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Checklist of the Odonata (Insecta) of Sundaland and Wallacea (Malaysia, Singapore, Brunei, Indonesia and Timor Leste)

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Abstract

A checklist, based on a database containing published data, of the Odonata (dragonflies and damselflies) occurring in Sundaland and Wallacea is presented. The presence of (sub)species is indicated for eight main regions (Singapore & Peninsular Malaysia, South China Sea (islands in the South China Sea that are not sensibly treated as satellites of larger landmasses), Borneo, Sumatra, Java & Bali, Lesser Sunda, Sulawesi, Moluccas), 22 subregions and 80 smaller islands and island groups. In total 743 full species are recorded from the entire area with 549 species known from Sundaland and 270 from Wallacea. Of these 482 are not found outside Sundaland and Wallacea, 385 (ca. 52% of the fauna) of which are single region endemics; the majority of these are actually single island endemics. Notes are provided on taxonomic problems or indicating problematic distribution records. *Prodasineura lansbergei* is considered to be a nomen nudum (stat nov.). For each of the eight main regions the history of the study of odonates is briefly discussed, information is provided on the coverage of the available data and the faunal composition is described. An overview is given of genera for which no larvae have been described. A brief comparison is made between the faunas of Sundaland and Wallacea showing that they only share 10% of the species between them (76 of 743).

Key words: damselfly, dragonfly, diversity, taxonomy, biogeography, freshwater diversity

Introduction

In 1954 a Handlist of the Malaysian Odonata was published by Lieftinck (1954). This document (over 200 pages in length) contains a concise overview of all the dragonflies and damselflies recorded from Sundaland at the time and for each species provides information on the distribution, a bibliography and, when available, some details on habitat and behaviour. Lieftinck (1954) is nearly 70 years old and although it is still an important source of information it has become outdated in many respects due to changes in taxonomy, the description of new species, new information on habitat and behaviour and the publication of new records. For Wallacea, the area to the east of Sundaland, no complete overview of the odonate fauna has ever been published although checklists are available for parts of this area (Lieftinck 1949b: Moluccas; Lieftinck 1936c, 1953a: Lesser Sunda islands; Monk *et al*. 1997: Moluccas and Lesser Sunda islands). All of these checklists are, like the checklist of Sundaland, outdated and do not reflect our current knowledge of odonate distributions and taxonomy in the area. Over a decade ago RD and VJK initiated work on a database containing, as far as is practical, all reliable published records of dragonflies and damselflies from the area stretching from Malaysia in the west to the Solomons in the east. The current paper provides an updated checklist for both Sundaland and Wallacea using the above-mentioned database as its main source. The occurrence of each species found in the area in eight main regions (Singapore & Peninsular Malaysia, South China Sea, Borneo, Sumatra, Java & Bali, Lesser Sunda, Sulawesi, Moluccas), 22 subregions and 80 smaller islands and island groups is indicated.

Methods

The checklist presented in this paper covers the areas known as Sundaland and Wallacea (Figure 1). Sundaland encompasses Peninsula Malaysia (including Singapore), Sumatra, Java and Borneo. It is basically the area which, during glacial periods in which the sea level was low, was broadly connected by land. Although each of these landmasses have their own endemics there is a strong resemblance between the general composition of their faunas and many animal groups widely occurring in Sundaland are not found in Wallacea to the east. The northern limit of Sundaland is considered to be the Isthmus of Kra in southern Thailand where the ‘neck’ of the Malay Peninsula is at its narrowest. Because of this a small southern section of Thailand, which from a biogeographical point of view is part of Sundaland, is not included in this checklist. The border between Sundaland and Wallacea lies between Borneo and Sulawesi and between Bali and Lombok. Politically Bali is a separate province of Indonesia and for biological reasons we include it in Sundaland. Wallacea as defined here includes all islands between the Sunda and the Sahul shelf excluding the Philippines in the north. These islands are unified by all never having been connected with mainland Asia or with mainland Australia/New Guinea. Therefore, the species or their predecessors occurring on these islands have either arrived airborne or rafted with fragments of continental shelf to their current position. In biogeographical terms the western border separating Wallacea from Sundaland is called the Wallace line while the

border between Wallacea and the Papuan region in the east is known as Lydekker's Line. The Raja Ampat Islands and the Aru Islands are part of the Sahul region as they were connected to New Guinea and Australia during glacial periods; these islands are not considered further here.

FIGURE 1. Map of study area.

In order to create the checklist a database containing distribution records was created based on 585 papers (Kalkman & Dow 2022). This includes all available papers known to us containing reliable records of dragonflies and damselflies published up to early 2021. It should be noted that not only are there likely to be papers published in Indonesia that are not known or available to us, but that we have also deliberately excluded some of the Indonesian literature in which the identifications of species have been made using entirely inappropriate sources

(for instance material from Sulawesi identified using keys to species from Australia or a book on the Odonata of Borneo) leading to a high percentage of incorrect identifications. In the checklist the records from the database have been supplemented with additional records of species from Borneo, Perhentian Island (Peninsular Malaysia) and Singapore published in 2022. The main data collected from literature consists of information on locality, the date of observation or collecting, the name of the collector where known, the sex and life stage and the identification. Altitude and geographical coordinates were included in the database when present in a publication. For the name of the taxon two sets of fields were used, one with the identification as given in the publication and one with our interpretation. In many cases these are different due to name-changes, species being split or identifications being corrected. The locality was noted as was stated in the publication. In addition, we used separate fields indicating the island, region and country and an interpretation of the location (for instance Jesselton is an old name for Kota Kinabalu in Sabah, the latter name is used in the interpreted field for records where the former is given as the location in the original publication). In most cases no geographical coordinates are given in the publication and in these cases, where possible, coordinates were given based on our interpretation of the locality.

Based on the database the presence or absence of each species was established for each of the eight main regions (Singapore & Peninsular Malaysia, South China Sea, Borneo, Sumatra, Java & Bali, Lesser Sunda, Sulawesi, Moluccas), 22 subregions and 80 smaller islands and island groups. In cases where records of a taxon are problematic or doubtful for a particular region, we have indicated this with a question mark, however these records have been included in the counts of the species for the region. In order to examine the number of single island endemics and to look at the distribution of the most widespread species we also analysed the presence and absence of species per major landmass and for convenience we refer to all landmasses as islands. For this, islands were defined as: Peninsular Malaysia, Singapore, Borneo (Brunei, Kalimantan, Labuan, Sabah and Sarawak), Sumatra, Java, Bali, South China Sea (SCS, for islands in the South China Sea that are not sensibly treated as satellites of larger landmasses), Sulawesi, Halmahera, Buru, Seram, Moluccas: other, Lombok, Sumbawa, Sumba, Flores, Lesser Sunda: other and Timor, the latter consisting of Indonesian Timor and Timor Leste (East Timor).

The taxonomy used in the checklist largely follows that adopted in the World Odonata List (Paulson *et al*. 2024). The checklist includes both species and subspecies, but the numbers in the text and tables always refer to full species. Authorities for the names of taxa (species and genera) are given in Table 1 and not in the text with the exception of taxa not included in Table 1 for which the authority is given at first use. The reader should note that in some cases we disagree with the authorities for taxa names currently given in Paulson *et al*. (2024), instead following the (corrrect) interpretation of the rules of the International Code of Zoological Nomenclature and sensible approach to stability used in Hämäläinen & Sasamoto (2021) both for names explicitly discussed by Hämäläinen & Sasamoto (2021) and in other similar cases.

The abbreviation RMNH refers to National Museum of Natural History (currently Naturalis Biodiversity Center), Leiden, the Netherlands. De Selys Longchamps is written as Selys. In a few places in the notes Van Tol (2011) is referred to, somewhat frustratingly this resource has recently ceased to be available online (a CD version still exists) but we have left the citations to it in place since it demonstrates differences in opinion between recognised taxonomic authorities.

Because *Zootaxa* requires a reference to the original description of each species and genus mentioned, we have included such references. Because many references are included just because taxa described in them are listed, in cases of multiple publications by the same author(s) in one year we have placed those that are actually cited in the text first. The only exception to this is in cases where publications form part of a numbered series.

Results

Table 1 gives the checklist of dragonflies and damselflies for the eight main regions (Singapore & Peninsular Malaysia, South China Sea, Borneo, Sumatra, Java & Bali, Lesser Sunda, Sulawesi, Moluccas) and 22 subregions. Table 6 (in an appendix) gives the checklist for 80 smaller islands and island groups included in the area.

The database contains 50,447 published records. Of these 4,938 (ca. 9.8 %) refer to secondary records, that is repeats of records that have been published two or more times in different papers. For records that are repeated over multiple publications the first published instance has not always been chosen as the primary one, instead that with most pertinent information has been taken as primary (for instance in some cases an original species description

gives less information on the location and date on which the holotype was collected than is present on the labels of the specimen and a later publication gives this information in full, so the latter record is taken as primary and the original as secondary). It should be noted that there are a small number of cases, almost entirely involving early records, where so little information is given that it is not possible to determine accurately which are primary and which (if any) are secondary and these cases are set to primary by default in the database. There are other confounding factors in deciding whether a given record is primary or secondary, such as different authors (or the same author in different publications) using different names for a single location or errors in published collection dates, so that the attempt to divide records into primary and secondary will not be perfect. Secondary records are not taken into account in the remainder of this paper. The majority of primary records clearly originate from one of the eight regions and most can be assigned to one of the subregions, however there are a minority that cannot be assigned even to a region with certainty (54 records) and others (17 records) that are assigned (at region or subregion level) with doubts expressed about the origin of the record in the publications concerned (for instance "Java ?"); both of these categories have been excluded in the discussion of pre 1980 and 1980 onwards records and sampling intensity below.

As well as the period in which records were made, it is important to consider the intensity of sampling and spread of records within each region. Although simply plotting the locations on a map (for instance Figure 2) gives an idea of the spread of records it is not particularly informative on sampling intensity. As a simple measure of sampling intensity, we use the ratio of number of records to land area for each region (and for some of the subregions). Due to difficulties in obtaining reliable figures for the land area of some of the regions, the numbers we give for records per 100 km^2 here are approximate, however they do serve to illustrate differences in sampling intensity between regions (Figure 3).

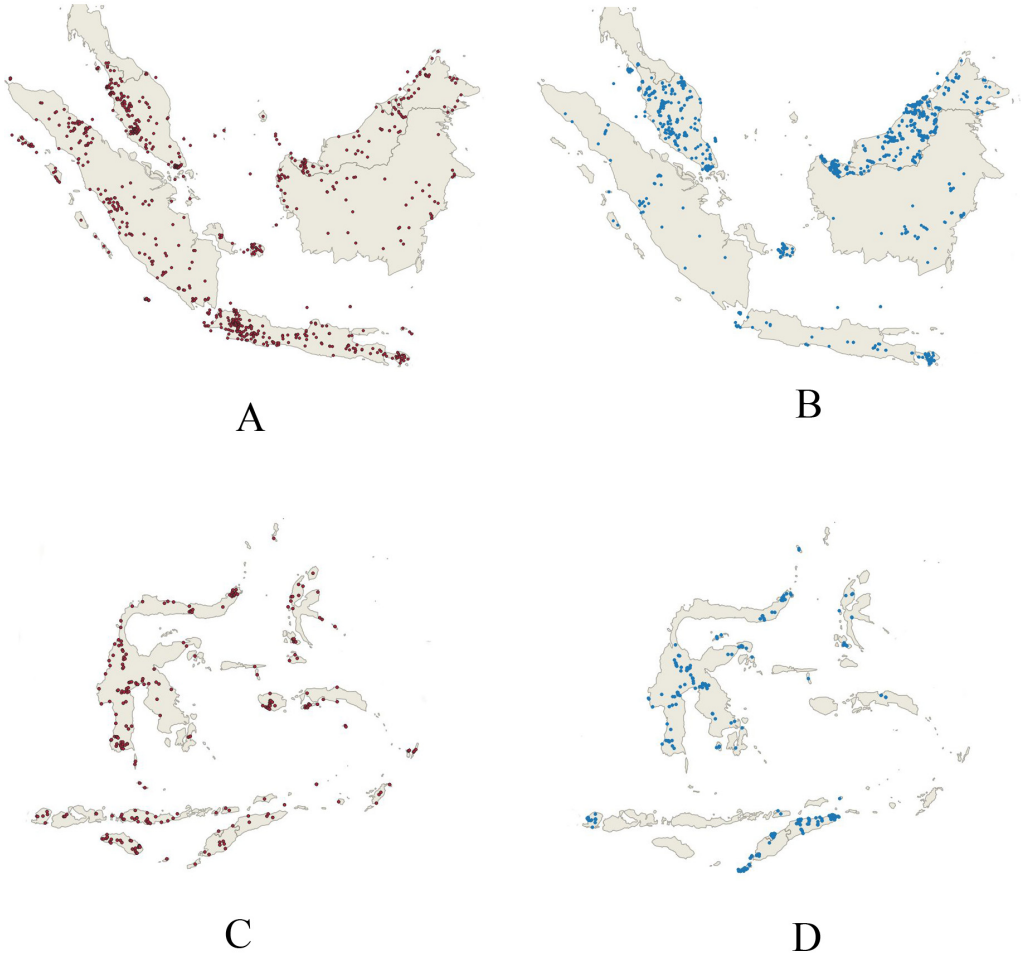

FIGURE 2. Localities with records prior to 1980 and from 1980 onwards. (a) Sundaland, prior to 1980, (b) Sundaland, from 1980 onwards, (c) Wallacea prior to 1980, (d) Wallacea from 1980 onwards.

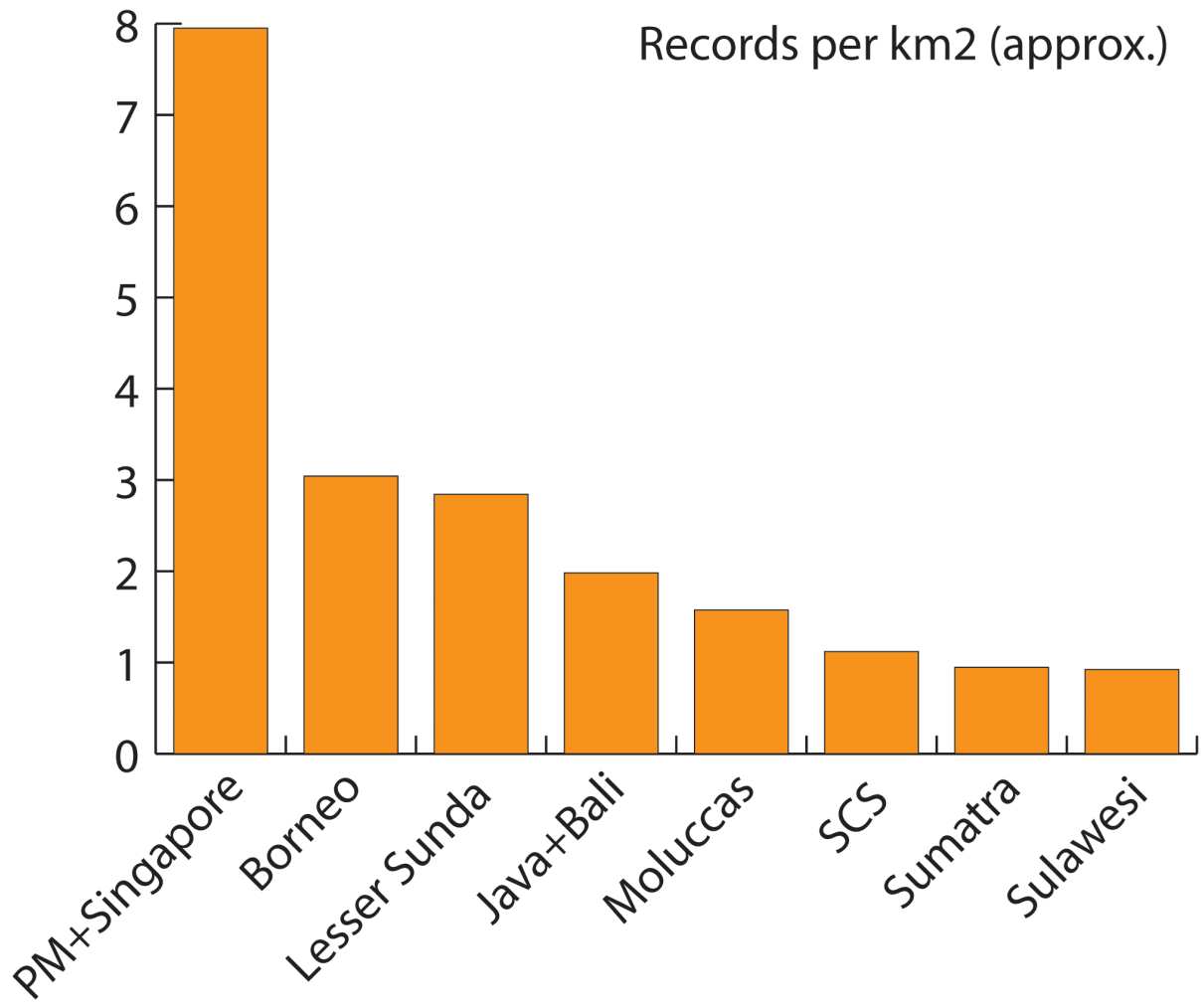

FIGURE 3. Number of records per 100 km^2.

Of the 45,506 primary records, ca. 25% are based on data collected prior to 1980 and ca. 70% are based on data from 1980 onwards. There are 2,001 records published from 1980 onwards that have no year given for the records. The post 1979 'no year' records can be broadly divided between those of older museum specimens without dates on the labels and post 1979 data where authors have simply not given dates—we have simply excluded all such records from the analysis below. Figure 4 shows the number of records accumulated per decade (where the record can be assigned to a decade). Figure 2 shows the localities with pre 1980 data and those with data from 1980 onwards. The exclusion of post 1979 'no year' records will slightly skew the analysis in favour of the pre 1980 period, but not sufficiently to change our conclusions since the percentage of records excluded for any particular region is small. Figure 3 shows the approximate number of records per 100 km^2 for each of the main regions, these numbers range from slightly less than 1 (Sulawesi, Sumatra) to almost 8 (Peninsular Malaysia plus Singapore).

The amount of field work on odonates is unevenly divided between the regions and between periods (Figures 2–5). Clearly Singapore and Peninsular Malaysia have been better explored in the latter period and they also have the highest number of records per 100 km^2 of any of our regions. Sumatra, the Moluccas and the Lesser Sundas have been explored relatively poorly and for the latter two regions there is a clear deficiency in field work from 1980 onwards compared to pre 1980 while for the first region the number of records per 100 km^2 is the lowest of any of the regions except Sulawesi. Far more work has been done in Borneo from 1980 onwards than before, however while Malaysian Borneo has been much better explored from 1980 onwards and almost all data from Brunei is from the latter period, Kalimantan has been poorly explored in both periods. Borneo as a whole has a relatively high number

of records (about 3) per 100 km^2 but this is heavily skewed by records from the north of island, Kalimantan—far larger than Brunei and the Malaysian part of the island combined—has only ca. 0.3 records per 100 km^2. There is far more pre 1980 data from Java (although the majority of data from Bali is from 1980 onwards) with published field data from 1980 onwards relatively limited; there are only ca. 2 records per 100 km^2 for the entire region. Although Sulawesi was poorly explored prior to 1980 with fieldwork spiking in the 1980s and 1990s, this is not reflected in Figure 4 because a large amount of the data collected from 1980 onwards has yet to be published, similarly the relatively low number of records per 100 km^2 will increase significantly if and when this data is published. Data from islands in the South China Sea is minimal and almost entirely pre 1980.

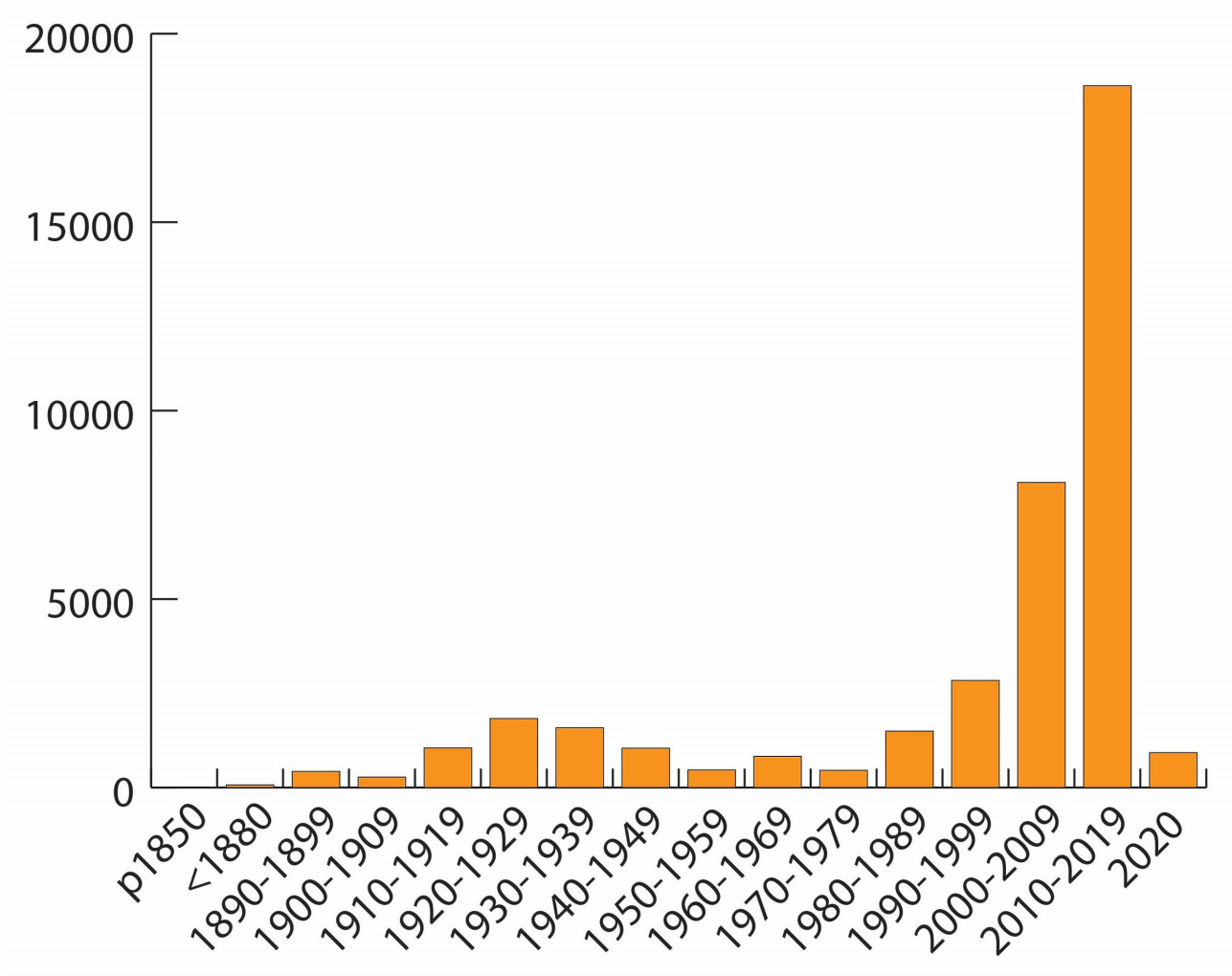

FIGURE 4. Number of records accumulated per decade.

Table 2 shows the total number of species and the total number of endemic species for each of the 8 main region and 22 subregions. In total 743 species are known from Sundaland plus Wallacea of which 333 belong to the Anisoptera and 410 to the Zygoptera (Table 3).

Checklist of the Odonata of Sundaland and Wallacea

Singapore & Peninsular Malaysia

Peninsular Malaysia, historically known as Malaya and known politically as West Malaysia, has an area of 132,490 km^2, with the island nation of Singapore (728.6 km^2) at its southern tip. Peninsular Malaysia consists of 11 states and two federal territories, and is surrounded by a number of islands, the largest of which are Penang, Langkawi,

Pangkor, Tioman and Perhentian. Most records of Odonata from the islands are from Langkawi, Penang, Pangkor and Tioman. Limited Odonata records are also available from other smaller islands such as Angsa, Aor, Besar, Carey, Jarak, Lalang and Perak (not to be confused with the state, actually under Kedah). Singapore has 64 small offshore islands. The major islands with regards to Odonata records are Semakau, Tekong, Ubin, Coney and Sentosa. Odonata records from these and smaller offshore islands are available, some published while others exist in unpublished working checklists. Singapore is separated from Peninsular Malaysia by the narrow Johor Strait. Due to their close proximity, Peninsular Malaysia and Singapore share a similar fauna and flora. Historically, the Odonata fauna of Peninsular Malaysia and Singapore have often been treated together, as we do here.

Early Odonata records from Peninsular Malaysia and Singapore come from papers published by Selys from 1859 to 1891, based mostly on material collected by A.R. Wallace. New species were described in these papers from both Peninsular Malaysia (for instance Selys 1859, 1874) and Singapore (for instance Selys 1860, 1877). Other early authors also produced records and descriptions of Odonata from Peninsular Malaysia and Singapore (for instance Laidlaw 1902a, 1902b, 1923a, 1925; Förster 1914). Laidlaw was the first author to produce a synopsis of Peninsular Malaysia (including Singapore) Odonata (Laidlaw 1931a). Other significant contributions include Fraser (1942) and Lieftinck (1937a). Lieftinck (1954) included a Peninsular Malaysia (including Singapore) checklist of 189 species and subspecies. Later on, Lieftinck described a few more species from Peninsular Malaysia (Lieftinck 1964a, 1964b, 1965c). Much later, other authors described a few additional odonate taxa from Peninsular Malaysia (Kemp 1989, 1994; Karube 1994). Despite the publications already mentioned, progress after Lieftinck (1954) was slow until the start of the present century when A.G. Orr produced a significant publication "A Pocket Guide: Dragonflies of Peninsular Malaysia and Singapore" (Orr 2005). Orr listed 229 odonate taxa for Peninsular Malaysia and Singapore. In Table 1 we list 256 species for the combined region (103 Zygoptera, 153 Anisoptera).

In the years following the publication of Orr (2005), a large amount of work on the Odonata of this region has taken place, resulting in publications including new species descriptions as well as fresh records. New species have been described in *Chalybeothemis* (Dow *et al*. 2007), *Amphicnemis* (Dow *et al*. 2010a), *Leptogomphus* (Choong 2016), *Drepanosticta* (Dow *et al*. 2017), and *Coeliccia* (Dow *et al*. 2018). We list 253 species of Odonata from Peninsular Malaysia in Table 1 (103 Zygoptera, 150 Anisoptera). Odonata work specifically for Singapore was pioneered by Prof. D. H. Murphy who surveyed the nation's nature reserves (Murphy 1997). Since then, Odonata research in Singapore has been growing steadily, with the first checklist for Singapore (117 species) produced in 2008 (Norma-Rashid *et al*. 2008). The Singapore checklist was revised in the publication "A Photographic Guide to the Dragonflies of Singapore", where 124 species were listed (Tang *et al*. 2010). More recently, in 2022 another publication "A Photographic Field Guide to the Dragonflies and Damselflies of Singapore" was published, and the species count was updated to 136 (Ngiam & Ng 2022), the same as it is from our checklist (Table 1; 51 Zygoptera, 85 Anisoptera).

The database contains 10,533 primary records from the combined area (1,406 from Singapore, 9,127 from Peninsular Malaysia) with almost 8 records per 100 km^2 (ca. 193 for Singapore, ca. 7 for Peninsular Malaysia; the figure for Singapore is by far the highest of any (sub)region covered here). Endemicity for the combined region is lower than any other of the eight regions except the South China Sea, with 23 species (ca. 9%) endemic to the region, 15 (ca. 15%) Zygoptera and eight (ca. 5%) Anisoptera. No species is known to be endemic to Singapore but 18 species (ca. 7%) (and also one subspecies) are endemic to Peninsular Malaysia, 12 (ca. 12%) Zygoptera and six (4%) Anisoptera. The endemic species to this region are mainly from the families Platystictidae (nine species) and Gomphidae (four species; also the subspecies *Asiagomphus xanthenatus malayanus*). Other families including endemic taxa are Platycnemididae (three species), Coenagrionidae (three species), Aeshnidae (one species), Chlorogomphidae (one species), Synthemistidae (one species) and Libellulidae (one species). Almost all of the species of Platystictidae known from this region are endemic to the region, the exception is *Drepanosticta sharpi*, which can be found in Thailand and, possibly (see note 08) the Lingga Islands (also see note 09). The genus *Amphicnemis* is represented by four species, two of them are endemic to this region. Fairly substantial Odonata data are available for most of the 11 states of Peninsular Malaysia and data for Singapore is the most comprehensive for any subregion considered here. However, the amount of data for some states of Peninsular Malaysia, such as Negeri Sembilan and Melaka, is relatively low due to lesser sampling effort. A number of Odonata are listed as nationally extinct in Singapore, which is the only one of our subregions where such a judgement can be sensibly made, and we have included this information in Table 1.

Borneo

Borneo, over 755,000 km^2 including satellite islands, is the largest island in Sundaland and Wallacea. Unlike the other major islands, Borneo is divided between three nations (Brunei, Indonesia and Malaysia). We have divided the island into four subregions: Brunei, Kalimantan, Sabah and Sarawak. Borneo has relatively few satellite islands, fewer still of which have any records of Odonata. The most significant, in odonatological terms, of the satellite islands is Labuan (a separate federal territory of Malaysia), several other islands off the coast of Sabah have data on odonates—Banggi, Mengalum and Sangai—as do the Tambelan Islands (data only from Tambelan Besar) off the coast of Kalimantan (Indonesian Borneo). We have also included the Karimata Islands under Kalimantan.

The earliest significant records of Odonata from Borneo are spread across papers published by Selys from 1859 to 1891, in which many species were described based mostly on material from Sarawak and Labuan (for instance Selys 1859, 1873a, 1886, 1889). Other early authors included records and descriptions of Bornean odonates (for instance Waterhouse 1878, Kirby 1889a, Karsch 1900, Martin 1909b, Förster 1897a, Krüger 1899a, McLachlan 1898a, Needham 1907, Ris 1909a (and others in the same series)) but F.F. Laidlaw was the first author to publish papers focusing on Borneo (mostly based on material from Sabah and Sarawak), with species descriptions (e.g. Laidlaw 1911a, 1911b) and accounts of Odonata collected on expeditions (e.g. Laidlaw 1912a) and in 1920 the first attempt at a checklist of species for the island (Laidlaw 1920) with an updated list in Laidlaw (1931b). There are few other significant contributions in the first few decades of the twentieth century, but Hincks (1930) published on material in the Sarawak Museum, Lieftinck (for instance Lieftinck 1931, 1932a, 1933a, 1937a, 1940a, 1948a) produced many species descriptions and Kimmins (1936) published an important paper primarily on the Odonata of Mount Dulit in Sarawak including new species descriptions. In the 1950s Lieftinck published several Borneo focused papers (Lieftinck 1950c, 1951a, 1953c) in addition to the Borneo checklist of 259 species and subspecies in Lieftinck (1954). After 1954 Lieftinck continued to publish taxonomic works including species from Borneo, most notably Lieftinck (1965b (*Vestalis*) and 1968 (*Oligoaeschna*)). Aside from two faunistic papers on Sabah and Sarawak (Asahina 1966, Inoue & Kuwahara 1974) little else was published in the 1960s and 1970s. Rather more was published in the 1980s and 1990s (for instance Donnelly 1997, Hämäläinen 1994, Huisman & van Tol 1989, Kitagawa 1997b, Kitagawa *et al*. 1999, Matsuki & Kitagawa 1992, 1993, Tsuda & Kitagawa 1989), including regional revisions of *Euphaea* (van Tol & Norma-Rashid 1995) and *Leptogomphus* (van Tol 1990a), and also including the first papers dealing with the fauna of Brunei (Orr 1999, Thompson & van Tol 1993), however very little was contributed for Kalimantan in this period.

The present century has seen a huge increase in published data on Odonata from Borneo, with almost 88% of primary records in the database published from the year 2000 onwards. This increase began with a checklist and large dataset from Brunei (Orr 2001) and the publication of A.G. Orr's "A guide to the dragonflies of Borneo …" (Orr 2003) in which "about 275" species were considered known from Borneo and some unnamed species were included in the checklist. In the first 21 years of the 21st century many other taxonomic papers concerning or including taxa from Borneo have appeared, including genus descriptions, regional revisions and reviews—*Telosticta* (Dow & Orr 2012a), *Dysphaea* (Hämäläinen, Dow & Stokvis 2015), *Devadatta* (Dow, Hämäläinen & Stokvis 2015), *Bornargiolestes* (Dow 2014a), *Rhinagrion* (Kalkman & Villanueva 2011), *Coeliccia* (Dow 2010b, 2016b, 2020), *Pericnemis* (Orr & Hämäläinen 2013), *Teinobasis* (Dow 2010a), *Borneogomphus* (Karube & Sasamoto 2014), *Leptogomphus* (Dow, Stokvis & Ngiam 2017), *Megalogomphus* (Dow & Price 2020) and *Chalybeothemis* (Dow, Choong & Orr 2007)—as well as papers describing species (for instance Dow 2011, Dow & Hämäläinen 2008, Dow & Orr 2012b, Dow & Reels 2011, Orr 2002, Orr & van Tol 2001, and many others). Many faunistic and ecological papers (Afendy *et al*. 2017, Choong 2011, Choong & Chung 2019, Choong *et al*. 2020a, Dow 2021, Dow, Ahmad *et al*. 2021, Dow, Butler *et al*. 2019, 2021, Dow & Choong 2021, Dow & Morris 2021, Dow & Ngiam 2012, 2014, Dow, Ngiam & Ahmad 2015, Dow & Reels 2013 Dow, Reels & Butler 2013, Dow & Unggang 2010, Grinang 2004, Luke *et al*. 2017, Norma-Rashid *et al*. 2010, Hisamatsu & Sasamoto 2003, Steinhoff 2015, Steinhoff *et al*. 2019, Yagi & Kitagawa 2001 and many others) were published in the same period. Most of the purely non-taxonomic works covering Borneo in the 21st century have been on the north of Borneo but there have been a few significant contributions on Kalimantan (Cleary *et al*. 2004, Dolný *et al*. 2011, Dow & Silvius 2014, Julaika *et al*. 2018, Dow, Wahyudi & Lupiyaningdyah 2022). Most recently Dow *et al*. (2022) published a new checklist of the Odonata of Borneo listing 371 species (including a number of as-yet-unnamed species). From our database and Dow *et al*. (2022) 336 named species of Odonata (183 Zygoptera, 153 Anisoptera) have been recorded from Borneo, with

many species still awaiting description; note that Dow *et al.* (2022) left the highly problematic *Gynacantha furcata* out of their list. Ultimately it seems certain that more than 400 species will be recorded from Borneo, in particular a large increase is expected for Kalimantan, especially since the mountainous interior parts of this huge area have hardly been explored for Odonata at all.

The database contains 22,978 primary records from more than 1,000 individual sites in Borneo, with ca. 3 records per 100 km^2. Brunei and Sarawak, followed by Sabah, are the best studied parts of Borneo for Odonata, as demonstrated not just by the numbers of primary records in the database for each part, but also by the number of records per 100 km^2 for the part: ca. 19 and ca. 15 for Brunei and Sarawak respectively, ca. 1.9 for Sabah, but only ca. 0.3 for Kalimantan. However, even in Sarawak new records are still being made regularly, with six named species (*Devadatta tanduk*, *Libellago phaethon*, *Rhinocypha humeralis*, *Gynacantha maclachlani*, *Oligoaeschna platyura* and *Macromia jucunda*) recorded in the state for the first time in 2020–2022 despite the disruption caused by the global COVID-19 pandemic, indicating that there is still much to learn about the Odonata of the state. Endemicity is high in the Bornean odonate fauna, we list 162 species (ca. 48%) as endemic here. However, the percentage of endemic species is very different between the two suborders, with 129 (ca. 70%) of the Zygoptera endemic but only 33 (ca. 22%) of the Anisoptera (see also the discussion of endemic species in Dow *et al*. (2022)). The high endemicity in the Bornean odonate fauna is likely to be at least partly explained by the relative isolation of Borneo from the rest of Sundaland, also endemic species mostly fall into two main habitat categories, those of hilly and mountainous terrain (the majority) and those from lowland, swamp forest habitats; both of these habitat types are well represented in Borneo and tend to form 'habitat islands' which might be playing a role in speciation.

A number of genera are endemic to Borneo: *Bornargiolestes* (curiously the only representatives of the Rhipidolestidae in our entire area), *Matronoides*, *Pachycypha*, *Rhinoneura*, *Linaeschna* and *Borneogomphus*. The presence of a species of *Metaphya* (*M. micans*) in Borneo is notable since the genus is otherwise only recorded from the other side of Lydekker's Line. Some families and genera are particularly well represented in Borneo. Thirty-four named species from the Platystictidae have been recorded from the island (all endemic), with *Telosticta* almost endemic to Borneo (one species is known from Palawan in the Philippines). Similarly, the Platycnemididae are better represented in Borneo than any of the other regions, with 38 species known from the island; *Coeliccia* and *Prodasineura* are particularly well represented with 15 and 13 species respectively. Like *Telosticta*, *Stenagrion* is almost endemic to Borneo, with the second species from the genus known from Palawan. Of six full species of *Devadatta* known from Sundaland, five are confined to Borneo and similarly with *Dysphaea* (three species known from Sundaland, two endemic to Borneo). With six species *Podolestes* is better represented in Borneo than any other of our regions, and *Amphicnemis* (15 species) and *Leptogomphus* (six species) also stand out in this regard. Orr (2003: 11) noted a 'limited affinity' between the odonate faunas of Borneo and Palawan in the Philippines, and indeed as well as the two genera mentioned above that are shared only with Palawan, *Euphaea subcostalis* and *Rhinocypha humeralis* are shared only with Palawan or the broader Palawan region.

Given the disparities in data from different parts of Borneo it is perhaps premature to make many comments on regional patterns within its odonate fauna (for instance the greater number of species known from the north of the island is likely to be largely or entirely the result of sampling effort rather than a genuine difference in diversity), but it is clear that each part of the island has its own endemic species. Also, considering species shared with Peninsular Malaysia, Singapore and Sumatra (and in some cases beyond), some appear confined to the northwest and west of Borneo (the parts closest to Peninsular Malaysia and Sumatra) as would be expected from geography, but some others appear absent from, or extremely uncommon in, the west but are present in the northeast and east.

South China Sea (SCS)

The islands considered under the South China Sea heading—the Natuna and the Anambas Islands—are administratively part of Indonesia's Riau Islands Province and are too remote from any major landmass to treat them as satellites of any such a landmass. Both island groups are situated between Borneo and Peninsular Malaysia and both are very poorly explored for Odonata, with only 29 primary records definitely from the islands in the database. The two island groups are considered to fall into different bioregions (as defined at www.oneearth.org/bioregions), with the Anambas Islands part of the Peninsular Malaysian & Sumatran Tropical Rainforests bioregion and the Natuna Islands part of the Borneo Tropical Forests & Sundaland Heath Forests bioregion.

The Anambas Islands have a land area less than 1,000 km^2 and only five records of four species in the database (all from Laidlaw 1932a) are from these islands. Three of the species (*Euphaea impar*, *Agriocnemis femina* and *Archibasis viola*) occur widely in Sundaland, while *Heliocypha biseriata* also occurs in Borneo and the Lingga Islands but (see note 18) is in all probability a junior synonym of the widespread *H. biforata*. However, the form of *H. biseriata* from the Anambas islands was originally described as a distinct subspecies—*Rhinocypha biseriata anambae*—by Laidlaw (1932a).

The Natuna Islands cover a larger land area (ca. 2,000 km^2) than the Anambas Islands with the largest island, Natuna Besar or Bunguran, having an area of 1,720 km^2. The database contains 24 primary records from these islands, with one additional record, of *Heliaeschna crassa*, listed with a ? by Lieftinck (1954). Published records are from Laidlaw (1932b) and Lieftinck (1954) with one record in Seehausen & Dow (2016; although this record of *Neurothemis fluctuans* is treated as primary by default because of a lack of information to the contrary, it is likely that it is actually a repeat of a record from Laidlaw 1932b). Excluding the *Heliaeschna* 11 species (all from the Coenagrionidae and Libellulidae and all widespread in Sundaland) have been recorded from the islands. Only one record (*Tyriobapta torrida*) is from Natuna Besar, which would be expected to have the highest odonate diversity based on its size. No species is currently regarded as endemic to any of the islands or island groups in the South China Sea.

Clearly further odonatological work is needed on both the Anambas and Natuna Islands. In particular Natuna Besar has an endemic primate species (*Presbytis natunae*) and should be considered as a priority for odonatological research in the Natuna Islands.

Sumatra

Sumatra, at ca. 480,790 km^2 including satellite islands, is, after Borneo, the second largest island of Sundaland and Wallacea. In addition to the main island numerous, small to medium large, islands are included in this region. To the east of Sumatra these islands include Bangka, Belitung (Billiton), the Lingga Islands and the Riau Archipelago (including Durian). The latter is closer to Peninsular Malaysia and Singapore than to Sumatra but is included in the Sumatra region here as it is part of Indonesia. About 75 to 125 km to the west of Sumatra lies a chain of islands, the larger islands include, from north to south, the Simeulue Islands, Nias, the Mentawai islands (including Siberut) and Enggano. Compared to mainland Sumatra these islands might appear small but the largest (Nias) is almost as large as Bali and larger than Lombok.

The Odonata of Sumatra were the first of Sundaland and Wallacea to receive serious attention with several famous odonatologists of the late nineteenth and early twentieth centuries publishing papers focussed on Sumatra (McLachlan 1880; Selys 1889; Karsch 1891a, Campion 1925, Ris 1927). The first review of the fauna was published by L. Krüger in a series of four large papers (1898, 1899a, 1899b, 1902). Other important papers from this period include Ris (1915a) on the fauna of the island Simalur and Laidlaw (1926) on the fauna of the Mentawai islands. In the period 1929 to 1971 nearly all papers containing additional records for Sumatra were by M.A. Lieftinck. The major exception to this is the paper by Schmidt (1934) which contains many records including several species descriptions. Lieftinck published two reviews of the fauna of Sumatra, Lieftinck (1935a) listing 180 species and the second in Lieftinck (1954) listing 222 (sub)species. In the period 1971 to 2015 few papers appeared and most of them were part of revisions or species descriptions containing only a handful of records from Sumatra, for instance Dow *et al*. (2007) on *Chalybeothemis* (records from Belitung), Sasamoto & Karube (2007) with descriptions of two new species of *Drepanosticta* from Sumatra, and Hämäläinen *et al*. (2015) on *Dysphaea*. An exception is Tsuda & Kitagawa (1988) who published a good number of records based on collections made by M. Iwasaki and Yukawa & Yamane (1985) and Van Tol (1990b) who provided data on Krakatau islands to the east of Sumatra containing a checklist for these islands. Since 2016 there has been a much-needed increase in publications containing larger number of records, including those of common and widespread species, from some parts of Sumatra, for instance Alfarisyi (2018, 2019) on Belitung and Dow, Advento *et al.* (2018) on Riau Province. There has been a lack of systematic sampling over most of Sumatra and it is likely that many species still await discovery there. At present 264 species (112 Zygoptera, 152 Anisoptera) have been recorded from Sumatra and adjacent islands but it is likely that additional fieldwork will show the actual number to be well over 300 and maybe even over 350 species. The database contains 4,556 primary records from about 400 locations in Sumatra, but only 2,662 primary records from

about 230 locations are from mainland Sumatra. For Sumatra as a whole there are ca. 0.9 records per 100 km^2. Endemicity is relatively low in the known Sumatran odonate fauna, with only 43 species (ca. 16%) endemic to the main and/or satellite islands, 29 (ca. 26%) of which are Zygoptera and 14 (ca. 9%) are Anisoptera. However, most new species described from Sumatra in the future will probably be endemic to the region so that the endemicity figures are likely to rise with more work.

When looking at the main island of Sumatra it is clear that the areas surrounding the important colonial towns of Padang and Medan have been the best explored. Elsewhere in Sumatra sampled sites are widely scattered with records nearly lacking from the northern tip (Aceh) and the lowlands of southeast Sumatra. Of the islands to the east of Sumatra, Belitung is relatively well explored while the larger Bangka Islands have received little attention. All of the islands and island groups to the west of Sumatra have been comparatively well explored with between 100 to 200 records known for each of them, most of these records are however old and originate from before Indonesian independence.

Java & Bali

Bali is often regarded as one of the Lesser Sunda islands but is situated to the west of the Wallace line placing it closer to Java from a biogeographical point of view as well as geographically. Java was, together with Peninsula Malaysia and Singapore, among the first areas in Sundaland or Wallacea with permanent European settlements and served as administrative center of the Dutch East Indies during colonial times. Due to this the odonate fauna, especially that of the western part of the island, was already relatively well studied prior to World War II. The first extensive overview of its fauna was provided by Lieftinck (1934c), which includes an overview of collections made on Java and an annotated species list already containing 142 species. In the years following, numerous papers by M.A. Lieftinck made Java the best studied island of Sundaland and Wallacea for odonate faunistics and taxonomy. Lieftinck (1954) listed 156 species for Java and subsequently only a few additions/subtractions were made to/from the list so that the number of species listed for Java has changed little (currently 162 species, 57 Zygoptera, 105 Anisoptera). The number of records published after Lieftinck (1954) remained low for several decades with records mainly being published as part of larger regional revisions, for instance Asahina (1967) on *Ceriagrion* and Watson (1967) on *Tramea*. The last new species described from Java was *Procordulia papandayanensis* published as part of a revision of *Procordulia* in western Malesia (van Tol 1997). From 2010 onwards there has been an increase in the number of publications on the dragonflies and damselflies of Java including a number of regional inventories being published. This resulted, for instance, in the rediscovery of the Javan endemic *Rhinagrion tricolor* after a period of 59 years with no records (Zaman *et al*. 2017), as well as (for instance) in first records of species such as *Ceriagrion annulosum* and *Amphiaeschna ampla* from the island for many decades (Makitan (2013) and Syahroni *et al.* (2021) respectively). Fifty-four species (15 Zygoptera, 39 Anisoptera) have been recorded from Bali and 166 species (59 Zygoptera, 107 Anisoptera) from Java and Bali combined.

Java and Bali were connected to Sumatra during glacial periods and given their proximity it is no surprise that their faunas show a strong resemblance. These three islands share 18 endemics between them and nearly all of the species not endemic to Java are also found on Sumatra. A noteworthy difference is found in the genera *Amphicnemis* and *Teinobasis* which are represented by six and three species respectively on Sumatra but only one species of *Teinobasis* is known from Java where *Amphicnemis* is absent altogether. These genera favour lowland swamp habitats and it is not unlikely they were present on Java but became very rare or extinct due to the early and widespread clearance of lowland forest on the island. In addition to the 18 endemic species shared with Sumatra, Java is home to another 21 endemic species, 12 (ca. 20%) Zygoptera and 9 (ca. 8%) Anisoptera, of which two are shared with Bali. Both Java and Bali are west of the Wallace Line and their fauna is nearly completely composed of Oriental taxa. The only exception is *Nososcticta insignis* which is restricted to Bali, Java and Sumatra. *Nososcticta* seems to have its origin in Australia and New Guinea where it is very species rich and from there it has successfully first crossed Lydekker's Line and then the Wallace Line, reaching as far north as the Nicobar Islands where two species are known to occur (Rajeshkumar & Raghunathan 2018).

The database contains 2,681 primary records from Java and Bali (2,223 from Java, 458 from Bali) from about 350 individual locations (about 280 in Java, 70 in Bali). The number of records per 100 km^2 is ca. 2 (ca. 1.7 for Java, ca. 8 for Bali).

Regional patterns within the odonate fauna of Java have not been studied but two general patterns are obvious: a distinct difference between the lowland fauna and that found in the central west-east running mountain ranges and a gradual difference in the fauna between the west and the east which has a more pronounced dry season. The distinction between the lowland and highlands is exaggerated by the better preservation of natural vegetation in the highlands. Species restricted to the highlands include *Chlorogomphus magnificus* and *Procordulia papandayanensis* while species such as *Rhinagrion tricolor* are confined to the lowlands. The distinct dry season in the east results in a reduced diversity and the data suggest that especially diversity of species dependent on running water is diminished towards the east. This is well illustrated by the absence or scarcity of many families dominated by lotic species on Bali where only 7 of the 27 Javan species of Euphaeidae, Calopterygidae, Chlorocyphidae and Gomphidae have been recorded.

Interest in dragonflies and damselflies has increased in the past decades but this has not yet led to a major increase in availability of distribution records. Thorough explorations of some of the forest reserves in the mountains are needed to assess the conservation status of some poorly known species such as *Onychogomphus banteng* and it is not unlikely that this will results in the discovery of species new to science. From a conservation point of view a thorough inventory of Ujung Kulon National Park would be particularly valuable as it contains the largest remaining lowland rainforest on Java.

Sulawesi

In addition to the main island of Sulawesi, the islands of Banggai, Peleng, Buton, Muna and Sangihe are also included in the Sulawesi region and the combined area is about 188,500 km^2. Most of the above-mentioned islands are clearly closer to the main island of Sulawesi than the other landmasses. The exception is Sangihe to the north of Sulawesi which is almost centrally placed between Halmahera, Mindanao and Sulawesi, but is included in the Sulawesi region based on its clear faunal links.

Despite its distinctness the odonate fauna of Sulawesi remained poorly studied until the 1980s and even today a proper faunistic overview or even a checklist is wanting. In total the database contains just over 1,740 primary records published in 94 papers from Sulawesi, with ca. 0.9 records per 100 km^2. Most (63) of the papers containing records from Sulawesi were published prior to 1980 although these contain only about a third of the available records. Most of these pre 1980 records were part of general faunal lists of the wider Indonesian area or papers discussing certain genera or families and only a handful are largely devoted to Sulawesi (Lieftinck 1936a,1936b; 1948a and section II of 1948b). This lack of studies on the odonate fauna of Sulawesi can at least partly be explained by the scarcity of available material from the island, however it should be noted that there is significant material from the first half of the 20th century in RMNH that has only partly been published on. There was a huge increase in available material in 1985 when Project Wallace, the 'largest entomological expedition ever' was held (Knight 1988). This expedition was organised by the Royal Entomological Society of London and the Indonesian Institute of Sciences (LIPI) and was attended by over 200 entomologists from all over the world with field work mainly focussing on the northern peninsula of Sulawesi. Several entomologists collected dragonflies during this Project Wallace, with Jan van Tol concentrating on dragonflies and damselflies. These collections, together with those made during smaller expeditions in 1989, 1991, 1993 (De Jong 2004) are housed at RMNH and form the largest source of information on the odonates of Sulawesi. In the years following Project Wallace a series of papers has been published devoted to the odonates of Sulawesi and containing species descriptions and revisions: *Celebophlebia* and *Diplacina* (van Tol 1987), *Macromia* (van Tol 1994), *Procordulia* (van Tol 1997), *Watuwila* (van Tol 1998), *Protosticta* (van Tol 2000), *Drepanosticta* (van Tol 2007a), *Libellago* and *Sclerocypha* (van Tol 2007b), *Argiolestes* (Kalkman 2007), *Celebargiolestes* (Kalkman 2016), *Rhinocypha* (Van Tol & Günther 2018). Despite its interesting fauna, non-taxonomic papers remained very scare with four papers devoted to behaviour (Günther 2006, 2019, 2021 on the reproductive behaviour of *Neurobasis kaupi*, *Sclerocypha bisignata*, *Disparocypha biedermanni* respectively and Kitching (1986, on larvae of *Lyriothemis cleis* in a water-filled treeholes) and a handful of faunistic papers (Amrullah 2018, Linoa *et al*. 2019, Malkmus 2007). Despite the numerous taxonomic papers published since 1985 there are still many genera in need of revision and it is likely that several dozens of species await discovery and description. The genera most in need of revision are *Ceriagrion*, *Pseudagrion*, *Teinobasis*, *Nososticta*, *Anax*, *Gynacantha*, *Heliaeschna*, *Oligoaeschna*, *Ictinogomphus* and *Hemicordulia*.

Like other parts of Wallacea the dragonfly and damselfly fauna of Sulawesi is a mixture of Oriental and Australasian species with taxa of Oriental origin dominant. Distinct Papuan genera present include *Argiolestes*, *Diplacina*, *Nannophlebia* and *Nososticta*. Of the genera endemic to Sulawesi the genus *Celebargiolestes* is clearly of Australasian origin but it is unclear if it arrived from Papua or directly from Australia rafting on a piece of continental shelf which docked onto Sulawesi (Kalkman *et al*. 2018). Of the groups with a clear link with Sundaland the numerous species and genera of Chlorocyphidae are noteworthy. As pointed out by Van Tol & Gassmann (2007) an interesting feature of Sulawesi is the complete or partial absence of families widespread in Sundaland to the west or the Philippines to the north with Euphaeidae completely absent and Calopterygidae, Platycnemididae and Gomphidae largely absent. Of the 137 species known (59 Zygoptera, 78 Anisoptera) to occur 65 (ca. 47%) are endemic to Sulawesi and its adjacent islands with 44 Zygoptera (ca. 75%) and 21 Anisoptera (ca. 27%) being found nowhere else (similar but slightly higher percentages for the individual suborders, almost identical overall, to those for Borneo). It is likely that further species description will result in a further increase of the percentage of endemics. Sulawesi has distinct endemism at genus level with six genera not found outside Sulawesi (*Celebargiolestes*, four species; *Celebophlebia*, two species; *Celebothemis*, one species; *Disparocypha*, one species; *Sclerocypha*, one species and *Watuwila*, one species). The high level of endemism at both species and genus level is at least partly explained by its isolation in combination with its considerable size.

The geological history of Sulawesi is complex with the different arms of the island having different geological origins and it is unclear whether or not these arms have been continuously above sea level before they arrived at their present position. A summary of the geological history and the biogeography of freshwater taxa of Sulawesi is given by Van Tol & Gassmann (2007). As already pointed out by Polhemus & Polhemus (1990) and further stressed by Van Tol & Gassmann (2007) many freshwater taxa are confined to distinct parts of the island with Polhemus & Polhemus (1990) recognising five distinct areas of endemism. This is also true for the odonates and most endemic species are confined to certain areas of the island although a proper analyses of distribution patterns is still lacking. In order to unravel the biogeographical history of the odonates of Sulawesi in more detail some of the above-mentioned genera need to be revised and molecular dated phylogenies need to be produced. As the history of each of these genera will be different it will be necessary to do this for several genera in order to get any useful insight into the processes that shaped the diversity of the odonates of this region.

As already mentioned, the odonate fauna of Sulawesi is still relatively poorly explored especially when considering its interesting fauna and biogeographical history. The almost complete absence of basic faunistic studies is especially striking. Nearly all publications published since 1980 are revisions and due to this hardly any data has been published on common species. Therefore, relatively simple (but good quality) studies describing the faunal composition of areas, providing basic information on abundance, habitat and behaviour, are of high value for Sulawesi.

Moluccas

We have divided the Moluccas into four subregions, three corresponding to the largest islands Buru, Halmahera and Seram and the fourth including all of the smaller islands. A total of 1,142 primary records from 83 publications are available from the Moluccas, with ca. 1.6 records per 100 km^2. Publications can roughly be divided in four periods: (1) the period prior to 1909 includes 22 papers by Förster, Kirby, Krüger, Martin and Selys, most of which contain only a handful records; (2) from 1909 to 1929 Ris published 15 papers containing records from the Moluccas; (3) between 1926 and 1971 Lieftinck published 27 papers which form the core of our knowledge on the odonates of the Moluccas. The fourth period covers the past fifty years in which records were mainly published as part of revisions (Asahina 1967 on *Ceriagrion*, Watson 1967 on *Tramea*, Lohmann 1984 and Kalkman & Orr 2014 on *Rhodothemis*, van Tol 1994 on *Macromia*, van Tol 2007c on *Drepanosticta*). Based on the published records none of the islands can be considered to be well explored for Odonata, but the best explored are the large islands Buru (229 primary records, ca. 2 records per 100 km^2), Halmahera (166 primary records, ca. 0.9 records per 100 km^2) and Seram (135 primary records, ca. 0.8 records per 100 km^2) which were the most accessible during colonial times. Dedicated efforts to collect odonates since 1960 are limited to field work by F.G. Rozendaal, R.R. Askew (Bacan, 1985), J. van Tol (Halmahera, Ternate, Tidore, 1995), M. Bedjanič (Seram, 1996) and P. Lupiyaningdyah (Halmahera, 2012). None of these collections have however been fully published. It is noteworthy that very few of the currently available

papers deal specifically with the Moluccas and no larger faunistic studies have been published due to which not only knowledge on distribution of species is scant but also information on habitat, abundance and ecology is largely absent. The only papers providing an overview of the fauna are Lieftinck (1949b) which contains a checklist for the Moluccas as part of a larger checklist of the Papuan Region and a checklist compiled by Jan van Tol and published in Monk *et al*. (1997). Probably all of the faunal lists for the islands are highly incomplete and undoubtably many species new to science remain to be discovered.

In total 135 species (57 Zygoptera, 78 Anisoptera) are known from the Moluccas many of which are wide ranging in both Wallacea and the Papuan region. Counts for the larger islands can be found in Table 2. Forty-nine (over a third, ca, 36%) of the species are endemic to the region, of which 32 are Zygoptera (ca. 56%) and 17 (ca. 22%) are Anisoptera. In addition, the region includes several species which are otherwise largely restricted to Sulawesi (*Gynacantha nausicaa*, *Pseudagrion celebense*, *P. crocops*, *P. ustum*, *Teinobasis helvola*, *T. lorquini*, *T. superba*) showing that colonisation from Sulawesi to the Moluccas (or vice versa) takes place. The Moluccas are also the westernmost point of occurrence of several Papuan genera: *Agyrtacantha*, *Huonia*, *Nannophlebia*, *Palaeosynthemis*, *Tanymecosticta* and *Selysioneura*.

The main islands of the Moluccas are divided into the northern Moluccas with Halmahera and adjacent smaller islands (Morotai, Obi and Bacan) and the southern Moluccas with main islands Seram and Buru. Geologically speaking the southern Moluccas are an extension of the Lesser Sunda islands arc, but due to their proximity to Halmahera and New Guinea and their wetter climate lacking a distinct dry season they show more faunal affinity with Halmahera than with the Lesser Sunda islands. The only more detailed biogeographical study on the odonates of the Moluccas is that of Van Tol (2007c) on *Drepanosticta*. He recognised three distinct group of species within this genus, with the three Moluccan species of the *megametta*-group having related species in Mindanao (Philippines) and the Bismarck Archipelago, the four Moluccan species of the *lymetta*-group having relatives in the Philippines and Biak and all the four members of the *moluccana*-group being restricted to the southern Moluccas. The link between the northern Moluccas and the islands of Biak-Supiori is further stressed by the presence of *Huonia rheophila* on both island groups.

In addition to the main Moluccan islands the region also includes the Sula Islands (in the west of the Moluccas) and the Tanimbar and the Kai islands (in the east of the Moluccas). The Sula Islands form a somewhat forgotten island group between Sulawesi and the main Moluccan Islands. The three main islands, Taliabu, Mangole and Sanana are considered to be fragments of continental plate and the natural vegetation consists of tropical forest. The highest peaks reach 1,640 m a.s.l. on Taliabu but remain below 1,000 m a.s.l. on Mangole and below 700 m a.s.l. on Sanama. There are just 17 publications with original records from the islands. Many of the records for the islands are imprecise and often even lack a clear indication which island is involved and sensible checklists for the individual islands cannot be drafted. The list of species occurring on the islands group includes some Papuan elements, *Agyrtacantha dirupta* and *Rhinocypha tincta*, a species shared with Seram (*Rhinocypha ustulata*) as well as species largely restricted to Sulawesi (*Pseudagrion ustum*, *Teinobasis lorquini*) showing that the island group, as can be expected based on its position, has a fauna composed of a mixture of Moluccan (Papuan) species and species that originated from Sulawesi. No endemic species are currently known from the Sula islands but especially Taliabu with its >1,600 m high mountain is likely to have some endemic species. The easternmost part of the Moluccas is formed by the Tanimbar and the Kai islands the fauna of which have hardly been studied with five publications containing original records available from Tanimbar (as far as known all collected in 1929–1938) and 21 publications containing original records available for the Kai Islands (1908–1941). The islands experience a distinct dry season from May to September the impact of which is on Tanimbar further increased by the karstic geology of the island which results in few permanent streams. Due to their relatively small size, isolation and the influence of the monsoon climate they are not expected to be species rich. Nonetheless the 19 species known from Tanimbar and 25 species known from the Kai Islands are probably only less than half of the species occurring on the islands. In addition to widespread species several species with smaller ranges occur, all which show a distinct Papuan link. *Agyrtacantha dirupta* and *Tanymecosticta fissicollis*, both also found on mainland New Guinea, occur on Tanimbar, while two others with a link to New Guinea (*Tanymecosticta capillaris* and *Agrionoptera cynthiae*) are endemic to the island. This clear link with Papua is even more distinct on the better explored Kai Islands with species as *Agyrtacantha dirupta*, *Nesoxenia mysis* and *Rhinocypha tincta* shared with Papua and *Drepanosticta robusta*, *Tanymecosticta simonae* endemic but belonging to Papuan groups.

Lesser Sundas

We have divided the Lesser Sunda Islands into seven subregions, including the larger islands of Lombok, Sumbawa, Sumba, Flores and Timor (divided into two subregions because of its political split) with a separate subregion for the smaller islands. A total of 1,771 primary records from 59 publications are available from the Lesser Sunda Islands. Most of these papers only contain a handful of records and only a few are dedicated to the odonate fauna of the island group. Prior to 2014 only two papers dedicated to the Lesser Sunda Islands and containing a large number of records were published. The first of these is Lieftinck (1936c) who provided a review of the islands (including Bali) listing 63 (sub)species. The second key paper is Lieftinck (1953a) which again includes a review of the island group with emphasis on Sumba and in which 101 (sub)species are listed. Remarkably, in the sixty years to follow less than 50 records were published. Since 2014 an increase in studies has taken place and a series of publication appeared containing numerous new records for the islands: Kosterin (2014b: Lombok), Seehausen (2017a: Timor Leste), Seehausen & Theischinger (2017: Flores, Lombok, Sumba, Sumbawa, Timor, Timor Leste), Seehausen *et al*. (2018: Rote, Timor, Timor Leste), Da Silva Pinto *et al*. (2020: Timor Leste, Alor, Rote, Semau), Ilhamdi *et al*. (2020: Lombok). Of these islands only Lombok (236 primary records, ca. 4 records per 100 km^2), Sumba (587 primary records, ca. 5 records per 100 km^2) and Timor (590 primary records, ca. 2 records per 100 km^2) have more than 200 primary records in the database.

At present 99 species (34 Zygoptera, 65 Anisoptera) are known from the Lesser Sunda islands. It is likely that this number will increase to close to 150 with further fieldwork, but nonetheless it is clear that the islands are among the least diverse areas in the Indonesian Archipelago for Odonata. This is due to a combination of their isolation, relatively small size and the monsoon climate resulting in a distinct dry season. From Sumba, the best explored island, 71 species are known while from Sumbawa, the least explored of the larger islands, only 31 species have been recorded. We estimate that on most of the islands between 70–100 species occur, in which case for some islands a third to a half of the species remain unreported.

A large portion of the fauna belongs to wide ranging species with species of standing water, mostly from the families Coenagrionidae, Aeshnidae and Libellulidae, being well represented. In contrast species of running waters are poorly represented with Calopterygidae absent and Euphaeidae (1 species), Chlorocyphidae (2), Platycnemididae (5) and Gomphidae (4) poorly represented. Some of the typical Papuan genera which are found in the Moluccas such as *Agyrtacantha*, *Argiolestes*, *Huonia*, *Nannophlebia*, *Palaeosynthemis* and *Tanymecosticta* are lacking in the Lesser Sunda islands. Clear Papuan influence in the fauna is restricted to the genus *Nososticta*, which is represented by four species endemic to the Lesser Sunda Islands. Of the species with clear Oriental affinity the occurrence of two endemic species of *Idionyx* is remarkable as these seem unlikely candidates for colonising new islands across larger stretches of water. Of the 99 species, 22 (14 (ca. 41%) Zygoptera, eight (ca. 12%) Anisoptera) are restricted to the Lesser Sunda Islands, the majority of these species are found on two or more of the islands.

From west to east the dominance of the monsoon climate increases and the east of Timor has a climate which resembles that of northern Australia. In addition, it is closer to Australia (<500 km) than to New Guinea, the Moluccas and Java. However, the proximity of the Lesser Sunda Islands to Australia is reflected only weakly in their fauna with the common Australian species *Ischnura heterosticta* (only Timor) and *Orthetrum caledonicum* (several islands) occurring, *Anax georgius* occurs both in Timor and northwest Australia and the mainly Australian genus *Austroallagma* is represented by *A. sagittiferum* in the Lesser Sundas. Numerous other Australian species such as *Crocothemis nigrifrons*, *Ictinogomphus australis*, *Ischnura pruinescens* and *Nannodiplax rubra* which are widespread in the northwest of Australia and for which habitat seems to be present in the Lesser Sundas have not yet been reported suggesting that exchange from Australia to the Lesser Sunda islands is limited.

TABLE 1. Checklist of dragonflies and damselflies for the eight main regions (Singapore & Peninsular Malaysia, South China Sea, Borneo, Sumatra, Java & Bali, Lesser Sunda, Sulawesi, Moluccas) and the 22 subregions. An * after a species name indicates that the species is endemic to Sundaland and Wallacea.
m: only recorded from the main island;
i: only recorded from one or more of the smaller islands (see Table 6);
b: recorded both from the main islands and from one or more of the smaller islands (see Table 6);
e: extinct (Singapore only).

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Family: Lestidae																									
Indolestes	**Fraser, 1922**																								
Indolestes alfurus *	Lieftinck, 1960													m											
Indolestes anomalus	Fraser, 1946		m																						
Indolestes bellax *	(Lieftinck, 1953)																		m	m	m				
Indolestes dajakanus *	(Lieftinck, 1948)			m																					
Indolestes floresianus *	Lieftinck, 1960																				m				
Indolestes lafaeci *	Seehausen, 2017																						m	m	
Indolestes sutteri *	Lieftinck, 1953																			m					
Lestes	**Leach, 1815**																								
Lestes concinnus	Hagen in Selys, 1862										b								m	m	m			m	1
Lestes dorothea	Fraser, 1924		m																						
Lestes praecellens *	Lieftinck, 1937		m								m														
Lestes praemorsus decipiens	Kirby, 1894	b	b	m	b		m			b	b									m	m			m	2
Lestes praemorsus praemorsus	Hagen in Selys, 1862												m		m		m								2
Lestes praevius *	Lieftinck, 1940				m			m		i															
Lestes quercifolia	Selys, 1878													m	m		m								

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Orolestes	**McLachlan, 1895**																								
Orolestes wallacei *	(Kirby, 1889)	e	m	m	m		m	m		b	m														
Platylestes	**Selys, 1862**																								
Platylestes heterostylus *	Lieftinck, 1932	m	b		i			m		i	m														
Family: Platystictidae																									3
Drepanosticta	**Laidlaw, 1917**																								
Drepanosticta actaeon *	Laidlaw, 1934			m	m																				
Drepanosticta adenani *	Dow & Reels, 2018			m																					
Drepanosticta amboinensis *	van Tol, 2007																m								
Drepanosticta arcuata *	Lieftinck, 1934									m															
Drepanosticta asahinai *	Sasamoto & Karube, 2007									m															
Drepanosticta attala *	Lieftinck, 1934			m			m	m																	
Drepanosticta barbatula *	Lieftinck, 1940				m			m																	
Drepanosticta bartelsi *	Lieftinck, 1937										m														
Drepanosticta berinchangensis *	Kemp, 1994		m																						
Drepanosticta berlandi *	Lieftinck, 1939																	m	m						
Drepanosticta bicolor *	van Tol, 2007												i												
Drepanosticta bifida *	van Tol, 2007																m								
Drepanosticta bispina *	Fraser, 1932									m															
Drepanosticta burbachi *	Dow, 2013			m																					
Drepanosticta crenitis *	Lieftinck, 1933			m?	m?		m?	m																	4
Drepanosticta dentifera *	Kimmins, 1936			m																					
Drepanosticta draco *	Phan, Karube & Sasamoto, 2018									m															
Drepanosticta drusilla *	Lieftinck, 1934			m				m																	
Drepanosticta dulitensis *	Kimmins, 1936			m																					
Drepanosticta ephippiata *	Lieftinck, 1937												b												

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas				Lesser Sunda						
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Drepanosticta floresiana *	Lieftinck, 1939																				m				
Drepanosticta fontinalis *	Lieftinck, 1937		b																						5
Drepanosticta forficula *	Kimmins, 1936			m			m?																		4
Drepanosticta gazella *	Lieftinck, 1929										m														
Drepanosticta halmahera *	van Tol, 2007													m											
Drepanosticta hamadryas *	Laidlaw, 1931		m																						
Drepanosticta hamulifera *	van Tol, 2007												i												
Drepanosticta kosterini *	Dow, 2017			m																					
Drepanosticta krugeri *	Laidlaw, 1926									i															
Drepanosticta marsyas *	Lieftinck, 1965		m																						
Drepanosticta moluccana *	Lieftinck, 1938														m	m?									6
Drepanosticta monoceros *	Lieftinck, 1965							m																	7
Drepanosticta obiensis *	van Tol, 2007																m								
Drepanosticta pan *	Laidlaw, 1931		m																						
Drepanosticta pararudicula *	Theischinger, Lupiyaningdyah & Richards, 2015													m											
Drepanosticta penicillata *	van Tol, 2007												m												
Drepanosticta psygma *	van Tol, 2007																m								
Drepanosticta pytho *	Lieftinck, 1937									m															
Drepanosticta quadrata *	(Selys, 1860)	m	m																						5
Drepanosticta rahmani *	Dow, Choong & Ng, 2017		m																						5
Drepanosticta robusta *	Fraser, 1926																m								
Drepanosticta rudicula *	van Tol, 2007													m											
Drepanosticta rufostigma *	(Selys, 1886)			m	m	m	m	m																	
Drepanosticta sbong *	Dow, 2010			m																					
Drepanosticta sembilanensis *	van Tol, 2007													m											
Drepanosticta seramensis *	van Tol & Bedjanic, 2018															m									

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas	Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Drepanosticta sharpi	(Laidlaw, 1907)		m							i															5, 8
Drepanosticta siebersi *	Fraser, 1926										m														
Drepanosticta silenus *	Laidlaw, 1934		m																						
Drepanosticta simuni *	Dow & Orr, 2012			m																					
Drepanosticta siu *	van Tol, 2007													m											
Drepanosticta spatulifera *	Lieftinck, 1929										m														
Drepanosticta sumatrana *	Sasamoto & Karube, 2007									m															
Drepanosticta sundana *	(Krüger, 1898)										b														
Drepanosticta tenella *	Lieftinck, 1935									m															
Drepanosticta versicolor *	(Laidlaw, 1913)			m	m		m																		7
Drepanosticta watuwilensis *	van Tol, 2007												m												
Protosticta	**Selys, 1885**																								
Protosticta bivittata *	Lieftinck, 1939												m												
Protosticta coomansi *	van Tol, 2000												m												
Protosticta curiosa	Fraser, 1934		m																						9
Protosticta foersteri *	Laidlaw, 1902		m																						9
Protosticta geijskesi *	van Tol, 2000												m												
Protosticta gracilis *	Kirby, 1889												m												
Protosticta joepani *	Dow, Phan & Choong, 2020			m	m																				
Protosticta kinabaluensis *	Laidlaw, 1915				m																				
Protosticta linduensis *	van Tol, 2000												m												
Protosticta marenae *	van Tol, 2000												m												
Protosticta maurenbrecheri *	van Tol, 2000												m												
Protosticta pariwonoi *	van Tol, 2000												m												
Protosticta reslae *	van Tol, 2000												m												
Protosticta rozendalorum *	van Tol, 2000												i												

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas	Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Protosticta simplicinervis *	Selys, 1885											b												
Protosticta vanderstarrei *	van Tol, 2000											m												
Telosticta	**Dow & Orr, 2012**																							
Telosticta belalongensis *	Dow & Orr, 2012			m?			m																	10
Telosticta berawan *	Dow & Orr, 2012			m																				
Telosticta bidayuh *	Dow & Orr, 2012			m																				
Telosticta dayak *	Dow & Orr, 2012			m			m																	
Telosticta dupophila *	(Lieftinck, 1933)			m				m																
Telosticta feronia *	(Lieftinck, 1933)							m																
Telosticta fugispinosa *	Dow, Afendy & Rahman, 2016				m																			
Telosticta gading *	Dow & Orr, 2012			m																				
Telosticta iban *	Dow, 2014			m																				
Telosticta janeus *	Dow & Orr, 2012				m																			
Telosticta kajang *	Dow & Orr, 2012			m																				
Telosticta longigaster *	Dow & Orr, 2012			m			m																	
Telosticta santubong *	Dow & Orr, 2012			m																				
Telosticta serapi *	Dow & Orr, 2012			m																				
Telosticta tubau *	(Dow, 2010)			m																				
Telosticta ulubaram *	Dow & Orr, 2012			m	m																			
Family: Euphaeidae																								
Dysphaea	**Selys, 1853**																							
Dysphaea dimidiata	Selys, 1853	e	m	m	m	m	m	m		b	m													
Dysphaea lugens *	Selys, 1873			m	m			m																
Dysphaea ulu *	Hämäläinen, Dow & Stokvis, 2015			m	m		m																	

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas			Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Euphaea	**Selys, 1840**																								
Euphaea ameeka *	van Tol & Norma-Rashid, 1995			m			m																		
Euphaea aspasia *	Selys, 1853									b															
Euphaea basalis *	(Laidlaw, 1915)			m	m																				
Euphaea bocki *	McLachlan, 1880									m															
Euphaea impar	Selys, 1859	m	b	m	m		m	m	m	b															
Euphaea lara balica *	McLachlan, 1898											m													11
Euphaea lara lara *	Krüger, 1898																			m					11
Euphaea lara lombockensis *	McLachlan, 1898																	m	m		m	m			11
Euphaea masoni	Selys, 1879		m																						
Euphaea modigliani *	Selys, 1898									b															
Euphaea ochracea	Selys, 1859		b																						12
Euphaea subcostalis	Selys, 1873			m	m	m	m	m																	
Euphaea subnodalis *	(Laidlaw, 1915)			m	m																				
Euphaea tricolor *	Selys, 1859			m	m	m	m	m																	
Euphaea variegata *	Rambur, 1842									m	b	m													
Family: Devadattidae																									
Devadatta	**Kirby, 1890**																								
Devadatta aran *	Dow, Hämäläinen & Stokvis, 2015			m	m			m																	
Devadatta argyoides argyoides *	(Selys, 1859)	m	b							b															13
Devadatta argyoides tiomanensis *	Laidlaw, 1934		i																						13
Devadatta clavicauda *	Dow, Hämäläinen & Stokvis, 2015			m			m	m																	
Devadatta podolestoides *	Laidlaw, 1934			m				m																	
Devadatta somoh *	Dow, Hämäläinen & Stokvis, 2015			m			m																		
Devadatta tanduk *	Dow, Hämäläinen & Stokvis, 2015			m	m																				

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas	Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Family: Rhipidolestidae																			
Bornargiolestes	**Kimmins, 1936**																		
Bornargiolestes fuscus *	Dow, 2014			m			m												
Bornargiolestes nigra *	Kimmins, 1936			m				m											
Bornargiolestes reelsi *	Dow, 2014			m															
Family: Philosinidae																			
Rhinagrion	**Calvert, 1913**																		
Rhinagrion borneense *	(Selys, 1886)			m		m	m	m											
Rhinagrion elopurae *	(McLachlan in Selys, 1886)				m			m											
Rhinagrion macrocephalum *	(Selys, 1862)		m							m									
Rhinagrion mima	(Karsch, 1891)									m									14
Rhinagrion tricolor *	(Krüger, 1898)										b								
Rhinagrion viridatum	Fraser, 1938		b																14
Family: Argiolestidae																			
Argiolestes	**Selys, 1862**																		
Argiolestes alfurus *	Lieftinck, 1956																m		
Argiolestes celebensis *	Kalkman, 2007												m						
Argiolestes obiensis *	Lieftinck, 1956																m		
Celebargiolestes	**Kennedy, 1925**																		
Celebargiolestes askewi *	Kalkman, 2016												m						
Celebargiolestes cinctus *	(Selys, 1886)												b						
Celebargiolestes orri *	Kalkman, 2016												m						
Celebargiolestes toli *	Kalkman, 2016												b						
Podolestes	**Selys, 1862**																		
Podolestes atomarius *	Lieftinck, 1950							m											
Podolestes buwaldai *	Lieftinck, 1940		m							m									

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Podolestes chrysopus *	Selys, 1889			m				m																	
Podolestes coomansi	Lieftinck, 1940									m															15
Podolestes furcifer *	Lieftinck, 1950							m																	
Podolestes harrissoni *	Lieftinck, 1953			m			m																		
Podolestes orientalis	Selys, 1862	m	m	m	m	m	m	m		b															
Podolestes parvus *	Dow & Ngiam, 2019			m																					
Family: Calopterygidae																									
Echo	**Selys, 1853**																								
Echo modesta	Laidlaw, 1902	e	b																						
Echo uniformis *	Selys, 1879									b															
Matronoides	**Förster, 1897**																								
Matronoides cyaneipennis *	(Förster, 1897)			m	m																				
Neurobasis	**Selys, 1853**																								
Neurobasis chinensis	(Linnaeus, 1758)	e	b							b															
Neurobasis florida *	(Hagen in Walker, 1853)										m														
Neurobasis kaupi *	Brauer, 1867												m												16
Neurobasis longipes *	Hagen, 1887		m	m	m	m	m	m																	
Vestalis	**Selys, 1853**																								
Vestalis amabilis *	Lieftinck, 1965			m	m		m																		
Vestalis amaryllis	Lieftinck, 1965			m	b	m	m	m		i															
Vestalis amethystina	Lieftinck, 1965	m	b							m															
Vestalis amnicola *	Lieftinck, 1965			m	m		m																		
Vestalis amoena	Hagen in Selys, 1853	m	b	m	b	m	m	b		b															
Vestalis anacolosa *	Lieftinck, 1965				m																				17
Vestalis atropha *	Lieftinck, 1965			m	m		m	m																	17
Vestalis beryllae *	Laidlaw, 1915			m	m		m	m																	

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea		Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Vestalis gracilis	(Rambur, 1842)	m	b																						
Vestalis luctuosa *	(Burmeister, 1839)									m	m	m													
Vestalis lugens *	Albarda in Selys, 1879									b															
Family: Chlorocyphidae																									
Aristocypha	**Laidlaw, 1950**																								
Aristocypha fenestrella	(Rambur, 1842)		b							i															
Disparocypha	**Ris, 1916**																								
Disparocypha biedermanni *	Ris, 1916												m												
Heliocypha	**Fraser, 1949**																								
Heliocypha angusta angusta *	(Hagen in Selys, 1853)									b															
Heliocypha angusta oceanis *	Lieftinck, 1947									i															
Heliocypha biforata	(Selys, 1859)		b							i															18
Heliocypha biseriata *	(Selys, 1859)			m	m		m	m	m	i															18
Heliocypha fenestrata cornelii *	(Lieftinck, 1947)											m													
Heliocypha fenestrata fenestrata *	(Burmeister, 1839)										b														
Heliocypha mariae *	(Lieftinck, 1930)									m															
Heliocypha nubecula *	(Lieftinck, 1948)									m															
Heliocypha perforata limbata	(Selys, 1879)		m																						12
Heliocypha vantoli *	Hämäläinen, 2016									i															
Libellago	**Selys, 1840**																								
Libellago asclepiades *	(Ris, 1916)												m												
Libellago aurantiaca	(Selys, 1859)	m	m	m			m	m		b															
Libellago celebensis anoa *	van Tol, 2007												m												
Libellago celebensis celebensis *	van Tol, 2007												m												
Libellago celebensis dorsonigra *	van Tol, 2007												m												
Libellago celebensis orientalis *	van Tol, 2007												m												

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Libellago daviesi *	van Tol, 2007												m												
Libellago dorsocyana *	Lieftinck, 1937							m																	
Libellago hyalina	(Selys, 1859)	m	m	m	m		m	m		b															
Libellago lineata	(Burmeister, 1839)	m	b					m		m	m	m													
Libellago manganitu *	van Tol, 2007												i												
Libellago naias *	Lieftinck, 1932																			m	m				
Libellago orri *	Dow & Hämäläinen, 2008			m																					
Libellago phaethon *	(Laidlaw, 1931)			m	m			m																	
Libellago rufescens *	(Selys, 1873)												m												
Libellago semiopaca *	(Selys, 1873)		m	m	m		m	m		m															
Libellago stictica *	(Selys, 1869			m			m	m																	
Libellago stigmatizans	(Selys, 1859)	e	m	m						m															
Libellago sumatrana *	(Albarda in Selys, 1879)									b	m														
Libellago xanthocyana *	(Selys, 1869)												b												16
Melanocypha	**Fraser, 1949**																								
Melanocypha snellemanni javana *	Laidlaw, 1950										m														
Melanocypha snellemanni snellemanni *	(Albarda in Selys, 1879)									m															
Pachycypha	**Lieftinck, 1950**																								
Pachycypha aurea *	Lieftinck, 1950			m				m																	
Rhinocypha	**Rambur, 1842**																								
Rhinocypha anisoptera *	Selys, 1879									m	m														
Rhinocypha aurofulgens *	Laidlaw, 1931			m	m		m	m																	
Rhinocypha aurulenta *	Förster, 1903														m										
Rhinocypha cucullata *	Selys, 1873			m	m	m	m	m																	
Rhinocypha flavipoda *	van Tol & Günther, 2018												m												
Rhinocypha frontalis frontalis *	Selys, 1873												b												16

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas	Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Rhinocypha frontalis sulselensis *	van Tol & Günther, 2018												m												
Rhinocypha heterostigma *	Rambur, 1842										m														
Rhinocypha humeralis	Selys, 1873			m	b	m	m	m																	
Rhinocypha monochroa *	Selys, 1873												b												
Rhinocypha moultoni *	Laidlaw, 1915				m																				
Rhinocypha pagenstecheri pagenstecheri *	Förster, 1897																	m	m		m	m			
Rhinocypha pagenstecheri pusilla *	Lieftinck, 1953																m								
Rhinocypha pagenstecheri timorana *	Lieftinck, 1936																m					m	m	m	
Rhinocypha pallidifrons *	Ris, 1927									m															
Rhinocypha pelengensis *	van Tol & Günther, 2018												i												
Rhinocypha pelops	Laidlaw, 1936		m																						
Rhinocypha phantasma *	Lieftinck, 1935												b												
Rhinocypha sangihensis *	van Tol & Günther, 2018												i												
Rhinocypha selysi *	Krüger, 1898									m															
Rhinocypha spinifer *	Laidlaw, 1931			m	m			m																	
Rhinocypha stygia *	Förster, 1897			m	m		m																		
Rhinocypha sumbana *	Förster, 1897																			m					
Rhinocypha tincta sagitta	Lieftinck, 1938																m								
Rhinocypha tincta semitincta	Selys, 1869													m			m								
Rhinocypha togeanensis *	van Tol & Günther, 2018												i												
Rhinocypha ustulata *	Brauer, 1867															m	m								
Rhinocypha viola *	Orr, 2002							m																	
Rhinocypha virgulata *	van Tol & Günther, 2018												m												
Rhinocypha xanthe *	Ris, 1927									m															

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas	Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Rhinoneura	**Kimmins, 1936**																								
Rhinoneura caerulea *	Kimmins, 1936			m																					
Rhinoneura villosipes *	Laidlaw, 1915				m																				
Sclerocypha	**Fraser, 1949**																								
Sclerocypha bisignata *	(McLachlan, 1870)												b												
Sundacypha	**Laidlaw, 1950**																								
Sundacypha petiolata	(Selys, 1859)		m	m			m	m		m															
Sundacypha striata *	Orr, 1999			m			m																		
Watuwila	**van Tol, 1998**																								
Watuwila vervoorti *	van Tol, 1998												m												
Family: Isostictidae																									
Selysioneura	**Förster, 1900**																								19
Selysioneura aglaia *	Lieftinck, 1953																m								
Selysioneura thalia *	Lieftinck, 1953													m											
Tanymecosticta	**Lieftinck, 1935**																								
Tanymecosticta capillaris *	Lieftinck, 1959																m								
Tanymecosticta fissicollis	(Lieftinck, 1932)																m								
Tanymecosticta simonae *	Lieftinck, 1969																m								
Family: Platycnemididae																									
Calicnemia	**Strand, 1928**																								
Calicnemia chaseni	(Laidlaw, 1928)		b																						
Calicnemia rectangulata *	Laidlaw, 1932		m																						
Coeliccia	**Kirby, 1890**																								
Coeliccia albicauda	(Förster in Laidlaw & Förster, 1907)	m	b																						
Coeliccia arcuata *	Lieftinck, 1940			m?	m			m																	20

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Coeliccia borneensis *	(Selys, 1886)			m	m		m																		
Coeliccia campioni *	Laidlaw, 1918			m																					
Coeliccia cyaneothorax *	Kimmins, 1936			m	m		m	m																	
Coeliccia didyma	(Selys, 1863)	m	b																						
Coeliccia erici	Laidlaw, 1917		b																						
Coeliccia flavostriata *	Laidlaw, 1918			m				m																	
Coeliccia junis *	Dow, 2020			m																					
Coeliccia kenyah *	Dow, 2010			m			m																		
Coeliccia lieftincki *	Laidlaw, 1932										b														
Coeliccia macrostigma *	Laidlaw, 1918			m			m																		
Coeliccia matok *	Dow, 2016			m																					
Coeliccia membranipes membranipes *	(Rambur, 1842)									m	b														
Coeliccia membranipes nereis *	Lieftinck, 1948									i															
Coeliccia nemoricola *	Laidlaw, 1912			m																					21
Coeliccia nigrohamata *	Laidlaw, 1918			m	m	m	m	m																	22
Coeliccia octogesima *	(Selys, 1863)	m	b							m															
Coeliccia paludensis *	Dow, 2016							m																	
Coeliccia resecta *	Lieftinck, 1953							m																	22
Coeliccia roberti *	Dow, 2020			m			m																		
Coeliccia sameerae *	Dow, Choong & Ng, 2018		m																						
Coeliccia southwelli *	Dow & Reels, 2011			m				m																	
Copera	**Kirby, 1890**																								
Copera imbricata *	(Hagen in Selys, 1863)									m															
Copera marginipes	(Rambur, 1842)	m	b					m		b	b	m						m	m	m	m				
Copera vittata acutimargo *	Krüger, 1898									b															
Copera vittata javana *	Lieftinck, 1940										m														

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Copera vittata vittata	(Selys, 1863)	b	b	m	b	m	m	m		b															
Elattoneura	**Cowley, 1935**																								
Elattoneura analis *	(Selys, 1860)		m	m	m		m	m		m															
Elattoneura aurantiaca *	(Selys, 1886)		m	m				m		b															
Elattoneura coomansi *	Lieftinck, 1937		m	m				m		i															
Elattoneura erythromma *	Lieftinck, 1953							m																	
Elattoneura longispina *	Lieftinck, 1937		m	m				m		i															
Elattoneura mauros *	Dow, Choong & Ng, 2010			m																					
Indocnemis	**Laidlaw, 1917**																								
Indocnemis orang	(Förster in Laidlaw & Förster, 1907)		m																						12
Nosoticta	**Hagen in Selys, 1860**																								23
Nosoticta circumscripta *	(Selys, 1886)													m			m								
Nosoticta diadesma *	(Lieftinck, 1936)																			m					
Nosoticta eburnea	(Förster, 1897)														m		m								
Nosoticta egregia *	(Lieftinck, 1937)														m										
Nosoticta emphyla *	(Lieftinck, 1936)																	m	m		m				
Nosoticta exul	(Selys, 1886)													m			m								
Nosoticta flavipennis *	(Selys, 1886)												m												
Nosoticta halmahera *	Theischinger, Lupiyaningdyah & Richards, 2015													m											
Nosoticta impercepta *	Seehausen & Theischinger, 2017																						m	m	
Nosoticta insignis *	(Selys, 1886)									m	b	m													
Nosoticta moluccensis *	(Selys, 1886)														m	m	m								
Nosoticta phoenissa *	(Ris, 1929)														m										
Nosoticta selysi *	(Förster, 1896)																			m	m	m			

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas			Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Onychargia	**Selys, 1865**																								
Onychargia atrocyana	Selys, 1865	b	b	m	m		m	m		b	b														
Palaiargia	**Förster, 1903**																								
Palaiargia obiensis *	Lieftinck, 1957																m								
Palaiargia optata *	(Hagen in Selys, 1865)																m								
Palaiargia perimecosoma *	Lieftinck, 1957													m			m								
Palaiargia tanysiptera *	Lieftinck, 1953													m											
Prodasineura	**Cowley, 1934**																								
Prodasineura abbreviata *	Lieftinck, 1951							m																	
Prodasineura autumnalis	(Fraser, 1922)										b	m													24
Prodasineura collaris	(Selys, 1860)	m	b	m	m		m	m		b															
Prodasineura delicatula *	(Lieftinck, 1930)										b														
Prodasineura dorsalis *	(Selys, 1860)			m	m		m	m																	
Prodasineura flammula *	Lieftinck, 1948				m			m																	25
Prodasineura gracillima *	(Selys, 1886)												m												26
Prodasineura haematosoma *	Lieftinck, 1937			m				m																	
Prodasineura hosei *	(Laidlaw, 1913)			m	m		m	m																	
Prodasineura humeralis *	(Selys, 1860)	m	b																						24
Prodasineura hyperythra *	(Selys, 1886)			m	m	m	m	m																	
Prodasineura interrupta *	(Selys, 1860)	m	m							b															27
Prodasineura laidlawii	(Förster in Laidlaw & Förster, 1907)		b																						
Prodasineura notostigma *	(Selys, 1860)	m	b	m				m		b															
Prodasineura peramoena *	(Laidlaw, 1913)			m			m																		
Prodasineura quadristigma *	Lieftinck, 1951							m																	
Prodasineura tenebricosa *	Lieftinck, 1937			m				m																	
Prodasineura verticalis delia *	Karsch, 1891									b															24

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Prodasineura verticalis verticalis *	(Selys, 1860)			m	m		m	m		b	m?														24
Prodasineura yulan *	Dow & Ngiam, 2013			m																					
Pseudocopera	**Fraser, 1922**																								
Pseudocopera ciliata	(Selys, 1863)		b	m						b	m														
Family: Coenagrionidae																									
Aciagrion	**Selys, 1891**																								
Aciagrion approximans	(Selys, 1876)									m															
Aciagrion borneense	Ris, 1911		b	m			m	m		m															
Aciagrion fasciculare *	Lieftinck, 1934			m?							m														28
Aciagrion feuerborni *	Schmidt, 1934									m															
Aciagrion fragile	(Tillyard, 1906)																m			m					
Aciagrion hisopa	(Selys, 1876)	b	b							b	m														
Agriocnemis	**Selys, 1877**																								
Agriocnemis femina femina	(Brauer, 1868)	b	b	m	b		m	m	m	b	b	m	m	m	m	m	m	m	m	m	m	m	m	m	
Agriocnemis materna *	Hagen in Selys, 1877									m															29
Agriocnemis minima	Selys, 1877	m	b	m				m		b	m														
Agriocnemis naia	Fraser, 1923		b?																						30
Agriocnemis nana	(Laidlaw, 1914)	m	b																						30
Agriocnemis pygmaea	(Rambur, 1842)	b	b	m	i		m	m		b	b	m	m				m		m	m	m			m	
Amphicnemis	**Selys, 1863**																								31
Amphicnemis amabilis *	Lieftinck, 1940							m																	
Amphicnemis annae *	Lieftinck, 1940			m			m	m																	
Amphicnemis bebar *	Dow, Choong & Ng, 2010	m	m																						
Amphicnemis bicolor *	(Martin, 1897)				i																				
Amphicnemis billitonis *	Lieftinck, 1940									i															
Amphicnemis dactylostyla *	Lieftinck, 1953							m																	

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas	Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Amphicnemis ecornuta *	Selys, 1889		m	m						m															
Amphicnemis erminea *	Lieftinck, 1953							m																	
Amphicnemis gracilis	Krüger, 1898	m	b							m															
Amphicnemis hoisen *	Dow, Choong & Ng, 2010		m																						
Amphicnemis kuiperi *	Lieftinck, 1937									i															
Amphicnemis madelenae *	Laidlaw, 1913			m				m																	
Amphicnemis mariae *	Lieftinck, 1940							m																	
Amphicnemis martini *	Ris, 1911			m?			m?	m																	31
Amphicnemis pandanicola *	Lieftinck, 1953							m																	
Amphicnemis platystyla *	Lieftinck, 1953							m																	
Amphicnemis remiger *	Laidlaw, 1912			m	m		m																		
Amphicnemis rigiketit *	Dow, 2019			m																					
Amphicnemis smedleyi *	Laidlaw, 1926									i															32
Amphicnemis triplex *	Dow, 2014							m																	
Amphicnemis wallacii *	Selys, 1863			m			m?	m																	31
Archibasis	**Kirby, 1890**																								
Archibasis crucigera	Lieftinck, 1949													m			m								
Archibasis incisura *	Lieftinck, 1949		m	m	m		m	m		m															
Archibasis melanocyana *	(Selys, 1877)	m	b	m	m		m	m		b															
Archibasis oscillans	(Selys, 1877)		m							m	m														
Archibasis rebeccae *	Kemp, 1989	m	m							m															
Archibasis tenella *	Lieftinck, 1949			m			m	m		i															
Archibasis viola	Lieftinck, 1948	b	m	m	b		m	m	m	b	b		m												
Argiocnemis	**Selys, 1877**																								33
Argiocnemis rubescens lunulata *	Selys, 1877												m				m								33
Argiocnemis rubescens rubeola	Selys, 1877	b	b	m	m		m	m		m	b														33

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas			Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Argiocnemis rubescens rubescens	Selys, 1877														m?	m?	m				m				33
Austroallagma	**Lieftinck, 1953**																								
Austroallagma sagittiferum *	(Lieftinck, 1949)																m			m			m		
Ceriagrion	**Selys, 1876**																								
Ceriagrion aeruginosum	(Brauer, 1869)														m										
Ceriagrion annulosum *	Lieftinck, 1934									m	m														
Ceriagrion auranticum auranticum	Fraser, 1922		b							b	b									m					
Ceriagrion batjanum *	Asahina, 1967																m								
Ceriagrion bellona *	Laidlaw, 1915			m	m																				34
Ceriagrion calamineum	Lieftinck, 1951		i							m	b		m						m	m			m?	m?	35
Ceriagrion cerinorubellum	(Brauer, 1865)	b	b	m	m	m	m	b	m	b	m														
Ceriagrion chaoi	Schmidt, 1964	m	b																						
Ceriagrion fallax	Ris, 1914		m																						
Ceriagrion hoogerwerfi *	Lieftinck, 1940									m															34
Ceriagrion olivaceum	Laidlaw, 1914		b																						
Ceriagrion praetermissum	Lieftinck, 1929		i							m	m														
Ischnura	**Charpentier, 1840**																								
Ischnura aurora aurora	(Brauer, 1865)										m									m				m	
Ischnura foylei *	Kosterin, 2015									m															
Ischnura heterosticta	(Burmeister, 1839)																						m	m	
Ischnura senegalensis	(Rambur, 1842)	b	b	m	b		m	m		b	b	m	m		m		m	m	m	m		m	m	m	
Mortonagrion	**Fraser, 1920**																								
Mortonagrion aborense	(Laidlaw, 1914)	m	b	m?				m?		b															36
Mortonagrion alcyone *	(Laidlaw, 1931)				m		m	m																	
Mortonagrion amoenum *	(Ris, 1915)									b	m														
Mortonagrion appendiculatum *	Lieftinck, 1937									i															

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Mortonagrion arthuri	Fraser, 1942	b	b							i															
Mortonagrion falcatum	Lieftinck, 1934	m	m	m	i		m	m		b	b														
Mortonagrion forficulatum *	Lieftinck, 1953							m																	
Mortonagrion indraneil *	Dow, 2011			m			m	m																	
Mortonagrion megabinluyog *	Dow & Choong, 2015			m?			m																		37
Paracercion	**Weekers & Dumont, 2004**																								
Paracercion calamorum dyeri	(Fraser, 1919)		b							i															
Paracercion melanotum	(Selys, 1876)										m														
Pericnemis	**Hagen in Selys, 1863**																								38
Pericnemis dowi *	Orr & Hämäläinen, 2013			m			m																		38
Pericnemis kiautarum *	Orr & Hämäläinen, 2013			m	m		m	m?																	38
Pericnemis stictica	Hagen in Selys, 1863	m	m	m				m		b	b														39
Pericnemis triangularis *	Laidlaw, 1931				b?			m?																	38
Pseudagrion	**Selys, 1876**																								
Pseudagrion australasiae	Selys, 1876	m	b							m	m														
Pseudagrion calosomum *	Lieftinck, 1936																		m	m					
Pseudagrion celebense *	Lieftinck, 1937												m	m											
Pseudagrion coomansi *	Lieftinck, 1937			m				m		i															40
Pseudagrion coriaceum *	Selys, 1876													m	m	m	m								
Pseudagrion crocops *	Selys, 1876												m		m										
Pseudagrion lalakense *	Orr & van Tol, 2001		m?	m			m	m																	41
Pseudagrion microcephalum	(Rambur, 1842)	b	b	m	b		m	m		b	b	m	m		m	m	m			m	m	m		m	
Pseudagrion nigrofasciatum *	Lieftinck, 1934										m														
Pseudagrion perfuscatum *	Lieftinck, 1937			m	m		m	m																	42
Pseudagrion pilidorsum declaratum *	Lieftinck, 1936											m						m	m	m	m	m			42
Pseudagrion pilidorsum deflexum *	Lieftinck, 1936																m					m	m	m	42

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Pseudagrion pilidorsum enganoense *	Lieftinck, 1948									i															42
Pseudagrion pilidorsum obscurum *	Lieftinck, 1936									i															42
Pseudagrion pilidorsum pilidorsum	(Brauer, 1868)			m	m			m																	42
Pseudagrion pilidorsum simalurum *	Lieftinck, 1948									i															42
Pseudagrion pruinosum	(Burmeister, 1839)	m	b							m	b	m						m							42
Pseudagrion rubriceps rubriceps	Selys, 1876	m	b							m	b	m						m	m		m				
Pseudagrion schmidtianum *	Lieftinck, 1936																						m		
Pseudagrion ustum *	Selys, 1876												m	m	m		m								
Pseudagrion williamsoni	Fraser, 1922		m							m															
Stenagrion	**Laidlaw, 1915**																								
Stenagrion dubium *	(Laidlaw, 1912)			m	m		m	m																	
Teinobasis	**Kirby, 1890**																								
Teinobasis cryptica *	Dow, 2010	m	m	m			m																		
Teinobasis euglena *	Lieftinck, 1934									b	b														
Teinobasis gracillima *	Fraser, 1926												m?												43
Teinobasis helvola *	Lieftinck, 1930												m				m								
Teinobasis kirbyi *	Laidlaw, 1902		m																						
Teinobasis laidlawi *	Kimmins, 1936			m	m			m																	
Teinobasis lorquini *	(Selys, 1877)												m				m								
Teinobasis rajah *	Laidlaw, 1912		b?	m	m		m	m																	44
Teinobasis ruficollis *	(Selys, 1877)	b	m	m				m		b															
Teinobasis rufithorax	(Selys, 1877)													m	m	m	m								
Teinobasis suavis *	Lieftinck, 1953			m?				m																	45
Teinobasis superba	(Hagen in Selys, 1877)												m	m	m	m	m								
Teinobasis tenuis *	(Martin, 1897)												m												

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Xiphiagrion	**Selys, 1876**																								
Xiphiagrion cyanomelas	Selys, 1876			m	m		m	m		b	m		m		m	m	m			m	m	m		m	
Family: Aeshnidae																									
Agyrtacantha	**Lieftinck, 1937**																								
Agyrtacantha dirupta	(Karsch, 1889)													m		m	m								
Agyrtacantha microstigma	(Selys, 1878)													m			m								
Amphiaeschna	**Selys, 1871**																								
Amphiaeschna ampla ampla *	(Rambur, 1842)										m														
Amphiaeschna ampla basitincta *	Lieftinck, 1940		m							m															
Anaciaeschna	**Selys, 1878**																								
Anaciaeschna jaspidea	(Burmeister, 1839)			m						b	b	m					m	m		m					
Anaciaeschna moluccana *	Lieftinck, 1930														m										
Anaciaeschna montivagans *	Lieftinck, 1932		m							m	m														46
Anax	**Leach, 1815**																								
Anax fumosus celebense *	Lieftinck, 1942												m												
Anax fumosus fumosus	Hagen, 1867													m	m	m	m								
Anax georgius	Selys, 1872																						m	m	
Anax gibbosulus	Rambur, 1842												m	m		m	m	m	m	m	m	m	m		47
Anax guttatus	(Burmeister, 1839)	b	b	m	b		m	m		b	b	m	m		m	m	m				m	m	m	m	
Anax panybeus	Hagen, 1867	b	m	m	m		m			m	b	m	m												47
Anax papuensis	(Burmeister, 1839)										m									m					
Gynacantha	**Rambur, 1842**																								48
Gynacantha arsinoe	Lieftinck, 1948												i												
Gynacantha arthuri *	Lieftinck, 1953																			m					
Gynacantha basiguttata	Selys, 1882	m	b	m	b		m	m		b	b		m												
Gynacantha bayadera	Selys, 1891	b	b	m			m			b	b	m	m							m	m	m		m	49

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Gynacantha calypso *	Ris, 1915													m	m	m	m								
Gynacantha corbeti	Lempert, 1999		m																						
Gynacantha demeter	Ris, 1911			m				m																	50
Gynacantha dohrni	Krüger, 1899	b	m	m	i		m	m		b	b														
Gynacantha furcata *	Rambur, 1842																								49
Gynacantha kirbyi	Krüger, 1899															m	m								
Gynacantha limbalis *	Karsch, 1892		m	m						m	m														
Gynacantha maclachlani *	Krüger, 1899			m			m			b															
Gynacantha mocsaryi	Förster, 1898													m	m	m	m								
Gynacantha musa *	Karsch, 1892										m	m						m			m				
Gynacantha nausicaa *	Ris, 1915												m	m			m								
Gynacantha pasiphae *	Lieftinck, 1948													m	m		m								
Gynacantha penelope *	Ris, 1915												m												
Gynacantha risi *	Laidlaw, 1931		m							m	m														
Gynacantha rosenbergi *	Brauer, 1867													m	m	m	m								
Gynacantha stenoptera *	Lieftinck, 1934										m														51
Gynacantha subinterrupta	Rambur, 1842	b	b							b	b	m	m					m		m					52
Heliaeschna	**Selys, 1882**																								
Heliaeschna bartelsi *	Lieftinck, 1940			m				m		m															
Heliaeschna crassa *	Krüger, 1899	m	m	m	m		m	m	m?	b															53
Heliaeschna filostyla *	Martin, 1907												m												54
Heliaeschna idae *	(Brauer, 1865)		m	m			m	m		b															53
Heliaeschna simplicia	(Karsch, 1891)	m	m	m	m		m			m															
Heliaeschna uninervulata	Martin, 1909	b		m	m			m		b	m														
Indaeschna	**Fraser, 1926**																								
Indaeschna grubaueri	(Förster, 1904)		b	m	m		m	m		m	m														

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Linaeschna	**Martin, 1909**																								
Linaeschna polli *	Martin, 1909			m	m																				
Oligoaeschna	**Selys, 1889**																								
Oligoaeschna amata *	(Förster, 1903)	m		m			m	m																	
Oligoaeschna buehri *	(Förster, 1903)			m			m	m		b															
Oligoaeschna elacatura *	(Needham, 1907)							m																	55
Oligoaeschna foliacea *	Lieftinck, 1968	m	m	m	m		m	m		m															
Oligoaeschna modiglianii *	Selys, 1889									i															
Oligoaeschna mutata *	Lieftinck, 1940							m																	
Oligoaeschna platyura *	Lieftinck, 1940			m	m		m	m																	
Oligoaeschna pseudosumatrana *	Karube, 1997									i															
Oligoaeschna sumatrana *	Lieftinck, 1953									b															
Oligoaeschna uropetala *	Lieftinck, 1968									b															
Oligoaeschna venatrix *	(Förster, 1903)												b												
Oligoaeschna venusta *	Lieftinck, 1968							m																	
Periaeschna	**Martin, 1909**																								
Periaeschna laidlawi *	(Förster, 1908)		m																						
Tetracanthagyna	**Selys, 1883**																								
Tetracanthagyna brunnea *	McLachlan, 1898		m	m	m																				56
Tetracanthagyna degorsi *	Martin, 1895			m	m		m	m		b	m														56
Tetracanthagyna plagiata	(Waterhouse, 1877)	m	m	m	m		m	m		b															
Tetracanthagyna waterhousei	McLachlan, 1898									m															57
Family: Gomphidae																									58
Acrogomphus	**Laidlaw, 1925**																								
Acrogomphus jubilaris	Lieftinck, 1964			m				m																	
Acrogomphus malayanus *	Laidlaw, 1925	m	b																						

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas	Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Acrogomphus walshae *	Lieftinck, 1935									m	m														
Asiagomphus	**Asahina, 1985**																								
Asiagomphus xanthenatus malayanus *	Karube, 1990		m																						
Borneogomphus	**Karube & Sasamoto, 2014**																								
Borneogomphus teramotoi *	Karube & Sasamoto, 2014			m?	m																				59
Burmagomphus	**Williamson, 1907**																								
Burmagomphus arthuri	Lieftinck, 1953	m	m	m				m																	
Burmagomphus divaricatus	Lieftinck, 1964	e	m																						
Burmagomphus inscriptus *	(Hagen in Selys, 1878)										m														
Burmagomphus insularis *	Laidlaw, 1914		m	m	m		m																		
Burmagomphus plagiatus *	Lieftinck, 1964	e	m	m				m		m															
Burmagomphus williamsoni austrosundanus *	Lieftinck, 1964																			m					
Burmagomphus williamsoni javicus *	Schmidt, 1934										m														
Burmagomphus williamsoni williamsoni	Förster, 1914		m																						
Euthygomphus	**Kosterin, 2016**																								
Euthygomphus parvus	(Krüger, 1899)		b							m															
Gomphidia	**Selys, 1854**																								
Gomphidia abbotti abbotti	Williamson, 1907		b	m				m		b															60
Gomphidia abbotti audax *	Lieftinck, 1948									m															60
Gomphidia javanica *	Förster, 1899										m														
Gomphidia maclachlani	Selys, 1873		m	m	m	m		m		i															60
Gomphidictinus	**Fraser, 1942**																								
Gomphidictinus perakensis	(Laidlaw, 1902)		m																						

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Heliogomphus	**Laidlaw, 1922**																								
Heliogomphus blandulus *	Lieftinck, 1929			m	m?			m																	61
Heliogomphus borneensis *	Lieftinck, 1964			m	m			m																	62
Heliogomphus drescheri *	Lieftinck, 1929									m	m														
Heliogomphus gracilis *	(Krüger, 1899)									m															
Heliogomphus kelantanensis *	(Laidlaw, 1902)	b	m																						
Ictinogomphus	**Cowley, 1934**																								
Ictinogomphus acutus *	(Laidlaw, 1914)		m	m			m	m		i															
Ictinogomphus australis lieftincki	(Schmidt, 1934)													m			m								
Ictinogomphus celebensis celebensis *	(Schmidt, 1934)												m												
Ictinogomphus celebensis velox *	(Schmidt, 1934)												m												
Ictinogomphus decoratus decoratus *	(Selys, 1854)									b	m	m													
Ictinogomphus decoratus melaenops	(Selys in Selys & Hagen, 1858)	b	b	m	m		m	m		b															63
Lamelligomphus	**Fraser, 1922**																								
Lamelligomphus castor	Lieftinck, 1941		m																						
Leptogomphus	**Selys, 1878**																								
Leptogomphus coomansi *	Laidlaw, 1936			m	m		m	m																	
Leptogomphus lansbergei assimilis *	Krüger, 1899									b															
Leptogomphus lansbergei lansbergei *	Selys, 1878										m														
Leptogomphus pasia *	van Tol, 1990			m	m																				
Leptogomphus pendleburyi *	Laidlaw, 1934			m	m		m																		
Leptogomphus risi	Laidlaw, 1932	m	b																						
Leptogomphus schieli *	Dow, Stokvis & Ngiam, 2017			m																					
Leptogomphus sii *	Dow, Stokvis & Ngiam, 2017			m																					
Leptogomphus tioman *	Choong, 2016		b																						
Leptogomphus williamsoni *	Laidlaw, 1912			m	m			m																	

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Macrogomphus	**Selys in Selys & Hagen, 1858**																								
Macrogomphus abnormis *	Selys, 1884							m?																	26
Macrogomphus albardae	Selys, 1878		m	m				m		b	m														64
Macrogomphus decemlineatus *	Selys, 1878		m	m				m		b															
Macrogomphus parallelogramma *	(Burmeister, 1839)									m	m														64
Macrogomphus phalantus phalantus *	Lieftinck, 1935		m?	m				m		m															65
Macrogomphus quadratus *	Selys, 1878	m	m	m			m	i		b															
Macrogomphus thoracicus	McLachlan, 1884		m							m															
Megalogomphus	**Campion, 1923**																								
Megalogomphus borneensis *	(Laidlaw, 1914)			m	m			m																	
Megalogomphus buddi *	Dow & Price, 2020			m	m		m	m																	
Megalogomphus junghuhni *	Lieftinck, 1934										m														66
Megalogomphus sumatranus	(Krüger, 1899)		b							b	m														
Merogomphus	**Martin, 1904**																								
Merogomphus femoralis *	Laidlaw, 1931	m	m	m																					
Microgomphus	**Selys in Selys & Hagen, 1858**																								
Microgomphus chelifer chelifer	Selys in Selys & Hagen, 1858	m	b	m	m		m	m		m															67
Microgomphus chelifer thelyphonus *	Lieftinck, 1929									m	b														67
Nepogomphus	**Fraser, 1934**																								
Nepogomphus fruhstorferi	(Lieftinck, 1934) *		m							m	m	m									m				
Nepogomphus walli	(Fraser, 1924)		m																						
Nychogomphus	**Carle, 1986**																								58
Nychogomphus duaricus	(Fraser, 1924)		m																						
Nychogomphus geometricus *	(Selys, 1854)										m														

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TABLE 1. (Continued)

		Malaya	Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas	Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Onychogomphus	**Selys, 1854**																								58
Onychogomphus banteng *	Lieftinck, 1929										m														
Onychogomphus marijanmatoki *	Dow, 2014			m																					
Onychogomphus nigrescens *	Laidlaw, 1902		m																						68
Onychogomphus perplexus *	Lieftinck, 1935									m															
Onychogomphus pollux *	Lieftinck, 1941									m															
Onychogomphus rappardi *	Lieftinck, 1937									m															
Onychogomphus thienemanni *	Schmidt, 1934		m							m	m														69
Orientogomphus	**Chao & Xu, 1987**																								70
Orientogomphus aemulus *	(Lieftinck, 1937)		m							m															
Orientogomphus minor	(Laidlaw, 1931)		m																						
Paragomphus	**Cowley, 1934**																								
Paragomphus capitatus *	(Martin, 1909)												m												
Paragomphus capricornis	(Förster, 1914)	m	b							m															
Paragomphus flavohamatus *	(Martin, 1921)																	m	m		m				
Paragomphus reinwardtii *	(Selys, 1854)										m	m													
Paragomphus tachyerges *	(Lieftinck, 1934)																			m					
Phaenandrogomphus	**Lieftinck, 1964**																								
Phaenandrogomphus asthenes	Lieftinck, 1964		m																						
Phaenandrogomphus safei *	Dow & Luke, 2015			m	m																				58
Sieboldius	**Selys, 1854**																								
Sieboldius japponicus	Selys, 1854		m	m	m		m			m															
Stylogomphus	**Fraser, 1922**																								
Stylogomphus malayanus	Sasamoto, 2001		b																						

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Family: Chlorogomphidae																									71
Chlorogomphus	**Selys, 1854**																								
Chlorogomphus arooni	Asahina, 1981		b																						
Chlorogomphus dyak *	(Laidlaw, 1911)			m	m																				72
Chlorogomphus magnificus *	Selys, 1854									m	m														
Chlorogomphus manau *	Dow & Ngiam, 2011			m																					
Chlorogomphus yoshihiroi *	Karube, 1994		m																						
Chloropetalia	**Carle, 1995**																								
Chloropetalia kimminsi *	(Fraser, 1940)									i															71
Family: Macromiidae																									
Epophthalmia	**Burmeister, 1839**																								
Epophthalmia australis	Hagen, 1867												m												16
Epophthalmia vittata sundana	Lieftinck, 1931									m	m														
Epophthalmia vittigera vittigera	(Rambur, 1842)	b	b	m	m		m	m		b	m	m											m?	m?	73
Macromia	**Rambur, 1842**																								
Macromia arachnomima	Lieftinck, 1953		m	m				m																	
Macromia callisto	Laidlaw, 1922		m	m				m																	
Macromia celebica *	van Tol, 1994												m												
Macromia chalciope *	Lieftinck, 1952													m			m								
Macromia cincta	Rambur, 1842	m	b	m	m		m	m		b	m														
Macromia corycia *	Laidlaw, 1922			m	m		m	m																	74
Macromia cupricincta	Fraser, 1924		m																						
Macromia cydippe	Laidlaw, 1922	m	b	m	m			m		b	m														
Macromia dione *	Lieftinck, 1971									m															
Macromia erato *	Lieftinck, 1950										m														75
Macromia euterpe *	Laidlaw, 1915				m																				76

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Macromia gerstaeckeri *	Krüger, 1899		b		m					m	m														74
Macromia irina *	Lieftinck, 1950												m												
Macromia jucunda *	Lieftinck, 1955			m							m	m													
Macromia mnemosyne *	Lieftinck, 1935							m																	
Macromia moorei fumata *	Krüger, 1899									m	m		m												
Macromia moorei malayana	Laidlaw in Campion & Laidlaw 1928		m																						
Macromia polyhymnia *	Lieftinck, 1929									m															
Macromia septima	Martin, 1904										m														
Macromia westwoodii	Selys, 1874		b	m	m		m	m		m	m														76
Synthemistidae																									
Idionyx	**Hagen, 1867**																								77
Idionyx laidlawi *	Fraser, 1936		m																						
Idionyx montana *	Karsch, 1891		b	m						b	m														
Idionyx murcia *	Lieftinck, 1971																	m	m						
Idionyx orchestra *	Lieftinck, 1953																			m					
Idionyx yolanda	Selys, 1871	m	b	m	m		m	m		b															
Macromidia	**Martin, 1907**																								
Macromidia atrovirens *	Lieftinck, 1935									m															
Macromidia fulva *	Laidlaw, 1915			m	m		m	m																	
Macromidia genialis erratica *	Lieftinck, 1948			m						m	m														78
Macromidia genialis genialis *	Laidlaw, 1923		m																						78
Macromidia genialis shanensis	Fraser, 1927		b																						78
Palaeosynthemis	**Förster, 1903**																								
Palaeosynthemis alecto *	(Lieftinck, 1953)													m											

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Family: Corduliidae																									
Hemicordulia	**Selys, 1870**																								
Hemicordulia assimilis *	Hagen in Selys, 1871												m												
Hemicordulia australiae *	(Rambur, 1842)											m									m				
Hemicordulia chrysochlora *	Lieftinck, 1953																			m					
Hemicordulia eduardi *	Lieftinck, 1953																			m				m	
Hemicordulia tenera	Lieftinck, 1930	b	m	m	m		m	m		m	m														
Hemicordulia toxopei *	Lieftinck, 1926														m										
Metaphya	**Laidlaw, 1912**																								
Metaphya micans *	Laidlaw, 1912			m			m																		
Procordulia	**Martin, 1907**																								
Procordulia artemis *	Lieftinck, 1930		m							m	m														
Procordulia fusiformis *	Lieftinck, 1977			m	m																				
Procordulia karnyi *	Fraser, 1926									m	m														
Procordulia lompobatang *	van Tol, 1997												m												
Procordulia papandayanensis *	van Tol, 1997										m														
Procordulia rantemario *	van Tol, 1997												m												
Procordulia sambawana *	(Förster, 1899)											m						m	m	m	m				
Family: Libellulidae																									
Acisoma	**Rambur, 1842**																								
Acisoma panorpoides	Rambur, 1842	b	b	m	m		m	m		b	b	m	m					m		m	m			m	
Aethriamanta	**Kirby, 1889**																								
Aethriamanta aethra	Ris, 1912	m	b							m	m														
Aethriamanta brevipennis brevipennis	(Rambur, 1842)	b	m							b															
Aethriamanta brevipennis subsignata	(Selys, 1897)												m		m						m				79
Aethriamanta gracilis	(Brauer, 1878)	b	b	m			m	m		b															

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Agrionoptera	**Brauer, 1864**																								
Agrionoptera cynthiae *	Lieftinck, 1942																m								
Agrionoptera insignis chalcochiton *	Ris, 1915									i															
Agrionoptera insignis insignis	(Rambur, 1842)	b	b	m	b	m	m	m		b	b	m	m					m		m	m	m		m	
Agrionoptera insignis nereis *	Lieftinck, 1948									i															
Agrionoptera insignis papuensis	Selys, 1879																m								
Agrionoptera longitudinalis longitudinalis	Selys, 1878													m		m	m								
Agrionoptera quatuornotata	Brauer, 1867												b				m								
Agrionoptera sexlineata *	Selys, 1879	b	m	m	m		m	m		b															
Agrionoptera similis	Selys, 1879													m	m	m	m								
Brachydiplax	**Brauer, 1868**																								
Brachydiplax chalybea chalybea	Brauer, 1868	b	b	m	b	m	m	b	m	b	b	m	m					m							80
Brachydiplax chalybea simalura *	Ris, 1915									i															81
Brachydiplax denticauda	(Brauer, 1867)																m								
Brachydiplax duivenbodei	(Brauer, 1866)												m	m	m	m	m		m	m	m			m	
Brachydiplax farinosa	Krüger, 1902	m	m	m?	m?		m?	m?		m	m														82
Brachydiplax sobrina	(Rambur, 1842)		m																						
Brachydiplax sollaarti *	Lieftinck, 1953									m															
Brachygonia	**Kirby, 1889**																								
Brachygonia oculata	(Brauer, 1878)	m	b	m	m	m	m	m	m	b			m												
Brachygonia ophelia *	Ris, 1910		m	m			m	m																	
Brachygonia puella *	Lieftinck, 1937			m				m		i															
Brachythemis	**Brauer, 1868**																								
Brachythemis contaminata	(Fabricius, 1793)	m	b					m		m	b	m	m					m	m	m		m	m	m	

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Camacinia	**Kirby, 1889**																								
Camacinia gigantea	(Brauer, 1867)	b	b	m	b			m		b	b		m				m	m		m	m		m	m	
Camacinia harterti	Karsch, 1890		m		m		m			m															
Celebophlebia	**Lieftinck, 1936**																								
Celebophlebia carolinae *	van Tol, 1987												i												
Celebophlebia dactylogastra *	Lieftinck, 1936												m												
Celebothemis	**Ris, 1909**																								
Celebothemis delecollei *	Ris, 1912												m												
Chalybeothemis	**Lieftinck, 1933**																								
Chalybeothemis chini *	Dow, Choong & Orr, 2007		m																						
Chalybeothemis fluviatilis	Lieftinck, 1933	b	m	m			m	m		b															
Chalybeothemis pruinosa *	Dow, Choong & Orr, 2007			m																					
Cratilla	**Kirby, 1900**																								
Cratilla lineata assidua	Lieftinck, 1953										b	m	i?												
Cratilla lineata lineata	(Brauer, 1878)	b	b	m	m		m	m		b															83
Cratilla metallica	(Brauer, 1878)	b	b	m	m		m	m		b	m														
Crocothemis	**Brauer, 1868**																								
Crocothemis servilia servilia	(Drury, 1773)	b	b	m	m			m		b	b	m	m	m			m	m	m	m	m	m	m	m	
Diplacina	**Brauer, 1868**																								
Diplacina militaris dumogae *	van Tol, 1987												m												
Diplacina militaris militaris *	Ris, 1909												b												
Diplacina phoebe amoena *	Lieftinck, 1953													m			m								
Diplacina phoebe phoebe *	Ris, 1919														m	m	m								
Diplacina phoebe phryne *	Lieftinck, 1953																m								
Diplacina sanguinolenta *	van Tol, 1987												b												
Diplacina torrenticola *	van Tol, 1987												m												16

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Diplacodes	**Kirby, 1889**																								
Diplacodes bipunctata	(Brauer, 1865)																m			m				m	
Diplacodes haematodes	(Burmeister, 1839)																						m	m	
Diplacodes nebulosa	(Fabricius, 1793)	b	b							b	m				m										
Diplacodes trivialis	(Rambur, 1842)	b	b	m	b	m	m	b		b	b	m	m		m	m	m	m	m	m	m	m	m	m	
Huonia	**Förster, 1903**																								
Huonia daphne *	Lieftinck, 1953													m											
Huonia ferentina *	Lieftinck, 1953													m											
Huonia rheophila	Lieftinck, 1935													m											
Hydrobasileus	**Kirby, 1889**																								
Hydrobasileus brevistylus	(Brauer, 1865)													m		m	m								
Hydrobasileus croceus	(Brauer, 1867)	m	b	m	m		m	m		b	m		m												16
Hydrobasileus vittatus	Kirby, 1889												m		m		m				m				
Hylaeothemis	**Ris, 1909**																								
Hylaeothemis clementia	Ris, 1909		m	m	m			m																	84
Indothemis	**Ris, 1909**																								
Indothemis carnatica	(Fabricius, 1798)	b	m																						
Indothemis limbata	(Selys, 1891)	m	b																						
Lathrecista	**Kirby, 1889**																								85
Lathrecista asiatica asiatica	(Fabricius, 1798)	b	b	m	b		m	m		b	b	m	m		m			m		m	m	m			
Lathrecista asiatica festa	(Selys, 1879)																m								
Lathrecista asiatica pectoralis	(Brauer, 1867)												m			m	m								
Lyriothemis	**Brauer, 1868**																								
Lyriothemis biappendiculata	(Selys, 1878)		b	m	m	m	m	m		b															
Lyriothemis cleis cleis	Brauer, 1868	m	b	m	b		m	m		b	b														
Lyriothemis cleis frontalis *	Kirby, 1889												m				m								

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Lyriothemis eurydice *	Ris, 1909											m													
Lyriothemis magnificata	(Selys, 1878)		m	m	m					b	b									m					
Lyriothemis meyeri	(Selys, 1878)												m				m								
Lyriothemis salva *	Ris, 1927									m															
Macrodiplax	**Brauer, 1868**																								
Macrodiplax cora	(Brauer, 1867)	b	b	m	i			m		b	b		m			m	m	m				m	m		
Nannophlebia	**Selys, 1878**																								
Nannophlebia aerostiba *	Lieftinck, 1955																m								
Nannophlebia aglaia *	Lieftinck, 1948												m												
Nannophlebia anacharis *	Lieftinck, 1955													m			m								
Nannophlebia arethusa *	Lieftinck, 1948														m	m	m								
Nannophlebia buruensis *	Lieftinck, 1926														m										
Nannophlebia lorquini *	(Selys, 1869)													m		m	m								
Nannophya	**Rambur, 1842**																								
Nannophya pygmaea	Rambur, 1842	b	b	m	m		m	m		b	i		m	m	m	m	m								
Nannophyopsis	**Lieftinck, 1935**																								
Nannophyopsis chalcosoma *	Lieftinck, 1935			m			m	m		i															
Nesoxenia	**Kirby, 1889**																								
Nesoxenia lineata	(Selys, 1879)	m	m	m	m		m	m		b	m		m												
Nesoxenia mysis interrogata	(Selys, 1878)													m			m								
Nesoxenia mysis moluccana *	Lieftinck, 1942													m	m	m	m								
Nesoxenia mysis tarafia	Lieftinck, 1942														m		m								
Neurothemis	**Brauer, 1867**																								
Neurothemis decora	(Brauer, 1866)																m								
Neurothemis disparilis *	Kirby, 1889	e?	m?					m																	86
Neurothemis feralis *	(Burmeister, 1839)									b	b														

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TABLE 1. (Continued)

		Malaya	Borneo						South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Neurothemis fluctuans	(Fabricius, 1793)	b	b	m	b	m	m	b	m	b	b														
Neurothemis fulvia	(Drury, 1773		b							m															
Neurothemis intermedia excelsa *	Lieftinck, 1934										b									m					
Neurothemis manadensis	(Boisduval, 1835)												b	m	m	m	m								
Neurothemis nesaea *	Ris, 1911												m												
Neurothemis ramburii martini *	Krüger, 1903																m			m					
Neurothemis ramburii oceanis *	Lieftinck, 1948									i															
Neurothemis ramburii ramburii	(Brauer, 1866)			m	m		m	m		b	b	m	b	m	m	m	m	m		m	m	m		m	
Neurothemis stigmatizans bramina	(Guérin, 1830)													m			m								
Neurothemis terminata obscura *	Fraser, 1926									i	i														
Neurothemis terminata terminata	Ris, 1911			m	b		m	m		b	b	m						m	m	m	m				
Neurothemis tullia	(Drury, 1773)		b																						
Onychothemis	**Brauer, 1868**																								
Onychothemis abnormis	Brauer, 1868									m	m														87
Onychothemis celebensis *	Ris, 1912												m												
Onychothemis coccinea *	Lieftinck, 1953		m	m	m		m	m																	
Onychothemis culminicola	Förster, 1904		m	m	m	m	m	m		m	m	m													
Onychothemis testacea	Laidlaw, 1902	m	b																						
Orchithemis	**Brauer, 1878**																								
Orchithemis pruinans	(Selys, 1878)	m	m	m			m	m		b															
Orchithemis pulcherrima	Brauer, 1878	b	b	m	m		m	b	m	b	m		m												
Orchithemis xanthosoma *	Laidlaw, 1911			m			m	m																	
Orthetrum	**Newman, 1833**																								
Orthetrum austrosundanum *	Lieftinck, 1953																			m					
Orthetrum borneense *	Kimmins, 1936			m	m																				88
Orthetrum caledonicum	(Brauer, 1865)																			m		m	m	m	

...Continued on the next page

TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Orthetrum chrysis	(Selys, 1891)	b	b	m	m	m	m	b	m	b	b	m	m					m	m	m					
Orthetrum glaucum	(Brauer, 1865)	b	b	m	m		m	m		b	m	m	m		m	m	m	m	m	m	m	m?	m	m	89
Orthetrum luzonicum	(Brauer, 1868)	m	b							b	m														
Orthetrum pruinosum clelia	Selys, 1878												m												16, 90
Orthetrum pruinosum pruinosum *	(Burmeister, 1839									b	m	m						m	m		m	m			90
Orthetrum sabina sabina	(Drury, 1773)	b	b	m	b	m	m	m	m	b	b	m	m	m	m	m	m	m		m	m	m	m	m	
Orthetrum serapia	Watson, 1984												m	m	m	m	m								
Orthetrum schneideri	Förster, 1903		b	m	b		m	m		b													m?	m?	90
Orthetrum signiferum *	Lieftinck, 1926														m										
Orthetrum silvarum *	Lieftinck, 1934									m	m														91
Orthetrum testaceum soembanum *	Förster, 1903																m	m	m	m	m	m			92
Orthetrum testaceum testaceum	(Burmeister, 1839)	b	b	m	b		m	b		b	b	m	m				m	m				m	m	m	92
Orthetrum triangulare malaccense	Förster, 1903		m							b	m														
Orthetrum villosovittatum villosovittatum	(Brauer, 1868)													m	m	m	m								
Pantala	**Hagen, 1861**																								
Pantala flavescens	(Fabricius, 1798)	b	b	m	b	m	m	m		b	b	m	m		m	m	m	m	m	m		m	m	m	
Phyllothemis	**Fraser, 1935**																								
Phyllothemis eltoni	Fraser, 1935		m																						93
Phyllothemis raymondi *	Lieftinck, 1950		m	m				m		m															93
Pornothemis	**Krüger, 1902**																								
Pornothemis serrata	Krüger, 1902		m?	m	m?		m?	m?		m, i?	m?		m?												94
Pornothemis starrei	Lieftinck, 1948	b		m			m	m		b															
Potamarcha	**Karsch, 1890**																								
Potamarcha congener	(Rambur, 1842)	b	b		m					m	b	m	b				m	m	m	m	m	m		m	

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TABLE 1. (Continued)

		Malaya		Borneo				South China Sea	Sumatra	Java & Bali	Sulawesi	Moluccas				Lesser Sunda								
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Protorthemis	**Kirby, 1889**																								
Protorthemis celebensis *	Kirby, 1889											m													
Protorthemis coronata	(Brauer, 1866)														m										
Pseudagrionoptera	**Ris, 1909**																								
Pseudagrionoptera diotima *	Ris, 1912			m			m	m																	
Pseudothemis	**Kirby, 1889**																								
Pseudothemis jorina	Förster, 1904	b	b	m			m																		
Raphismia	**Kirby, 1889**																								
Raphismia bispina	(Hagen, 1867)	b	i	m	b		m	m	m	i	b		m	m	m	m	m								
Raphismia inermis *	Ris, 1910			m			m	m		i															
Rhodothemis	**Ris, 1909**																								
Rhodothemis nigripes	Lohmann, 1984												m	m?	m	m	m			m	m			m?	95
Rhodothemis rufa	(Rambur, 1842)	b	b	m	m		m	m		b	b														
Rhyothemis	**Hagen, 1867**																								
Rhyothemis aterrima	Selys, 1891		m	m	m		m	m		m															
Rhyothemis fulgens *	Kirby, 1889	e	m	m			m	m		b															
Rhyothemis graphiptera	(Rambur, 1842)														m					m			m		
Rhyothemis obsolescens	Kirby, 1889	b	b	m	m		m	m	m	b															
Rhyothemis phyllis chloe	Kirby, 1894																m								96
Rhyothemis phyllis ixias *	Lieftinck, 1953																			m	m	m?		m	96
Rhyothemis phyllis obscura	Brauer, 1868													m	m	m	m								96
Rhyothemis phyllis phyllis	(Sulzer, 1776)	b	b	m	b		m	m	m	b	b							m								96
Rhyothemis phyllis snelleni	Selys, 1878												m												96
Rhyothemis plutonia	Selys, 1883		m							m															
Rhyothemis pygmaea	(Brauer, 1867)												m				m								
Rhyothemis regia exul *	Ris, 1913																m								

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Rhyothemis regia pretiosa	Selys, 1878												m		m										
Rhyothemis regia regia	(Brauer, 1867)			m	m					i			m	m			m								
Rhyothemis regia thisbe	Lieftinck, 1953														m					m	m				
Rhyothemis resplendens	Selys, 1878													m	m	m	m								
Rhyothemis triangularis	Kirby, 1889	b	b	m	m		m	m		b	m														
Risiophlebia	**Cowley, 1934**																								
Risiophlebia dohrni	(Krüger, 1902)	m	m	m	m		m	m		b															
Tetrathemis	**Brauer, 1868**																								
Tetrathemis flavescens	Kirby, 1889			m				m		b															
Tetrathemis hyalina	Kirby, 1889	m	b	m	b		m	m		m	b	m							m	m	m		m?	m?	97
Tetrathemis leptoptera	(Selys, 1869)												m	m	m	m	m								
Tetrathemis platyptera	Selys, 1878		m	m?	m?					b	m														98
Tholymis	**Hagen, 1867**																								
Tholymis tillarga	(Fabricius, 1798)	b	b	m	b		m	m		b	b	m	m	m	m	m	m	m		m	m	m		m	
Tramea	**Hagen, 1861**																								
Tramea eurybia eurybia	Selys, 1878									m			m	m	m		m	m		m	m	m			
Tramea loewii	Brauer, 1866															m	m			m		m		m	
Tramea phaeoneura *	Lieftinck, 1953			m	b		m	m		i															
Tramea rosenbergi	Brauer, 1866												m			m	m								
Tramea stenoloba	(Watson, 1962)										i							m		m	m	m	m	m	
Tramea transmarina euryale	(Selys, 1878)	b	b	m	b		m	m		b	b	m	m				m			m					
Tramea virginia	(Rambur, 1842)			m?	m?					i	m														99
Trithemis	**Brauer, 1868**																								
Trithemis aurora	(Burmeister, 1839)	b	b	m	m		m	m		b	m	m	m							m	m	m	m	m	
Trithemis festiva	(Rambur, 1842)	b	b	m	m			m		b	m	m	m	m	m	m	m	m		m	m	m	m	m	
Trithemis lilacina *	Förster, 1899																m	m	m	m	m	m	m	m	

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TABLE 1. (Continued)

		Malaya		Borneo					South China Sea	Sumatra	Java & Bali		Sulawesi	Moluccas				Lesser Sunda							
		Singapore	**Peninsular Malaysia**	**Sarawak**	**Sabah**	**Labuan**	**Brunei**	**Kalimantan**	**SCS**	**Sumatra**	**Java**	**Bali**	**Sulawesi**	**Halmahera**	**Buru**	**Seram**	**Moluccas: other**	**Lombok**	**Sumbawa**	**Sumba**	**Flores**	**Lesser Sunda: other**	**Timor**	**East Timor**	**Note**
Trithemis pallidinervis	(Kirby, 1889)	b	b							b															
Tyriobapta	**Kirby, 1889**																								
Tyriobapta kuekenthali *	(Karsch, 1900)		m	m	m		m	m		b															100
Tyriobapta laidlawi *	Ris, 1919			m			m	m																	100
Tyriobapta torrida	Kirby, 1889	m	b	m	m	m	m	b	m	b															
Urothemis	**Brauer, 1868**																								
Urothemis abbotti	Laidlaw, 1927	e	m																						
Urothemis bisignata	Brauer, 1868										b									m					
Urothemis signata insignata	(Selys, 1872)	b	b	m			m	m		b															
Zygonyx	**Selys in Hagen, 1867**																								
Zygonyx ida ida	Selys, 1869		b							m	m	m						m		m			m?	m?	101
Zygonyx ida errans *	Lieftinck, 1953			m	m		m	m																	
Zygonyx ilia	Ris, 1912												m												
Zygonyx iris malayana	Laidlaw, 1902		b																						
Zyxomma	**Rambur, 1842**																								
Zyxomma multinervis	Carpenter, 1897															m									
Zyxomma obtusum	Albarda, 1881	i	b	m	m		m	m		b	m	m	m				m	m		m	m			m	
Zyxomma petiolatum	Rambur, 1842	b	b	m	m		m	m		b	b	m	m			m		m				m		m	

TABLE 2. Number of species and the endemics for each of the 8 main region, 22 subregions.

(sub)region	Species	Anisoptera	Zygoptera	Endemic species	Endemic Anisoptera	Endemic Zygoptera
Malaya	**256**	**153 (60%)**	**103 (40%)**	**23 (9%)**	**8 (5%)**	**15 (15%)**
Singapore	136	85 (63%)	51 (38%)	0 (0%)	0 (0%)	0 (0%)
Peninsular Malaysia	253	150 (59%)	103 (41%)	18 (7%)	6 (4%)	12 (12%)
Borneo	**336**	**153 (46%)**	**183 (54%)**	**162 (48%)**	**33 (22%)**	**129 (70%)**
Brunei	174	92 (53%)	82 (47%)	0 (0%)	0 (0%)	0 (0%)
Kalimantan	228	115 (50%)	113 (50%)	24 (11%)	5 (4%)	19 (17%)
Labuan	27	12 (44%)	15 (56%)	0 (0%)	0 (0%)	0 (0%)
Sabah	179	98 (55%)	81 (45%)	8 (4%)	1 (1%)	7 (9%)
Sarawak	288	140 (49%)	148 (51%)	32 (11%)	5 (4%)	27 (18%)
South China Sea	**16**	**11 (69%)**	**5 (31%)**	**0 (0%)**	**0 (0%)**	**0 (0%)**
Sumatra	**264**	**152 (58%)**	**112 (42%)**	**43 (16%)**	**14 (9%)**	**29 (26%)**
Java & Bali	**166**	**107 (64%)**	**59 (36%)**	**21 (13%)**	**9 (8%)**	**12 (20%)**
Java	162	105 (65%)	57 (35%)	19 (12%)	8 (8%)	11 (19%)
Bali	54	39 (72%)	15 (28%)	0 (0%)	0 (0%)	0 (0%)
Sulawesi	**137**	**78 (57%)**	**59 (43%)**	**65 (47%)**	**21 (27%)**	**44 (75%)**
Moluccas	**135**	**78 (58%)**	**57 (42%)**	**49 (36%)**	**17 (22%)**	**32 (56%)**
Halmahera	62	41 (66%)	21 (34%)	12 (19%)	3 (7%)	9 (43%)
Buru	57	38 (67%)	19 (33%)	7 (12%)	4 (11%)	3 (16%)
Seram	50	39 (78%)	11 (22%)	1 (2%)	0 (0%)	1 (9%)
Moluccas: other	104	64 (62%)	40 (38%)	15 (14%)	2 (3%)	13 (33%)
Lesser Sunda	**99**	**65 (66%)**	**34 (34%)**	**22 (22%)**	**8 (12%)**	**14 (41%)**
Lombok	44	34 (77%)	10 (23%)	0 (0%)	0 (0%)	0 (0%)
Sumbawa	31	17 (55%)	14 (45%)	0 (0%)	0 (0%)	0 (0%)
Sumba	71	49 (69%)	22 (31%)	8 (11%)	5 (10%)	3 (14%)
Flores	53	35 (66%)	18 (34%)	2 (4%)	0 (0%)	2 (11%)
Lesser Sunda: other	34	26 (76%)	8 (24%)	0 (0%)	0 (0%)	0 (0%)
Timor (island)	53	37 (70%)	16 (30%)	3 (6%)	0 (0%)	3 (19%)
Timor	33	23 (70%)	10 (30%)	1 (3%)	0 (0%)	1 (10%)
East Timor	48	34 (71%)	14 (29%)	0 (0%)	0 (0%)	0 (0%)

Notes

These notes deal with taxonomic and distribution issues. There are numerous taxonomic issues concerning taxa from the Sundaland and Wallacea area, and the notes below do not attempt to deal with every such known issue, instead concentrating on those that potentially impact the distributions, or arise from apparent peculiarities in these distributions, shown in Tables 1 and 6, and endemicity to the region, as well as some cases of species most likely to be junior synonyms of others and groups where major revision is needed. So, for instance, we have not commented on known but not yet named species except where their eventual description will necessitate changes to the tables beyond their addition to one or both of the tables. For example, although one or more additional species closely allied to *Drepanosticta dentifera* are known to occur in Sarawak, since *D. dentifera* itself is also known from Sarawak, the description of these species would only change the table by the addition of one or more rows. On the other hand, if species closely allied to *Drepanosticta crenitis* are described from all or part of material from Brunei, Sabah or Sarawak currently included under *D. crenitis* with a ? then changes beyond the addition of rows are likely to be necessary.

Gynacantha furcata is only known from the holotype, apparently from Borneo but with no other location information. This species is therefore included in the list without indication of the subregion where it occurs (see also note 49).

The unique type of *P. lansbergei* appears to be lost, as noted by Lieftinck (1951a) (RD has also searched for it in the Selys collection without result) and the original description (Selys 1886) is brief and inadequate. Although it has been speculated that the type was from Borneo (for instance Lieftinck (1954: 42) states "Borneo (?)") there is no definite evidence of this. With the available information it is impossible to determine if this is a synonym of some other blue-marked *Prodasineura* species or a species never recorded again and it should be regarded as **nomen nudum (stat nov.)**.

Note 01

The known distribution of this species, widely distributed in mainland Asia and also known from Australia, is odd, with records from Java and the Lesser Sunda Islands as well as the Philippines, but no records from Sumatra, Borneo or Sulawesi and also no records from New Guinea but an isolated record from the Solomon Islands (Marinov & Pikacha 2013) and records from New Caledonia (Lieftinck 1975).

Note 02

The reader is referred to Note 06 in Kalkman *et al.* (2020) on the distributions of *L. p. praemorsus* and *L. p. decipiens*.

Note 03

The highly polyphyletic nature of both *Drepanosticta* and *Protosticta* has been commented on elsewhere (for instance see Dijkstra *et al.* (2014)) and new genera will have to be erected in both, which will result in changes to the genus in which many species in our region are placed. The simplest example of this is *Protosticta*, the genotype of *Protosticta* is *P. simplicinervis* from Sulawesi and all species from Sundaland currently placed in this genus are at best distantly related to the true *Protosticta* and are not likely to remain in that genus in the long run.

Note 04

The reader is referred to Notes 4 and 6 in Dow (2021) for *D. crenitis* and *D. forficula*; nothing further can sensibly be added at the time of writing.

Note 05

Drepanosticta quadrata and its allies *D. fontinalis*, *D. rahmani* and *D. sharpi* (in Sundaland) and also the extra-limital *D. viridis* Fraser, 1922 from the Mergui Islands of Myanmar and *D. khaochongensis* Asahina, 1984 from Thailand, need revision. It is probable that this group (the *D. quadrata*-group) contains both synonyms and additional species and that changes to Table 1 will eventually be needed, but additional material and molecular data are needed before a revision can be completed satisfactorily.

Note 06

The record of *Drepanosticta moluccana* from Seram is doubtful, see van Tol (2007c: 260, under *Drepanosticta auriculata* (Selys, 1878)), and is therefore listed with a ? in Table 1.

Note 07

Drepanosticta versicolor was described (in *Protosticta*) from a female from somewhere near Lawas in Sarawak (Laidlaw 1913) and the male was not known until Orr (2001) published a description of a specimen from Brunei, and also transferred the species to *Drepanosticta*. The illustration of the male anal appendages as depicted by Orr (2001) is somewhat different from those of numerous males otherwise agreeing with his description and associated with females from many locations in Brunei, Sabah and Sarawak seen by RD and treated as *D. versicolor* and further study is needed to determine if a second species is involved. *Drepanosticta monoceros* was described from a pair of specimens from East Kalimantan (Lieftinck 1965a) before the male of *D. versicolor* was known, and Lieftinck (1965a) did not even consider *D. versicolor*. It is now known that *D. versicolor* (as understood here) is one of the most widely distributed and common Platystictidae in at least the north of Borneo. In fact the two species appear to be generally very similar except in the superior anal appendages of the male (if Lieftinck's illustration in lateral view is accurate). It is also worth remarking here that *Drepanosticta ceratophora* Lieftinck, 1974, known from the Palawan region of the Philippines (records from Palawan and Balabac) is morphologically very similar to the species treated as *D. versicolor* here and it is not inconceivable that the two are synonyms, although we have treated *D. versicolor* as endemic to Borneo here.

The issues mentioned in this note were recently touched upon by Phan *et al.* (2022) who provided some notes on *D. versicolor* (in their sense agreeing with what is understood here) and descriptions of both sexes along with images of the male. Unfortunately, the treatment of Phan *et al.* (2022) was based on very limited material and therefore does not deal adequately with either variation or even diagnostic features of the species, and is not illuminating on the issue of how many closely related species there are in this group.

Note 08

St. Quentin (1968) recorded a male of *Drepanosticta sharpi*, attributed to Fruhstorfer, from the Lingga Islands between Peninsular Malaysia and Sumatra. Although, without checking the specimen, this record cannot be dismissed, it is an outlier to the distribution of *D. sharpi* and might be either a misidentification (presumably of *D. quadrata* which occurs in Singapore and might well occur in the nearby Lingga Islands) or a case of mislabelling (not a unique problem with material attributed to Fruhstorfer). Hämäläinen & Pinratana (1999: note 16) suggested that *D. khaochongensis* Asahina, 1984, from Thailand, might be a junior synonym of *D. sharpi* but this requires confirmation, however *D. sharpi* is known to occur in Thailand anyway.

Note 09

Recently Phan *et al.* (2022) placed *Protosticta curiosa* Fraser, 1934 in the synonymy of *Protosticta trilobata* and we have accepted this change here. *Protosticta trilobata*, as understood here, is a widely distributed species in mainland Asia (including Peninsular Malaysia) and is somewhat variable in many respects, which has contributed to the creation of a number of synonyms in the past. *Protosticta foersteri,* only known from Peninsular Malaysia, is morphologically very similar to *P. trilobata*, differing only in details of colouration and size, and the two might eventually prove to be synonyms, in which case *P. foersteri* is the senior synonym. On the other hand, very little molecular data is available for this complex and once more such data is available the complex might need to be divided into separate species again.

Note 10

Telosticta belalongensis is known with certainty only from the holotype from Brunei but there are female and teneral male specimens from Sarawak that might be the same species and its occurrence in Sarawak is extremely likely.

Note 11

Krüger (1898) described *Euphaea lara* from a single male from Bali. In the same year McLachlan (1898b) described *Euphaea lara*, *var*. *balica* from a single male, with "abdomen mutilated", from Bali, noting that it differed from typical individuals from Sumba only in its smaller size. There have been no later records of any *Euphaea* from Bali apart from *E. variegata*, leaving room for the suspicion that the only specimen of *E. l. balica* is actually mislabelled. McLachlan (1898b) also described *Euphaea lara*, *var*. *lombockensis* from a longer series from Lombok, giving a longer list of differences from the nominate form, including larger size; most of these differences are in small, variable characters of wing venation and possibly equally variable characters in the markings of the thorax. All three taxa need to be reviewed and it may prove that there are no grounds to treat any of them as distinct from the others even at subspecific level, *E. l. balica* in particular seems insufficiently distinct to have any separate status whatsoever, but we have included it in Table 1 by default.

Note 12

Lieftinck (1935a) listed *Euphaea ochracea*, *Heliocypha perforata limbata* and *Indocnemis orang* from Sumatra. Later Lieftinck (1954: footnotes 1 on pages 13, 17 and 50) noted that these records are all based on short series of specimens labelled as from Sumatra in the Hamburg Museum, collected by B. Jachan and are all doubtful. In the case of *Euphaea ochracea,* Lieftinck also noted that a male from the same source but labelled as from Peninsular Malaysia was also present in the same collection, implying a suspicion that the other specimens were mislabelled. There have been no additional records of any of the three species from Sumatra since Lieftinck (1954) was published and Lieftinck's doubts over the provenance of Jachan's material are certainly justified; we have excluded these three species from the Sumatran fauna in Table 1. Despite the above comments, although still poorly known, the lowland odonate fauna of the parts of Sumatra close to Peninsular Malaysia certainly shares many elements with that of the latter and all three of these species are common there, so it is certainly far from impossible that some or all of them do occur in Sumatra.

Note 13

It is very doubtful that the differences between *D. a. argyoides* and *D. argyoides tiomanensis* (described when very little material of the nominate subspecies was available) will hold up once a thorough review is made; in all probability *D. a. tiomanensis* is a junior synonym of *D. argyoides*.

Note 14

Differences listed by Kalkman & Villanueva (2011) between *Rhinagrion mima* and *R. viridatum* appear to breakdown on examination of material collected later (Dow, Choong & Ng (2016), Kosterin (2014a)) and *R. viridatum* is likely to be a junior synonym of *R. mima*, as it was considered to be by Lieftinck (1954).

Note 15

Podolestes coomansi is known from mainland Sumatra and also Thailand (e.g. Kosterin & Vikhrev (2009)). There is a record of a *Podolestes* species (Alfarisyi 2017) that is likely to be *P. coomansi* from a site on Belitung but given that no specimens are available at present the identity of the Belitung population is best left open, hence only mainland Sumatra is listed in the distribution of *P. coomansi* here.

Note 16

Van Tol & Günther (2018: 301) state "Although the locality of *R. frontalis* was given as 'Moluques' (Moluccas), collected by Lorquin, the type series is almost certainly from the Minahasa, the tip of the northern arm of Sulawesi. These erroneous locality labels have been found in various other specimens, although also specimens genuinely from Halmahera (northern Moluccas) and collected by Lorquin are labelled »Moluques«." Therefore there is room for doubt over the occurrence of some taxa only known from the Moluccas on the basis of specimens collected by P.J.M. Lorquin (all with no specific location information beyond Moluccas): *Neurobasis kaupi* (Selys (1869a)), *Libellago xanthocyana* (Selys (1869a)), *Rhinocypha frontalis frontalis* (Selys (1873a)), *Epophthalmia australis* (Lieftinck (1931)), *Diplacina torrenticola* (Ris (1909a) as *Diplacina bolivari militaris*, see also van Tol 1987), *Hydrobasileus croceus* (Ris (1913b)) and *Orthetrum pruinosum clelia* (Ris (1909b) and these records have all been omitted from the tables.

Note 17

With more material available than Lieftinck (1965b) had at his disposal when describing *V. anacolosa* and *V. atropha* it appears likely that the two are the same species (for instance see Note 15 in Dow (2021)). If the two do prove to be the same species the shorter, more descriptive and more often used name *V. atropha* is preferable to *V. anacolosa*.

Note 18

Differences between *Heliocypha biforata* and *H. biseriata* are all in variable characters and appear to be non-diagnostic; it is almost certain that these two are synonyms.

Note 19

The only records of named species from this genus within our region are from the Moluccas. Askew *et al*. (1989) recorded a female of this genus from North Sulawesi; the specimen needs to be examined to determine if it really belongs to *Selysioneura*.

Note 20

Coeliccia arcuata is known from Kalimantan and Sabah. An at least similar taxon occurs on the Usun Apau plateau in Sarawak (Dow, Reels & Ngiam (2015)) but more material is needed to determine if this is merely a form of *C. arcuata* or (more likely in RDs opinion) a distinct species.

Note 21

In Table 1 we have considered a number of published records of *Coeliccia nemoricola* to not actually refer to that species, leaving only records from Sarawak. A paper (Dow, Price & Choong in preparation) dealing with *Coeliccia nemoricola* and similar species is in preparation and will likely result in some modifications to the distribution presented in Table 1.

Note 22

Laidlaw (1918) described *Coeliccia nigrohamata* from southwest Sarawak. Lieftinck (1953b) described *C. resecta* from two males from Kalimantan Timur, based on very slight differences from *C. nigrohamata* (which was still a

very poorly known species at the time) and *C. resecta* might be a junior synonym or a subspecies of *C. nigrohamata*, however this issue is not clear cut, and since *C. nigrohamata* and its allies are under revision by RD it is premature to say much more on the issue here. We have followed Dow (2021, see Note 26) in listing all material from Sarawak under *C. nigrohamata* pending the completion of the above mentioned revision, and have also treated the few other records of *C. resecta* except the original one (records from Brunei in Thompson & van Tol (1993) and from Sarawak in Kitagawa (1997b; from the location, these records unequivocally refer to *C. nigrohamata sensu stricto*), Central Kalimantan (Lieftinck (1953c; material from the Sampit area), repeated (as South Borneo) in Lieftinck (1954)) and Matsuki & Kitagawa (1993; of these that from south western Sarawak also clearly refer to *C. nigrohamta sensu stricto*)), as *C. nigrohamata* for the time being.

Note 23

There are records of unidentified *Nososticta* from a number of islands. Of these that from Rote (Da Silva Pinto *et al*. (2020)) is most notable because there is no other record of the genus from the island.

Note 24

The known distribution of *P. autumnalis* is strange, it was originally described from northeastern India by Fraser (1922a) and subsequently recorded from other parts of India, Bangladesh, Nepal, Myanmar, China and Indochina. The species is also recorded from Java and Bali (where it is not uncommon). The closely allied or synonymous *P. humeralis* (in the latter case the senior synonym) is known from Peninsular Malaysia and both taxa are closely related to *P. verticalis* which is known from Borneo and Sumatra (see below), but differs in at least its markings and hue from the other two taxa. There is also a record of *P. autumnalis* from Sumatra in Lieftinck (1954: 30–39), given as "Sumatra (west)" without further information, this record might not actually refer to present day West Sumatra Province, but could refer to anywhere on the western side of the island. Some years ago RD looked for Lieftinck's Sumatran material in the papered collection at RMNH but the only specimens he could find labelled as *P. autumnalis* in that collection proved to not actually be that species on examination of the male anal appendages; this appears to have been mis-identification by Lieftinck based on general appearance and leaves very considerable room for the doubt over the occurrence of *P. autumnalis* in Sumatra, so the Sumatran record is not included in Table 1 here. Whether the taxon found in Java and Bali is really the same as that found further to the north remains an open question, but it was originally described under a separate (and available) name *Caconeura corvina* Lieftinck, 1930. However convincing morphological differences between the Sundaland and mainland populations have not so far been discovered and in fact the only clear difference that we are aware of is in living eye colour (reddish in southern populations, not in northern ones). *Prodasineura autumnalis* is still treated as distinct from *P. humeralis* here, but no morphological differences are known to us, available molecular data gives no support to separate status and colouration in populations in Peninsular Malaysia (including that of the male anal appendages, a variable character that is given significance by some authorities, for instance Kosterin (2020: 144) on *P. autumnalis*) is variable and sometimes approaches that of *P. autumnalis*, so that in our view it is doubtful that the two are distinct even a subspecific level.

Prodasineura humeralis is sometimes treated as a subspecies of *P. verticalis* but has not been treated as such in most recent publications where the taxon is recorded. The two are very similar but do differ consistently in colour; they are weakly separated in the available (unpublished) molecular data. In cases such as this whether to treat the taxon as a subspecies or distinct species seems largely a matter of taste. Moreover (see above and below), given the number of taxonomic issues in the whole *P. verticalis*-group species, it might be better to leave *P. humeralis* as a distinct species until a satisfactory revision of the whole group is available; this is the course that we have taken here.

Prodasineura verticalis verticalis is known from Borneo and Sumatra, with a few old records from Java, the latter all originally published as *humeralis* (Lieftinck 1934c, Ris 1912a). A check of the Javanese material is needed, it might prove to be misidentified and we have included Java with a ? in Table 1 for this reason. There are also records of *P. v. verticalis* from mainland Asia, but the identity of all of these seems questionable and it is likely that

one or more separate species are involved; we have listed *P. v. verticalis* as endemic to our region in Table 1 for this reason. Additionally, beyond *P. humeralis*, a number of taxa are or have been treated as subspecies of *P. verticalis*, three of them extralimital and we refrain from further discussion of these here. One taxon still treated as a subspecies of *P. verticalis*, *P. v. delia*, is known from Sumatra. *Disparoneura delia* was described from Sumatra (Karsch 1891a) from female specimens, Lieftinck (1954) considered all records of *delia* to refer to *P. verticalis* but this issue does not seem to have been satisfactorily resolved and we note, for instance, that there is a male labelled as *delia* in the Selys collection that has significant differences in the anal appendages from typical *P. verticalis*. We have left *delia* as a separate subspecies in Table 1. It should be clear that the entire complex of taxa considered in this note requires revision, we have only given a brief summary of the issues involved here.

Note 25

Lieftinck (1948a: 227–229) described *P. flammula* from a single male from "Batu Besi", a location somewhere in the Sangkulirang area of East Kalimantan, stating that "This species comes very near *dorsalis* (SELYS), but can be at once distinguished from that species by the broad orange band between the eyes, the deeper orange tint of the thorax, and by the slightly different anal appendages of the male." Dow (2019a) already commented on the variability of the markings concerned in *P. dorsalis* and the likelihood that the differences in the anal appendages are due to rotation, but a detailed check of the holotype of *P. flammula* is needed before it is synonymised with *P. dorsalis*, although the synonymy of the two seems highly likely. Dow (2019a) also pointed out that *P. dorsalis* certainly occurs in East Kalimantan. The only other record of *P. flammula* that we are aware of is of a pair from Tenom in Sabah in Tsuda & Kitagawa (1989), this identification was most likely made on the basis of colouration and we have treated the record from Sabah as *P. dorsalis* in Table 1, leaving only the record of the holotype under the name *P. flammula*.

Note 26

Many specimens with J.W. van Lansberge indicated as their source lack any other information on their provenance or have only very vague and/or questionable information on their provenance. Van Lansberge was governor general of the Dutch East Indies from 1875–1881, material with his name attached could have been collected by him or given to him by other collectors and although it is reasonable to assume that most or all of this material originated in present day Indonesia, nothing more can be sensibly inferred. Two species included in the checklist are known only from specimens attributed to J.W. van Lansberge: *Prodasineura gracillima* and *Macrogomphus abnormis*. A third, *Prodasineura lansbergei*, is considered to be a nomen nudum here (see the introduction to these notes). Selys (1886) described *Alloneura gracillima* from specimens of both sexes received from Lansberge, stating that they were probably from Sulawesi but possibly from Borneo. There has been no subsequent record of this species, apart from an obviously spurious one from Peninsular Malaysia based on a teneral male (Laidlaw 1902b). Part of the type series of *P. gracillima* is in the Selys collection, it consists of two males lacking their terminal abdominal segments with labels stating "Lansbg." but no other information on their provenance. RD briefly checked these specimens in 2017, to determine if they could still be found and to transcribe the labels, but did not have time for a careful examination of the specimens, so can add nothing more on their taxonomy here. Since the type series of *P. gracillima* is still in existence it is difficult to dismiss it as a zombie species but, given the condition of the existing material, it might to be difficult to determine if it is the same as some other species. We have listed it from Sulawesi, but with a ?, in Table 1.

Macrogomphus abnormis was most recently discussed by Dow, Butler *et al.* (2021) and nothing further can be added here, we have listed it from Kalimantan with a ? in Table 1.

Note 27

Although *Prodasineura interrupta* has been recorded from Borneo (Sarawak and Kalimantan), the form occurring there is distinct from the true *P. interrupta*, described from Singapore and also known from Peninsular Malaysia and

Sumatra; a description of the Bornean species is in preparation and Borneo is excluded from the distribution of *P. interrupta* here. The illustration in Orr (2005) of the anal appendages of *P. interrupta* appears to be based on material from Borneo (probably loaned to him from RMNH as *P. interrupta* based on identification by Lieftinck) and in fact refers to the undescribed species.

Note 28

Aciagrion fasiculare is known with certainty only from Java, but an at least similar taxon occurs at Bako National Park in southwest Sarawak. Further investigation is needed to determine if the form occurring in Sarawak is really the true *A. fasiculare*.

Note 29

Agriocnemis materna was described from a male and female from an unspecified location in Sumatra (Selys 1877). It was subsequently recorded from locations in present day North Sumatra (Karsch 1891a, Krüger 1898) with Krüger (1898) also listing specimens from Java without more specific location data. There are no further published records of the taxon as far as we are aware and Lieftinck (1954) treated it as a junior synonym of *A. femina*, however we are not aware that the supposed synonymy was ever formally justified. The issue of the status of *A. materna* does not appear to be settled, and for instance van Tol (2011) listed it as a synonym of *A. femina* but Paulson *et al.* (2024) listed it as a good species. Matti Hämäläinen (personal communication 2020) collected specimens in Sumatra in 1997 that he identified as both *A. femina* and *A. materna*. We do not offer any opinion on this issue here but have included *A. materna* as a distinct species in Table 1 (records from Sumatra, that from better studied Java has been listed under *A. femina*) to indicate that the issue is not satisfactorily settled.

Note 30

Agriocnemis nana was described from a single male from the Kachin Hills in Myanmar (Laidlaw 1914a), the type is or was (implicitly) in the Indian Museum. Later Fraser (1923) named *A. naia*, also from Myanmar (this 'description' is in a key and only notes supposed differences in the colouration of abdominal segment 8 from *A. nana*, with an illustration of the terminal abdominal segments, and gives the name *naia*; the information that the types are from Myanmar is given along with full descriptions in Fraser (1933: 389): "*Type* in the British Museum collection, from King Island, Mergui, Lower Burma; paratypes in the Pusa collection, from the same locality."). The first record possibly of *A. nana* from our region is in Lieftinck (1930a) who recorded, described and illustrated males from Perak, but as *Argiocnemis* ? *nana* and stating "I refer my specimens to *nana* with much doubt" and listing differences between Laidlaw's description (there is no indication that Lieftinck had seen the type of *A. nana*) and the Perak material (which is stated to have been in the Hamburg Museum and therefore was probably destroyed during the Second World War). Laidlaw (1931a: 201) recorded a male of *A. nana* from Pahang, stating "I have been able to compare … with a long series of the same species from Burma, and can find no differences." There are no further details on the "long series" from Myanmar. Lieftinck (1954) treated both the material from Perak and Laidlaw's record from Pahang as *A. nana*, also including Singapore and Thailand in the range of that taxon, without further comment. There are relatively many later records of *A. nana* from Peninsular Malaysia.

Agriocnemis naia has hardly been recorded since Fraser, but Lieftinck (1954: 73) states "I have seen good series of both sexes from Penang I., which correspond in every respect with the existing descriptions." Wilson & Gibert (2006) listed both *A. nana* and *A.* cf *naia* from Endau Rompin National Park.

The type specimen of *A. nana* may no longer be in existence, it is not listed in Sheela *et al.* (2016). The type of *A. naia* is in the Natural History Museum, London. *Agriocnemis naia* has been treated as a junior synonym of *A. nana* by some authorities but this has never been properly established, instead seemingly being based solely on a note written by Lieftinck on the labels of the type: and transcribed by Kimmins (1966: 206): "This is the same species as *nana* Laidlaw". There is no indication of when Lieftinck's note was made and it might represent an

earlier opinion to that expressed in Lieftinck (1954). The available information (especially the fact that Wilson & Gibert (2006) record both *A. nana* and *A.* cf *naia* from the same protected area) does suggest that two separate taxa are present in our region. Also unpublished molecular data shows possibly significant differences between material identified as *A. nana* from Peninsular Malaysia on the one hand and from Cambodia on the other, The *Agriocnemis minima*-group, to which both *A. naia* and *A. nana* belong, needs revision, but in the absence of the type of *A. nana* it may prove difficult to convincingly demonstrate which name (and whether a new name is needed) should be applied to which taxa.

Note 31

Amphicnemis is an extremely difficult genus and while there are certainly distinct species awaiting description there are also likely to be some synonyms. Molecular data (Naturalis unpublished data: both COI and ITS have been obtained from a moderately large set of samples from Borneo and Peninsular Malaysia) but unfortunately only distinguishes broad species groups, failing to separate even the most obviously distinct species within those groups so that little or nothing can be read into the failure to distinguish more problematic forms. These problems with molecular methods for the genus—presumably the result of recent (and possibly paraphyletic) speciation, introgression and incomplete lineage sorting—mean that taxonomic progress on the genus at species level will likely have to be made using only morphology. With one exception we refrain from making further notes on individual species from the genus here. Notes on a number of the species occurring in Borneo (where the genus is most diverse) can be found in Dow (2021) and these notes explain the uncertainty in some entries (*A. martini* and *A. wallacii*) in Table 1.

Note 32

Amphicnemis smedleyi is known with certainty only from the Mentawai Islands (Laidlaw 1926) and was originally described as a subspecies of *A. louisae* Laidlaw, 1913 (currently considered to be a junior synonym of *Amphicnemis wallacii*). Prior to the description of *A. smedleyi* Ris (1915a) recorded *A. louisae* from the Simeulue Islands on the basis of a single female specimen. Lieftinck (1954) listed the record from Simeulue under *A. smedleyi* with a ? and we have followed the same course; further material from the Simeulue Islands is needed to determine whether the taxon occurring there is really *A. smedleyi*.

Note 33

A number of subspecies of *Argiocnemis rubescens* are recognised, including the widespread *A. r. rubeola*. It is likely that *A. r. rubeola* is a distinct species and in that case *A. r. intermedia* Selys, 1877 (known from the Philippines) and *A. r. lunalata* would be better treated as either subspecies of *rubeola* rather than of *rubescens* or also as distinct species. A distinct species (based on both morphology and molecular evidence) occurs in part of the range of *A. r. rubeola* (for instance see Note 40 in Dow (2021)) but in all probability already has a name buried in the synonymy of *A. rubescens*; it is likely that some records of *A. r. rubeola* from at least Borneo, Peninsular Malaysia and Sumatra are misidentifications of this taxon. A paper dealing with these issues is in preparation. Records from the Moluccas (Buru, Morotai and Seram from Ris (1929) and Monk *et. al*. (1997)) are given with a ? since it needs to be checked whether these actually refer to *A. r. rubescens* or *A. r. lunalata*.

Note 34

Recent claims of the Bornean *Ceriagrion bellona* from mainland Asia are misidentifications of *C. chaoi* (a paper dealing, among other issues, with this is in preparation). *Ceriagrion chaoi* itself shows some colour variation (the source of much of the already mentioned confusion). Asahina (1967) treated the poorly known Sumatran species

C. hoogerwerfi as a subspecies of *C. bellona* but this has not received wide acceptance and in our view the two are best treated as separate until more information is available on the Sumatran taxon. Very recently Yu *et al.* (2023) have claimed that *C. chaoi* is a junior synonym of *C. bellona*. The study of Yu *et al*. (2023) uses morphology and molecular methods, but all the material that they studied (whether initially identified as either *C. chaoi* or *C. bellona*) is from China except for seven previously published COI sequence of *C. chaoi* from (Peninsular) Malaysia (one) and Singapore (six); there is no attempt to study the type material of *C. bellona* (in the Natural History Museum, London) or any confirmed *C. bellona* from Borneo either morphologically or through molecular data, so that the results are entirely uninformative with regards to *C. bellona*. In fact the publication in preparation mentioned above demonstrates both morphological and molecular differences between genuine *C. bellona* and *C. chaoi* and we do not accept the view of Yu *et al.* (2023) (whose results merely give support to all *C. chaoi*-like *Ceriagrion* from mainland Asia, including those that had been identified as *C. bellona*, and Singapore being a single species) and list *C. bellona* and *C. chaoi* separately here, with *C. bellona* endemic to Borneo.

Note 35

There is a record of *Ceriagrion calamineum* from Timor in Monk *et al*. (1997), presumably based on material in the Naturalis Biodiversity Centre. However no location beyond Timor is given by Monk *et al*. (1997), so it is not clear if the species has been recorded in Timor Leste or the Indonesian part of the island (or both), and both are marked with a ? in Table 1.

Note 36

Mortonagrion aborense is a widespread species in mainland Asia. Dow (2016a) noted that two forms, one differing markedly in the morphology of the penile organ from examples from mainland Asia, occur in Sumatra and that this latter form also occurs in Borneo (where the typical form might not occur, all examples from Borneo where the penile organ has been examined conform to the atypical form). Further investigation of this issue is needed, but it is possible that the true *M. aborense* does not occur in Borneo.

Note 37

Mortonagrion megabinluyog is known with certainty only from the type location in Brunei. However a similar taxon has been found at a location in the Rejang Delta in Sarawak (see Note 43 in Dow (2021)), further material is needed to determine if this is a case of geographic variation in a single species or if the taxon from Sarawak is a distinct species.

Note 38

Pericnemis triangularis remains known with certainty only from the holotype female from the Bettotan area in Sabah. Orr & Hämäläinen (2013) quite reasonably described two additional species of *Pericnemis* from Borneo, but it is certainly not inconceivable that one of these will eventually prove to be a junior synonym of *P. triangularis* once we have a better understanding of variation in females of this genus. See Note 14 in Dow *et al.* (2022) for further discussion of issues involving Bornean *Pericnemis*, including a record of *P. triangularis* from Banggi Island off Sabah included with a ? in Tables 1 and 6 here.

Note 39

The only named species of *Pericnemis* that has been recorded from Peninsular Malaysia is the apparently widespread *P. stictica*. Choong *et al.* (2012) recorded a female *Pericnemis* from Terengganu that appears to be outside of known variation in *P. stictia*.

Note 40

It has been suggested (e.g. Orr (2005)) that *Pseudagrion coomansi* (known from Borneo and Belitung) is a junior synonym of *P. williamsoni* (widespread in mainland Asia and also known to occur in Riau Province in Sumatra). The two are structurally identical or nearly so, but known populations do differ consistently in colouration, a fact that has been partially obscured by an error in the original description of *P. coomansi* where Lieftinck (1937a: 87) states incorrectly that the "Anterior surface of head, as far upwards as level of anterior ocellus, apple-green" in *P. coomansi* whereas in fact it is blue. Although molecular data (Naturalis, unpublished) gives no clear support to separate status for the two (there is a slight separation in the ITS marker but the two cannot be distinguished using COI) given the known distributions, if they are really the same species then clinal variation is likely to occur in mainland Sumatra between Riau Province and Belitung and it is best to wait until populations from this area have been found before making final decisions over the status of *P. coomansi*.

Note 41

Pseudagrion lalakense has been regarded as endemic to Borneo, however Choong *et al.* (2020) recorded a single male *Pseudagrion* from Terengganu in northern Peninsular Malaysia with almost identical anal appendages to, but outside of the variation seen in the markings of, Bornean populations of *P. lalakense*. Further material is needed to determine the status of the Peninsular Malaysian population.

Note 42

Pseudagrion perfuscatum, *pilidorsum* and *pruinosum* (and the subspecies of the latter two) differ in mature colouration but are identical or almost identical in morphology. Although it might be tempting to believe (for instance) that *P. perfuscatum* is a Bornean subspecies or even a junior synonym of either *P. pruinosum* or *P. pilidorsum*, rather than a distinct species, molecular data (Naturalis unpublished) does not provide obvious support to either view; this is an issue in need of further study.

Note 43

Teinobasis gracillima was described with the following information: "Java, a single male without date … Type in the Buitenzorg Museum, Java" (Fraser 1926b: 494). Lieftinck (1934c: 451) states that *T. gracillima* is "Identical with *T. superba* (SELYS). Fraser's type comes from Celebes, not Java." Lieftinck (1935b) lists *T. gracillima* as a junior synonym of *T. superba* but Lieftinck (1971b: 91) states "Erroneously considered synonymous with *T. superba* (Selys) by Lieftinck 1935c [1935b here]: 254. Bona species." We have listed *T. gracillima* with a ? from Sulawesi.

Note 44

Dow (2010a) questioned the occurrence of *Teinobasis rajah* in Peninsular Malaysia, but as noted by Dow (2021: Note 48) this is an issue that, unfortunately, cannot be considered as settled. Because of this records from Peninsular Malaysia (Penang and the mainland) are marked with a ? in Tables 1 and 6.

Note 45

Teinobasis suavis is known with certainty only from Central Kalimantan, however Dow (2010a, 2021) reported a female *Teinobasis* that might be this species from southwestern Sarawak, so *T. suavis* might be more widespread than is currently known.

Note 46

Dow, Reels & Butler (2013) recorded a female of an *Anaciaeschna* species (not *A. jaspidea*) from Kubah National Park in Sarawak. Dow (2021: Note 50) commented on the possibility that this female is a form of *A. montivagans*, further material is required to settle this issue, and we have not included Sarawak in the range of *A. montivagans* in Table 1.

Note 47

Recently a molecular study (Clement *et al.* 2021) suggested that *Anax gibbosulus*, *A. panybeus* and the extra-limital *A. piraticus* Kennedy, 1934 might be conspecific. This suggestion is certainly highly plausible, but we note that the analysis in Clement *et al.* (2021) only includes material of *A. panybeus* (type locality Panybee, supposedly in Sulawesi) from Japan and material of *A. gibbosulus* only from Samoa, New Caledonia and the Solomon Islands). Concerning *A. gibbosulus* and *A. panybeus* we suggest that, as well as morphological investigations including checks on type material, material from both taxa from Southeast Asia, especially from Sulawesi where both taxa have been recorded, should be included in the analysis before any taxonomical changes are made.

Note 48

Gynacantha is a difficult genus in which there are likely to be both synonyms and undescribed species, the notes below only deal with a few of the issues. It is worth remarking here that Seehausen *et al.* (2018) recorded *Gynacantha* sp. cf. *dobsoni* from Timor (not included in Table 1 because of the uncertain identification), noting that it might be either *G. dobsoni* (an Australian species) or *Gynacantha rosenbergi* or an undescribed species.

Note 49

As noted by Lieftinck (1954: footnote on page 100) *Gynacantha furcata*, known only from a single female (the whereabouts of this specimen is not known to us and it may no longer be in existence) from somewhere in Borneo, is probably the same species as *G. bayadera*, in which case *G. furcata* is the senior synonym. We have listed *G. furcata* in Table 1 without indication of location.

Note 50

Gynacantha demeter is very similar to, and likely to be a junior synonym of, *G. dohrni*. The reader is referred to Note 51 in Dow (2021) for further discussion of this issue; a revision of this group of species is required.

Note 51

Gynacantha stenoptera, described from a single male supposedly from an unspecified location in Java (Lieftinck 1934b), remains known only from the type specimen and given that the specimen was bought at an auction ("an old locality label : Auctie v[an] Eyndh. [oven], Java, in H. Albarda's handwriting") there is room for doubt over its real provenance. However we have listed it under Java in Table 1 without a ? by default.

Note 52

In addition to the distribution within our region shown in Table 1, Lieftinck (1954) listed *G. subinterrupta* from Borneo without further details. The specimen or specimens on which this record is based are probably in the Naturalis Biodiversity Centre and should be checked.

Note 53

The reader is referred to Note 52 in Dow (2021) on *Heliaeschna crassa* and *H. idae*, it would be premature to add anything at this time and in most cases we have left records of these two taxa under the name used in the relevant publication. Lieftinck (1954) listed *H. crassa* from the Natuna Islands with a ?, we have followed the same course here. Norma-Rashid *et al.* (2008) listed *H. idae* from Singapore based on exuviae, in our view even now there is insufficient information available to make this determination and the record is not currently accepted in Singapore. We have not listed *H. idae* from Singapore in Table 1.

Note 54

The fact that *Heliaeschna filostyla* does not actually belong in *Heliaeschna* has been discussed many times (for instance by Kawashima & Sasamoto 2007, Orr *et al.* 2013). We have left the taxon in *Heliaeschna* for convenience until the issue of its placement is resolved (it might require the erection of a new genus).

Note 55

Needham (1907) described *Oligoaeschna elacatura* from a single female from "Mindai, Borneo" with no other information on the provenance of the specimen. Mindai is (or was) apparently in South Kalimantan (see under *Neurobasis longipes* in Hämäläinen & Fliedner (2022)). This species has not been recorded since it was described; the shape of the abdomen is extraordinary, so it is unlikely to be a synonym of any other species for which the female is known.

Note 56

There is a confused situation surrounding *T. brunnea* (which is only known from the female) and *T. degorsi* and a thorough revision needs to be made.

Note 57

Tetracanthagyna waterhousei was described from a female labelled as from Borneo and another female without location information (McLachlan 1898a). The specimen labelled from Borneo was designated as the lectotype by Kimmins (1969). Förster (1914) described *T. waterhousei sumatrana* from a single female from Padang Panjang in present day West Sumatra. There have been no other records of this species from our region that we are aware of, but it appears to be relatively common in parts of mainland Asia north of Peninsular Malaysia. The female of *T. waterhousei* is easily differentiated from the females of other known *Tetracanthagyna* species, so that it is not likely that it is a synonym of one of the other species occurring in our region, but in the absence of later records one does wonder if the type specimen is mislabelled and does not really come from Borneo. Lieftinck (1954: footnote on page 107) notes that he had never seen any example of *T. waterhousei* from Sumatra, implying that he had not seen the type of *T. w. sumatrana* and it is not clear to us if that type specimen has been re-examined since the subspecies was described.

Note 58

There are numerous taxonomic issues with this family in our region and progress is hampered in the majority of such cases by the difficulty in obtaining sufficient mature (especially male) material. This problem is well illustrated by the proportion of individual entries in the database that are of larvae (including exuviae) or teneral specimens,

this proportion is high in the Gomphidae (ca. 18% for larvae and exuviae compared with ca. 2% overall, ca. 6% for records of teneral individuals compared with ca. 1% overall).

Within the Onychogomphinae in particular there are issues over which genus some species should be placed or even over whether some genera are recognised, the discussion here is restricted to cases relevant to our region. It is unlikely that any species included here and currently placed in *Onychogomphus* actually belongs in that genus and those left in *Onychogomphus* in Table 1 have been done so by default, awaiting their correct placement; the situation here is currently confused and this confusion is only likely to be satisfactorily resolved by a molecular study with adequate taxon sampling. *Onychogomphus castor* is placed in *Lamelligomphus* in Paulson *et al.* (2024) but was left in *Onychogomphus* by van Tol (2011), we have followed Paulson *et al.* (2024) in Table 1. *Onychogomphus pollux*, noted as closely allied to *O. castor* by Lieftinck (1941) has not been placed in *Lamelligomphus* by any authority as far as we are aware, but probably should be if *castor* is. Several species from our region are listed in (the currently poorly characterised) *Nychogomphus* in Paulson *et al.* (2024) but this genus was not even listed by van Tol (2011), possibly indicating doubts over the availability of the name *Nychogomphus*, which has been used by some authorities but not others. Here we have used *Nychogomphus* by default, but it should be noted that even the authors of this paper do not entirely agree on this issue. Additionally, if *Nychogomphus* is recognised then (as noted by Dow, Butler *et al.* (2021)) *Phaenandrogomphus safei* should be placed there as should *Onychogomphus rappardi* and also probably the extralimital *O. treadawayi* Müller & Hämäläinen, 1993; quite possibly *O. banteng* and *O. perplexus* should also go to *Nychogomphus* but all have been left in *Onychogomphus* in Table 1 for now. From the other species retained in *Onychogomphus* in Table 1, *Onychogomphus nigrescens* is discussed in Note 68 and nothing can be sensibly added on the taxonomy of the other two (*Onychogomphus marijanmatoki* and *Onychogomphus thienemanni*) here.

In addition to the records in Table 1, Che Salmah *et al*. (2005) recorded a larva of "*Lamelligomphus*?" species and larvae of "*Ophiogomphus*?" species, both from Perlis in northern Peninsular Malaysia. The occurrence of the latter genus is highly unlikely as Old World species currently considered to belong to *Ophiogomphus* are restricted to the Palaearctic (Kalkman *et al.* 2022).

Note 59

As noted by Dow (2021: Note 58) specimens from Sarawak (females and larvae) are likely to represent at least one undescribed species from the recently described genus *Borneogomphus*, but we have included them under *B. teramotoi* until mature male specimens become available.

Note 60

Sumatran populations of *Gomphidia abbotti* are somewhat problematic at present. Lieftinck (1948) described the subspecies *G. a. audax* for material from southern Sumatra but Dow, Butler *et al.* (2021) pointed out that at least some of the supposedly diagnostic characters are actually variable and non-diagnostic. Lieftinck (1954) gives the range of *G. a. abbotti* in Sumatra as "not south" and includes material treated as *G. maclachlani* by Krüger (1899a) and Ris (1927) under *G. a. abbotti*, but with question marks. Additional material from across Sumatra as well as a thorough re-examination of all existing material is needed to satisfactorily deal with Sumatran populations of *G. abbotti* and will be crucial to the resolution of wider issues mentioned by Dow, Butler *et al.* (2021) and Kosterin (2014c).

Note 61

See Dow & Stokvis (2018) for a discussion of *Heliogomphus blandulus* and the uncertainty over the record from Sabah.

Note 62

It is likely that *Heliogomphus borneensis* is a junior synonym of *H. kelantanensis*, see Dow & Stokvis (2018).

Note 63

Within our region (and more generally) the status of *Ictinogomphus decoratus* (known from Java, Sumatra and Bali, with Belitung also listed by Lieftinck (1954)) and its subspecies *I. d. melaenops* (known from Borneo, Sumatra and mainland Asia and also recorded from Belitung) needs to be re-examined. The two are only distinguished by their markings and outside of our region considerable variation has been reported in these characters in some populations (for instance Kosterin & Chartier (2017) recorded a Cambodian population "showing a striking trimorphism for male coloration"). A revision of this genus in Asia is needed.

Note 64

Although described as a distinct species *Macrogomphus albardae* was treated as a subspecies of *M. parallelogramma* for many years until Kosterin (2019) again, provisionally, treated it as a separate species. The question of whether or not *M. albardae* is really a distinct species or a junior synonym of a variable *M. parallelogramma* remains open (a revision is planned). Dow, Butler *et al.* (2021) noted that records of *M. parallelogramma* from Borneo refer to two separate species, *M. albardae* occurring in the west and another species with records from Brunei and parts of Sarawak, the latter species is not likely to be the true *M. parallelogramma*. Here we have treated all records not clearly of *M. albardae* (as currently understood) from Java and Sumatra as *M. parallelogramma* and simply (since the species is not yet named) omitted such records from Borneo.

Note 65

We agree with Kosterin (2019) that the male from Taiping identified as "?*Macrogomphus phalantus*" by Asahina (1986b) is actually *M. albardae* and strongly suspect that the same is true of other records of *M. phalantus* from Peninsular Malaysia, for which reason a ? is included with the Peninsular Malaysia entry for this species in Table 1. Despite this, the true *M. phalantus* might well occur in Peninsular Malaysia. The nominate subspecies is endemic to our region but a subspecies *M. p. jayavarman* Kosterin, 2019 is known from Cambodia.

Note 66

Megalogomphus junghuhni was described from a single female specimen attributed to Heyne from an unspecified location in Java (Lieftinck 1934b). It has never been recorded since and does not appear to be closely related to the other *Megalogomphus* species known from our region; Lieftinck (1934b: 267) places it closest to *M. sommeri* (Selys, 1854) known from China, Laos and Vietnam and also originally described from the female. In the absence of additional material from Java the possibility that the type is a mislabelled specimen actually originating from somewhere in mainland Asia cannot be ruled out.

Note 67

The only named species of *Microgomphus* currently recorded from the Greater Sunda Islands is *M. chelifer*. *Microgomphus chelifer* was described from a male specimen from Mount Ophir (Selys & Hagen 1858), which is present day Gunung Ledang in Johor, Peninsular Malaysia. Lieftinck (1929a) described *M. thelyphonus* from Java, based on old specimens in the Selys collection. Later Lieftinck (e.g. Lieftinck 1934a) treated *thelyphonus* as

a subspecies of *M. chelifer* and in 1935 he (Lieftinck 1935a: 19) noted a male from Sumatra "rather intermediate between *chelifer* and *thelyphonus*" (but not stating what the intermediate characters are except that the specimen is smaller than Javan *theyphonus*) although he still listed the two as distinct subspecies in Lieftinck (1954). Lieftinck (1929a: 130) lists a number of differences between *chelifer* and *thelyphonus*, the most striking of which is that the sides of the synthorax are supposed to be largely "bright orange" in both sexes of *thelyphonus*, we wonder if this is a poor choice of words or poor interpretation of the colour in old specimens on Lieftinck's part, but this can only be determined by checking the specimens. Other differences (listed for the male only) include a larger size in *thelyphonus*, a more extensive dark stripe on the side of the synthorax, most abdominal segments wholly black, outer branches of superior anal appendages parallel to each other rather than slightly diverging, a narrower space between the inner branches of the superior anal appendages and inferior anal appendage reaching more than half the length of the superior anal appendages in *thelyphonus* but not in *chelifer*. The last character mentioned appears to be a mistake on Lieftinck's part, on the previous page he states "The figures of the anal appendages [in Selys & Hagen 1858, of *chelifer*], drawn by H. A. HAGEN, are very good". In the figures referred to by Lieftinck (Selys & Hagen 1858: Plate 6, Fig. 3) the lateral view shows an inferior anal appendage considerably longer than implied by Lieftinck for *chelifer*, but in the dorsal view it does appear much shorter, which is presumably the result of either the angle from which the drawing was made or inaccuracy in the drawing (or both). Lieftinck (1929a) illustrated the vertex and occiput of the female of *M. thelyphonus*, showing two clusters of small spines on the occipital ridge. In the same paper Lieftinck noted that he had seen female specimens of *M. chelifer* in the Selys collection, but not realising that the female had not been described, he "missed the opportunity to study the female more thoroughly" (Lieftinck 1929a: 128). Asahina (1986a) partially illustrated his supposed *M. c. thelyphonus* female from Thailand, giving drawings of the head (his Fig. 47) as well as reproducing Lieftinck's illustration. Asahina's illustration shows similar structures on the free margin of the occiput, albeit with a lower number of spines. We are not aware of any other published illustration of the female occiput of *M. chelifer*. In 2017 RD examined three female *M. chelifer* in the Selys collection, presumably those mentioned by Lieftinck, all from Borneo. Two of these specimens are teneral, and the occiput of one of these is too damaged to discern its structure. The free margin of the occiput of the other two is similar to Lieftinck's illustration but with lower numbers of spines, so if the Bornean examples are actually (as we suppose) *M. c. chelifer* then either the female of *M. c. thelyphonus* is very similar in its occipital structures or Lieftinck incorrectly associated the female with the male. Female *M. chelifer* collected by RD in Borneo and in Peninsular Malaysia by CC all have similar structures, although the exact number of spines is highly variable and non-diagnostic.

Only *M. c. chelifer* has been recorded from Borneo (a second species known from females and larvae is also present but there are reasons to think that this is distinct from *thelyphonus*, at least if Lieftinck correctly associated the sexes), and all mature examples of *M. chelifer* seen by RD agree more with *M. c. chelifer* than *M. c. thelyphonus*, but the dark marking on the side of the synthorax is somewhat variable in extent in both sexes. There are few records of *thelyphonus* after Lieftinck, and none (published) from the Greater Sunda Islands that we know of. Asahina (1986a) recorded a female *M. c. thelyphonus* from Thailand, but the characters illustrated overlap with Bornean *M. c. chelifer*. Later Asahina (1990) recorded a male *Microgomphus* from Yala in Thailand as *M. c. thelyphonus*, stating that "the body pattern and the characters of caudal appendages coincide well to those of subsp. *thelyphonus*", however he does not mention the bright orange colour and his illustrations seem to fit at least as well to Bornean *chelifer* as to *thelyphonus*, while the dorsal view of the anal appendages shows the superior pair slightly diverging along their outer margins and inner branches widely separated, so that the superior appendages actually agree better with *M. c. chelifer* than with *M. c. thelyphonus* on the basis of the illustrations by Lieftinck and Hagen. Asahina's identification of specimens from Thailand seems to have been made using the lateral markings of the synthorax, which, as noted above, are somewhat variable. Kitagawa (1997a) recorded a female *M. c. thelyphonus* from Penang Island, Peninsular Malaysia, with a photograph of the specimen, again this female seems to fit just as well with Bornean *chelifer* as with *thelyphonus*. The only other *thelyphonus* record that we are aware of is in Kitagawa & Katatani (2007) who list a female *M. c. thelyphonus* from Johor without illustration. Asahina (1980) recorded *M.c. thelyphonus* from Palawan based on teneral females, Hämäläinen & Müller (1997) treated this record and others from Palawan as *Microgomphus* sp. and we see no good reason not to follow the latter course. It remains to be seen if *thelyphonus* deserves a separate status from *chelifer* but we are certainly sceptical about its occurrence in mainland Asia, and have only listed it from Java and Sumatra in Table 1, and have listed it as endemic to our region, for this reason.

Note 68

Laidlaw (1902a) described *Onychogomphus geometricus nigrescens* from a single female from a location in Kelantan, Peninsular Malaysia, giving a brief description and distinguishing it from *geometricus* on the basis of the extent of yellow colouration and a feature of wing venation. There is no later record of this taxon and Williamson (1907: 310) stated "Doctor Laidlaw agrees with my suggestion to him that this is really *saundersii*", noting that the venational character treated as diagnostic by Laidlaw is "common to a large group of species" and Laidlaw (1931a) followed this view, as did van Tol (1992). However no real justification for treating *nigrescens* as *saundersii* (itself still a very poorly known taxon, see Note 65 in Kalkman *et al.* (2020), the closest definite record of which to Kelantan is from Bhamo in northern Mynamar, approximately 2,000 km distant) was given and it seems to have been merely a guess based on general similarity. Moreover, the two names were never formally synonymised. Lieftinck (1954) listed *O. nigrescens* as a full species with no other comment on its taxonomy, as did Orr (2005). Lieftinck (1954) was certainly aware of both Williamson (1907) and Laidlaw (1931a) so it seems unlikely that his failure to even mention their view was simply an omission and more likely represents a dismissal of their opinions. In our view the issue of the status of *O. nigrescens* remains open and treating it as a junior synonym of *O. saundersii* without further investigation could result in a large over estimation of the range of the latter, poorly known and potentially threatened species, while possibly entirely ignoring the existence of another species. The holotype of *O. nigrescens* is in the University Museum of Zoology, Cambridge (Turner, E. & Stebbings, R., personal communication October 2022), so this is not a zombie species. A thorough check of the holotype is needed to see if it can sensibly be assigned *saundersii* or any other named species.

Note 69

Novelo-Gutiérrez & Che Salmah (2013) described the supposed larva of *Onychogomphus thienemanni* from material from Kelantan, Peninsular Malaysia. In his description of *O. louissiriusi* Fleck, 2020, Fleck (2020) noted that "All gomphid larvae thus far described are all strongly different to that of *O. louissiriusi* n. sp. except one attributed to *Onychogomphus thienemanni* by Novelo-Gutiérrez & Che Salmah (2013)" and questioned the identity of the larvae described by Novelo-Gutiérrez & Che Salmah (2013). It is therefore possible that the larvae from Kelantan represent some other species, *O. louissiriusi* or an ally thereof, hitherto unrecorded from Malaysia.

Note 70

Donnelly (1998) recorded a male identified as *Onychogomphus* species aff *circularis* from Perak in Peninsular Malaysia. It is not clear what species this record really refers to but *circularis* is currently placed in *Orientogomphus*. We have not included this record in Table 1.

Note 71

There is confusion and disagreement at genus level in the Chlorogomphidae, with some authorities treating subgenera erected by Carle (1995) as genera and others not recognising them at all. Of Carle's taxa, Paulson *et al.* (2024) only include *Chloropetalia* as a genus and we have, by default, followed them, with only *C. kimminsi* included in our region.

Note 72

Although recorded from Peninsular Malaysia (Furtado (1969: larval), Laidlaw (1931a) and Ng, Dow & Choong (2011: larval record with a ?)) the occurrence of *Chlorogomphus dyak* in mainland Asia was questioned by Karube (1994). We strongly suspect that all records of *C. dyak* from Peninsular Malaysia actually refer to *C. yoshihiroi* (or

conceivably, in the case of larval records, additional undescribed species), most such records were made before the latter species was described and most of them are only of larvae, and for this reason we do not include Peninsular Malaysia in the distribution of the species in Table 1 and they are treated as *Chlorogomphus* sp. in the database. *Chlorogomphus dyak* has also been recorded from the Philippines (Asahina 1980) but Hämäläinen & Müller (1997) list Asahina's record as *Chlorogomphus* sp. and we have treated it as endemic to Borneo in Table 1.

Note 73

Lieftinck (1931) recorded a male of *E. vittigera* from Timor without further locality information, so that it cannot be determined if the specimen was from Timor Leste or the Indonesian part of the island. Because of this we have marked both parts of Timor with a ? in Table 1.

Note 74

It has already been noted (for instance by Dow, Ahmad *et al.* (2021)) that the Bornean *M. corycia* is likely to be a junior synonym of *M. gerstaeckeri*. Despite this it is best to wait until a direct comparison can be made between *M. corycia* and topotypical Javan material of *M. gerstaeckeri* before making a final decision on this issue.

Note 75

Macromia erato is known from Java (Lieftinck 1950b, 1954). Kitagawa & Katatani (2003) recorded it from Trang in Thailand, but we suspect that this is a misidentification of some other member of the *M. septima*-group and have marked *M. erato* as endemic to our region in Table 1. It should be noted (see also the previous note) that the entire *M. septima*-group requires revision and is likely to contain several synonyms.

Note 76

Dow *et al.* (2019) already noted that *M. euterpe* is almost certainly a junior synonym of *M. westwoodii*. There might, however, be one additional closely related species in Borneo (Dow, Ahmad *et al.* 2021). Choong *et al*. (2017) recorded *Macromia* cf *westwoodii* from Tioman Island; this record has been included under *M. westwoodii* in Table 6, but with a ?

Note 77

Kishi (1999) recorded multiple individuals of an unidentified *Idionyx* species from Bali, there is no other record of the genus from the island. *Idionyx montana* occurs in Java (including in the east of the island) and *I. murcia* occurs in Lombok so in all likelihood Kishi's records refer to one of these two species, probably the former.

Note 78

Kosterin (2018) presented a summary of knowledge of *Macromidia* in general and on the subspecies of *M. genialis* in particular. We have followed Kosterin (2018) here in treating all records of adult male *M. genialis* from Peninsular Malaysia (in Asahina (1987) and Lieftinck 1971a)), except that of the type of *M. g. genilais* itself, as *M. g. shanensis*. It is however worth noting here that of three differences in markings between *M. g, genialis* and *M. g. shanensis*, although considered "profound" by Kosterin (2018), two seem insignificant to us (likely to be the result of some combination of age, state of preservation of specimens or simple, non-geographic intraspecific variation), the only

one that seems likely to have any diagnostic value is the presence of a dorsal yellow mark on abdominal segment 6 in *M. g. shanensis* but (apparently) no such spot on the holotype of *M. g. genialis* (which could also be the result of age; a thorough check of the type specimen is required). It may well ultimately prove that all differences merely represent variation within a single species, not warranting separate subspecies status for *M. g. shanensis*. Also, although Asahina (1987) listed his male *M. genialis* specimens from Peninsular Malaysia among specimens from Thailand and Myanmar under *M. g. shanensis*, in his summary of distributions of the subspecies he only listed *M. g. genialis* from the Malay Peninsula (Asahina 1987: 706) but twice on the same page gives the distribution of *M. g. shanensis* as only Thailand and Myanmar, so it is not at all clear that Asahina (1987) actually considered his Malaysian material to be *M. g. shanensis*, although it does have the yellow spot on abdominal segment 6 and would therefore be that subspecies by Kosterin (2018). Records of female and larval *M. genialis*, as well as those with gender and/or life stage not mentioned, from Peninsular Malaysia are here considered unidentified to subspecies, whatever the subspecific name given in the original publication. *Macromidia g. erratica*, known from Sumatra and Borneo, is more clearly differentiated from the nominate subspecies and might be better treated as a separate species (as it was originally).

Note 79

The known distribution of *Aethriamanta brevipennis subsignata* is strange, with records from Sulawesi, the Moluccas and Flores in the Lesser Sunda Islands, plus an isolated record from Guadalcanal in the Solomon Islands (Lieftinck 1949a). There are few records of this subspecies and it may be the lack of records from between the Moluccas and the Solomon Islands is merely an artefact of sampling effort, but further investigation is warranted.

Note 80

Lieftinck (1954: 143) has "Nias (subspec. ?)" in the distribution of this species; we are not aware of any subsequent discussion of the status of the Nias population. We have listed the record from Nias under the nominate subspecies with a ? in Table 6.

Note 81

Lieftinck (1954: 144) includes records from Enggano under *Brachydiplax chalybea simalura* but states "The subspecific identification of the Enggano population remains still uncertain." No progress has been made on this issue since 1954 and we have listed the Enggano population under *B. c. simalura* in Table 6, but with a ?

Note 82

It has already been pointed out (Dow, Choong & Ng 2016) that two species are currently treated under the name *Brachydiplax farinosa*, with both occurring in Peninsular Malaysia. The type of *B. farinosa*, from Sumatra, is a female, rendering determination of which of the two taxa concerned is the true *B. farinosa* difficult. Both taxa are treated under *B. farinosa* in Table 1, but records from Borneo, where only one of the taxa has been recorded, are given with a ?

Note 83

Additionally to the records in Table 1, Ris (1909b) recorded *Cratilla lineata* from Selayar Island off South Sulawesi, there is no other record of the species from Sulawesi and no record at all from the Lesser Sunda Islands or the Moluccas and it is not clear which subspecies occurs on Selayar Island. However *Cratilla lineata assidua* occurs

in the Philippines and to the southwest of Sulawesi in Java so that its presence in Sulawesi is likely and we have included the record from Ris (1909b) under that subspecies with a ?

Note 84

There are striking differences in colouration and markings between populations of *Hylaeothemis clementia* from our region and those from further to the north (China, Laos, northern Thailand, and Vietnam), although clear morphological differences have not been reported. Investigation into whether there are intermediate populations in intermediate areas is needed, and if not, the northern populations are probably best treated as a distinct species.

Note 85

Several subspecies of *Lathrecista asiatica* have been described, mainly based on the pattern on the thorax and the extent and intensity of the dark spot at the wingtips. The latter shows age-related variation and is of little use in delimiting subspecies. Based on the pattern on the sides of the thorax Ris (1910) was only able to make clear distinction between two of these subspecies, the nominate subspecies *L. asiatica asiatica* (widespread in mainland Asia and Sundaland) and *L. a. festa* with a much-reduced dark pattern on the thorax (found in Australia and the Papuan region). *Lathrecista a. pectoralis* from Sulawesi and the Moluccas has not officially been synonymised and is therefore included in the checklist. Further work is needed to establish if this species indeed consists of two well recognisable taxa with *L. a. pectoralis* being a synonym of *L. a. festa* and, if so, which of these is found in the Philippines.

Note 86

Neurothemis disparilis was described from Borneo (Kirby 1889a) without further location information. It was later reported from Peninsular Malaysia (Laidlaw 1902a) and Singapore (Laidlaw 1902a) but there have been no subsequent records from outside of Borneo. Seehausen & Dow (2016) noted that of definite records from Borneo the only ones with more detailed location information are from West Kalimantan. Seehausen & Dow (2016) were not able to examine any specimens from Peninsular Malaysia or Singapore and wondered if they represented extinct populations. It is also quite possible that the non-Bornean populations are actually misidentifications of extreme examples of the highly variable *N. fluctuans* or (for instance) of *N. intermedia atalanta* Ris, 1919 which is known from outside of our region (including Thailand) and might possibly occur in, or occasionally stray into, Peninsular Malaysia. We have listed *N. disparilis* with a ? for both Peninsular Malaysia and Singapore in Table 1.

Note 87

The known distribution of *Onychothemis abnormis* is odd, with records from Java and Sumatra and also from the Philippines (for instance Hämäläinen & Muller 1997) but none from Borneo. However morphological differences between *Onychothemis* species are weak at best so that their differentiation is largely based on colour and pattern characters that might be variable between populations. A thorough revision of the entire genus is needed and might throw light on the peculiar distribution of *O. abnormis*.

Note 88

Karube & Takizawa (2012) recorded tandem formation between a male of *Orthetrum glaucum* and a female of *Procordulia fusiformis* at 1800–1900m a.s.l. on Gunung Alab in the Crocker Range in Sabah. They included photographs of the specimens, the *Orthetrum* is clearly *O. borneense*, not *O. glaucum*, a species with no published record from Sabah under the correct name.

Note 89

Da Silva Pinto *et al*. (2020) recorded *Orthetrum* cf. *glaucum* from Alor in the Lesser Sunda Islands. There is no record of *O. glaucum* from Alor and, although the species is known from all of the major Lesser Sunda Islands, the fact that the record in Da Silva Pinto *et al*. (2020) is based on a photograph of a female does leave room for doubt over its identity. *Ortherum glaucum* is therefore listed from Alor with a ? in Tables 1 and 6.

Note 90

Of the species that have been treated as subspecies of *Orthetrum pruinosum* (described from Sumatra) within our region, *O. schneideri* (also described from Sumatra) has been treated as a subspecies of *O. pruinosum* by most authorities for most of the last 100 years, although it was never formally combined with *O. pruinosum*. Judged from old records the ranges of the two taxa overlap broadly in Sumatra but we had some doubts over the identifications in some such records and in the database we took the default course of listing *schneideri* as a subspecies of *pruinosum*. Recently Janra *et al.* (2021) confirmed the occurrence of the two taxa at the same location, leaving little room for doubt over their separate status, so we have listed *O. schneideri* as a distinct species here. Although *O. p. clelia* has been suggested as the senior synonym of *O. schneideri* (e.g. see Seehausen (2017a)) and genuine morphological differences between the two are slight or lacking, DNA barcoding data (Naturalis unpublished) gives some support to the two being distinct species. Quite possibly *clelia* is actually a distinct species from *O. pruinosum* as well, but molecular data for the nominate subspecies is lacking and we have left *clelia* as a subspecies in Table 1 until a proper revision is conducted. Also see Note 16.

Records of *Orthetrum schneideri* or a taxon closely resembling *O. schneideri* from both parts of Timor (Seehausen (2017a), Seehausen *et al.* (2018)) are somewhat puzzling and we have listed the records from Timor with a ? in Table 1 for this reason.

Note 91

The only record of *Orthetrum silvarum* in the scientific literature is of the type series (all male) from one location in Java. In the collections of the Naturalis Biodiversity Centre there are specimens from Jambi Province in Sumatra. Since this is a highly significant record, we include it and give the details here: 1 ♂, 1 ♀, Sungai Ulu Jernih & tiny side streams, ca. 1500–1600 m a.s.l., Pelompek, Jambi Province, Sumatra, 22 v 1997, leg. M. Hämäläinen.

Note 92

Seehausen *et al.* (2018) recorded a male of *Orthetrum testaceum* from Romang Island in the Moluccas based on a photograph, briefly discuss supposed differences between the nominate subspecies and *O. t. soembanum* and state "it might belong to the ssp. *soembanum*". We have listed this record under *O. t. soembanum* and agree with Seehausen *et al.* (2018: 31) that "A review of the taxonomical status of ssp. *soembanum* is advised."

Note 93

Phyllothemis eltoni and *P. raymondi* appear poorly separated from each other and will likely prove ultimately to be a single species. The only character that has been used to separate them that appeared at all convincing is the supposed presence of a "sub-apical ventral spine" on the superior anal appendages of *P. eltoni* (the anal appendages of which have never been illustrated) but not on *P. raymondi* (Lieftinck 1950a: 645). In August 2023 RD checked the type specimen of *P. eltoni* in the Natural History Museum, London and found no "sub-apical ventral spine" on the superior anal appendages. It appears that there was an error in the original description of *P. eltoni* (Fraser 1935) that has propagated through the literature until now. Until a more thorough comparison of material from Sundaland

with material from Myanmar and Thailand has been made we refrain from synonymising the two *Phyllothemis* taxa in case other for now, undetected, differences are present. The only record of *P. eltoni* from our region is that of a single male in Donnelly (1998) from Perak in Peninsular Malaysia without any descriptive comments. Orr (2005) noted that it was possible that Donnelly's record actually refers to *P. raymondi* and we agree with this, however without examining the specimen this suspicion cannot be confirmed and we have left *P. eltoni* in Table 1 under Peninsular Malaysia.

Note 94

As noted by Dow, Butler *et al.* (2021) three distinct species are being treated under the name *P. serrata* (all of which occur in Borneo). A revision of the genus is being prepared and until it is published it is not possible to say whether records from anywhere except Sumatra are the true *P. serrata*, except that it is one of the species occurring in Sarawak. For this reason records from most areas in Tables 1 and 6 are given with a ?

Note 95

Da Silva Pinto *et al*. (2020) recorded *Rhodothemis nigripes* cf from Timor Leste based on photographs of a teneral male; there is no other record of the genus from Timor. Although, based on the known distributions of species in the genus, the occurrence of *R. nigripes* in Timor is likely, in the circumstances the single record from the island is best treated as in need of confirmation and this is reflected by the ? in Table 1. Kalkman & Orr (2014) treated records of *Rhodothemis rufa* from Halmahera in the Moluccas (another island with no other records of the genus) as *Rhodothemis* sp., since these records are most likely to refer to *R. nigripes* that species is listed with a ? under Halmahera in Table 1.

Note 96

The *Rhyothemis phyllis* complex, with no less than 12 subspecies described, is problematic, the reader is referred to the recent discussion of the issues involved in Da Silva Pinto *et al.* (2020). Here we have generally left records under the subspecies listed in the source literature, or in the case of records not assigned to a subspecies, placed them under the subspecies known to occur in the same area. In particular Seehausen *et al.* (2018) recorded *R. phyllis* from Rote based on a photograph and remarked that based on the known distribution subspecies *ixias* was the most likely but that further studies were likely to result in the synonymizing of *ixias* with the nominate subspecies; we have placed the record from Rote under *ixias* with a ?.

Note 97

Lieftinck (1942) listed *Tetrathemis hyalina* from Timor without further details of the location. We are not aware of any subsequent record of this species from Timor and it remains unclear from which part of the island the sole record comes from. For this reason we have listed the species from both Timor Leste and the Indonesian part of the island with a ?

Note 98

Tetrathemis specimens morphologically identical (or almost identical) to *T. platyptera* but lacking strongly pigmented areas on the hindwing are known from Sabah and Sarawak. These specimens might represent a distinct species or a Bornean form or subspecies of *T. platyptera*; this issue is the subject of ongoing investigation and for this reason records from Borneo are given as a ? in Table 1.

Note 99

There is an old record of *Tramea virginia* from Sarawak (Hincks 1930), this had long been thought to be a case of wind-blown migrants rather than a breeding population but recent records (e.g. Dow, Ahmad *et al.* 2021) demonstrate that this is not the case. However the Bornean population differs from typical *T. virginia* in a number of respects and might not be that species, for this reason the records from Sarawak, and Sabah (Dow *et al.* 2022), are included with a ? under *T. virginia*.

Note 100

See Dow & Orr (2021) on past confusion over *Tyriobapta kuekenthali* and *T. laidlawi* and uncertainty over the occurrence of the latter in Peninsular Malaysia.

Note 101

Ris (1912b) recorded *Zygonyx ida* from Timor without further location information and based on a female specimen, this appears to be the only record of the genus from the island. Since we cannot tell if the record comes from the Indonesian part or Timor Leste we have included it Table 1 with a ? for both parts of the island.

Discussion

Sundaland and Wallacea

Table 3 gives an overview of the number of species and endemic species found in Sundaland and Wallacea. The table shows that with 549 species (302 Zygoptera, 247 Anisoptera) Sundaland holds far more species than the 270 (125 Zygoptera, 145 Anisoptera) found in Wallacea. The percentage of Anisoptera is slightly higher and the percentage of endemics (see below) is slightly lower in Wallacea. Only 76 of the 743 (ca. 10%) species (59 Anisoptera, 17 Zygoptera) are shared between both Sundaland and Wallacea. Table 4 compares Sundaland and Wallacea at family level, showing that of the 19 families only nine families have species shared between the two and only for Coenagrionidae, Aeshnidae and especially Libellulidae this is a substantial number of species. Of the 19 families, four (Devadattidae, Rhipidolestidae, Philosinidae, Chlorogomphidae) do not occur in Wallacea while one (Isostictidae) is not found in Sundaland and another two (Euphaeidae and Calopterygidae) only marginally occur in Wallacea (Figure 6). The strong faunal break between Sundaland and Wallacea demonstrates that despite the relatively strong dispersal capacities of dragonflies and damselflies the seas between Borneo and Sulawesi (120 km at the narrowest) and Bali and Lombok (40 km at the narrowest) form effective barriers against faunal exchange. Table 5 gives an overview of the species occurring in six or more of the main regions. This list of most widespread species is dominated by Libellulidae and to a lesser extent Coenagrionidae with only three of the 37 species belonging to other families. It is furthermore evident that species of standing water are far more likely to have widespread distributions with only one (*Trithemis festiva*) of the 37 species being largely dependent on running waters.

TABLE 3. Number of species and the endemics for Sundaland and Wallacea.

(sub)region	Species	Anisoptera	Zygoptera	Endemic species	Endemic Anisoptera	Endemic Zygoptera
Sundaland & Wallacea	743	333 (45%)	410 (55%)	482 (65%)	160 (48%)	322 (79%)
Sundaland	549	247 (45%)	302 (55%)	333 (61%)	109 (44%)	224 (74%)
Wallacea	270	145 (54%)	125 (46%)	145 (54%)	48 (33%)	97 (78%)

Diversity per region and island

As expected, the generally much larger islands of Sundaland have a much higher diversity (Table 2). This is not only a matter of size but is also influenced by these islands having been connected during glacial times facilitating exchange of taxa. This explains why the smaller Java plus Bali (134,000 km^2) with 166 species has more species than Sulawesi (180,000 km^2) which has 137 species. With 336 species Borneo is the most species rich. In the past two decades the fauna of Malaysian Borneo and Brunei, especially that of Sarawak, was intensely studied resulting in the description of more than fifty species. It is not unlikely that a similar effort in Sumatra would show the island to be almost as rich. Of the 743 species found in Sundaland and Wallacea 333 (ca. 45%) belong to the Anisoptera and 410 (ca. 55%) to the Zygoptera (Figure 7). The percentage of Anisoptera ranges from ca. 44% and ca. 46% on Labuan and the entirety of Borneo respectively, to ca. 77% and ca. 78% on Lombok and Seram (Table 2) indicating that there is tendency that the percentage Anisoptera is higher on smaller, less diverse islands.

TABLE 4. Comparison between the fauna of the Sundaland and Wallacea. The second column gives the total number of species from both areas combined, that of the third and fourth column give the number of species found in Sundaland and Wallacea, respectively. Column five gives the overlap in the species composition while column six gives the number of single islands endemics with the percentage in brackets of species that is restricted to a single island.

Family	Combined	Sundaland	Wallacea	Overlap (%)	Single region endemics (%)
Aeshnidae	58	40	25	8 (14%)	19 (33%)
Argiolestidae	15	8	7	0 (0%)	12 (80%)
Calopterygidae	18	17	1	0 (0%)	10 (56%)
Chlorocyphidae	61	38	23	0 (0%)	44 (72%)
Chlorogomphidae	6	6	0	0 (0%)	4 (67%)
Coenagrionidae	104	86	31	13 (13%)	44 (42%)
Corduliidae	14	8	8	2 (14%)	9 (64%)
Devadattidae	6	6	0	0 (0%)	5 (83%)
Euphaeidae	16	16	1	1 (6%)	9 (56%)
Gomphidae	70	65	7	2 (3%)	33 (47%)
Isostictidae	5	0	5	0 (0%)	4 (80%)
Lestidae	15	9	8	2 (13%)	6 (40%)
Libellulidae	154	103	96	45 (29%)	30 (19%)
Macromiidae	22	18	6	2 (9%)	9 (41%)
Philosinidae	6	6	0	0 (0%)	3 (50%)
Platycnemididae	72	55	18	1 (1%)	48 (67%)
Platystictidae	89	58	31	0 (0%)	87 (98%)
Rhipidolestidae	3	3	0	0 (0%)	3 (100%)
Synthemistidae	9	6	3	0 (0%)	6 (67%)

Endemism

Of the 743 species found in our area 482 are not found outside Sundaland and Wallacea. Of these 145 are only found in Wallacea and 333 are only found in Sundaland. Only four species endemic to the whole area are shared between Sundaland and Wallacea: *Euphaea lara*, *Gynacantha musa*, *Hemicordulia australiae*, *Procordulia sambawana*, all of which are shared between Java/Bali and the Lesser Sundas (also one endemic subspecies: *Neurothemis intermedia excelsa*). Two further endemic subspecies (where the entire species is not endemic to Sundaland plus Wallacea) are known: *Asiagomphus xanthenatus malayanus* and *Macrogomphus phalantus phalantus*. Of the 743 species 358 (48%) are single region endemics (in most cases these are actually single island endemics). The percentage of single region endemics varies strongly between families (Table 4) ranging from 19% for Libellulidae to 80% or more for Platystictidae, Devadattidae, Rhipidolestidae, Argiolestidae, and Isostictidae. The Platystictidae are particularly rich in single region and island endemics with 84 of the 89 species restricted to one island.

TABLE 5. Overview of the most widespread species with species occurring in six or more of the regions listed. The number of regions is given between brackets.

Family	Species (number of regions recorded)
Lestidae	*Lestes praemorsus* (7)
Coenagrionidae	*Agriocnemis femina* (8); *Agriocnemis pygmaea* (7); *Archibasis viola* (6); *Argiocnemis rubescens* (7); *Ischnura senegalensis* (7); *Pseudagrion microcephalum* (7); *Xiphiagrion cyanomelas* (6)
Aeshnidae	*Anax guttatus* (7); *Gynacantha bayadera* (6)
Libellulidae	*Acisoma panorpoides* (6); *Agrionoptera insignis* (7); *Brachydiplax chalybea* (7); *Brachythemis contaminata* (6); *Camacinia gigantea* (7); *Crocothemis servilia* (7); *Diplacodes trivialis* (7); *Lathrecista asiatica* (7); *Lyriothemis cleis* (6); *Macrodiplax cora* (7); *Nannophya pygmaea* (6); *Neurothemis ramburii* (6); *Orchithemis pulcherrima* (6); *Orthetrum chrysis* (7); *Orthetrum glaucum* (7); *Orthetrum sabina* (8); *Orthetrum testaceum* (7); *Pantala flavescens* (7); *Potamarcha congener* (7); *Raphismia bispina* (7); *Rhyothemis phyllis* (8); *Tholymis tillarga* (7); *Tramea transmarina* (7); *Trithemis aurora* (6); *Trithemis festiva* (7); *Zyxomma obtusum* (7); *Zyxomma petiolatum* (7)

Prioritisation for research

It is about a hundred years since the study of the odonates of Sundaland and Wallacea started in earnest. During that period our knowledge on the distribution of species in the area has strongly increased but much is still unknown which is hampering, for instance, conservation. In order to address this scarcity of data the action is needed on the following subjects: taxonomy, funding, field guides and legislation.

Taxonomy and funding. Having well defined species and genera is essential to all biodiversity studies. A very rough estimate is that at least 100 to 200 odonate species occurring in Sundaland plus Wallacea are still undescribed. The fundamental need here is for increased funding for both alpha taxonomy and for field surveys, but such funding is instead becoming scarcer and in most cases comes with restrictive conditions (for instance many grants are only available for early career researchers, therefore excluding experienced workers; a more sensible approach would be to insist on the inclusion of early career researchers where possible) or generally unrealistic demands such as demonstrating genuine long-term benefits to local communities or concrete conservation gains for a species where the immediate need is for enough data to determine if the species is actually threatened or just appears threatened because not enough is known about its distribution. Investing in alpha taxonomy and faunistic work is therefore needed and could, for instance and to some extent, be achieved by PhD projects in which basic taxonomic work is combined with work on diversity and conservation, and an increase in the number of funding bodies willing to support general (rather than focused on particular species) surveys by qualified workers.

Another way to provide some speed up of taxonomic work is by making DNA barcodes of all species available based on existing collections. We are aware of the limitation of barcodes as there are not only many cases known where clearly distinct species cannot be distinguished using barcodes but also some single species show high (often clearly geographical but occurring over relatively short distances) variability in the COI marker; this is an area where further work is needed to better understand the shortcomings of DNA barcoding as a tool in taxonomy. A further issue, despite claims to the contrary, is that the effective use of barcodes is not as inexpensive as is often claimed (see Zamani *et al.* 2022 for a recent discussion of this and other issues with solely barcode based taxonomic studies). Nonetheless, the availability of barcodes will often make it possible to identify larvae based on DNA and will in some cases help to test whether or not taxa are distinct.

In addition to the description of species, generic revisions are also needed in order to elucidate species limits and identification characters. There are many smaller and larger problems, but the following genera are among those most in need of revision: *Prodasineura*, *Aciagrion*, *Amphicnemis*, *Teinobasis*, *Gynacantha*, *Oligoaeschna* and *Onychogomphus sensu latu* and *Mortonagrion* in relation to *Agriocnemis*.

In addition to work on adult odonates work is needed on larvae. This is especially true for those genera that are often easier to find as larva than as adult. A key to the larvae of the genera found in Sundaland and a key to the genera found in Wallacea is highly desirable and of higher priority than additional larval descriptions of single species. The larva of the following genera have not yet been described: *Bornargiolestes*, *Disparocypha*, *Dysphaea, Melanocypha*, *Pachycypha*, *Rhinoneura*, *Sclerocypha*, *Sundacypha*, *Watuwila*, *Tanymecosticta*, *Agyrtacantha*, *Amphiaeschna*, *Linaeschna*, *Oligoaeschna*, *Gomphidictinus*, *Nepogomphus*, *Celebophlebia*, *Chalybeothemis*,

Phyllothemis, *Pornothemis*, *Protorthemis*. The larva of *Agyrtacantha* is depicted in Orr & Kalkman (2015) but has not been officially described. *Onychogomphus* is a special case as probably none of the seven species listed as *Onychogomphus* from Sundaland (absent from Wallacea) belongs to *Onychogomphus* in the strict sense. Description of the larvae of these *Onychogomphus sensu latu* species would help in elucidating their true affinities.

Field guides. With the exception of the Malay Peninsula and Singapore none of the regions discussed in this paper have even reasonably complete field guides available. This means that identification of species needs to be based on a combination of field guides for other regions and numerous taxonomical papers. This leads to numerous errors and discourages biology students, ecologists and volunteers living in Sundaland or Wallacea from starting to work on dragonflies and damselflies. Making field guides for the different regions should therefore be a priority. However, producing field guides is time consuming and poorly compensated, while field guides as such are not fully acknowledged as scientific output.

Legislation. In addition to taxonomic problems and lack of field guides fieldwork is further hampered by legislation. We recognise the need for permit systems to be in place, especially for work in protected areas, but acquiring permits for field work is often difficult. Complicated, costly and time-consuming permit processes for catching and collecting insects are not contributing to their conservation (the situation is entirely different to that with many vertebrates where taking even small numbers of specimens can damage already small populations) but merely hampers field work, contributing to the absence of data needed for establishing conservation priorities. Simple, transparent and inexpensive permit systems so that permits can easily be acquired for basic data collection by even individual workers or small and poorly funded groups of workers would help to accelerate research.

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Appendix: Species recorded from smaller islands

Table 6 is a list of species recorded from 80 smaller islands and island groups within Sundaland and Wallacea. The abbreviations for islands and island groups used in Table 6a are explained in Table 6b.

TABLE 6. Species recorded from the smaller islands are shown in 6a, 6b is the list of codes used for island names. Where a +/- is present after a particular code in Table 6a this indicates (+) main island plus one or more of its satellites or (-) one or more satellite islands but not the main island. For example, be+ in Table 6a indicates presence on Belitung plus one or more of the smaller satellite islands of Belitung listed in Table 6b, si- indicates presence on one or more of the smaller satellite islands of Simeulue but not on Simeulue itself.

TABLE 6a.

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Family: Lestidae										
Lestes										
Lestes concinnus							kn, m, nk			
Lestes praemorsus decipiens		la	m			be	d, kn, pa			
Lestes praemorsus praemorsus	t, u								s, ta	
Lestes praevius						eg				
Lestes quercifolia									am, l	
Lestidae										
Orolestes wallacei						be				
Platylestes										
Platylestes heterostylus		la	b			be				
Family: Platystictidae										
Drepanosticta										
Drepanosticta amboinensis									am	
Drepanosticta bicolor								bu		
Drepanosticta bifida									bc	
Drepanosticta ephippiata								ba		
Drepanosticta fontinalis		pa, pe, t								
Drepanosticta hamulifera								k		
Drepanosticta krugeri						m				
Drepanosticta obiensis									o	
Drepanosticta psygma									bc	
Drepanosticta robusta									ke	
Drepanosticta rufostigma										

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Drepanosticta sharpi						l				
Drepanosticta sundana							nk			
Protosticta										
Protosticta rozendalorum								sa		
Protosticta simplicinervis								sa		
Family: Euphaeidae										
Dysphaea										
Dysphaea dimidiata						be				
Euphaea										
Euphaea aspasia						m, n, si+				
Euphaea impar		pa, pe, t			t	ba, l				
Euphaea lara lombockensis										al, g, p
Euphaea modigliani						m				
Euphaea ochracea		pe								
Euphaea subcostalis										
Euphaea tricolor										
Euphaea variegata							pa			
Family: Devadattidae										
Devadatta										
Devadatta argyoides argyoides		pa, pe, ph				l				
Devadatta argyoides tiomanensis		t								
Family: Philosinidae										
Rhinagrion										
Rhinagrion borneense										
Rhinagrion tricolor							nk			
Rhinagrion viridatum		la								
Family: Argiolestidae										
Argiolestes										
Argiolestes alfurus									bc	
Argiolestes obiensis									o	
Celebargiolestes										
Celebargiolestes cinctus								sa		
Celebargiolestes toli								ba		

...continued on the next page

TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Podolestes										
Podolestes orientalis						be, l, r				
Family: Calopterygidae										
Echo										
Echo modesta		la								
Echo uniformis						eg				
Neurobasis										
Neurobasis chinensis		la, pe				n, si				
Neurobasis longipes										
Vestalis										
Vestalis amaryllis			b			ba				
Vestalis amethystina		pa, pe								
Vestalis amoena		pe, t	b	k		ba, be+, l				
Vestalis gracilis		la, pe								
Vestalis lugens						eg, m, n				
Family: Chlorocyphidae										
Aristocypha										
Aristocypha fenestrella		pe, t				l				
Heliocypha										
Heliocypha angusta angusta						n				
Heliocypha angusta oceanis						eg				
Heliocypha biforata		la				ba, be+				
Heliocypha biseriata					t	l				
Heliocypha fenestrata fenestrata							nk, pa			
Heliocypha vantoli						m				
Libellago										
Libellago aurantiaca						be+				
Libellago hyalina						ba, be+				
Libellago lineata		pe								
Libellago manganitu								sa		
Libellago sumatrana						m, n, si				
Libellago xanthocyana								ba, k		
Rhinocypha										
Rhinocypha cucullata										
Rhinocypha frontalis frontalis								bu		

...continued on the next page

TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Rhinocypha humeralis			b							
Rhinocypha monochroa								k, se		
Rhinocypha pagenstecheri pagenstecheri										p
Rhinocypha pagenstecheri pusilla									dm	
Rhinocypha pagenstecheri timorana									we	al
Rhinocypha pelengensis								ba		
Rhinocypha phantasma								bu		
Rhinocypha sangihensis								sa		
Rhinocypha tincta sagitta									ke	
Rhinocypha tincta semitincta									bc, bd, eb, ke, mr, s, te	
Rhinocypha togeanensis								to		
Rhinocypha ustulata									am, s	
Sclerocypha										
Sclerocypha bisignata								to		
Family: Isostictidae										
Selysioneura										
Selysioneura aglaia									mr	
Tanymecosticta										
Tanymecosticta capillaris									ta	
Tanymecosticta fissicollis									ta	
Tanymecosticta simonae									ke	
Family: Platycnemididae										
Calicnemia										
Calicnemia chaseni		pe								
Coeliccia										
Coeliccia albicauda		pe, t								
Coeliccia didyma		la								
Coeliccia erici		pa								
Coeliccia lieftincki							nk			
Coeliccia membranipes membranipes							nk			
Coeliccia membranipes nereis						eg				

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Coeliccia nigrohamata										
Coeliccia octogesima		pa								
Copera										
Copera marginipes		la				m	b, kn, nk, pa			
Copera vittata acutimargo						si+				
Copera vittata vittata	t, u	la, pa, pe, ph	b			be+, l				
Elattoneura										
Elattoneura aurantiaca						ba, be+				
Elattoneura coomansi						ba, be				
Elattoneura longispina						be				
Nososticta										
Nososticta circumscripta									bc, o	
Nososticta eburnea									ke	
Nososticta exul									bc, eb, o	
Nososticta insignis							nk			
Nososticta moluccensis									am, l	
Nososticta selysi										k, sa
Onychargia										
Onychargia atrocyana	u	pa				ba, be+, m	pa			
Palaiargia										
Palaiargia obiensis									o	
Palaiargia optata									o	
Palaiargia perimecosoma									bc	
Prodasineura										
Prodasineura autumnalis							b, kr, nk			
Prodasineura collaris		pa, pe, la				be+, m, si				
Prodasineura delicatula							nk, pa			
Prodasineura humeralis		la								
Prodasineura hyperythra										
Prodasineura interrupta						be+				
Prodasineura laidlawii		la, pe, ph								
Prodasineura notostigma		pa, pe, t				ba				
Prodasineura verticalis delia						n				

...continued on the next page

TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Prodasineura verticalis verticalis						be+, m, si, n, w				
Pseudocopera										
Pseudocopera ciliata		la				be+				
Family: Coenagrionidae										
Aciagrion										
Aciagrion borneense		la								
Aciagrion fragile									ta	
Aciagrion hisopa	t, u	b, pe, la				be+				
Agriocnemis										
Agriocnemis femina femina	s, u	c, la, pa, pe, pr, t	b, m		t	ba, be+, eg, k, m, n, se, si, w	b, kr		am, bc, ke, l, s, te	r
Agriocnemis minima		pe				be+				
Agriocnemis naia		pe								
Agriocnemis nana		la								
Agriocnemis pygmaea	s	la, pe, t	m			be, k	b, kr		dm	
Amphicnemis										
Amphicnemis bicolor			b							
Amphicnemis billitonis						be				
Amphicnemis gracilis		c, pa								
Amphicnemis kuiperi						be+				
Amphicnemis smedleyi						m, si?				
Archibasis										
Archibasis crucigera									bc, mr, te	
Archibasis melanocyana		pe				be				
Archibasis tenella						be				
Archibasis viola	u		m		t	ba, be+, eg	kr			
Argiocnemis										
Argiocnemis rubescens lunulata								s	s	
Argiocnemis rubescens rubeola	u	c, la, pa					nk			

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Argiocnemis rubescens rubescens									mr	
Austroallagma										
Austroallagma sagittiferum									ta	
Ceriagrion										
Ceriagrion auranticum auranticum		la				w	b, h, pa			
Ceriagrion batjanum									bc	
Ceriagrion calamineum		la, pe					h, kn			
Ceriagrion cerinorubellum	s, u	c, la, pa, pe		k	n	ba, be+, m, n, r, si				
Ceriagrion chaoi		pa								
Ceriagrion olivaceum		la								
Ceriagrion praetermissum		la								
Ischnura										
Ischnura senegalensis	s, u	b, c, j, la, pa, pe, ph, pr, t	b, m			ba, be+, bh, k, se, si, w	b, kn, kr, t		s	r
Mortonagrion										
Mortonagrion aborense		la				be+				
Mortonagrion amoenum						si				
Mortonagrion appendiculatum						be+				
Mortonagrion arthuri	s, t, u	pa, t				be+				
Mortonagrion falcatum			m			be+	kr			
Paracercion										
Paracercion calamorum dyeri		la				w				
Pericnemis										
Pericnemis stictica						eg	nk			
Pericnemis triangularis			b?							
Pseudagrion										
Pseudagrion australasiae		b, la								
Pseudagrion coomansi						ba, be+				
Pseudagrion coriaceum									am	

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Pseudagrion microcephalum	u	b, c, la, pa, pe, ph, t	m			be+, k, si+, w	pa		am, bb, l, s	al, r
Pseudagrion pilidorsum declaratum										al, sa
Pseudagrion pilidorsum deflexum									dm, we	r
Pseudagrion pilidorsum enganoense						eg				
Pseudagrion pilidorsum obscurum						n				
Pseudagrion pilidorsum simalurum						m, si				
Pseudagrion pruinosum		pe, t					b			
Pseudagrion rubriceps rubriceps		b, la, pe					b			
Pseudagrion ustum									s	
Teinobasis										
Teinobasis euglena						eg	pa			
Teinobasis helvola									bc	
Teinobasis lorquini									s	
Teinobasis rajah *		pe?								
Teinobasis ruficollis	s, t, u					be+, l, r				
Teinobasis rufithorax									bc, ke, l, o, te	
Teinobasis superba									bc, te	
Xiphiagrion										
Xiphiagrion cyanomelas						eg, si-			am, l, s, we	r, se
Family: Aeshnidae										
Agyrtacantha										
Agyrtacantha dirupta									bc, ke, o, s, ta, te	
Agyrtacantha microstigma									bc, te	
Anaciaeschna										
Anaciaeschna jaspidea						si	kn, pa		am, bd, l	

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Anax										
Anax fumosus fumosus									bc, o, te	
Anax gibbosulus									am, bc, bd, ke, l, o, te	sa
Anax guttatus	u	an, c, la, pe, t	b, m			ba, be+, eg, k	b, kn, kr		am, bd, ki, l, te, we	g, se
Anax panybeus	u						pa			
Gynacantha										
Gynacantha arsinoe								ta		
Gynacantha basiguttata		pa	b			be, eg, si+	nk, pa			
Gynacantha bayadera	s	la				ba, be+	kn, nk			sa
Gynacantha calypso									am	
Gynacantha dohrni	s, u		m			be, m, si	nk			
Gynacantha kirbyi									am, ta	
Gynacantha maclachlani						be+				
Gynacantha mocsaryi									am, bc, ke, l, mr, te	
Gynacantha nausicaa									bc, g, mr, o, te	
Gynacantha pasiphae									am, bc, mr, o	
Gynacantha rosenbergi									am, ke, l, ta	
Gynacantha stenoptera										
Gynacantha subinterrupta	s, u	c				ba	b, kn, kr			
Heliaeschna										
Heliaeschna crassa					n?	be+				
Heliaeschna idae						ba, be+				
Heliaeschna uninervulata	u					eg				
Indaeschna										
Indaeschna grubaueri		la								

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Oligoaeschna										
Oligoaeschna buehri						be				
Oligoaeschna modiglianii						n				
Oligoaeschna pseudosumatrana						p				
Oligoaeschna sumatrana						m				
Oligoaeschna uropetala						m, p				
Oligoaeschna venatrix								ba, bu		
Tetracanthagyna										
Tetracanthagyna degorsi						n				
Tetracanthagyna plagiata						ba, be				
Family: Gomphidae										
Acrogomphus										
Acrogomphus malayanus		ao, b, la, pa								
Euthygomphus										
Euthygomphus parvus		la								
Gomphidia										
Gomphidia abbotti abbotti		la				w				
Gomphidia maclachlani						be+				
Heliogomphus										
Heliogomphus kelantanensis	u									
Ictinogomphus										
Ictinogomphus acutus						be				
Ictinogomphus australis lieftincki									bc, ke, o, te	
Ictinogomphus decoratus decoratus						be				
Ictinogomphus decoratus melaenops	u	c, la, pe, ph, t				ba, be+, w				
Leptogomphus										
Leptogomphus lansbergei assimilis						m				
Leptogomphus risi		la								

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Leptogomphus tioman		t, ph								
Macrogomphus										
Macrogomphus albardae						ba, be+				
Macrogomphus decemlineatus						be+				
Macrogomphus quadratus				t		be				
Megalogomphus										
Megalogomphus sumatranus		la, pe				be				
Microgomphus										
Microgomphus chelifer chelifer		b, la, pa, pe, t								
Microgomphus chelifer thelyphonus							nk			
Paragomphus										
Paragomphus capricornis		la, pe								
Stylogomphus										
Stylogomphus malayanus		la								
Family: Chlorogomphidae										
Chlorogomphus										
Chlorogomphus arooni		la, t								
Chloropetalia										
Chloropetalia kimminsi						n				
Family: Macromiidae										
Epophthalmia										
Epophthalmia vittigera vittigera	u	la, pe, t				ba, be+				
Macromia										
Macromia chalciope									bc	
Macromia cincta		la, pe				ba, be+				
Macromia cydippe		la				ba, be				
Macromia gerstaeckeri		la								
Macromia westwoodii		la, pe, t?								

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Synthemistidae										
Idionyx										
Idionyx montana		la				m				
Idionyx yolanda		b, la, pa				be				
Macromidia										
Macromidia genialis genialis										
Macromidia genialis shanensis		pe								
Family: Corduliidae										
Hemicordulia										
Hemicordulia tenera	se									
Family: Libellulidae										
Acisoma										
Acisoma panorpoides	u	c, la, pe				ba, be+, k, m, w	b			
Aethriamanta										
Aethriamanta aethra		la								
Aethriamanta brevipennis brevipennis	u					be+				
Aethriamanta gracilis	u	la				be+				
Agrionoptera										
Agrionoptera cynthiae									ta	
Agrionoptera insignis chalcochiton						m, si+				
Agrionoptera insignis insignis	s, u	lg, pa, ph, t	m			ba, be+, k, r, se	b, d, kn, kr, nk, pa, pe			al, r
Agrionoptera insignis nereis						eg				
Agrionoptera insignis papuensis									ke	
Agrionoptera longitudinalis longitudinalis									bc, eb, g, te	
Agrionoptera quatuornotata								se	s	
Agrionoptera sexlineata	u					be+, l				

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Agrionoptera similis									am, bc, bd, eb, g, ke, l, mr, o, s, ta, te	
Brachydiplax										
Brachydiplax chalybea chalybea	u	c, la, pa, pe, ph, t	m	k	n	ba, be+, n?, r, w	kr			
Brachydiplax chalybea simalura						eg?, m, si+				
Brachydiplax denticauda									s	
Brachydiplax duivenbodei									am, bc, l, s, te	
Brachygonia										
Brachygonia oculata		pa			n	ba, be+				
Brachygonia puella						be				
Brachythemis										
Brachythemis contaminata		c, la, pe					nk			r
Camacinia										
Camacinia gigantea	u	la, pa	b, m			be+, eg	kn, kr, pa, pe		am, g, ki, l, mr	
Celebophlebia										
Celebophlebia carolinae								sa		
Chalybeothemis										
Chalybeothemis fluviatilis	u					be+				
Cratilla										
Cratilla lineata assidua							pa, pe	se?		
Cratilla lineata lineata	c, u, t	la, pa				k				
Cratilla metallica	u	la, pa, t				ba, m, si				
Crocothemis										
Crocothemis servilia servilia	s, u	c, la, pa, pe, t				be+, k, w	b, t		bc, te	al, r, se
Diplacina										
Diplacina militaris militaris								ba		
Diplacina phoebe amoena									bc, o	

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Diplacina phoebe phoebe									am	
Diplacina phoebe phryne									am	
Diplacina sanguinolenta								ba		
Diplacodes										
Diplacodes bipunctata									am, bb, ke	
Diplacodes nebulosa	s	la, pe				ba, be+				
Diplacodes trivialis	s, u	c, la, lg, pa, pe, ph, pr, t	m	k		ba, be+, eg, k, m, n, r, si+, w	b, kn, kr, m, pa, t		am, mr, l, s, ta, we	al, k, r, se
Hydrobasileus										
Hydrobasileus brevistylus									bc, te	
Hydrobasileus croceus		la, pe, ph				ba, be+, w				
Hydrobasileus vittatus									am	
Indothemis										
Indothemis limbata		la								
Indothemis carnatica	u									
Lathrecista										
Lathrecista asiatica asiatica	c, u	c, la, pa, pe	m			ba, w	kn, nk, pe			k
Lathrecista asiatica festa									ta	
Lathrecista asiatica pectoralis									am	
Lyriothemis										
Lyriothemis biappendiculata		la				ba, m				
Lyriothemis cleis cleis		t	b			ba, m	nk			
Lyriothemis cleis frontalis									s	
Lyriothemis magnificata						ba, be	nk, pe			
Lyriothemis meyeri									bc, o, te	
Lyriothemis salva										
Macrodiplax										
Macrodiplax cora	s, u	la, lg	m			ba, be+, k, w	b, nk, pa, t		ke, wa	r
Nannophlebia										
Nannophlebia aerostiba									am	
Nannophlebia anacharis									bc	

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Nannophlebia arethusa									am, l, o	
Nannophlebia lorquini									am, bc	
Nannophya										
Nannophya pygmaea	u	pa, pe				ba, be+, m, r, si			am, bc, l, mr, s, te	
Nannophyopsis										
Nannophyopsis chalcosoma						be				
Nesoxenia										
Nesoxenia lineata						ba, be, m				
Nesoxenia mysis interrogata									bc	
Nesoxenia mysis moluccana									bc, eb, ke, l, mr, o	
Nesoxenia mysis tarafia									am, ke, l	
Neurothemis										
Neurothemis decora									am	
Neurothemis feralis						k	nk, t			
Neurothemis fluctuans	s, u	c, la, pa, pe, ph, pr, t	b, s	k	n	ba, be+, n, r, si+, w	nk, pa			
Neurothemis fulvia		la, pe								
Neurothemis intermedia excelsa							kn			
Neurothemis manadensis								bu, to	am, bc, eb, l, mr, s, te	
Neurothemis ramburii martini									ke, s	
Neurothemis ramburii oceanis						eg				
Neurothemis ramburii ramburii						eg-, n, si, w	b, nk, pa	to	am, bc, bd, l, s, te	al, r, se
Neurothemis stigmatizans bramina									am, ke, o, ta	
Neurothemis terminata obscura						se	kr			
Neurothemis terminata terminata			b, m			ba, k, m	b, d, kn, pa			
Neurothemis tullia		pe								

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Onychothemis										
Onychothemis culminicola										
Onychothemis testacea		la, pe								
Orchithemis										
Orchithemis pruinans						ba, be+				
Orchithemis pulcherrima	t, u	pa, pe		k	n	ba, be+, l, m, si				
Orthetrum										
Orthetrum caledonicum										se
Orthetrum chrysis	u	b, c, la, lg, pa, pe, ph, t,		k	n	ba, be+, m, n, r, si, w	b, kr			
Orthetrum glaucum	u	c, la, lg, pa, pe, ph, t				ba, be+, k, n			am, l	al?
Orthetrum luzonicum		la				be				
Orthetrum pruinosum pruinosum						be, n				al
Orthetrum sabina sabina	s, se, u	b, c, la, pa, pe, t	b, m		n	ba, be+, eg, k, m, n, si+	b, kn, kr, nk, pa, pe, t		am, bb, bc, eb, ke, l, s, ta, te	al, r, se
Orthetrum serapia									am, mr, s, ta	
Orthetrum schneideri		b, c, la, ph	b			n, si				
Orthetrum testaceum soembanum									rm?, we	al
Orthetrum testaceum testaceum	u	c, la, lg, pa, pe, t	b, m	k		k, m, n, r, si, w	kn, pa		bc	r
Orthetrum triangulare malaccense						eg				
Orthetrum villosovittatum villosovittatum									am, bc, eb, ke, l, s, te	
Pantala										
Pantala flavescens	s, u	an, c, la, pa, pe, ph, pr, t	m			ba, be+, eg, k, m, n, r, si	b, kr, nk, si		am, bc, bd, eb, ke, ki, l, s, ta, we	al, k, r

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Pornothemis										
Pornothemis serrata						be+?, l?, m?, si?				
Pornothemis starrei	c, t, u					be+				
Potamarcha										
Potamarcha congener	u	c, la, pe					b, kn, nk	se	am, l, s	r, se
Pseudothemis										
Pseudothemis jorina	u	la, pe								
Raphismia										
Raphismia bispina	u, t, s	t	m		n	be+, k, r	kr, t		am, bc, eb, l, mr, s, te	
Raphismia inermis						ba				
Rhodothemis										
Rhodothemis nigripes									bc, o, s	
Rhodothemis rufa	u	la, pe, ph, pr				ba, be, eg, w	nk			
Rhyothemis										
Rhyothemis fulgens						ba, be, n				
Rhyothemis obsolescens	u	t			n	ba, be+, m, n				
Rhyothemis phyllis chloe									ta	
Rhyothemis phyllis ixias										r?
Rhyothemis phyllis obscura									am, bc, mr	
Rhyothemis phyllis phyllis	s, u	c, la, pa, pe, ph, pr, t	m		n	ba, be+, eg, k, m, w	kn, nk, t			
Rhyothemis pygmaea									am	
Rhyothemis regia exul									ke	
Rhyothemis regia regia						eg, si+, w			am, te	
Rhyothemis resplendens									am, bc, eb, l, te	
Rhyothemis triangularis	u	la				ba				

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Risiophlebia										
Risiophlebia dohrni						ba, be+				
Tetrathemis										
Tetrathemis flavescens						be+				
Tetrathemis hyalina		la	b				pa			
Tetrathemis leptoptera									am, bc, ke, l, o, s	
Tetrathemis platyptera						m				
Tholymis										
Tholymis tillarga	u	c, j, la, pa, pe, pr, t	m			be+, eg, r, se, si	b, kn, kr, pa		am, bc, l, mr, s, te	r
Tramea										
Tramea eurybia eurybia									am, bb, bc, ke, l, o, te	k, sa
Tramea loewii									eb, ke, ta	sa
Tramea phaeoneura			m			be+				
Tramea rosenbergi									am, s	
Tramea stenoloba							kn			r, sa, se
Tramea transmarina euryale	s, u	c, la, pa, pe	m			ba, be+, eg, k, si	b, kn, kr, pa, t		am	
Tramea virginia						be				
Trithemis										
Trithemis aurora	u	c, la, lg, pa, pe, t				w				r
Trithemis festiva	u	la, lg, pa, pe, t				eg, n			am, bb, bc, l, ta, te	al, r, se
Trithemis lilacina									we	al, p
Trithemis pallidinervis	s, u	la				ba, be				
Tyriobapta										
Tyriobapta kuekenthali						be				
Tyriobapta torrida		la, pa		k	n	ba, be+				

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TABLE 6a. (Continued)

	Singapore	Peninsular Malaysia	Malaysian Borneo	Kalimantan	SCS	Sumatra	Java	Sulawesi	Moluccas	Lesser Sunda
Urothemis										
Urothemis bisignata							b			
Urothemis signata insignata	u	la				ba, be+, w				
Zygonyx										
Zygonyx ida		pe, t								
Zygonyx iris malayana		la								
Zyxomma										
Zyxomma obtusum	u	la				eg, si+			am	
Zyxomma petiolatum	u	pe, ph				ba, be+	pa			r

TABLE 6b.

Main	Subregion	Island	Code
Borneo			
	Malaysian	Banggi	b
		Mengalum Island	m
		Sangai Island	s
	Kalimantan	Tambelan Islands (Tambelan Besar)	t
		Borneo: Karimata Islands (Karimata)	k
Java			
		Bawean island	b
		Deli Island	d
		Handeuleum Island	h
		Kangean islands (Kangean, Saebus, Sepanjang)	kn
		Karimunjawa Islands	kr
		Madura Island	m
		Nusa Kambangan Island	nk
		Panaitan island	pa
		Peucang Island	pe
		Thousand Islands (general Thousand Islands plus Dapur, Edam, Talak, Hoorn, Onrust)	t
Lesser Sunda			
		Alor	a
		Groot Bastaard (satellite of Flores)	g
		Komodo	k
		Pantar	p
		Rote	r

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TABLE 6b. (Continued)

Main	Sub	Island	Code
		Sawu	sa
		Semau	se
Moluccas			
		Ambon	am
		Babar	bb
		Bacan Islands (Bacan)	bc
		Banda Islands (Banda, Naira)	bd
		Damar	dm
		Elbor	eb
		Gebe	g
		Kei Islands (Kei Dulah, Kei Besar)	ke
		Kisar	ki
		Lease Islands (Sapura)	l
		Morotai	mr
		Obi Islands (Obi)	o
		Romang	rm
		Sula Islands (Mangole, Sanana)	s
		Tanimbar Islands (Larat, Yamdena)	ta
		Ternate	te
		Watubela Islands	wa
		Wetar	we
		Unknown	u
Peninsular Malaysia plus Singapore	PM		
		Angsa Island	an
		Aor Island	ao
		Besar Island	b
		Carey Island	c
		Jarak Island	j
		Lalang Island	lg
		Langkawi Island	la
		Pangkor Island	pa
		Penang Island	pe
		Perak Island	pr
		Perhentian Island	ph
		Tioman Island	t
	Singapore		
		Semakau Island	s
		Tekong Island	t
		Ubin Island	u
		Coney Island	c
		Sentosa Island	se

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TABLE 6b. (Continued)

Main	Sub	Island	Code
Sulawesi			
		Banggai Islands (Peleng)	ba
		Buton	bu
		Kabaena	k
		Sangihe islands (Sangihe)	sa
		Selayar Islands (Jampea, Kalao, Selayar)	se
		Talaud Islands (Salebabu)	ta
		Togean Islands (Batudaka, Kadidiri, Togean)	to
Sumatra			
		Bangka	ba
		Belitung plus satellites (Betangan, Burung, Kampak, Kepayang, Lengkuas, Mendanau, Rengit, Seliu)	be/be+
		Berhala Island	bh
		Enggano Island plus satellites (Bangkei)	eg/eg+/eg-
		Krakatau Islands (Anak Krakatau, Krakatau, Panjang, Sertung)	k
		Lingga Islands	l
		Mentawai islands (Pagai Selatan, Pagai Utara, Siberut, Sipura)	m
		Nias Island	n
		Batu Islands (Pini)	p
		Riau Archipelago (Durian)	r
		Sebesi Island	se
		Simeulue Islands (Simeulue plus Babi, Lekon, Panjang, Salaut Besar, Simeulucut)	si/si+/si-
		Weh Island	w
South China Sea (SCS) between PM and Borneo			
		Tudjuh Archipelago (Anambas Islands: Jemaja, Siantan)	t
		Natuna Islands (Bunguran, Panjang, Serasan, Subi Besar, Subi Kecil)	n