International Dragonfly Fund - Report

Journal of the
International Dragonfly Fund

ISSN 1435-3393

Content

Volume 78 2015

The International Dragonfly Fund (IDF) is a scientific society founded in 1996 for the improvement of odonatological knowledge and the protection of species.

Internet: http://www.dragonflyfund.org/

This series intends to publish studies promoted by IDF and to facilitate cost-efficient and rapid dissemination of odonatological data.

Editorial Work: Martin Schorr, Milen Marinov

Layout: Martin Schorr

Indexed by Zoological Record, Thomson Reuters, UK

Home page of IDF: Holger Hunger

Printing: ikt Trier, Germany

Impressum: International Dragonfly Fund - Report - Volume 78

- Date of publication: 10.02.2015
- Publisher: International Dragonfly Fund e.V., Schulstr. 7B, 54314 Zerf, Germany. E-mail: oestlap@online.de
- Responsible editor: Martin Schorr

Results of Odonata larval rearing in the Gunung Mulu National Park, Sarawak, Malaysia from April to August 2014

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Abstract

Records of larval rearing in the Gunung Mulu National Park, Sarawak, Malaysia carried out in 2014 are presented. In total, larvae of 27 species were collected. Larvae of eleven species (22 individuals) were successfully reared out, one individual is currently still being reared. An additional three species were collected right after emergence, with the adult still sitting on its exuvia. Most notable are the samples of *Orthetrum borneense, Leptogomphus* cf. *pendleburyi, Coeliccia* cf. *nemoricola 1, Coeliccia cf. nemoricola 2, Heliocypha biseriata* and *Elattoneura analis* whose final instar larvae are undescribed.

Key words

Odonata; Sarawak; Borneo; Malaysia; larval rearing

Introduction

Between April and August 2014, the odonate fauna of the Gunung Mulu National Park (GM NP) in Sarawak, Malaysia was sampled. The sampling included the collection of adults as well as the collection and rearing of larvae. The results of the adult sampling will be published in combination with data from earlier investigations at a later time (Dow et al. in prep.). Thus, this report focuses on the results of the larval collection and rearing.

GM NP is located in Sarawak, Malaysia on the island of Borneo and with more than 52,800 ha is Sarawak's largest National Park (NP). GM NP is a rather isolated mountain range in the interior of Sarawak, close to the border of Brunei (Fig. 1). In 2000, the NP was declared a World Natural Heritage by UNESCO (UNESCO, 2000). It is famous for its many, often huge caves that are typical for karst landscapes (Leser, 2009). Also, the NP is characterized by its high biodiversity with a large number of different vegetation types, which include several types of montane forest. The Gunung (Malay for "Mount") Mulu reaches up to nearly 2400m a.s.l.

Figure 1. Overview map of Borneo, with GM NP indicated (From Wikimedia commons 2012, modified).

Several surveys to collect odonates have been carried out in GM NP between 2005 and 2012 by R. A. Dow, G. T. Reels and S. G. Butler (cf. Dow et al. 2010 for a summarizing report on the results of some of these fieldtrips). During these surveys, larvae were collected and reared too, the results remain to be published.

The main scope of this research project was to collect larvae from montane regions where previously only little fieldwork was carried out. During the four months in Mulu, I additionally sampled other regions relatively low on the mountain that had not been sampled before. A list of the sampling localities is given in Appendix 1, the numbers refer to Dow et al. (2010). An additional "P" indicates a site that had not been sampled before.

Research area and methods

A rather large area of the lowland regions of GM NP is easily accessible over a well developed system of trails and boardwalks. There is one trail that leads up the partially very steep Gunung Mulu itself. Along the trail there are three basic shelters, the first (Camp 1) at about 250m a.s.l., the second (Camp 3) at 1300m a.s.l. and the third at about 1800m a.s.l. (Camp 4). Streams on the lower slopes of Gunung Mulu, up to about 700m a.s.l., are accessible from Camp 1 (including an one hour walk up the trail). To access the higher regions of the mountain, a stay at Camp 3 is necessary. For this project, 2 fieldtrips per month were planned. Each fieldtrip was scheduled with about a week duration. Longer fieldtrips are not advisable, as it is hard to keep many larvae in a fieldcamp. Also, the larvae at base camp should ideally be looked after every day to ensure that freshly emerged adults do not get eaten by ants or fall into the water. Thus a fieldtrip of more than one day requires to find somebody willing and able to take care of the larvae.

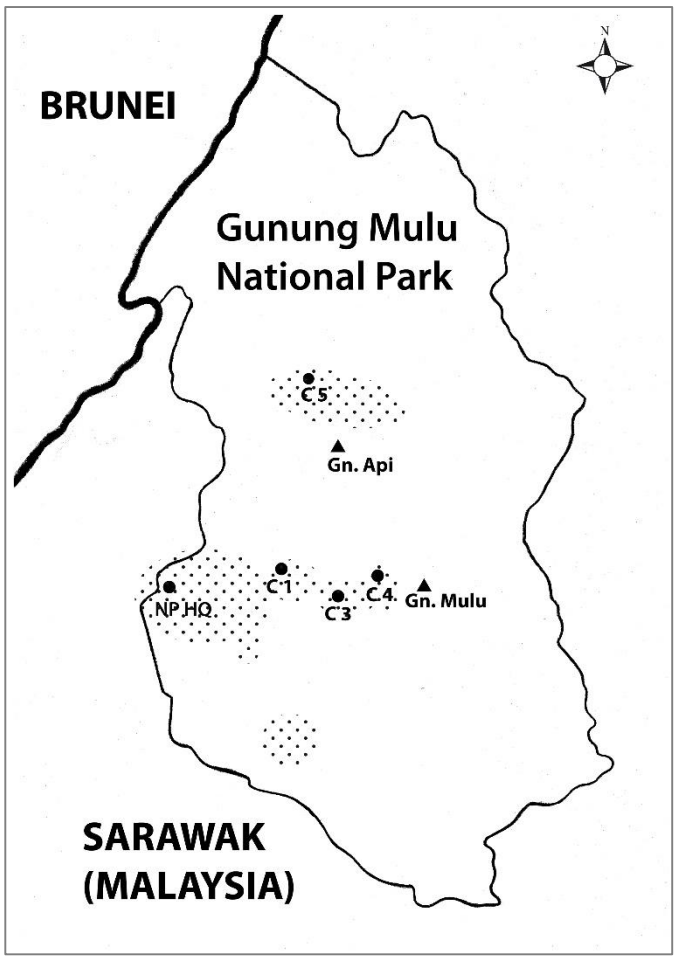

Figure 2. Overview map of GM NP. Dotted background indicates areas that have been sampled for odonate larvae. (From http://www.mulupark.com/htm/mulumap.htm 2007, strongly modified)

Due to several unpredictable factors, such as the severe dryness of high altitude streams in April and May, the frequent unavailability of porters and a forest fire, only three trips to Camp 3 and higher were possible. In addition, I stayed twice at Camp 1 to sample streams on the lower slopes of the mountain. Also, two fieldtrips to the north and very south of GM NP respectively were carried out, where I sampled streams at

about 300-500m a.s.l. The rest of the four months was filled with day trips, during which I tried to sample as many different areas as possible. (See App. 1 for a list of all sampled locations, and Fig. 2 for an overview map).

Every waterbody encountered during a fieldtrip, was searched for larvae, although I especially focused on flowing waterbodies. Habitat types ranged from tree holes over swampy forest pools to open rivers (Fig. 4 A-F). Steep, small streams however, made up the majority of sampled sites.

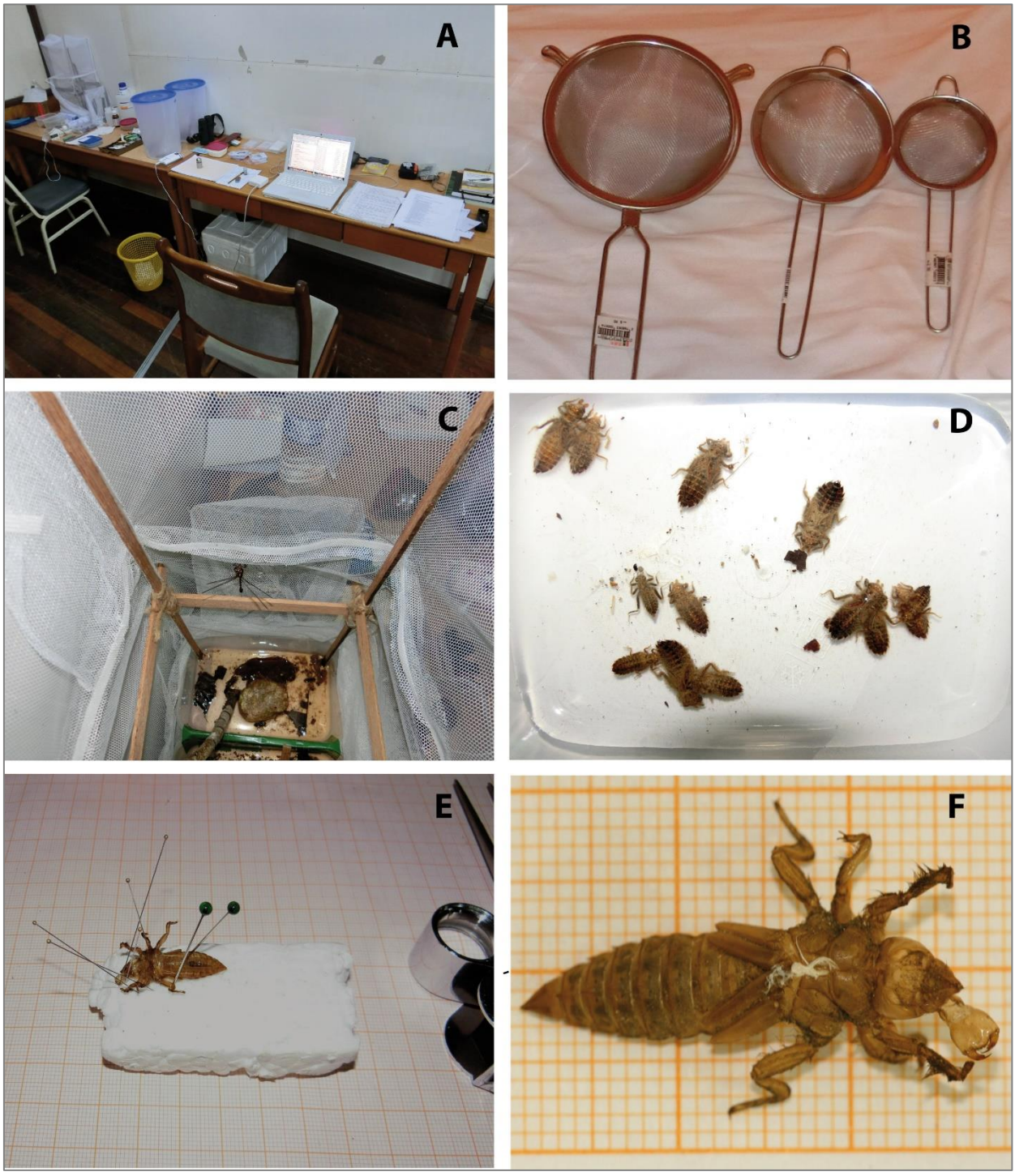

Figure 3. Details of the larval rearing. A laboratory setup with the larvae cages at the left side, B kitchen sieves for catching larvae, C freshly emerged *Acrogomphus jubilaris* in the emergence container, D typical set of larvae from one location, E exuvia preparation, F dried exuvia. All photos by POMS.

Figure 4. Examples of sampled locations. A Open stream loc. 12, B streamlet loc. 8b, C rocky stream loc. P4b, D rocky streamlet loc. 5b(p), E swampy pools loc. 9a(p), F waterfall streamlet loc. 5b(p). Photo C by Jessica Jakobitz, all other photos by POMS.

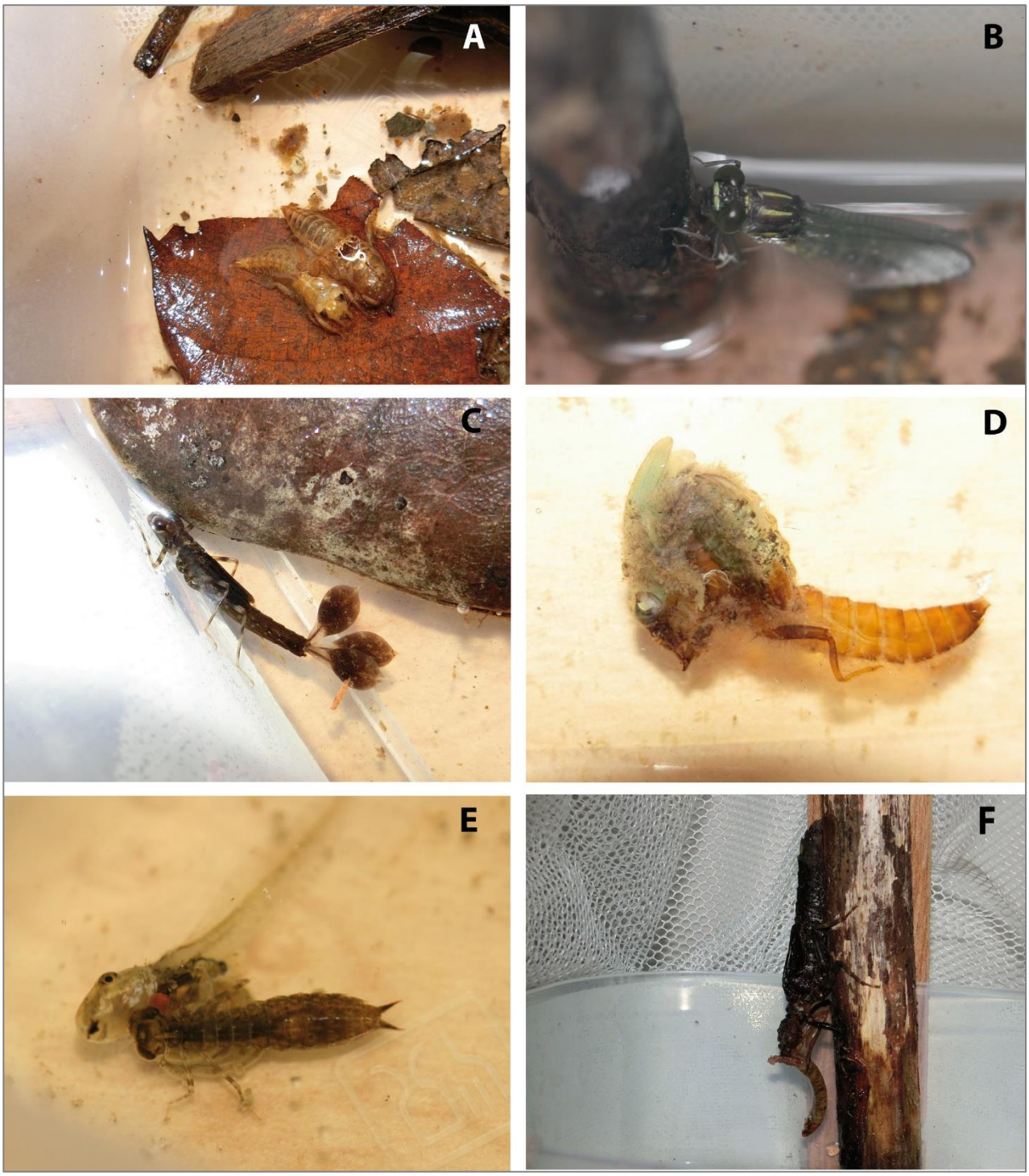

Figure 5. Images of larval rearing. A *Acrogomphus jubilaris* exuvia right after emergence of the adult. Individual emerged horizontally, larva partially covered by water B *Leptogomphus coomansi* emerging vertically C *Coeliccia cf. nemoricola* from a pool at 1300m a.s.l. D *Leptogomphus spec.* moulting E *Indaeschna grubaueri* feeding on tadpole F *Tetracanthagyna spec.* feeding on small fish. All photos by POMS.

Each visited location was sampled for larvae, although not everywhere larvae were found. Especially in rocky streams high up on the mountain often no larvae were found. Larvae were searched for with usual kitchen sieves of different sizes (Fig. 3 B), by sieving through the sediment. Collected larvae were subsequently put into small plastic containers with some water and sediment. Identification of larvae to genus level was mostly possible in the field, difficult cases were identified with the help of literature in

the laboratory. Usually, very small larvae were only collected when the genus was not identifiable or no bigger larvae of the same genus were found (See Fig. 3 D for a typical set of larvae caught at one location).

At base camp, larvae were kept in plastic containers of different sizes, equipped with some sediment from the according sampling sites. Larvae were kept together in one container only if they were of about the same size, to avoid cannibalism. Also, individuals of genera that are known to frequently feed on other odonate larvae as *Acrogomphus* or *Tetracanthagyna* were kept separately. Containers that hold stream-dwelling species were equipped with an additional air pump for waterflow and oxygenation. Containers that contained larvae, which were assumed to be ready or near ready to emerge, were provided with different emergence supports and kept with a tent of mosquito netting, to prevent larvae from escaping and allow a safe maiden flight. See Fig. 3 A, C for photos of the rearing setup. Larvae were fed irregularly with tadpoles, mosquito larvae and small fish (Fig. 5 E-F).

After emergence, the exuvia was positioned on a piece of polysterene. With the help of forceps and insect pins, the legs were spread and the labium was pulled out to simplify subsequent investigations. Insect pins were used to fix the exuvia on the polystyrene, where it was left to dry off (Fig. 3 E-F).

Results

Larvae of 27 species were collected over the research period. Out of those, eleven species were successfully reared from larva to adult (Tab. 1). The exuvia of three species were collected with the adult still sitting on it or next to it, right after emergence (Tab. 1). The larva of one species is currently still being reared. In addition, two exuviae were collected without the adult (Tab. 2).

The actual number of species found may be higher than 27, as many larvae died early and could thus only be determined to genus level (Tab. 2). Also, it is possible that the *Microgomphus* and *Leptogomphus* larvae that could not be reared out, do not represent additional species. That would reduce the number of collected species to 25.

However, for at least 14 collected species, the final instar larva can be linked to an adult (Table 1). Out of those, 6 larvae are undescribed to date.

In flowing waterbodies, larvae of the family Gomphidae were most frequently encountered. Among those, species of the genus *Leptogomphus* were most common.

Above ~1200m a.s.l., no larvae were found in flowing waterbodies. Larvae of three species, namely *Coeliccia cf. nemoricola 2, Orthetrum borneense* and *Indaeschna grubauer*i were found in standing waters above ~1200m a.s.l.

Discussion

The 26 species recorded during this study, only represent a small fraction of the more than 150 species known to occur in GM NP (Dow et al. 2010).

Table 1. List of larvae reared out. A "cf." indicates that the identification on species level may not be reliable. * Species that were collected after emergence and not artificially reared. † Larvae undescribed to date. ** Individual currently still reared.

Species	Sex	Nr. of Ind.	Location(s)
Heliocypha biseriata†	m	1	1a
*Euphaea impar**	m	1	1b
*Elattoneura analis**†	f	1	2b
Coeliccia cf. *nemoricola 1*†	f	1	P4c
Coeliccia cf. *nemoricola 2*†	f	1	9a(p)
Coeliccia cf. *nemoricola 2*†	m	1	9a(p)
Indaeschna grubaueri	m	1	9a(p)
Macromia cf. *westwoodii*	f	1	8b
Acrogomphus jubilaris	m	3	8a, 8b
Acrogomphus jubilaris	f	1	5b(p)
*Acrogomphus spec. **	m	1	1b
Leptogomphus coomansi	m	1	1b
Leptogomphus cf. *pendleburyi**†	f	1	P4a
Leptogomphus spec. A	f	1	1b
Leptogomphus spec. B	m	1	5b(p)
Microgomphus chelifer	m	2	P2b, 1b
Orthetrum borneense†	f	5	9a(p)
Orthetrum borneense†	m	4	9a(p)

Table 2. List of collected species not reared to adult. * Indicates species were the exuvia was collected without the adult.

Species	Location(s)
Vestalis spec.	5b(p)
*Euphaea spec.**	15
Burmagomphus spec.	1a, 1b
*Gomphidia spec.**	1b
Heliogomphus spec.	2a, P6a, P6b, 8a, 8b, P8a
Leptogomphus spec.	1a, 1b, 5b(p), 8a, 8b, P6a, P6b, P8a
Macrogomphus spec.	1b, P6b
Microgomphus spec.	1a, 1b
Chlorogomphus spec.	P6a, 5b(p)
Tetracanthagyna spec.	8a, 8b, 5b(p)
cf. Macromia spec.	1b, 5b(p), 8a
Orthetrum spec.	1b
Tyriobapta spec.	3a
Lyriothemis cleis	11b

Especially important however, are the six unknown larvae, which will be described from the material collected during this study (Steinhoff et al. in prep.).

It is obvious, that more research on larvae needs to be carried out in the future, as many species remain unknown. This is true for all tropical countries and especially so for GM NP. Fig. 2 shows how many areas of the NP have not been sampled, despite the rather high number of field surveys conducted here.

Also, for future larval sampling in GM NP, the use of alternative methods should be considered. A big portion of the collected larvae died during the rearing process. Thus, especially a setup that allows the rearing at the waterbody itself, meaning the erection of a cage-like construction in a stream or pool, promises to be fruitful. It would reduce the artificial effects to a minimum and help to keep a natural surrounding. It must however be situated near to base camp, in order to enable daily visits. This restricts the usage, as especially steep mountain streams are not located in the vicinity of the base camp.

The rearing of odonate larvae is time consuming and complex, but rewarding in areas like GM NP where so little is known. With an increasing knowledge about the larvae, research in the future can focus more and more on complexes such as seasonality and moult numbers.

With this, the understanding of ecological relationships in threatened ecosystems such as karst landscapes will increase and help to protect those areas.

Acknowledgements

This research project would not have been possible without the great support by Rory Dow, who initially developed the idea for a project outline, organized a collecting permit and constantly helped with ID-issues over the course of the 4 months. During a joined trip, Rory Dow and Stephen Butler gave an invaluable in situ introduction into odonata-fieldwork in Borneo. Stephen Butler introduced me into larval rearing techniques and constantly helped with larval-ID issues.

I am indebted to the Gunung Mulu Park management and staff, for their constant support, from organisation of porters to the providing of consumable materials and the care-taking of the larvae. Furthermore I thank Martin Schorr, who supported the project from the start and provided important help with documents. The manuscript was improved by comments from Rory Dow and Stephen Butler. The Sarawak Forest Department and Sarawak Forestry Corporation granted permits to collect Odonata in Sarawak. Financial support was provided by the German Academic Exchange Service (DAAD) through a PROMOS-scholarship.

References

Dow, R.A., Reels, G.T. & Butler, S.G. 2010. Results of collecting of odonata carried out in Sarawak in 2005-2010. Part IV: Gunung Mulu National Park. Report on collecting of Odonata in Gunung Mulu National Park, 2005-2010; compiled for the Sarawak Forestry Department.

Leser, H. 2009. Geomorphologie. Westermann; Braunschweig.

UNESCO, 2000. Report of the 24th session of the committee. http://whc.unesco.org/archive/repcom00.htm#1013

Appendix 1

Nr.	Name	Habitat	GPS coordinates
1a	Sungai Paku tributary at the Bat Observatory	open lowland stream	N4 01.399 E114 49.325
1b	Sungai Paku tributary downstream of the Bat Observatory	open lowland stream	N4 01.410 E114 49.191
1c(p)	Small tributary of Sungai Paku tributary	Sluggish, shady stream	N4 01.427 E114 49.185
2a	Streams and Rivers around Summit and Deer Cave Trails and the trail to the Royal Mulu Resort ("Dead End" and "Kenyalang Loop" trails)	open lowland streams/ sluggish, shady streams	N4 01.519 E114 48.338, N4 01.474 E114 48.455, N4 01.399 E114 48.682, N4 01.306 E114 48.707
2b	Swampy areas and forest pools around Summit and Deer Cave Trails and the trail to the Royal Mulu Resort ("Dead End" and "Kenyalang Loop" trails)	Swamp and forest pools	N4 01.999 E114 48.996, N4 01.877 E114 49.033, N4 01.548 E114 48.297
3a	Swamp pools and temporary streams around the Night walk loop	Swamp and temporary streams	N4 02.872 E114 48.931
5a	Garden of Eden area, stream flowing into Deer Cave	Rocky, open stream	N4 01.884 E114 50.031
5b(p)	Garden of Eden area, tributaries of stream flowing into Deer Cave	small, steep streams	N4 01.784 E114 50.131, N4 01.788 E114 50.280, N4 01.757 E114 50.164
6a	Long Lansat, main stream	open lowland stream	
6b	Long Lansat, tributaries of main stream	small, steep streams	
7a	Main stream at Camp 1	Rocky, open mountain stream	N4 02.944 E114 51.499
7b	Smaller streams near Camp 1	Sluggish, shady streams	N4 02.907 E114 51.579, N4 02.866 E114 51.666, N4 03.007 E114 51.477
7d	Large stream crossed by summit trail shortly before junction with Sarawak Chamber trail	Rocky, open mountain stream	N4 03.249 E114 51.235
8a	Between Camp 1 and Camp 3, streams at Camp 2	small, steep streams	N4 02.433 E114 52.265, N4 02.510 E114 52.278
8b	Between Camp 1 and Camp 3, streams away from the trail slightly lower on the mountain	small, steep streams	N4 02.538 E114 52.265, N4 02.573 E114 52.209, N4 02.617 E114 52.162
9a(p)	Forest pools near to and above Camp 3	forest pools	N4 02.282 E114 53.252, N4 02.212 E114 53.437
9b(p)	Stream at km 11.5 near to Camp 3	small, steep streams	N4 02.294 E114 53.155
9c(p)	Stream "Jeffry" at km ≈12.6 (down left of the trail)	small, steep streams	N4 02.194 E114 53.486, N4 02.230 E114 53.493
9d(p)	Stream above km 13 (down right of the trail)	small, steep streams	N4 02.107 E114 53.474, N4 02.094 E114 53.486
10	Streams on the old trail to the Sarawak Chamber	Densely vegetated lowland streams	
11a	Streams in alluvial forest close to Sungai Melinau and to Park buildings at base camp as far as streams on trail to Moon Milk cave	Sluggish, shady stream	N4 02.770 E114 48.727, N4 03.037 E114 48.888, N4 03.229 E114 49.358
11b	Pools and treeholes in alluvial forest close to Sungai Melinau and to Park buildings at base camp as far as streams on trail to Moon Milk cave	forest pools and treeholes	N4 03.037 E114 48.888
12	Sungai Melinau upstream from Park HQ (until Camp 5)	open lowland streams/ rivers	N4 02.733 E114 48.593

Nr.	Name	Habitat	GPS coordinates
14a	Streams crossing the trail between Sungai Melinau (Kuala Litut) and Camp 5	Sluggish, shady streams	N4 08.206 E114 52.552
14d(p)	Streams somewhat away from trail between Sungai Melinau (Kuala Litut) and Camp 5	Sluggish, shady streams	N4 08.168 E114 53.068
15	Sungai Melinau at Camp 5	open lowland streams/rivers	N4 08.162 E114 52.462
P1a	Sungai Melinau Paku upstream from Bridge (Deer Cave Trail)	open lowland stream	N4 02.272 E114 49.773
P1b	Sungai Melinau Paku downstream from the Bridge (Deer Cave Trail)	open lowland stream	N4 01.586 E114 48.649
P2a	Sungai Lupar upstream from Botany Loop	Densely vegetated low-land streams	N4 02.403 E114 49.025
P2b	Small muddy tributaries of Sungai Lupar	Sluggish, shady streams	N4 02.436 E114 49.087
P3a	Paku Valley Loop, swampy areas and swampy streams	Sluggish, shady streams/ponds	N4 03.003 E114 49.399, N4 02.882 E114 49.478, N4 02.753 E114 49.552, N4 02.692 E114 49.477
P4a	Area east (outside) from the garden of Eden, stream flowing into Deer Cave (upstream from Waterfall)	Rocky, open mountain stream	N4 01.671 E114 50.387
P4b	Area east (outside) from the garden of Eden, big tributary of a, joining at the Waterfall	Rocky, open mountain stream	N4 01.730 E114 50.566
P4c	Area east (outside) from the garden of Eden, tributaries of a and b	small, steep streams	N4 01.759 E114 50.395, N4 01.701 E114 50.363, N4 01.594 E114 50.578
P5a	Camp 4 area, tributary of Sungai Tapen, down at Camp 4	small, steep stream	N4 02.507 E114 54.825
P6a	Streams crossing "researchers trail" to Bat Cave	small, steep streams	N4 07.946 E114 54.144, N4 07.778 E114 54.266, N4 07.766 E114 54.302, N4 07.748 E114 54.314
P6b	Streams away from "researchers trail" to Bat Cave	small, steep streams	N4 08.041 E114 54.030, N4 07.962 E114 54.093
P7a	Sandy pools and streams on the Bat Cave Plateau	sandy pools and streams	N4 07.721 E114 54.493
P7b	Partially submerged streams on the Bat Cave Plateau	Limestone rock formations with partially submerged streams	N4 07.713 E114 54.604
P8a	Streams in area southeast of Sungai Long Lansat	Rocky, open mountain streams	N4 00.128 E114 49.560, N3 59.964 E114 49.679, N4 00.427 E114 49.696
P8b	Tributary streams in area southeast of Sungai Long Lansat	small, steep streams	N3 59.727 E114 49.823, N3 59.879 E114 49.787

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Rebora, M., Piersanti, S. & E. Gaino. 2004. Visual and mechanical cues used for prey detection by the larva of Libellula depressa (Odonata Libellulidae). Ethology, Ecology & Evolution 16(2): 133-144.

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79	2010	Villanueva, Reagan, Philippinen	Odonata of the Diomabok-Lake region south of Davao, The Philippines Follow-up
80	2011	Villanueva, Reagan, Philippinen	Odonata of the Catanduanes-Island, The Philippines
81	2012	Villanueva, Reagan, Philippinen	Odonata of Dinapique, The Philippines
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84		Marinov, Milen, Christchurch	Odonata of Solomon Islands
85	2012	Villanueva, Reagan, Philippinen	Odonata from Talaingod, Davao del Norte, Mindanao Island, Philippines
86	2012	Do Manh, Cuong, Hanoi, Vietnam	Mau Son Mountain Odonata, Vietnam
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101	2014	Dow, Rory, UK/The Netherlands	Naming an Onychogomphus from Malaysia
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103	2014	Marinov, Milen, Christchurch, New Zealand	Odonata of Samoa, revisiting the localities from Fraser 1925, 1926, 1927, 1953 and 1956
104	2014	Ahmed Zia, Pakistan	Zygoptera in eastern Pakistan
105	2014	Saeed, Muhammad & Fazlullah Gujjar, Haripur, Pakistan	Progress study: Distribution and diversity of Odonata with emphasis on Gomphidae and Cordulegastridae in the border region of Pakistan and Afghanistan and China