The Zygoptera of Viti Levu and Vanua Levu, the two larger islands in the Fiji archipelago

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Agriocnemis exsudans (Photo by Hans Van Gossum)

ABSTRACT

In 2005 we started a study of the ecology and evolutionary history of damselflies of the genus *Nesobasis*, endemic to Fiji. In addition we made account of the species of Zygoptera present at our study sites, and made notes on the Anisoptera. In general, the odonate fauna of the Fiji archipelago is poorly studied. Here, we provide an historical overview of the knowledge on this fauna and give details of the species we encountered in August - September 2005. We made observations and collected voucher specimens for 2 species of the genus *Ischnura*, 2 of the genus *Agriocnemis*, 1 of the genus *Austrolestes*, 7 of the genus *Melanesobasis* and 25 of the genus *Nesobasis*. For *Melanesobasis* we also made account of an additional subspecies. Further, we discovered 2 species of damselfly new to science, 1 on Viti Levu and 1 on Vanua Levu, both belonging to the genus *Nesobasis*.

Our results indicate that further exploration within the Fiji archipelago will be rewarding and that more species new to science are to be discovered. We hope our work will spur further interest in the Pacific, which will be essential if we are to conserve the unique community of damselflies encountered in this region.

INCENTIVE FOR OUR STUDY ON NESOBASIS DAMSELFLIES

In a famous remark, Charles Darwin (1874) once observed that while reproduction without sex was widespread in the animal kingdom there was currently no evidence of asexual reproduction in either humans or dragonflies (Odonata). However, recent work by Prof. Adolfo Cordero and colleagues, would lead Mr. Darwin to revise his view. Inspired by a literature report that only females of the damselfly species *Ischnura hastata* could be found on the Azores Islands, the scientists were stunned to discover that the species was parthenogenetic on these islands (adults reproduce from unfertilized eggs without the need for males). Indeed, over the past two years, females of *I. hastata* have been reared in the laboratory over nine generations without ever producing a male (Cordero et al., 2005).

On the island archipelago of Fiji there exists a genus of damselfly, *Nesobasis*, containing >20 species which are found nowhere else on the planet (Donnelly, 1990). In some members of this genus (*N. flavostigma* and *N. caerulescens*) females are common, but males have never been found (Donnelly, 1990), raising the very real possibility that these species are also parthenogenetic. Yet the story might be even more intriguing. In one of the most common of these damselfly species (*N. rufostigma*) males appear to behave more like females and *vice-versa*, a phenomenon known as “sex-role reversal” in birds, but never seen before in damselflies. Thus, unlike all other damselfly species outside Fiji (e.g. Corbet, 1999), it appears that the females of this species defend territories, while little is known about the males (Donnelly, 1990; 1999).

The aim of our 2005 research was to study the ecology and evolution of the genus *Nesobasis*. Specifically, our aims included evaluating whether females of species such as *N. rufostigma* do actively defend territories and questioning what behaviour males of these species show. Also, our objective was to study the ratios of males and females at the water and further away. This should learn whether ratios of males to females differ among the different species of this damselfly genus. Ultimately, our aim is to find out whether some species of *Nesobasis* are examples of sex-role reversal, while others may reproduce parthenogentically and yet others reproduce in ways comparable to damselflies as seen worldwide. Also, we hope to unravel the mechanisms behind such potential variation in modes of reproduction.

LOCAL COLLABORATION AND INTERNATIONAL NETWORK

Our work was advanced though collaboration with researchers at the Department of Biology of the University of the South Pacific (USP). In particular we collaborated with Dr. Tim Markwell and Dr. Linton Winder, Head of the Department of Biology. Dr. Markwell's interests include ecology, behaviour and conservation with an emphasis on island organisms. Dr. Winder has performed considerable research in insect ecology in the past and with his recent move to USP he has focused his research on the ecology and diversity of island insects. Colleagues at USP provided invaluable support for this project in first-hand knowledge of the ecosystems of Fiji as well as familiarity and sensitivity to the unique cultural aspects of work in these islands. Dr. Winder, as the head of the Biology Department, is working to promote collaboration between USP faculty and students and international researchers. The international collaborations developed in this project (see next paragraph) allow exposure of students and faculty at USP to a range of knowledge and expertise and the opportunity to establish research relationships. In 2005 we introduced one student (Hilda Waqa) to taxonomic and behavioural research on odonates. During future visits our objectives will include involving more students in our research. Specifically, we aim to help promote the pursuit of graduate degrees by Fijian students in Biology.

Further international collaboration outside Fiji in connection with this project is extensive and occurs with:

- Drs. Gregory Hurst (University College London, UK) and Sylvain Charlat (University of California Berkeley, Gump Research Station, French Polynesia) for identifying types and degrees of infection by endosymbionts of damselflies of the genus Nesobasis.
- Dr. Jeff Skevington (Agriculture Canada) and Arash Rashed (Carleton University, Canada) for developing the phylogeny of the damselflies based on mitochondrial and nuclear genes.
- Dr. Nick Donnelly for taxonomy and identification of *Nesobasis* specimens.
- Dr. Adolfo Cordero and Olalla Lorenzo for rearing damselflies under controlled laboratory conditions.

THE FIJI ARCHIPELAGO

The Fiji Islands occupy an ocean area of about 650,000 km², of which the land area is less than 3% (Evenhuis & Bickel, 2005). Fiji consists of approximately 320 islands located between 16° and 20°S, 177°W and 175°E (Ryan, 2000). The highest elevation is Mt Tomaniivi (1,323m) situated on Viti Levu.

The majority of the land area in Fiji is volcanic, with some areas of reef-formed limestone and coastal sedimentary deposits (Ryan, 2000). We focused our study on the two larger islands in the archipelago: Viti Levu (10,388 km²) and Vanua Levu (5,535 km²).

Fiji has a warm, humid tropical maritime climate. There are few extremes in temperature, with mean monthly temperatures from 22°C in July to 26°C in January (Evenhuis & Bickel, 2005). The high central plateaux and mountains of the interior of the main islands create a rain shadow. This makes the western areas much drier with more distinct seasonal differences compared to the eastern sides, where the predominant wind flow is the south-east trade (Ryan, 2000). Fiji supports a wide variety of habitats, including lowland and montane forests, coastal communities and mangroves, inland swamps, mixed grasslands and inland waters (Ryan, 2000).

Introduction to the odonates of Fiji and its researchers

Damselflies have been studied intensively for many aspects of their biology in temperate zones; also most tropical areas have received significant attention; but some regions remain largely unexplored. The southwest Pacific, where our study was conducted, is one such example of an area where most discoveries on damselfly biology remain to be made. This is unfortunate: the World Summit on Sustainable Development has recognized island communities as essential to global well being, and biodiversity (Cicin-Sain et al., 2002). We hope the future will bring further exploration of the rich and unique fauna of the Pacific.

Up to the present, limited exploration has been done on the Odonata of the Fiji Islands. In the late nineteenth century Selys contributed to our knowledge on the *Nesobasis* species (Selys, 1891). Thereafter Tillyard provided an overview of all knowledge on the species observed on Fiji by 1924 (Tillyard, 1924). The late twentieth century was marked by further explorations, especially by Donnelly. This resulted in detailed papers on the distribution and taxonomy of members of the genera *Nesobasis* (Donnelly, 1990) and *Melanesobasis* (Donnelly, 1984). Also, Dan Polhemus has paid attention to the odonates of the Pacific region, including Fiji, as part of the Arthropod surveys he has been/ is involved in. Dan Polhemus and Neal Evenhuis do provide a list of the Odonata of Fiji on the internet (http://hbs.bishopmuseum.org/fiji/checklists/odonata.html). Finally, we (Chris Beatty, Tom Sherratt and Hans Van Gossum) have taken an interest in the Odonata (especially the genus *Nesobasis*) of Fiji since 2005.

METHODS

Our study took place between August 4 and September 30, 2005, during which we sampled odonates at localities on Viti Levu and on Vanua Levu, the two larger islands within the Fiji archipelago. In most instances this required the odonates to be caught and thereafter to be identified in the laboratory at the University of the South Pacific. In several occasions identification of species requires magnifying glasses (20 times) or a field-microscope, as a close look at the exact structure of genitalia and/or mesostigmal laminae is required (see Donnelly, 1990).

Sampling occurred through netting all observed damselflies occurring at any of the studied rivers, whereafter individuals were assigned to genus and species. Additionally, we noted the date, latitude and longitude, and the approximate time our sampling took. Many sites were only sampled for very short times (<1h) because of our research aims. Here, we report on sites for which minimally one hour of sampling occurred allowing for the more common species at a site to be detected (see Beatty et al., submitted). We have also chosen to exclude sites for which we sampled for an hour or greater, but where our sample efforts were only focused on the capture of particular species for our research; in these cases sampling effort would not provide an unbiased sample of species diversity at a site. Very long periods of sampling (longer than we usually conducted) may allow detecting species that are rare or may be present at the water at different times of the day than those sampled (see Beatty et al., submitted). In those instances where we observed a species at a site that we visited only shortly (<1h) but the species was not observed at any of the other sites here included we provide further details.

LOCALITIES AND SPECIES

21 *Nesobasis* species were previously described (Tillyard, 1924; Donnelly, 1990). For Vanua Levu more species have been observed in the recent past by Donnelly and these will be the topic of a forthcoming publication (Donnelly unpublished manuscript). With respect to the latter and as agreed upon with Nick Donnelly, in what follows we use the first letter(s) of the species names Donnelly will be using in his forthcoming manuscript to allow convenient comparison. In addition during our sampling we found two species of *Nesobasis* new to science, here referred to as undescribed species (*Nesobasis uds1* and *uds2*). Also for *Melanesobasis* we encountered one undescribed species which we refer to as *Melanesobasis uds*.

Species of Zygoptera observed during our study for
Viti Levu: *Agriocnemis exsudans*, *A. vitiensis*, *Austrolestes vitiensis*, *Ischnura aurora*, *I. heterosticta*, *Melanesobasis corniculata corniculata*, *M. flavilabris*, *M. maculosa*, *M. mcleani*, *M. simmondsi*, *Nesobasis angulicollis*, *N. caerulecaudata*, *N. campioni*, *N. comosa*, *N. erythrops*, *N. flavifrons*, *N. heteroneura*, *N. longistyla*, *N. malcolmi*, *N. monticola*, *N. pedata*, *N. rufostigma*, *N. selysi*, *N. telegastrum*, *N. uds1*
Vanua Levu: *Agriocnemis vitiensis*, *Melanesobasis corniculata marginata*, *M. flavilabris*, *M. prolixa*, *M. uds*, *Nesobasis au*, *N. al*, *N. brachycerca*, *N. c*, *N. f*, *N. l*, *N. r*, *N. t*, *N. uds2*, *N. v*

More in detail; sites and species for Viti Levu were (see Figure 2a):

- Abaca Road 2 (17° 39.99' S; 177° 31.65' E, elev. 380m), sampled on 23 August and 23 September, 1-2 km before entering Abaca Village one passes a narrow stream valley with dense vegetation on both sides, we sampled a small stream at the left-hand side of the road driving towards Abaca Village: *Austrolestes vitiensis*, *M. simmondsi*, *N. angulicollis*, *N. comosa*, *N. erythrops*, *N. flavifrons*, *N. longistyla*, *N. monticola*, *N. pedata*, *N. selysi*, *N. telegastrum*
- Abaca Road 3 (17° 40.11' S; 177° 32.52' E, elev. 535m), sampled on 23 August and 23 September, on Vereni Creek, a medium-sized stream which is located behind Abaca Village, in Abaca National Park, the stream is high gradient with cascades and waterfalls flowing over exposed rock and boulders, we sampled an area with water running over large patches of exposed rock: *N. angulicollis*, *N. comosa*, *N. erythrops*, *N. flavifrons*, *N. longistyla*, *N. malcolmi*, *N. rufostigma*, *N. uds1*
- Korowaiwai (17° 36.18' S; 177° 56.83' E, elev. 700m), sampled on 14 August, where the road from Nadarivatu to Lewa crosses a second bridge, we sampled the river at both sides of the bridge: *Agriocnemis vitiensis*, *Austrolestes vitiensis*, *N. angulicollis*, *N. comosa*, *N. erythrops*, *N. monticola*, *N. rufostigma*, *N. selysi*
- Namosi Road 6 (18° 06.74' S; 178° 11.21' E, elev. 265m), sampled on 11 September and 22 September, second small waterfall above Wainikovu Tributary at road post 8/10: *M. corniculata corniculata*, *M. flavilabris*, *N. angulicollis*, *N. campioni*, *N. comosa*, *N. erythrops*, *N. longistyla*, *N. rufostigma*
- Nukunuku (17° 37.11' S, 177° 56.71' E, elev. 660m), sampled on 14, 24, 26 August and 5 September, road crossing just downstream of confluence between Vunikadanu Creek and Nukunuku Creek: *I. heterosticta*, *N. angulicollis*, *N. erythrops*, *N. heteroneura*, *N. rufostigma*, *N. selysi*

Figure 1: *N. malcolmi* (left upper panel), *N. uds2* (left middle), *N. erythrops* (left lower panel), *N. rufostigma* (right upper panel), *N. brachycerca* (right middle) and *N. heteroneura* (right lower panel). Photos have been reduced in quality. Photo credits: Hans Van Gossum.

- Qualiwana Tributary (17° 36.45' S; 177° 59.34' E, elev. 725m), sampled on 14 August, a small tributary of Qualiwana Creek running out of the Forest Preserve north of the sub depot bridge: *Agriocnemis vitiensis*, *Austrolestes vitiensis*, *I. heterosticta*, *M. corniculata corniculata*, *M. flavilabris*, *N. erythrops*, *N. selysi*
- Vaqo Creek (18° 04.89' S; 178° 26.57' E, elev. 50m), sampled on 11 August, upstream of confluence with Savua River: *I. heterosticta*, *M. maculosa*, *N. rufostigma*, *N. selysi*
- Vaturu Dam Road 2 (17° 46.23' S; 177° 36.58' E, elev. 430m), sampled on 22 August, steep-gradient stream crossing Vaturu Dam Road, many very large boulders and exposed bedrock: *Austrolestes vitiensis*, *M. flavilabris*, *N. angulicollis*, *N. caerulecaudata*, *N. comosa*, *N. erythrops*, *N. flavifrons*, *N. longistyla*, *N. rufostigma*, *N. selysi*
- Waikubukubu (17° 32.84' S; 177° 56.62' E, elev. 210m), sampled on 15 August and 5, 6, 7, 9 and 24 September, section 0.5km from Waikubukubu Village at left-hand site coming from the village: *Austrolestes vitiensis*, *I. heterosticta*, *M. corniculata corniculata*, *M. flavilabris*, *M. maculosa*, *M. mcleani*, *M. simmondsi*, *N. angulicollis*, *N. caerulecaudata*, *N. erythrops*, *N. flavifrons*, *N. heteroneura*, *N. longistyla*, *N. pedata*, *N. rufostigma*, *N. selysi*, *N. telegastrum*
- Wainikovu (18° 06.39' S; 178° 10.82' E, elev. 230m), sampled on 11 August and 11 and 22 September, small stream with open areas and sections shaded by overhanging vegetation: *Austrolestes vitiensis*, *M. flavilabris*, *M. maculosa*, *N. angulicollis*, *N. comosa*, *N. erythrops*, *N. rufostigma*, *N. selysi*

For Vanua Levu (see Figure 2b) we sampled:

- Bagasau Creek (16° 42.90' S; 179° 43.67' E, elev. 55m), sampled on 17 September, the stream adjoining the road east of Bagasau Village on the eastern peninsula: *Agriocnemis vitiensis*, *N. l*, *N. v*
- Lomaloma Falls (16° 37.38' S; 179° 10.00' E, elev. 300m), sampled on 18, 19 and 20 September, waterfall next to the main road on the right-hand side between Lomoloma and Saivou west of Savusavu: *M. corniculata marginata*, *M. flavilabris*, *M. prolixa*, *M. uds*, *N. au*, *N. al*, *N. brachycerca*, *N. c*, *N. l*, *N. t*, *N. uds2*, *N. v*
- Niuwauvudi Creek (16° 38.12' S; 179° 45.18' E, elev. 230m), sampled on 17 September, a deep stream (1-2m depth) near the forestry station in the drainage upslope from Bagasau: *Agriocnemis vitiensis*, *N. brachycerca*, *N. l*, *N. t*

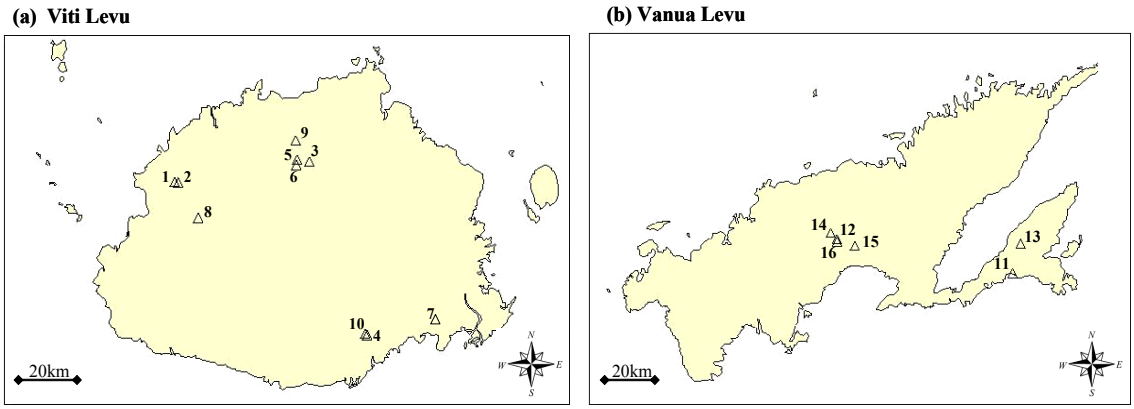

Figure 2: (a) Map of Viti Levu showing site locations. Location names are 1) Abaca Road 2; 2) Abaca Road 3; 3) Korowaiwai; 4) Namosi Road 6; 5) Nukunuku; 6) Qualiwana Tributary; 7) Vaqo Creek; 8) Vaturu Dam Road; 9) Waikubukubu; 10) Wainikovu.
(b) Map of Vanua Levu showing site locations. Location names are 11) Bagasau Creek; 12) Lomaloma Falls; 13) Niuwauvudi Creek; 14) Raviravi Creek; 15) Sauvuqoro Creek; 16) Volivoli Creek.

- Raviravi Creek (16° 36.44' S; 179° 08.87' E, elev. 90m), sampled on 19 September, a small stream entering the river at Saivou village: *M. corniculata marginata*, *M. prolixa*, *N. au*, *N. al*, *N. brachycerca*, *N. l*, *N. uds2*, *N. v*
- Sauvuqoro Creek (16° 38.50' S; 179° 13.50' E, elev. 250m), sampled on 20 September, a stream with pools in the Waisali Nature Preserve along the nature trail: *M. corniculata marginata*, *M. uds*, *N. al*, *N. brachycerca*, *N. f*, *N. r*, *N. t*, *N. v*
- Volivoli Creek (16° 37.75' S; 179° 10.08' E, elev. 135m), sampled on 18 and 20 September, a large stream with much fast flowing water (1-2m deep in some places) on the left-hand side between Lomoloma and Saivou, to reach the stream one should follow a dirt track on the left after having passed Lomaloma coming from Savusavu, where the tracks crosses the river we obtained our samples: *N. al*, *N. l*, *N. uds2*, *N. v*

Two species of Zygoptera were each only observed at one locality, where they were locally very common: *A. exsudans* was found at Monasavu Marsh (17° 41.03' S; 178° 00.27' E) on 2 September; *I. aurora* was present during August and September at a small pond at university.

For the Anisoptera *Diplacodes bipunctata*, *Orthetrum serapia*, and *Procordulia irregularis* were observed at many of our sample sites on Viti Levu. Further, we collected two specimens *Gynacantha* aff. *stevensoni* (Fraser, 1927) in the shower house of the Raintree Lodge (our accommodation near to Suva) and one *Anax guttatus* at Waikumbukumbu. For Vanua Levu we collected one *Procordulia irregularis* at Lomaloma and *Lathrecista asiatica* at Bagasau. Wolfgang Schneider also identified a male *Hypothemis hageni* among our voucher specimens. Some further species were seen on the wing but could not be collected or identified. Therefore, we think the Anisoptera species reported here is only a fraction of the diversity present on these islands.

Behaviour and reproduction in the genus *Nesobasis*

Sex-role reversal occurs when males and females exchange their standard roles in territorial defence or parental care. One circumstance under which sex-role reversal may occur is when females outnumber males in a population, such that females have to compete for access to males. Preliminary reports suggested that some species of the genus *Nesobasis* exhibit showed female territorial behaviour and absence of near absence of males. Our results, indeed, support that for some species of Nesobasis males are rare (*N. rufostigma*, *N. heteroneura*) to absent (*N. malcolmi*), at least in the populations we were able to survey. In other species ratios of males to females are as seen as in damselflies worldwide (*N. selysi*, *N. angulicollis*, *N. erythrops*) (see also Van Gossum et al., submitted). Formal observations of where both males and females were common, confirmed that males of these species were highly territorial, in that they physically challenged intruders while remaining within a confined area. By contrast in three species where males were consistently rare or absent, females were not territorial and moved widely (Van Gossum et al., submitted). While we do not know the underlying reason for the rarity of males in some species, it is clear that it has not provided sufficient selection pressure to generate genuine sex-role reversal.

Future work will further explore causes for male rarity. One of our current projects concerns developing a phylogenetic analysis for all the species of *Nesobasis* we collected.

Figure 3: *N. longistyla* (left upper panel), *I. heterosticta* devouring *N. erythrops* (left lower panel), *N. comosa* (right upper panel), and *N. angulicollis* (right lower panel). Photos have been reduced in quality. Photo credits: Hans Van Gossum.

USE OF MONEY FROM IDF

The money granted by IDF for our project was spent on car rental and training of a local student. Hilda Waqa, student at USP, joined us on a four day trip trough the interior of Viti Levu, where we introduced her to the odonates, and instructed her to behavioural study.

ACKNOWLEDGMENTS

We are very much in debt to Nick Donnelly for his many years of work in describing *Nesobasis* damselflies, in raising the idea, and for his advice, knowledge and hospitality during our visits to his house and his stimulating enthusiasm. We would further like to thank Linton Winder, Marika. Tuiwawa and Tim Markwell, for facilitating our stay in Fiji. We also thank Dan Polhemus for sharing his knowledge on species identification and distribution. We thank Hilda Waqa for her assistance in the field. We thank Martin Schorr for organizing funds with the International Dragonfly Fund for our project, for his interest in our work and for sending us information on Fijian Odonata and on *Wolbachia*. We thank Wolfgang Schneider for identifying or confirming the identity of the Anisoptera we did collect. Finally, we thank Wolfgang Schneider for valuable comments on an early draft. The Ministry of Fisheries & Forests gave permission to collect and export sample specimens of the damselflies. Funding was provided by the International Dragonfly Fund (specifically Rolf Busse, Jürgen Ruddeck, Florian Weihrauch, and Hansruedi Wildermuth showed kindness and interest in our work through contributing by individual funds via the International Dragonfly Fund), the University of Antwerp and the Fund for Scientific Research-Flanders to Hans Van Gossum; Carleton University to Chris Beatty; and NSERC to Tom Sherratt. HVG is a postdoctoral fellow with the Fund for Scientific Research-Flanders.

We feel it appropriate to make a note on the cultural aspects that come with conducting field research on Fiji. Most of the land officially belongs to the Fijian people, with the lands surrounding a village under the control of the village chief. Accessing land for scientific research requires the permission of the chief. Requesting permission involves a ceremony in which visitors present a gift of kava (the roots of the plant *Piper methysticum*, which is used for making a ceremonial drink) and explain the purpose of the visit. Our project brought us in contact with many native Fijians; we always experienced very friendly and enthusiastic reactions to our research and often we benefited by a person of the village accompanying us during our field work.

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Förderprojekte des International Dragonfly Fund e.V. 1996 - 2006

Nr.	Jahr	geförderte Person bzw. Körperschaft	Fördergegenstand
1	1996	Societas Internationalis Odonatologica	Druckkostenzuschuß zur Herausgabe von zwei Nummern des Mitteilungsblattes Selysia
2	1997	Stansilav Gorb	The role of visual cues in mate recognition in the damselfly Coenagrion puella (L.)
3	1997	SGL Baden-Württemberg	Pflege- und Entwicklungsplan Weberalten
4	1997	Greg O'Neill	Studies of a dragonfly biodiversity gradient in Ghana, West Africa
5	1998	Paul-Michael Brunelle	The status of Somatochlora brevicincta (Anisoptera, Corduliidae) in the maritime provinces, Canada
6	1998	Graham Vick	Visit of the nature reserve Mount Oku (Cameroun) by Otto Mesumbe
7	1998	Viola Clausnitzer	Identification key of East African Odonata I
8	1999	Klaus Reinhardt	Untersuchungen zur Libellenfauna Ost-kasachstans
9	1999	Steffen Förster	Bestimmungsschlüssel für die Libellen Mittel-amerikas
10	1999	Arjèn van't Hof	Behavioural ecology of the giant damselfly Megaloprepus coerulatus
11	1999	Viola Clausnitzer	Identification key of East African Odonata II
12	1999	Milen Marinov	Distribution of Somatochlora metallica and S. meridionalis in Bulgaria
13	1999	Thomas Artiss	Molecular systematics and the evolution of genitalia in libellulid dragonflies
14	2000	Viola Clausnitzer	Identification key of East African Odonata III
15	2000	Jens Kipping	Libellen des Harry Oppenheimer Okavango Research Centre in Maun, Botswana, Afrika: Reisekostenzuschuß
16	2000	Diane Srivastava	Are rainforest canopies important for Mecistogaster modesta?
17	2000	Milen Marinov	Annotated odonatological bibliography of Bulgaria
18	2000	Kosterin / Zaika	Dragonfly research in the Tuva-Region.

Nr.	Jahr	geförderte Person bzw. Körperschaft	Fördergegenstand
19	2001	Garcia / Dijkstra	Odonata of Ankarafantsika Forest Reserve, Madagascar
20	2001	Kosterin	Provisional revision of the genus Enallagma
21	2001	Dijkstra	Oreocnemis phoenix in Malawi
22	2002	Marinov	Zuschuss zur Verteidigung der Dissertation
23	2002	Sévérin Tchibozo	Inventaire des libellules des zones humides du Sud-Bénin
24	2003	Francy Kakkassery	Flugreisekostenzuschuss, WDA-Symposium, Australien
25	2003	Do Cuong, Hanoi	Beschaffung von Literatur zu den Libellen Vietnams
26	2003	KD Dijkstra, Leiden	Fertigstellung des Bestimmungsschlüssels "Ostafrikanische Libellen"
27	2004	Seffen Oppeln, Goroka	Odonata of the Crater Mountain Wildlife Management Area (Papua New Guinea)
28	2005	Lyudmyla Khrokalo, Kiew	Flugreisekostenzuschuss, WDA-Symposium, Spanien
29	2005	Vladimir Skvortsov	Handbook of East European Odonata
30	2006	van Gossum, Hans, Belgien	Odonata of Fidji-Islands
31	2006	Do Cuong, Hanoi	Handbook / Checklist Odonata of Vietnam
32	2006	Cosim Manci, Rumänien	Compilation of Romanian odonate data in a database for mapping distribution maps
33	2006	Joachim Hoffmann, Hamburg	Auswirkungen des Klimawandels auf die Aeshnidae in Peru