Some additional records to the inventory of dragonflies and damselflies (Odonata) in Andalas University’s Limau Manis campus complex, Padang, West Sumatra

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Abstract. Since the last publication of the inventory list for dragonflies and damselflies within the boundary of Andalas University’s Limau Manis Campus Complex, Padang, in 2018, the study has been continuously conducted. In this study we add five new species of Odonata for Andalas University’s Limau Manis Campus Complex, with one species Drepanosticta cf. bispina requires further investigation and elaboration on its existence in West Sumatra. We also corrected the identification of Heliocypha fenestrata into H. angusta angusta. With this addition, Andalas University’s Limau Manis Campus Complex currently resides for 32 species and 9 families of Odonata, increasing from previously 27 species and 8 families.

Keywords: damselflies, dragonflies, Drepanosticta cf bispina, Heliocypha angusta angusta, H. fenestrata,

INTRODUCTION

The study on odonates in Oriental region requires an ongoing effort to reveal its actual diversity. This region is among those indicated as the most diverse area for odonata along with Australasian and Neotropical regions [1]. Sumatra becomes part of Oriental region which now facing serious threats from mainly deforestation, land-shifting and other human-related disturbances [2]. The dragonflies and damselflies are fragments of biodiversity components that severely impacted and experience loss at local, national and regional levels [3,4].

Sumatran odonates were historically studied by European researchers during the period of Dutch colonials started at around early 19th century [5], up until mid 1950s [6]. There is around 50 years gap between the last comprehensive odonata survey to the current time in Sumatra. Hence, every effort to list odonate diversity is considered valuable for the development of Indonesian odonatology. Following the publication of odonata inventory from the surrounding of Andalas University in Limau Manis Padang [7], the survey efforts have been consistently performed to exhaustedly reveal the actual diversity in this area. Therefore, in this article we provide a worthy update to the odonata inventory list from Andalas University’s campus complex as part of efforts to continuously explore Sumatran odonata diversity.

METHODOLOGY

We keep the consistency in using photographical method to survey the odonata in the Andalas University’s Limau Manis Campus Complex (hereinafter Unand’s LMCC) [7]. Nikon Coolpix P900 set on macro mode and fine resolution (4608x3456) is used to take pictures, or else the camera embedded in handphone Vivo V9 series would be the replacement. Incidental observation was conducted whenever dragonfly or damselfly encountered outside the observation period.

The survey was conducted sporadically between March 2018 until June 2019, located in similar sites with previous study [7]. Species identification was consulted to proper odonata guide books for the area [8, 9, 10], complemented by advice from odonata experts and online sources.

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Table 1. Some additional records of Odonata in Andalas University’s Limau Manis Campus Complex

| No | Suborder/Family | Species | Habitat |
|----|----------------|---------|---------|
| A  | ZYGOPTERA       |         |         |
| 1  | Platystictidae  | Drepanosticta cf. bispina Fraser 1932 | Shaded river |
| 2  | Platycnemididae | Pericnemis stictica Hagen in Selys, 1863 | Forest |
| B  | ANISOPTERA      |         |         |
| 3  | Aeshnidae       | Anax guttatus (Burmeister, 1839) | Forest edge |
| 4  | Macromiidae     | Macromia westwoodi Selys 1874 | Anthropogenic area |
| 5  | Libellulidae     | Zyxomma petiolatum Rambur 1842 | Anthropogenic area |

RESULTS AND DISCUSSION

New species observed for Unand’s LMCC area
During the period of a year after the first odonata inventory published, there are five additional species recorded from Unand’s LMCC area (Table 1). These species consist of two zygopterans and three anisopterans. Platystictidae is a new family recorded in Unand’s LMCC, represented by a single species *Drepanosticta cf. bispina*. The other four species belong to families that have been previously recorded in this area. Therefore, this addition increased the number of species into 32 species with 9 families. Further detail is given on these additional species.

*Drepanosticta cf. bispina* Fraser 1932.
This species was seen once on 16 February 2019, represented by a female individual observed on the bank of a forested stream. The individual flew slowly in vertical manner. It has striking elongated abdominal, easily seen from afar. The prothorax whitish, synthorax glossy black, mesepimeron black with single whitish band. Abdomens brown with lighter basal ring on each segment. The processes on prothorax unclear. Wings clear with dark and square pterostigma.

The identity of this peculiar damselfly was thought to be *D. bispina*, the only member of this genus ever recorded from this area. Flight behavior, habitat preference and morphological characters helped in pointing to the possibility of this species. A single holotype specimen, female, was collected from West Sumatra in 1923 [6, 11]. The scanned image of this specimen can be seen at virtualcollections.naturalsciences.be/virtual-collections/entomology/odonata/coenagrionidae/drepanosticta-bispina-fraser-1932 for further reference.

*Pericnemis stictica* Hagen in Selys 1863
A teneral female was observed on 13 June 2019 at the forest near small stream behind Unand’s LMCC. Soft wing, tender body and moisture appearance indicate that this individual has just emerged from its aquatic nymph stage. Abdominal segments of this species remarkably elongated, dark in color with no prominent basal rings. Prothorax buff, mesepimeron dark brown with a paler band on rear, border with much paler synthorax. White pterostigma indicates this individual as a female of the species.

*Pericnemis* is Sundaland typical damselfly with 7 known species with probably many forms yet undescribed from Philippines [12]. It is widely distributed in the region, but considered as scarce in Singapore [13, 14]. It is also known to breed within the holes on tree bark or other natural cavity filled with water [14].

*Anax guttatus* (Burmeister, 1839)
A male individual was observed perching on the morning of 19 February 2019 within the biology students’ fieldwork camp located at the forest edge behind the Unand’s LMCC. It is a large and stout dragonfly, green on eyes and thorax with second and third segment of abdomen bright blue. The rest of abdominal segments are black, with lateral brown dots on each side.
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It is quite difficult to take the picture of this dragonfly during its active time on daylight, as it flies fast, almost non-stop, across the water surface [8]. Male *Anax guttatus* is known for being sexually matured during the last stage of nymph as well as being protective for its mate during mating and egg-laying process [15, 16]. In Unand’s LMCC, this species can be seen infrequently hovers above the sizeable pools and ponds.

*Macromia westwoodi* Selys 1874.
A headless male individual was found in the Faculty of Mathematics and Natural Sciences’ mosque, during the overcast day on 12 September 2018. It might be interested to indoor lighting before fell prey to the house lizard. Although headless, the intact body is still sufficient for the identification process. It has emerald green on overall thorax. Dorsum and lower rear of mesepimeron with a yellow band, which also exist in the middle of synthorax. Abdomen is also in emerald green, the base of seventh segment with a yellow basal ring. A yellow spot may present on the ventral of segment eight. The terminal segments of abdominal form spear-like construction, swollen mostly on segment nine and gradually shrink to the end. Wing clear with slight brownish wash, pterostigma dark or black.

This dragonfly species is the dweller of forested rivers in Southeast Asia. It has small population and locally rare [17, 18].

*Zyxomma petiolatum* Rambur 1842
A couple of individuals entered the building as this dragonfly attracted by the lighting. It has slim body shape, thinner than *Z. obtusum* which also recorded in this area [7]. The body generally browns in colour but paler on most parts of thorax. Eyes green. Wing with brown wash. It is a crepuscular insect which active during dusk, morning or afternoon [18].
Species Identification Revision
In the previous study in Unand’s LMCC area [7], we identified a small-metallic color damselfly from Chlorocyphidae as *Heliocypha fenestrata* (Burmeister 1839). This identification may seem not correct as *H. fenestrata* is not confirmed its existence from Sumatra. We use information on this small number and limited-distribution genus provided in a recent publication [19] to reassess the morphological characters appeared in the species pictures in order to identify the species. Colour pattern on wings and thorax are reliable characters to separate species or subspecies.

**Figure 6.** Male *Heliocypha angusta angusta* (top) and female individual (bottom)

Wings on Unand’s LMCC photo specimens are slender and slightly pointed terminally. The opaque area on wing limited around terminal portion. The iridescent marks arranged in the last third portion of hindwing. Thorax with extensive pale marking; bright blue on synthorax and pinkish on mesepimeron of males, and yellowish on females. These characters are in line with those described for *Heliocypha angusta angusta* (Hagen in Selys, 1853), in addition to the known geographical limitation for this species [19, 20]. With this revision, we corrected the identification of this species with appropriate taxonomy.

The addition of these new observations into the inventory of Unand’s LMCC’ dragonflies reflects the extent of possibility to reveal the dragonfly diversity in this area. The species *Drepanosticta cf bispina* is an elusive damselfly, albeit it actually distributes across Malay Peninsula and Greater Sunda. It was recorded twice only; from the holotype collected from West Sumatra from 1932 and another one from 1954 [6, 11], which is surprisingly having no published record for this species until now. *Pericnemis stictica* and *Macromia westwoodi* are known for their rarity across their distribution range, in addition to the specific requirements for habitat. Hence, their existence can be made as significant indicator for specific environmental condition [21, 22]. Either as a single entity, or combined with other indicator taxa, dragonflies can give solid confirmation regarding the factual condition of an area.

Revision of *Heliocypha fenestrata* into *H. angusta angusta* may signal several things about odonatology in Sumatra. First, the lack of odonatological study in Sumatra, especially those conducted by local researchers may impair the knowledge on Sumatran dragonfly by the local scientist. It could get worse whenever the scientific publications resulted from those researches are not accessible or made available for public. Secondly, this revised identification points out the challenge for the photographic approach used in surveying the odonata diversity [7], as it should be able to present a reliable clue for species identification. Finally, the members of *Heliocypha* genus in Sumatra are identified morphologically through the slight appearance cues which may be easily overlooked.

**CONCLUSION**

Unand’s LMCC through the addition of these newly observed species possesses 32 species and 9 families of odonata. *Drepanosticta cf bispina* and other four species recently observed in this area may cue the importance of habitats surrounding Unand’s LMCC for the conservation of dragonflies.

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REFERENCES

[1] Kalkman V J, Clausnitzer V, Dijkstra K B, Orr A G, Paulson D R and van Tol J. 2008. Global diversity of dragonflies (Odonata) in freshwater. Hydrobiologia 595:351-363.

[2] Margono B A, Potapov V, Turubanova S, Stolle F and Hansen M C. 2014. Primary forest cover loss in Indonesia over 2000-2012. Nat. Clim. Change 4:730-735.

[3] Simaika J P and Samways M J. 2015. Predicted range shifts of dragonflies over a wide elevation gradient in the southern hemisphere. Freshw. Sci. 34:1133-1143.

[4] Goertzen D and Suhling F. 2018. Urbanization versus other land use: Diverging effects on dragonfly communities in Germany. Divers. Distrib. 25:38-47.

[5] de Selys Longchamps E. 1889. Odonate de Sumatra comprenant les especes recueillies a Pulo Nias par M. le Dr. E. Modigliani. Annali Museo Civico Storia Naturale Genova 27:444-484.

[6] Lieftinck M A. 1954. Handlist of Malaysian Odonata. A catalogue of the dragonflies of the Malay Peninsula. Sumatra, Java and Borneo, including the adjacent small islands. Treubia (Suppl.) 22:i-xiii + 1-202.

[7] Janra M N. 2018. Inventory of dragonflies and damselflies (Odonata) in Andalas University’s Limau Manis Complex, Padang: Using photographic approach. JN Semarang Raya 18(2):89-96.

[8] Setiyono J, Diniarsih S, Oscilata ENR and Budi N S. 2017. Dragonflies of Yogyakarta, Jenis Capung Daerah Istimewa Yogyakarta. (Yogyakarta: Indonesia Dragonfly Society).

[9] Barta D and Dolny A. 2013. Dragonflies of Sungai Wain. Ecological Field Guide to the Odonata of Lowland Mixed Dipterocarp Forest of South-eastern Kalimantan. (Czech Republic: Taita Publisher).

[10] Rembold K and Schröter A. 2017. Dragonflies and damselflies of the EFForTS study area in Jambi and Bogor (Indonesia) Version 2. Biodiversity, Macroecology & Biogeography (Germany: Faculty of Forest Sciences and Forest Ecology of the University of Goettingen).

[11] Steinmann D H. 1997. World Catalogue of Odonata I: Zygoptera. (Netherland: Walter de Gruyter Publishing).

[12] Orr A G and Hämaläinen M. 2013. Two new species of Pericnemis from Borneo with comparative notes on related species (Zygoptera: Coenagrionidae). Odonatologica 42(4):335-345.

[13] Norma-Rashid Y, Cheong L F, Lua F K and Murphy D H. 2008. The dragonflies (Odonata) of Singapore – Current status records and collections of the raffles Museum of Biodiversity Research. (Singapore: Raffles Museum of Biodiversity Research, National University of Singapore).

[14] Ngiam RWJ and Leong T M. 2012. Larva of the phytotelm-breeding damselfly, Pericnemis stictica Selys from forests in Singapore (Odonata: Zygoptera: Coenagrionidae). NiS 5:103-115.

[15] Bakare S S and Andrew R J. 2011. Spermatogenesis and sperm bundle formation in the dragonfly Anax guttatus (Burmeister) (Insecta: Odonata: Aeshnidae). The Bioscan 6(4):587-590.

[16] Martens A, Gunther A and Suhling F. 2012. Diversity in mate-guarding types within the genus Anax (Odonata: Aeshnidae). Libellula Supplement 12:113-122.

[17] Baskoro K, Irawan F and Kamaludin N. 2018. Odonata Semarang Raya: Atlas Biodiversitas Capung di Kawasan Semarang Raya. (Semarang: Departemen Biologi, Universitas Diponegoro).

[18] Pamungkas B C, Nugrahani M P and Makitan T T. 2016. "Odonata Community Index – Corsica" (OCIC): A new biological index based on adult odonate populations for assessment of the ecological status of watercourses in Corsica. Ecol. Indic. 66:163-172.