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SYNOPSIS OF THE PHILIPPINE ODONATA, WITH LISTS OF SPECIES RECORDED FROM FORTY ISLANDS *

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A list of dragonflies known from the Philippines is presented with data on their distribution by the accuracy of the islands. In addition to the 224 named spp. (and 3 sspp.), some 65-70 still undescribed or unidentified (to species level) taxa are listed. Detailed collecting data are presented for 14 named spp., which are listed from the Philippines for the first time, viz. *Archibasis viola, Ceriagrion cerinorubellum, Acrogomphus jubilaris, Ictinogomphus decoratus melaenops, Gynacantha arsinoe, G. dohrni, Heliaeschna simplicia, H. uninervulata, Indaeschna grubaueri, Tetracanthagyna brunnea, Macromia westwoodi, Aethriamanta gracilis, Neurothemis fluctuans* and *Rhyothemis obsolescens. Prodasineura obsoleta* (Selys, 1882) is synonymized with *P. integra* (Selys, 1882) and *Gomphidia platerosi* Asahina, 1980 with *G. kirschii* Selys, 1878. A few other possible synonymies are suggested for future confirmation. A brief review of the earlier studies on Philippine Odonata is presented. Grouped according to the present understanding of the Philippine biogeographical regions, all major islands are briefly characterized and separate lists are given for 40 islands. The records are based on literature data, and on ca 27 000 specimens in Roland Müller's collection, ca 2 000 specimens in coll. Ris at SMF and on some other smaller collections studied by the authors.

INTRODUCTION

While the second author made plans for a zoological expedition to the Philippines in 1985, Dr Bastiaan K i a u t a suggested him to take collecting of dragonflies as one of the goals, because the knowledge of the Philippine Odonata fauna was very inadequate.

Collecting dragonflies was rather random and incidental during the visits to Luzon,

* Results of the Roland Müller Zoological Expeditions to the Philippines, No. 14.

Mindanao and Palawan in April-June 1985. However, a total of 344 specimens representing 59 species were netted. During the next expedition to Mindanao and Sibuyan in July-August 1986 a total of 533 specimens of 45 species were collected.

These specimens were sent to the first author for identification in 1986. As he could confirm that the collection included a dozen undescribed species, the study of the Philippine dragonfly fauna became Roland Müller's main zoological interest during the next six expeditions in 1987-1996 (cf. Appendix).

During these expeditions many local collectors have been trained for dragonfly collecting. Since 1988 some of them have made extensive own collecting trips to several islands, and some others have collected only in their home island. It has been practice to send the collectors to the islands and localities from where, according to the literature, none or very few dragonflies were known. Most of the material originates from these trips. One or two of the collectors usually visited the sites beforehand, that were selected as targets for Roland Müller's own expeditions.

Fig. 1. Approximate position of localities of the specimens in Roland Müller collection.

The present or past collectors, most of whom also served as guides in the group are: Theobaldo B. Borromeo and his son Theobaldo B. Borromeo, Jr., Alex Buenafe, Wilfredo Catal, Adrian Gorostiza, Lionel Gorostiza, Celso M. Nazareno and J. de los Reyes. In addition there have been a few more casual contributors.

A considerable amount of specimens has accumulated as the result of a "side-activity" of colleagues and friends during their own expeditions. Colin G. Treadaway (Limbach, Germany), assisted by Theobaldo B. ("Dodong") Borromeo, has during his butterfly collecting trips netted

also plenty of dragonflies from many islands; among them are several new species. Arne S c h a n o w s k y (Germany) provided a small collection, including a new species, *Gynacantha constricta* Hämäläinen, 1991, from Luzon in 1988. Lorenzo V i n c i g u e r r a (Bern, Switzerland), who is working on bats, gathered in May-June 1992 (with Adrian Gorostiza and Alex Buenafe) a fine collection from Palawan and in January-February 1994 from Mindanao and Palawan (with E. H o r n).

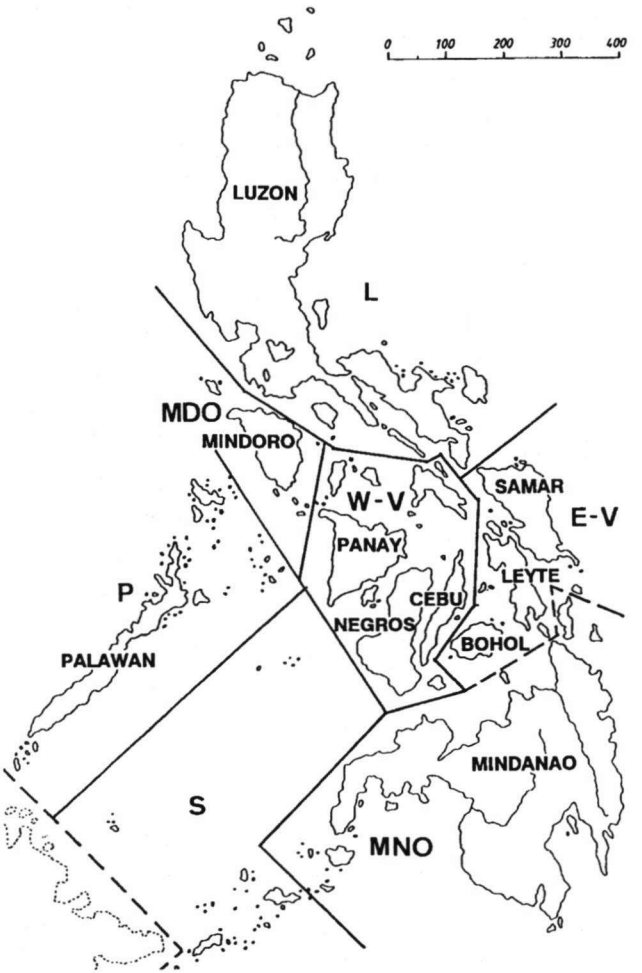


Fig. 2. Biogeographic division of the areas of endemism in the Philippines, modified from VANE-WRIGHT (1990, fig. 6, p. 26). – [Abbreviations: L = Luzon region; – MDO = Mindoro region; – W-V = West Visayan region; – E-V = East Visayan subregion; – MNO = Mindanao subregion (E-V and MNO together form Mindanao region; – P = Palawan group (part of the Greater Sunda endemic area); – S = Sulu region]. – The Luzon, Mindoro, West-Visayan and Mindanao regions comprise the Philippines proper.

PRESENT SCOPE OF COLLECTION MÜLLER

At present (October 1, 1996) the Roland Müller Philippine dragonfly collection contains ca 27 000 curated and filed specimens, referable to ca 250 species. Some 2000 further specimens, mostly common species from various islands, are still waiting for curating. Some 75 species were (or still are) undescribed. The value of the collection is increased by the fact that the large majority of the specimens originates from the streams in primary forests. Common ricefield and pond species are poorly represented. The selective collection certainly underestimates the number of species in some islands.

All specimens have been identified by the first author. A computer file of the specimens is maintained. The material originates from 36 islands (Fig. 1), from ca 500 localities/dates. Some of the localities have been visited more than once, in different seasons.

PREVIOUS PUBLICATIONS ON COLLECTION MÜLLER

A brief general report on the results of the first expeditions was presented by MÜLLER (1989). HÄMÄLÄINEN (1994, 1996) based his reviews on the conservation aspects of the Philippine dragonflies mainly on Roland Müller's material. So far only a small part of this large material has been treated taxonomically or faunistically in various publications. The partial revision of the genus *Risiocnemis* (HÄMÄLÄINEN, 1991c, 1991d) is to a great extend based on Müller's specimens. Two smaller revisions of the genus *Cyrano* (HÄMÄLÄINEN, 1989b) and of *Neurobasis luzoniensis* (HAMALAINEN, 1990), as well as several minor papers, each describing 1-2 new species have been published, viz. HÄMÄLÄINEN (1989a, 1991a, 1991b, 1993), HÄMÄLÄINEN & MÜLLER (1989), MÜLLER (1992, 1996), MÜLLER & HÄMÄLÄINEN (1993). Altogether 20 new species and 1 new subspecies have so far been described, partly or exclusively from Müller's material. Müller and his coworkers have also found most of the remaining still undescribed Philippine species. Revisions of all Philippine members of some large genera, like *Drepanosticta*, *Amphicnemis* and *Teinobasis*, are badly needed. The very elusive species of the difficult genus of *Oligoaeschna* are also poorly known. Also the Philippine *Chlorogomphus* are in need of a careful revision.

ON THE CONTENTS OF THE PRESENT PAPER

At present we are aware of some 290-295 species to occur in the Philippines. Since a considerable proportion of them is still undescribed, and since new material is constantly coming from various islands by local collectors, and further expeditions are planned, it is far too early to attempt compiling a more detailed synopsis of the Philippine dragonflies. However, it seemed important to present some kind of a preliminary account of our present knowledge of the dragonfly fauna in the different islands of the Philippines. Aside from the Roland Müller collection, the information in the present paper is based on

- critical consideration of all published data;
- ca 2000 specimens (ca 135 species) in the Senckenberg Museum (SMF) Frankfurt/M;
- some of the material in the Nationaal Natuurhistorisch Museum (RMNH) Leiden; unfortunately, as yet we were unable to study all the Philippine material in this museum;
- specimens in National Museum of Natural History (USNM) Washington, DC;

– specimens preserved in some private collections.

Based on these sources, an annotated list of all species known from the Philippines is given with distribution data on pp. 256-276. A number of described species is recorded from the Philippines for the first time; only these species are furnished with detailed collecting data. Two new synonyms are presented and a few likely synonyms are tentatively proposed.

We know that many other museums and collections (especially in Japan and the Philippines) also contain plenty of unpublished Philippine material, the study of which would certainly increase the knowledge of species composition in different islands.

A brief history of the progress on the knowledge of the Philippine dragonfly fauna appears on pp. 253-256. It is neither aimed to be comprehensive, nor is the list of references complete. However, all major publications are listed.

On p. 285, a brief general chapter on the Philippines is presented. For more detailed information on the subject and for some useful travellers hints we warmly recommend the work of PETERS (1994).

In the second half of the paper, brief characterizations are given of the islands from where any dragonfly records are known. The islands are grouped in accordance with the present understanding of the regional zoogeography (Fig. 2). Within each region or subregion, the major islands are listed in sequence of their relative size. A separate species list is presented for each island.

Although the structure of the present publication may appear unusual, and the presentation not always satisfactory, we do hope that the paper will facilitate the work of the visiting and local dragonfly collectors alike.

HISTORY OF ODONATE STUDIES IN THE PHILIPPINES

Trithemis aurora (Burmeister, 1839) appears to be the first dragonfly species to be described from the Philippines, followed by *Euphaea refulgens* Hagen, 1853 and *Ictinogomphus tenax* (Hagen, 1854).

SEMPER's MATERIAL

Insect collections made by the German zoologist Dr Carl Gottfried Semper in 1859-1861 and 1863-1865 form the starting point of our knowledge on the Philippine dragonfly fauna. The following brief itinerary of his travels in the Philippines is compiled from data presented in SEMPER (1861, 1862) and WEIDNER (1967).

Semper arrived in Manila in December 1858 and collected first in its surroundings. In August 1859 he travelled to the south and worked mainly near Zamboanga in Mindanao and in Basilan. In March 1860 he returned to Manila and left for the northeastern part of Luzon in April 1860, travelling through Bulacan and Nueva Ecija to Baler in Aurora province. From there he proceeded along the coast to Palanan in Isabela province and further across the Sierra Madre mountain chain to Cagayan from where he had to return back to Manila due to an attack of malaria.

In April 1861 he left again for northern Luzon. His route proceeded through Nueva Ecija to San Nicolas and further to Benquet province. From there he visited also La Union province. At the end of July he arrived at Mankayan at the northern corner of Benquet. Unfortunately, we are not aware of his route thereafter, but he returned to Manila in November 1861, this time with dysentery. In order to recover

from the disease he embarked on a long voyage in the Pacific.

In 1863 he visited Bohol, Cebu, Leyte and Mindanao and in May-December 1864 stayed in the eastern and inner parts of Mindanao. Semper left Manila for Europe in May 1865.

BRAUER (1867, 1868a, 1868b) described 22 new species from Semper's dragonfly material. Hagen and De Selys Longchamps described in the 1860-1870s about a dozen new species from the Philippines, most of them from Semper's material, which at present seems to be scattered in museums in Brussels, Vienna and Cambridge, Mass.

The first synopsis of the Philippine dragonflies was compiled by de SELYS LONGCHAMPS (1882). A total of 77 species were listed, including 9 new species. Most of the specimens treated were collected by Semper. Most of the records were from Luzon, Mindanao, Bohol and Cebu, but a few came also from Mindoro, Basilan and Panaon. However, some of the species listed (incl. 2 newly described) appear to be mere synonyms, and actually only some 70 species were known at that time. Nine years later he published an addition to his "Odonates des Philippines" (1891), adding 7 species, including one new species. Meanwhile also KIRBY (1884) had reported on a few common species from the Philippines.

BOETTCHER's MATERIAL

RIS (1912, 1915) described four new species, collected in Mindoro and Samar in 1910-1911. Later F. Ris received splendid material, gathered by Dr med. G. Boettcher (Wiesbaden, Germany) in 15 islands between October 1913 and March 1918.

Boettcher, the author of some dipterological papers, travelled extensively in the archipelago. In November 1913 - January 1914 he was in North Palawan, in 1914 he collected in many Luzon provinces and left for the South in late November, stopping briefly at Negros on his way to Zamboanga and Basilan in December 1914. In 1915 he collected in many places in Mindanao (e.g. in Surigao), and visited also Samar, Leyte, Biliran, Panaon, Dinagat. In August-September 1915 he collected in Polillo and in the southern provinces of Luzon. In 1916 he was first in Mindoro and Luzon, but in July returned to Bohol, Camiguin, Surigao (in Mindanao) and collected in Siargao. His 1917-1918 material comes mostly from Luzon, but also from Mindoro.

Boettcher's material in the Senckenberg Museum (SMF) contains ca 1800 specimens of some 135 species. We do not know how many of his specimens are deposited in other museums. SCHMIDT (1951) described *Coeliccia boettcheri* from 13 specimens, taken at Binaluan in northern Palawan, preserved in Zoological Museum in Berlin. The Ris collection contains also 23 specimens from the same site, which were not mentioned in the *C. boettcheri* description.

Unfortunately, RIS (1930) published only a single paper, describing four new

euphaeid species from this rich collection. LIEFTINCK (1957) studied some *Amphicnemis* and *Teinobasis* specimens from it, but did not describe any of the new taxa in this material. The first author has recently studied the collection for his revisions of *Neurobasis* and *Risiocnemis* (HAMALAINEN, 1990, 1991c, 1991d). Boettcher's material is valuable also from the conservation point of view, since it was gathered when most islands were still covered with extensive primary forests.

NEEDHAM & GYGER

The next large collection was amassed by teachers and students of the agriculture and forestry institutes preceeding the present "University of the Philippines at Los Baños" in the 1920-1930s. Among others C.F. Baker and L.B. Uichanco provided much of this material. Most of this material was collected in the surroundings of Los Baños and elsewhere in Luzon. A fair number of species came also from Zamboanga in Mindanao and some specimens also elsewhere from Mindanao and Samar, single specimens from Dinagat, Negros and Polillo.

This material forms the basis of NEEDHAM & GYGER's "The Odonata of the Philippines" (1937, 1939, 1941). A small part of Baker's specimens had earlier been worked out by LAIDLAW (1925), CAMPION & LAIDLAW (1928) and COWLEY (1936). As a whole, Needham & Gyger's series is a very useful illustrated account of the regional fauna. Unfortunately, the presentation of the material is rather uneven and some of the species descriptions are too meagre for a reliable identification of allied forms. The series lists nearly 150 species and contains descriptions of 32 new species. Some papers, containing descriptions of the Philippine novelties did not come to the author's attention in time, viz. LAIDLAW (1934) and FRASER (1936).

LIEFTINCK AND ASAHINA

Dr M.A. Lieftinck was the next author to deal with the Philippine dragonflies. His major contributions include a treatment of some species in *Teinobasis* and *Amphicnemis* (LIEFTINCK, 1957), reports on the results of the H. Hoogstraal & F.G. Werner-Philippine Zoological Expedition 1946-1947 (LIEFTINCK, 1961; for the itinerary see HOOGSTRAAL, 1951) and the Noona Dan Expedition, 1961-1962 (LIEFTINCK, 1974; for the itinerary see PETERSEN, 1966), and a treatment of some species of the genus *Risiocnemis* (LIEFTINCK, 1981). In these and some other papers (LIEFTINCK, 1939a, 1940a, 1940b, 1948), he described some 20 new species and subspecies from the Philippines, many of them from Palawan.

Dr S. Asahina has also made a major contribution to the knowledge of the Philippine Odonata, and he has so far described six new species from the Philippines. In his first major paper, ASAHINA (1968) reported on material from various sources, collected between 1932-1966. Another paper (ASAHINA, 1980), dealing with the

Gomphidae, Chlorogomphidae and Corduliidae, contains material amassed by a few Philippine (e.g. Dr C. Plateros) and by many Japanese collectors, mostly in 1960-1970s. Minor are the papers by ASAHINA (1990) and KITAKAWA (1990), while NAKAO et al. (1976) reported on some species from the Luzon and Mindanao ricefields; for localities, see YASUMATSU et al. (1975). NARUMI (1979, pp. 125--156) provided in his Japanese book a chapter on the Luzon and Mindanao species, with some colour photographs.

OTHER CONTRIBUTORS

Other recent works on the Philippine dragonflies include the cytotaxonomic papers by KIAUTA & KIAUTA (1980, 1981, 1983) and a semipopular article by SILSBY (1994). The Philippine entomologists have also made some contributions to odonatology. GAPUD & RECUENCO (1993) recently described a new *Argiolestes* species from Luzon. Earlier GAPUD (1984) commented briefly on the state of knowledge on the Philippine Odonata. PLATEROS (1972) reported on the results of his studies on the Libellulidae of Bohol, Cebu and Leyte. BARRION (1979) listed 16 species occurring in the Philippine rice agroecosystem. Considerable unpublished material is available in the collections of the University of the Philippines at Los Baños.

Not considering the presently known synonyms and other obvious errors, the list of known Philippine dragonfly species has increased as follows:

- De SELYS LONGCHAMPS (1882, 1891): 84 spp.
- NEEDHAM & GYGER (1937, 1939, 1941): 148 spp.
- The present list, which includes also undescribed species: ca 290-295 spp.

The fact that several new species of *Drepanosticta*, *Risiocnemis* and *Amphicnemis* were discovered in rather restricted mountain areas in Luzon and Mindanao in 1995-1996 indicates that many species seem restricted to certain mountain chains. As large areas of Luzon and Mindanao still remain virtually unexplored, a considerable number of new species in these and in some other genera, can still be expected. Also some islands, large enough to support endemic taxa, are still unexplored. Undoubtedly a number of Philippine dragonfly taxa has already become extinct during this century without having been discovered, especially so in the deforested smaller islands. Unfortunately, many more species are doomed to disappear in the near future.

We estimate that at least 350-400 dragonfly species existed in the Philippines at the beginning of this century.

ANNOTATED CHECKLIST OF THE PHILIPPINE ODONATA

- The list includes a number of species marked as "sp.n." or "sp." Most of the latter undoubtedly also represent new species or subspecies.
- The asterisked taxa (*), represent new records for the Philippines.
- The synonyms are listed only where the status of a name disagrees with the usage in BRIDGES (1994). Two of them are new. Some other synonymies are preliminarily suggested ("?"), but these are subject to subsequent confirmation (checking the type material).

- The known distributions of all taxa are stated, the islands are listed by regions or subregions.
- Genera and species are usually listed in alphabetical order within the resp. families and genera. However, in the large genera Drepanosticta, Amphicnemis, Teinobasis and Risiocnemis, a preliminary species grouping is attempted. The details are presented in the respective comments.
- Many taxa are commented upon, see comments 1 - 111 on pp. 276-285.

PLATYSTICTIDAE

Drepanosticta annulata (Selys, 1886) [1]
Luzon region: Luzon
D. aries Needham & Gyger, 1941
Mindanao subregion: Mindanao
Drepanosticta sp./spp. (cf. *aries*) [3]
East Visayan subregion: Samar; - Mindanao subregion: Mindanao; - Sulu region: Tawi Tawi
D. belyshevi Hämäläinen, 1991
East Visayan subregion: Leyte, Panaon, Bohol
D. ceratophora Lieftinck, 1974
Palawan region: Palawan
D. lestoides (Brauer, 1868)
East Visayan subregion: Panaon; - Mindanao subregion: Mindanao, Dinagat
D. lymetta Cowley, 1936
Mindanao subregion: Mindanao
Drepanosticta sp. (cf. *lymetta*) [4]
West Visayan region: Siquijor
D. megametta Cowley, 1936
Mindanao subregion: Mindanao
D. mylitta Cowley, 1936 (? syn. *septima* Needham & Gyger, 1939) [5]
East Visayan subregion: Samar, Leyte, Biliran, Homonhon, Panaon; - Mindanao subregion: Dinagat
Drepanosticta sp. (cf. *mylitta*) [6]
East Visayan subregion: Samar
Drepanosticta sp.n. [7]
Luzon region: Luzon
Drepanosticta sp.n. [8]
Luzon region: Luzon
Drepanosticta sp.n. [9]
Luzon region: Luzon
Drepanosticta sp.n. [10]
Luzon region: Luzon
Drepanosticta sp.n. [11]
Luzon region: Catanduanes
Drepanosticta sp.n. [12]

Mindoro region: Mindoro
Drepanosticta sp.n. [13]
West Visayan region: Negros, Panay, Sibuyan
Drepanosticta sp.n. [14]
Mindanao subregion: Mindanao
Drepanosticta sp.n. [15]
Mindanao subregion: Mindanao
Drepanosticta sp.n. [16]
Mindanao subregion: Mindanao
Drepanosticta sp.n. [17]
Mindanao subregion: Mindanao
Drepanosticta sp.n. [18]
Mindanao subregion: Mindanao, Camiguin
Drepanosticta sp.n. [19]
Palawan region: Palawan
Drepanosticta sp.n. [20]
Palawan region: Palawan, Busuanga
D. halterata (Brauer, 1868) [21]
Luzon region: Luzon
D. philippa Lieftinck, 1961
Luzon region: Luzon
D. taurus Needham & Gyger, 1941
Mindanao subregion: Mindanao
D. trimaculata Lieftinck, 1939
Luzon region: Luzon
Drepanosticta sp.n. [22]
West Visayan region: Negros, Panay, Sibuyan
Drepanosticta sp.n. [23]
East Visayan subregion: Bohol
Drepanosticta sp./spp. (cf. *philippa* & *trimaculata*) [24]
Luzon region: Luzon, Marinduque
Protosticta sp.n. [25]
Luzon region: Luzon
Protosticta sp.n. [26]
Luzon region: Luzon
Protosticta sp.n. [27]
Luzon region: Polillo

PROTONEURIDAE

Prodasineura integra (Selys, 1882) (syn. *Alloneura obsoleta* Selys, 1882, n.syn.) [28]
West Visayan region: Masbate; - East Visayan subregion: Samar, Leyte,

Homonhon; - Mindanao subregion: Mindanao, Basilan, Dinagat, Camiguin

P. palawana Lieftinck, 1948
Palawan region: Palawan, Busuanga, Dumaran

Prodasineura sp.n. [29]
Palawan region: Palawan

COENAGRIONIDAE

Aciagrion borneense Ris, 1911
Palawan region: Busuanga

Agriocnemis f. femina (Brauer, 1868)
Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Cebu, Masbate, Negros, Sibuyan, Siquijor, Ticao; - East Visayan subregion: Leyte, Bohol, Biliran, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan; - Sulu region: Tawi Tawi, Jolo, Sibutu

A. pygmaea (Rambur, 1842)
Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Panay, Negros, Sibuyan; - East Visayan subregion: Panaon; - Mindanao subregion: Mindanao, Basilan; - Palawan region: Palawan

Amphicnemis circularis Lieftinck, 1974 [2, 30]
Sulu region: Tawi Tawi, Sanga Sanga, Bongao, Sibutu

A. dentifer (Needham & Gyger, 1939) [1]
Mindanao subregion: Mindanao, Siargao

Amphicnemis sp. (cf. *dentifer*) [31]
East Visayan subregion: Samar, Homonhon

A. furcata Brauer, 1868
Luzon region: Luzon

Amphicnemis sp.n. [32]
Mindoro region: Mindoro

Amphicnemis sp.n. [33]
West Visayan region: Negros, Sibuyan

A. cantuga (Needham & Gyger, 1939) [2, 34]
East Visayan subregion: Samar, Leyte, Biliran, Homonhon; - Mindanao subregion: Mindanao, Dinagat

A. macgregori (Needham & Gyger, 1939)
Luzon region: Luzon

A. bonita (Needham & Gyger, 1939) [35]
Luzon region: Luzon, Marinduque

Amphicnemis sp. (cf. *bonita*) [36]
West Visayan region: Panay, Negros, Cebu, Masbate

A. flavicornis (Needham & Gyger, 1939)

Luzon region: Luzon
Amphicnemis sp. (cf. *flavicornis*) [37]
East Visayan region: Samar
Amphicnemis sp. (cf. *flavicornis*) [38]
West Visayan region: Negros
Amphicnemis sp.n. [39]
Luzon region: Luzon
A. incallida Needham & Gyger, 1939 [40]
Luzon region: Luzon; - East Visayan region: Samar
Amphicnemis sp. (cf. *incallida*) [41]
East Visayan subregion: Samar, Leyte; - Mindanao subregion: Mindanao
Amphicnemis sp. [42]
Luzon region: Catanduanes
Amphicnemis sp. [43]
East Visayan subregion: Bohol
Amphicnemis sp. [44]
Mindanao subregion: Mindanao, Dinagat
Amphicnemis sp.n. [45]
Mindanao subregion: Mindanao
Amphicnemis sp. [46]
East Visayan subregion: Samar, Leyte, Panaon, Biliran
A. lestoides (Brauer, 1868)
Mindanao subregion: Mindanao
Amphicnemis sp. / spp. (cf. *lestoides*) [47]
Mindanao subregion: Mindanao, Dinagat
Amphicnemis sp. (cf. *lestoides*) [48]
East Visayan subregion: Homonhon
A. glauca Brauer, 1868 [49]
Luzon region: Luzon
Argiocnemis rubescens intermedia Selys, 1877
Luzon region: Luzon, Polillo, Catanduanes; - Mindoro region: Mindoro; - West Visayan region: Cebu, Panay, Sibuyan, Siquijor; - East Visayan subregion: Leyte, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Siargao, Basilan; - Palawan region: Palawan, Dumaran; - Sulu region: Tawi Tawi, Sanga Sanga, Bongao, Sibutu
* *Archibasis viola* Lieftinck, 1949 [50]
Palawan region: Palawan
Cercion luzonicum Asahina, 1968
Luzon region: Luzon
C. malayanum (Selys, 1876)
Luzon region: Luzon
C. pendulum (Needham & Gyger, 1939)

Luzon region: Luzon

Ceriagrion calamineum Lieftinck, 1951

Luzon region: Luzon; - Palawan region: Busuanga, Dumaran

* *C. cerinorubellum* (Brauer, 1865) [51]

Palawan region: Dumaran

C. lieftincki Asahina, 1967

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Panay, Cebu, Ticao; - East Visayan subregion: Leyte, Samar, Bohol, Panaon, Homonhon; - Mindanao subregion: Mindanao, Basilan, Dinagat; - Palawan region: Palawan; - Sulu region: Tawi Tawi, Jolo, Sanga Sanga, Bongao, Siasi

Ischnura a. aurora Brauer, 1865

Mindanao subregion: Mindanao

I. senegalensis (Rambur, 1842)

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Sibuyan, Masbate; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan; - Sulu region: Tawi Tawi

Ischnura sp. [52]

Luzon region: Luzon

Moroagrion danielli Needham & Gyger, 1939 [53]

? (Guara)

Onychargia atrocyana Selys, 1865

Mindoro region: Mindoro; - Mindanao subregion: Mindanao

Pseudagrion azureum Needham & Gyger, 1939

Luzon region: Luzon

P. buenafei Müller, 1996

Mindanao subregion: Mindanao

P. evanidum Needham & Gyger, 1939

Luzon region: Luzon

P. microcephalum (Rambur, 1842)

Luzon region: Luzon; - West Visayan region: Panay; - Mindanao subregion: Mindanao; - Sulu region: Jolo

P. p. pilidorsum (Brauer, 1868)

Luzon region: Luzon, Polillo, Marinduque, Catanduanes; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Sibuyan, Masbate, Siquijor, Ticao; - East Visayan region: Samar, Leyte, Panaon, Homonhon, Biliran; - Mindanao subregion: Mindanao, Dinagat, Camiguin, Basilan; - Palawan region: Palawan, Dumaran; - Sulu region: Tawi Tawi, Jolo

P. r. rubriceps (Selys, 1876)

Luzon region: Luzon; - Mindoro region: Mindoro

Stenagrion sp.n. [54]

Palawan region: Palawan

Teinobasis annamaijae Hämäläinen & Müller, 1989 [2]

Mindanao subregion: Mindanao, Dinagat

T. corolla Needham & Gyger, 1939
Luzon region: Luzon, Marinduque; - West Visayan region: Negros, Masbate, Ticao

T. filamentum Needham & Gyger, 1939
East Visayan subregion: Samar, Bohol, Panaon, Homonhon; - Mindanao subregion: Mindanao, Basilan

Teinobasis sp. (cf. *filamentum*) [55]
Luzon region: Luzon

T. filiformis (Brauer, 1868)
Luzon region: Luzon

Teinobasis sp. (cf. *filiformis*) [56]
Mindanao subregion: Mindanao

T. filum (Brauer, 1868)
Mindanao region: Mindanao

T. hamalaineni Müller, 1992
Luzon region: Luzon

T. nigra Campion & Laidlaw, 1928
Luzon region: Luzon, Polillo

T. olivacea Ris, 1915
Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Masbate, Ticao; - East Visayan subregion: Samar, Leyte, Homonhon; - Mindanao subregion: Mindanao, Siargao; - Palawan region: Palawan, Dumaran

T. ranee Needham & Gyger, 1941
Mindanao subregion: Mindanao

T. recurva (Selys, 1877)
Mindanao subregion: Mindanao, Basilan

T. rubricauda Lieftinck, 1974 [2]
Palawan region: Palawan, Dumaran

T. samaritis Ris, 1915
Luzon region: Luzon, Polillo, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Masbate, Sibuyan, Siquijor, Ticao; - East Visayan subregion: Samar, Homonhon; - Mindanao subregion: Mindanao, Basilan; - Palawan region: Palawan, Busuanga; - Sulu region: Tawi Tawi, Sanga Sanga, Tandubas, Sibutu

T. strigosa Needham & Gyger, 1939
Luzon region: Luzon, Polillo; - East Visayan subregion: Samar

Xiphiagrion cyanomelas Selys, 1876
Luzon region: Luzon; - West Visayan region: Sibuyan; - East Visayan subregion: Leyte; - Mindanao subregion: Mindanao, Dinagat; - Sulu region: Tawi Tawi, Sanga Sanga, Sibutu

PLATYCNEMIDIDAE

Asthenocnemis stephanodera Lieftinck, 1949
Palawan region: Palawan
Asthenocnemis sp. (cf. *stephanodera*) [57]
Palawan region: Palawan
Coeliccia axinocercus Lieftinck, 1974
Palawan region: Balabac
C. boettcheri Schmidt, 1951
Palawan region: Palawan, Dumaran, Cuyo
C. brachysticta Ris, 1912
Mindoro region: Mindoro
C. dinoceras Laidlaw, 1925 [2]
West Visayan region: Siquijor; - East Visayan subregion: Samar, Leyte, Panaon, Biliran, Bohol; - Mindanao subregion: Mindanao, Basilan, Dinagat
C. exoleta Lieftinck, 1961 [2]
Mindanao subregion: Mindanao
C. palawana Lieftinck, 1940 [2]
Palawan region: Palawan
C. werneri Lieftinck, 1961 [2]
Palawan region: Palawan
Coeliccia sp. [58]
Palawan region: Busuanga
Coeliccia sp.n. [59]
Palawan region: Dumaran
Copera vittata palawana Lieftinck, 1940
Palawan region: Palawan
Risiocnemis appendiculata (Brauer, 1868)
East Visayan subregion: Samar, Leyte, Panaon, Biliran, Bohol, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Camiguin
R. arator Hämäläinen, 1991
Luzon region: Luzon
R. asahinai Kitagawa, 1990
Luzon region: Luzon; - Mindoro region: Mindoro
R. confusa Hämäläinen, 1991
Luzon region: Luzon, Catanduanes
R. elegans Kitagawa, 1990 [60]
Luzon region: Luzon
R. erythrura (Brauer, 1868)
Mindanao subregion: Mindanao, Siargao
R. gracilis Hämäläinen, 1991 [2]
Luzon region: Luzon

R. kiautai Hämäläinen, 1991
West Visayan region: Sibuyan
R. laguna Hämäläinen, 1991
Luzon region: Luzon
R. moroensis Hämäläinen, 1991 [1]
Mindanao subregion: Mindanao
R. praeusta Hämäläinen, 1991
East Visayan subregion: Samar, Leyte, Panaon, Biliran; - Mindanao subregion: Dinagat
R. pulchra Hämäläinen, 1991 [60]
Luzon region: Luzon
R. rolandmuelleri Hämäläinen, 1991
West Visayan region: Panay, Negros, Sibuyan, Masbate, Siquijor
R. serrata (Hagen in Selys, 1863)
Luzon region: Luzon, Polillo, Marinduque, Catanduanes
R. varians Hämäläinen, 1991
Luzon region: Luzon
Risiocnemis sp.n. [61]
Luzon region: Luzon
R. atripes (Needham & Gyger, 1941)
Mindanao subregion: Mindanao
R. atropurpurea (Brauer, 1868)
Luzon region: Luzon, Marinduque
R. calceata Hämäläinen, 1991 [2]
East Visayan subregion: Panaon; - Mindanao subregion: Dinagat
R. flammea (Selys, 1882) [2]
East Visayan subregion: Samar, Leyte, Biliran, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat
R. fuligifrons Hämäläinen, 1991 [2]
East Visayan subregion: Panaon; - Mindanao subregion: Mindanao, Dinagat, Basilan
R. haematopus (Selys, 1882)
Luzon region: Luzon, Catanduanes; - East Visayan subregion: Samar
R. ignea (Brauer, 1868)
Luzon region: Luzon
R. incisa Kimmins, 1936
Luzon region: Luzon; - Mindoro region: Mindoro
R. melanops Hämäläinen, 1991 [2]
East Visayan subregion: Samar
R. odobeni Hämäläinen, 1991 [2]
Luzon region: Luzon, Catanduanes; - Mindoro region: Mindoro
R. plebeja Hämäläinen, 1991 [2]

West Visayan region: Panay, Sibuyan
R. polilloensis Hämäläinen, 1991 [2]
Luzon region: Polillo, Catanduanes
R. rubripes (Needham & Gyger, 1939)
Mindanao subregion: Mindanao, Dinagat
R. siniae Hämäläinen, 1991 [2]
East Visayan subregion: Samar, Leyte, Biliran
R. tendipes (Needham & Gyger, 1941)
Mindanao subregion: Mindanao
Risiocnemis sp.n. [62]
East Visayan subregion: Samar
Risiocnemis sp.n. [63]
Mindanao subregion: Mindanao
Risiocnemis sp.n. [64]
Mindanao subregion: Mindanao
Risiocnemis sp.n. [65]
Mindanao subregion: Mindanao
Risiocnemis sp. [66]
Luzon region: Luzon

LESTIDAE

Lestes concinnus Hagen *in* Selys, 1862
Luzon region: Luzon
L. p. praemorsus (Selys, 1862)
Luzon region: Luzon; - West Visayan region: Panay; - East Visayan subregion: Samar, Homonhon; - Mindanao subregion: Dinagat, Siargao
L. quercifolia (Selys, 1878)
Mindanao subregion: Basilan; - Palawan region: Balabac; - Sulu region: Tawi Tawi, Sanga Sanga, Sibutu

MEGAPODAGRIONIDAE

Rhinagrion philippinum (Selys, 1882)
Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Masbate; - East Visayan region: Samar, Bohol; - Mindanao subregion: Mindanao
Argiolestes realensis Gapud & Recuenco, 1993
Luzon region: Luzon
Argiolestes sp.n. [67]
Luzon region: Luzon

AMPHIPTERYGIDAE

Devadatta podolestoides basilanensis Laidlaw, 1934 (syn. *filipina* Needham & Gyger, 1939)
Mindanao subregion: Mindanao, Dinagat, Basilan
Devadatta sp. [68]
Luzon region: Luzon

CHLOROCYPHIDAE

Cyrano angustior Hämäläinen, 1989
East Visayan subregion: Samar, Leyte; - Mindanao subregion: Mindanao, Dinagat, Camiguin
C. unicolor (Hagen *in* Selys, 1869)
Luzon region: Luzon, Marinduque, Catanduanes; - Mindoro region: Mindoro; - West Visayan region: Negros, Panay
Rhinocypha colorata (Hagen *in* Selys, 1869) [69]
Luzon region: Luzon, Marinduque, Catanduanes; - Mindoro region: Mindoro; - West Visayan region: Panay, Negros, Cebu, Masbate, Sibuyan; - East Visayan subregion: Samar, Leyte, Bohol, Biliran, Panaon; - Mindanao subregion: Mindanao, Basilan, Dinagat
R. dorsosanguinea Lieftinck, 1961 [70]
Mindanao subregion: Basilan
R. hageni Krüger, 1898
Sulu region: Jolo
R. humeralis Selys, 1873 (syn. *eximia* Selys, 1873)
Palawan region: Palawan, Busuanga, Balabac
R. latimaculata Lieftinck, 1974
Sulu region: Tawi Tawi, Bongao
R. sanguinolenta Lieftinck, 1961 [2]
Mindanao subregion: Mindanao
R. turconii Selys, 1891 [71]
Luzon region: Luzon, Catanduanes; - West Visayan region: Cebu; - East Visayan subregion: Samar, Leyte, Biliran, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Camiguin

EUPHAEIDAE

Cyclophaea cyanifrons Ris, 1930
Palawan region: Palawan, Busuanga
Euphaea amphicyana Ris, 1930
East Visayan subregion: Samar, Leyte, Panaon, Homonhon; - Mindanao subregion:

Mindanao, Dinagat, Basilan
E. cora Ris, 1930 [2]
East Visayan subregion: Samar; - Mindanao subregion: Mindanao, Basilan
E. subcostalis Selys, 1873 (syn. *laidlawi* Kimmins, 1936)
Palawan region: Palawan
E. refulgens Hagen *in* Selys, 1853 (syn. *semperi* Selys, 1879)
Luzon region: Luzon, Marinduque, Catanduanes; - Mindoro region: Mindoro
Heterophaea barbata (Martin, 1902) [? syn. *ruficollis* (Ris, 1930)] [2, 72]
Luzon region: Luzon

CALOPTERYGIDAE

Neurobasis anumariae Hämäläinen, 1989
East Visayan subregion: Samar, Leyte; - Mindanao subregion: Mindanao
N. daviesi Hämäläinen, 1993
Palawan region: Palawan
N. l. luzoniensis Selys, 1879
Luzon region: Luzon; - Mindoro region: Mindoro
N. luzoniensis subpicta Hämäläinen, 1990
West Visayan subregion: Negros, Panay
Vestalis melania Selys, 1873
Luzon region: Luzon, Catanduanes; - Mindoro region: Mindoro; - East Visayan region: Samar, Leyte, Panaon; - Mindanao subregion: Mindanao, Basilan, Dinagat; Sulu region: Jolo
V. amaryllis Lieftinck, 1965
Palawan region: Balabac

GOMPHIDAE

* *Acrogomphus jubilaris* Lieftinck, 1964 [73]
East Visayan subregion: Samar
Gomphidia kirschii Selys, 1878 (syn. *Gomphidia platerosi* Asahina, 1980, n. syn.) [74]
Luzon region: Luzon, Marinduque; - Mindoro region: - Mindoro; - East Visayan subregion: Samar, Leyte, Homonhon; - Mindanao subregion: Mindanao, Basilan
Heliogomphus bakeri Laidlaw, 1925
Luzon region: Luzon, Catanduanes; - Mindoro region: Mindoro; - West Visayan region: Panay, Negros, Sibuyan; - East Visayan subregion: Samar, Leyte, Homonhon; - Mindanao subregion: Mindanao, Dinagat
H. olivaceus Lieftinck, 1961 [2]
Palawan region: Palawan, Busuanga
Ictinogomphus tenax (Hagen *in* Selys, 1854)
Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - Mindanao

subregion: Mindanao
* *I. decoratus melaenops* (Selys, 1858) [75]
Palawan region: Palawan, Dumaran
Leptogomphus palawanus Asahina, 1968
Palawan region: Palawan, Busuanga, Dumaran
L. semperi Selys, 1878 [2]
Luzon region: Luzon; - East Visayan subregion: Samar, Leyte; - Mindanao subregion: Mindanao, Basilan
Microgomphus chelifer Selys, 1857 ssp. [76]
Palawan region: Palawan
Onychogomphus treadawayi Müller & Hämäläinen, 1993
Palawan region: Busuanga
Paragomphus balneorum (Needham & Gyger, 1937)
Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Panay; - Mindanao subregion: Mindanao
Paragomphus sp. (cf. *balneorum*) [77]
Palawan region: Busuanga

AESHNIDAE

Anaciaeschna jaspidea (Burmeister, 1839)
Luzon region: Luzon; - Mindanao subregion: Mindanao
Anax guttatus (Burmeister, 1839)
Luzon region: Luzon, Polillo, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Panay, Negros; - East Visayan subregion: Leyte; - Mindanao subregion: Mindanao; Sulu region: Sibutu
A. panybeus Hagen, 1867
Luzon region: Luzon, Marinduque; - West Visayan region: Negros, Panay; - East Visayan subregion: Samar, Leyte, Bohol, Biliran; - Mindanao subregion: Mindanao; - Sulu region: Sanga Sanga, Bongao
Anax sp. [78]
Mindanao subregion: Mindanao
Gynacantha alcathoe Lieftinck, 1961
East Visayan subregion: Samar, Homonhon; - Mindanao subregion: Mindanao; - Sulu region: Bongao, Sanga Sanga, Sibutu
* *G. arsinoe* Lieftinck, 1948 [79]
Sulu region: Tawi Tawi, Bongao, Sanga Sanga
G. basiguttata Selys, 1882
Luzon region: Luzon; - Mindoro region: Mindoro; - Palawan region: Palawan
G. bayadera Selys, 1891
Luzon region: Luzon; - West Visayan region: Panay, Sibuyan; - Mindanao subregion: Mindanao, Dinagat; - Palawan region: Palawan; - Sulu region: Tawi

Tawi, Bongao, Sanga Sanga
G. constricta Hämäläinen, 1991
Luzon region: Luzon
* *G. dohrni* Krüger, 1898 [80]
East Visayan region: Leyte; - Palawan region: Palawan
G. hyalina Selys, 1882 [81]
Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Negros; - East Mindanao subregion: Homonhon; - Mindanao subregion: Mindanao; - Palawan region: Palawan, Dumaran
G. rolandmuelleri Hämäläinen, 1991
West Visayan region: Panay, Sibuyan
G. subinterrupta Rambur, 1842 [81]
Luzon region: Luzon; - Mindanao subregion: Mindanao; - Palawan region: Palawan
* *Heliaeschna simplicia* (Karsch, 1891) [82]
Sulu region: Bongao, Sanga Sanga
* *H. uninervulata* Martin, 1909 [83]
Palawan region: Palawan
Indaeschna baluga Needham & Gyger, 1937
Luzon region: Luzon
* *I. grubaueri* (Förster, 1904) [84]
West Visayan region: Negros; - Mindanao subregion: Mindanao
Oligoaeschna poeciloptera (Karsch, 1889) [85]
Luzon region: Luzon; - East Visayan subregion: Homonhon
Oligoaeschna spp. (cf. *poeciloptera*) [86]
Mindoro region: Mindoro; - Mindanao subregion: Mindanao, Dinagat
O. uemurai Asahina, 1990
East Visayan subregion: Samar; - Mindanao subregion: Mindanao
O. zambo Needham & Gyger, 1937
Mindanao subregion: Mindanao
Oligoaeschna sp. [87]
East Visayan subregion: Leyte
Oligoaeschna sp. [88]
Mindoro region: Mindoro
Oligoaeschna sp. [89]
Palawan region: Palawan
Oligoaeschna sp. [90]
Sulu region: Tawi Tawi
Tetracanthagyna bakeri Campion & Laidlaw, 1928
Luzon region: Luzon; - Mindoro region: Mindoro; - East Visayan subregion: Leyte; - Mindanao subregion: Mindanao
* *T. brunnea* McLachlan, 1898 [91]

Palawan region: Palawan

CHLOROGOMPHIDAE

Chlorogomphus splendidus (Selys, 1878) [92]
Luzon region: Luzon
Chlorogomphus sp.n. [93]
West Visayan region: Panay
Chlorogomphus sp. [93]
Mindoro region: Mindoro
Chlorogomphus sp. [93]
Palawan region: Palawan, Busuanga
Chlorogomphus sp./spp. [93]
Luzon Region: Marinduque; - Mindanao subregion: Dinagat, Mindanao

CORDULIIDAE

Epophthalmia v. vittigera (Rambur, 1842)
West Visayan region: Negros; - Mindanao subregion: Mindanao; - Palawan region: Palawan; - Sulu region: Tawi Tawi, Sanga Sanga
E. elegans (Brauer, 1865) [94]
Luzon region: Luzon
Hemicordulia apoensis Asahina, 1980
Mindanao subregion: Mindanao
H. m. mindana Needham & Gyger, 1937
Mindoro region: Mindoro; - East Visayan subregion: Samar, Leyte, Biliran; - Mindanao subregion: Mindanao, Basilan, Dinagat; - Palawan region: Palawan; - Sulu region: Tawi Tawi
Heteronaias heterodoxa (Selys, 1878) [95]
Luzon region: Luzon, Marinduque, Catanduanes; - Mindoro region: Mindoro; - West Visayan region: Negros, Panay, Masbate, Sibuyan; - East Visayan subregion: Samar, Leyte, Bohol, Biliran, Homonhon, Panaon; - Mindanao subregion: Mindanao, Dinagat; - (Palawan region: Palawan)
Idionyx philippa Ris, 1912
Luzon region: Luzon; - Mindoro region: Mindoro; - East Visayan subregion: Samar, Leyte, Panaon, Homonhon; - Mindanao subregion: Mindanao, Basilan, Dinagat
I. salva Needham & Gyger, 1937
Luzon region: Luzon
Idionyx sp. (cf. *salva*) [96]
Palawan region: Palawan, Busuanga
Macromia cincta Rambur, 1842

Palawan region: Palawan; - Sulu region: Tawi Tawi

M. negrito Needham & Gyger, 1937 [97]

Luzon region: Luzon; - Palawan region: Busuanga

* *M. westwoodi* Selys, 1874 [98]

Palawan region: Palawan

Macromidia asahinai Lieftinck, 1971 [2]

Palawan region: Palawan

M. samal Needham & Gyger, 1937 [1]

Luzon region: Luzon; - Mindoro region: Mindoro; West Visayan region: Negros; - Mindanao subregion: Mindanao, Dinagat

Procordulia moroensis Lieftinck, 1977

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Negros; - Mindanao subregion: Mindanao

LIBELLULIDAE

Acisoma p. panorpoides Rambur, 1842

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Sibuyan, Siquijor; - East Visayan subregion: Samar, Leyte, Homonhon; - Mindanao subregion: Mindanao, Dinagat; - Palawan region: Busuanga

* *Aethriamanta gracilis* (Brauer, 1878) [99]

Sulu region: Tawi Tawi

Agrionoptera bartola Needham & Gyger, 1937 [100]

?

A. insignis (Rambur, 1842) [101]

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Siquijor; - East Visayan subregion: Samar, Leyte, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Siargao, Basilan; - Palawan region: Palawan, Balabac; - Sulu region: Tawi Tawi, Bongao, Sanga Sanga, Tandubas, Sibutu

Brachydiplax c. chalybea Brauer, 1868

Luzon region: Luzon; - Mindoro region: Mindoro; - East Visayan subregion: Bohol; - Mindanao subregion: Mindanao, Dinagat; - Palawan region: Palawan, Dumaran; - Sulu region: Tawi Tawi, Tandubas, Sibutu

B. duivenbodei (Brauer, 1866)

East Visayan subregion: Bohol, Homonhon; - Mindanao subregion: Dinagat

Brachythemis contaminata (Fabricius, 1793)

Luzon region: Luzon

Camacinia gigantea (Brauer, 1867)

Luzon region: Luzon, Polillo; - Mindanao subregion: Mindanao, Dinagat, Siargao, Basilan; - Palawan region: Palawan; - Sulu region: Tawi Tawi, Bongao, Sanga Sanga, Sibutu, Cagayan Sulu

Cratilla l. lineata (Brauer, 1878)

Palawan region: Palawan, Balabac

C. lineata assidua Lieftinck, 1953

Luzon region: Luzon, Polillo; - Mindoro region: Mindoro; - West Visayan region: Sibuyan; - East Visayan subregion: Samar, Leyte; - Mindanao subregion: Mindanao, Dinagat, Siargao, Basilan; - Sulu region: Tawi Tawi, Sanga Sanga, Bongao, Sibutu

C. metallica (Brauer, 1878)

Luzon region: Luzon; - Palawan region: Palawan

Crocothemis s. servilia (Drury, 1770)

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Masbate; - East Visayan subregion: Samar, Leyte, Bohol, Panaon; - Mindanao subregion: Mindanao

Diplacina bolivari Selys, 1882

Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Masbate, Siquijor; - East Visayan subregion: Samar, Leyte, Bohol, Biliran, Panaon; - Mindanao subregion: Mindanao, Basilan, Camiguin

D. bolivari ssp. [102]

Palawan region: Palawan, Busuanga; - Sulu region: Tawi Tawi

D. braueri Selys, 1882

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Masbate, Sibuyan; - East Visayan subregion: Samar, Panaon; - Mindanao subregion: Mindanao, Basilan; - Sulu region: Tawi Tawi, Jolo

D. lisa Needham & Gyger, 1941 [2]

Luzon region: Luzon; - Mindoro region: Mindoro; - Mindanao subregion: Mindanao

D. nana Brauer, 1868 [2]

Luzon region: Luzon; - West Visayan region: Cebu, Negros, Siquijor; - East Visayan subregion: Samar, Bohol, Biliran; - Mindanao subregion: Mindanao, Dinagat

Diplacodes nebulosa (Fabricius, 1793)

Luzon region: Luzon; - Mindoro region: Mindoro; - Mindanao subregion: Mindanao

D. trivialis (Rambur, 1842)

Luzon region: Luzon, Marinduque, Catanduanes; - Mindoro region: Mindoro; - West Visayan region: Panay, Cebu, Negros, Sibuyan, Ticao; - East Visayan region: Leyte, Bohol, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan, Busuanga, Balabac, Dumaran, Cuyo, Albaguin; - Sulu region: Tawi Tawi, Sanga Sanga, Bongao, Sibutu

Hydrobasileus croceus (Brauer, 1867)

Luzon region: Luzon; - Mindoro region: Mindoro; - Mindanao subregion: Mindanao, Dinagat; - Palawan region: Palawan

Lathrecista asiatica (Fabricius, 1798) [103]
Luzon region: Luzon, Polillo; - Mindoro region: Mindoro; - West Visayan region: Cebu, Panay, Negros, Masbate, Sibuyan, Siquijor; - East Visayan subregion: Leyte, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Siargao, Basilan, Camiguin; - Palawan region: Palawan, Busuanga, Balabac; - Sulu region: Tawi Tawi, Sanga Sanga, Bongao, Sibutu

Lyriothemis cleis Brauer, 1868
Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Sibuyan; - East Visayan subregion: Samar, Leyte, Homonhon, Panaon; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan, Balabac; - Sulu region: Tawi Tawi, Sanga Sanga, Sibutu

L. latro Needham & Gyger, 1937
Luzon region: Luzon; - East Visayan subregion: Samar, Bohol

Macrodiplax cora (Brauer, 1867)
Luzon region: Luzon; - Mindoro region: Mindoro; - Mindanao subregion: Mindanao, Basilan; - Palawan region: Palawan

Nannophya pygmaea Rambur, 1842
Mindoro region: Mindoro; - East Visayan subregion: Samar, Leyte, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat

Nesoxenia lineata (Selys, 1879)
Mindoro region: Mindoro; - East Visayan subregion: Homonhon; - Mindanao subregion: Mindanao; - Palawan region: Palawan, Dumaran

* *Neurothemis fluctuans* (Fabricius, 1793) [104]
Palawan region: Palawan, Busuanga

N. r. ramburii (Brauer, 1866)
Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Masbate, Sibuyan, Siquijor; - East Visayan subregion: Samar, Leyte, Bohol, Biliran, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan, Busuanga; - Sulu region: Tawi Tawi, Sitangkai, Sibutu, Sanga Sanga, Jolo, Bongao

N. t. terminata Ris, 1911
Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Masbate, Sibuyan, Siquijor, Ticao; - East Visayan subregion: Samar, Leyte, Bohol, Biliran, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Camiguin, Basilan; - Palawan region: Palawan, Busuanga, Balabac, Dumaran, Cuyo, Albaguin; - Sulu region: Tawi Tawi, Bongao, Jolo, Sanga Sanga, Sibutu

Onychothemis abnormis Brauer, 1868
Luzon region: Luzon; - Mindoro region: Mindoro; - East Visayan subregion: Leyte, Bohol

Orchithemis pulcherrima Brauer, 1878
Luzon region: Luzon; - Mindanao subregion: Basilan; - Sulu region: Tawi Tawi,

Sanga Sanga

Orthetrum chrysis (Selys, 1891)

Luzon region: Luzon, Polillo; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Masbate, Sibuyan, Ticao; - East Visayan subregion: Samar, Leyte, Biliran, Homonhon; - Mindanao subregion: Mindanao; - Palawan region: Palawan, Busuanga, Balabac, Cuyo; - Sulu region: Tawi Tawi

O. glaucum (Brauer, 1865)

Luzon region: Luzon; - West Visayan region: Panay

O. luzonicum (Brauer, 1868)

Luzon region: Luzon; - Mindoro region: Mindoro; - Palawan region: Busuanga

O. pruinosum clelia (Selys, 1878)

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Sibuyan, Siquijor; - East Visayan subregion: Samar, Leyte, Bohol, Biliran, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan; - Sulu region: Tawi Tawi, Sanga Sanga, Jolo, Bongao, Sibutu

O. s. sabina (Drury, 1770) [105]

Luzon region: Luzon, Marinduque, Catanduanes; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Masbate, Sibuyan, Siquijor, Ticao; - East Visayan subregion: Samar, Leyte, Bohol, Biliran, Panaon, Homonhon; - Mindanao subregion: Mindanao, Basilan; - Palawan region: Palawan, Busuanga, Cuyo, Albaguin; - Sulu region: Tawi Tawi, Jolo, Bongao, Sanga Sanga, Sibutu

O. t. testaceum (Burmeister, 1839)

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Masbate, Sibuyan, Siquijor, Ticao; - East Visayan subregion: Samar, Leyte, Bohol, Biliran, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Siargao, Basilan; - Palawan region: Palawan, Balabac; - Sulu region: Tawi Tawi, Jolo, Bongao, Sanga Sanga, Sibutu

Pantala flavescens (Fabricius, 1798)

Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Sibuyan, Tablas, Ticao; - East Visayan region: Samar, Leyte, Bohol, Panaon, Biliran, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan, Busuanga, Balabac; - Sulu region: Tawi Tawi, Jolo, Sanga Sanga, Sibutu

Potamarcha congener (Rambur, 1842)

Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Masbate, Sibuyan, Siquijor, Ticao; - East Visayan subregion: Samar, Leyte, Bohol, Panaon, Homonhon; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan, Dumaran; - Sulu region: Tawi Tawi, Sanga Sanga, Bongao

Protorthemis intermedia Fraser, 1936

Palawan region: Palawan

Raphismia bispina (Hagen, 1867)
Luzon region: Luzon, Polillo; - Mindoro region: Mindoro; - West Visayan region: Masbate; - East Visayan subregion: Homonhon; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan; - Sulu region: Tawi Tawi, Bongao, Sanga Sanga, Sibutu, Sitangkai

Rhodothemis rufa (Rambur, 1842)
Luzon region: Polillo; - East Visayan subregion: Leyte; - Mindanao subregion: Dinagat; - Palawan region: Dumaran; - Sulu region: Sibutu

* *Rhyothemis obsolescens* Kirby, 1889 [106]
Mindoro region: Mindoro

R. phyllis subphyllis Selys, 1882 [107]
Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu; - East Visayan region: Samar, Leyte, Bohol; - Mindanao subregion: Mindanao, Basilan, Dinagat; - Palawan region: Palawan, Busuanga; - Sulu region: Tawi Tawi, Sanga Sanga, Bongao, Jolo, Tumindanao, Cagayan Sulu

R. r. regia (Brauer, 1867)
Mindoro region: Mindoro; - East Visayan subregion: Samar; - Mindanao subregion: Mindanao, Basilan, Dinagat; - Palawan region: Palawan, Balabac; - Sulu region: Sanga Sanga, Sibutu, Bongao, Cagayan Sulu

R. triangularis Kirby, 1889 [108]
Mindoro region: Mindoro; - East Visayan subregion: Samar; - Mindanao subregion: Mindanao; - Palawan region: Palawan; - Sulu region: Tawi Tawi

Tetrathemis i. irregularis Brauer, 1868
Luzon region: Luzon, Polillo; - Mindoro region: Mindoro; - West Visayan region: Masbate, Sibuyan; - East Visayan subregion: Samar; - Mindanao subregion: Mindanao, Dinagat, Basilan; - Palawan region: Palawan; - Sulu region: Tawi Tawi, Sanga Sanga

Tholymis tillarga (Fabricius, 1798)
Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Panay, Sibuyan, Siquijor; - East Visayan subregion: Leyte, Bohol, Homonhon; - Mindanao subregion: Mindanao, Basilan, Dinagat; - Palawan region: Palawan, Balabac; - Sulu region: Jolo, Bongao, Sanga Sanga

Tramea rosenbergi Brauer, 1866 [109]
Luzon region: Luzon; - East Visayan subregion: Samar; - Mindanao subregion: Mindanao

T. transmarina euryale (Selys, 1878)
Luzon region: Luzon; - West Visayan region: Sibuyan; - East Visayan subregion: Bohol, Homonhon; - Mindanao subregion: Mindanao, Dinagat; - Palawan region: Palawan; - Sulu region: Tawi Tawi, Bongao, Sanga Sanga, Sibutu

Trithemis adelpha Selys, 1878 [110]
Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu; - East Visayan subregion: Samar, Bohol, Panaon; - Mindanao subregion:

Mindanao, Basilan

T. aurora (Burmeister, 1839)

Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Panay, Masbate, Sibuyan; - East Visayan subregion: Samar, Leyte, Bohol, Panaon, Homonhon; - Mindanao subregion: Mindanao, Basilan; - Palawan region: Palawan, Busuanga, Dumaran, Albaguin

T. festiva (Rambur, 1842)

Luzon region: Luzon, Marinduque; - Mindoro region: Mindoro; - West Visayan region: Negros, Cebu, Masbate, Sibuyan; - East Visayan subregion: Samar, Leyte, Bohol, Homonhon, Panaon; - Mindanao subregion: Mindanao, Dinagat, Basilan, Camiguin; - Palawan region: Palawan; - Sulu region: Tawi Tawi

T. pallidinervis (Kirby, 1889)

Luzon region: Luzon; - Mindoro region: Mindoro

Urothemis signata bisignata Brauer, 1868

Luzon region: Luzon; - Mindoro region: Mindoro; - Sulu region: Tawi Tawi

Zyxomma obtusum Albarda, 1881

Luzon region: Luzon; - Mindoro region: Mindoro; - West Visayan region: Cebu, Negros, Masbate; - East Visayan subregion: Leyte, Homonhon; - Mindanao subregion: Mindanao, Basilan; - Palawan region: Palawan; - Sulu region: Bongao, Siasi, Sibutu

Z. petiolatum Rambur, 1842

Luzon region: Luzon; - Mindoro region: Mindoro; - East Visayan subregion: Homonhon; - Mindanao subregion: Mindanao, Dinagat; - Palawan region: Palawan; - Sulu region: Tawi Tawi

Zygonyx sp. [111]

Luzon region: Luzon

COMMENTS ON THE CHECKLIST

(1) Material in coll. Müller includes also the undescribed male.

(2) Material in coll. Müller includes also the undescribed female.

(3) Material in coll. Müller includes specimens (41 ♂, 6 ♀) from Mindanao (Zamboanga del Sur, Zamboanga del Norte and Lanao del Norte), Samar (1 ♂) and Tawi Tawi / Sanga Sanga (18 ♂, 5 ♀). It is still uncertain, how many different taxa they represent.

(4) 7 ♂ in coll. Müller.

(5) *Drepanosticta septima*, described on the basis of a single female from Samar may prove conspecific with *D. mylitta*.

(6) 6 ♂, 5 ♀ in coll. Müller.

(7) Coll. Müller includes specimens (15 ♂, 11 ♀) from Nueva Vizcaya, Nueva Ecija and Aurora provinces. Coll. Selys includes a female specimen from Luzon, originally identified as *annulata*. This is the second species in the

series from which LIEFTINCK (1961: 135-136) selected the lectotype of *D. annulata* (Selys, 1886).

(8) Coll. Müller includes specimens (1 ♂, 6 ♀) from Nueva Vizcaya Nueva Ecija and Quirino provinces.

(9) 1 ♂ from Ifugao province in RMNH.

(10) 1 ♂ (in RMNH) and 1 ♀ (in SMF) from Camarines Sur province.

(11) 3 ♂, 1 ♀ in coll. Müller.

(12) 30 ♂, 9 ♀ in coll. Müller.

(13) Coll. Müller includes specimens from Negros (4 ♂, 6 ♀), Panay (1 ♂, 5 ♀) and Sibuyan (4 ♂, 3 ♀). Further there is 1 ♂ from Panay in coll. G.S. Vick.

(14) Coll. Müller includes specimens (99 ♂, 19 ♀) from Surigao del Sur province.

(15) 2 ♂ from Davao Oriental province in coll. Müller.

(16) 45 ♂ from Davao Oriental province in coll. Müller.

(17) 42 ♂ from Davao Oriental province in coll. Müller. From the same site as the previous sp. Further 8 ♀ of one of the two species.

(18) Specimens (71 ♂ and 23 ♀) from South and North Cotabato, Bukidnon, Davao and Davao Oriental provinces in Mindanao and 6 ♂ and 1 ♀ from Camiguin Island in coll. Müller; 1 ♂ from Zamboanga del Norte province in RMNH.

(19) 1 ♂ in coll. Müller and 1 ♀ in coll. Hämäläinen.

(20) Coll. Müller includes 13 ♂ and 11 ♀ from Palawan and Busuanga; coll. Hämäläinen 4 ♂ and 3 ♀ from Palawan; coll. Ris 1 ♂ and 1 ♀ from Palawan.

(21) *D. halterata* and the following species are considered to form an own group among the Philippine species in the genus.

(22) Coll. Müller includes 204 ♂ and 40 ♀ from Negros, 55 ♂ and 5 ♀ from Panay and 2 ♀ from Sibuyan. Further 1 ♂ from Panay in coll. G.S.Vick. It is uncertain whether the Panay and Negros specimens belong to the same taxon.

(23) 2 ♂ from Bohol in coll. Müller.

(24) Still unidentified specimens from different parts of central and NE Luzon in coll. Müller, RMNH and SMF and 1 ♂ from Marinduque in coll. Müller. Further material from different parts of Luzon are needed to disclose their status.

(25) 1 ♂ from Quirino province in coll. Müller.

(26) 2 ♂ and 1 ♀ from Quirino province in coll. Müller.

(27) 1 ♂ at SMF.

(28) M.H. has studied the type specimen of *Prodasineura obsoleta* (Coll. Selys at IRSN). The teneral specimen in rather poor shape, labelled "Quelle des Baubo" (in "interior" Minadanao) seems to be conspecific with *integra*. This synonymy was already foreseen by NEEDHAM & GYGER (1939).

(29) 1 ♂ in coll. Müller.

(30) *Amphicnemis* is undoubtedly the most difficult Zygoptera genus in the Philippines and in need of thorough revision. The number of collected specimens is still too limited for any analysis of the Philippine fauna. The species are listed in 3 groups, based on the structure of male appendages. The first group includes species with rudimentary inferior appendages. The superiors have a distinct ventral hook.

(31) Specimens from Samar (7 ♂, 2 ♀) and Homonhon (59 ♂, 25 ♀) in coll. Müller.

(32) 4 ♂ and 5 ♀ specimens at SMF.

(33) Coll. Müller includes 2 ♂ from Sibuyan and 1 ♀ from Negros.

(34) In this group the superior appendages are strongly curved and inferiors are clearly shorter.

(35) The rest of species are lumped to this somewhat variable group. Superiors are straight or slightly curved, inferiors nearly as long or even longer than the superiors.

(36) A total of 4 ♂, 9 ♀ from Cebu in coll. Müller and Hämäläinen; 1 ♀ from Panay and 2 ♀ from Negros in coll. Müller.

(37) 1 ♂ at SMF.

(38) 1 ♂ and 1 ♀ in coll. Müller.

(39) Specimens (2 ♂, 6 ♀) in coll. Müller from Quirino and Nueva Vizcaya provinces. I ♂ from Laguna province at SMF.

(40) Needham & Gyger's (1939) material should be studied, to see whether the specimens from Luzon and Samar are conspecific. The holotype of *Amphicnemis incallida* was not designated. The lectotype should be selected from Luzon specimens.

(41) Coll. Müller includes 1 ♂ from Samar and 2 ♀ from Leyte and 1 ♂ from Mindanao. 1 ♀ from Leyte in SMF.

(42) 3 ♂ and 3 ♀ in coll. Müller.

(43) 3 ♂ in coll. Müller.

(44) 3 ♂ from Dinagat in coll. Müller. 1 ♂ from Surigao at SMF apparently belongs to the same taxon.

(45) 5 ♂ and 1 ♀ from Surigao del Sur province in coll. Müller.

(46) Coll. Müller includes specimens from Samar (8 ♂, 1 ♀), Leyte (2 ♂, 1 ♀), Biliran (1 ♂) and Panaon (1 ♂); 2 ♂ from Samar at SMF. There is slight variation between the specimens from different islands.

(47) Specimens resembling *lestoides*, but still slightly different, are known from some localities in Mindanao. More material from different sites is necessary to reveal the taxonomica status of these populations. Coll. Müller 16 ♂ and 2 ♀ from South Cotabato, Lanao del Norte, Davao Oriental and Surigao del Sur provinces.

(48) 16 ♂ and 7 ♀ in coll. Müller.

(49) The male of *A. glauca* is still unknown, therefore it cannot be placed in any

of the above species groups.

(50) *Archibasis viola* is new to the Philippines: 1 ♂, Palawan, Mt Saint Paul, Tagabinit, Babuyan River (alt. 160 m), 25/30-III-1992, L. Vinciguerra & A. Gorostiza leg. A widespread species.

(51) *Ceriagrion cerinorubellum* is new to the Philippines: 1 ♂, Dumaran Island (Palawan region), Araceli, Baeng, Mauringon, 1st Creek, 20/25-XII-1995, A. Buenafe leg.

(52) In addition to *I. senegalenis*, NEEDHAM & GYGER (1939) listed also *I. elegans* from Luzon. M.H. has studied 2 ♂ from "Chamartin, 12-VIII-1903" preserved at USNM, labelled "*I. elegans*" by Needham & Gyger, although in the publication they were reported to be *senegalensis*. These specimens are not *elegans*, but they are also clearly distinct from *senegalensis*. Needham & Gyger's whole *Ischnura* material should be carefully restudied. Coll. Müller includes 1 ♀ from Zambales province, which seem to be conspecific with the males from Chamartin.

(53) Recorded from "Guara". We have not been able to locate this place from the Philippines.

(54) 1 ♂ in coll. Müller. This species will be named after the late Peter Miller in one of the next issues of *Odonatologica*.

(55) 3 ♂ from Nueva Vizcaya province in coll. Müller.

(56) 1 ♂ from Davao province in coll. Müller.

(57) 67 ♂ and 15 ♀ from Central Palawan in coll. Müller and coll. Hämäläinen.

(58) Specimens (26 ♂, 7 ♀) in coll. Müller.

(59) Coll. Müller includes 6 ♂.

(60) New material from Quirino province seems to indicate that *R. elegans* and *R. varians* are distinct species. The two ♀ specimens in coll. Selys, supposed to be *R. pulchra* by HÄMÄLÄINEN (1991c), belong to *R. elegans*.

(61) 8 ♂, 1 ♀ from Quirino province in coll. Müller.

(62) 7 ♂ and 1 ♀ in coll. Müller. The second part (covering the subgenus *Igneocnemis* Hämäläinen, 1991) of the *Risiocnemis* revision has been postponed, since new species are still discovered every year.

(63) 5 ♂ in coll. Müller.

(64) 16 ♂, 6 ♀ in coll. Müller.

(65) 2 ♂ and 1 ♀ in coll. Müller.

(66) 11 ♀ from Los Baños at SMF. These specimens, collected by Boettcher in 1914, somewhat resemble *R. polilloensis*; without males their identity remains uncertain.

(67) 1 ♂ from Quirino province in coll. Müller.

(68) A ♀ specimen from Los Baños was listed by NEEDHAM & GYGER (1939) as *Devadatta argyoides* Selys. M.H. has studied this specimen (CU). A pair of wings is mounted on glass, otherwise the specimen in poor condition is preserved in alcohol. It is neither *argyoides* nor *podolestoides basilanensis*,

but may represent an undescribed species. New material, especially males, are needed before its status can be confirmed.

(69) *Rhinocypha colorata*. As pointed out by ASAHINA (1968), its populations are variable in the different regions of the Philippines, and certainly a number of subspecies could be conveniently defined, as done in the related *R. tincta* Rambur. ASAHINA (1968) considered *colorata* as a subspecies of *tincta*, but LIEFTINCK (1974) treated *tincta* and *colorata* "as separate species belonging apparently to one superspecies".

(70) LIEFTINCK (1961) presented the distribution of *dorsosanguinea* as "Basilan; ?Mindanao". However, so far no reliable material is known to us from Mindanao.

(71) The holotype of *turconii* is stated to come from "Panay pay (Ile de Zebu)". Since this is the only specimen known from the whole West Visayan region, the correctness of the locality label must be considered somewhat doubtful. Recent material from Aurora province in Luzon and from Catanduanes island, confirms the occurrence of this species also in the Luzon region.

(72) It seems nobody has compared the actual types of *Heterophaea barbata* and *H. ruficollis*. Müller's specimens from Quirino Province fit well with the type of *ruficollis* at SMF. In RMNH, there are similar specimens, identified by Lieftinck as *barbata*. These two taxa may prove conspecific.

(73) *Acrogomphus jubilaris* is new to the Philippines. 1 ♂, Samar, Eastern Samar province, San Rafael, 20/28-V-1993, Th. Borromeo leg. Jan van Tol kindly compared this specimen with the holotype of *jubilaris* from Borneo and confirmed its identity. Perhaps this elusive species is more widespread in the Philippines.

(74) Difficulties in separating Müller's *Gomphidia* specimens (15 ♂, 7 ♀) from 7 islands to *kirschii* and *platerosi* led to the observation that the proposed relative difference in the length of the inferior appendages in males of these species (ASAHINA, 1980) depends on their "internal position" in the specimens. When the inferior appendages were removed, those in lateral view looking like in *kirschii* were as long as those looking like in *platerosi* in Asahina's figures. ASAHINA (1980) listed both "species" from the same locality and date "Bislig, Mindanao, 3.VII.1977, leg. Kurosawa" and "Bislig, Mindanao, 4.VII.1977, leg. Kurosawa" respectively.

(75) *Ictinogomphus decoratus melaenops* is new to the Philippines. 1 ♂, N. Palawan, Mt Saint Paul, Tagabinit, Babuyan River (alt. 160 m), 25/30-III--1992, L. Vinciguerra & A. Gorostiza leg.; 2 ♂, Dumaran Island, Araceli, Baeng, Mauringon, 3rd Creek (alt. 80-150 m), 20/25-XII-1995, A. Buenafe leg.

(76) *Microgomphus chelifer* ssp. ASAHINA (1980) reported on two crushed teneral ♀ specimens from Palawan under the name *M. chelifer thelyphonus* Lieftinck. Our recent material (5 ♂, 3 ♀) includes also mature male speci-

mens. A revision of the whole *chelifer* group is needed to clarify the correct status of the Palawan populations.

(77) 1 ♂ in coll. Müller. This may also prove conspecific with *balneorum*.

(78) Specimens of both sexes from South Cotabato and Davao Oriental provinces in coll. Müller. A thorough revision of the genus *Anax* is badly needed.

(79) *Gynacantha arsinoe* is new to the Philippines; all from Sulu Archipelago, Tawi Tawi group: 1 ♂, Bongao Island, Bongao Peak, forested area (alt. 314 m), 23/24-VI-1988, W. Catal leg.; 1 ♂, Sanga Sanga Island, Boloboc, 1/11--I-1990, Th. Borromeo, Jr leg; 1 ♂, Tawi Tawi Island, Batu-Batu, Magsag-Gaw, 14/16-III-1991, Th. Borromeo, Jr leg. The specimens were compared with the holotype at RMNH. Earlier known only from Talaud Island, between Mindanao and Halmahera.

(80) *Gynacantha dohrni* is new to the Philippines: 1 ♂, Leyte, Mahaplag, Hilusig, Mt Balocaue (alt. 600 m), 15-V-1987, Th. Borromeo leg.; 1 ♂, 1 ♀, same locality, 28-V-1988, C. Treadaway leg.; 1 ♂, N. Palawan, Mt Capoas, Barrio Banbanan, Camp Inunugan River, 16/22-III-1992, L. Vinciguerra & A. Gorostiza leg.; 1 ♀, S. Palawan, Quezon distr., Malatgao, Bugon, II-1994, L. Vinciguerra & E. Horn leg; 1 ♂, Palawan, Pancol, 10-I-1914, G. Boettcher leg. (at SMF). Coll. Ris includes also a ♀ from Polillo (11-VIII-1915, G. Boettcher leg.), identified by Ris as *"G. dohrni ?"*, but, its identity remains uncertain. - Widely distributed in Malesia.

(81) *Gynacantha hyalina* and *G. subinterrupta* remain difficult to separate, especially the females. Coll. Müller includes nearly 30 unidentified ♀ specimens from Homonhon, Luzon, Mindanao, Mindoro and Palawan.

(82) *Heliaeschna simplicia* is new to the Philippines; all from Sulu Archipelago, Tawi Tawi group: 1 ♂, Sanga-Sanga Island, Boloboc, forested area, 25/29--VI-1988, W. Catal leg.; 1 ♀, same locality, 1/11-I-1990, Th. Borromeo Jr leg.; 1 ♂, Bongao Island, Nalil, 4/9-III-1991, Th. Borromeo leg. - Known from Sumatra and Borneo.

(83) *Heliaeschna uninervulata* is new to the Philippines. 1 ♂, S. Palawan, Quezon distr., Malatgao, Magmuni stream (alt. 1000 ft), 16/22-V-1992, C.G. Treadaway & Th. Borromeo leg. - Nearest to Palawan this widely distributed species is known from Borneo.

(84) *Indaeschna grubaueri* is new to the Philippines: 1 ♂, Negros, Negros Oriental prov., Amlan (alt. 500 m), VI-1985, C.G. Treadaway leg.; 1 ♀, Mindanao, Bukidnon prov., Lapatan, Mt Apolang (alt. 1300 m), 24/29--VIII-1989, Th. Borromeo Jr leg. - Widespread in Malesia.

(85) Taxonomic work on *Oligoaeschna* is badly hampered, due to the elusiveness of the species. As to the Philippine species, problems arise also from the fact that *O. poeciloptera* is known only the ♀ sex. Two female specimens from Homonhon match quite well with the description of *poeciloptera*. It is safe to estimate that at least 7-8 species occur in the archipelago, but

apparently many more.

(86) 2 ♀ from Mindoro and 1 ♀ from Dinagat in coll. Müller. These specimens have 5-celled anal loop like *poeciloptera*, but differ in some other details. All other species listed below have 3-celled anal loop.

(87) 1 ♂ in coll. Müller.

(88) 1 ♂ at SMF.

(89) 1 ♂ from South Palawan in coll. Hämäläinen.

(90) 1 ♂ and 1 ♀ from the same site in Tawi Tawi in coll. Müller.

(91) *Tetracanthagyna brunnea* is new to the Philippines: 1 ♀, N. Palawan, Olanguan (alt. 500 m), 5/10-VII-1988, C.G. Treadaway leg.; 1 ♀, S. Palawan, Quezon distr., Malatgao, Magmuni stream, 25-V/1-VI-1991, L. Vinciguerra & A. Gorostiza leg. - Nearest to Palawan occurs in Borneo.

(92) Aside of the old record of *C. splendidus* from Luzon, apparently only a single ♂ *Chlorogomphus* specimen (from Balagatan, Mindanao) has been reported in the literature by ASAHINA (1980), with comments "belongs very probably to *dyak* Laidlaw". H. Karube and D.A.L. Davies are studying the Philippine material, including specimens in coll. Müller.

(93) Specimens of both sexes in coll. Müller.

(94) *Epophthalmia elegans* was reported by de SELYS LONGCHAMPS (1891) from Luzon. For some reason LIEFTINCK (1931) did not consider this record in his revision of the genus. Neither were the Philippines included in the range of *elegans* in LIEFTINCK et al. (1984).

(95) *Heteronaias heterodoxa* seems to be common in the Philippines proper, but it has not been found in the Sulu Archipelago. Until further specimens become available from Palawan, the labelling of a single ♀ specimen reported by ASAHINA (1980) from Puerto Princesa must be considered doubtful.

(96) Coll. Müller includes 1 ♂ and 5 ♀ from Busuanga and 4 ♀ from North Palawan. One of the Palawan females has a 4-sided triangle in the fore wings, an apparent individual anomaly. The structure of the male appendages shows that the Palawan taxon is clearly distinct from *philippa*. However, since no males from Luzon have become available, which could be linked with the somewhat dubious *I. salva* (described on basis of a single female, which also posses a 4-sided triangle in the fore wing) it remains to be confirmed, whether the Palawan taxon is distinct also from *salva*, which LIEFTINCK (1971, p. 3) considered as a good species.

(97) Coll. Müller includes 2 ♂ from Busuanga at present identified as *Macromia negrito* with some doubt. A direct comparison with the holotype ♂ from Luzon is necessary to verify their status.

(98) *Macromia westwoodi* is new to the Philippines: 2 ♂, N. Palawan, Matalangao waterfalls, between Port Barton and Roxas (alt. 200 m), 16-V-1985, R.A. Müller leg.; 1 ♂, N. Palawan, Mt Capoas, Sitio Caoban, Camp Neutico (alt. 280 m), 11/15-III-1992, L. Vinciguerra & A. Gorostiza leg.

(99) *Aethriamanta gracilis* is new to the Philippines: 4 ♂, Sulu Archipelago, Tawi Tawi group, Tawi Tawi island, Tarawakan (alt. 100 m), 22/26-VI-1992, C.G. Treadaway & Th. Borromeo leg.

(100) *Agrionoptera bartola* is a dubious species, described from a (single?) female. No designation of the holotype and no locality data were given!

(101) The wide ranging *Agrionoptera insignis* has been divided into several subspecies, of which at least *quatuornotata* Brauer and *similis* Selys have been listed from the Philippines. The material available in coll. Müller from various islands looks quite uniform, but the infraspecific status is left open at the moment.

(102) This Palawan taxon, mentioned already by RIS (1909, p. 99), was listed by LIEFTINCK (1974) as "*Diplacina bolivari* subsp.?" We have plenty of new material of both sexes. A thorough revision of the genus could clarify whether the Palawan taxon would deserve the status of a good species.

(103) *Lathrecista asiatica*. We have not attempted to place the Philippine specimens into any of the many subspecies of this widespread species (cf. LIEFTINCK, 1974).

(104) *Neurothemis fluctuans* is new to the Philippines: 13 ♂, 4 ♀, Busuanga Island, (Coron / Conception / Busuanga), 1/3-VIII-1990, Th. Borromeo leg.; 6 ♂, Busuanga Island, Coron, Mabentangen River, 4/7-V-1991, Th. Borromeo leg.; 3 ♂, Busuanga Island, 5 km NW Coron, Mabentangen River, 25/29-II-1996, H. Zettel leg.; - 1 ♀, N. Palawan, Port Barton, 13/27-V-1985, R.A. Müller leg.

(105) According to WATSON (1984), the Philippine populations conventionally considered as *Orthetrum s. sabina* apparently represent two distinct species: the true *sabina* and another species, conspecific or nearly related to *O. serapia* Watson, 1984. WATSON (1984) lists *sabina* from "Philippines" without further data, and the other taxon from "Luzon" and "Palawan". Coll. Müller contains 341 Philippine "*sabina*" specimens from 26 islands. We have not attempted to analyze them in this respect, but list here all records as *sabina*.

(106) *Rhyothemis obsolescens* is new to the Philippines: all material from Mindoro, Mindoro Oriental, Mt Halcon: 1 ♂, 1 ♀, Barrio Luyang (alt. 360-500 m), 14/17-VI-1991, R.A. Müller leg.; 1 ♂, Calopan, Nao-jan, Barrio Boliti (alt. ca 1500 m), VI-1991, N. Mohagan leg.; 2 ♂, 1 ♀, Budlungan, Bukayao River (alt. 700-1000 m), 20/31-V-1991; 1 ♂, Calapan (alt. 500 m), 5/15-VI--1992, N. Mohagan leg. As in case of *R. triangularis* this is a considerable extension of its known range.

(107) *Rhyothemis phyllis subphyllis*. The subspecific status of the Palawan populations remains open (see LIEFTINCK, 1974). However, our specimens from Palawan and the Sulu Archipelago look quite similar to those from the Philippines proper.

(108) *Rhyothemis triangularis* was reported as new to the Philippines by MULLER (1989) from Palawan. Later it was found to be more widespread in the archipelago. The dark area in the wings is considerable more extended than in continental Asian specimens. In the hind wings the dark area extends to the level of the nodus, in the fore wings it extends 1-2 cells proximal to the nodus, which is furnished with a dark spot in most specimens.

(109) *Tramea rosenbergi* was reported as new to the Philippines by MULLER (1989) from Mindanao. Later it has been found at Nueva Vizcaya in Luzon and in western Samar.

(110) *Trithemis adelpha* is a problematic taxon, the type locality of which is the Philippines. It has been considered conspecific with *aurora*. LIEFTINCK (1974) raised again the question whether "*aurora* will prove to be composed of two nearly related, yet distinct, taxa". - In Cebu, M.H. collected *aurora* and *adelpha* simultaneously at the same site. Their co-occurrence is known also from other localities in Basilan, Panaon and Samar. Especially impressive is a long series of the larger *adelpha* males and females, collected together with *aurora* in Samar. Since no intermediate specimens of these "forms" appear in the large material of *aurora/adelpha* complex in coll. Müller (384 ♂, 115 ♀) and the differences are distinct in both sexes, we are tempted to believe that two really distinct species occur in the Philippines, often side by side. *T. adelpha* may have a smaller range in the archipelago. Since *adelpha*-like specimens have been reported also elsewhere, the variability of *aurora* throughout its wide distribution should be carefully studied.

(111) NEEDHAM & GYGER (1937) listed a female specimen of *Zygonyx ida* Selys, 1869 from "Luzon" without any other collecting data. The identity of the specimen should be checked and further material should be found to confirm its occurrence in Luzon.

UNCONFIRMED OR INCORRECT RECORDS

The following species, reported from the Philippines, were not included in the above checklist:

- *Pseudagrion crocops* Selys, 1876. A specimen reported from the "Philippines" by de SELYS LONGCHAMPS (1882), without any other data (see MÜLLER, 1996).
- *Pseudagrion decorum* (Rambur, 1842). A ♀ specimen listed by de SELYS LONGCHAMPS (1891) from Luzon, certainly misidentified (see MÜLLER, 1996).
- *Libellago l. lineata* (Burmeister, 1839). For some reason this species was included in NEEDHAM & GYGER (1939), although furnished with comment "not yet reported from the Philippines". TSUDA (1986, 1991) included the species in his Philippine list.
- *Anax parthenope julius* Brauer, 1865 was listed by de SELYS LONGCHAMPS (1891) from "Irocin" (Luzon). Although NEEDHAM & GYGER (1937) referred to this record, LIEFTINCK et al. (1984) and TSUDA (1986, 1991) did not include the Philippines in the range of this species.
- *Anax gibbosulus* Rambur, 1842 was listed by NEEDHAM & GYGER (1937) from Luzon. Probably *A. panybeus*.
- *Anax n. nigrofasciatus* Oguma, 1915. Listed by TSUDA (1986, 1991) from the Philippines, but no

other data available.

- *Macromia gerstaeckeri* Kruger, 1899. Listed by NEEDHAM & GYGER (1937) on the basis of an inadequately labelled, incomplete ♀. Its occurrence in the Philippines is unlikely.
- *Idionyx yolanda* Selys, 1871. Listed by LIEFTINCK (1939b) on the basis of a ♀ from Basilan. M.H. has reidentified this specimen at RMNH as *I. philippa*.

GENERAL INFORMATION ON THE PHILIPPINES

The Philippines consist of 7107 islands, situated between the latitudes 5 and 21 N (from North to South ca 1900 km) and 117 and 121 E (from West to East ca 1100 km). The total land area is 299 404 km^2. Most of the islands are very small, merely rocks, and only a little more than 500 are larger than 1 km^2.

CLIMATE. – The Philippine climate is tropical. The weather pattern is rather complex and influenced by monsoons. The seasonality of the dry and wet season throughout the archipelago is presented in Figures 3-4. Typhoons, which are formed on the Pacific, occur over the northern parts of the archipelago usually from June to November, causing occasionally large devastation and making the travel difficult. Roads and bridges may be flooded away and remote areas or mountain sites may be blocked for weeks. Although some of the rarest dragonfly species might be found only during the wet season, the overall conditions for travelling and collecting can be too detrimental. In spite of own experience, it is difficult to state the best time for dragonfly collecting. May and June are quite good months to visit many islands. However, each season can be profitable, since different species occur in different periods. In order to study the phenology more precisely, the same site should be visited during different seasons.

DEFORESTATION. – Biologists involved in studies on the rich and geographically highly interesting Philippine fauna and flora, follow with increasing alarm the continuing and intensive destruction of the primary rain forest. It is an obvious danger that the whole archipelago will be cleared of most of its natural forest cover before a reasonable knowledge of its species diversity can be obtained. The original rain forests are destroyed in an increasing tempo. The second author's two visits to Sibuyan Islands witnessed this alarming and rapid change. In 1986, the almost intact rain forest surrounded the Pawala River and continued almost to the mountains (Fig. 5), in 1987 it was largely destroyed (Fig. 6).

The destruction starts when the authorized forestry companies make roads to forest areas and cut down the commercially valuable trees. The roads enable settlers to arrive, who cut more trees for their houses, furnitures and other necessities. When the forest is depleted from the useful trees, it is burned down ("kaingin"). The burned areas remain suitable for cultivation only for a short time, since the thin humus layer wears out in a few years. The soil erodes or is covered by cogongras or secondary forest. This vegetation is useless for animals and plants, dependant on primary rain forests.

A considerable number of national parks, wildlife sanctuaries and other protected areas have been established in the Philippines. However, most of them are continuously encroached by the growing population and affected because of the inadequate law enforcement.

CHARACTERIZATION OF THE ISLANDS, WITH LISTS OF SPECIES

Luzon region

Main islands: Luzon, Catanduanes, Marinduque, Polillo, Burias, Babyan Islands, Batan Islands.

Dragonflies: 144 species.

LUZON ISLAND
104 683 km², 140 species *

Luzon, the largest of the Philippine islands, is characterized by a great variability of landscapes. In the North the Cagayan Valley separates the Central Kordillera, known for its famous rice terraces, from Sierra Madre mountains, which range from Escarpada Cape in the northeastern corner of the island to Laguna de Bay in the South. The wide plateaus of Cagayan Valley are extensively cultivated. A still larger plateau, extending from Laguna de Bay northwest to Lingayen Gulf on the west coast, is densely populated and divided by numerous roads. It separates the Central Cordillera in North and Sierra Madre in the East from the volcanous Zambales mountains in the West, which include the continuously active Mt Pinatubo (1754 m). The two plateaus were once covered by a dense lowland rain forest, of which practically nothing is left any more.

Southern Luzon is a mosaic of small lowland patches and separate volcanoes or volcano chains, of which Mt Mayon (2462 m) is at present very active. The others, like Mt Labo (1544 m) and Mt Isarog (1966 m) have been inactive for a long time and are partly still covered by the original dipterocarp forest.

The largest remaining rainforest areas in Luzon are in the Central Cordillera and Sierra Madre mountains. The highest peaks in Sierra Madre rise up to 1200-1905 m. They descend steeply towards the Pacific Ocean and safe harbours are few. Thus the eastern coast is very sparsely populated and difficult to enter. The peaks in Central Cordillera are higher, the highest of them Mt Pulog reaches 2934 m.

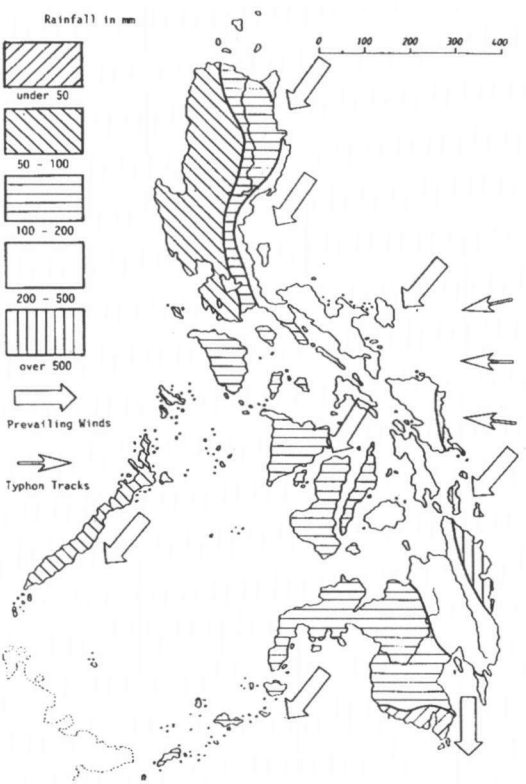


Fig. 3. Precipitation and prevailing winds in January.

Luzon is the most frequently visited island of the Philippines. A large proportion of all Philippine dragonfly records in literature comes from Luzon. We are aware of dragonfly records from practically all provinces in Luzon, although the great majority of them come from the central provinces near Manila, particularly from Laguna province. At least 86 species have been found in Laguna province, most of them from Mt Maquiling and Los Baños, which is the type locality of many species described by Needham & Gyger. At least 46 species are known from Quezon province. Also over 40 species are known from "Manila"; most of those which are confined to clean streams have certainly disappeared by now. In general, the northern and southern provinces are rather poorly studied, e.g. we know only 15 spe-

* Those species, which are not present in coll. Müller from the island in question are asterisked (*).

cies from Sorsogon, the southermost province, and 14 species from Camarines Sur, the region of the interesting mountains: Mt Iriga and Mt Isarog.

Boettcher collected extensively in Luzon in 1914-1918. His material (849 specimens of 72 spp.) comes from a dozen provinces, from Sorsogon in the South to Ilocos Sur in the North.

Most of the roughly 3400 specimens in coll. Müller (representing 87 species) comes from the northcentral provinces Nueva Vizcaya and Nueva Ecija, where the second author has collected in June 1985 and June 1991. Especially A. Gorostiza has also contributed many specimens from there. We know a total of 46 and 25 species from these provinces. A fair amount of Müller's specimens (35 spp.) come also from Quirino province in the central part of Sierra Madre, where C.G. Treadaway and Th. Borromeo visited in May 1990 and April 1991 and Celso M. Nazareno in August 1996. Smaller lots come from Mountain, Ifugao, Benguet, Aurora, Bulacan, Bataan, Cavite, Laguna, Rizal and Quezon provinces, from various collectors. From the deep South we have unfortunately so far no material.

PLATYSTICTIDAE: *Drepa-nosticta annulata, D. halter-ata, D. philippa, D. trimaculata, Drepanosticta* sp.n., *Drepanosticta* sp.n., **Dre-panosticta* sp.n., **Drepanosticta* sp.n., *Drepano-sticta* sp./spp.(?), *Protosticta* sp.n., *Protosticta* sp.n. – COENAGRIONIDAE: *Agrio-cnemis femina, A. pygmaea, *Amphicnemis bonita, A. incallida, A. flavicornis, *A. macgregori, *A. furcata, *A. glauca, Amphicnemis* sp.n., *Argiocnemis rubescens in-termedia, *Cercion luzoni-cum, *C. malayanum, *C. pendulum, *Ceriagrion calamineum, C. lieftincki, Ischnura senegalensis, Ischnura* sp., **Pseudagrion azureum, *P. evanidum, P. microcephalum, P. pilidorsum, *P. rubriceps, Teinobasis corolla, *T. filiformis, T. nigra, *T. olivacea, T. samaritis, T. strigosa, T. hamalaineni, Teinobasis* sp., **Xiphiagrion cyanomelas.* – PLATYCNEMIDIDAE: *Risiocnemis arator, *R. asahinai, R. confusa, R. elegans, R. gracilis, *R. laguna, *R. pulchra, R.serrata, R. varians, Risiocnemis* spn, *R. atropurpurea, R. haematopus, R. ignea, R. incisa, *R. odobeni, *Risiocnemis* sp. –

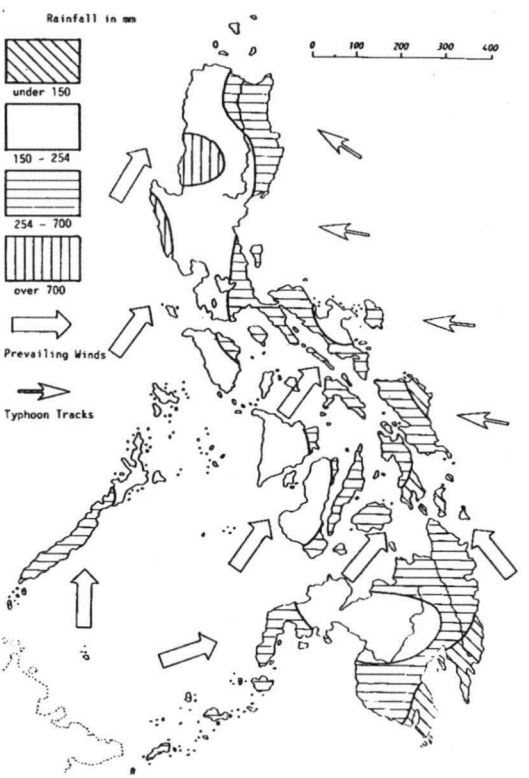


Fig. 4. Precipitation and prevailing winds in July.

LESTIDAE: **Lestes concinnus, L. praemorsus.* – MEGAPODAGRIONIDAE: **Rhinagrion philippinum, *Argiolestes realensis, Argiolestes* sp.n. – AMPHIPTERYGIDAE: **Devadatta* sp. – CHLOROCYPHIDAE: *Cyrano unicolor, Rhinocypha colorata, R. turconii.* – EUPHAEIDAE: *Euphaea refulgens, Heterophaea barbata.* – CALOPTERYGIDAE: *Neurobasis l. luzoniensis, Vestalis melania.*

GOMPHIDAE: *Gomphidia kirschii, Heliogomphus bakeri, *Ictinogomphus tenax, *Leptogomphus semperi, Paragomphus balneorum.* – AESHNIDAE: **Anaciaeschna jaspidea, *Anax guttatus, A. panybeus, *Gynacantha basiguttata, G. bayadera, G. constricta, G. hyalina, *G. subinterrupta, Indaeschna baluga, *Oligoaeschna poeciloptera, Tetracanthagyna bakeri.* – CHLOROGOMPHIDAE: **Chlorogomphus splendidus.* – CORDULIIDAE: **Epophthalmia elegans, Heteronaias heterodoxa, *Idionyx philippa, *I. salva, *Macromia negrito, Macromidia samal, *Procordulia moroensis.* – LIBELLULIDAE: *Acisoma panorpoides, Agrionoptera insignis, *Brachydiplax chalybea, Brachythemis contaminata, Camacinia gigantea, Cratilla lineata assidua, *C. metallica, Crocothemis servilia, Diplacina bolivari, D. braueri, D. lisa, *D. nana, *Diplacodes nebulosa, D. trivialis, *Hydrobasileus croceus, Lathrecista asiatica, *Lyriothemis cleis, *L. latro, Macrodiplax cora, Neurothemis ramburii, N. terminata, *Onychothemis abnormis, *Orchithemis pulcherrima, Orthetrum chrysis, O. glaucum, O. luzonicum, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, *Raphismia bispina, *Rhyothemis phyllis subphyllis, Tetrathemis irregularis, Tholymis tillarga, Tramea rosenbergi, *T. transmarina euryale, Trithemis adelpha, T. aurora, T. festiva, T. pallidinervis, Urothemis signata bisignata, *Zyxomma obtusum, *Z. petiolatum, *Zygonyx* sp.

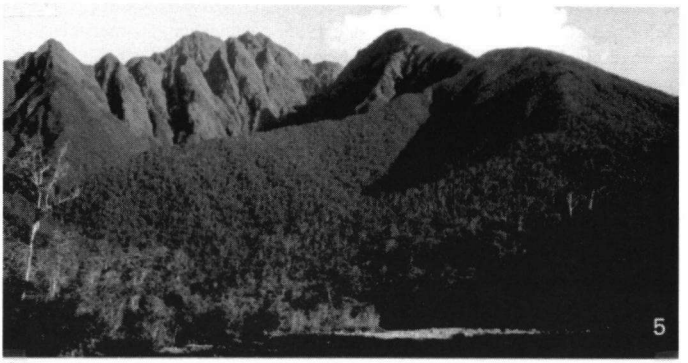
CATANDUANES ISLAND
1431 km², 18 species

This islands is located W from Camarines Sur province in SW Luzon. It is separated from Luzon by 6.5 km wide and ca 80 m deep Maqueda channel. The island is hilly with many rivers and streams. The highest point is 898 m. A mountain chain streches from N to S through the western part of the island. A smaller chain covers the eastern side of the island, which is almost yearly hit by typhoons.

In lowlands coco palms, abaca (*Musa textilis*) and rice are cultivated. Cogongrass covers the deforested hills and mountain slopes.

Already GONZALES (1983) reported that most of the forests were destroyed or badly damaged. According to Alex Buenafe, who visited the island in June 1996, a few forest patches still exist be-

Figs 5-7. Deforestation in the Philippines: (5) View from Camp "New St. Gallen" on the Pawala River (alt. 50-70 m), Sibuyan, July 1986. In the background Mt Guiting Guiting (2050 m). Dense forest still covers the mountain slopes, the habitat for some rare endemic species, like *Risiocnemis kiautai*. (Photo Roland A. Müller); – (6) Camp "New St. Gallen" on the Pawala River in March 1987. Only 8 months earlier the site was covered with intact rainforest (cf. Fig. 5). (Photo Roland A. Müller); – (7) Logged forest in the surroundings of Sibutu Hill in Sibutu Island (July 1990). The porous coral ground is clearly visible. After the trees have been cut, the thin humus layer is rapidly carried away by rainwater (Photo C.G. Treadaway).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tween Gigmoto and Viga. We do not know the present situation at Caramoran, Manamag and Virac, which GONZALES (1983) mentions in his report.

A. Buenafe's dragonfly collection, made in June 1996, contains ca 450 specimens of 18 species. The fauna shows resemblance to that of southern Luzon.

PLATYSTICTIDAE: *Drepanosticta* sp.n. – COENAGRIONIDAE: *Amphicnemis* sp.n., *Argiocnemis rubescens intermedia, Pseudagrion pilidorsum.* – PLATYCNEMIDIDAE: *Risiocnemis confusa, R. serrata, R. haematopus, R. odobeni, R. polilloensis.* – CHLOROCYPHIDAE: *Cyrano unicolor, Rhinocypha colorata, R. turconii.* – EUPHAEIDAE: *Euphaea refulgens.* – CALOPTERYGIDAE: *Vestalis melania.*

GOMPHIDAE: *Heliogomphus bakeri.* – CORDULIIDAE: *Heteronaias heterodoxa.* – LIBELLULIDAE: *Diplacodes trivialis, Orthetrum sabina.*

MARINDUQUE ISLAND
898 km², 27 species

There are no high mountains in this almost round island; the highest peak, Mt Malindig, in the South reaches 1157 m. The island is densely populated and the rain forests are almost destroyed, only a few patches are left.

No published dragonfly records are known to us. Our knowledge is based exclusively on the ca 400 specimens in coll. Müller, most of which have been collected in the southern part of the island by V. Francisco, in February 1993.

PLATYSTICTIDAE: *Drepanosticta* sp. – COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis bonita, Pseudagrion pilidorsum, Teinobasis corolla, T. samaritis.* – PLATYCNEMIDIDAE: *Risiocnemis serrata, R. atropurpurea.* – CHLOROCYPHIDAE: *Cyrano unicolor, Rhinocypha colorata.* – EUPHAEIDAE: *Euphaea refulgens.*

GOMPHIDAE: *Gomphidia kirschii, Ictinogomphus tenax.* – AESHNIDAE: *Anax guttatus, A. panybeus, Gynacantha hyalina* – CHLOROGOMPHIDAE: *Chlorogomphus* sp. – CORDULIIDAE: *Heteronaias heterodoxa.* – LIBELLULIDAE: *Diplacina bolivari, Diplacodes trivialis, Neurothemis ramburii, N. terminata, Orthetrum sabina, Pantala flavescens, Potamarcha congener, Trithemis aurora, T. festiva.*

POLILLO ISLAND
605 km², 17 species

Polillo Islands are located eastwards from the Central Luzon. Polillo is the largest of the group. It is mostly flat with smooth slopes. The highest point is 345 m in the southern part of the island. According to secondhand information through some Philippine businessmen, the island is largely deforested and cultivated. A few small forest patches appear to be left on the higher slopes in the South. Much of our knowledge is based on the small collection (26 specimens), made by Boettcher in August 1915.

PLATYSTICTIDAE: **Protosticta* sp.n. – COENAGRIONIDAE: **Argiocnemis rubescens intermedia, *Pseudagrion pilidorsum, *Teinobasis nigra, *T. samaritis, *T. strigosa.* – PLATYCNEMIDIDAE: **Risiocnemis polilloensis, *R. serrata.*

AESHNIDAE: **Anax guttatus, *Gynacantha* sp. – LIBELLULIDAE: **Camacinia gigantea, *Cratilla lineata assidua, *Lathrecista asiatica, *Orthetrum chrysis, *Raphismia bispina, *Rhodothemis rufa, *Tetrathemis irregularis.*

Mindoro region

Main islands: Mindoro and Lubang.
Dragonflies: 77 species.

MINDORO ISLAND
10 245 km², 77 species

Mindoro is a compact island just S of Luzon. The island is divided by a broad mountain range. The highest peak, the impressive Mt Halcon (2582 m), is situated 35 km SW from Calapan. Mt Baco (2363 m), in the cental part of the island, belongs to Mt Iglit-Mt Baco Wildlife Reserve, which provides the only refuge for the Tamaraw (*Bubalus mindorensis*) against extinction.

In Mindoro extensive forests still cover the higher elevations. However, cultivation extends already over the foothills, and the future of the remaining forests looks grim. If the exploitation continues at the present rate, the remaining forest is to disappear within a few years.

Records in literature are rather scanty, some 15 species have been listed in various publications, most of them from Naujan. Boettcher collected in Calapan-San Teodore area in January 1916 and in Mangarin in November 1917, and gathered 83 specimens (21 spp.).

Müller's dragonfly material (ca 2000 specimens of 60 species) comes mainly from Mt Halcon, where the second author stayed in May 1991. Later A. Gorostiza, N. Mohagan, F. Venus and C.G. Treadaway have collected there at various times in 1991-1993. Mt Tarugin, W of Lake Naujan was visited by A. Gorostiza twice in 1990. Mindoro seems to be rich in libellulids, *Rhyothemis obsolescens* has not yet been recorded from the other Philippine islands.

PLATYSTICTIDAE: *Drepanosticta* sp.n. – COENAGRIONIDAE: *Agriocnemis femina, A. pygmaea, *Amphicnemis* sp.n., *Argiocnemis rubescens intermedia, Ceriagrion lieftincki, Ischnura senegalensis, *Onychargia atrocyana, Pseudagrion pilidorsum, P. rubriceps, Teinobasis olivacea, *T. samaritis.* – PLATYCNEMIDIDAE: *Coeliccia brachysticta, Risiocnemis asahinai, *R. incisa, *R. odobeni.* – CHLOROCYPHIDAE: *Cyrano unicolor, Rhinocypha colorata.* – EUPHAEIDAE: *Euphaea refulgens.* – CALOPTERYGIDAE: *Neurobasis l. luzoniensis, *Vestalis melania.*

GOMPHIDAE: *Gomphidia kirschii, *Heliogomphus bakeri, Ictinogomphus tenax, Paragomphus balneorum.* – AESHNIDAE: *Anax guttatus, *Gynacantha basiguttata, Gynacantha hyalina, Oligoaeschna* sp., *Oligoaeschna* sp., *Tetracanthagyna bakeri.* – CHLOROGOMPHIDAE: *Chlorogomphus* sp. – CORDULIIDAE: *Hemicordulia mindana, Heteronaias heterodoxa, Idionyx philippa, M. samal, Procordulia moroensis.* – LIBELLULIDAE: *Acisoma panorpoides, *Agrionoptera insignis, *Brachydiplax chalybea, Cratilla lineata assidua, Crocothemis servilia, Diplacina bolivari, D. braueri, D. lisa, Diplacodes nebulosa, D. trivialis, Hydrobasileus croceus, Lathrecista asiatica, Lyriothemis cleis, Macrodiplax cora, Nannophya pygmaea, *Nesoxenia lineata, Neurothemis ramburii, N. terminata, Onychothemis abnormis, Orthetrum chrysis, O. luzonicum, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, Raphismia bispina, Rhyothemis obsolescens, R. phyllis subphyllis, *R. regia, R. triangularis, *Tetrathemis irregularis, Tholymis tillarga, *Trithemis adelpha, T. aurora, T. festiva, *T. pallidinervis, *Urothemis signata bisignata, Zyxomma obtusum, Z. petiolatum.*

West Visayan region

Main islands: Panay, Negros, Cebu, Masbate, Tablas, Guimaras, Sibuyan, Siquijor, Ticao, Romblon.

Dragonflies: 67 species.

PANAY ISLAND
12 327 km², 34 species

A 140 km long and 35 km broad mountain chain extends through the whole western part of the island. The highest peak, Mt Madja-as (2117 m), is situated 12 km from Culasi near the W coast. The eastern part of the island is mostly lowland with gently sloping hills. The eastern parts are heavily overpopulated and all original forest have changed to culture steppe. Primary forest is restricted to the higher mountains, and only small remnants of the lowland forests are left. The highest peaks are covered with mossy forest.

Literature records from Panay are very scanty. Coll. Müller contains so far ca 450 specimens of 32 spp. from a dozen localities in Antique and Iloilo provinces (collected by Th. Borromeo in 1987, F. Mohagan in 1992-1993, Karel Cerny in 1991 and A. Buenafe in 1994-1996). Thus, the species list is still far from complete. Politically active rebels have their hide-outs in the mountain forests, which prevents all collecting activity in the most interesting areas. The Panay fauna appears similar to that of Negros. *Neurobasis luzoniensis subpicta* was also recorded here.

PLATYSTICTIDAE: *Drepanosticta* sp.n., *Drepanosticta* sp.n. – COENAGRIONIDAE: *Amphicnemis* sp., *Agriocnemis pygmaea, Argiocnemis rubescens intermedia, Ceriagrion lieftincki, Ischnura senegalensis, Pseudagrion microcephalum, P. pilidorsum.* – PLATYCNEMIDIDAE: *Risiocnemis rolandmuelleri, R. plebeja.* – LESTIDAE: *Lestes praemorsus.* – CHLOROCYPHIDAE: *Cyrano unicolor, Rhinocypha colorata.* – CALOPTERYGIDAE: *Neurobasis luzoniensis subpicta.*

AESHNIDAE: *Anax guttatus, A. panybeus, Gynacantha bayadera, G. rolandmuelleri.* – GOMPHIDAE: **Heliogomphus bakeri, Paragomphus balneorum.* – CHLOROGOMPHIDAE: *Chlorogomphus* sp.n. – CORDULIIDAE: *Heteronaias heterodoxa.* – LIBELLULIDAE: *Diplacina bolivari, Diplacodes trivialis, *Lathrecista asiatica, Neurothemis ramburii, N. terminata, Orthetrum glaucum, O. pruinosum clelia, O. sabina, Pantala flavescens, Tholymis tillarga, Trithemis aurora.*

NEGROS ISLAND
9225 km², 40 species

Two high volcanos, Mt Canla-on (2465 m) in the N and Cuernos de Negros (1870 m) in the S give Negros a special charm. They are part of a rugged mountain chain, which extends through the whole island. The northwestern part of the island is a lowland region, which ascends smoothly towards the mountains. Ricefields characterize the lowlands and sugar-cane plantations the foothills. Tablas highlands at the altidude of 500-700 m in the SW is watered by numerous forested canyons. Original dipterocarp rain forest still covers the highest mountain slopes, changing to mossy forest in the highest peaks. In extreme deep and unpenetrable gorges the forest has remained intact also at low elevations.

Literature data on Negros dragonflies are scanty, only a few species have been listed before Müller's

material became available. It consists of some 2000 specimens, representing 37 species. Much of it comes from Mt Canla-on in the northern half of Negros, where A. Buenafe has been active since 1987. Other sites studied include Mt Talinis (C. Treadaway & Th. Borromeo, 1982 and 1985), Mt Bunga (A. Buenafe, 1990-1991) and Mt Mandalagan and Mt Balapag (F. Mohagan, 1992-1993). R. Müller visited some localities at Mt Silay in May 1996. From other regions the material is very scanty.

PLATYSTICTIDAE: *Drepanosticta* sp.n., *Drepanosticta* sp.n. – COENAGRIONIDAE: *Amphicnemis* sp.n., *Amphicnemis* sp., *Amphicnemis* sp., *Agriocnemis femina, *A. pygmaea, Ischnura senegalensis, Pseudagrion pilidorsum, Teinobasis corolla, T. samaritis.* – PLATYCNEMIDIDAE: *Risiocnemis rolandmuelleri.* – CHLOROCYPHIDAE: *Cyrano unicolor, Rhinocypha colorata.* – CALOPTERYGIDAE: *Neurobasis luzoniensis subpicta.*

GOMPHIDAE: *Heliogomphus bakeri.* – AESHNIDAE: *Anax guttatus, A. panybeus, Gynacantha hyalina, Indaeschna grubaueri.* – CORDULIIDAE: *Epophthalmia vittigera, Heteronaias heterodoxa, Macromidia samal, Procordulia moroensis.* – LIBELLULIDAE: *Diplacina bolivari, D. braueri, D. nana, Diplacodes trivialis, Lathrecista asiatica, Neurothemis ramburii, N. terminata, Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, *Trithemis aurora, *T. festiva, Zyxomma obtusum.*

CEBU ISLAND
5088 km², 32 species

Cebu Island makes a hopeless impression to every naturalist. Almost bare and completely dried-up hills and rocks dominate the landscape. All slopes are covered with cogon grass. Stream-dwelling dragonflies are uncommon in Cebu, since the completely deforested river- and streambeds do not provide proper habitats. No original intact forests are left, but a few patches of dense secondary forest, like that at Camp Seven in Minglanilla area still harbour a few real "forest damselflies", including an *Amphicnemis* species.

In the literature 21 species have been listed, many of them collected already by Semper. PLATEROS (1972) added several libellulids to the Cebu list. Our Cebu material includes ca 950 specimens (28 spp.), the bulk of them collected by W. Catal in 1988-1989. Also Th. Borromeo did some collecting, and both authors visited Cebu in May 1991.

COENAGRIONIDAE: *Amphicnemis* sp., *Agriocnemis femina, A. pygmaea, Argiocnemis rubescens intermedia, Ceriagrion lieftincki, Ischnura senegalensis, Pseudagrion pilidorsum, Teinobasis olivacea, T. samaritis.* – CHLOROCYPHIDAE: *Rhinocypha colorata, *R. turconii.*

LIBELLULIDAE: *Agrionoptera insignis, Crocothemis servilia, Diplacina bolivari, D. braueri, D. nana, Diplacodes trivialis, Lathrecista asiatica, Neurothemis ramburii, N. terminata, Orthetrum chrysis, *O. pruinosum clelia, O. sabina, *O. testaceum, *Pantala flavescens, Potamarcha congener, Rhyothemis phyllis subphyllis, Tholymis tillarga, Trithemis adelpha, T. aurora, T. festiva, Zyxomma obtusum.*

MASBATE ISLAND
4047 km², 27 species

In Masbate, the lowland and hilly regions alternate, but there are no prominent mountains. Rain forests were reduced to a few km2 on the highest hills. Cattle breeding (with herds as large as 4000 head) and rice cultivation provide the main means of livelihood.

There are no earlier dragonfly records known to us until Th. Borromeo collected nearly 250 specimens from northern and central parts of the island in 1987 and 1993.

PROTONEURIDAE: *Prodasineura integra.* – COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis* sp., *Ischnura senegalensis, Pseudagrion pilidorsum, Teinobasis corolla, T. olivacea, T. samaritis.* – PLATYCNEMIDIDAE: *Risiocnemis rolandmuelleri.* – MEGAPODAGRIONIDAE: *Rhinagrion philippinum.* – CHLOROCYPHIDAE: *Rhinocypha colorata.*

CORDULIIDAE: *Heteronaias heterodoxa.* – LIBELLULIDAE: *Crocothemis servilia, Diplacina bolivari, D. braueri, Lathrecista asiatica, Neurothemis ramburii, N. terminata, Orthetrum chrysis, O. sabina, O. testaceum, Potamarcha congener, Raphismia bispina, Tetrathemis irregularis, Trithemis aurora, T. festiva, Zyxomma obtusum.*

TABLAS ISLAND
686 km², 1 species

Practically all rain forest has already disappeared in Tablas, as also in Romblon. Thus, the view is almost desperate to a naturalist, especially during the dry season. Water in streams is brown. Stream banks lack low vegetation, the only green present are the coconut trees. The smallest streams have completely dried up.

No dragonfly records in literature. On his way home from Sibuyan in 1986 the second author collected one species near the airport.

LIBELLULIDAE: *Pantala flavescens.*

SIBUYAN ISLAND
449 km², 37 species

In Sibuyan untouched and wide rainforest still exists, also in lowland regions. Mountain slopes and gorges are usually steep and rough, especially on Mt Guiting Guiting (2057 m), the highest mountain in the island (Fig. 5). On the highest slopes of Mt Guiting Guiting the dipterocarp forest changed into lower mossy forest. From the coastal lowland regions and foothills the forest has already been cleared to cultivations. Zoologically and botanically the island is interesting due to remarkable endemics.

There are no earlier records known to us. The second author and his collaborators collected a total of ca 550 specimens, in areas around Mt Guiting Guiting in August 1986 and in April 1987, altogether during 6 weeks.

PLATYSTICTIDAE: *Drepanosticta* sp.n., *Drepanosticta* sp.n. – COENAGRIONIDAE: *Agriocnemis femina, A. pygmaea, Amphicnemis* sp.n., *Argiocnemis rubescens intermedia, Ischnura senegalensis, Pseudagrion pilidorsum, Teinobasis samaritis, Xiphiagrion cyanomelas.* – PLATYCNEMIDIDAE: *Risiocnemis kiautai, R. roland-*

muelleri, R. plebeja. – CHLOROCYPHIDAE: *Rhinocypha colorata.*

GOMPHIDAE: *Heliogomphus bakeri.* – AESHNIDAE: *Gynacantha bayadera, G. rolandmuelleri.* – CORDULIIDAE: *Heteronaias heterodoxa.* – LIBELLULIDAE: *Acisoma panorpoides, Cratilla lineata assidua, Diplacina braueri, Diplacodes trivialis, Lathrecista asiatica, Lyriothemis cleis, Neurothemis ramburii, N. terminata, Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, Tetrathemis irregularis, Tholymis tillarga, Tramea transmarina euryale, Trithemis aurora, T. festiva.*

SIQUIJOR ISLAND
336 km², 19 species

Siquijor is located in the Bohol Sea, eastwards from the southern Negros. Mt Malabahoc (628 m) in the central part and Mt Cudtingan (466 m) in the northern part dominate the landscape. As all other small islands, Siquijor is largely cultivated and remnants of rain forest remain only in the highest and steepest slopes. During the rainy season, heavy downpours feed numerous small streams descending to the sea.

No records in literature. In April 1993 Th. Borromeo made a quite representative collection of nearly 400 specimens from Barrio Bandilaan.

PLATYSTICTIDAE: *Drepanosticta* sp. – COENAGRIONIDAE: *Agriocnemis femina, Argiocnemis rubescens intermedia, Pseudagrion pilidorsum, Teinobasis samaritis.* – PLATYCNEMIDIDAE: *Coeliccia dinoceras, Risiocnemis rolandmuelleri.*

LIBELLULIDAE: *Acisoma panorpoides, Agrionoptera insignis, Diplacina bolivari, D. nana, Lathrecista asiatica, Neurothemis ramburii, N. terminata, Orthetrum pruinosum clelia, O. sabina, O. testaceum, Potamarcha congener, Tholymis tillarga.*

TICAO ISLAND
334 km², 13 species

Ticao Islands belongs to Masbate province. It is located between Masbate and the southernmost tip of Luzon (Sorsogon province). The 43 km long and 15 km broad island is, in spite of poor transport conditions, largely cultivated. There are no high mountains, the highest peak (405 m) is in the NW and it still contains a few disturbed forest patches.

No records in the literature. A small collection (117 specimens) was made by Th. Borromeo in March 1993. It consists mainly of common species.

COENAGRIONIDAE: *Agriocnemis femina, Ceriagrion lieftincki, Pseudagrion pilidorsum, Teinobasis corolla, T. olivacea, T. samaritis.*

LIBELLULIDAE: *Diplacodes trivialis, Neurothemis terminata, Orthetrum chrysis, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener.*

Mindanao region/Eastern Visayan subregion

Main islands: Samar, Leyte, Bohol, Biliran, Panaon, Camotes Islands, Homonhon.
Dragonflies: 100 species.

SAMAR ISLAND
9949 km², 69 species

The fate of the dipterocarp forest in Samar is similar as in Negros and Panay. Large areas have been deforested and changed to cultivated land or steppe. The hills are covered mostly by cogon grass, the virgin dipterocarp forest is restricted to the mountainous interior, which is rather difficult to enter. There are no high mountains in Samar, the highest peak Mt Capotoan in the northern part of the island reaches 846 m.

Literature contains only a few records from Samar; 12 species have been reported. Boettcher collected 78 specimens (19 spp.) in Catbalogan in April 1915. Müller's material (ca 650 specimens of 63 spp.) comes from a few localities. Most of the specimens were collected in Hinabangan, San Rafael (Th. Borromeo and C.G. Treadaway, 1992), at Oras and in eastern Samar (Th. Borromeo, 1992-1994) and at San Isidoro in western Samar (Th. Borromeo, 1994). Further studies on this interesting island are urgently needed.

PLATYSTICTIDAE: **Drepanosticta mylitta, Drepanosticta* sp., *Drepanosticta* sp. – PROTONEURIDAE: *Prodasineura integra.* – COENAGRIONIDAE: **Amphicnemis incallida, A. cantuga, Amphicnemis* sp., **Amphicnemis* sp., *Amphicnemis* sp., *Ceriagrion lieftincki, Pseudagrion pilidorsum, Teinobasis filamentum, T. olivacea, T. samaritis, T. strigosa.* – PLATYCNEMIDIDAE: *Coeliccia dinoceras, Risiocnemis appendiculata, R. flammea, *R. haematopus, R. melanops, R. praeusta, R. siniae, Risiocnemis* sp.n. – MEGAPODAGRIONIDAE: *Rhinagrion philippinum.* – LESTIDAE: *Lestes praemorsus.* – CHLOROCYPHIDAE: *Cyrano angustior, Rhinocypha colorata, R. turconii.* – EUPHAEIDAE: *Euphaea amphicyana, E. cora.* – CALOPTERYGIDAE: *Neurobasis anumariae, Vestalis melania.*

GOMPHIDAE: *Acrogomphus jubilaris, Gomphidia kirschii, Heliogomphus bakeri, Leptogomphus semperi.* – AESHNIDAE: *Anax panybeus, Gynacantha alcathoe, Oligoaeschna uemurai.* – CORDULIIDAE: *Hemicordulia mindana, Heteronaias heterodoxa, Idionyx philippa.* – LIBELLULIDAE: *Acisoma panorpoides, Agrionoptera insignis, Cratilla lineata assidua, Crocothemis servilia, Diplacina bolivari, D. braueri, *D. nana, Lyriothemis cleis, L. latro, Nannophya pygmaea, Neurothemis ramburii, N. terminata, Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, *Pantala flavescens, Potamarcha congener, Rhyothemis phyllis subphyllis, R. regia, R. triangularis, Tetrathemis irregularis, Tramea rosenbergi, Trithemis adelpha, T. aurora, T. festiva.*

LEYTE ISLAND
6268 km², 58 species

Leyte is separated from Samar only by a very narrow strait and these islands form a close biogeographical unit. A long mountain chain divides the island. The highest peak is Mt Cancayan (1350 m). In the S there is a separate smaller mountain chain with lower peaks between Maasin and Bontoc. At the higher elevations intact dipterocarp forest still prevails. In the central and northern parts of the island, there are some mountain lakes, with rich vegetation between 700-1000 m. The northwestern and northeastern parts of Leyte are lowlands with gently sloping hills. These areas are cultivated and all forests have disappeared.

Besides the 15 libellulid species listed without further data from Leyte (PLATEROS, 1972), only a

few records are available in the literature, most of them from Saint Bernard area in the southern Leyte. During his travels, Boettcher stopped twice in Leyte, but he collected only a few specimens.

Müller's material from Leyte consists of ca 850 specimens of 48 species. Most of the specimens come from Mt Balocaue in central Leyte, where Th. Borromeo has visited several times in 1986-1994. A smaller amount of specimens comes from Mt Hapag and Mt Saint Bernard (by A. Buenafe in 1989-1990) in the South.

PLATYSTICTIDAE: *Drepanosticta belyshevi, D. mylitta.* – PROTONEURIDAE: *Prodasineura integra.* – COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis cantuga, Amphicnemis* sp., *Amphicnemis* sp., *Argiocnemis rubescens intermedia, Ceriagrion lieftincki, Pseudagrion pilidorsum, *Teinobasis olivacea, *Xiphiagrion cyanomelas.* – PLATYCNEMIDIDAE: *Coeliccia dinoceras, Risiocnemis appendiculata, R. praeusta, R. flammea, R. siniae.* – CHLOROCYPHIDAE: *Cyrano angustior, Rhinocypha colorata, R. turconii.* – EUPHAEIDAE: *Euphaea amphicyana.* – CALOPTERYGIDAE: *Neurobasis anumariae, Vestalis melania.*

GOMPHIDAE: **Gomphidia kirschii, Heliogomphus bakeri, Leptogomphus semperi.* – AESHNIDAE: *Anax guttatus, A. panybeus, Gynacantha dohrni, Oligoaeschna* sp., *Tetracanthagyna bakeri.* – CORDULIIDAE: *Hemicordulia mindana, Heteronaias heterodoxa, Idionyx philippa.* – LIBELLULIDAE: **Acisoma panorpoides, Agrionoptera insignis, *Cratilla lineata assidua, *Crocothemis servilia, Diplacina bolivari, Diplacodes trivialis, *Lathrecista asiatica, Lyriothemis cleis, Nannophya pygmaea, Neurothemis ramburii, N. terminata, Onychothemis abnormis, *Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, Rhodothemis rufa, Rhyothemis phyllis subphyllis, Tholymis tillarga, *Trithemis aurora, T. festiva, *Zyxomma obtusum.*

BOHOL ISLAND
4117 km², 33 species

Bohol is largely deforested and cultivated. Large areas are covered by dry bushland or cogon grass. Some forest patches remain in the nortwestern part, but most of the original forests are restricted to the mountains in the southern part of the island.

Already Semper visited Bohol, and subsequently some species were listed in the early literature, *Rhinagrion philippinum* being described from there. Altogether 22 species has been listed in the literature. Boettcher stayed a few days in Garcia Hernandez in July 1916, but collected only 3 species.

Müller's small collection (ca 100 specimens of 17 species) comes mainly from the mountains surrounding Sierra Bullones (W. Catal, April 1989). A few specimens were collected in Jagna by Th. Borromeo in March 1988 and by A. Buenafe in Pilar in March 1994.

PLATYSTICTIDAE: *Drepanosticta belyshevi, Drepanosticta* sp.n. – COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis* sp., **Ceriagrion lieftincki, Teinobasis filamentum.* – PLATYCNEMIDIDAE: **Coeliccia dinoceras, Risiocnemis appendiculata.* – MEGAPODAGRIONIDAE: **Rhinagrion philippinum.* – CHLOROCYPHIDAE: *Rhinocypha colorata.*

AESHNIDAE: *Anax panybeus.* – CORDULIIDAE: *Heteronaias heterodoxa.* – LIBELLULIDAE: **Brachydiplax chalybea, *B. duivenbodei, Crocothemis servilia,*

**Diplacina bolivari, *D. nana, *Diplacodes trivialis, Lyriothemis latro, Neurothemis ramburii, N. terminata, *Onychothemis abnormis, Orthetrum pruinosum clelia, *O. sabina, O. testaceum, *Pantala flavescens, Potamarcha congener, *Rhyothemis phyllis subphyllis, Tholymis tillarga, *Tramea transmarina euryale, *Trithemis adelpha, *T. aurora, *T. festiva.*

BILIRAN ISLAND
498 km², 24 species

Relatively steep extinct volcanoes characterize this island. Mt Sayoa (1266 m) is the highest mountain. Also in Biliran, cultivation climbs steadily higher up on the forested mountain slopes, but there are still some good dipterocarp forests left on steep slopes and gorges high in the mountains. Biliran is located N of Leyte and the two islands are separated only by a narrow strait. Consequently, their faunas are similar.

Boettcher collected 3 species in Biliran in October 1915. In October-November 1992 Th. Borromeo visited two sites on Mt Sayoa and collected ca 200 specimens of 23 species.

PLATYSTICTIDAE: *Drepanosticta mylitta.* – COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis cantuga, Amphicnemis* sp., *Pseudagrion pilidorsum.* – PLATYCNEMIDIDAE: *Coeliccia dinoceras, Risiocnemis appendiculata, R. praeusta, R. flammea, R. siniae.* – CHLOROCYPHIDAE: *Rhinocypha colorata, R. turconii.*

AESHNIDAE: *Anax panybeus.* – CORDULIIDAE: *Hemicordulia mindana, Heteronaias heterodoxa.* – LIBELLULIDAE: *Diplacina bolivari, D. nana, Neurothemis ramburii, N. terminata, Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, *Pantala flavescens.*

PANAON ISLAND
202 km², 38 species

Panaon is separated from southern Leyte only by the 400 m broad Panaon strait. A mountain chain extends from N to S, the highest peak being Mt Jinauanan (851 m). Many of the higher slopes and gorges are still covered with untouched dipterocarp forest. However, also here penetrate the settlers deeper and deeper to the mountain forests and exploitate these.

Only two species from Panaon have so far been listed in the literature. Boettcher collected 15 specimens of 6 species in November-December 1915. Müller's material from Panaon consists of over 650 specimens representing 38 species. Most of them were collected by W. Catal in August and October 1988 and some more by Th. Borromeo in October 1990 and February 1991. This material shows that the fauna closely resembles that of Leyte.

PLATYSTICTIDAE: *Drepanosticta belyshevi, D. lestoides, D. mylitta.* – COENAGRIONIDAE: *Agriocnemis femina, A. pygmaea, Amphicnemis* sp., *Argiocnemis rubescens intermedia, Ceriagrion lieftincki, Pseudagrion pilidorsum, Teinobasis filamentum.* – PLATYCNEMIDIDAE: *Coeliccia dinoceras, Risiocnemis appendiculata, R. praeusta, R. calceata, R. flammea, R. fuligifrons.* – CHLOROCYPHIDAE: *Rhinocypha colorata, R. turconii.* – EUPHAEIDAE: *Euphaea amphicyana.* – CALOPTERYGIDAE: *Vestalis melania.*

CORDULIIDAE: *Heteronaias heterodoxa, Idionyx philippa.* – LIBELLULIDAE: *Cro-*

cothemis servilia, Diplacina bolivari, D. braueri, Diplacodes trivialis, Lyriothemis cleis, Nannophya pygmae, Neurothemis ramburii, N. terminata, Orthetrum pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, Trithemis adelpha, T. aurora, T. festiva.

HOMONHON ISLAND
104 km², 47 species

Gently sloping hills characterize this small island between Dinagat and the southernmost tip of Samar. It contains rich deposits of chrome, which will soon be exploitated. The northernmost part of the island with the highest hill (Mt Pamunagan, 341 m) is covered with secondary forests or bush, in 1988 only ca 2 hectares of good rainforest was left at Inapulangan.

In 1980s the largest area of original forest in the island was in the southeastern part around Magellanes Point. A few months before Roland Müller's visit in May-June 1988, this forest was nearly completely burned down, only 2-3 km² remained untouched. At present also this last patch is disturbed (F. Lagramada in litt. 1993). The four-week collecting activity at Magellanes Point and in Bitaugan area in 1988 shows well how rich the dragonfly fauna in the tiny island was. Even three different *Amphicnemis* species were found. The island should be studied again after a few years to find out what has been lost together with the last forests.

No earlier records are available in literature. Müller's material includes ca 1100 specimens.

PLATYSTICTIDAE: *Drepanosticta mylitta.* – PROTONEURIDAE: *Prodasineura integra.* – COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis cantuga, Amphicnemis* sp., *Amphicnemis* sp., *Argiocnemis rubescens intermedia, Ceriagrion lieftincki, Pseudagrion pilidorsum, Teinobasis filamentum, T. olivacea, T. samaritis.* – PLATYCNEMIDIDAE: *Risiocnemis appendiculata, R. flammea.* – LESTIDAE: *Lestes praemorsus.* – CHLOROCYPHIDAE: *Rhinocypha turconii.* – EUPHAEIDAE: *Euphaea amphicyana.*

GOMPHIDAE: *Gomphidia kirschii, Heliogomphus bakeri.* – AESHNIDAE: *Gynacantha alcathoe, Gynacantha hyalina, Oligoaeschna poeciloptera.* – CORDULIIDAE: *Heteronaias heterodoxa, Idionyx philippa.* – LIBELLULIDAE: *Acisoma panorpoides, Agrionoptera insignis, Brachydiplax duivenbodei, Diplacodes trivialis, Lathrecista asiatica, Lyriothemis cleis, Nannophya pygmaea, Nesoxenia lineata, Neurothemis ramburii, N. terminata, Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, Raphismia bispina, Tholymis tillarga, Tramea transmarina euryale, Trithemis aurora, T. festiva, Zyxomma obtusum, Z. petiolatum.*

Mindanao region/Mindanao subregion

Main islands: Mindanao, Basilan, Dinagat, Siargao and Bucas Grande, Camiguin, Sarangani Islands.

Dragonflies: 134 species.

MINDANAO ISLAND
94 596 km², 126 species

Mindanao is the second largest island of the archipelago. Its area was once largely covered with rain forests. Volcanous mountains and marshland dominate now the landscape. Some of the higher mountains are still covered by extensive rain forests, especially at higher elevations. Mossy forests prevail above 1000 m.

Mt Apo volcano (2954 m) on the boundary of North Cotabato and Davao del Sur provinces is the highest mountain in the Philippines. Its slopes contain many steamy sulphur springs. Other high mountains include Mt Katanglad (2938 m) and Mt Kalatungan (2865 m) in Bukidnon province, Mt Ragang (2815 m) in North Cotabato province, Mt Mayo (2621 m) at Kampalili range in Davao province, Mt Malindang (2425 m) in Misamis Occidental province, Mt Matutum (2295 m) and Mt Busa (2083 m) in South Cotabato province and Mt Hilonghilong (2012 m) at Diuata Range in Agusan del Norte province.

There are two wide lowland regions in Mindanao. Agusan River valley separates the Diuata mountain range in the northeastern corner of the island from the extensive Bukidnon highlands in central Mindanao. The other lowland region, Cotabato Valley, is surrounded by Mt Ragang range in the North, Mt Apo and Mt Matutum ranges in the East and Mt Busa and Parker ranges in the South.

The future of the remaining forests looks as serious as in other islands. Lowlands and lower hills are largely cultivated and used for production of rice, banana and pineapple, or they are marshy. Lowland rain forests are reduced to very small patches here and there. Also forests in mountains have been reduced by logging and slash-and-burn cultivation by the settlers. Even the well known Mt Apo national park has not remained intact.

Most of the earlier literature records on Mindanao come from Zamboanga peninsula, Davao provinces and from Surigao area. Boettcher collected in Mindanao at three occasions in December 1914 - February 1915, in May-August 1915 and August-September 1916. Most of his 442 specimens (49 spp.) come from Surigao area, some also from Zamboanga, from Dansalan (in Lanao del Sur) and elsewhere, mainly in the coastal areas.

Müller's material from Mindanao consists of almost 7000 specimens, representing 104 species. A considerable part of it comes from Mt Busa mountain range, S from Koronadal in South Cotabato province, where the second author has collected in 1985 and 1986 and L. Vinciguerra in 1994. J. de los Reyes has also provided specimens from there now and then. During his 1985 and 1995 expeditions, the second author collected also at Mt Apo and plenty of further specimens have been provided from there by A. Buenafe in 1993-1995. Besides Mt Apo, many localities in Davao Oriental and Surigao del Sur provinces were studied during the 1995 and 1996 expeditions. From different mountains in Bukidnon province (Katanglad, Kalatungan, Imbayo Mts, etc.) comes a fine series collected by C.G. Treadaway in 1989, Th. Borromeo in 1989-1990, A. Buenafe in 1991 and 1995 and F. Mohagan in 1993. Other areas from where we have material include Mt Malindang in Misamis Occidental province (Th. Borromeo, 1987-1988), Kapatagan area in Lanao del Norte province (W. Catal, 1988) and Zamboanga del Norte province (W. Catal, Th. Borromeo and C.G. Treadaway, 1987-1988).

At present records are available from all provinces except from Sultan Kudarat. The best known of these are South Cotabato (69 spp.), Surigao del Sur (59 spp.), Zamboanga del Sur (57 spp.), Bukidnon (56 spp.), Davao Oriental (53 spp.) and North Cotabato (45 spp.). From Mt Apo National Park (partly in North Cotabato, partly in Davao del Sur) we know at least 32 species.

Unfortunately, due to continuous political unrest, many faunistically interesting mountain areas (like Mt Ragang, Mt Hilonghilong, Mt Kampalili and some others) are too dangerous for collecting trips. Apparently many unknown species still exist on these mountains.

PLATYSTICTIDAE: *Drepanosticta aries, D. lestoides, D. lymetta, *D. megametta, *D. taurus, Drepanosticta* sp., *Drepanosticta* sp.n., *Drepanosticta* sp.n.,

Drepanosticta sp.n., *Drepanosticta* sp.n., *Drepanosticta* sp.n. – PROTONEURIDAE: *Prodasineura integra.* – COENAGRIONIDAE: *Agriocnemis femina, A. pygmaea, Amphicnemis cantuga, A. dentifer, *A. lestoides, Amphicnemis* sp., **Amphicnemis* sp., *Amphicnemis* sp.n., *Amphicnemis* sp./spp., *Argiocnemis rubescens intermedia, Ceriagrion lieftincki, *Ischnura aurora, I. senegalensis, *Onychargia atrocyana, Pseudagrion buenafei, P. microcephalum, P. pilidorsum, Teinobasis annamaijae, T. filamentum, *T. filum, *T. olivacea, T. ranee, T. recurva, T. samaritis, Teinobasis* sp., *Xiphiagrion cyanomelas.* – PLATYCNEMIDIDAE: *Coeliccia dinoceras, C. exoleta, Risiocnemis appendiculata, R. erythrura, R. moroensis, R. atripes, R. flammea, R. fuligifrons, R. rubripes, R. tendipes, Risiocnemis* sp.n., *Risiocnemis* sp.n., *Risiocnemis* sp.n. – MEGAPODAGRIONIDAE: *Rhinagrion philippinum.* – AMPHIPTERYGIDAE: *Devadatta podolestoides basilanensis.* – CHLOROCYPHIDAE: *Cyrano angustior, Rhinocypha colorata, R. sanguinolenta, R. turconii.* – EUPHAEIDAE: *Euphaea amphicyana, *E. cora.* – CALOPTERYGIDAE: *Neurobasis anumariae, Vestalis melania.*

GOMPHIDAE: *Gomphidia kirschii, Heliogomphus bakeri, Ictinogomphus tenax, *Leptogomphus semperi, Paragomphus balneorum.* – AESHNIDAE: **Anaciaeschna jaspidea, Anax guttatus, A. panybeus, Anax* sp., *Gynacantha alcathoe, G. bayadera, G. hyalina, *G. subinterrupta, Indaeschna grubaueri, *Oligoaeschna uemurai, *O. zambo, *Oligoaeschna sp., Tetracanthagyna bakeri.* – CHLOROGOMPHIDAE: *Chlorogomphus* sp. – CORDULIIDAE: *Epophthalmia vittigera, Hemicordulia apoensis, H. mindana, Heteronaias heterodoxa, Idionyx philippa, Macromidia samal, Procordulia moroensis.* – LIBELLULIDAE: **Acisoma panorpoides, Agrionoptera insignis, Brachydiplax chalybea, *Camacinia gigantea, Cratilla lineata assidua, Crocothemis servilia, Diplacina bolivari, D. braueri, D. lisa, D. nana, Diplacodes nebulosa, D. trivialis, Hydrobasileus croceus, Lathrecista asiatica, Lyriothemis cleis, *Macrodiplax cora, Nannophya pygmaea, *Nesoxenia lineata, Neurothemis ramburii, N. terminata, Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, *Raphismia bispina, Rhyothemis phyllis subphyllis, R. regia, R. triangularis, *Tetrathemis irregularis, Tholymis tillarga, Tramea rosenbergi, T. transmarina euryale, Trithemis adelpha, T. aurora, T. festiva, Zyxomma obtusum, *Z. petiolatum.*

BASILAN ISLAND
1280 km², 48 species

The lowlands of Basilan are nearly completely deforested and under cultivation. Mahogany and rubber plantations mixed with coconut groves and fruit orchards have spread over much of the island. There are small patches of young secondary forests, here and there. Swamp areas are uncommon, but the coastal areas are largely covered with dense mangrove forest.

In the mountains in the central part of the island, the original rain forest still exists in nearly inaccessible canyons and gorges. The highest peak (Basilan peak) reaches 1011 m. Plentiful rain feeds the numerous streams and brooks. Unfortunately, the politically unsettled conditions are preventing also

here the exploration of the faunistically most interesting mountain areas.

Literature contains a fair number of dragonfly records, the oldest of these by Semper. Also ASAHINA (1968) listed many species from this island. A total of 24 species have been listed in literature, including two taxa (*Devadatta podolestoides basilanensis* and *Rhinocypha dorsosanguinea*) originally described from Basilan. Boettcher visited the island in December 1914 and collected 125 specimens of 15 species, also *R. dorsosanguinea*.

Müller's material includes nearly 300 specimens, representing 31 species collected by C.G. Treadaway and Th. Borromeo near Isabela and Lamitan in the northern part of Basilan, in June 1988, April 1991 and April 1993.

PROTONEURIDAE: *Prodasineura integra*. – COENAGRIONIDAE: **Agriocnemis femina, *A. pygmaea, *Argiocnemis rubescens intermedia, Ceriagrion lieftincki, *Ischnura senegalensis, Pseudagrion pilidorsum, Teinobasis filamentum, *T. recurva, T. samaritis*. – PLATYCNEMIDIDAE: *Coeliccia dinoceras, Risiocnemis fuligifrons*. – LESTIDAE: *Lestes quercifolia*. – AMPHIPTERYGIDAE: **Devadatta podolestoides basilanensis*. – CHLOROCYPHIDAE: *Rhinocypha colorata, *R. dorsosanguinea*. – EUPHAEIDAE: *Euphaea amphicyana, E. cora*. – CALOPTERYGIDAE: *Vestalis melania*.

GOMPHIDAE: *Gomphidia kirschii, *Leptogomphus semperi*. – CORDULIIDAE: *Idionyx philippa*. – LIBELLULIDAE: *Agrionoptera insignis, *Camacinia gigantea, Cratilla lineata assidua, Diplacina bolivari, D. braueri, Diplacodes trivialis, Lathrecista asiatica, *Lyriothemis cleis, *Macrodiplax cora, Neurothemis ramburii, N. terminata, Orchithemis pulcherrima, Orthetrum pruinosum clelia, *O. sabina, O. testaceum, *Pantala flavescens, Potamarcha congener, *Raphismia bispina, Rhyothemis phyllis subphyllis, *R. regia, Tetrathemis irregularis, *Tholymis tillarga, Trithemis adelpha, T. aurora, T. festiva, *Zyxomma obtusum*.

DINAGAT ISLAND
801 km², 62 species

Dinagat is situated northwards from the northeastern tip of Mindanao. The landscape is hilly in the S, and mountainous in the N. The highest peaks are Mt Redondo (929 m) and Mt Canbinlio (903 m). Large areas of the original dipterocarp forest have already been destroyed by burning or due to strip mining (surface quarrying) of chrome ore, but the steep mountains are still partly covered with dense forests. Mangrove forests cover large areas of the very sinuous coastline.

Our knowledge of the quite rich fauna is based largely on Müller's collection. Only two *Risiocnemis* species had been listed in the earlier literature (NEEDHAM & GYGER, 1939). Boettcher visited the island briefly in December 1915, but collected only one specimen (*Amphicnemis cantuga*). Müller's material contains ca 1200 specimens of 61 species. They were gathered by A. Buenafe from the northern mountains in May-June 1988, February 1989, April-May 1989, June-July 1989, September 1989 and March 1990. As far as we know, no collections have been made in southern Dinagat.

PLATYSTICTIDAE: *Drepanosticta lestoides, D. mylitta*. – PROTONEURIDAE: *Prodasineura integra*. – COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis cantuga, Amphicnemis* sp., *Amphicnemis* sp., *Argiocnemis rubescens intermedia, Ceriagrion lieftincki, Ischnura senegalensis, Pseudagrion pilidorsum, Teinobasis annamaijae, Xiphiagrion cyanomelas*. – PLATYCNEMIDIDAE: *Coeliccia dinoceras, Risiocnemis*

*appendiculata, R. praeusta, R. calceata, R. flammea, R. fuligifrons, *R. rubripes.* – LESTIDAE: *Lestes praemorsus.* – AMPHIPTERYGIDAE: *Devadatta podolestoides basilanensis.* – CHLOROCYPHIDAE: *Cyrano angustior, Rhinocypha colorata, R. turconii.* – EUPHAEIDAE: *Euphaea amphicyana.* – CALOPTERYGIDAE: *Vestalis melania.*

GOMPHIDAE: *Heliogomphus bakeri.* – AESHNIDAE: *Gynacantha bayadera, Oligoaeschna* sp. – CHLOROGOMPHIDAE: *Chlorogomphus* sp. – CORDULIIDAE: *Hemicordulia mindana, Heteronaias heterodoxa, Idionyx philippa, Macromidia samal.* –LIBELLULIDAE: *Acisoma panorpoides, Agrionoptera insignis, Brachydiplax chalybea, B. duivenbodei, Camacinia gigantea, Cratilla lineata assidua, Diplacina nana, Diplacodes trivialis, Hydrobasileus croceus, Lathrecista asiatica, Lyriothemis cleis, Nannophya pygmae, Neurothemis ramburii, N. terminata, Orthetrum pruinosum clelia, O. testaceum, Pantala flavescens, Potamarcha congener, Raphismia bispina, Rhodothemis rufa, Rhyothemis phyllis subphyllis, R. regia, Tetrathemis irregularis, Tholymis tillarga, Tramea transmarina euryale, Trithemis festiva, Zyxomma petiolatum.*

SIARGAO ISLAND
436 km², 10 species

It is situated SE from Dinagat. We have no specimens from there, but Boettcher collected 16 specimens of 10 species in September-November 1916.

COENAGRIONIDAE: **Amphicnemis dentifer, *Argiocnemis rubescens intermedia, *Teinobasis olivacea.* – PLATYCNEMIDIDAE: **Risiocnemis erythrura.* – LESTIDAE: **Lestes praemorsus.*

LIBELLULIDAE: **Agrionoptera insignis, *Camacinia gigantea, *Cratilla lineata assidua, *Lathrecista asiatica, *Orthetrum testaceum.*

CAMIGUIN ISLAND
238 km², 10 species

Mt Mambajao (1600 m) dominates this small volcanic island between Bohol and Mindanao. Aside of the few specimens of two common species collected by Boettcher in July 1916, no other data were available until A. Buenafe visited briefly Mt Hibokhibok and Mt Timbo-ong in May 1995, collecting 59 specimens of 9 species.

PLATYSTICTIDAE: *Drepanosticta* sp.n. – PROTONEURIDAE: *Prodasineura integra.* – COENAGRIONIDAE: *Pseudagrion pilidorsum.* – PLATYCNEMIDIDAE: *Risiocnemis appendiculata.* – CHLOROCYPHIDAE: *Cyrano angustior, Rhinocypha turconii.*

LIBELLULIDAE: *Diplacina bolivari, Lathrecista asiatica, *Neurothemis terminata, Trithemis festiva.*

Palawan region

Main islands: Palawan, Busuanga, Culion, Dumaran, Cuyo Islands, Balabac.
Dragonflies: 92 species.

PALAWAN ISLAND
14 896 km², 78 species

Palawan, a 420 km long and only 45 km broad island, forms with the Balabac island group in the S and the Calamian group in the N "a bridge" between Borneo and Luzon. The mountain group, extending through the whole island is interrupted by narrow lowland straits at Baheli and at Quezon, conveniently deviding the island into a northern, a central and a southern part. The highest peaks are Mt Mantalingajan (2085 m) in the S, Victoria peak (1709 m) in the central part and Cleopatra Needle (1602 m) in the N.

Only 10-20 years ago Palawan was covered with fine and extensive rain forests. The present speed of logging and slash-and-burn farming severely endangers the future of the forests also here. The places which were covered by dense forests during a visit in 1985, were in 1991 already destroyed. Also a new road southwards from Quezon, towards the Mt Mantalingajan range, has already increased the number of settlers and hastened the destruction of the surrounding forests. It is to be expected that in 10-20 years a great majority of forests will have disappeared, if deforestation is allowed to proceed at the present pace.

Even so, at present extensive areas of the original dipterocarp cover still exist and provide shelter for a very interesting fauna and flora. As in other groups, species composition in dragonflies is an interesting mixture of Borneon / continental Asian origin, Philippine proper origin and endemic elements.

Literature contains records of 49 species, most of them listed by LIEFTINCK (1974). Boettcher collected in northern Palawan (Binaluan, Bacuit and Pancol) between November 1913 and January 1914, gathering at least 119 specimens of 18 species, including the holotypes of *Cyclophaea cyanifrons* and *Coeliccia boettcheri*. Our material includes ca 1900 specimens of 64 species. The second author collected in Port Barton area in North Palawan in May 1985 and our combined expedition in May-June 1991 covered localities in southern, central and northern parts of the island. Some specimens from central and northern Palawan were provided by C.G. Treadaway and Th. Borromeo in July 1988. A marvellous collection, gathered by Lorenzo Vinciguerra and his collaborators in Taytay and Saint Paul area in March 1992, increased considerably our knowledge of North Palawan dragonflies. Some endemic species, like *Cyclophaea cyanifrons* appear to be common and abundant.

PLATYSTICTIDAE: *Drepanosticta ceratophora, Drepanosticta* sp.n., *Drepanosticta* sp.n. – PROTONEURIDAE: *Prodasineura palawana, Prodasineura* sp.n. – COENAGRIONIDAE: *Agriocnemis femina, *A. pygmaea, *Argiocnemis rubescens intermedia, Archibasis viola, *Ceriagrion lieftincki, Ischnura senegalensis, Pseudagrion pilidorsum, Stenagrion* sp.n., **Teinobasis olivacea, T. rubricauda, T. samaritis.* – PLATYCNEMIDIDAE: *Asthenocnemis stephanodera, Asthenocnemis* sp., *Coeliccia boettcheri, C. palawana, C. werneri, *Copera vittata palawana.* – CHLOROCYPHIDAE: *Rhinocypha humeralis.* – EUPHAEIDAE: *Cyclophaea cyanifrons, *Euphaea subcostalis.* – CALOPTERYGIDAE: **Neurobasis daviesi.*

GOMPHIDAE: *Heliogomphus olivaceus, Ictinogomphus decoratus melaenops, Leptogomphus palawanus, Microgomphus chelifer* ssp. – AESHNIDAE: *Gynacantha basiguttata, G. bayadera, G. dohrni, G. hyalina, *G. subinterrupta, Heliaeschna*

uninervulata, Oligoaeschna sp., *Tetracanthagyna brunnea.* – CHLOROGOMPHIDAE: *Chlorogomphus* sp. – CORDULIIDAE: *Epophthalmia vittigera, Hemicordulia mindana, Idionyx* sp., *Macromia cincta, M. westwoodi, Macromidia asahinai.* – LIBELLULIDAE: **Agrionoptera insignis, Brachydiplax chalybea, Camacinia gigantea, Cratilla l. lineata, *C. metallica, Diplacina bolivari* ssp., *Diplacodes trivialis, Hydrobasileus croceus, Lathrecista asiatica, *Lyriothemis cleis, *Macrodiplax cora, *Nesoxenia lineata, Neurothemis fluctuans, N. ramburii, N. terminata, Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, *Protorthemis intermedia, Raphismia bispina, Rhyothemis phyllis* (? *subphyllis*), *R. regia, R. triangularis, Tetrathemis irregularis, Tholymis tillarga, Tramea transmarina euryale, Trithemis aurora, T. festiva, Zyxomma obtusum, Z. petiolatum.*

BUSUANGA ISLAND
890 km², 28 species

Busuanga is the largest island of the Calamian Group located N from Palawan. Most of the forests, especially in the lowlands have been cut down to make way for cattle grazing. The island has some of the largest cattle farms in the Philippines. The lowland areas, consisting mostly of open grassland, cogon grass and bush are seasonally rather dry. Scattered patches of secondary forest exist and there are some small swampy areas, which dry up during the dry season. About half of the island consists of undulating gentle hills, some with young secondary forest, the others barren. The central and southern parts of the island seem to be more cultivated, with large grassland areas and scattered villages. Cashew nuts are a common crop in the western areas.

Only few records from Busuanga are available in the literature. Much of our knowledge is based on the ca 200 specimens (26 spp.) in coll. Müller. Most of these were collected by C.G. Treadaway and Th. Borromeo in August 1990 and May 1991. A small addition was made by Herbert Zettel in February 1996.

PLATYSTICTIDAE: *Drepanosticta* sp.n. – PROTONEURIDAE: *Prodasineura palawana.* – COENAGRIONIDAE: **Aciagrion borneense, Ceriagrion calamineum, Teinobasis samaritis.* – PLATYCNEMIDIDAE: *Coeliccia* sp. – CHLOROCYPHIDAE: *Rhinocypha humeralis.* – EUPHAEIDAE: *Cyclophaea cyanifrons.*

GOMPHIDAE: **Heliogomphus olivaceus, Leptogomphus palawanus, Onychogomphus treadawayi, Paragomphus* sp. – CHLOROGOMPHIDAE: *Chlorogomphus* sp. – CORDULIIDAE: *Idionyx* sp., *Macromia negrito*? – LIBELLULIDAE: *Acisoma panorpoides, Diplacina bolivari* ssp., *Diplacodes trivialis, Lathrecista asiatica, Neurothemis fluctuans, N. ramburii, N. terminata, Orthetrum chrysis, O. luzonicum, O. sabina, Pantala flavescens, Rhyothemis phyllis* (? *subphyllis*), *Trithemis aurora.*

DUMARAN ISLAND
331 km², 19 species

The island is situated E of northern Palawan, separated by the only 2 km wide Dumaran Channel. The landscape of the island is flat, the highest point ony 169 m. The coastland is covered by mangrove

and most of the interior by coconut palms. Here, too, most of the forest has been cut down. According to Alex Buenafe, who visited the island in December 1995, small patches still remain in the interior. He found also a small patch near Araceli, with small clean streams, from where he collected 19 spp. (140 specimens), two of them new to the Philippines.

PROTONEURIDAE: *Prodasineura palawana.* – COENAGRIONIDAE: *Argiocnemis rubescens intermedia, Ceriagrion calamineum, C. cerinorubellum, Pseudagrion pilidorsum, Teinobasis olivacea, T. rubricauda.* – PLATYCNEMIDIDAE: *Coeliccia boettcheri, Coeliccia* sp.n.

AESHNIDAE: *Gynacantha hyalina.* – GOMPHIDAE: *Ictinogomphus decoratus melaenops, Leptogomphus palawanus.* – LIBELLULIDAE: *Brachydiplax chalybea, Diplacodes trivialis, Nesoxenia lineata, Neurothemis terminata, Potamarcha congener, Rhodothemis rufa, Trithemis aurora.*

BALABAC ISLAND
324 km², 15 species

The island is located between the southernmost tip of Palawan and Borneo. Our knowledge on the present situation of its nature is restricted to the unfortunate fact, that also here the rain forests are largely destroyed. It is very likely that also the remnants will disappear within the next few years. Since the fauna is very little known, many insect species may become extinct without having ever been discovered.

Our knowledge on the dragonfly fauna of Balabac is based on literature only. An expedition to the remaining forest areas should be urgently arranged, although the island is politically unsettled and dangerous to travel.

PLATYCNEMIDIDAE: **Coeliccia axinocercus.* – LESTIDAE: **Lestes quercifolia.* – CHLOROCYPHIDAE: **Rhinocypha humeralis.* – CALOPTERYGIDAE: **Vestalis amaryllis.*

LIBELLULIDAE: **Agrionoptera insignis, *Cratilla l. lineata, *Diplacodes trivialis, *Lathrecista asiatica, *Lyriothemis cleis, *Neurothemis terminata, *Orthetrum chrysis, *O. testaceum, *Pantala flavescens, *Rhyothemis regia, *Tholymis tillarga.*

CUYO ISLANDS
52 km², 5 species

This group of small islands is located between Palawan and Panay. The main island, Cuyo, is densely populated and heavily cultivated. Mt Bonbon (259 m) is the highest point. Like most other hills in the island it is covered by cashew nut trees. Coconut palms prevail in the coastal areas. A small rest of the original forest still prevailed at Igaba, E from Little Baguio in December 1995, when Alex Buenafe visited the island. However, the forest patch was partly disturbed and is used as freshwater reserve. In the dry season, most of the streamlets were dry, and only a few dragonflies were seen.

A small collection of 12 specimens gathered by A. Buenafe in Cuyo, consists of 5 species.

PLATYCNEMIDIDAE: *Coeliccia boettcheri.* – LIBELLULIDAE: *Diplacodes trivialis, Neurothemis terminata, Orthetrum chrysis, O. sabina.*

ALBAGUIN ISLAND
3-4 km², 4 species

The small island is located in the bay near Port Barton, on the W coast of Palawan. Small patches of field characterize the island, which lack primary vegetation. On the coastline dominate coconut palms and mangrove trees. There is no permanent running water, in the rainy season small rillets and pools are formed. Correspondingly the species list is very short, apparently quite typical for a very small island in the Philippines. R. Müller collected 4 species during his visit in May 1985.

LIBELLULIDAE: *Diplacodes trivialis, Neurothemis terminata, Orthetrum sabina, Trithemis aurora.*

Sulu region

Main island groups: Jolo Group, Pangutaran Group, Tapul Group, Tawi Tawi Group, Sibutu Group.

Dragonflies: 55 species.

Jolo Group

JOLO ISLAND
893 km², 15 species

Jolo is the largest island in the Sulu Archipelago. Large coastland areas are bordered with mangrove, and hills and low mountains characterize the interior of this volcanic island. The highest peaks, Mt Tamutangas (812 m) and Mt Bahu (790 m), are still partly covered by a dense primary dipterocarp forest. Lowlands have been taken to cultivation or are covered by cogon grass. Rainfalls are heavy, but clean streams and brooks can be found only outside the Jolo City area. Unfortunately, the political situation continuosly prevents the exploration of the mountain forests, which may still harbour the endemic *Rhinocypha hageni*, the only Jolo dragonfly mentioned in the literature. This species is not included in the small collection (88 specimens of 13 species) made in the surroundings of the capital Jolo by C.G. Treadaway and Th. Borromeo in June 1992. If still surviving, *R. hageni* may be confined to the streams in the virgin mountainous rainforests. J. Nyada collected a few *Vestalis melania* specimens in Jolo, in 1993.

COENAGRIONIDAE: *Agriocnemis femina, Ceriagrion lieftincki, Pseudagrion microcephalum, P. pilidorsum.* – CHLOROCYPHIDAE: **Rhinocypha hageni.* – CALOPTERYGIDAE: **Vestalis melania.*

LIBELLULIDAE: *Diplacina braueri, Neurothemis ramburii, N. terminata, Orthetrum pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Rhyothemis phyllis subphyllis, Tholymis tillarga.*

Tapul Group

SIASI ISLAND
77 km², 2 species

Almost all forests in this island have been cut down, with the exception of a very small patch, covering the extreme summit of Bud Siasi Mountain (900 m). C.G. Treadaway and Th. Borromeo visited this forest in March 1991 and were surprised to note that this tiny woodland was almost empty of animal life, no mammals, birds, lizards or insects were encountered there. Only a few butterflies and dragonflies were seen just outside the forest, but none were flying inside. The rest of the island, apart from Siasi Town and numerous villages, is used for crop production or cattle raising or it is waste. Just outside Siasi Town, there are a few patches of young trees and bushes. The coastline is partly covered with dense mangrove. Water seems to be scarce all the year round and extremely scarce in the drier part of the year. Farmers have to go for long distances to collect as much water as possible. On Bud Siasi coconut milk is used as a replacement of water during the dry season, since otherwise all water should be carried up from the lowlands. Due to political unrest travelling to Siasi is rather dangerous.

COENAGRIONIDAE: *Ceriagrion lieftincki*. – LIBELLULIDAE: *Zyxomma obtusum*.

Tawi Tawi Group

TAWI TAWI ISLAND
592 km², 44 species

There are still large continuous dipterocarp forests left in Tawi Tawi, although the clearing takes place also here. A new road is under construction, connecting Languyan in the N with Sanga Sanga Island in the S. The opening up of these, at present almost uninhabited, areas to traffic will speed up forest destruction. Due to the unsettled political situation, collecting trips to the remote mountain areas are dangerous at present. During a collecting trip by R. Müller and C.G. Treadaway, in June 1990, the surroundings of Languyan were still covered with dense forests. Also in the Tarawakan area, there still existed large primary forest in June 1992. Coll. Müller also includes specimens collected by Treadaway and Borromeo in February 1989 and March 1991. Available are ca 400 specimens, referable to 42 species. LIEFTINCK (1974) mentioned 15 species from the island.

PLATYSTICTIDAE: *Drepanosticta* sp. – COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis circularis, Argiocnemis rubescens intermedia, Ceriagrion lieftincki, *Ischnura senegalensis, Pseudagrion pilidorsum, Teinobasis samaritis, Xiphiagrion cyanomelas*. – LESTIDAE: *Lestes quercifolia*. – CHLOROCYPHIDAE: *Rhinocypha latimaculata*.

AESHNIDAE: *Gynacantha arsinoe, G. bayadera, Oligoaeschna* sp. – CORDULIIDAE: *Epophthalmia vittigera, Hemicordulia mindana, Macromia cincta*. – LIBELLULIDAE: *Aethriamanta gracilis, Agrionoptera insignis, Brachydiplax chalybea, Camacinia gigantea, Cratilla lineata assidua, Diplacina bolivari* ssp., *D. braueri, Diplacodes trivialis, Lathrecista asiatica, Lyriothemis cleis, Neurothemis ramburii, N. terminata, Orchithemis pulcherrima, Orthetrum chrysis, O. pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, Raphismia*

*bispina, Rhyothemis phyllis subphyllis, R. triangularis, Tetrathemis irregularis, Tramea transmarina euryale, Trithemis festiva, Urothemis signata bisignata, *Zyxomma petiolatum.*

SANGA SANGA ISLAND
46 km², 31 species

Only narrow sea channels separate Sanga Sanga from Tawi Tawi and Bongao. It is a small, flat island, with low hills up to 70 m, originally covered with a dense dipterocarp forest. The coastline in the N and E is bordered by 1 km broad mangrove swamps. At present, the forest is almost gone, a small patch still exists at Boloboc only.

There are no records in the literature. Coll. Müller contains over 700 specimens of 30 species, collected by W. Catal in 1988-1989, by C.G. Treadaway and/or Th. Borromeo in 1989-1992.

COENAGRIONIDAE: *Amphicnemis circularis, Argiocnemis rubescens intermedia, Ceriagrion lieftincki, Teinobasis samaritis.* – LESTIDAE: *Lestes quercifolia.*

AESHNIDAE: *Anax panybeus, Gynacantha alcathoe, G. arsinoe, G. bayadera, Heliaeschna simplicia.* – CORDULIIDAE: *Epophthalmia vittigera.* – LIBELLULIDAE: *Agrionoptera insignis, Camacinia gigantea, Cratilla lineata assidua, Diplacodes trivialis, Lathrecista asiatica, Lyriothemis cleis, Neurothemis ramburii, N. terminata, Orchithemis pulcherrima, Orthetrum pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Potamarcha congener, Raphismia bispina, Rhyothemis phyllis subphyllis, R. regia, Tetrathemis irregularis, Tholymis tillarga, Tramea transmarina euryale.*

BONGAO ISLAND
ca 10 km², 26 species

The impressive element in Bongao is the 314 m high Bongao Peak. Aside of coconut palms and mangrove swamps, very little is left from the original vegetation. Trees of 5-10 m high and some bush still remain on a few steep slopes and in the valleys, where tiny streams and pools appear during the rainy season.

There are no records in the literature. Coll. Müller contains over 200 specimens of 26 species, collected by W. Catal in 1988, R.A. Müller in 1990, C.G Treadaway and/or Th. Borromeo in February 1989-1992 and by N. Mohagan in 1993.

COENAGRIONIDAE: *Amphicnemis circularis, Argiocnemis rubescens intermedia, Ceriagrion lieftincki.* – CHLOROCYPHIDAE: *Rhinocypha latimaculata.*

AESHNIDAE: *Anax panybeus, Gynacantha alcathoe, G. arsinoe, G. bayadera, Heliaeschna simplicia.* – LIBELLULIDAE: *Agrionoptera insignis, Camacinia gigantea, Cratilla lineata assidua, Diplacodes trivialis, Lathrecista asiatica, Neurothemis ramburii, N. terminata, Orthetrum pruinosum clelia, O. sabina, O. testaceum, Potamarcha congener, Raphismia bispina, Rhyothemis phyllis subphyllis, R. regia, Tholymis tillarga, Tramea transmarina euryale, Zyxomma obtusum.*

TUMINDANAO ISLAND
18 km², 1 species

Also this coral island is flat and rises only a few meters above the sea level. Mangrove covers most of the coastal areas. The thin humus layer above the coral ground has prevented the formation of rain forest. C.G. Treadaway and Th. Borromeo recorded a single species during their visit in November 1988.

LIBELLULIDAE: *Rhyothemis phyllis subphyllis.*

TANDUBAS ISLAND
ca 10 km², 3 species

Tandubas is a flat coral island, ca 12 km SE from the northernmost Tawi Tawi. Most of its surface is under coconut cultivation. The natural vegetation, which has apparently not been rich, is restricted to a few trees and bushes. The humus layer above the coral ground seems to have been very thin.

C.G. Treadaway and Th. Borromeo collected a few specimens of 3 species in the islands in June 1992.

COENAGRIONIDAE: *Teinobasis samaritis.* – LIBELLULIDAE: *Agrionoptera insignis, Brachydiplax chalybea.*

SITANGKAI ISLAND
1-2 km², 2 species

This is a very small island, where land is in such demand that most people live in houses on stilts in the sea. Water is a scarce commodity during most of the year.

C.G Treadaway and Th. Borromeo visited the island in November 1988 and collected 2 species.

LIBELLULIDAE: *Neurothemis ramburii, Raphismia bispina.*

Sibutu Group

SIBUTU ISLAND
101 km², 26 species

The Sibutu Group is situated nearest to Borneo. Sibutu, a flat island, was originally covered with dipterocarp forests. Large forest areas existed still in 1971 (DUPONT & RABOR, 1973). During a 3-week visit by R. Müller and C.G. Treadaway, in June 1990, there was only 1-2 km² rainforest left around Sibutu Hill (137 m), although the highest trees were already cut. In March 1993, C.G.Treadaway reported this, too, as having vanished. Anything like 90% of the land area is covered with coconut palms or dry bush. The porous coral ground absorbs quickly the surface water, therefore there are no streams. Without the protecting forest, the humus layer is carried away by heavy rains (Fig. 7).

No dragonfly records exist in the literature. Coll. Müller includes ca 350 specimens of 26 species, collected by W. Catal in 1988, C.G. Treadaway and Th. Borromeo in 1989 and R.A. Müller in 1990.

COENAGRIONIDAE: *Agriocnemis femina, Amphicnemis circularis, Argiocnemis rubescens intermedia, Teinobasis samaritis, Xiphiagrion cyanomelas.* – LESTIDAE: *Lestes quercifolia.*

AESHNIDAE: *Anax guttatus, Gynacantha alcathoe.* – LIBELLULIDAE: *Agrionoptera*

insignis, Brachydiplax chalybea, Camacinia gigantea, Cratilla lineata assidua, Diplacodes trivialis, Lathrecista asiatica, Lyriothemis cleis, Neurothemis ramburii, N. terminata, Orthetrum pruinosum clelia, O. sabina, O. testaceum, Pantala flavescens, Raphismia bispina, Rhodothemis rufa, Rhyothemis regia, Tramea transmarina euryale, Zyxomma obtusum.

GAGAYAN SULU ISLAND
? km², 3 species

In the literature, 3 species have been listed from this isolated island between Tawi Tawi and Palawan.
LIBELLULIDAE: **Camacinia gigantea, *Rhyothemis phyllis* ssp., **R. regia.*

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Appendix

ITINERARY OF ROLAND A. MÜLLER's ZOOLOGICAL EXPEDITIONS TO THE PHILIPPINES

	1985
March 30 - April 22	MINDANAO, South Cotabato prov.: Parker Mountains (Koronadal, Bulol, Barrio 8, Lake Sebu, Salacafe, Lake Maugham)
April 4 - May 5	MINDANAO, North Cotabato prov.: Mt Apo (Lake Agko, Marbel River, Lake Venado, Apo Peak Area
May 10 - 18	PALAWAN, Central Palawan: Puerto Princesa area; North Palawan: Port Barton area
June 2 - 9	LUZON, Nueva Vizcaya/Nueva Ecija prov.: Dalton Pass area
	1986
July 12 - 16	MINDANAO, South Cotabato prov.: Barrio 8 area
July 19 - August 4	SIBUYAN (Romblon prov.): Magdiwang - Mt Guiting Guiting area

	1987
March 18 - April 11	SIBUYAN (Romblon prov.): Magdiwang - Mt Guiting Guiting area
	1988
May 11 - June 1	HOMONHON (Eastern Samar prov.)
	1990
June 6 - 10	TAWI TAWI (Tawi Tawi prov.): Languyan area
June 5 and 11	BONGAO (Tawi Tawi prov.): Bongao Peak area
June 12 - July 2	SIBUTU (Tawi Tawi prov.): Sibutu Hill area
August 5	LUZON, Laguna prov.: Pagsanjan Falls
	1991
May 13 - 18	MINDORO Island, Mindoro Oriental prov.: Mt Halcon area, 1
May 21 - 22	CEBU, Cebu Province: Minglanilla, Camp Seven area, 2
May 26 - June 1	PALAWAN, South Palawan: Quezon area, 3
May 28 - 30	PALAWAN, North Palawan: Port Barton, Matalangao, Olanguan areas, 1
June 1	PALAWAN, Central Palawan: Iwahig-Balsahan, 1
June 4	PALAWAN, Central Palawan: Narra, Esterella Falls, 1
June 4 - 5	PALAWAN, Central Palawan: Iwahig-Balsahan, 3
June 8 - 13	LUZON, Nueva Vizcaya/Nueva Ecija provinces: Dalton Pass area, 1
N o t e: Participants	1 Roland A. Müller 2 Roland A. Müller & M. Hämäläinen 3 M. Hämäläinen
	1995
March 28	MINDANAO, Davao del Sur Province: Malagos
March 29 - April 2	MINDANAO, North Cotabato prov.: Mt Apo (Lake Venado, Lake Agko)
April 5 - 8	MINDANAO, Davao Oriental prov.: Baganga area
April 9 - 11	MINDANAO, Davao Oriental prov.: Cateel area
April 12 - 25	MINDANAO, Surigao del Sur prov.: Tandag, San Miguel, Carmen
	1996
May 20 - 24	NEGROS, Negros Occidental prov.: Silay, Patag area, Mt Mandalagan
May 26	MINDANAO, Surigao del Sur prov.: Bislig, Tabon area
May 28	MINDANAO, Davao Oriental prov.: Boston, Caatijan area
May 29 - June 8	MINDANAO, Davao Oriental prov.: Boston, Mt Agtuuganon
June 10 - 12	MINDANAO, Surigao del Sur prov.: Carmen, Pakwan
June 12 - 18	MINDANAO, Surigao del Sur prov.: Tago, Barangay, Meme River