island extinction of Odonata in the Philippines.

Remarks for Palawan Island

Despite being one of the more extensively studied islands in the Philippine archipelago for Odonata, four (*Lestes p. praemorsus*, *Pseudagrion microcephalum*, *Xiphagrion cyanomelas*, *Anax guttatus*) additional island records could be contributed during the short visual survey. This suggests that more species are expected to be found once poorly explored sites in the island are surveyed.

This study demonstrates the potential of visual survey on Odonata study. It however has limitation on those species that need closer examination.

Acknowledgement

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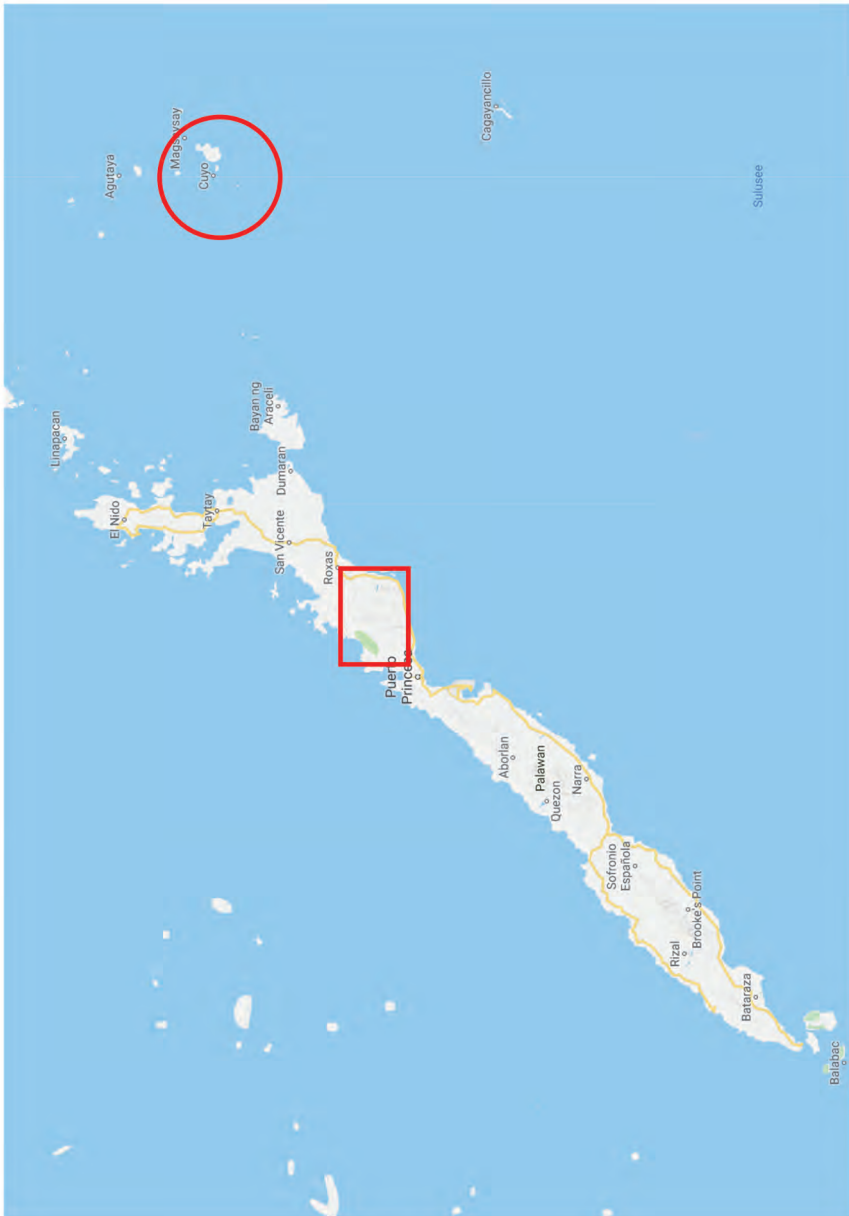
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Appendix



Map of Palawan. Red circle: Cuyo-Island. Red square: Puerto Princesa and Cleopatra's Needle Forest Reserve regions. (Cartography: Google Maps)

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Reference cited in the text should read as follows: Tillyard (1924), (Tillyard 1924), Swezey & Williams (1942).

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Tillyard, R., 1924. The dragonflies (Order Odonata) of Fiji, with special reference to a collection made by Mr. H.W. Simmonds, F.E.S., on the Island of Viti Levu. Transactions of the Entomological Society London 1923 III-IV: 305-346.

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the 1990s, the number of people who have been employed in the public sector has increased in almost all countries.

There are a number of reasons for the increase in public sector employment. One of the main reasons is the increasing demand for public services. As the population ages, there is a need for more social security and health care services. In addition, there is a growing demand for education and infrastructure services. Another reason for the increase in public sector employment is the expansion of the welfare state. Many countries have implemented policies that have led to an increase in public sector employment, such as the creation of new public services and the expansion of existing ones.

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