Odonata attracted by light – a new topic for myth-busters

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Abstract

Six Odonata species were collected during night light trapping on the Mambilla Plateau, Taraba State Nigeria. Being predominantly diurnal insects, odonates captured in light traps have always been considered as an anomaly. The new data initiated an extensive interrogation of all records on Odonata collected near artificial light sources. A total of 415 records (402 published and 13 new) are presented here with a summary of previous discussions and new discussion points. The general conclusion is that odonates are mainly confused by, rather than attracted to the light. New avenues for further research in this field are suggested based on previous important studies undertaken on Odonata morphology and physiology.

Introduction

Odonates are amongst the oldest of distinct insect orders and supremely visual animals (Yang & Osorio 1996). They have the largest compound eyes of any insect and the highest number of omatidia (Corbet 1999). As a result it is not surprising that their vision has evolved to near perfection. Olberg et al. (2005) proved that odonates, perched or flying, could precisely estimate the size of their potential prey and the distance to it. Moreover they can aim at a point in front of their prey, so that it is intercepted with a relatively straight flight trajectory. Mizutani et al. (2003) report on the so called motion camouflage established in *Anax papuensis* (Burmeister, 1839) and possibly used by other species as well. This is achieved when the predator moves towards the prey in such a manner that projects a stationary image in the prey's retina. This aerial manoeuvre involves a precise estimation of prey's position and movements.

Visual clues play a crucial role in prey detection by Odonata (Labhart & Nilsson 1995, Olberg et al. 2000, 2005), as well as in habitat selection (Wildermuth 1994), sexual recognition behaviour (Wildermuth 1998) and any aspects of pre- and postcopulatory behaviour (Corbet 1999). Moreover several studies support the suggestion that the

polarised light reflected by water provides important information on the quality of freshwater habitats, not only for odonates, but for number of aquatic insects (Kriska et al. 2006). These authors found that red and black horizontal plastic reflector sheets were equally highly attractive to water insects, while yellow and white reflectors were unattractive. In odonates reflective surfaces can aid the orientation from a distance, particularly where other cues (e.g. atmospheric humidity, dimension and shape of the water body, undulation of the water surface, water plants on the surface and on the shore, temperature and odour) are still ineffective (Bernáth et al. 2002).

In spite of their visual superiority odonates have often been confused and trapped when their natural environment has been altered by humans. Individuals have been reportedly attracted by the shiny surface of car roofs (Wildermuth & Horváth 2005), asphalt (Fraser 1936), solar panels (Horváth et al. 2010), and grave stones (Horváth et al. 2007). Furthermore, choice experiments have shown that crude oil can be more attractive to odonates than water (Horváth et al. 1998). Therefore, odonates have been sampled with various traps usually set up for studies on other animal groups. Aerial nets attached to large vessels have produced interesting findings on the migratory species (Holzapfel & Harrell 1968, Wolf et al. 1986, Yoshimoto et al. 1962), as have ornithological and bow nets (Baccetti et all. 1990; Borisov 2008, 2009; Rintele 1997). Hoess & Rezbanyai-Reser (2005) caught the powerful flier *Libelulla quadrimaculata* Linnaeus, 1758 with a pitfall trap. Although very rare, Odonata in pitfall traps have been reported in other occasions, too (Garcia Ruiz 2005, Mertent et al. 2007, Santos et al. 2007). Dogramaci et al. (2010) collected Zygoptera specimens using pan traps and on several occasions odonates have been collected with Malaise traps (Askew et al. 1998; Flint 1996, Richards & Windsor, 2007; Rizali et al. 2002, Sartor et al. 2009). Glotzhober & Riggs (1998) were able to increase their total catch of Odonata using a modified Malaise trap.

However, the majority of records of trapped Odonata come from collections around light sources. The total catch per trap varies between regions globally but range from single individuals to tens of thousands (Feng et al. 2006). There are conflicting views about the reasons behind this relatively high trapping success at night. Odonates are predominantly diurnal species, but the significant number collected near light sources has led many researchers to interpret this behaviour as some kind of attraction to the light (e.g. Aubert 1964; Averill 1995).

Odonata larvae have also been collected using underwater light-traps (Aiken 1979, Dommanget 1991, Engelmann 1973, 1974, Espinosa & Clark 1972, Hungerford et al. 1955, Nikolaeva 2008, Schilling et al. 2009, Weber 1987, Williams et al. 1996). Some laboratory studies on the orientation of the larvae according to the light rays have been undertaken as well (Abbott 1926, Riley 1912).

The present paper presents new data on odonates captured from light traps. It investigates the previous records of all Odonata collected by light sources, presents a

discussion on the probable reasons for this behaviour and suggests future research to clarify this behaviour.

Material and Methods

Light trapping was conducted on the Mambilla Plateau (approx. 1,500 m a.s.l.) near the village of Yelwa, Taraba State, Nigeria (Fig. 1). The trapping was a part of a larger ecological study investigating the effect of land use on benthic invertebrate communities in tropical highland Nigerian streams. Nine streams were selected in three differing land uses: three forested, three maize fields and three tea plantations (Fig. 1 and Table 1). The traps consisted of a light source (12 volts DC flash lamps) and a white plastic tray filled with water. Detergent was added to the water to reduce surface tension.

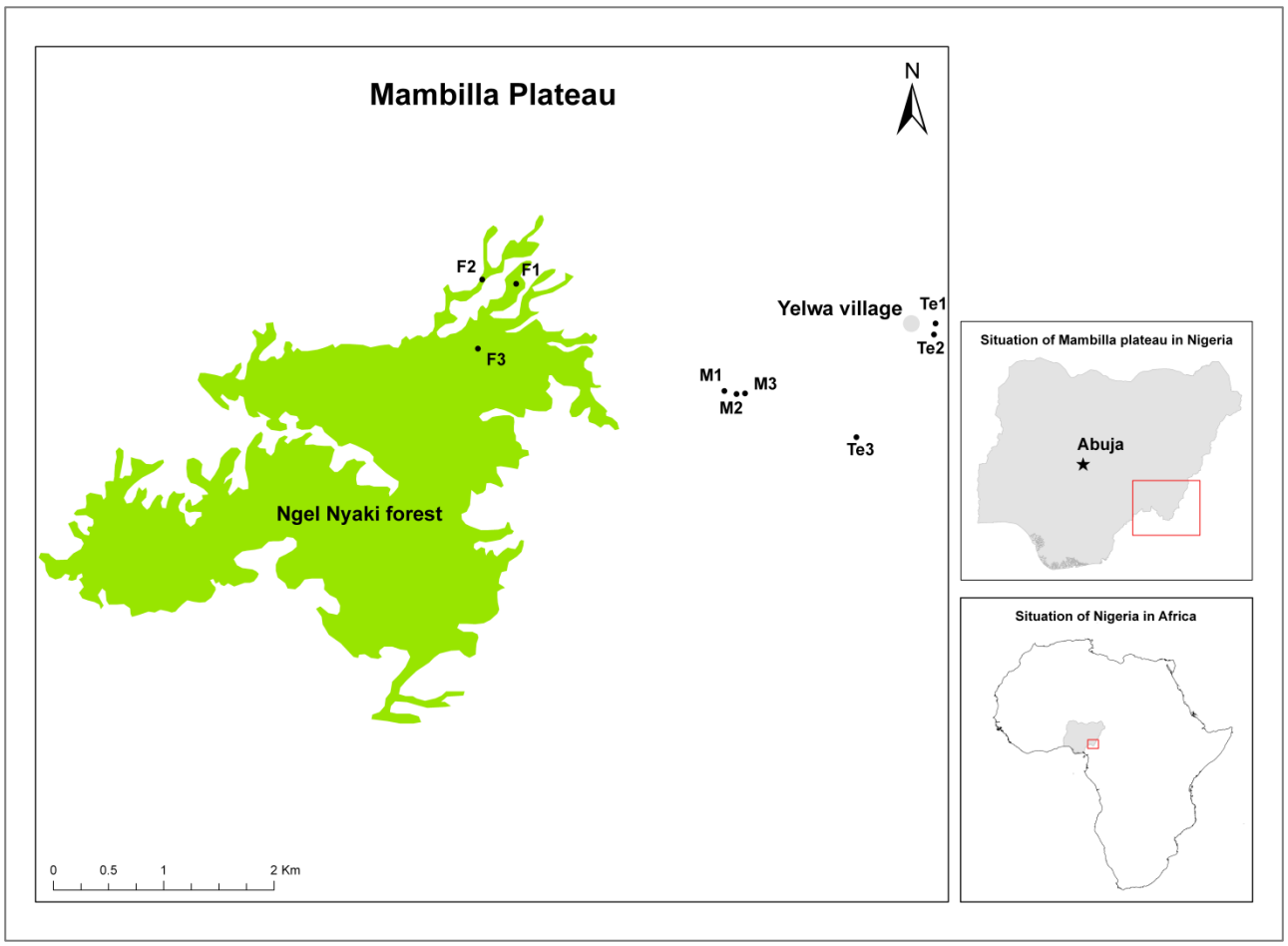

Figure 1. Situation of light traps on Mambilla Plateau, Taraba State Nigeria.

The trays were placed at about 30cm from the water edge and the light source was attached at about 30cm above the trays' rim (Fig. 2). Light traps were set up overnight in four occasions (07 December 2010, 07 January 2011, 07 February 2011 and 07 March 2011). At this stage only Odonata species were identified using Clausnitzer & Dijkstra (in press). On collection three characteristics were recorded: species affiliation, sex, and state of maturity. The specimens were preserved in low grade etha-

nol which made the final identification difficult. Two specimens were particularly difficult to identify. One was badly damaged, making identification impossible and the second was identified with supposition because the species affiliation could not be confirmed. The state of maturity of specimens posed the greatest challenge because it was unclear if the lack of body colour pattern was due to age or to the method

Table 1. Locations of all nine light traps set up during the experiment.

Trap ID	Land use	Elevation (m a.s.l.)	Latitude	Longitude
F1	forested	1,531	7° 5.808’	11° 3.518’
F2	forested	1,508	7° 5.829’	11° 3.352’
F3	forested	1,525	7° 5.491’	11° 3.331’
M1	maize field	1,592	7° 5.284’	11° 4.536’
M3	maize field	1,591	7° 5.269’	11° 4.595’
M3	maize field	1,595	7° 5.272’	11° 4.637’
Te1	tea plantation	1,609	7° 5.614’	11° 5.568’
Te2	tea plantation	1,606	7° 5.560’	11° 5.560’
Te3	tea plantation	1,617	7° 5.058’	11° 5.181’

Figure 2. The design of the light traps (picture also shows the primary investigator).

of preservation. Immature specimens were generally identified by the body colour and intensity of the pruinescence on the abdomen, in combination with the hardness of the wing membrane. No detailed discussion was made on these results

as some of them were based on the "best guesses" from the identification. The state of maturity was included in the current paper for general orientation only and should not be interpreted in future studies.

A review of all known records of odonates coming to artificial light sources was prepared by reviewing the published literature and consulting other experts, acknowledged here. The discussion was performed on the information about Odonata imago only. Responses of larvae to the light sources must be investigated separately as the results from the experiments are inconsistent in their findings.

Results

A total of 94 specimens belonging to six odonate species were collected with four of the light traps from Nigeria. Table 2 represents the total catch per trap and date.

All six species were included in another table containing a total of 415 records of Odonata coming to light. These records are from the literature or provided by experts (Table 3, see appendix). The species from Nigeria are recorded for the first time from light traps, which increases the overall number of odonate taxa recorded from light sources to 198 (Table 4, see appendix). As the list includes a large number of records from various parts of the world, a unified approach was preferred while assessing the current taxonomic species status. With one exception, species were included according to the World List of Odonata (Schorr & Paulson 2011). Thus some original published records may not match the entries or may not agree completely with the taxonomy currently suggested by other authors. *Orthetrum camerunense* Gambles, 1959 is the only species whose taxonomy differs from Schorr & Paulson (2011), where it is given as synonym of *Orthetrum caffrum* (Burmeister, 1839). Here a full separate species rank is preferred following the unpublished key of Clausnitzer & Dijkstra (in press) which specifically deals with African Odonata.

Discussion

Odonates are considered predominantly diurnal insects with few species active during morning and evening twilight (eocrepuscular), and few others flying in evening twilight (crepuscular) (Corbet 1999). Adults are sometime visitors of moth traps and have also been found actively flying near lanterns (Feulner 2007), candles (Pemberton 1995, Wesenberg-Lund 1913), lighted buildings or vessels (Askew et al. 1998, Averill 1995, Campos 1931, Dannreuther 1935, Mitra 1974, Morley 1919, Morton 1932, Paine 1996b, Platt & Harrison 1994, Schneider 1992, Tani 1998, Walker & Pittaway 1987, Yamane & Hashiguchi 1994, Young 1967), street lights (Askew et al. 1998), searchlights (Bartenef 1933), flashlights (Honda 2003). This type of behaviour is generally reported as "surprising" (Morley 1919), "uncharacteristic" (Yosef 1994) or "curious" (Young 1967). The prevalent opinion is that these species have been *at-*

Table 2. Odonata species collected during the light trap experiment in Nigeria.

Species	M2				Te1				Te2				Te3			
	male		female		male		female		male		female		male		female	
	immature	mature	immature	mature	immature	mature	immature	mature	immature	mature	immature	mature	immature	mature	immature	mature
Crocothemis erythraea (Brullé, 1832)	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Crocothemis sanguinolenta (Burmeister, 1839)	1		1		-	-	1	-	-	-	-	-	-	-	-	-
Orthetrum camerunense Gambles, 1959	3	15	4	2	22	28	-	-	2	4	1	-	3	1	-	1
Orthetrum chrysostigma (Burmeister, 1839)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Orthetrum ? guineense Ris, 1909	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Palpopleura portia (Drury, 1773)	-	-	-	-		1	-	-	-	-	-	-	-	-	-	-
Total number	**4**	**15**	**5**	**2**	**25**	**30**	**1**	**0**	**2**	**4**	**1**	**0**	**3**	**1**	**0**	**1**
Total per site	**26**				**56***				**7**				**5**			

tracted to light, which infers a preference for specific wave lengths of the light. Indeed, comparing the efficacy of different light sources, Ramamurthy et al. (2010) established that mercury lamps were better than UV and black light sources, providing more than 70% of the total Odonata catch. Other research has provided stronger indications of some species being lured to light. Borisov (1990) used the term phoxene (introduced by Gornostaev 1984) to denote animals that move towards artificial light. He distinguished 8 odonate species obligatory photoxenes and 12 facultative photoxens from SW Tajikistan. However, the total sample sizes were strongly influenced by the type of light source. Theischinger (2003, 2010) suggested that *Austrocnemis macculochi* (Tillyard, 1926) and *Austrocordulia refracta* Tillyard, 1909 respectively have an attraction to artificial light. Those two species have been collected regularly and in large numbers near artificial light sources. Sharma et al. (2000) set up an Odonata light trap experiment and reported 14 species with *Diplacodes trivialis* (Rambur, 1842), *Brachythemis contaminata* (Fabricius, 1793) and *Agriocnemis pygmaea* (Rambur, 1842) being the most numerous and therefore appear to be light-attracted. Parr (2006b) refers to an observation when *Aeshna grandis* (Linnaeus, 1758) was lured in the light trap just few minutes after its initial operation. Frost (1971) summarised 12 years of sampling records carried out with light traps at the Archbold Biological Station, Florida. He used data on *Pachydiplax longipennis* (Burmeister, 1839) to support the view that some Odonata are attracted to light, with 96 specimens having been col-

lected in one month. The majority of the specimens were sampled during calm nights, thus not disturbed by humans or bad weather conditions.

However, a number of theories have been proposed to explain odonate captures by light traps. Borisov (2007) outlines three groups of obligatory photoxenes:

- Individuals, which during warm periods of the year could embark on activities during the night such as searching for food, flying to roosting places and copulation.
- Species whose adults emerge during the night.
- Entirely diurnal species active in high temperature, low humidity and direct sun light. However, some predominantly teneral individuals arrive to the light sources.

In summary, Borisov (2007) suggested that obligatory photoxenes appear to be individuals behaving differently from their typical behaviour when they experience extremes in weather conditions or unusual situations. A summary of the theories explaining this natural phenomenon is provided below.

Night emergence of imago

Borisov (2004) considered night emergence as a means for regulating mating, avoiding predators and desiccation. Adults emerging during the night have no experience and could easily be confused by the bright rays of the light source. Corbet (1981) also considered this phenomenon as important because tenerals performing their maiden flight have been regularly sampled during the experiments done in Trinidad. Showers & Horsnail (2001) reported on an exceptional situation where 187 Zygoptera exuviae were collected from a light trap over 13 days, with a maximum of 56 individuals collected during one night. *Lindenia tetraphylla* (Vander Linden, 1825) was initially identified as a facultative photoxene (Borisov 1990), but transferred to the group of obligatory photoxene due to its night emergence (Borisov 2007). However, not all species whose imago emerge during the night seem to be affected by the light. *Sympecma* species typically emerge at night, but are not included amongst the obligatory phoxene (Borisov 2007).

Escaping from a refuge

Night emergence was used by Mazochin-Porchnakov (1960) to develop a theory explaining light catches. He suggested that the insects travel to light as they come out of their night refuge because they could see a way for a free flight. The light indicates to the animal an open area to fly to. Therefore it is not the light itself which attracts the insects, but the opportunity they perceive as a path towards an open area. In nature open spaces usually better lit and brighter than close-canopied areas. Insects constantly use bright illumination as an indication of a space (emergence from a hollow, or from dense vegetation). Borisov (2007) supported this view with exam-

ples from his odonatological studies. He emphasises that the flight towards a light source could be explained as a movement towards a clear area with UV-light. Campos (1931) concluded that odonates have been captured in the traps while they have been searching for sheltered places. The electrical light was found to be of no importance for them and does not attract these insects.

Prey availability

Borisov (1990) emphasised that odonates may have not been attracted to light, but to the prey which they may find near the light. Some *Anax parthenope* (Selys, 1839) adults, for example, tended to withdraw from the light after being confused and lost orientation close to the source. Corbet (1999) concluded that it was unclear what drives an adult to fly towards the light – the stimulus of the light itself or the potential prey assemblages. He included this type of behaviour in a special Strategy A.1.2 that is believed to increase the foraging efficiency. The same views are shared by other researchers (Sluvko 2007, Richards & Rowe 1994, Wright 1944, Yosef 1994, Young 1967).

Odonates disturbed near light sources

Corbet (1999) suggested that some individuals caught in light traps may have been disturbed by the trap operator and inadvertently flown in. Wright (1944) reported that individuals disturbed by workmen were perching on or near the lights of the cars and feeding on smaller insects. Furthermore, Dumont (2004) suggested that some species may end up in light traps after having been disturbed while roosting at night, and may not normally be night-active at all. Both Dunkle (1978) and Parr (2006b) came to the conclusion that many of the catches by light traps may simply reflect individuals accidentally disturbed near the trap. However, only species which in late evening retain their motion at a certain level, referred to as a *period of potential activity* (Borisov 1990), could be forced to move within the study area. Species in a state of complete inactivity could not be chased off the ground and usually fell to the ground off the perching substrates. Similarly, Bick (1949) collected *Libellula needhami* Westfall, 1943, *A. junius* and *P. longipennis* from their roosting grounds with a simple flashlight.

Further important discussion points

The summary of the above presented theories was prepared following the new records from Nigeria, which initiated a large literature review. It could possibly be expanded in the near future with more data from other publications. Light trapping is a very popular method in entomology. It has provided similar estimates for the relative abundance of grasshoppers compared to sweeping technique (Evans et al. 1983), proved to be effective in studying migration patterns of Heteroptera (Benedek & Jászai 1973), not to mention the key role that light–trapping plays in the study of

moths (Hausmann 2001). Odonata are often part of the by-catch and as such they may be reported at order level only. Nevertheless they do present in the samples collected using light traps. That is why a detailed review of any record of dragonflies coming to light source must consider every other insect group that has been studied by this method. Such a review is an overwhelming task and is out of focus of the present review. However, entomologists are encouraged to add their records (Parr 2006a) in order to achieve a thorough and comprehensive list of Odonata species collected near the light sources. Every piece of new data could open novel discussions to the one presented below.

The literature review considers six other discussion points, either underestimated or neglected so far, as important in explaining odonates' behaviour in relation to artificial light: a) link between Odonata collected by the light traps to the extreme weather conditions and migration, b) low proportion of species and individual odonates compare to other insect groups, c) low representation in the samples of crepuscular species, d) female dominated sex ratio, e) Zygoptera are much underrepresented in the light trap samples than Anisoptera, and f) atypical behaviour near light sources.

Extreme weather conditions and odonates migration

Odonates have often been sampled near light sources when forced to move long distances due to severe change in atmospheric conditions or during their regular annual migration. Al-Houty (1985, 1989) reported on significant numbers of *Selysiothemis nigra* (Vander Linden, 1825) associated with sandstorms. The individuals were obviously exhausted and easy to catch by hand, which is atypical for this species. *S. nigra* is usually difficult to observe and individuals are hard to catch with a net (M. Marinov, per. observ.). Corbet (1981) stated that the number of individuals collected by the light traps was high soon after the onset of the rains, while Ramamurthy et al. (2010) showed a significant positive correlation with average rainfall and Odonata catches by the light traps. Furthermore, *Anax guttatus* (Burmeister, 1839), *Anax ephippiger* (Burmeister, 1839) and *Gynacantha hyalina* Selys, 1882 have been collected during monsoons (Asaithambi & Manickavasagam 2002). *A. ephippiger* is also a well known migrant and is the fourth most often collected species from light sources (Table 4). Averill (1995) reported on a large number of *A. ephippiger* hovering around the decks of a lighted ship when the moon was obscured but they did not occur on cloudless nights. Other species commonly caught in light traps are known for their long distance dispersal which happens in assemblages of tens of thousands individuals. Barrois (1896) reported a single observation of about 60,000 individuals sitting on the electric wires running along roadsides for about 12 km. These were probably *Sympetrum striolatum* (Charpentier, 1840) and *Sympetrum sanguineum* (Müller, 1764), which rank as the first and fifth most often collected species respectively (Table 4). Furthermore, *Aeshna mixta* Latreille, 1805, which ranks second, is a regular migrant bearing the colloquial named *Migrant Hawker*. Riddiford (1992)

refered to a huge number of *A. mixta* described by local people as *clouds of dragonflies* on the night preceding light-trapping. Parr (1996) commented on the high number of reports of migration events involving hundreds of *A. mixta* individuals. Parr (2006b) also attributed all UK records of *S. sanguineum*, *S. striolatum* and *A. mixta* from light traps to the migration mode of those species. *Pantala flavescens* (Fabricius, 1798), third place in Table 4, is perhaps the best example. Its aerial distapersal has been witnessed many times with some extraordinary figures. Feng et al. (2006) reported on the most striking catch ever – 42,161 specimens collected with a search-light trap for one night. They related this massive movement to the nights characterised by fog or slight wind.

Odonates underrepresented in light traps

Despite the high figures presented above odonates usually represent a very low (if anything at all) proportion of the total number of insects caught per light trap. During his 30-years life-time of experience with Noctuidae, the lepidopterologist Stoyan Beshkov has barely found any Odonata in his moth trap. He has been working very intensively in one of the Europe's biodiversity hot spots, (the Rhodopes Mountain in Bulgaria and Greece) with total of 61 Odonata species known so far and at least 3 more expected (Marinov 2004, 2007). Farrow (1984) operated a light trap for 351 nights and collected total of 105,480 specimens with only 19 of them being odonates. A 12-years period of light-trapping on the Florida Peninsula produced as many as 200 specimens from 17 species (Frost 1971). These are a small fraction of the 143 species reported by Frost (1970) for the entire Florida Peninsula. While the total catch of 200 specimens sounds high, it was obtained over a 12-years period. During the same period *Caenis diminuta* Walker, 1853 was represented in the samples with 44,079 specimens collected over only one month (Frost 1963). Moreover, in some years no odonates were collected at all (Frost 1962). It is true that in this occasion the observation was done during the winter months, but Odonata are active on the Peninsula all year around (Chelmick 2005). McGregor et al. (1987) collected total of 1,126,946 insects from the North Island hill country, New Zealand with only 12 individual odonates. New Zealand is generally poor in Odonata species and this is the only record for the country of any imago coming to light.

Low representation of crepuscular and eocrepuscular species

Surprisingly the data indicate that species caught in light traps are mainly known to have well expressed diurnal activities. However crepuscular (feeding) behaviour is known of many species from all continents: Reeves (2003) listed 23 crepuscular species for Australia; Belevich & Yurchenko (2010) presented observations form Eurasia for eight crepuscular Aeshnidae; Williams (1937) discussed the situation for the Americas; Samraoui (1999) provided details for Africa, and Asian crepuscular species were treated in Arai (1985), Orr (2011), Wilson (2001). In contrast eocrepuscular

species, like *T. tillarga* and Gynacanthini, have been recorded less often light sources (Table 4). Corbet (1961) found it interesting that a crepuscular species like *Gynacantha villosa* Grünberg, 1902 was not collected in light traps which caught four other Odonate species. Münchberg (1966) interpreted the ocelli at the vertex region of caput ("frontal eyes") as "receptors for light of low intensity". "Their arrangement in space and dimension indicates that they inform also of the direction of the incident light rays." Probably those ocelli play an important role both in crepuscular activity and attraction by artificial light sources. Adults do need light for orientation and in twilight they probably use their ocelli in a similar manner as Wellington (1974) described for bumblebees. In those insects polarised light and ocelli can prolong foraging, but homing was a problem for bumblebees when they depend on landmarks and have insufficient light for orienteering. That is perhaps why crepuscular and eocrepuscular odonates were very rarely collected with light traps. Those species are probably able to distinguish between the dim light (their natural environment) and atypical light source (artificial light).

Female odonates dominate in light traps

Females outnumbering males around the light sources is another interesting discovery that has been documented by other authors. Dumont (2004) attributed this fact to the cryptic behaviour of the female. High male density near the water edge is commonly observed in odonates, while females visit water significantly less frequently (Corbet 1999). In the present review, females only samples were reported in 57 occasions, while males only were found in 52 samples; females' prevalence in the light traps was observed in 17 instances and males were found to be dominant in nine of the traps. Eleven catches produced equal number for males and females. This perhaps reflects the location in which the light traps have usually been set up, that is in forest clearings away from the water edge. Borisov (1990) established that female *Ischnura evansi* Morton, 1919 were twice as likely to be trapped as males. Similarily females of *Ischnura fountainei* Morton, 1905 were four times as likely to be caught as males when the trap was not operating close to any wetland.

A significant dominance of Anisoptera over Zygoptera

Tunmore (2005) observed that damselflies do not often appear at the light sources. Figure 3 presents a summary of the ratio between Zygoptera and Anisoptera representatives trapped by the artificial light. The dominance of Anisoptera families (83%) may be explained with the observed tendency of trapping mainly migratory species that embark on long distance dispersals. However, Parr (2006b) sought the explanation of this fact in other than biological underlying mechanism because the migration alone does not explain the much lower records of Zygoptera (17%) coming to light compare to Anisoptera. As mentioned above Parr (2006b) did not consider the attraction to light as typical behaviour for this insect order but rather suggested that

most of the captures are due to accidental individuals chased from their temporal refuges.

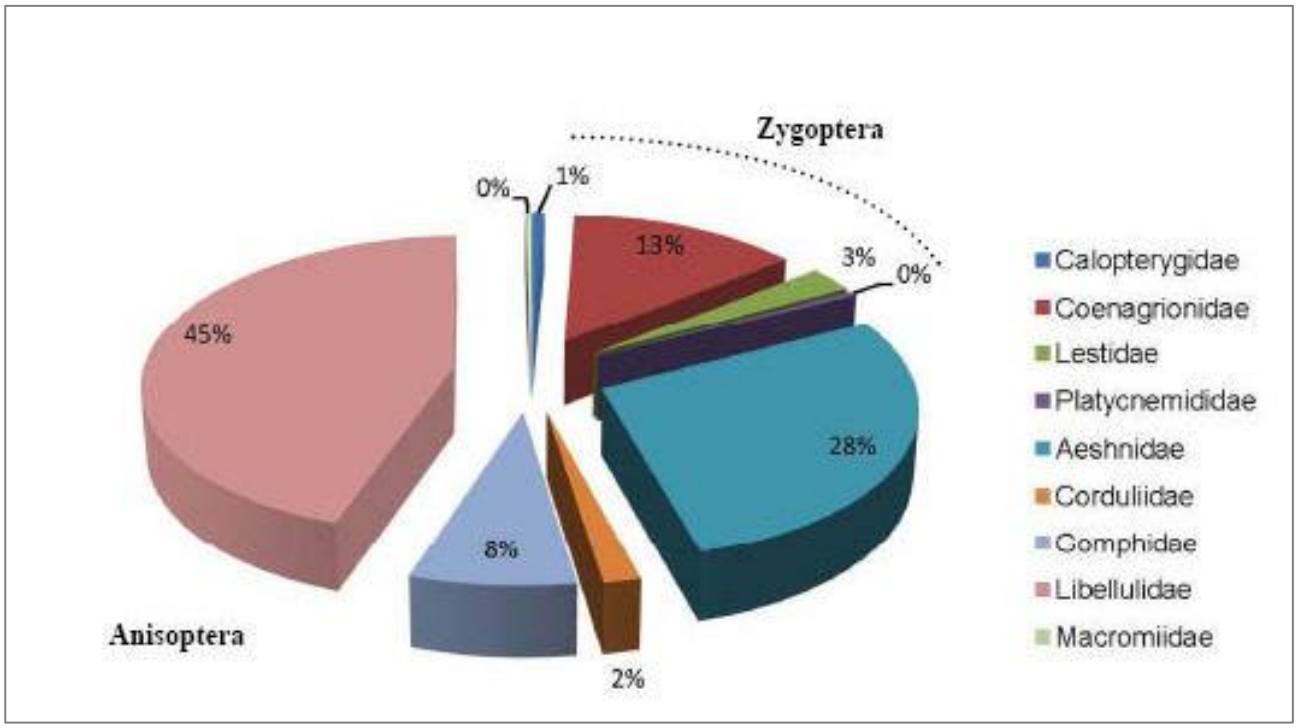

Figure 3. Zygoptera versus Anisoptera families recorded from light traps.

Atypical behaviour near light sources

Atypical behaviour near a light source was reported for the first time by Bayford (1911). On this occasion powerful fliers such as *A. cyanea* were sitting motionless and easily picked up by hand. The research suggested that the atypical behaviour near electric lamps could be triggered by the light source which alters the otherwise powerful sight of odonates. The light may act in the same manner as it does on humans staring directly into a light source. Zieba & Buczynski (2007) have observed *Aeshna viridis* Eversmann, 1836 individuals sitting head on to the lamp so that their body axes were forwardly directed to the source of light. They were easy to collect by hand although the authors do not believe the odonates were completely dazzled (P. Zieba & P. Buczynski per. comm.). Young (1967) has observed *Epitheca princeps* Hagen, 1861 on lighted wall, again easy to pick up by hand and individuals did not fly away when let back on the substrate. An anomalous behavior of curving the abdomen upwards when perched on the wall was observed. This atypical behaviour of *E. princeps* was interesting also for the individuals had repeatedly aggregated at a particular light source although other lamps on the street obviously illuminated the same wave lengths. The dragonfly persistence was attributed to the physical environment of the surroundings, like vegetation. A similar relationship between the vegetation and dragonfly body position at rest was observed by Bartenef (1930). The position and orientation of the adults was determined by the transmitted sun light regardless of the cloudiness and the direct exposure to the sun light of the insects'

bodies. Orientation of the adults on defoliated trees was more constant than those sitting on fully leaved trees. The light transmitted by the leaves obviously has influenced the orientation of the adults in various directions.

Platt & Harrison (1994) provide an anecdotal observation for the atypical behaviour which may have been provoked by the effect which light has on odonates' senses. A male *Anax junius* (Drury, 1773) was observed circling around the lamp bulb for several minutes. The authors believe that the male may have been responding to the prismatic spectral rainbows created by the faceted glass edges of the lamp housing. The green and blue light bands could have created an image of another male. Therefore the flight around the house lamp could be a behavioural response to confront a conspecific rival male. Reflected light could act as a very strong stimulus. Hooper et al. (2006) showed that polarised reflection from a wing surface of *Aeshna cyanea* (Müller, 1764) acted as an intraspecific signalling channel. The responses to this reflection depended on the thickness of the wing membrane and the nature of wax pruinosity. Wiesenborn (2011) concluded that nitrogen concentration in the insect exoskeleton appeared to increase as abundances of resilin and other fluorescent, elastic proteins increased. In *P. longipennis* these structural compounds are responsible for emitting blue fluorescence in the UV light at the area of wing articulation and are probably important nitrogen sources for insectivorous vertebrates. Indeed, Mitra (1974) found that geckoes attack *Crocothemis servilia servilia* (Drury, 1773) and *B. contaminata*, but never *Tholymis tillarga* (Fabricius, 1798) even when individuals coming to light are sitting very close to the lizard. This reaction is linked to the colouration of the *T. tillarga* wings which superficially resemble hymenopterous insects.

A new theory following the Nigerian data

For the purposes of this research it is important to understand how the Nigerian data fit into the discussion. The total sample consists of six species belonging to the same family Libellulidae (Table 2). For light trap Te1 odonates were the only insects collected during the night. All of the species are very common and known as exclusive inhabitants of stagnant water bodies. No crepuscular, eocrepuscular or significant long dispersal activities have been recorded for them. Males totally dominate and as far as the preservation method allows us to tell, the immature individuals were less abundant than mature ones. The general conclusion is that the sample is typical of what one could find during the day along the banks of vegetated pools. However, the light traps were set up at the sample streams and at first sight all new data do not comply entirely with what already has been discussed in the literature. No rain storms or other extreme weather conditions were observed during the time of trapping, no atypical activities were noted around the light traps, odonates totally dominated in some light traps, so did males over females. It is unlikely that the individuals were newly emerged searching for an open space as not any truly teneral

specimens were present in the sample. Those identified as immature possess much harder wing membrane from what are typically observed for tenerals. It is undoubtedly a situation never encountered before which deserves a special attention in future studies. This finding could be explained with the proximity of an irrigation pool occurred within 50m from the light trap Te1. It is possible that the effect of the light in combination with the reflection from the water surface of the tray, which was reported above as an extremely powerful signal for odonates, had created an image of a possible new habitat and lured the males for establishing new territories. It is not difficult to imagine that the warm climate of tropical Nigeria could keep the individuals in the discussed above situation of *period of potential activity*. Perhaps the territorial and predation mode of odonates do not drop so significantly during the night and they could react to such a strong aerial ecological photopollutant (after Horváth et al 2009) like bright artificial light sources.

Conclusions and recommendations

All main discussion points presented above are supportive for the view that odonates are probably not *attracted*, but *confused* by the light. Those insects are a by-product of the total catch per light trap rather than obligatory visitors to light sources. Even when very large catches were made by light traps it does not necessarily mean that they have been attracted to the wave length of the source. It seems more likely that they are caught in light traps due to some combination of other factors. Yamane & Hashiguchi (1994) report on a large number of *P. flavescens* that in a fine windless weather dived into the sea. Some of them were picked up and when released went to the sea again. In no circumstances could such behaviour be attributable to any kind of attraction to death.

However, more studies are needed to establish the true nature of the phenomenon discussed here. Generally light traps are not popular in Odonata studies. Borisov (1990) and Sharma et al. (2000) are so far the only examples of light trap studies specifically designed for capturing adult Odonata. People are encouraged to use this method in odonatological studies as well (Wada & Inoue 1997, Zieba & Buczynski 2007), because light-trapping was found important in studying the phenology and ecology of the adult Anisoptera (Corbet 1981). The study case from Nigeria is supportive of this general conclusion. If indeed the adult odonates in the tropical regions sustain their activity during the night, then the light trapping within those areas is something that must be considered in the odonatological studies. Moreover there are already some very important results that have been obtained during occasional samples using light-trapping method. Holotypes of *Melanocacus mungo* (Needham, 1940), *Hemicordulia gracillima* Fraser, 1944, *Orthetrum icteromelas cinctifrons* Pinhey, 1970, *Gynacantha rammohani* Mitra & Lahiri, 1975, are known from this type of study.

Future studies in this field must consider two additional points not discussed in details by previous research: a) Odonata population dynamics and ratio, and b) individual species perception of light.

The bulk of the data from light-trap investigations was collected from research done on migratory species and with just few exceptions, Odonata species and individuals were far underrepresented in the total catch of insect specimens. This fact could well be a reflection of the total ratio of adult odonates towards other insect orders in nature. This could be supported only with evidences from population studies involving large scale insect sampling encompassing species from various orders within the same investigated area. Such information, is not however available at the moment, but would make a very interesting study for future analyses.

The insect perception of wave length would be another important part of a study towards clarifying whether odonates are indeed confused by light rather than attracted by it. It is well established that the insect vision varies between the species even within the same order or family. Yang & Osorio (1996) have found substantial differences between the laminas in the eyes of *Hemicordulia* and *Sympetrum*, which may perhaps explain the different responses to light of the representatives of the Corduliidae and Libellulidae. Similar comparisons need to be made between crepuscular/eocrepuscular species versus those with well expressed diurnal flying modes. Such research is believed to shed some more light on the dilemma discussed here. It will determine whether the so called *attraction to light sources* of odonates has its origin in the morphology of the eyes, is a physiological reaction or purely an accidental event as inferred here for the majority of species reported so far.

Acknowledgements

The study was supported by the International Dragonfly Fund. Many people contributed with literature, advises and valuable comments at various stages during the work. Here their names are arranged in alphabetical order: Adrian Parr, Akihiko Sasamoto, Attila Kalmár, Bastiaan Kiauta, Elizabeth Graham, Jean-Piere Boudot, Jon Harding, Jon O'Brien, Jurg De Marmels, Marianne Kiauta, Naoji Katatani, Naoya Ishizawa, Natalia von Ellenrieder, Pam Taylor, Richards Rowe, Richard Seidenbusch, Sergey Borisov, Shyamkant Talmale, Stephen Richards, Tim Beynon, Viola Clausnitzer.

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Appendix

Table 3. A summary of Odonata records (published and new data) from light traps.

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
Japan	Calopterygidae	*Atrocalopteryx atrata* (Selys, 1853)	1 ♂			Tani (1998)
French Guyana	Calopterygidae	*Hetaerina moribunda* Hagen in Selys, 1853	1 ♂			Geijskes (1971)
India	Calopterygidae	*Vestalaria smaragdina* (Selys, 1879)		2		Shull & Nadkerny (1967)
Botswana	Coenagrionidae	*Agriocnemis exilis* Selys, 1872				Pinhey (1976)
India	Coenagrionidae	*Agriocnemis pygmaea* (Rambur, 1842)				Sharma et al. (2000)
Ivory Coast	Coenagrionidae	*Agriocnemis zerafica* Le Roi, 1915	2 ♀♀			Dumont (2004)
USA	Coenagrionidae	*Anomalagrion hastatum* (Say, 1839)				Frost (1964)
USA	Coenagrionidae	*Argia fumipennis* (Burmeister, 1839)				Frost (1975)
Australia	Coenagrionidae	*Austrocnemis macculochi* (Tillyard, 1926)	55 ♂♂, 22 ♀♀			Theischinger (2003)
China	Coenagrionidae	*Cecrion sexlineatum* (Selys, 1883)				Easton & Liang (2000)
China	Coenagrionidae	*Cecrion sexlineatum* (Selys, 1883)			new for the country	Wilson (1996)
India	Coenagrionidae	*Ceriagrion coromandelianum* (Fabricius, 1798)			occasionally at the light source	Andrew & Tembhare (1997)
India	Coenagrionidae	*Ceriagrion coromandelianum* (Fabricius, 1798)				Sharma et al. (2000)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
Namibia	Coenagrion-idae	*Ceriagrion suave* Ris, 1921	4 ♂♂			Martens et al. (2003)
Russia	Coenagrion-idae	*Coenagrion lanceo-latum* (Selys, 1872)				Kosterin & Dubatolov (2005)
USA	Coenagrion-idae	*Enallagma cardenium* Selys, 1876				Frost (1975)
USA	Coenagrion-idae	*Enallagma civile* (Hagen, 1861)	1 ♂			Wright (1944)
USA	Coenagrion-idae	*Enallagma concisum* Williamson, 1922				Frost (1964)
Russia	Coenagrion-idae	*Enallagma cyathige-rum* (Charpentier, 1840)				Sluvko (2007)
UK	Coenagrion-idae	*Enallagma cyathige-rum* (Charpentier, 1840)				Odin (2006)
UK	Coenagrion-idae	*Enallagma cyathige-rum* (Charpentier, 1840)				Paine (1992b)
UK	Coenagrion-idae	*Enallagma cyathige-rum* (Charpentier, 1840)				Parr (2006b)
UK	Coenagrion-idae	*Enallagma cyathige-rum* (Charpentier, 1840)		1		Parr (2007)
UK	Coenagrion-idae	*Enallagma cyathige-rum* (Charpentier, 1840)			exuviae	Showers & Horsnail (2001)
UK	Coenagrion-idae	*Enallagma cyathige-rum* (Charpentier, 1840)		5		Tunmore (2005)
USA	Coenagrion-idae	*Enallagma laurenti* Calvert, 1919				Frost (1969)
Russia	Coenagrion-idae	*Erythromma najas* (Hansemann, 1823)				Borisov (2007)
UK	Coenagrion-idae	*Erythromma najas* (Hansemann, 1823)			exuviae	Showers & Horsnail (2001)
Russia	Coenagrion-idae	*Erythromma viridulum* Charpentier, 1840				Borisov (1990)
UK	Coenagrion-idae	*Erythromma viridulum* Charpentier, 1840				Jones (2004)
UK	Coenagrion-idae	*Erythromma viridulum* Charpentier, 1840				Parr (2006b)
Brazil	Coenagrion-idae	*Homeoura ? nepos* (Selys, 1876)	3 ♂♂, 1 ♀			Longfield (1929)
Japan	Coenagrion-idae	*Ischnura asiatica* (Brauer, 1865)	1 ♂, 1 ♀		Coll. 27. 07. 2002 at the Omurasaki Center, Ho-kuto City	N. Ishizawa (per. comm.)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
Bulgaria	Coenagrion-idae	*Ischnura elegans* (Vander Linden, 1820)	1 ♂			S. Beshkov (per. observ.)
Poland	Coenagrion-idae	*Ischnura elegans* (Vander Linden, 1820)	1 ♂			Buczyński & Buczyńska (2010)
Russia	Coenagrion-idae	*Ischnura elegans* (Vander Linden, 1820)		11	Maximum catch for one night	Borisov (1990)
Tadzhi-kistan	Coenagrion-idae	*Ischnura elegans* (Vander Linden, 1820)		1		Borisov (2007)
UK	Coenagrion-idae	*Ischnura elegans* (Vander Linden, 1820)				Parr (2006b)
UK	Coenagrion-idae	*Ischnura elegans* (Vander Linden, 1820)		2		Tunmore (2005)
Arab Penin-sula	Coenagrion-idae	*Ischnura evansi* Morton, 1919			thousands of immature indi-viduals at light source far from the near-est known larval habitat (T. Pittaway per. comm.)	Corbet (1999)
Arab Penin-sula	Coenagrion-idae	*Ischnura evansi* Morton, 1919			to lighted windows	Walker & Pittaway (1987)
Oman	Coenagrion-idae	*Ischnura evansi* Morton, 1919			large number attracted to light	Waterson & Pittaway (1991)
Russia	Coenagrion-idae	*Ischnura evansi* Morton, 1919		146	maximum catch for one night	Borisov (1990)
Russia	Coenagrion-idae	*Ischnura fountainei* Morton, 1905		411	maximum catch for one night	Borisov (1990)
USA	Coenagrion-idae	*Ischnura posita* (Hagen, 1861)				Frost (1966)
USA	Coenagrion-idae	*Ischnura posita* (Hagen, 1861)				Frost (1969)
Russia	Coenagrion-idae	*Ischnura pumilio* (Charpentier, 1825)	1 ♀			Borisov (1990)
Mexico	Coenagrion-idae	*Ischnura ramburii* (Selys in Sagra, 1857)			collected at 32, 74 and 106 km dis-tance off the shore	Sparks et al. (1986)
USA	Coenagrion-idae	*Ischnura ramburii* (Selys in Sagra, 1857)				Frost (1964)
USA	Coenagrion-idae	*Ischnura ramburii* (Selys in Sagra, 1857)	1 ♀			Wright (1944)
India	Coenagrion-idae	*Ischnura senegalensis* (Rambur, 1842)			occasionally at the light source	Andrew & Tembhare (1997)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
India	Coenagrion-idae	*Ischnura senegalensis* (Rambur, 1842)				Sharma et al. (2000)
USA	Coenagrion-idae	*Nehalennia integri-collis* Calvert, 1913				Frost (1964)
USA	Coenagrion-idae	*Nehalennia pallidula* Calvert, 1913				Frost (1969)
Russia	Coenagrion-idae	*Nehalennia speciosa* (Charpentier, 1840)				Kosterin & Dubatolov (2005)
India	Coenagrion-idae	*Pseudagrion decorum* (Rambur, 1842)				Sharma et al. (2000)
India	Coenagrion-idae	*Rhodischnura nursei* (Morton, 1907)			occasionally at the light source	Andrew & Tembhare (1997)
Mexico	Coenagrion-idae	Coenagrionidae indet.		9 ind. from 1 spe-cies	collected at 32, 74 and 106 km dis-tance off the shore	Wolf et al. (1986)
USA	Lestidae	*Archilestes grandis* (Rambur, 1942)				Platt & Harrison (1994)
Japan	Lestidae	*Indolestes peregrinus* (Ris, 1916)	1 ♂		collected on 28. 07.2007 at the Omurasaki Center, Ho-kuto City	N. Ishizawa (per. comm.)
Japan	Lestidae	*Indolestes peregrinus* (Ris, 1916)	1 ♂		collected on 22. 07.2000 at the Omu-rasaki Cen-ter, Hokuto City	N. Ishizawa (per. comm.)
UK	Lestidae	*Lestes sponsa* (Hansemann, 1823)				Paine (1992a)
UK	Lestidae	*Lestes sponsa* (Hansemann, 1823)				Parr (2006b)
USA	Lestidae	*Lestes vidua* Hagen, 1861				Frost (1975)
USA	Lestidae	*Lestes* sp.				Platt & Harrison (1994)
Russia	Lestidae	*Sympecma gobica* Förster, 1900				Borisov (1990)
Russia	Lestidae	*Sympecma paedisca* (Brauer, 1877)		1		Borisov (1990)
Russia	Lestidae	*Sympecma paedisca* (Brauer, 1877)				Kosterin & Dubatolov (2005)
Russia	Lestidae	*Sympecma paedisca* (Brauer, 1877)	1 ♂, 1 ♀			Malikova et al. (2007)
Poland	Platycne-mididae	*Platycnemis pennipes* (Pallas, 1771)	2 ♂♂			Buczyński & Buczyńska (2010)
Switzer-	Platycne-	*Platycnemis pennipes*	2 ♂♂, 2 ♀♀			Hoess & Rezbanyai-

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
land	mididae	(Pallas, 1771)				Reser (2005)
Switzer-land	Aeshnidae	*Aeshna cyanea* (Müller, 1764)	20 ♂♂			Hoess & Rezbanyai-Reser (2005)
Switzer-land	Aeshnidae	*Aeshna cyanea* (Müller, 1764)	1 ♂			Schiess (1982)
UK	Aeshnidae	*Aeshna cyanea* (Müller, 1764)				Bayford (1911)
UK	Aeshnidae	*Aeshna cyanea* (Müller, 1764)	1 ♀		possibly mi-grating indi-vidual	Bland (1997)
UK	Aeshnidae	*Aeshna cyanea* (Müller, 1764)				Moorley (1919)
UK	Aeshnidae	*Aeshna cyanea* (Müller, 1764)				Parr (2006b)
UK	Aeshnidae	*Aeshna cyanea* (Müller, 1764)	1 ♀			Roddis (2007)
Denmark	Aeshnidae	*Aeshna grandis* (Linnaeus, 1758)		1	catching flies around the altar candles	Wesenberg-Lund (1913)
UK	Aeshnidae	*Aeshna grandis* (Linnaeus, 1758)		1		Dannreuther (1937a)
UK	Aeshnidae	*Aeshna grandis* (Linnaeus, 1758)				Paine (1996b)
UK	Aeshnidae	*Aeshna grandis* (Linnaeus, 1758)				Parr (2006b)
Bulgaria	Aeshnidae	*Aeshna mixta* Latreille, 1805	1 ♀			S. Beshkov (per. observ.)
Spain	Aeshnidae	*Aeshna mixta* Latreille, 1805		79		Riddiford (1992)
Switzer-land	Aeshnidae	*Aeshna mixta* Latreille, 1805	21 ♂♂			Hoess & Rezbanyai-Reser (2005)
Switzer-land	Aeshnidae	*Aeshna mixta* Latreille, 1805				Schiess (1982)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805				Brown (2000)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805			Hundreds in-dividuals fly-ing pass the ship	Dannreuther (1935)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805				Dannreuther (1937a)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805				Dannreuther (1937b)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805				Deans (2005)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805		1		Dewick (2000)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805		1		Dewick (2006)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805		1		Hadley (1980)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805				Jones (2004)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805				Odin (2006)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805		1		Parr (2000b)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805			20+ records	Parr (2006b)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805		1		Perrin (2011)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805		1		Tunmore (2006)
UK	Aeshnidae	*Aeshna mixta* Latreille, 1805		1		Tunmore (2010)
Poland	Aeshnidae	*Aeshna viridis* Eversmann, 1836	1 ♂, 4 ♀♀			Zieba & Buczynski (2007)
UK	Aeshnidae	*Aeshna viridis* Eversmann, 1836	1 ♀			Mattila (2001)
Cayman islands	Aeshnidae	*Anax amazili* (Burmeister, 1839)	1 ♀			Askew et al. (1998)
not specified	Aeshnidae	*Anax amazili* (Burmeister, 1839)	2 ♀♀			Campos (1931)
Cyprus	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)			on the decks of a ship	Averill (1995)
Dubai	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)	1 ♀			Chalmers (2010)
Egypt	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)				Silsby (1993)
India	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)			collected during monsoon	Asaithambi & Manickavasagam (2002)
Iran	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)				Sutton (1966)
Monte-negro	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)	1 ♂			Dumont (1977)
Russia	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)				Borisov (1990)
UAE	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)		1	attracted by the light of a lantern	Feulner (2007)
Uganda	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)	20 ♂♂, 46 ♀♀		all but 1 ♂ were near the light trap	Corbet (1984)
UK	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)	1 ♀			Paine (1996b)
UK	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)				Parr (2006b)
India	Aeshnidae	*Anax guttatus*			predominant-	Andrew & Tembhare

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
		(Burmeister, 1839)			ly collected at light source	(1997)
India	Aeshnidae	*Anax guttatus* (Burmeister, 1839)				Arulprakash & Gunathilagaraj (2010)
India	Aeshnidae	*Anax guttatus* (Burmeister, 1839)			collected during monsoon	Asaithambi & Manickavasagam (2002)
India	Aeshnidae	*Anax guttatus* (Burmeister, 1839)		18		Patil et al. (1982)
Laos	Aeshnidae	*Anax guttatus* (Burmeister, 1839)			lighted candle	Pemberton (1995)
Republic of Maldives	Aeshnidae	*Anax guttatus* (Burmeister, 1839)	1 ♂			Mahlendorf & Martens (2004)
Singapore	Aeshnidae	*Anax guttatus* (Burmeister, 1839)	1 ♀			Norma-Rashid et al. (2008)
Tailand	Aeshnidae	*Anax guttatus* (Burmeister, 1839)	1 ♀			Hämäläinen (1988)
India	Aeshnidae	*Anax immaculifrons* Rambur, 1842			predominantly collected at light source	Andrew & Tembhare (1997)
India	Aeshnidae	*Anax immaculifrons* Rambur, 1842				Sharma et al. (2000)
Russia	Aeshnidae	*Anax imperator* Leach, 1815				Sluvko (2007)
Switzerland	Aeshnidae	*Anax imperator* Leach, 1815	1 ♀			Hoess & Rezbanyai-Reser (2005)
UK	Aeshnidae	*Anax imperator* Leach, 1815				Parr (2006b)
UK	Aeshnidae	*Anax imperator* Leach, 1815		1		Parr (2007)
Mexico	Aeshnidae	*Anax junius* (Drury, 1773)		8	collected at 74, 106 & 160 km distance off the shore	Sparks et al. (1986)
USA	Aeshnidae	*Anax junius* (Drury, 1773)				Beckemeyer (2003)
USA	Aeshnidae	*Anax junius* (Drury, 1773)				Frost (1966)
USA	Aeshnidae	*Anax junius* (Drury, 1773)	1 ♂			Platt & Harrison (1994)
USA	Aeshnidae	*Anax junius* (Drury, 1773)				Wright (1944)
Willis Island, Australia	Aeshnidae	*Anax papuensis* (Burmeister, 1839)		11		Farrow (1984)
Dubai	Aeshnidae	*Anax parthenope* (Selys, 1839)	2 ♀♀			Chalmers (2010)
Egypt	Aeshnidae	*Anax parthenope* (Selys, 1839)				Silsby (1993)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
India	Aeshnidae	*Anax parthenope* (Selys, 1839)			sitting near light sources	Asaithambi & Manickavasagam (2002)
Oman	Aeshnidae	*Anax parthenope* (Selys, 1839)	1 ♂			Waterson & Pittaway (1991)
Russia	Aeshnidae	*Anax parthenope* (Selys, 1839)				Borisov (1990)
UK	Aeshnidae	*Anax parthenope* (Selys, 1839)	1 ♀			Parr (2006b)
China	Aeshnidae	*Anax parthenope julius* Brauer, 1865				Easton & Liang (2000)
China	Aeshnidae	*Anax parthenope julius* Brauer, 1865		59, 342	caught during 2003 field season	Feng et al. (2006)
Gambia	Aeshnidae	*Anax tristis* Hagen, 1867				Silsby (1999)
off Angola	Aeshnidae	*Anax tristis* Hagen, 1867	1 ♂		60 km from mainland	Schnieder (1992)
Tanganyika	Aeshnidae	*Anax tristis* Hagen, 1867				Pinhey (1961)
France	Aeshnidae	*Boyeria irene* (Fonscolombe, 1838)	1 ♂			Morton (1932)
Canada	Aeshnidae	*Boyeria vinosa* (Say, 1840)	1 ♀			Hutchingso (2001)
not specified	Aeshnidae	*Coryphaeschna adnexa* (Hagen, 1861)	1 ♀			Campos (1931)
USA	Aeshnidae	*Coryphaeschna ingens* (Rambur, 1842)				Frost (1964)
French Guyana	Aeshnidae	*Coryphaeschna viriditas* Calvert, 1952	1 ♂, 1 ♀			Geijskes (1971)
Trinidad	Aeshnidae	*Coryphaeschna viriditas* Calvert, 1952	3 ♂♂, 5 ♀♀			Corbet (1981)
USA	Aeshnidae	*Epiaeschna heros* (Fabricius, 1798)		1		Platt & Harrison (1994)
USA	Aeshnidae	*Gomphaeschna antilope* (Hagen, 1874)				Frost (1964)
India	Aeshnidae	*Gynacantha bayadera* Selys, 1891 (= *G. furcata*?)			predominantly collected at light source	Andrew & Tembhare (1997)
Ivory Coast	Aeshnidae	*Gynacantha bullata* Karsch, 1891	4 ♂♂, 1 ♀			Dumont (2004)
Sarawak, Malaysia	Aeshnidae	*Gynacantha ? dohrni* Krüger, 1899				Dow (2005)
India	Aeshnidae	*Gynacantha hyalina* Selys, 1882				Arulprakash & Gunathilagaraj (2010)
India	Aeshnidae	*Gynacantha hyalina* Selys, 1882			collected during monsoon	Asaithambi & Manickavasagam (2002)
Trinidad	Aeshnidae	*Gynacantha mexicana*	1 ♂			Corbet (1981)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
		Selys, 1868				
Cayman Islands	Aeshnidae	*Gynacantha nervosa* Rambur, 1842	1 ♀			Askew et al. (1998)
Trinidad	Aeshnidae	*Gynacantha nervosa* Rambur, 1842	4 ♂♂, 1 ♀			Corbet (1981)
USA	Aeshnidae	*Gynacantha nervosa* Rambur, 1842				Frost (1964)
USA	Aeshnidae	*Gynacantha nervosa* Rambur, 1842		2		Ihssen (1997)
India	Aeshnidae	*Gynacantha rammo-hani* Mitra & Lahiri, 1975	1 ♀		holotype	Mitra & Lahiri (1975)
Tailand	Aeshnidae	*Gynacantha saltatrix* Martin, 1909				Hämäläinen (1987a)
Borneo, Malaysia	Aeshnidae	*Gynacantha* sp.				Orr (1995)
Ivory Coast	Aeshnidae	*Gynacantha* sp.	1♀			Dumont (2004)
not specified	Aeshnidae	*Gynacantha* sp.		1		Campos (1931)
Sarawak, Malaysia	Aeshnidae	*Gynacantha* sp.	1 ♀			Dow (2005)
Sarawak, Malaysia	Aeshnidae	*Heliaeschna crassa* Krüger, 1899				Dow (2005)
Borneo, Malaysia	Aeshnidae	*Heliaeschna* sp.				Orr (1995)
Sarawak, Malaysia	Aeshnidae	*Heliaeschna* sp.	1 ♀			Dow (2005)
Malay Penin-sula & Indonesia	Aeshnidae	*Indaeschna grubaueri* (Förster, 1904)				Lieftinck (1954)
French Guyana	Aeshnidae	*Neuraeschna clavifor-cipata* Martin, 1909	1 ♂			Geijskes (1971)
French Guyana	Aeshnidae	*Neuraeschna costalis* (Burmeister, 1839)	1 ♀			Geijskes (1971)
Borneo, Malaysia	Aeshnidae	*Oligaeschna* sp.				Orr (1995)
Malay Penin-sula	Aeshnidae	*Periaeschna laidlawi* (Förster, 1908)	immature ♀			Lieftinck (1954)
Sarawak, Malaysia	Aeshnidae	*Tetracanthagyna brun-nea* McLachlan, 1898	1 ♀			Dow (2005)
Malay Penin-sula	Aeshnidae	*Tetracanthagyna plagiata* (Waterhouse, 1877)				Lieftinck (1954)
Cayman Islands	Aeshnidae	*Triacanthagyna septi-ma* (Selys in Sagra, 1857)	1 ♀			Askew et al. (1998)
not	Aeshnidae	*Triacanthagyna septi-*				Campos (1931)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
specified		*ma* (Selys in Sagra, 1857)				
Trinidad	Aeshnidae	*Triacanthagyna septima* (Selys in Sagra, 1857)	1 ♀			Corbet (1981)
USA	Aeshnidae	*Triacanthagyna trifida* (Rambur, 1842)				Frost (1964)
Mexico	Aeshnidae	Aeshnidae indet.		8 ind. from 1 sp.	collected at 74, 106 & 160 km distance from the shore	Wolf et al. (1986)
Australia	Corduliidae	*Austrocordulia refracta* Tillyard, 1909				Theischinger (2010)
USA	Corduliidae	*Epitheca cynosura* (Say, 1840)				Frost (1966)
USA	Corduliidae	*Epitheca princeps* Hagen, 1861	63 ♂♂, 15 ♀♀		for 17 consequitive nights	Young (1967)
USA	Corduliidae	*Epitheca sepia* (Gloyd, 1933)				Frost (1966)
Malaysia	Corduliidae	*Hemicordulia gracillima* Fraser, 1944	1 ♀		holotype	Fraser (1944)
USA	Corduliidae	*Neurocordulia yamaskanensis* (Provancher, 1875)	1 ♀			Montgomery (1955)
Switzerland	Corduliidae	*Oxygastra curtisii* (Dale, 1834)	1 ♀			Hoess & Rezbanyai-Reser (2005)
Thailand	Gomphidae	*Acrogomphus minor* Laidlaw, 1931	1 ♀		paratype	Laidlaw (1931)
Russia	Gomphidae	*Anormogomphus kiritschenkoi* Bartenev, 1913	1 ♀		teneral female	Borisov (1990)
Australia	Gomphidae	*Austrogomphus australis* Dale in Selys, 1854				Corbet (1999)
Malaysia	Gomphidae	*Burmagomphus arthuri* Lieftinck, 1953	1 ♀		new for the country	Hämäläinen (2000)
French Guyana	Gomphidae	*Cacoides latro* (Erichson, 1848)	2 ♀♀			Geijskes (1971)
Russia	Gomphidae	*Gomphus flavipes lineatus* Bartenev, 1929			tenerals	Borisov (2007)
Peru	Gomphidae	*Heterogomphus* sp.				Burmeister (2006)
Thailand	Gomphidae	*Ictinogomphus decoratus melaenops* Selys, 1857	1 ♀			Hämäläinen (1987b)
India	Gomphidae	*Ictinogomphus rapax* (Rambur, 1842)			Predominantly collected at light source	Andrew & Tembhare (1997)
India	Gomphidae	*Ictinogomphus rapax* (Rambur, 1842)			sitting near light sources	Asaithambi & Manickavasagam (2002)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
India	Gomphidae	*Ictinogomphus rapax* (Rambur, 1842)				Sharma et al. (2000)
Kuwait	Gomphidae	*Lindenia tetraphylla* (Vander Linden, 1825)			sampled during a sand storm	Al-Houty (1985)
Kuwait	Gomphidae	*Lindenia tetraphylla* (Vander Linden, 1825)			sampled during a sand storm	Al-Houty (1989)
Russia	Gomphidae	*Lindenia tetraphylla* (Vander Linden, 1825)	1 ♂, 1 ♀		teneral female	Borisov (1990)
Russia	Gomphidae	*Lindenia tetraphylla* (Vander Linden, 1825)	1 ♀			Skvortsov & Kutaev (2010)
Indonesia	Gomphidae	*Macrogomphus p. parallelogramma* (Burmeister, 1839)	♀♀			Lieftinck (1954)
USA	Gomphidae	*Melanocacus mungo* (Needham, 1940)	2 ♂♂		teneral + holotype	Needham (1940)
Uganda	Gomphidae	*Notogomphus lujai* (Schouteden, 1934)	1 ♂		mature individual	Corbet (1961)
Russia	Gomphidae	*Onychogomphus flexuosus* (Schneider, 1845)	1 ♂, 1 ♀		teneral female	Borisov (1990)
Bulgaria	Gomphidae	*Onychogomphus forcipatus* (Linnaeus, 1758)	1 ♂			S. Beshkov & M. Beshkova (per. observ.)
Switzerland	Gomphidae	*Onychogomphus f. forcipatus* (Linnaeus, 1758)	1 ♂, 1 ♀			Hoess & Rezbanyai-Reser (2005)
Russia	Gomphidae	*Ophiogomphus reductus* Calvert, 1898	1 ♀			Borisov (1990)
Namibia	Gomphidae	*Paragomphus cognatus* (Rambur, 1842)	1 ♂			Martens et al. (2003)
India	Gomphidae	*Paragomphus lineatus* (Selys, 1850)			predominantly collected at light source	Andrew & Tembhare (1997)
Sudan	Gomphidae	*Paragomphus pumilio* (Rambur, 1842)				Ris (1924)
French Guyana	Gomphidae	*Phyllogomphoides andromeda* (Selys, 1869)	1 ♂, 1 ♀			Geijskes (1971)
French Guyana	Gomphidae	*Phyllogomphoides fuliginosus* (Hagen in Selys, 1854)	1 ♂			Geijskes (1971)
Peru	Gomphidae	*Phyllogomphoides selysi* (Navás, 1924)		2		Dunkle (1989)
Uganda	Gomphidae	*Phyllogomphus selysi* Schouteden, 1933	1 ♀			Dijkstra et al. (2006)
French Guyana	Gomphidae	*Progomphus brachycnemis* Needham, 1944	1 ♀		juvenile	Geijskes (1971)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
China	Gomphidae	*Sinictinogomphus clavatus* (Fabricius, 1775)				Easton & Liang (2000)
Ivory Coast	Libellulidae	*Aethriamanta rezia* Kirby, 1889	1 ♂			Dumont (2004)
French Guyana	Libellulidae	*Anatya guttata* (Erichson, 1848)	1 ♂			Geijskes (1971)
Trinidad	Libellulidae	*Anatya guttata* (Erichson, 1848)	1 ♀			Corbet (1981)
India	Libellulidae	*Brachydiplax sobrina* (Rambur, 1842)				Sharma et al. (2000)
Trinidad	Libellulidae	*Brachymesia furcata* (Hagen, 1861)	1 ♀			Corbet (1981)
Trinidad	Libellulidae	*Brachymesia herbida* (Gundlach, 1889)	1 ♂			Corbet (1981)
India	Libellulidae	*Brachythemis contaminata* (Fabricius, 1793)			prey of gecko	Mitra (1974)
India	Libellulidae	*Brachythemis contaminata* (Fabricius, 1793)				Sharma et al. (2000)
India	Libellulidae	*Brachythemis contaminata* (Fabricius, 1793)		3		Shull & Nadkerny (1967)
Uganda	Libellulidae	*Brachythemis leucosticta* (Burmeister, 1839)				Corbet (1959)
India	Libellulidae	*Bradinopyga geminata* (Rambur, 1842)			occasionally at the light source	Andrew & Tembhare (1997)
India	Libellulidae	*Bradinopyga geminata* (Rambur, 1842)		1		Shull & Nadkerny (1967)
Malay Peninsula & Indonesia	Libellulidae	*Camacinia gigantea* (Brauer, 1867)				Lieftinck (1954)
USA	Libellulidae	*Celithemis eponina* (Drury, 1773)				Frost (1975)
USA	Libellulidae	*Celithemis ornata* (Rambur, 1842)				Frost (1964)
Ivory Coast	Libellulidae	*Chalcostephia flavifrons* Kirby, 1889	4 ♂♂, 2 ♀♀			Dumont (2004)
Nigeria	Libellulidae	*Crocothemis erythraea* (Brullé, 1832)				this paper
Nigeria	Libellulidae	*Crocothemis sanguinolenta* (Burmeister, 1839)				this paper
India	Libellulidae	*Crocothemis servilia* (Drury, 1773)			occasionally at the light source	Andrew & Tembhare (1997)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
India	Libellulidae	*Crocothemis servilia* (Drury, 1773)			prey of gecko	Mitra (1974)
India	Libellulidae	*Crocothemis servilia* (Drury, 1773)				Sharma et al. (2000)
Russia	Libellulidae	*Crocothemis servilia* (Drury, 1773)		30	maximum catch for one night	Borisov (1990)
Russia	Libellulidae	*Diplacodes lefebvrii* (Rambur, 1842)				Borisov (1990)
Uganda	Libellulidae	*Diplacodes luminans* (Karsch, 1893)	21 ♂♂, 27 ♀♀			Corbet (1984)
India	Libellulidae	*Diplacodes trivialis* (Rambur, 1842)				Sharma et al. (2000)
USA	Libellulidae	*Erythemis simplicicollis* (Say, 1840)				Frost (1975)
USA	Libellulidae	*Erythemis simplicicollis* (Say, 1840)				Wright (1944)
French Guyana	Libellulidae	*Erythrodiplax famula* (Erichson, 1848)	12 ♂♂, 24 ♀♀			Geijskes (1971)
not specified	Libellulidae	*Erythrodiplax fusca* (Rambur, 1842)	1 ♀			Campos (1931)
Trinidad	Libellulidae	*Erythrodiplax fusca* (Rambur, 1842)	1 ♂			Corbet (1981)
French Guyana	Libellulidae	*Erythrodiplax haematogastra* (Burmeister, 1839)	1 ♂			Geijskes (1971)
French Guyana	Libellulidae	*Erythrodiplax longitudinalis* (Ris, 1919)	6 ♂♂, 3 ♀♀			Geijskes (1971)
USA	Libellulidae	*Erythrodiplax minuscula* (Rambur, 1842)				Frost (1964)
Trinidad	Libellulidae	*Erythrodiplax umbrata* (Linnaeus, 1758)	1 ♂			Corbet (1981)
Ivory Coast	Libellulidae	*Hemistigma albipuncta* (Rambur, 1842)	1 ♀			Dumont (2004)
Ukraine	Libellulidae	*Leucorrhinia pectoralis* (Charpentier, 1825)	1 ♂, 1 ♀			Bartenef (1933)
USA	Libellulidae	*Libellula auripennis* Burmeister, 1839				Wright (1944)
USA	Libellulidae	*Libellula axilena* Westwood, 1837				Yosef (1994)
UK	Libellulidae	*Libellula quadrimaculata* Linnaeus, 1758				Dannreuther (1935)
Thailand	Libellulidae	*Macrodiplax cora* (Kaup in Brauer, 1867)	1 ♂			Hämäläinen (1987b)
French Guyana	Libellulidae	*Micrathyria aequalis* (Hagen, 1861)	1 ♀			Geijskes (1971)
French Guyana	Libellulidae	*Micrathyria atra* (Martin, 1897)	1 ♀			Geijskes (1971)
Trinidad	Libellulidae	*Micrathyria atra* (Martin, 1897)	1 ♀			Corbet (1981)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
Trinidad	Libellulidae	*Micrathyria laevigata* Calvert, 1909	1 ♀			Corbet (1981)
French Guyana	Libellulidae	*Micrathyria mengeri* Ris, 1919	1 ♀			Geijskes (1971)
Trinidad	Libellulidae	*Micrathyria ocellata* Martin, 1897	1 ♂, 1 ♀			Corbet (1981)
French Guyana	Libellulidae	*Nephepeltia flavifrons* (Karsch, 1889)	1 ♀			Geijskes (1971)
Malaysia	Libellulidae	*Neurothemis tullia tullia* (Drury, 1773)		1		Lieftinck (1954)
Uganda	Libellulidae	*Notiothemis robertsi* Fraser, 1944	1 ♂		mature individual	Corbet (1961)
Ivory Coast	Libellulidae	*Olpogastra lugubris* (Karsch, 1895)	1 ♀			Dumont (2004)
French Guyana	Libellulidae	*Orthemis ferruginea* (Fabricius, 1775)	1 ♀			Geijskes (1971)
Trinidad	Libellulidae	*Orthemis ferruginea* (Fabricius, 1775)	8 ♂♂, 5 ♀♀			Corbet (1981)
Trinidad	Libellulidae	*Orthemis sulphurata* Hagen, 1868	2 ♀♀			Corbet (1981)
Ivory Coast	Libellulidae	*Orthetrum brachiale* (Palisot de Beauvois, 1805)	2 ♂♂, 4 ♀♀			Dumont (2004)
Russia	Libellulidae	*Orthetrum brunneum* (Fonscolombe, 1837)				Borisov (1990)
Nigeria	Libellulidae	*Orthetrum camerunense* Gambles, 1959				this paper
Switzerland	Libellulidae	*Orthetrum cancellatum* (Linnaeus, 1758)	1 ♀			Hoess & Rezbanyai-Reser (2005)
Nigeria	Libellulidae	*Orthetrum chrysostigma* (Burmeister, 1839)				this paper
Nigeria	Libellulidae	*Orthetrum* ? *guineense* Ris, 1909				this paper
Uganda	Libellulidae	*Orthetrum hintzi* Schmidt, 1951	1 ♂		mature individual	Corbet (1961)
not specified	Libellulidae	*Orthetrum icteromelas cinctifrons* Pinhey, 1970	1 ♂		holotype	Dijkstra (2007)
Uganda	Libellulidae	*Orthetrum julia* Kirby, 1900	1 ♂, 2 ♀♀ probably of this species		mature individual	Corbet (1961)
India	Libellulidae	*Orthetrum sabina* (Drury, 1770)			occasionally at the light source	Andrew & Tembhare (1997)
India	Libellulidae	*Orthetrum sabina* (Drury, 1770)				Sharma et al. (2000)
Russia	Libellulidae	*Orthetrum sabina* (Drury, 1770)				Borisov (1990)
Uganda	Libellulidae	*Orthetrum* ? *trinacria* (Selys, 1841)			identified by supposition	Corbet (1959)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
Japan	Libellulidae	*Orthetrum triangulare melania*(Selys, 1883)	1 ♂, 1 ♀		collected on 27.07. 2002 at the Omurasaki Center, Hokuto City	N. Ishizawa (per. comm.)
India	Libellulidae	*Orthetrum* sp.	3			Shull & Nadkerny (1967)
USA	Libellulidae	*Pachydiplax longipennis* (Burmeister, 1839)				Frost (1964)
USA	Libellulidae	*Pachydiplax longipennis* (Burmeister, 1839)	43 ♂♂, 53 ♀♀		collected for one month	Frost (1971)
USA	Libellulidae	*Pachydiplax longipennis* (Burmeister, 1839)				Frost (1975)
USA	Libellulidae	*Pachydiplax longipennis* (Burmeister, 1839)				Wright (1944)
Nigeria	Libellulidae	*Palpopleura portia* (Drury, 1773)				this paper
China	Libellulidae	*Pantala flavescens* (Fabricius, 1798)		96	caught during 2003 field season	Feng et al. (2006)
French Guyana	Libellulidae	*Pantala flavescens* (Fabricius, 1798)	1 ♂			Geijskes (1971)
India	Libellulidae	*Pantala flavescens* (Fabricius, 1798)				Sharma et al. (2000)
India	Libellulidae	*Pantala flavescens* (Fabricius, 1798)				Shull & Nadkerny (1967)
Japan	Libellulidae	*Pantala flavescens* (Fabricius, 1798)		10		Asahina & Turuoka (1967)
Japan	Libellulidae	*Pantala flavescens* (Fabricius, 1798)				Honda (2003)
Japan	Libellulidae	*Pantala flavescens* (Fabricius, 1798)				Inoue (1998)
Japan	Libellulidae	*Pantala flavescens* (Fabricius, 1798)			tens of kilometres off shore	Yamane & Hashiguchi (1994)
Republic of Maldives	Libellulidae	*Pantala flavescens* (Fabricius, 1798)		1		Mahlendorf & Martens (2004)
Russia	Libellulidae	*Pantala flavescens* (Fabricius, 1798)				Borisov (1990)
Trinidad	Libellulidae	*Pantala flavescens* (Fabricius, 1798)	1 ♂			Corbet (1981)
Willis Island, Australia	Libellulidae	*Pantala flavescens* (Fabricius, 1798)		3		Farrow (1984)
Cayman islands	Libellulidae	*Pantala hymenaea* Say, 1840		1		Askew et al. (1998)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
Mexico	Libellulidae	*Pantala hymenaea* Say, 1840		1	collected at 160 km off shore	Sparks et al. (1986)
India	Libellulidae	*Pantala* sp.		36		Patil et al. (1982)
Namibia	Libellulidae	*Parazyxomma flavicans* (Martin, 1908)	1 ♀			Martens et al. (2003)
Uganda	Libellulidae	*Parazyxomma flavicans* (Martin, 1908)				Corbet (1959)
Trinidad	Libellulidae	*Perithemis mooma* Kirby, 1889	1 ♂			Corbet (1981)
USA	Libellulidae	*Perithemis tenera* (Say, 1840)				Montgomery (1955)
Singapore	Libellulidae	*Pornothemis serrata* Krüger, 1902	1 ♂			Norma-Rashid et al. (2008)
Kuwait	Libellulidae	*Selysiothemis nigra* (Vander Linden, 1825)		great number	sampled during a sand storm	Al-Houty (1985)
Kuwait	Libellulidae	*Selysiothemis nigra* (Vander Linden, 1825)			sampled during a sand storm	Al-Houty (1989)
Russia	Libellulidae	*Selysiothemis nigra* (Vander Linden, 1825)				Borisov (1990)
Russia	Libellulidae	*Selysiothemis nigra* (Vander Linden, 1825)	1 ♀			Skvortsov & Kutaev (2010)
USA	Libellulidae	*Sympetrum ambiguum* (Rambur, 1842)				Montgomery (1955)
Russia	Libellulidae	*Sympetrum arenicolor* Jödicke, 1994				Borisov (2007)
Russia	Libellulidae	*Sympetrum danae* (Sulzer, 1776)				Kosterin & Dubatolov (2005)
UK	Libellulidae	*Sympetrum danae* (Sulzer, 1776)				Parr (2006b)
Russia	Libellulidae	*Sympetrum depressiusculum* (Selys, 1841)				Kosterin & Dubatolov (2005)
Russia	Libellulidae	*Sympetrum eroticum* (Selys, 1883)	1 ♀			Malikova et al. (2007)
Japan	Libellulidae	*Sympetrum eroticum eroticum* (Selys, 1883)	1 ♂		collected on 22.07.2000 at the Omurasaki Center, Hokuto City	N. Ishizawa (per. comm.)
UK	Libellulidae	*Sympetrum flaveolum* (Linnaeus, 1758)	1 ♂			Mendel & Marsh (1995)
UK	Libellulidae	*Sympetrum flaveolum* (Linnaeus, 1758)				Paine (1995)
UK	Libellulidae	*Sympetrum flaveolum* (Linnaeus, 1758)	1 ♂			Paine (1996a)
UK	Libellulidae	*Sympetrum flaveolum*				Parr (2006b)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
		(Linnaeus, 1758)				
Russia	Libellulidae	*Sympetrum fonscolombii* (Selys, 1840)				Borisov (1990)
UK	Libellulidae	*Sympetrum fonscolombii* (Selys, 1840)				Parr (2006b)
UK	Libellulidae	*Sympetrum fonscolombii* (Selys, 1840)	1 ♂			Tunmore (2002)
UK	Libellulidae	*Sympetrum fonscolombii* (Selys, 1840)			small numbers	Tunmore (2007)
Switzerland	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)	1 ♀			Hoess & Rezbanyai-Reser (2005)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)	1 ♂			Mendel & Marsh (1995)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)				Odin (2006)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)	1 ♀			Paine (1992a)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)				Paine (1995)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)		9		Parr (2000a)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)				Parr (2001)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)		12		Parr (2005)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)			20+ records	Parr (2006b)
UK	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)			single individuals	Parr (2007)
Spain	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		4		Riddiford (1992)
Switzerland	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)	1 ♂, 3 ♀♀			Hoess & Rezbanyai-Reser (2005)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Cade (2004)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Dannreuther (1937b)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Deans (2005)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		1		Deans (2006a)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Deans (2006b)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Deans (2008)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Deans (2009)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		1		Deans (2010)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		10	for a 20-days period	Dewick (1999)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		19	total for the season	Dewick (2000)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Dewick (2006)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)	1 ♂			Dewick (2011)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Moore (2009)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		42		Odin (2006)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)	1 ♂			Paine (1996a)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		19		Parr (2000a)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		1		Parr (2001)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)		26		Parr (2005)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)			approxima-tely 100 re-cords	Parr (2006b)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)			occasionally at the light source	Tunmore (2005)
UK	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)				Tunmore (2010)
Russia	Libellulidae	*Sympetrum vulgatum* (Linnaeus, 1758)				Borisov (2007)
Switzer-land	Libellulidae	*Sympetrum vulgatum* (Linnaeus, 1758)	2 ♂ ♂			Hoess & Rezbanyai-Reser (2005)
Russia	Libellulidae	*Sympetrum vulgatum decoratum* Selys, 1884				Borisov (1990)
Switzer-land	Libellulidae	*Sympetrum* sp.				Aubert (1964)
UK	Libellulidae	*Sympetrum* sp.				Dewick (2001)
UK	Libellulidae	*Sympetrum* sp.		18		Parr (2001)
USA	Libellulidae	*Sympetrum* sp.		3		Platt & Harrison (1994)
Trinidad	Libellulidae	*Tauriphila australis* (Hagen, 1867)	1 ♂			Corbet (1981)
Trinidad	Libellulidae	*Tholymis citrina* Hagen, 1867	1 ♀			Corbet (1981)
India	Libellulidae	*Tholymis tillarga* (Fabricius, 1798)				Arulprakash & Gunathilagaraj (2010)
India	Libellulidae	*Tholymis tillarga* (Fabricius, 1798)			mostly collec-ted sitting	Asaithambi & Manickavasagam

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
					near the light source	(2002)
India	Libellulidae	*Tholymis tillarga* (Fabricius, 1798)				Mitra (1974)
India	Libellulidae	*Tholymis tillarga* (Fabricius, 1798)				Sharma et al. (2000)
Ivory Coast	Libellulidae	*Tholymis tillarga* (Fabricius, 1798)	15 ♂♂, 34 ♀♀			Dumont (2004)
off Angola	Libellulidae	*Tholymis tillarga* (Fabricius, 1798)	2 ♂♂, 1 ♀		60 km from mainland	Schnieder (1992)
Willis Island, Australia	Libellulidae	*Tholymis tillarga* (Fabricius, 1798)		4		Farrow (1984)
not specified	Libellulidae	*Tramea basilaris* (Palisot de Beauvois, 1805)				Campos (1931)
Uganda	Libellulidae	*Tramea basilaris* (Palisot de Beauvois, 1805)	6 ♂♂, 9 ♀♀			Corbet (1984)
India	Libellulidae	*Tramea basilaris burmeisteri* Kirby, 1889			occasionally at the light source	Andrew & Tembhare (1997)
Trinidad	Libellulidae	*Tramea calverti* Muttkowski, 1910	2 ♂♂, 4 ♀♀			Corbet (1981)
USA	Libellulidae	*Tramea carolina* (Linnaeus, 1763)				Frost (1964)
Republic of Maldives	Libellulidae	*Tramea limbata* (Desjardins, 1832)	1 ♂			Mahlendorf & Martens (2004)
Willis Island, Australia	Libellulidae	*Tramea loewii* Kaup in Brauer, 1866		1		Farrow (1984)
Mexico	Libellulidae	*Tramea onusta* Hagen, 1861			collected at 32 km off shore	Sparks et al. (1986)
India	Libellulidae	*Tramea virginia* (Rambur, 1842)			occasionally at the light source	Andrew & Tembhare (1997)
not specified	Libellulidae	*Tramea* sp.				Campos (1931)
Sudan	Libellulidae	*Trithemis annulata* (Palisot de Beauvois, 1805)				Ris (1924)
French Guyana	Libellulidae	*Zenithoptera fasciata* (Linnaeus, 1758)	1 ♂			Geijskes (1971)
Indone-sia	Libellulidae	*Zyxomma obtusum* Albarda, 1881	♀♀			Lieftinck (1954)
Japan	Libellulidae	*Zyxomma obtusum* Albarda, 1881				Karube (1999)
Japan	Libellulidae	*Zyxomma obtusum* Albarda, 1881	1 ♂			Wada & Inoue (1997)

Counrty	Family	Species	Sex	Σ per site	Notes	Reference
India	Libellulidae	*Zyxomma petiolatum* Rambur, 1842			predominant-ly collected at light source	Andrew & Tembhare (1997)
India	Libellulidae	*Zyxomma petiolatum* Rambur, 1842				Sharma et al. (2000)
Republic of Mauritius	Libellulidae	*Zyxomma petiolatum* Rambur, 1842	1 ♂			Fraser (1950)
Tailand	Libellulidae	*Zyxomma petiolatum* Rambur, 1842				Hämäläinen (1987a)
Mexico	Libellulidae	Libellulidae indet.		2 ind. from 2 sp.	collected at 32 and 160 km distance off the shore	Wolf et al. (1986)
India	Macromiidae	*Epophthalmia frontalis* Selys, 1871				Arulprakash & Gunathilagaraj (2010)
USA		Anisoptera indet		10 sp.		Frost (1970)
Australia		Odonata indet.				Richards & Rowe (1994)
Bulgaria		Odonata indet.				Beshkov (1998)
Germany		Odonata indet.				Löschau (2010)
India		Odonata indet.				Ramamurthy et al. (2010)
New Zealand		Odonata indet.		12		McGregor et al. (1987)
USA		Odonata indet.		11		Frost (1963)
USA		Zygoptera indet.		7 sp.		Frost (1970)
West Is-land, Aldabra Atoll, Indian Ocean		Odonata indet.		5		Frith (1979)

Table 4. A summary of Odonata species ever recorded by light traps.

Suborder	Family	Species	Records
Anisoptera	Libellulidae	*Sympetrum striolatum* (Charpentier, 1840)	23
Anisoptera	Aeshnidae	*Aeshna mixta* Latreille, 1805	19
Anisoptera	Libellulidae	*Pantala flavescens* (Fabricius, 1798)	12
Anisoptera	Aeshnidae	*Anax ephippiger* (Burmeister, 1839)	11
Anisoptera	Libellulidae	*Sympetrum sanguineum* (Müller, 1764)	10
Anisoptera	Aeshnidae	*Anax guttatus* (Burmeister, 1839)	8
Zygoptera	Coenagrionidae	*Enallagma cyathigerum* (Charpentier, 1840)	7
Anisoptera	Aeshnidae	*Aeshna cyanea* (Müller, 1764)	7
Anisoptera	Libellulidae	*Tholymis tillarga* (Fabricius, 1798)	7
Zygoptera	Coenagrionidae	*Ischnura elegans* (Vander Linden, 1820)	6
Anisoptera	Aeshnidae	*Anax junius* (Drury, 1773)	5
Anisoptera	Aeshnidae	*Anax parthenope* (Selys, 1839)	5
Zygoptera	Coenagrionidae	*Ischnura evansi* Morton, 1919	4
Anisoptera	Aeshnidae	*Aeshna grandis* (Linnaeus, 1758)	4
Anisoptera	Aeshnidae	*Anax imperator* Leach, 1815	4
Anisoptera	Aeshnidae	*Gynacantha nervosa* Rambur, 1842	4
Anisoptera	Gomphidae	*Lindenia tetraphylla* (Vander Linden, 1825)	4
Anisoptera	Libellulidae	*Crocothemis servilia* (Drury, 1773)	4
Anisoptera	Libellulidae	*Pachydiplax longipennis* (Burmeister, 1839)	4
Anisoptera	Libellulidae	*Selysiothemis nigra* (Vander Linden, 1825)	4
Anisoptera	Libellulidae	*Sympetrum flaveolum* (Linnaeus, 1758)	4
Anisoptera	Libellulidae	*Sympetrum fonscolombii* (Selys, 1840)	4
Anisoptera	Libellulidae	*Zyxomma petiolatum* Rambur, 1842	4
Zygoptera	Coenagrionidae	*Erythromma viridulum* Charpentier, 1840	3
Zygoptera	Coenagrionidae	*Ischnura ramburii* (Selys in Sagra, 1857)	3
Zygoptera	Lestidae	*Sympecma paedisca* (Brauer, 1877)	3
Anisoptera	Aeshnidae	*Anax tristis* Hagen, 1867	3
Anisoptera	Aeshnidae	*Triacanthagyna septima* (Selys in Sagra, 1857)	3
Anisoptera	Gomphidae	*Ictinogomphus rapax* (Rambur, 1842)	3
Anisoptera	Libellulidae	*Brachythemis contaminata* (Fabricius, 1793)	3
Anisoptera	Libellulidae	*Orthetrum sabina* (Drury, 1770)	3
Anisoptera	Libellulidae	*Zyxomma obtusum* Albarda, 1881	3
Zygoptera	Coenagrionidae	*Cecrion sexlineatum* (Selys, 1883)	2
Zygoptera	Coenagrionidae	*Ceriagrion coromandelianum* (Fabricius, 1798)	2
Zygoptera	Coenagrionidae	*Erythromma najas* (Hansemann, 1823)	2
Zygoptera	Coenagrionidae	*Ischnura posita* (Hagen, 1861)	2
Zygoptera	Coenagrionidae	*Ischnura senegalensis* (Rambur, 1842)	2
Zygoptera	Lestidae	*Indolestes peregrinus* (Ris, 1916)	2
Zygoptera	Lestidae	*Lestes sponsa* (Hansemann, 1823)	2
Zygoptera	Paltycnemididae	*Platycnemis pennipes* (Pallas, 1771)	2
Anisoptera	Aeshnidae	*Aeshna viridis* Eversmann, 1836	2

Suborder	Family	Species	Records
Anisoptera	Aeshnidae	*Anax amazili* (Burmeister, 1839)	2
Anisoptera	Aeshnidae	*Anax immaculifrons* Rambur, 1842	2
Anisoptera	Aeshnidae	*Anax parthenope julius* Brauer, 1865	2
Anisoptera	Aeshnidae	*Coryphaeschna viriditas* Calvert, 1952	2
Anisoptera	Aeshnidae	*Gynacantha hyalina* Selys, 1882	2
Anisoptera	Gomphidae	*Onychogomphus forcipatus* (Linnaeus, 1758)	2
Anisoptera	Libellulidae	*Anatya guttata* (Erichson, 1848)	2
Anisoptera	Libellulidae	*Bradinopyga geminata* (Rambur, 1842)	2
Anisoptera	Libellulidae	*Erythemis simplicicollis* (Say, 1840)	2
Anisoptera	Libellulidae	*Erythrodiplax fusca* (Rambur, 1842)	2
Anisoptera	Libellulidae	*Micrathyria atra* (Martin, 1897)	2
Anisoptera	Libellulidae	*Orthemis ferruginea* (Fabricius, 1775)	2
Anisoptera	Libellulidae	*Pantala hymenaea* Say, 1840	2
Anisoptera	Libellulidae	*Parazyxomma flavicans* (Martin, 1908)	2
Anisoptera	Libellulidae	*Sympetrum danae* (Sulzer, 1776)	2
Anisoptera	Libellulidae	*Sympetrum eroticum* (Selys, 1883)	2
Anisoptera	Libellulidae	*Sympetrum vulgatum* (Linnaeus, 1758)	2
Anisoptera	Libellulidae	*Tramea basilaris* (Palisot de Beauvois, 1805)	2
Zygoptera	Calopterygidae	*Atrocalopteryx atrata* (Selys, 1853)	1
Zygoptera	Calopterygidae	*Hetaerina moribunda* Hagen in Selys, 1853	1
Zygoptera	Calopterygidae	*Vestalaria smaragdina* (Selys, 1879)	1
Zygoptera	Coenagrionidae	*Agriocnemis exilis* Selys, 1872	1
Zygoptera	Coenagrionidae	*Agriocnemis pygmaea* (Rambur, 1842)	1
Zygoptera	Coenagrionidae	*Agriocnemis zerafica* Le Roi, 1915	1
Zygoptera	Coenagrionidae	*Anomalagrion hastatum* (Say, 1839)	1
Zygoptera	Coenagrionidae	*Argia fumipennis* (Burmeister, 1839)	1
Zygoptera	Coenagrionidae	*Austrocnemis maccullochi* (Tillyard, 1926)	1
Zygoptera	Coenagrionidae	*Ceriagrion suave* Ris, 1921	1
Zygoptera	Coenagrionidae	*Coenagrion lanceolatum* (Selys, 1872)	1
Zygoptera	Coenagrionidae	*Enallagma cardenium* Selys, 1876	1
Zygoptera	Coenagrionidae	*Enallagma civile* (Hagen, 1861)	1
Zygoptera	Coenagrionidae	*Enallagma concisum* Williamson, 1922	1
Zygoptera	Coenagrionidae	*Enallagma laurenti* Calvert, 1919	1
Zygoptera	Coenagrionidae	*Homeoura* ? *nepos* (Selys, 1876)	1
Zygoptera	Coenagrionidae	*Ischnura asiatica* (Brauer, 1865)	1
Zygoptera	Coenagrionidae	*Ischnura fountainei* Morton, 1905	1
Zygoptera	Coenagrionidae	*Nehalennia integricollis* Calvert, 1913	1
Zygoptera	Coenagrionidae	*Nehalennia pallidula* Calvert, 1913	1
Zygoptera	Coenagrionidae	*Nehalennia speciosa* (Charpentier, 1840)	1
Zygoptera	Coenagrionidae	*Pseudagrion decorum* (Rambur, 1842)	1
Zygoptera	Coenagrionidae	*Rhodischnura nursei* (Morton, 1907)	1
Zygoptera	Lestidae	*Archilestes grandis* (Rambur, 1942)	1
Zygoptera	Lestidae	*Lestes vidua* Hagen, 1861	1

Suborder	Family	Species	Records
Zygoptera	Lestidae	*Sympecma gobica* Förster, 1900	1
Anisoptera	Aeshnidae	*Anax papuensis* (Burmeister, 1839)	1
Anisoptera	Aeshnidae	*Boyeria irene* (Fonscolombe, 1838)	1
Anisoptera	Aeshnidae	*Boyeria vinosa* (Say, 1840)	1
Anisoptera	Aeshnidae	*Coryphaeschna adnexa* (Hagen, 1861)	1
Anisoptera	Aeshnidae	*Coryphaeschna ingens* (Rambur, 1842)	1
Anisoptera	Aeshnidae	*Epiaeschna heros* (Fabricius, 1798)	1
Anisoptera	Aeshnidae	*Gomphaeschna antilope* (Hagen, 1874)	1
Anisoptera	Aeshnidae	*Gynacantha* ? *dohrni* Krüger, 1899	1
Anisoptera	Aeshnidae	*Gynacantha bayadera* Selys, 1891 (= *G. furcata*?)	1
Anisoptera	Aeshnidae	*Gynacantha bullata* Karsch, 1891	1
Anisoptera	Aeshnidae	*Gynacantha mexicana* Selys, 1868	1
Anisoptera	Aeshnidae	*Gynacantha rammohani* Mitra & Lahiri, 1975	1
Anisoptera	Aeshnidae	*Gynacantha saltatrix* Martin, 1909	1
Anisoptera	Aeshnidae	*Heliaeschna crassa* Krüger, 1899	1
Anisoptera	Aeshnidae	*Indaeschna grubaueri* (Förster, 1904)	1
Anisoptera	Aeshnidae	*Neuraeschna claviforcipata* Martin, 1909	1
Anisoptera	Aeshnidae	*Neuraeschna costalis* (Burmeister, 1839)	1
Anisoptera	Aeshnidae	*Periaeschna laidlawi* (Förster, 1908)	1
Anisoptera	Aeshnidae	*Tetracanthagyna brunnea* McLachlan, 1898	1
Anisoptera	Aeshnidae	*Tetracanthagyna plagiata* (Waterhouse, 1877)	1
Anisoptera	Aeshnidae	*Triacanthagyna trifida* (Rambur, 1842)	1
Anisoptera	Corduliidae	*Austrocordulia refracta* Tillyard, 1909	1
Anisoptera	Corduliidae	*Epitheca cynosura* (Say, 1840)	1
Anisoptera	Corduliidae	*Epitheca princeps* Hagen, 1861	1
Anisoptera	Corduliidae	*Epitheca sepia* (Gloyd, 1933)	1
Anisoptera	Corduliidae	*Hemicordulia gracillima* Fraser, 1944	1
Anisoptera	Corduliidae	*Neurocordulia yamaskanensis* (Provancher, 1875)	1
Anisoptera	Corduliidae	*Oxygastra curtisii* (Dale, 1834)	1
Anisoptera	Gomphidae	*Acrogomphus minor* Laidlaw, 1931	1
Anisoptera	Gomphidae	*Anormogomphus kiritschenkoi* Bartenev, 1913	1
Anisoptera	Gomphidae	*Austrogomphus australis* Dale in Selys, 1854	1
Anisoptera	Gomphidae	*Burmagomphus arthuri* Lieftinck, 1953	1
Anisoptera	Gomphidae	*Cacoides latro* (Erichson, 1848)	1
Anisoptera	Gomphidae	*Gomphus flavipes lineatus* Bartenev, 1929	1
Anisoptera	Gomphidae	*Ictinogomphus decoratus melaenops* Selys, 1857	1
Anisoptera	Gomphidae	*Macrogomphus parallelogramma parallelogramma* (Burmeister, 1839)	1
Anisoptera	Gomphidae	*Melanocacus mungo* (Needham, 1940)	1
Anisoptera	Gomphidae	*Notogomphus lujai* (Schouteden, 1934)	1
Anisoptera	Gomphidae	*Onychogomphus flexuosus* (Schneider, 1845)	1
Anisoptera	Gomphidae	*Ophiogomphus reductus* Calvert, 1898	1
Anisoptera	Gomphidae	*Paragomphus cognatus* (Rambur, 1842)	1

Suborder	Family	Species	Records
Anisoptera	Gomphidae	*Paragomphus lineatus* (Selys, 1850)	1
Anisoptera	Gomphidae	*Paragomphus pumilio* (Rambur, 1842)	1
Anisoptera	Gomphidae	*Phyllogomphoides andromeda* (Selys, 1869)	1
Anisoptera	Gomphidae	*Phyllogomphoides fuliginosus* (Hagen in Selys, 1854)	1
Anisoptera	Gomphidae	*Phyllogomphoides selysi* (Navás, 1924)	1
Anisoptera	Gomphidae	*Phyllogomphus selysi* Schouteden, 1933	1
Anisoptera	Gomphidae	*Progomphus brachycnemis* Needham, 1944	1
Anisoptera	Gomphidae	*Sinictinogomphus clavatus* (Fabricius, 1775)	1
Anisoptera	Libellulidae	*Aethriamanta rezia* Kirby, 1889	1
Anisoptera	Libellulidae	*Brachymesia furcata* (Hagen, 1861)	1
Anisoptera	Libellulidae	*Brachymesia herbida* (Gundlach, 1889)	1
Anisoptera	Libellulidae	*Brachythemis leucosticta* (Burmeister, 1839)	1
Anisoptera	Libellulidae	*Camacinia gigantea* (Brauer, 1867)	1
Anisoptera	Libellulidae	*Celithemis eponina* (Drury, 1773)	1
Anisoptera	Libellulidae	*Celithemis ornata* (Rambur, 1842)	1
Anisoptera	Libellulidae	*Chalcostephia flavifrons* Kirby, 1889	1
Anisoptera	Libellulidae	*Crocothemis erythraea* (Brullé, 1832)	1
Anisoptera	Libellulidae	*Crocothemis sanguinolenta* (Burmeister, 1839)	1
Anisoptera	Libellulidae	*Diplacodes lefebvrii* (Rambur, 1842)	1
Anisoptera	Libellulidae	*Diplacodes luminans* (Karsch, 1893)	1
Anisoptera	Libellulidae	*Diplacodes trivialis* (Rambur, 1842)	1
Anisoptera	Libellulidae	*Erythrodiplax famula* (Erichson, 1848)	1
Anisoptera	Libellulidae	*Erythrodiplax haematogastra* (Burmeister, 1839)	1
Anisoptera	Libellulidae	*Erythrodiplax longitudinalis* (Ris, 1919)	1
Anisoptera	Libellulidae	*Erythrodiplax minuscula* (Rambur, 1842)	1
Anisoptera	Libellulidae	*Erythrodiplax umbrata* (Linnaeus, 1758)	1
Anisoptera	Libellulidae	*Hemistigma albipuncta* (Rambur, 1842)	1
Anisoptera	Libellulidae	*Leucorrhinia pectoralis* (Charpentier, 1825)	1
Anisoptera	Libellulidae	*Libellula auripennis* Burmeister, 1839	1
Anisoptera	Libellulidae	*Libellula axilena* Westwood, 1837	1
Anisoptera	Libellulidae	*Libellula quadrimaculata* Linnaeus, 1758	1
Anisoptera	Libellulidae	*Macrodiplax cora* (Kaup in Brauer, 1867)	1
Anisoptera	Libellulidae	*Micrathyria aequalis* (Hagen, 1861)	1
Anisoptera	Libellulidae	*Micrathyria laevigata* Calvert, 1909	1
Anisoptera	Libellulidae	*Micrathyria mengeri* Ris, 1919	1
Anisoptera	Libellulidae	*Micrathyria ocellata* Martin, 1897	1
Anisoptera	Libellulidae	*Nephepeltia flavifrons* (Karsch, 1889)	1
Anisoptera	Libellulidae	*Neurothemis tullia tullia* (Drury, 1773)	1
Anisoptera	Libellulidae	*Notiothemis robertsi* Fraser, 1944	1
Anisoptera	Libellulidae	*Olpogastra lugubris* (Karsch, 1895)	1
Anisoptera	Libellulidae	*Orthemis sulphurata* Hagen, 1868	1
Anisoptera	Libellulidae	*Orthetrum* ? *guineense* Ris, 1909	1
Anisoptera	Libellulidae	*Orthetrum* ? *trinacria* (Selys, 1841)	1

Suborder	Family	Species	Records
Anisoptera	Libellulidae	*Orthetrum brachiale* (Palisot de Beauvois, 1805)	1
Anisoptera	Libellulidae	*Orthetrum brunneum* (Fonscolombe, 1837)	1
Anisoptera	Libellulidae	*Orthetrum camerunense* Gambles, 1959	1
Anisoptera	Libellulidae	*Orthetrum cancellatum* (Linnaeus, 1758)	1
Anisoptera	Libellulidae	*Orthetrum chrysostigma* (Burmeister, 1839)	1
Anisoptera	Libellulidae	*Orthetrum hintzi* Schmidt, 1951	1
Anisoptera	Libellulidae	*Orthetrum icteromelas cinctifrons* Pinhey, 1970	1
Anisoptera	Libellulidae	*Orthetrum julia* Kirby, 1900	1
Anisoptera	Libellulidae	*Orthetrum triangulare melania*(Selys, 1883)	1
Anisoptera	Libellulidae	*Palpopleura portia* (Drury, 1773)	1
Anisoptera	Libellulidae	*Perithemis mooma* Kirby, 1889	1
Anisoptera	Libellulidae	*Perithemis tenera* (Say, 1840)	1
Anisoptera	Libellulidae	*Pornothemis serrata* Krüger, 1902	1
Anisoptera	Libellulidae	*Sympetrum ambiguum* (Rambur, 1842)	1
Anisoptera	Libellulidae	*Sympetrum arenicolor* Jödicke, 1994	1
Anisoptera	Libellulidae	*Sympetrum depressiusculum* (Selys, 1841)	1
Anisoptera	Libellulidae	*Sympetrum vulgatum decoratum* Selys, 1884	1
Anisoptera	Libellulidae	*Tauriphila australis* (Hagen, 1867)	1
Anisoptera	Libellulidae	*Tholymis citrina* Hagen, 1867	1
Anisoptera	Libellulidae	*Tramea basilaris burmeisteri* Kirby, 1889	1
Anisoptera	Libellulidae	*Tramea calverti* Muttkowski, 1910	1
Anisoptera	Libellulidae	*Tramea carolina* (Linnaeus, 1763)	1
Anisoptera	Libellulidae	*Tramea limbata* (Desjardins, 1832)	1
Anisoptera	Libellulidae	*Tramea loewii* Kaup in Brauer, 1866	1
Anisoptera	Libellulidae	*Tramea onusta* Hagen, 1861	1
Anisoptera	Libellulidae	*Tramea virginia* (Rambur, 1842)	1
Anisoptera	Libellulidae	*Trithemis annulata* (Palisot de Beauvois, 1805)	1
Anisoptera	Libellulidae	*Zenithoptera fasciata* (Linnaeus, 1758)	1
Anisoptera	Macromiidae	*Epophthalmia frontalis* Selys, 1871	1