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88

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A brief primary faunistic note to the Odonata of Mt Dabieshan in center of eastern China

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Abstract

From 2011 to 2014, a series of surveys were conducted in Mt Dabieshan range to explore the diversity of Odonata. Totally, 55 species were recorded. The checklist also includes seldom recorded species as *Nihonogomphus bequaerti* and *Coenagrion aculeatum*.

Key words: Odonata, Mt Dabieshan, China, *Coenagrion aculeatum*

Introduction

Mt Dabieshan is of special interest of the zoogeography of Chinese Odonata fauna since it lies in the transition zone of Palaearctic and Oriental realm, and was subject of ongoing discussion in biogeography (Heiser & Schmitt, 2013). As predicted by these authors and in a preliminary field survey of the authors both Palaearctic species, like *Ischnura asiatica* (Brauer, 1865) and Oriental species (e.g. *Sinolestes* sp., *Philoganga* sp.) occur there. A comprehensive exploration to Mt Dabieshan is necessary in order to obtain additional information on the distribution of rare odonate species and to contribute to the biogeography of the region.

Here we report on the first comprehensive study of the Odonata fauna of Mt Dabieshan and richly illustrate our sampling efforts with photographs of every species encountered in the field.

Materials and Methods

Mt Dabieshan (30°10'~32°20'N, 112°40'~117°10'E) is an isolated mountain range at the centre of eastern China. It marks the boundary between Hubei province and its

neighbours of Henan (to the north) and Anhui (to the east) provinces. Running northwest to southeast (Fig. 1), the Dabieshan Mountains form the main watershed between the Huai and Yangtze rivers. The western part of Dabieshan Mountains has a low elevation of only (300–400 meters), though there are a few peaks rising to 900 meters. The eastern part is higher, averaging more than 1,000 meters (Wikipedia, access 08/03/2015). "The climate is north sub-tropical monsoon: humid and hot in the summer and dry and cold during the winter. The average annual temperature is 14.5°C, and annual rainfall c.1.400 mm (Liu & Wu 1994). Due to its geography and climate, the Dabiehan range harbours a rich diversity of flora and fauna. The main vegetation types in this area are plantations of bamboo, pine and chestnut trees. Secondary north-tropical evergreen broadleaf, and mixed deciduous and coniferous forests remain in the core areas of nature reserves and at high elevations (Liu et al. 2008). Subsistence agriculture is the heart of its economy with rice and tea predominating (Wikipedia, access 08/03/2015).

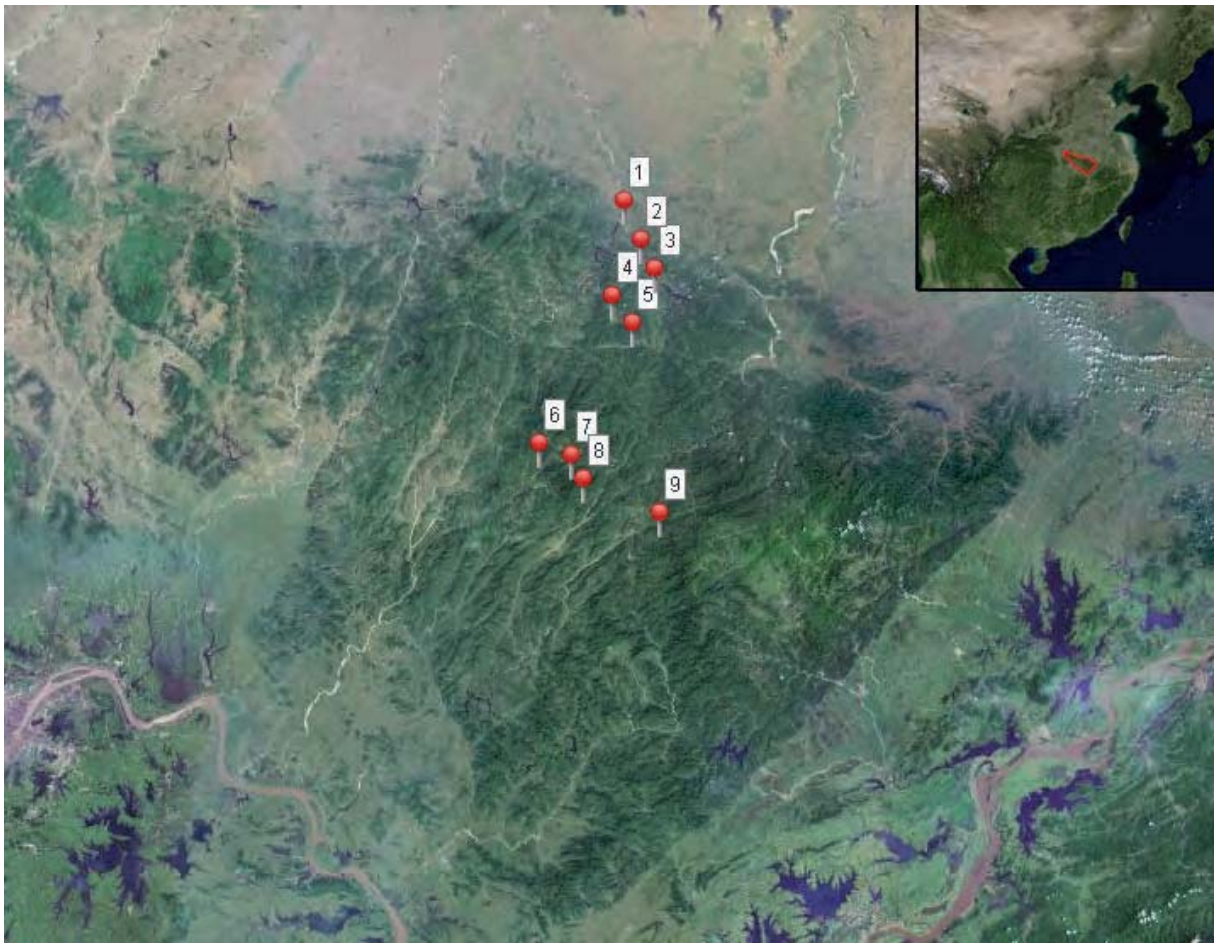

Figure 1. Sample localities of Mt Dabieshan.

Since Mt Dabieshan runs from northwest to southeast, sample localities were chosen on both sides of the ridge, which mainly lies in Anhui province (Jinzhai) and Hubei province (Luotian and Yingshan) (Fig. 1).

Odonata specimens were photographed or caught during spring and summer in 2011 to 2014. Specimens of some species were collected by a sweep net for identi-

fication. All specimens were deposited in the Institute of Entomology, Life Sciences College of Nankai University, Tianjin, China.

Localities (see Figures 2-9)

(1) Anhui, Jinzhai, Xincheng, Jiangdian: (31.721N, 115.936E), 65 m a.s.l., river.
(2) Anhui, Jinzhai, railway station: (31.632N, 115.982E), 60 m a.s.l., river.
(3) Anhui, Jinzhai, Shiyan: (31.572N, 116.014E), 120 m a.s.l., stream, pool.
(4) Anhui, Jinzhai, Yuanchong: (31.561N, 115.983E), 134 m a.s.l., stream, pool (Fig. 2-3).
(5) Anhui, Jinzhai, Qingshanzhen: (31.443N, 115.941E), 210 m a.s.l., stream, brook (Fig. 4-5).
(6) Hubei, Luotian, Qingtaiguan: (31.198N, 115.701E), 741 m a.s.l., brook.
(7) Hubei, Luotian, Tiantangzhai: (31.191N, 115.695E), 566 m a.s.l., stream (Fig. 6-7).
(8) Hubei, Yingshan, Longtanhegu: (31.083N, 115.817E), 342 m a.s.l., river (Fig. 8).
(9) Hubei, Yingshan, Taohuachong: (30.986N, 116.027E), 636 m a.s.l., stream (Fig. 9).

Figure 2 & 3. Anhui, Jinzhai, Yuanchong.

Figure 4 & 5. Anhui, Jinzhai, Qingshanzhen.

Figure 6 & 7. Hubei, Luotian, Tiantangzhai.

Figure 8. Hubei, Yingshan, Taohuachong.
Figure 9. Hubei, Yingshan, Longtanhegu.

Results

A total of 55 Odonata species belonging to 11 families and 43 genera were recorded during the study (Table 1).

Table 1. Odonate species from Mt Dabieshan (records from 2011 – 2004). Localities 1-5 at the northern ridge, 6-9 at the southern ridge (Fig. 1).

Species	Locality at northern ridge	Locality at southern ridge
Anisoptera		
Anax nigrofasciatus Oguma, 1915	3, 4	
Anax parthenope julius Brauer, 1865	1, 2, 4	7, 8
Periaeschna flinti Asahina, 1978	4	
Periaeschna magdalena (Martin, 1909)		7
Polycanthagyna melanictera (Selys, 1883)	4	
Chlorogomphus sp.		7
Anotogaster sieboldii (Selys, 1854)	4	6
Anisogomhus anderi Lieftinck, 1948		6
Ictinogomphus pertinax (Hagen in Selys, 1854)	2, 3, 4	8
Davidius fruhstorferi Martin, 1904		6, 9
Labrogomphus torvus Needham, 1931	2	
Lamelligomphus ringens (Needham, 1930)	4	
Melligomphus ardens (Needham, 1930)		6
Nihonogomphus bequaerti Chao, 1954	2	
Trigomphus agricola (Ris, 1916)	3, 4	
Sinictinogomphus clavatus (Fabricius, 1775)	1, 2	8
Epophthalmia elegans (Brauer, 1865)	1, 2, 4	8
Macromia sp.		7
Acisoma panorpoides Rambur, 1842	2, 4, 5	
Brachythemis contaminata (Fabricius, 1793)	2, 4, 5	
Crocothemis servilia (Drury, 1773)	1, 2, 3, 4, 5	8
Libellula melli Schmidt, 1948	4	
Lyriothemis pachygastra (Selys, 1878)	3, 4	
Orthetrum albistylum Selys, 1848	1, 2, 3, 4	8
Orthetrum japonicum (Uhler, 1858)	5	
Orthetrum melania (Selys, 1883)	1, 2, 3, 4	
Orthetrum triangulare (Selys, 1878)	1, 3, 4	
Palpopleura sexmaculata (Fabricius, 1787)	3, 4	8
Pantala flavescens (Fabricius, 1798)	1, 2, 3, 4, 5	8, 9
Pseudothemis zonata (Burmeister, 1839)	1, 2, 3	
Rhyothemis fuliginosa Selys, 1883	4	
Sympetrum infuscatum (Selys, 1883)	4	7
Sympetrum croceolum (Selys, 1883)	4	
Sympetrum darwinianum (Selys, 1883)	4	
Sympetrum eroticum (Selys,1883)	3, 4	8
Sympetrum baccha (Selys, 1884)	4	
Sympetrum kunckeli (Selys, 1884)	4, 7	

Species	Locality at northern ridge	Locality at southern ridge
Trithemis aurora (Burmeister, 1839)	1, 2, 3, 4	8
Tramea virginia Rambur, 1842	4, 5	
Zygoptera		
Philoganga robusta Navas, 1936	5	7
Matrona basilaris Selys, 1853	3, 4	7, 8, 9
Mnais tenuis Oguma 1913	4, 5	7
Agriocnemis femina Lieftinck, 1962	3, 4	8
Ceriagrion fallax Ris, 1914	2, 3, 4	7
Ceriagrion melanurum Selys 1876	3, 4	
Ceriagrion nipponicum Asahina, 1967	4	
Coenagrion aculeatum Yu & Bu, 2007	4	
Copera annulata (Selys, 1863)	3, 4	6
Ischnura asiatica (Brauer, 1865)	1, 2, 3	
Paracercion calamorum (Ris, 1916)	1, 2, 3	
Coeliccia cyanomelas Ris, 1912	4, 5	7, 9
Platycnemis phyllopoda Djakonow, 1926	3, 4	8
Sinolestes edita Needham, 1930	4, 5	7
Megalestes micans Needham, 1930	5	6, 7
Indolestes peregrinus (Ris, 1916)		7

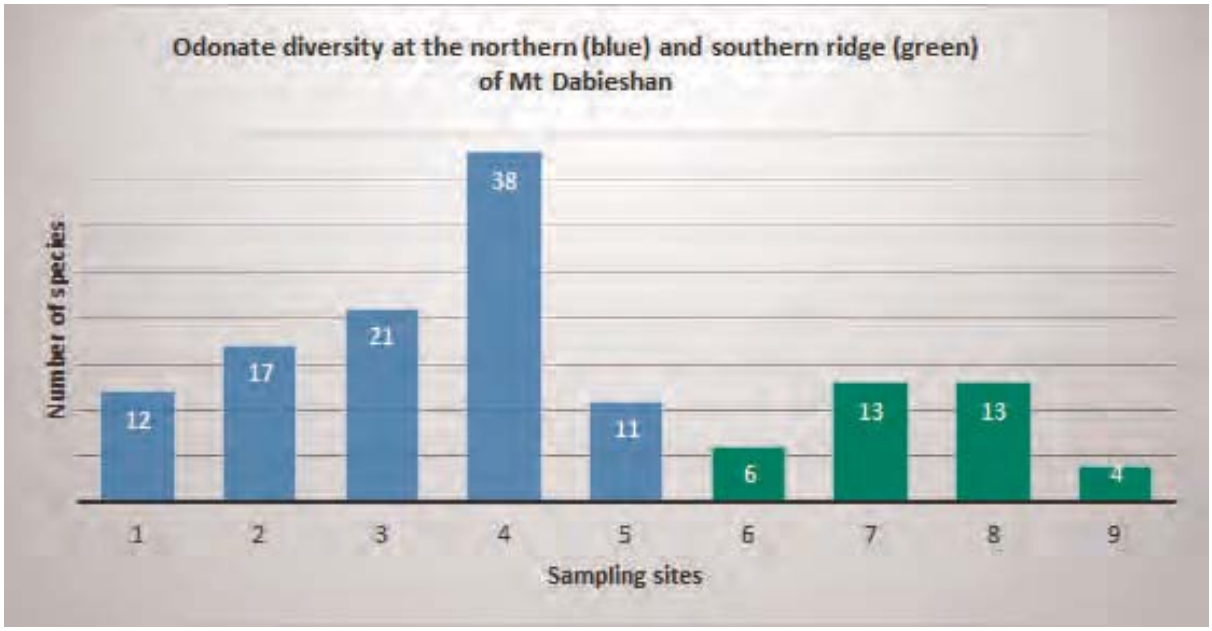

Figure 10. Numbers of species in each sample locality. Localities 1-5 at the northern ridge, 6-9 at the southern ridge (see Figure 1).

Generally, the north side of the ridge has a higher species diversity than the south side (Figure 10), whereas low altitude (100-200 meters) areas are more diverse than high altitude (500-800 meters) localities. Yuanchong (locality 4) has the largest number of species (n=38) as well as rare species (*Coenagrion aculeatum, Periaeschna flinti, Libellula melli, Rhyothemis fuliginosa, Sympetrum croceolum*) among all sample areas. Tiantangzhai (locality 7) has also a quite high number of rare species (*Indolestes peregrinus, Periaeschna magdalena, Chlorogomphus* sp., *Macromia* sp.).

Discussion

Mt Dabieshan is the northernmost known locality of *Sinolestes edita, Periaeschna magdalena, Tramea virginia, Coenagrion aculeatum*, and *Indolestes peregrinus* (unpubl. data). *S. edita, C. aculeatum* and *I. peregrinus* were encountered at every visit between 2011 and 2014, whereas *P. magdalena* and *T. virginia* only were found occasionally.

C. aculeatum is a Chinese endemic species, known only to occur in Chongqing (Yu & Bu 2007), Libo (Guizhou), Zhejiang province and Huangshan (Anhui) (own records of the authors) (Figure 11). This species clearly pends further study to identify its status. *Coenagrion aculeatum* was found in Dabieshan Mountains at a pool with shallow clear water within the stream bed (Figures 2 and 3). In 2014, we found for the first time

Figure 11. Distritbution of *Coenagrion aculeatum* in China. (map: https://gointochina.files.wordpress.com/2013/02/26563663.jpg

a couple of *C. aculeatum*, and in addition, a small population represented by five individuals was recorded, while all formerly records of the authors at this and additional localities resulted in only each a single specimen. *C. aculeatum* is a rare species in China and little is known about its biology and habitat preferences. Probably it can adapt to a broad scope of habitat, from lotic water to lentic, swamp to stream. Here in Mt Dabieshan we observed them flying along a slow flowing stream (Fig. 2), resting on riparian plants time to time. They are quite vigilant and difficult to be caught.

Mt Dabieshan is situated very close to Mt Tongbai (in Henan province, Wang, 2007) and shares most *Sympetrum* species with this region. Six *Sympetrum* species have been recorded for the investigated area which number is considered here quite high. However, the Palaearctic species *S. uniforme*, though is not rare in Tongbai, was never found in Mt Dabieshan.

There are many tea gardens on both sides of the ridge of Mt Dabieshan, most around elevations from 100 to 400 meters. Pesticides are limited in use at the north ridge side and replaced by using insect sticking boards (Fig. 12). Therefore some streams and pools at low altitude in this side are still clean and suitable as habitat for many animals. Whereas most low altitude areas in the south side have been cultivated extensively. There, insect sticking board is seldom used. That may be one reason why the north side has more odonate species than the south side (Fig. 10).

For instance, between 2011 and 2014 there was always a permanent population of *Trigomphus agricola* in a little pond located at the fringe of a small village, very close

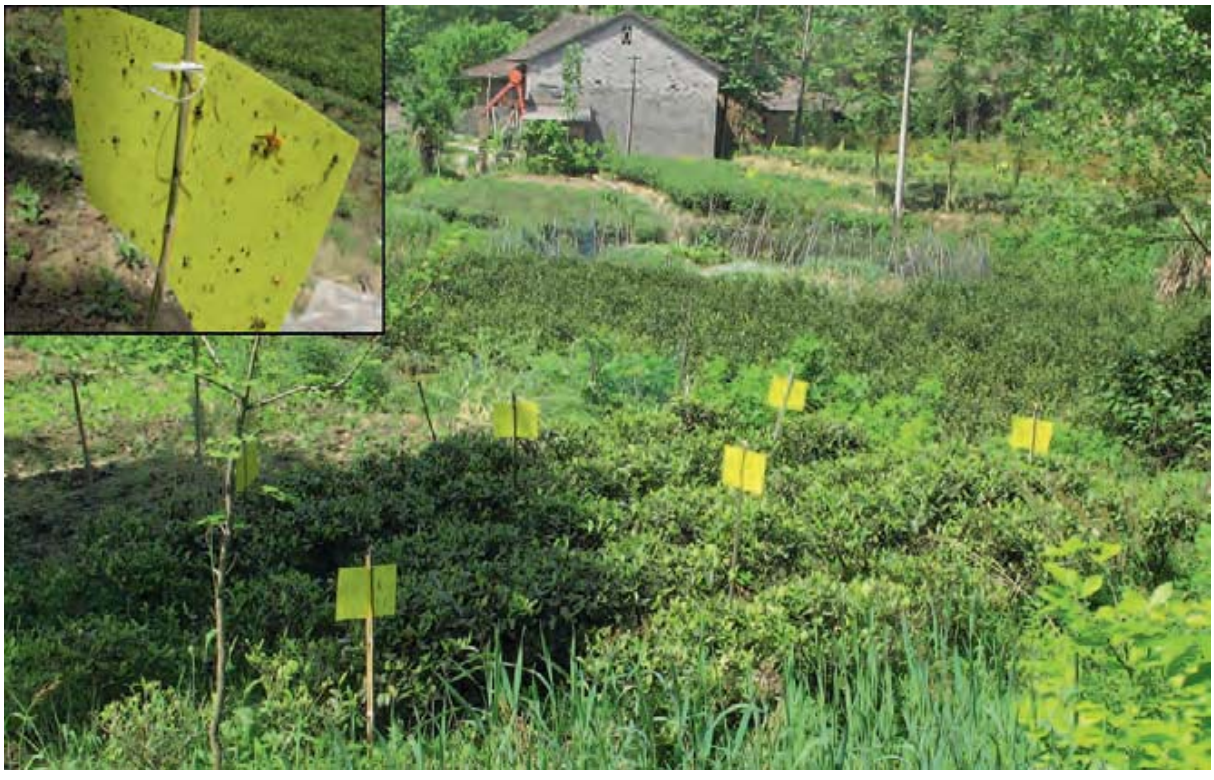

Figure 12. Anhui, Jinzhai, Shiyan. Show the using of insect sticking boards.

to the building of villagers. Each year during our survey in the same time, specimens of that species used exactly the same microhabitat (one special stone or a branch in the water) (Fig. 21B). A comparable situation never was found in the south side of our study area. This examples may highlight the benefits of biodiversity from sustainable agriculture.

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Figure 13. ***Anisogomhus anderi.*** **Figure 14.** ***Davidius fruhstorferi.***

Figure 15. ***Ictinogomphus pertinax*****. Figure 16.** ***Labrogomphus torvus*****.**

Figure 17. ***Lamelligomphus ringens.*** **Figure 18.** ***Melligomphus ardens.***

Figure 19. ***Nihonogomphus bequaerti.*** **Figure 20.** ***Sinictinogomphus clavatus.***

Figure 21A. ***Trigomphus agricola.*** **Figure 21B.** ***Trigomphus agricola at the pond.***

Figure 22. *Anotogaster sieboldii.* **Figure 23. *Chlorogomphus sp.***

Figure 24. ***Periaeschna flinti.***
Figure 25. ***Periaeschna magdalena.***

Figure 26. ***Polycanthagyna melanictera.***
Figure 27. ***Epophthalmia elegans.***

Figure 28 & 29. *Macromia* sp.

Figure 30. *Macromia* sp.

Figure 30. *Acisoma panorpoides.*

Figure 31. ***Brachythemis contaminata.*** **Figure 32.** ***Crocothemis servilia*****.**

Figure 33. ***Libellula melli.*** **Figure 34.** ***Lyriothemis pachygastra.***

Figure 35. ***Orthetrum albistylum.***
Figure 36. ***Orthetrum internum.***

Figure 37. ***Orthetrum melania*****. Figure 38.** ***Orthetrum triangulare*****.**

Figure 39. ***Palpopleura sexmaculata.***
Figure 40. ***Pseudothemis zonata.***

Figure 41A & B. *Sympetrum baccha.*

Figure 42. ***Sympetrum croceolum.*** **Figure 43.** ***Sympetrum darwinianum.***

Figure 44. ***Sympetrum eroticum.*** **Figure 45.** ***Sympetrum infuscatum.***

Figure 46A & B. *Sympetrum infuscatum*.

Figure 47. Sympetrum kunckeli. Figure 48. *Tramea virginia*.

Figure 49. ***Trithemis aurora.***
Figure 50. ***Sinolestes edita.***

Figure 51. ***Indolestes peregrinus.***
Figure 52. ***Philoganga robusta.***

Figure 53 & 54. *Mnais tenuis*.

Figure 55. *Matrona basilaris.*
Figure 56. *Coeliccia cyano-melas.*

Figure 57. *Copera annulata*. Figure 58. *Platycnemis phyllopoda*.

Figure 59. ***Platycnemis phyllopoda.*** **Figure 60.** ***Agriocnemis femina.***

Figure 61. ***Ischnura asiatica.***
Figure 62. ***Ceriagrion fallax.***

Figure 63. *Coenagrion aculeatum,* A: male, B: female.

Figure 64. ***Ceriagrion melanurum.***
Figure 65. ***Ceriagrion nipponicum.***

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