New records of Odonata for Cambodia – results from a trip through various places of the country November 14th - December 1st 2010

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Abstract

On our trip to Cambodia from November 14th to December 1st 2010 eight new species for the country have been verified. These are *Libellago lineata, Lestes praemorsus, Argiocnemis rubescens, Pseudagrion pruinosum, Epophthalmia frontalis, Indothemis carnatica, Indothemis limbata,* and *Orthetrum glaucum*. This publication raises the list of Cambodian Odonata to over 90 published species. This figure is considered as less than half of the actual species number that inhabits the country. Given the scarce observations based on opportunistic samples only and largely insufficiently land coverage we predict that a few new species to the science are to be expected from the future research. This opens still many opportunities to study dragonflies in Cambodia at locations nobody ever has looked for Odonata before.

Introduction

After having visited Cambodia in February 2010 mainly for watching birds and also photographing dragonflies whenever there was time for it (Roland & Roland, 2010) we quickly realized how scarce the knowledge on the distribution of dragonflies in Cambodia is. We could only find 13 further publications about Odonata in Cambodia (Martin, 1902, 1904; Asahina, 1967a, 1967b; Tsuda, 1991, 2000; Davidson 2006; Donnelly, 2000a, 2000b; Benstead, 2006; Kosterin & Vikhrev, 2006; Kosterin, 2010; Watson, 1967). Tsuda 1991 and 2000 only combined, what had been published before. While Hämäläinen & Pinratana (1999) list over 300 species for Thailand and Do & Dang (2006) over 230 species for Vietnam, the number for Cambodia is only 91-94 species. So far only one native Cambodian, Ms Sanh Sophoan, a birdwatching-guide from the Sam Vaesna Center, has discovered a new species for the country. She sent us a photo of *Ischnura aurora* taken close to Siem Reap on September 28th 2010. So we decided to make a second tour in 2010, this time with more emphasis on dragonflies.

Material and Methods

The material for this paper was collected during a field trip that took place from November 14th to December 1st, 2010. It was lead by the Ms Sanh Sophoan and was organized as to sample almost all of the sites visited during the bird-watching tour held earlier the same year. As it is very difficult to get a collecting permit for Cambodian invertebrates, no specimens have been preserved. All data were obtained by photographic life individuals on the field. Around 5,000 photos were taken. Species, which were easy to identify, were determined by sight and/or by photo. More difficult ones were caught and photographed in hand in details. Identification was done using a number of summarizing monographs and guides (Fraser, 1933; 1934; 1936; Orr, 2003; 2005; Tang et al., 2010). In this article we present some of the species keyed out successfully to genus or species level. From all other species at least one photo was taken. Also we report records from the most interesting locations. Data from further stops close to the roads of very common species are recorded in our database and can be provided on request (Figure 1).

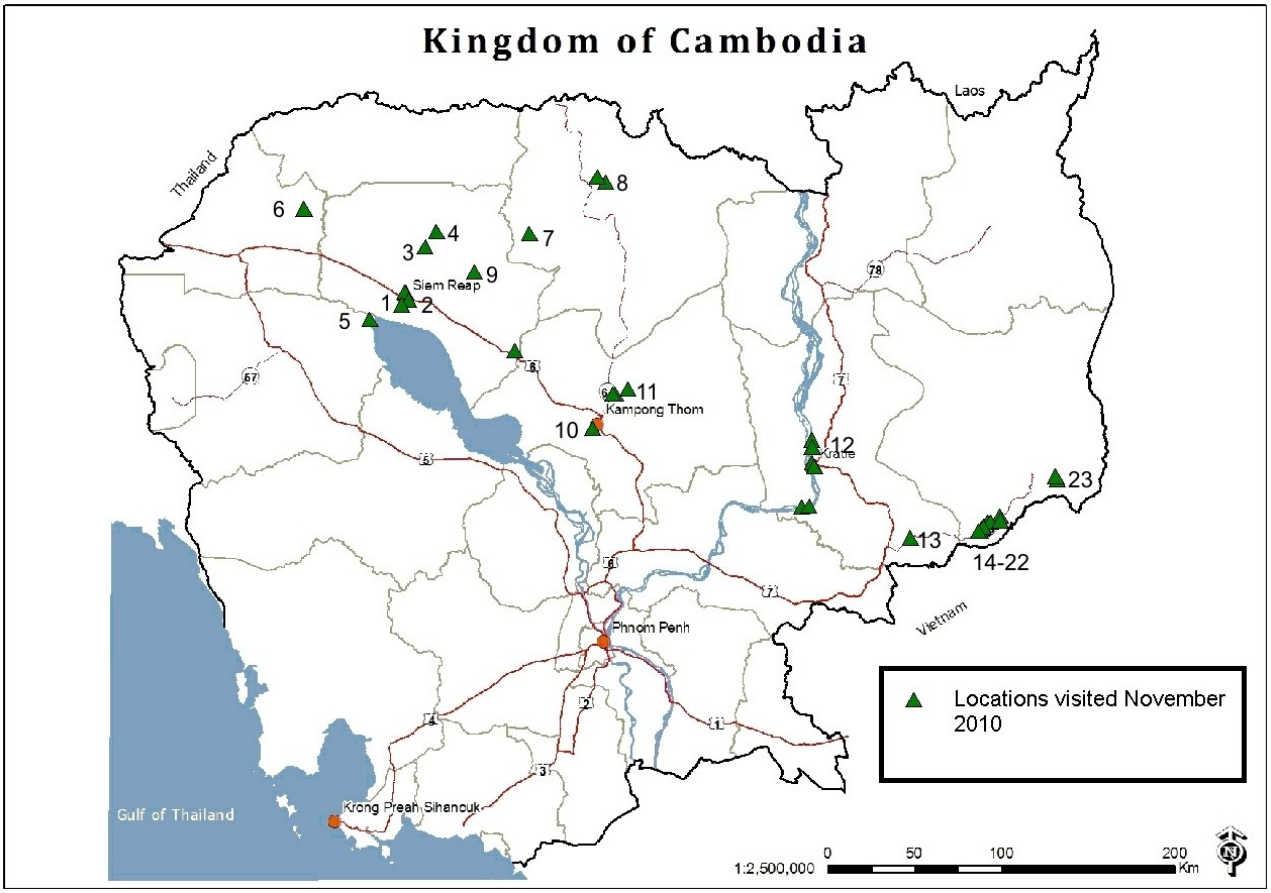

Figure 1: List of localities

List of localitites

1. Siem Reap, 14th of November 2010 (13°21,787 N, 103°51,502 E). We visited a park situated close to the hotel in the centre of Siem Reap. Lots of Flying Foxes (*Pteropus* sp.) were hanging in the trees. Odonata were found around some rain collecting basins with various aquatic vegetation.
2. Farmland with flooded rice paddy, artificial ponds and ditches southeast of Siem Reap, 14th of November 2010 (13°19,288 N, 103°52,8113 E).
3. Flooded rice paddy, artificial ponds and ditches at Banteay Srei Temple, 15th of November 2010 (13°35.857'N, 103°57.942' E).
4. Little creek at the verge of a forest at Angkor Centre of Conservation for Biodiversity north of Siem Reap, 15th of November 2010 (13°40,7412 N, 104° 01,533 E). This creek brought the first new species for Cambodia during the 2010 November-December trip.
5. Prek Toal flooded forest and the Great Lake Tonlesap, 16th of November 2010 (13°10.149'N, 103°38.615'E).
6. Widely flooded area with rice paddy, artificial ponds and ditches at Ang Trapaeng Thmor Conservation Area, 17th of November 2010 (13°47.388'N, 103°19.126'E). Numerous individuals. Unfortunately we could not visit the pond adjacent to the main reservoir near the Forestry Administration office, due to flooding.
7. Waterfall and little creek at the street from Siem Reap to Preah Vihear, 18th of November 2010 (13°40.350'N, 104°31.222'E). In February the creek was dried out and only one small puddle was remaining. This time the water was still flowing.
8. Various natural pools in deciduous dipterocarp forest at Tmatboey village, Preah Vihear, 19th to 20th of November 2010 (13°58.053'N, 104°52.868'E).
9. Moat around the temple at Beng Mealea, 21st of November 2010 (13°28.286'N, 104°13.749'E).
10. Rice paddy, artificial ponds, flooded areas and ditches around Kampong Thom afternoon 21th and morning 22nd of November 2010 (13°03,735' N, 104°26,667' E; 12°39,775' N, 104°51,482' E).
11. Little pond surrounded by forest at temple Sambor Prei Kuk close to Kampong Thom, 22nd of November 2010 (12°51,972 N, 105°02,621 E).
12. Rice paddy, artificial ponds, flooded areas and ditches around Kratie, 23rd and morning 24th of November 2010 (12°34,083 N, 106°01,511 E and more).

13. Little river bridge route 76 on the way to Seima, 25th of November 2010 (12°05,778 N, 106°32,586 E).
14. Creek at bridge route 76 within Seima Protection Forest, 25th, 26th and 27th of November 2010 (12°12,252 N, 107°01,033 E).
15. Seima, way to river outside but close to station Seima Protection Forest, 27th and 28th of November 2010 (12°07,660 N, 106°54,99 E).
16. Seima, little river at bridge route 76 outside Seima Protection Forest, 28th of November 2010 (12°07,512 N, 106°54,300 E).
17. Seima, two ponds at a quarry inside Seima Protection forest, 26th and 28th of November 2010 (12°10,608 N, 106°57,935 E). This quarry was used for building the road (route 76) and was closed in 2010. The ponds only exist since then.
18. Large artificial pond, about 4000 square meters in size, in Seima Protection Forest close to station, 25th, 26th 28th and 30th of November 2010 (12°08.344 N, 106°55.046 E).”.
19. Lake at route 76 inside Seima Protection Forest, 27th and 28th of November 2010 (12°08,952 N, 106°55,651 E). This lake is surrounded by natural forest and on the northern side by route 76. One can only access it from the street.
20. Big river inside Seima Protection Forest 3 km from the street, 27th of November 2010 (12°10,952 N, 107°01,089 E). Unfortunately it was too late in the day and rainy.
21. Inside the forest of Seima Protection Forest, 26th of November 2010 (12°10,513 N 106°57,003 E).
22. Route 76 way to drain, 29th of November 2010 (12°23,654 N, 107°19,316 E).
23. Waterfall Sen Monorum, Mondulkiri, 29th of November 2010 (12°24,600 N, 107°18,863 E).

Results

A total of 69 taxa has been observed during the 2010 November-December trip. Over 40 of them have been documented with details from photos in hand and 58 were surely identified at species or subspecies level.
Several taxa could not be identified safely despite the fact that we took detailed photos of captured individuals. These were:

- *Aciagrion* sp. (Figure 2). In an e-mail Dr. Matti Hämäläinen wrote about this genus: "The photos which you send represent the most difficult damselfly genera in the region! Especially *Aciagrion*, which is so poorly known and wrongly interpreted in many publications that it is hard to identify the species even from specimens!".

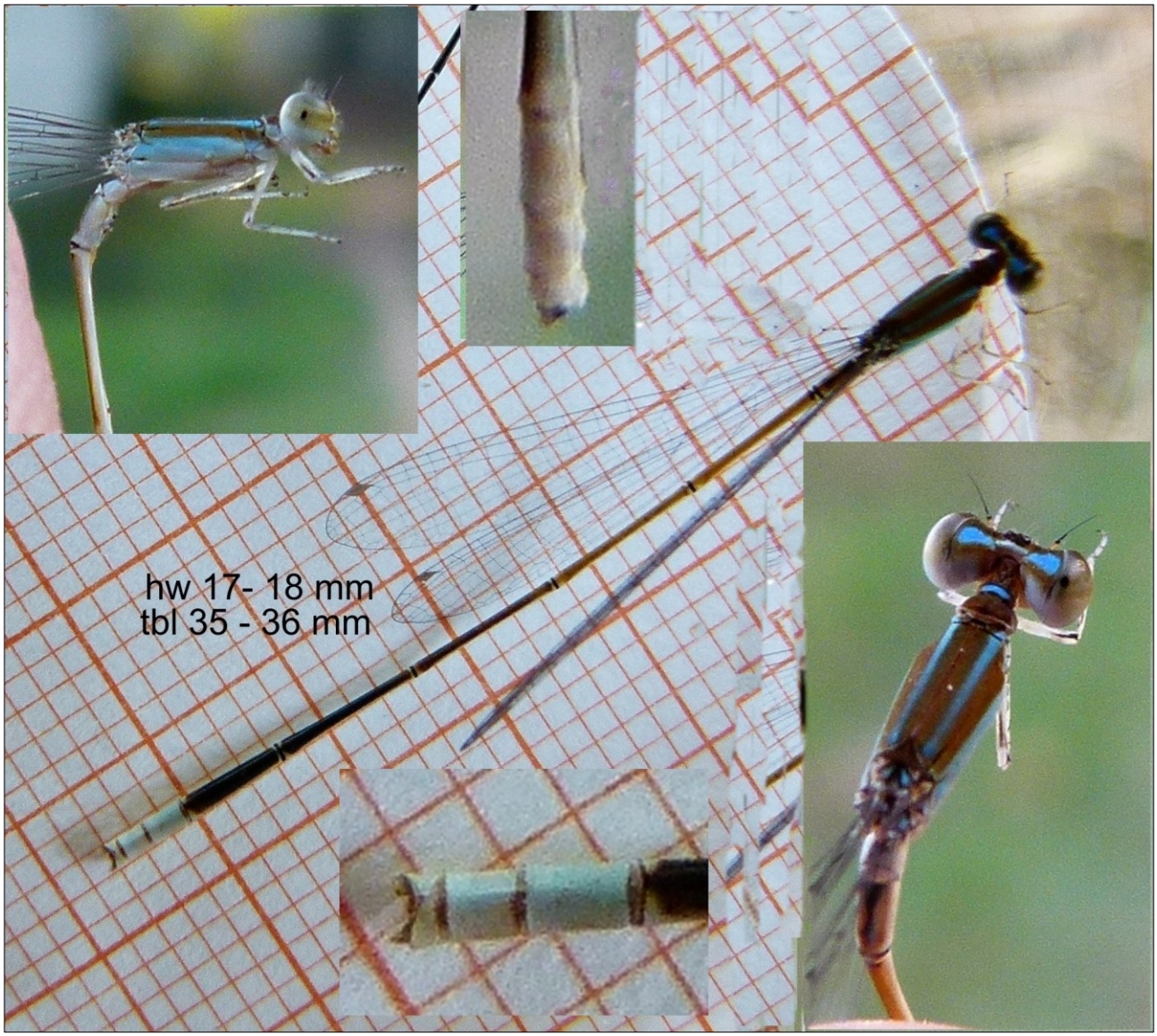

Figure 2. *Aciagrion* sp. Close to Siem Reap - H.-J. Roland

- Red (Figure 3) and yellow (Figure 4) *Ceriagrion* sp., which can only be identified safely by the mesostigmal lamella plate structure.

Figure 3. *Ceriagrion* sp. (red). Tmatboey - H.-J. Roland

Figure 4. *Ceriagrion* sp. (yellow). Quarry Seima Protection Forest - H.-J. Roland

- 1-2 species of *Coeliccia* which might not have been described so far (Figures 5 – 7). Figure 8 represents a teneral male with the wings being not hardened; however it had the most expanded black pattern on the pterothorax: compare to the very stripy pattern in mature individuals on figure 7. Appendages of the males were like in *Coeliccia kazukoae*, but the colors varied a lot. The female (Figure 6) is probably close related to one of these males.

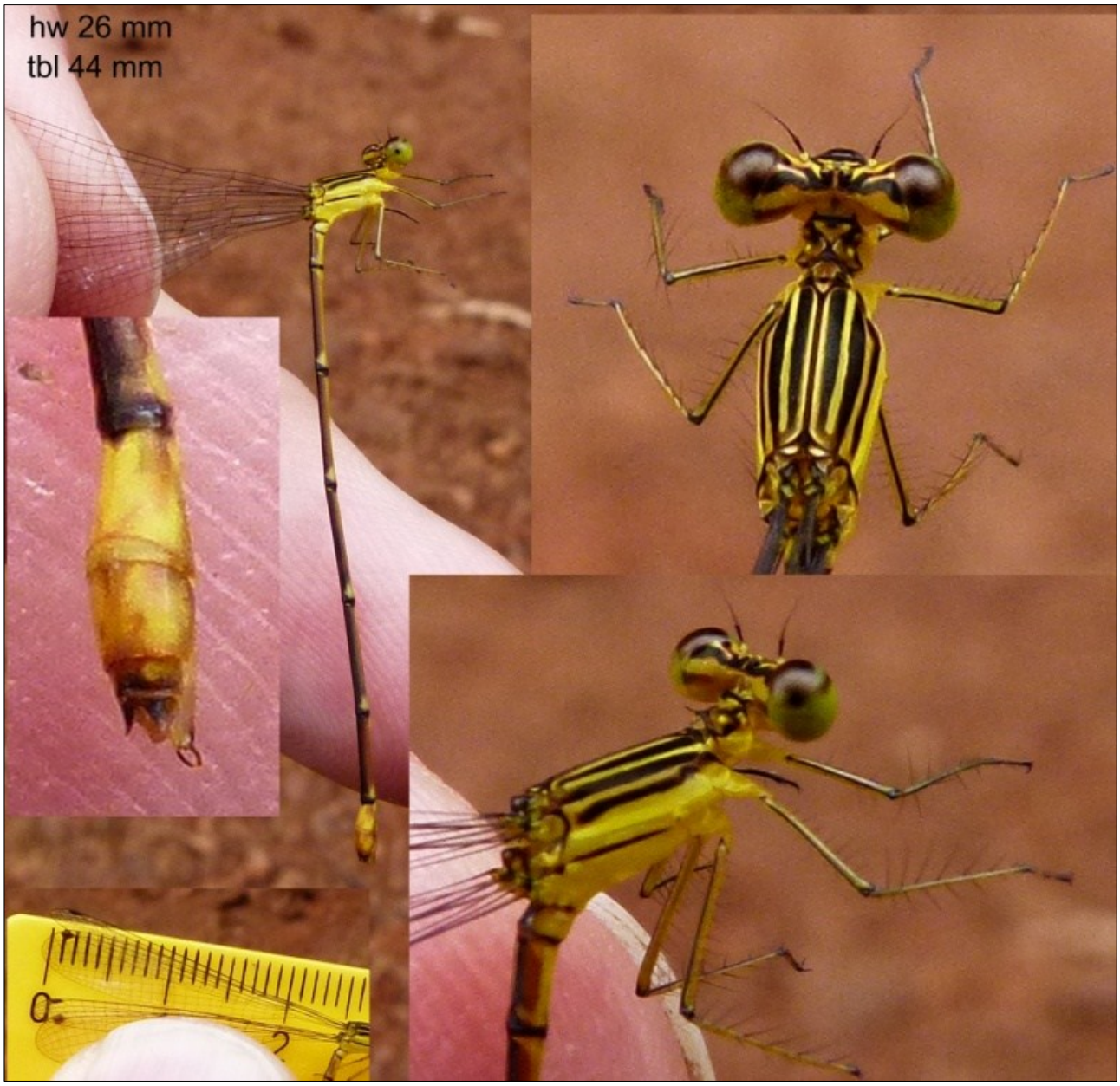

Figure 5. *Coeliccia* sp. female. Waterfall Sen Monorum, Mondulkiri – H.-J. Roland

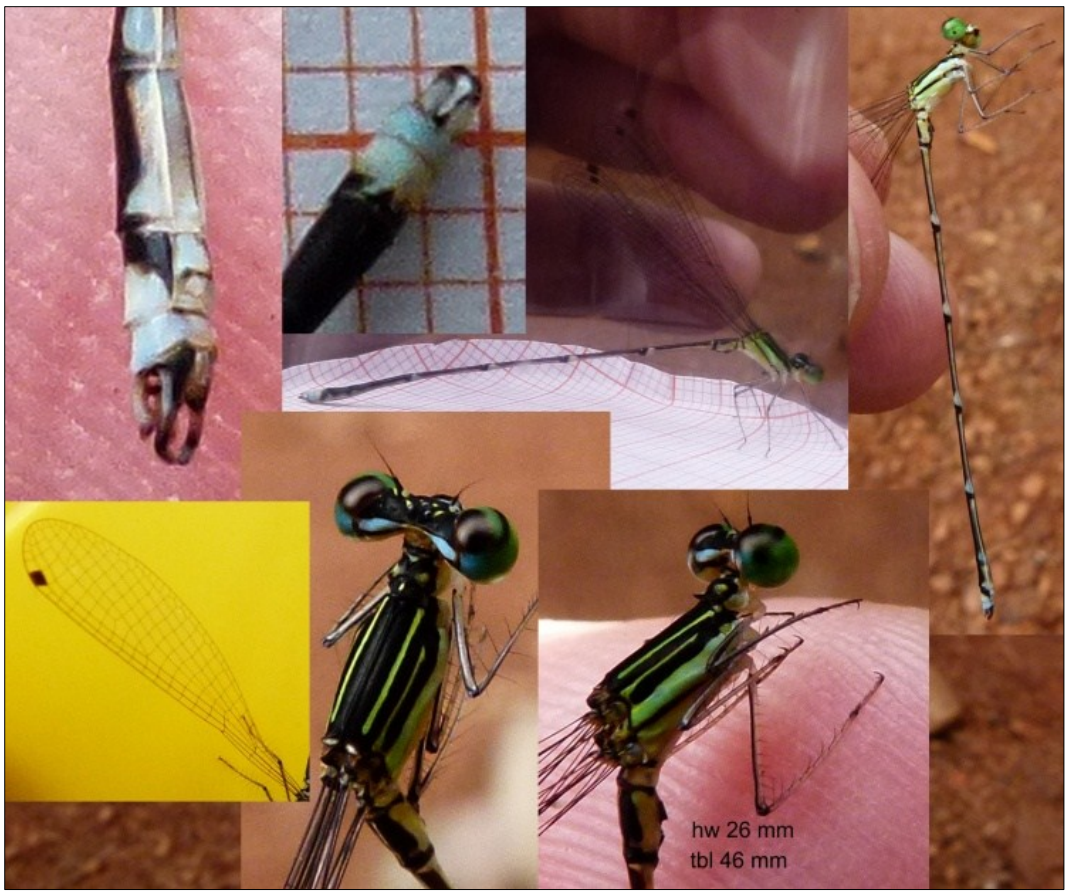

Figure 6. *Coeliccia* sp. male. Waterfall Sen Monorum, Mondulkiri – H.-J. Roland

Figure 7. *Coeliccia* sp. a different male. Waterfall Sen Monorum, Mondulkiri – H.-J. Roland

- *Gynacantha* sp. (Figure 8), probably *basiguttata*, which we couldn't catch.

Figure 8. *Gynacantha* sp. probably *basigutta*, Waterfall Sen Monorum, Mondulkiri – T. Sacher.

- *Neurothemis* sp. (Figure 9 and 10), which already caused problems on our trip in February. It had the size of *Neurothemis fluctuans* and the wing coloration looked more like *Neurothemis ramburii* but with almost straight hind wingspot border. Most likely this species is a colour variation of *Neurothemis fluctuans*. According to specialists (compare Roland & Roland, 2010), this genus also has to be reviewed.

Figure 9. *Neurothemis* sp. female. Bantea Srei – H.-J. Roland

Figure 10. *Neurothemis* sp. male. Sambor Prei Kuk – H.-J. Roland

Check list (new records for Cambodia are marked with "*")

1. ***Euphaea masoni* Selys 1879**
   Localities: 15, 16, 23 (at a little creek 500m away).
2. ***Heliocypha biforata* (Selys, 1859)**
   Localities: 4, 15.
3. ***Heliocypha* sp.**
   Localities: 21, 22.
4. ***Libellago lineata* (Burmeister, 1839)***
   Localities: 4, 19.
5. ***Neurobasis chinensis* (Linnaeus, 1758)**
   Localities: 14, 16, 20.
6. ***Vestalis gracilis* (Rambur, 1842)**
   Localities: 4, 15, 22.
7. ***Coeliccia* sp.** (probably two different species)
   Locality: 23.
8. ***Copera ciliata* (Selys,1863)**
   Locality: 18.
9. ***Copera marginipes* (Rambur, 1842)**
   Localities: 4, 13, 14, 19, 20.
10. ***Copera vittata* (Selys, 1863)**
    Localities: 14, 15.
11. ***Prodasineura autumnalis* (Fraser, 1922)**
    Localities: 13, 19.
12. ***Lestes concinnus* Hagen in Selys, 1862**
    Locality: 21.
13. ***Lestes praemorsus* Hagen in Selys, 1862***
    Locality: 18.
14. ***Aciagrion borneense* Ris, 1911**
    Localities: 2, 8, 11 (at the street close to the temple), 17, 18.
15. ***Aciagrion pallidum* Selys, 1891**
    Locality: 8.
16. ***Aciagrion* sp.**
    Localities: 2, 3, 11, 12.
17. ***Agriocnemis minima* Selys, 1877**
    Localities: 2, 5 (caught and photographed from a boat), 8, 10, 12.
18. ***Agriocnemis nana* Laidlaw, 1914**
    Localities: 8, 13.
19. ***Agriocnemis pygmaea* (Rambur, 1842)**
    Localities: 8, 12.
20. ***Argiocnemis rubescens* Selys, 1877***

Localities: 14, 15, 21, 22, 23.

21. ***Ceriagrion cerinorubellum*** **(Brauer, 1865)**
Locality: 3.

22. ***Ceriagrion olivaceum*** **Laidlaw, 1914**
Localities: 11, 15.

23. ***Ceriagrion praetermissum*** **Lieftinck, 1929**
Locality: 11.

24. ***Ceriagrion*** **sp. (brown)**
Locality: 1.

25. ***Ceriagrion*** **sp. (red)**
Localities: 3, 8, 18.

26. ***Ceriagrion*** **sp. (yellow)**
Localities: 8, 9, 17.

27. ***Ischnura senegalensis*** **(Rambur, 1842)**
Localities: 1, 3, 6, 8, 9, 10, 12, 17, 18.

28. ***Pseudagrion australasiae*** **Selys,1876**
Localities: 1, 3, 6, 7, 9, 10, 17, 18.

29. ***Pseudagrion pruinosum*** **(Burmeister, 1839)***
Locality: 14.

30. ***Pseudagrion rubriceps*** **Selys, 1876**
Localities: 4, 5, 6, 7, 13, 14.

31. ***Ictinogomphus decoratus*** **(Selys, 1854)**
Localities: 5, 8, 9, 10, 18.

32. ***Gynacantha*** **sp. ?** ***basiguttata*** **Selys, 1882**
Locality: 23.

33. **Aeshnidae sp.**
Locality: 18.

34. ***Epophthalmia frontalis*** **Selys, 1871***
Locality: 19.

35. ***Acisoma panorpoides*** **(Rambur, 1842)**
Localities: 5, 8, 9, 17, 18.

36. ***Aethriamanta brevipennis*** **(Rambur, 1842)**
Locality: 18.

37. ***Brachydiplax chalybea*** **Brauer, 1868**
Localities: 3, 12, 18.

38. ***Brachydiplax farinosa*** **Krüger, 1902**
Localities: 8, 9, 18.

39. ***Brachythemis contaminata*** **(Fabricius, 1793)**
Localities: 4, 5, 9, 10, 12, 17.

40. ***Camacinia gigantea*** **(Brauer, 1867)**
Localities: 1, 8.

41. ***Crocothemis servilia* (Drury, 1770)**
Localities: 1, 3, 5, 6, 7, 9, 10, 12, 18.
42. ***Diplacodes nebulosa* (Fabricius, 1793)**
Localities: 3, 6, 8, 10, 17, 18.
43. ***Diplacodes trivialis* (Rambur, 1842)**
Localities: 3, 4 (100m away from the water course), 6, 8, 10, 12, 17.
44. ***Indothemis carnatica* (Fabricius, 1798)***
Locality: 18.
45. ***Indothemis limbata* (Selys, 1891)***
Localities: 18, 19.
46. ***Indothemis* sp.**
Locality: 17.
47. ***Lathrecista asiatica* (Fabricius, 1798)**
Localities: 1 (at the hotelyard), 12 (forest around Buddhist temple close to Katie), 14, 21.
48. ***Neurothemis fluctuans* (Fabricius, 1793)**
Locality: 11.
49. ***Neurothemis fulvia* (Drury, 1773)**
Localities: 3, 4, 7, 9, 11, 12, 14, 15, 18, 21.
50. ***Neurothemis intermedia atalanta* Ris, 1919**
Localities: 8, 11, 21.
51. ***Neurothemis tullia* (Drury, 1773)**
Localities: 2, 3, 8, 12.
52. ***Neurothemis* sp.**
Localities: 3, 11.
53. ***Orthetrum chrysis* (Selys, 1891)**
Localities: 4, 14, 19.
54. ***Orthetrum glaucum* (Brauer, 1865)***
Localities: 14, 23.
55. ***Orthetrum pruinosum neglectum* (Rambur, 1842)**
Localities: 4, 13.
56. ***Orthetrum sabina* (Drury, 1770)**
Localities: 1, 3, 7, 8, 9, 10, 12, 17, 18.
57. ***Pantala flavescens* (Fabricius, 1798)**
Localities: 6, 10, 12, 17.
58. ***Potamarcha congener* (Rambur, 1842)**
Locality: 3.
59. ***Pseudothemis jorina* Förster, 1904**
Localities: 8, 12.
60. ***Rhodothemis rufa* (Rambur, 1842)**
Localities: 3, 9, 12, 18, 19.

61. ***Rhyothemis phyllis* (Sulzer, 1776)**
    Localities: 6, 10, 18.
62. ***Rhyothemis triangularis* Kirby, 1889**
    Localities: 18, 19.
63. ***Rhyothemis variegata* (Linnaeus & Johansson, 1764)**
    Localities: 6, 9, 12, 18.
64. ***Rhyothemis variegata/phyllis***
    Locality: 3.
65. ***Tholymis tillarga* (Fabricius, 1798)**
    Localities: 5, 10, 11 (at the street close to the temple), 12, 17.
66. ***Trithemis aurora* (Burmeister, 1839)**
    Localities: 4, 7, 13, 14, 16, 17.
67. ***Trithemis festiva* (Rambur, 1842)**
    Localities: 4, 13, 14, 16.
68. ***Trithemis pallidinervis* (Kirby, 1889)**
    Localities: 5, 6, 7, 10, 12, 17, 18.
69. ***Urothemis signata* (Rambur, 1842)**
    Localities: 3, 9, 12, 18.

The following species are new records for Cambodia. Some of them - marked with "*" - also have been seen by Oleg Kosterin, who visited Cambodia end of November / beginning of December 2010 (email-message, report in preparation).

Libellago lineata (Figure 11)

Figure 11. *Libellago lineata*, Lake at route 76 within the Seima Protection Forest, Mondulkiri – H.-J. Roland

Lestes praemorsus* (Figure 12)

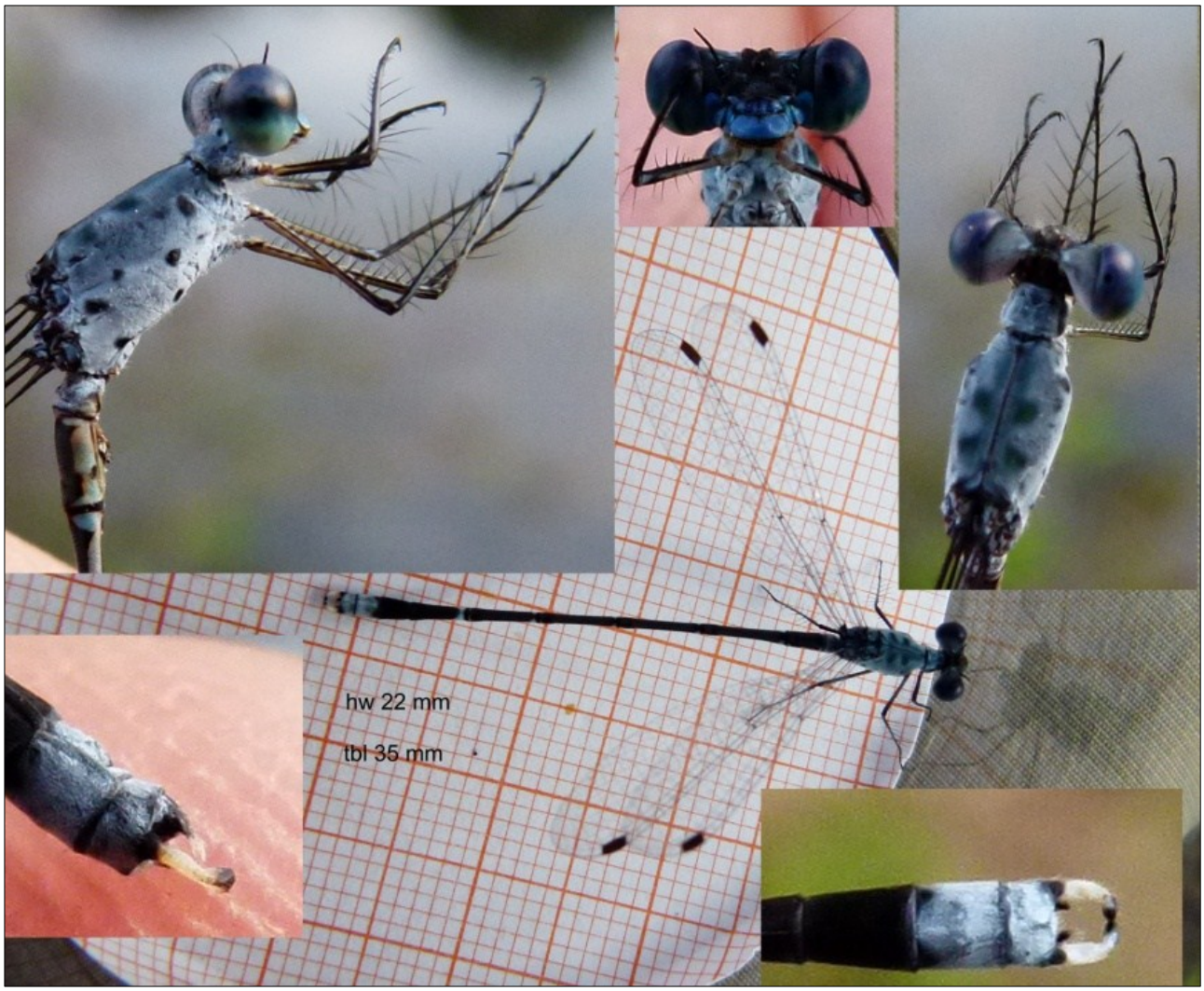

Figure 12. *Lestes praemorsus*. Artificial pond close to station Seima Protection Forest, Mondulkiri – H.-J. Roland

Pseudagrion pruinosum* (Figure 13)

Figure 13. *Pseudagrion pruinosum*. At Seima Protection Forest, Mondulkiri – T. Sacher

Argiocnemis rubescens* (Figure 14)

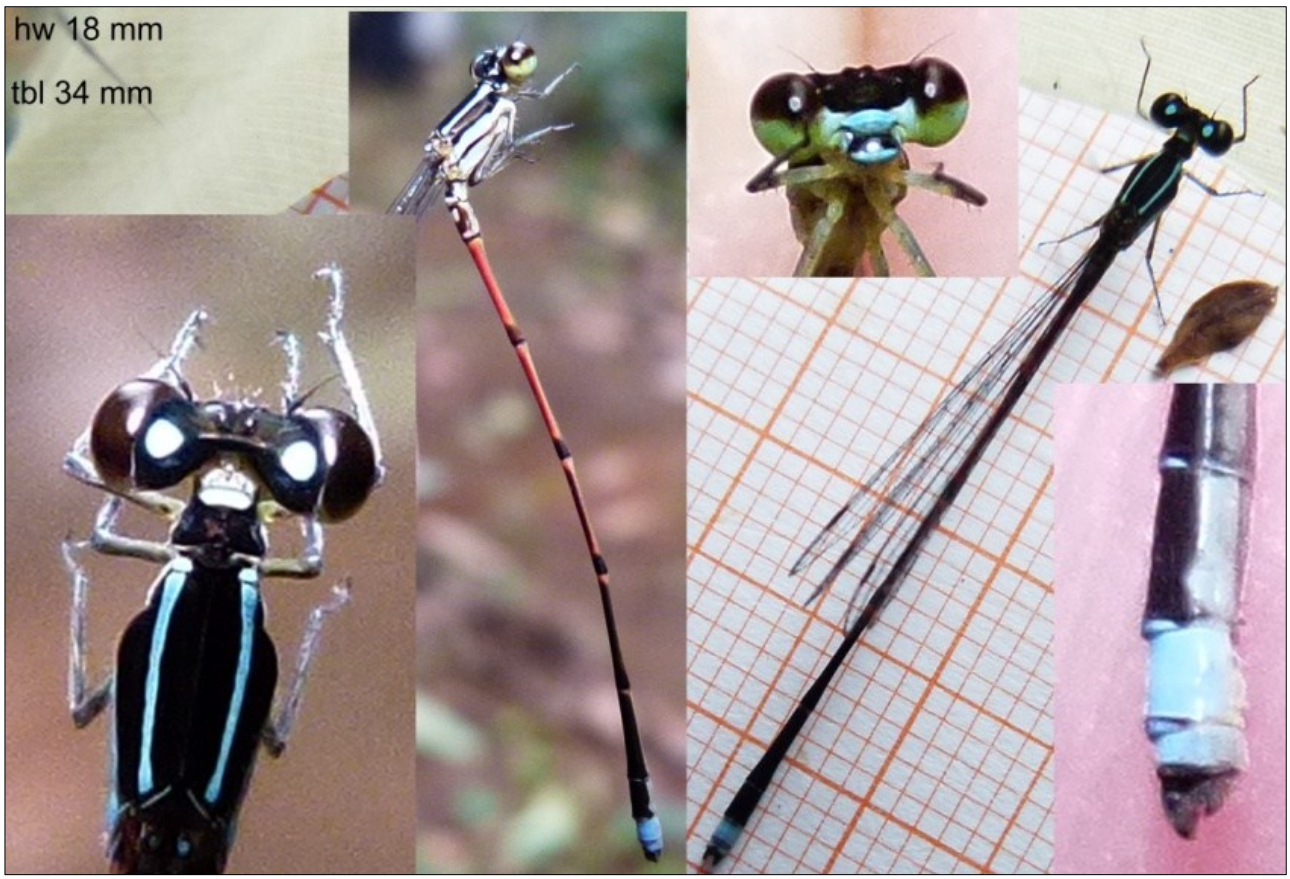

Figure 14. *Argiocnemis rubescens*. Forest close to station Seima Protection Forest, Mondulkiri – H.-J. Roland

Epophthalmia frontalis (Figure 15)

Figure 15. *Epopthalmia frontalis*. Lake at route 76 within Seima Protection Forest, Mondulkiri – T. Sacher

Indothemis carnatica (Figure 16)

Figure 16. *Indothemis carnatica*. Artificial pond close to station Seima Protection Forest, Mondulkiri – H.-J. Roland

Indothemis limbata* (Figure 17)

Figure 17. *Indothemis limbata*. Artificial pond close to station Seima Protection Forest, Mondulkiri – H.-J. Roland

Orthetrum glaucum* (Figure 18); mentioned in Martin (1904) as "Commune en Indo-Chine" but not clearly recorded for Cambodia so far.

Figure 18. *Orthetrum glaucum*, male. Waterfall Sen Monorum, Mondulkiri – H.-J. Roland

Discussion

Odonata of Cambodia are still insufficiently studied, which is a reflection of the low area coverage of the country. Figure 19 shows that there is a lot of open space for research. Considering the results of the trip of Oleg Kosterin (per. comm.) slightly more than 100 species have been recorded so far. Probably more than another 100 are waiting for their discovery, with a good chance, that a few undescribed species will be amongst them.

This paper makes a considerable contribution to studying Odonata fauna of Cambodia. During our trip in February we saw 33 species of Odonata (Roland & Roland, 2010). Only 4 were not met this time: *Aethriamanta aethra* and *Pseudagrion williamsoni* occurred at a pond at Ang Trapaeng Thmor, which we couldn't visit because of strong flooding. *Paracercion calamorum dyeri* and *Aethriamanta gracilis* flew at the pond close to the station of Seima Protection Forest (Figure 20) in Mondulkiri. We visited this pond four times, more than any other place on the trip.

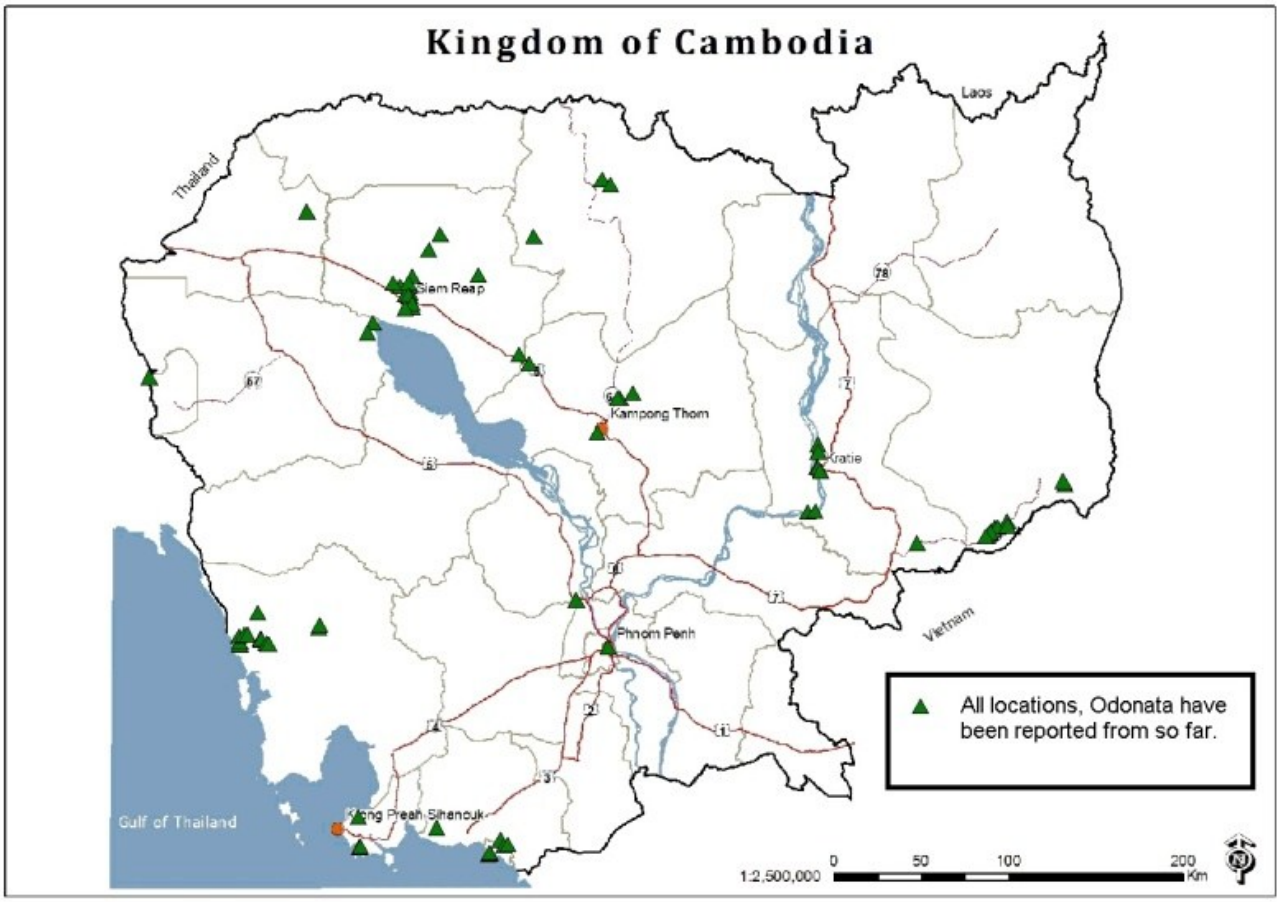

Figure 19. All locations in Cambodia where Odonata have been recorded from so far.

This brought a total of 24 species, as 22 were identified safely. Including the trip in February the number of 30 species has been verified there. After having found 4 new species for Cambodia there in February, another 3 were added. *Lestes praemorsus* and *Indothemis carnatica* have only been seen there, *Indothemis limbata* additionally in the near situated locality "Lake at route 76 inside Seima Protection Forest". Overall we saw 69 taxa on the trip, of which 62 were identified safely. Some localities held very high number of species. With total of 30 species a pond close to the station of Seima Protection Forest (Figure 20) in Mondulkiri was the most diverse site. The high species number encountered just for 17 days is due to the fact that a wide range of habitat types were searched especially for dragonflies. Particular attention was paid to small species (like *Agriocnemis* sp.) that may easily be overlooked. Apparently November is a very good time to go for Odonata studies in Cambodia. It is directly after the rainy season is a much better time of the year to watch dragonflies than in the hot season in the middle of February. For example, in February we only saw single individuals of Trithemis pallidinervis at 2 locations, while in November it was very abundant and observed at 8 sites. We did not see Pantala flavescens in February but November-December trip brought it to record from 7 locations. Most of the species of the rice paddy fields were much more numerous in November than they have been in February.

Figure 20. Artificial pond near station of Seima Protection Forest, Mondulkiri – H.-J. Roland

All we were able to find about Odonata in Cambodia is shown on the new website www.dragonflies-cambodia.com. This page will be updated, whenever new reports are coming out.

Acknowledgements

We are greatly indebted to Oleg Kosterin for assisting us with the identification of some of the species and reviewing this report. Also thanks to Matti Hämäläinen, who had a view on our photos. Thanks go also to Milen Marinov and Martin Schorr for help with this article and publishing it as IDF-report. We are also thankful to Ms Sanh Sophoan from the Sam Vaesna Center for guiding the field visits and the Cambodian Forestry Administration and Ministry of Environment for allowing access to the conservation areas. WCS Cambodia provided us with the basic map. Thanks for that as well.

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