A review of the taxonomy of African Odonata - finding ways to better identification and biogeographic insight

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The taxonomy of the approximately 850 species of sub-Saharan African Odonata is relatively well-known, probably due to the impoverished nature of the fauna as compared to that of other tropical regions. The need for revisions, study of higher classification, comprehension of (often clinal, environmentally induced) variability and knowledge of larvae, phylogeny and biogeography are stressed. Taxonomic priorities are discussed for each family. Supportive activities include the production of identification manuals for a broader public, the accumulation of supplementary material and the conservation of existing collections. A list of genera with estimated numbers of species, taxonomic status and references is provided, as well as a list of important regional works.

INTRODUCTION

Although not as well studied as the Holarctic and Australasian Region's faunas, knowledge of the taxonomy of African Odonata is well ahead of those of the Oriental and Neotropic Regions. The main reason is that the African fauna is relatively impoverished, harbouring only about 60% of the number of species found in each of the two other tropical regions. The writer here defines the African fauna as that occurring south of the Sahara, with the inclusion of the Indian Ocean islands (Comoros, Madagascar, Mascarenes and Seychelles). It numbers around 850 species, placed in 125 genera. The former figure is about 15% of the World total. Around 95% of species are not found beyond the region. Despite the fact that the African Odonata are relatively well-known, numerous taxonomic issues remain uncertain, or at least unsettlingly hazy. Elucidating the relationships between species, and finding ways to distinguish them, is perhaps the primary challenge of African odonatology. This knowledge is required as a fundament for future research, particularly for the almost untouched field of African odonate biogeography. The first priority for the taxonomy of African Odonata is, therefore, revisions.

REVISIONS & REVIEWS

It is hardly an exaggeration to say that all genera require at least some study. Elliot Pinhey tackled many problems, as can be seen from the numerous referrals to his work in the Appendix. Due to their size, large genera generally have the greatest problems. *Pseudagrion* is by far the largest genus with almost a hundred species. *Phyllomacromia* and *Trithemis* both number around forty species, *Chlorocypha*, *Paragomphus* and *Orthetrum* nearly thirty, and *Ceriagrion*, *Platycnemis*, *Gynacantha*, *Notogomphus* and *Phyllogomphus* about twenty. Other larger genera are *Lestes*, *Nesolestes*, *Agriocnemis*, *Elattoneura* and *Zygonyx*. Subtraction of the well-studied genera from the largest genera creates an idea of revision priority (*vide* Appendix). Besides full-scale revisions, many smaller issues of suspected synonyms, nomenclature, mix-ups, identification problems and species limits require attention. Some of the larger genera that appear fairly well sorted could be reviewed to straighten out the identification of the

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species. The problems are reviewed for each family below.

HIGHER CLASSIFICATION

Next to taxonomic work with a species-group (most often genus) approach, there are numerous problems in higher classification that require to be addressed. These are often relative to the fauna of the Oriental Region, with which the African fauna has most in common. It is a lucky coincidence that when Elliot Pinhey's 'trailblazer' Frederic Fraser began studying the African fauna intensively in the 1940s, he had about twenty years of experience of the oriental fauna. Many of the higher level problems are worldwide issues, and the knowledge of the African fauna shall profit from research in this field. The phylogeny of the Odonata is still much debated (e.g. Bechly 1995; Lohmann 1996; Trueman 1996). Especially the use of molecular techniques, which are used increasingly to study Odonata, holds the promise of new phylogenetic insights.

THE PROBLEM OF VARIABILITY

One of the greatest practical problems in African Odonata taxonomy is that of variability, particularly in size and melanisation (intensity of black pigmentation). Much of this variation is related to environmental conditions. The African Continent forms a vast, rather continuous landmass, and many of the species are wide-ranging. Numerous gradients in humidity and temperature lie across the continent, with the seasons adding another dimension of environmental variation. Specimens have been collected only fragmentarily along these clines in space and time, which may result in the false perception of discreteness in forms. The status of countless subspecies, as well as species, may be re-assessed with these recurrent variation trends in mind. Particularly sensitive to this problem are genera in which structural characters are of little taxonomic value (*Chlorocypha*) and groups that are difficult to collect (Gomphidae). In cases where discrete forms exist, one must ask why these are not worthy of species status, and if they are forms, what the ecological or behavioural backgrounds of them might be. Examples are the forms of *Palpopleura lucia* (Drury, 1773) (e.g. O'Neill & Paulson 2001) and *Eleuthemis buettikoferi* Ris, 1910 (Lempert 1988) and the subspecies of *Atoconeura biordinata* (Karsch, 1899) (Longfield 1953).

LARVAE

Most of what has been published on African Odonata (and most of what is written in this review) is about adults, but perhaps the greatest taxonomic frontier lies in the field of the larval stages. Although their study has (logically) lapsed behind, the larvae or exuviae of many genera have been described. Numerous genera and species are still awaiting such descriptions. The study of larvae shall offer a whole new set of characters for phylogenetic study. Many species are much easier to collect as larva than as adult (e.g. corduliids and gomphids) and, therefore, larvae also hold promise for biogeographic and ecological research. The rearing of larvae to adults must be especially stimulated, as it is the most reliable means to establish their specific identity.

PHYLOGENY & BIOGEOGRAPHY

Taxonomic research can be taken beyond the level of nomenclature and identification. With the aid of phylogenetic analysis and molecular techniques, hypotheses of the evolutionary history of African Odonata may be created. Combined with distribution data, this may serve to understand more about the climatology and geography of Africa and the origins and dispersive capacity of its dragonflies. Odonata have a number of biological advantages in this regard. Their strong relation with freshwater and different types of vegetation (particularly the forest-savanna contrast) make dragonflies sensitive to the environmental vicissitudes which characterise the continent's history. The species range from extremely good to very poor dispersers, which offer insight in different degrees of vicariance and dispersal. The Odonata are also a relatively ancient group, giving it a deep grasp in time. It of course remains to be seen (from the biogeographic and phylogenetic analyses advocated) if the present-day representatives are descendants of such ancient faunas. This combination of advantages

is distinct from that of other well-studied groups, such as vertebrates, butterflies and plants. Therefore, what may be learnt from Odonata about African biogeography may be not only of affirmative, but even of supplementary value.

REVIEWS OF THE FAMILIES

The Appendix lists genera of African Odonata. For each genus the number of species, and the need for revision and biogeographic valuation, are estimated. An attempt is also made to provide the most recent, comprehensive or relevant references, i.e. those treating all species known (at the time of writing), a large proportion thereof, or that provide a good overall impression of the genus. In the following paragraphs the taxonomic status of each family is briefly outlined. These reviews are not exhaustive, but do stipulate the most urgent cases.

AMPHIPTERYGIDAE & CALOPTERYGIDAE

Due to the small numbers of species in these families and their conspicuous nature, they are well-known. The generic distinction between *Sapho* and *Umma* requires some attention, especially in relation to the species *puella* Sjöstedt, 1917, that is variably placed in either genus (G.S. Vick pers. comm.).

CHLOROCYPHIDAE

This family was treated in its totality by Pinhey (1967a). Nevertheless, the taxonomy is still unsound as a result of the lack of structural characters in this group (Figure 1). As a result, the morphological basis of the genera is rather slim. Problems are greatest in the red-bodied *Chlorocypha* species, particularly the *dispar*- and *rubida*-groups. These range throughout Africa's equatorial forests and demonstrate strong variation in markings (related to age and environment), which is at the same time the sole foundation of the many species and subspecies that are currently recognised. A possible source of new characters, though not easily quantified, are the agonistic and courtship displays of males (e.g. Robertson 1982).

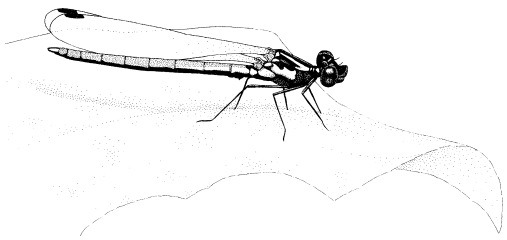

Figure **1**. Male of *Chlorocypha tenuis* Longfield. "*It has been realized for many years that some of the confusion is due to maturation changes in colour and markings*" writes Pinhey (1967a) in his revision of the African Chlorocyphidae. This variability still cripples the taxonomy of the group, which is poor in morphological characters, today.

LESTIDAE, PERILESTIDAE & SYNLESTIDAE

These families are small and taxonomically well-known. *Lestes* has been split into several (sub-) genera, six of which are recognised in Africa (Pinhey 1980b). The value of these can only be assessed after a complete phylogenetic treatment of this cosmopolitan group. Most of the African synlestids have limited ranges and knowledge of their phylogeny would yield insight into the biogeography of the Cape Region.

MEGAPODAGRIONIDAE

Coryphagrion grandis exhibits a strong ecological and morphological resemblance to the neotropical giant damselflies (Pseudostigmatidae). Thorough investigations should reveal whether these are mere analogies, or if the two are actually related (Clausnitzer & Lindeboom 2002). In the latter case it would provide a neotropical link at the 'wrong' side of Africa. The other genera seem more typically megapodagrionid, and their geographically isolated positions warrant biogeographic investigation relative to neotropical, oriental and australasian genera. The limits between *Allolestes*, *Nesolestes* and *Neurolestes* may require re-evaluation. Reviews of the three Malagasy genera also seem timely.

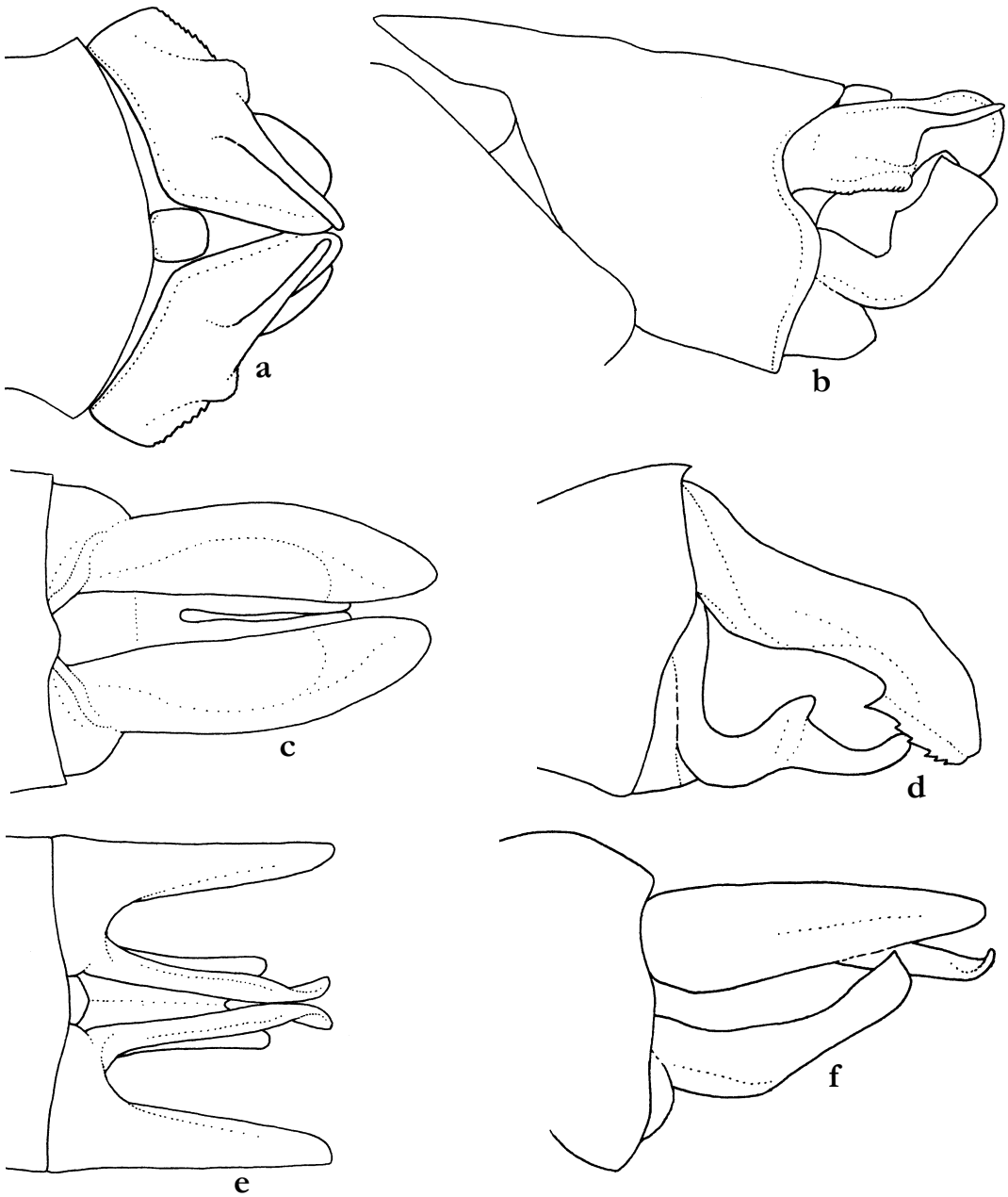

Figure **2**. Male appendages of African Gomphidae. **a**, *Ceratogomphus pictus* Hagen (dorsal aspect); **b**, *Ceratogomphus pictus* Hagen (lateral aspect); **c**, *Crenigomphus renei* Fraser (dorsal aspect); **d**, *Crenigomphus renei* Fraser (lateral aspect); **e**, *Microgomphus camerunensis* Longfield (dorsal aspect); **f**, *Microgomphus camerunensis* Longfield (lateral aspect). "*The main emphasis is on the Gomphidae since their appendages are far more diverse than other anisopterous families*" writes Pinhey (1969c) in what is still the most thorough investigation of odonate tandem linkage. Despite the morphological richness, no family requires more taxonomic attention than this one.

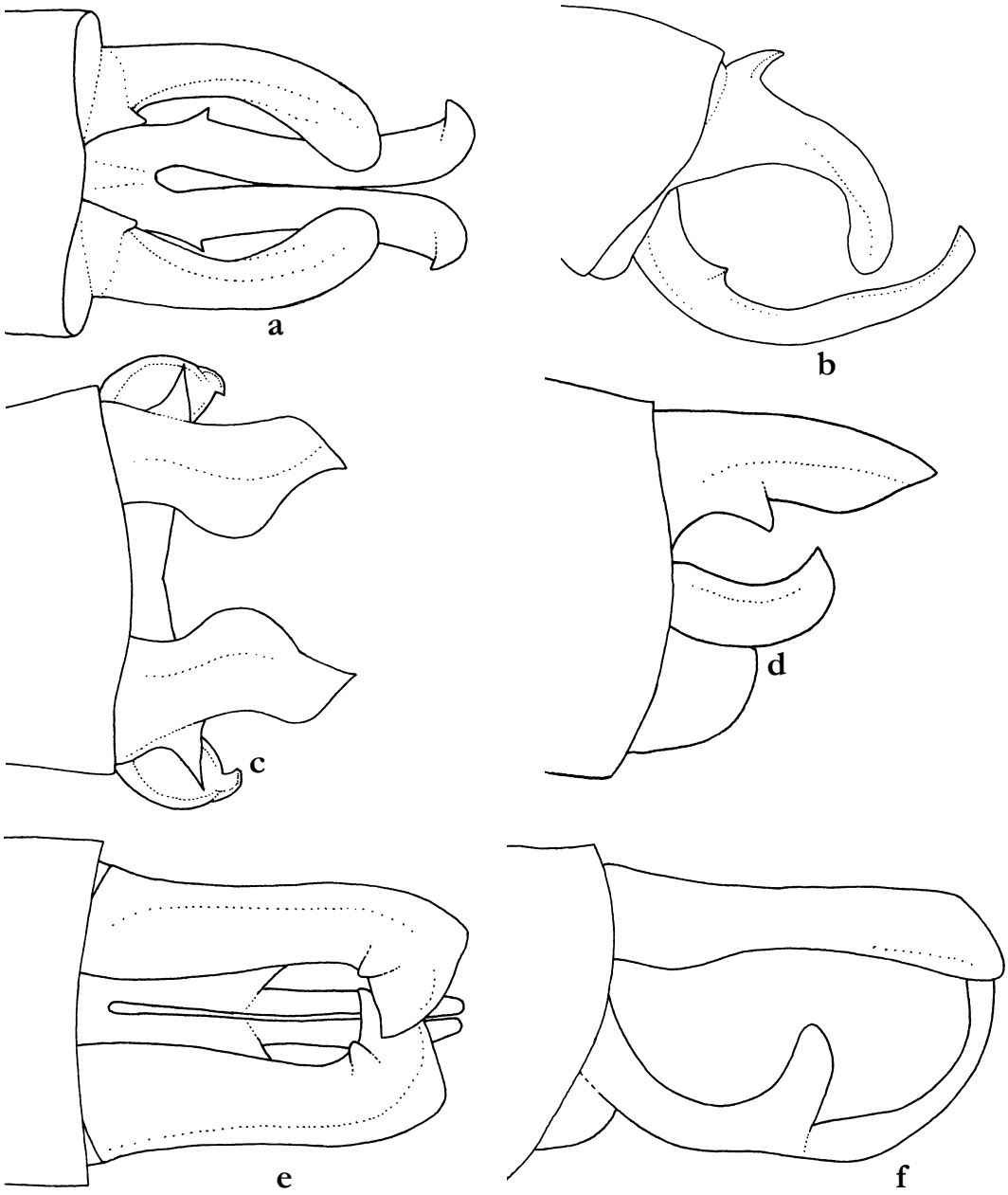

Figure **3**. Male appendages of African Gomphidae. **a**, *Nepogomphoides stuhlmanni* (Karsch) (dorsal aspect); **b**, *Nepogomphoides stuhlmanni* (Karsch) (lateral aspect); **c**, *Notogomphus lecythus* Campion (dorsal aspect); **d**, *Notogomphus lecythus* Campion (lateral aspect); **e**, *Onychogomphus styx* Pinhey (dorsal aspect); **f**, *Onychogomphus styx* Pinhey (lateral aspect). "*The main emphasis is on the Gomphidae since their appendages are far more diverse than other anisopterous families*" writes Pinhey (1969c) in what is still the most thorough investigation of odonate tandem linkage. Despite the morphological richness, no family requires more taxonomic attention than this one.

COENAGRIONIDAE

This is a large and problematic family. The status of a host of small or monotypic genera require study. Two species assigned to the oriental genus *Argiocnemis*, one from Cameroon and the one from the Indian Ocean island Rodriguez, are only known from the holotypes (Pinhey 1966b, 1970b). The anomalous *Argiagrion leoninum* is known only from the type female from Sierra Leone. Perhaps this specimen represents a mislabelled specimen from another fauna? Two West African *Pseudagrion* species were described by Pinhey (1973) in the same paper, but neither fits the genus: Relegation was indirectly proposed in the description of *Aciagrion walteri* Carfi & D'Andrea, 1994, an apparent synonym of *Pseudagrion cyathiforme* Pinhey, 1973. Gambles regarded *P. malagasoides* Pinhey, 1973 to represent a species of *Teinobasis* (G.S. Vick pers. comm.). *Teinobasis* is otherwise restricted to the eastern Oriental Region and the Pacific, save a complex of taxa described from Kenya, Madagascar, Malaŵi and the Seychelles, setting an interesting biogeographic scenario (V. Clausnitzer pers. comm.). What is the relationship of *Mortonagrion stygium* (Fraser, 1954) only African representative of an otherwise purely oriental genus to the varied complex of African *Agriocnemis* species? Finally, the Madagascar endemic *Millotagrion* exhibits similarities to *Aciagrion* not known from that island. The larger coenagrionid genera all require reviews. This is especially required for *Ceriagrion*. Numerous new species of *Pseudagrion*, described since Pinhey (1964a), make a re-evaluation valuable. Smaller taxonomic problems remain in this genus, particularly in the very variable group B (e.g. Dumont 1978). Research has shown that the African *Enallagma* break up into at least four genera, all unrelated to true *Enallagma* (May 1999).

PLATYCNEMIDIDAE

The taxonomic disarray of *Platycnemis* is almost legendary, authors having echoed each other's appeals for revision. The genus has an Equatorial African and a Malagasy radiation, numbering eight and 11 species respectively. The taxonomy of the Equatorial African group is especially troublesome, and revision shall probably lead to a reduction in the number of recognised species. The entire family would benefit from a phylogenetic study. In the platycnemidines, this would elucidate the relations of the two African radiations with that in the palearctic and with the oriental genus *Copera* Kirby, 1890. In the calicnemiines, the position of *Mesocnemis* and *Metacnemis*, and the origins of the many small, highly localised genera (relicts?) may be revealed. The first two are sometimes likened to the New World coenagrionid genus *Argia* Rambur, 1842 (e.g. Ris 1921).

PROTONEURIDAE

The genus *Elattoneura* is well-represented in the literature (e.g. Kimmins 1938; Legrand 1980, 1985; Lindley 1976), and an overview of it in its entirety would be valuable. *Prodasineura* numbers far less species, but has been treated only fragmentarily. Pinhey (1962b, 1981a) questions the validity of *Prodasineura* as separate from *Elattoneura*, but answering this also requires consideration of the oriental representatives of both. Similarly, *Chlorocnemis* is well-covered (Pinhey 1969a; Schmidt 1951c), but should be reviewed relative to the smaller, poorly known and closely related genus *Isomecocnemis*. Cowley (1936) and Schmidt (1951c) regarded *Chlorocnemis* and *Isomecocnemis* not as protoneurids, but as platycnemidids. These two genera have much in common with the platycnemidid *Allocnemis*, and the three may form a monophyletic group.

AESHNIDAE

Despite the broad review by Fraser (1962), the necessity of revising African *Gynacantha* is stressed by Pinhey (1974b) and repeated here. This genus is common in collections, which makes the production of good keys, especially to females, urgent. Much scarcer in collections are members of *Heliaeschna*, for which reason their taxonomic status is even more desperate. The African members of *Aeshna* are also awaiting treatment (G. Peters pers. comm.).

GOMPHIDAE

This family is without doubt the most problematic, and all African genera are in need of revision. Exceptions are the monotypic genera, together with *Ceratogomphus*, *Crenigomphus* and *Ictinogomphus*. The relationship of the monotypic *Cinitogomphus* with *Ictinogomphus* and *Gomphidia* deserves attention (Lieftinck 1969; Pinhey 1970d). The most daunting perspective in African odonatology is perhaps the taxonomic state of *Paragomphus*. Numerous species have been described, some only from females, while more stand in collections awaiting treatment. The status of the other genera is similarly bad, but they have fewer species. Gomphids are notoriously difficult to collect, and available material is often in a deplorable condition (e.g. teneral individuals). Although Fraser's (1960b) revision of *Crenigomphus* still appears to suffice, Fraser's (1957) treatment of *Phyllogomphus* is now completely outdated. The genus *Onychogomphus* ranges widely in the Old World and has partly been relegated to other genera. In that respect the remark of Carle (1986) that African representatives "… *are very likely* Cornigomphus" is of importance. For a systematist taking on the problems of gomphid taxonomy, the works of Corbet (1977), Fraser (1949a) and Pinhey (1969c) may offer inspiration (Figure 2 & 3).

CORDULIIDAE

The status of *Phyllomacromia* as an endemic genus distinct from *Macromia* was clarified by May (1997). Recent descriptions of numerous, often quite similar species illustrates the need of revision, despite progress outlined by Gambles (1979). Unravelling the phylogenetic position of the isolated genera *Libellulosoma*, *Nesocordulia*, *Syncordulia*, *Idomacromia* and *Neophya* is of particular biogeographic interest (M. May pers. comm.).

LIBELLULIDAE

This family numbers more species and genera than any other in Africa (Figure 4). The problems in it are similar to those in the second-largest family, Coenagrionidae. Firstly, the true value of many

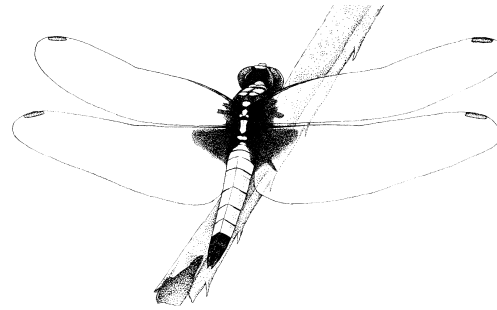

Figure **4**. Male of *Cyanothemis simpsoni* Ris. "*This is one of the most remarkable Libellulinae seen by me*" according to Ris (1915). As monographer of the libellulids, Ris was the best judge. After discussing its unique venation he continues: "*The colour-system is, perhaps, still more extraordinary: a very common pattern, sky-blue and black, is obtained, not as in all other known cases by pruinosity, but by pigmentation.*" The genus is monotypic, endemic to Africa and unmistakeable. Unfortunately such cases of taxonomic clarity are rare.

(small) genera must be established. Genera such as *Anectothemis*, *Congothemis*, *Lokia* and *Porpacithemis* have been mentioned as links between other genera and (the weakly defined) subfamilies. The discussion of Pinhey (1966c) on *Aethiothemis*, *Orthetrum* and *Oxythemis* is an example. The lack of clarity has in part been created by an overemphasis of wing venation characters and an underappreciation of their variability by previous authors. The Tetrathemistinae are particularly diverse in Africa, with numerous small genera inhabiting forests. The subfamily is probably an ancient one, and study of the phylogeny appears a promising perspective for biogeography, but also for the clear demarcation of the genera (G.S. Vick pers. comm.). Secondly, many of the larger genera require revisions or reviews.

SUPPORTIVE ACTIVITIES

Besides pure systematic research, the following action is required to support and advocate the research on African Odonata.

Table 1. Regional reviews. Abbreviations: **Sub** = suborders covered (**Z** = Zygoptera; **A** = Anisoptera), **keys** = keys provided (**G** = to genera; **S** = to species).

Reference	Country or region	Sub	Keys
Pinhey 1962a	Africa	ZA	G
Pinhey 1961a	Africa, eastern	ZA	GS
Pinhey 1951	Africa, southern	ZA	GS
Brooks & Jackson 2001	Bioko	ZA	
Pinhey 1976	Botswana	ZA	GS
Vick 2000	Cameroon, southwest	ZA	
Pinhey 1966c	DR Congo, northeast	ZA	GS
Consiglio 1978	Ethiopia	Z	
Pinhey 1982	Ethiopia	A	
Gambles *et al.* 1998	The Gambia	ZA	
O'Neill & Paulson 2001	Ghana	ZA	
Lempert 1998	Liberia	ZA	
Schmidt 1951a	Madagascar	Z	GS
Fraser 1956	Madagascar	A	GS
Lieftinck 1965	Madagascar	ZA	
Pinhey 1966a	Malawi	ZA	GS
Barlow 1996	Malawi	ZA	
Pinhey 1981b	Mozambique	ZA	
Martens *et al.* 2002	Namibia	ZA	
D'Andrea & Carfi 1994	Sierra Leone	ZA	
Carfi 1974	Somalia	ZA	
Pinhey 1984b	South Africa	Z	
Pinhey 1985	South Africa	A	
Pinhey 1984a	Zambia	ZA	S
Pinhey 1967b	Zambia, northeast	Z	GS
Lieftinck 1969	Zambia, northeast	A	
Pinhey 1984a	Zimbabwe	ZA	S

REGIONAL REVIEWS & IDENTIFICATION MANUALS

For individuals to research (all aspects of) African Odonata they need means to identify species, as well as knowledge of regional faunas. Table 1 lists such sources, in which the paramount importance of Pinhey's work is again notable. Transferring taxonomic knowledge to a broader public in the form of keys and field guides has a high priority. Such initiatives are underway for the adult Odonata of East Africa (Viola Clausnitzer & Klaas-Douwe Dijkstra), Cameroon (Graham Vick), Namibia (Andreas Martens) and South Africa (Michael Samways). A key to larvae of all African genera would be another major step forward in African odonatology. Larval keys are in preparation for Cameroon (David Chelmick), Mascarenes (Andreas Martens & Ole Müller) and southern Africa (Michael Samways).

EXPEDITIONS & COLLECTIONS

Study of the taxonomy, identification and biogeography of African Odonata is impossible without good material being available for study. Acquiring

and conserving it is, therefore, as important as systematic research itself. The most important collections of African Odonata are probably in museums in Berlin, Bulawayo, London, Paris and Tervuren. Only the fourth is presently in the hands of a specialised curator. Museums should be aided in the conservation, expansion and research of their collections. It is also necessary to create, expand and conserve collections in Africa itself, so the study of African Odonata can be taken from outside the continent, to within.

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REFERENCES & SELECTED BIBLIOGRAPHY

Aguesse, P. 1967. Nouveaux *Protolestes* Förster, 1899 de Madagascar (Odonata; Zygoptera). *Deutsche Entomologische Zeitschrift* (N.F.) **14**: 277-284.

Aguesse, P. 1968. Quelques Odonates récoltés en Sierra Leone. *Bulletin de l'Institut fondamental d'Afrique Noire* (A) **30**: 518-534.

Asahina, S. 1956. Notes on an African amphipterygid, *Pentaphlebia stahli* Foerster (Odonata: Amphipterygidae). *Kontyû* **24**: 221-223.

Barlow, A. 1996. Additions to the checklist of Odonata from Malawi, with taxonomic notes. *Odonatologica* **25**: 221-230.

Barnard, K. H. 1933. A new genus of corduliine dragonfly from South Africa (Odonata). *Stylops* **2**: 165-168.

Bechly, G. 1995. Morphologische Untersuchungen am Flügelgeäder der rezenten Libellen und deren Stammgruppenvertreter (Insecta; Pterygota; Odonata). *Petalura Special Issue* **1**: 1-341.

Blackman, R. A. A. & Pinhey, E. C. G. 1967. Odonata of the Seychelles and other Indian Ocean Island groups, based primarily on the Bristol University Expedition. *Arnoldia Rhodesia* **3**(12): 1-38.

Brooks, S. J. & Jackson, K. A. 2001. The Odonata of Bioko, Republic of Equatorial Guinea, with the description of fan-shaped setae on early instar Libellulidae larvae. *Odonatologica* **30**: 29-38.

Cammaerts, R. 1987. Taxonomic studies on African Gomphidae (Anisoptera) 1. *Malgassogomphus robinsoni* gen. nov., spec. nov. from Madagascar. *Odonatologica* **16**: 335-346.

Carfi, S. 1974. Contribution to the knowledge of Somalian Odonata. *Monitore Zoologico Italiano, NS supplemento* **5**: 147-181.

Carfi, S. & D'Andrea, M. 1994. Contribution to the knowledge of odonatological fauna in Sierra Leone, West Africa. *Problemi Attuali di Scienza e di Cultura* **267**: 111-191.

Carle, F. L. 1986. The classification, phylogeny and biogeography of the Gomphidae (Anisoptera). 1. Classification. *Odonatologica* **15**: 275-326.

Clausnitzer, V. & Lindeboom, M. 2002. Natural history and description of the dendrolimnetic larva of *Coryphagrion grandis* (Odonata). *Internationial Journal of Odonatology* **5**: 29-44.

Consiglio, C. 1978. Odonata collected in Ethiopia by the expeditions of the Accademia Nazionale Dei Lincei. I. Introduction and the Zygoptera. *Problemi Attuali di Scienza e di Cultura* **243**: 27-51.

Corbet, S. A. 1977. Gomphids from Cameroon, West Africa (Anisoptera: Gomphidae). *Odonatologica* **6**: 55-68.

Cowley, J. 1936. The *Disparoneura*-complex: generic characters and lists of species (Odonata). *Annals & Magazine of Natural History* (10)**17**: 509-526.

Davies, D. A. L. & Tobin, P. 1984. *The dragonflies of the World: a systematic list of the extant species of Odonata. Volume 1 Zygoptera, Anisozygoptera*. Societas Internationalis Odonatologica Rapid Communications (Supplement) **3**, ixx+1-127 pp.

Davies, D. A. L. & Tobin, P. 1985. *The dragonflies of the World: a systematic list of the extant species of Odonata. Volume 2 Anisoptera. Societas Internationalis* Odonatologica Rapid Communica-tions (Supplement) **5**, xi+1-151 pp.

Dumont, H. J. 1978. On confusion about the identity of *Pseudagrion acaciae* Foerster, 1906, with the description of *P. niloticus* spec. nov., and on the identity of *P. hamoni* Fraser, 1955 (Zygoptera: Coenagrionidae). *Odonatologica* **7**: 123-133.

Fraser, F. C. 1939. *Heliaeschna cynthiae*, a new species of dragonfly from Uganda (Order: Odonata). *Proceedings of the Royal Entomological Society of London* (B) **8**: 88-90.

Fraser, F. C. 1941. Notes on the genus *Tetrathemis* Brauer with descriptions of three new African species (Odonata). *Proceedings of the Royal Entomological Society of London* (B) **10**: 137-142.

Fraser, F. C. 1944. A note on the genus *Notiothemis* Ris, with the description of a new species (Order Odonata). *Proceedings of the Royal Entomological Society of London* (B) **13**: 40-43.

FRASER, F. C. 1946. A note on a third specimen of *Isomma hieroglyphicum* Selys (Odonata). *Proceedings of the Royal Entomological Society of London* (B) **15**: 155-159.

FRASER, F. C. 1949a. Gomphidae from the Belgian Congo (Order Odonata). *Revue de Zoologie et de Botanique Africaines* **42**: 101-138.

FRASER, F. C. 1949b. Notes on the Odonata of Mauritius 1. The genus *Hemicordulia* Sélys. *Proceedings of the Royal Entomological Society of London* (B) **18**: 130-134.

FRASER, F. C. 1951. Notes on Odonata in the Museum National d'Histoire Naturelle. With descriptions of a new species and a new Zygopterous nymph. *Revue Française d'Entomologie* **18**: 93-101.

FRASER, F. C. 1952. Notes on African Gomphidae with descriptions of four new species and a new genus (Order Odonata). *Occasional Papers of the Coryndon Memorial Museum* **3**: 3-12.

FRASER, F. C. 1953a. New genera and species of Libellulines from the Belgian Congo. *Revue de Zoologie et de Botanique Africaines* **48**: 242-256.

FRASER, F. C. 1953b. Odonates nouveaux de Madagascar. *Naturaliste Malgache* **5**: 159-166.

FRASER, F. C. 1954a. Further notes and descriptions of new species of Libellulidae from tropical Africa. *Revue de Zoologie et de Botanique Africaines* **50**: 252-268.

FRASER, F. C. 1954b. New species of *Macromia* from tropical Africa. *Revue de Zoologie et de Botanique Africaines* **49**: 41-76.

FRASER, F. C. 1955a. Les *Nesolestes* de Madagascar. *Naturaliste Malgache* **7**: 45-52.

FRASER, F. C. 1955b. The Megapodagriidae and Amphipterygidae (Odonata) of the African Continent. *Proceedings of the Royal Entomological Society of London* (B) **24**: 139-146.

FRASER, F. C. 1956. *Insectes Odonates Anisoptères. Faune de Madagascar I.* Publications de l'Institut de Recherche Scientifique, Tananarive-Tsimbazaza, 1-125 pp.

FRASER, F. C. 1957. A revision of the genus *Phyllogomphus* Sélys with description of five new species. *Revue de Zoologie et de Botanique Africaines* **56**: 9-32.

FRASER, F. C. 1958. Odonata new to the Belgian Congo with the description of the male of *Porpacithemis dubia* Fraser and another new species belonging to the same genus. *Revue de Zoologie et de Botanique Africaines* **58**: 39-42.

FRASER, F. C. 1960a. A note on the classification of the genus *Tatocnemis* Kirby, with a key to the species and the description of a new species. *Naturaliste Malgache* **12**: 65-69.

FRASER, F. C. 1960b. The Crenigomphines of tropical Africa. *Revue de Zoologie et de Botanique Africaines* **61**: 205-214.

FRASER, F. C. 1962. The *Gynacanthas* of tropical Africa. *Revue de Zoologie et de Botanique Africaines* **65**: 1-28.

GAMBLES, R. M. 1966. Two new species of *Nesciothemis* Longfield, 1955 (Odonata) from Nigeria. *Entomologist* **99**: 161-173.

GAMBLES, R. M. 1970. A new species of megapodagrionid dragonfly from continental Africa. *Entomologist* **103**: 53-61.

GAMBLES, R. M. 1979. West African species of *Macromia* (Odonata: Corduliidae) belonging to the *picta* and *sophia* groups. *Systematic Entomology* **4**: 389-407.

GAMBLES, R. M., MOORE, N. W., HÄMÄLÄINEN, M. & PRENDERGAST, E. D. V. 1998. Dragonflies from The Gambia: an annotated list of records up to the end of 1980. *Odonatologica* **27**: 25-44.

KIMMINS, D. E. 1931. Description of the male *Coryphagrion grandis* Morton (Odonata). *Annals & Magazine of Natural History* (10)**7**: 215-217.

KIMMINS, D. E. 1938. New African species of *Elattoneura* (Odonata). *Annals & Magazine of Natural History* (11)**1**: 294-302.

KIMMINS, D. E. 1958. New species and subspecies of Odonata. *Bulletin of the British Museum (Natural History) Entomology* **7**: 347-358.

LEGRAND, J. 1977. Deux *Tetrathemis* Brauer nouveaux du Gabon et la larve d l'un d'eux (Anisoptera: Libellulidae). *Odonatologica* **6**: 245-251.

LEGRAND, J. 1980. Nouvelles additions aux représentants afrotropicaux du genre *Elattoneura*: groupe *acuta-vrijdaghi* (Odonata: Protoneuridae). *Revue Française d'Entomologie* (N.S.) **2**: 153-161.

LEGRAND, J. 1982. *Elattoneura pluotae* spec. nov. (Protoneuridae) et *Mesocnemis dupuyi* spec. nov. (Platycnemididae), zygoptères noveaux du Sénégal. *Odonatologica* **11**: 153-158.

LEGRAND, J. 1984a. Un deuxieme *Idomacromia* de la foret Gabonaise: *I. lieftincki* spec. nov. (Anisoptera: Corduliidae). *Odonatologica* **13**: 113-117.

LEGRAND, J. 1984b. Un nouveau Corduliidae de l'archipel des Comores *Nesocordulia villiersi*, n. sp., et notes sur les espèces Malgaches du genre. *Revue Française d'Entomologie* (N.S.) **6**: 93-96.

LEGRAND, J. 1985. *Elattoneura* afrotropicaux nouveaux ou peu connus (Odonata: Protoneuridae). *Nouvelle Revue d'Entomologie* **2**: 159-168.

LEGRAND, J. 1986. *Malgassophlebia westfalli* spec. nov., nouveau Tetratheminae afrotropical des forêts du Gabon Oriental: imagos, larves, notes biologiques et discussion sur le genre (Anisoptera: Libellulidae). *Odonatologica* **15**: 97-105.

LEGRAND, J. 2002. *Malgassophlebia mayanga* (Ris, 1909) et un nouvelle espèce du genre à Madagascar (Odonata, Anisoptera, Libellulidae). *Revue Française d'Entomologie* (N.S.) **23**: 225-236.

LEGRAND, J. & LACHAISE, M. 2002. Un nouveau Gomphidae afrotropical, *Lestinogomphus matilei* n.sp. (Odonata, Anisoptera). *Revue Française d'Entomologie* (N.S.) **23**: 1-8.

LEMPERT, J. 1988. *Untersuchungen zur Fauna, Ökologie und zum Fortpflanzungsverhalten von Libellen (Odonata) an Gewässern des tropischen Regenwaldes in Liberia, Westafrika.* Diplomarbeit, Friedrich-Wilhelms Universität, Bonn, 1-238 pp.

LEMPERT, J. 1992. *Mesocnemis tisi* spec. nov., a new platycnemidid from Liberia, West Africa (Zygoptera: Platycnemididae). *Odonatologica* **21**: 495-497.

LIEFTINCK, M. A. 1961. Notes on the affinity and nomenclature of some Old World Corduliidae (Odonata). I. The genera *Syncordulia* Selys, *Presba* Barnard, and *Micromidia* Fraser. II. The genera *Metaphya* Laidlaw and *Anacordulia* Tillyard. *Proceedings Koninklijke Academie van Wetenschappen* (C) **63**: 410-423.

LIEFTINCK, M. A. 1963. The type of *Libellula hova* Rambur, 1842, with notes on the other species of *Zygonyx* Selys from Madagascar. *Verhandlungen der Naturforschenden Gesellschaft in Basel* **74**: 53-61.

LIEFTINCK, M. A. 1965. Notes on the Odonata of Madagascar, with special reference to the Zygoptera and with comparative notes on other faunal regions. *Verhandlungen der Naturforschenden Gesellschaft in Basel* **76**: 229-257.

LIEFTINCK, M. A. 1969. Odonata Anisoptera. Hydrobiological survey of the Lake Bangweulu Luapula River Basin. *Cercle Hydrobiologique de Bruxelle, Bruxelle* **14**: 5-64.

LINDLEY, R. P. 1970. On a new genus and species of libellulid dragonfly from the Ivory Coast. *Entomologist* **103**: 77-83.

LINDLEY, R. P. 1976. A new species of Ethiopian *Elattoneura* Cowley, 1935 from the Central African Republic, and some notes on the genus (Zygoptera: Protoneuridae). *Odonatologica* **5**: 153-164.

LOHMANN, H. 1980. Zur Taxonomie einiger *Crocothemis*-Arten, nebst Beschreibung einer neuen Art von Madagaskar (Anisoptera: Libellulidae). *Odonatologica* **10**: 109-116.

LOHMANN, H. 1996. Das phylogenetische System der Anisoptera (Odonata). *Entomologische Zeitschrift* **106**: 209-296.

LONGFIELD, C. 1947. The Odonata of south Angola. *Arquivos de Museu Bocage* **16**: 1-31.

LONGFIELD, C. 1953. The *Atoconeura* problem (Odonata, Libellulidae). *Entomologist* **86**: 42-49.

MARTENS, A., JÖDICKE, R. & SUHLING, F. 2003. An annotated checklist of the Odonata of Namibia. *Cimbebasia* **18**: 139-160.

MAY, M. L. 1997. Reconsideration of the status of the genera *Phyllomacromia* and *Macromia* (Anisoptera: Corduliidae). *Odonatologica* **26**: 405-414.

MAY, M. L. 1999. Phylogeny of *Enallagma* (Zygoptera: Coenagrionidae) and some related genera (p. 10). In *Abstracts of Papers and Posters presented at the 1999 International Congress of Odonatology*, 1-29.

O'NEILL, G. & PAULSON, D. 2001. An annotated list of Odonata collected in Ghana in 1997, a checklist of Ghana Odonata, and comments on West African odonate biodiversity and biogeography. *Odonatologica* **30**: 67-86.

PARR, M. J. 1977. A second species of *Pentaphlebia* Foerster (Zygoptera: Amphipterygidae), from the Nigerian-Cameroun border. *Odonatologica* **6**: 77-82.

PINHEY, E. 1951. *The dragonflies of southern Africa.* Transvaal Museum Memoir **5**, Transvaal Museum, Pretoria, 1-335 pp.

PINHEY, E. 1961a. *A survey of the dragonflies of eastern Africa (Order Odonata).* British Museum (Natural History), London, vii+1-214 pp.

PINHEY, E. 1961b. Dragonflies collected on an expedition from Rhodesia to Nigeria in 1958. Part 2. *Entomologist's Monthly Magazine* **96**: 256-271.

PINHEY, E. 1961c. Some dragonflies (Odonata) from Angola; and descriptions of three new species of the family Gomphidae. *Publicacoes Culturais Companhia de Diamantes de Angola* **56**: 79-86.

PINHEY, E. 1962a. A descriptive catalogue of the Odonata of the African continent. *Publicacoes Culturais Companhia de Diamantes de Angola* **59**: 11-322.

PINHEY, E. 1962b. Some records of Odonata collected in tropical Africa. *Journal of the Entomological Society of Southern Africa* **25**: 20-50.

PINHEY, E. 1963. Notes on both sexes of some tropical species of *Ceriagrion* Sélys (Odonata). *Annals & Magazine of Natural History* **13**: 17-28.

PINHEY, E. 1964a. A revision of the African members of the genus *Pseudagrion* Selys (Odonata). *Revista de Entomologia de Moçambique* **7**: 5-196.

PINHEY, E. 1964b. Dragonflies (Odonata) of the Angola-Congo borders of Rhodesia. *Publicacoes Culturais Companhia de Diamantes de Angola* **63**: 95-129.

PINHEY, E. 1966a. Check-list of dragonflies (Odonata) from Malawi, with description of a new *Teinobasis* Kirby. *Arnoldia Rhodesia* **2**(33): 1-24.

PINHEY, E. 1966b. Notes on African Odonata, particularly type material. *Revue de Zoologie et de Botanique Africaines* **73**: 283-308.

PINHEY, E. 1966c. Odonata. *Mission H. de Saeger, Exploration du Parc National de la Garamba* **45**: 1-114.

PINHEY, E. 1967a. African Chlorocyphidae (Odonata). *Journal of the Entomological Society of Southern Africa* **29**: 161-197.

PINHEY, E. 1967b. Odonata Zygoptera. Hydrobiological survey of the Lake Bangweulu Luapula River Basin. *Cercle Hydrobiologique de Bruxelle, Bruxelle* **14**: 8-39.

PINHEY, E. 1967c. The genus *Neurogomphus* Karsch (Odonata: Gomphidae). *Journal of the Entomological Society of Southern Africa* **29**: 64-37.

PINHEY, E. 1969a. A revision of the genus *Chlorocnemis* Sélys (Odonata). *Occasional Papers of the National Museums of Rhodesia (Natural Sciences)* (B) **4**: 209-266.

PINHEY, E. 1969b. On the genus *Umma* Kirby (Odonata). *Arnoldia Rhodesia* **4**(17): 1-11.

PINHEY, E. 1969c. Tandem linkage in dichoptic and other Anisoptera (Odonata). *Occasional Papers of the National Museums and Monuments of Rhodesia (Natural Sciences)* (28B) **4**: 137-207.

PINHEY, E. 1970a. A new approach to African *Orthetrum* (Odonata). *Occasional Papers of the National Museums of Rhodesia (Natural Sciences)* (B) **4**: 261-321.

PINHEY, E. 1970b. A remarkable new zygopteran (Odonata) from Cameroons. *Arnoldia Rhodesia* **4**(37): 1-3.

PINHEY, E. 1970c. Monographic study of the genus *Trithemis* Brauer (Odonata: Libellulidae). *Memoirs of the Entomological Society of Southern Africa* **11**: 1-159.

PINHEY, E. 1970d. The status of *Cinitogomphus* Pinhey (Odonata). *Arnoldia Rhodesia* **4**(38): 1-5.

PINHEY, E. 1971a. A new zygopteran genus (Odonata) from Malawi. *Arnoldia Rhodesia* **5**(9): 1-6.

PINHEY, E. 1971b. Odonata collected in Republique Centre-Africaine by R. Pujol. *Arnoldia Rhodesia* **5**(18): 1-16.

PINHEY, E. 1971c. Odonata of Fernando Po Island and of neighbouring Cameroons Territory. *Journal of the Entomological Society of Southern Africa* **34**: 215-230.

PINHEY, E. 1972. The genus *Aciagrion* Sélys (Odonata). *Occasional Papers of the National Museums of Rhodesia (Natural Sciences)* (B) **5**: 1-59.

PINHEY, E. 1973. Notes on some African representatives of the genus *Pseudagrion* Sélys, 1876, with descriptions of two new species (Zygoptera: Coenagrionidae). *Odonatologica* **2**: 317-327.

PINHEY, E. 1974a. A revision of the African *Agriocnemis* Sélys and *Mortonagrion* Fraser (Odonata: Coenagrionidae). *Occasional Papers of the National Museums & Monuments of Rhodesia (Natural Sciences)* (B) **5**: 171-278.

PINHEY, E. 1974b. Order Odonata (pp. 17-19). In COATON, W. G. H. (ed). *Status of taxonomy of the Hexapoda of southern Africa*. Entomological Memoir of the Department of Agriculture & Technical Services, Republic of South Africa **38**, 1-124 pp.

PINHEY, E. 1976. Dragonflies (Odonata) of Botswana, with ecological notes. *Occasional Papers of the National Museums & Monuments of Rhodesia (Natural Sciences)* (B) **5**: 524-601.

PINHEY, E. 1979. The status of a few well-known African anisopterous dragonflies (Odonata). *Arnoldia Zimbabwe* **8**(36): 1-7.

PINHEY, E. 1980a. A review of the *Metacnemis* group (Odonata: Platycnemididae). *Arnoldia Zimbabwe* **2**(9): 1-13.

PINHEY, E. 1980b. A revision of African Lestidae (Odonata). *Occasional Papers of the National Museums & Monuments of Rhodesia (Natural Sciences)* (B) **6**: 1-479.

PINHEY, E. 1981a. A new *Prodasineura* Cowley from Zambia (Odonata: Protoneuridae). *Arnoldia Zimbabwe* **9**: 69-72.

PINHEY, E. 1981b. Checklist of the Odonata of Moçambique. *Occasional Papers of the National Museums & Monuments of Rhodesia (Natural Sciences)* (B) **6**: 557-631.

PINHEY, E. 1982. Odonata collected in Ethiopia III. Anisoptera. *Problemi Attuali di Scienza e di Cultura* **252**: 5-56.

PINHEY, E. 1984a. A checklist of the Odonata of Zimbabwe and Zambia. *Smithersia* **3**: 1-64.

PINHEY, E. 1984b. A survey of the dragonflies (Odonata) of South Africa. Part 1. *Journal of the Entomological Society of Southern Africa* **47**: 147-188.

PINHEY, E. 1985. A survey of the dragonflies (Odonata) of South Africa. Part 2. Anisoptera. *Journal of the Entomological Society of Southern Africa* **48**: 1-48.

RIS, F. 1915. New dragonflies (Odonata) of the subfamily Libellulinae from Sierra Leone, W. Africa. *Annals & Magazine of Natural History* (8)**15**: 213-223.

RIS, F. 1921. The Odonata or dragonflies of South Africa. *Annals of the South African Museum* **18**: 245-445.

ROBERTSON, H. M. 1982. Courtship displays and mating behaviour of three species of Chlorocyphidae (Zygoptera). *Odonatologica* **11**: 53-58.

SCHMIDT, E. 1943. Bemerkungen über Lestiden II (Ordnung Odonata). Eine neue Gattung und Art aus Kamerun (*Eolestes diotima*). *Mitteilungen der Deutschen Entomologischen Gesellschaft, Berlin* **11**: 102-111.

SCHMIDT, E. 1951a. The Odonata of Madagascar, Zygoptera. *Memoires de l'Institute Scientifique de Madagascar* (A) **6**: 116-283.

SCHMIDT, E. 1951b. Zwei bermerkenswerte Platycnemididen aus dem Zoologischen Museum der Universität Berlin (Ordn. Odonata). *Mitteilungen der Münchner Entomologischen Gesellschaft* **41**: 202-209.

SCHMIDT, E. 1951c. Über neue und weniger bekannte afrikanische Platycnemididen (Odon.). *Mitteilungen der Münchner Entomologischen Gesellschaft* **41**: 217-240.

TRUEMAN, J. W. H. 1996. A preliminary cladistic analysis of odonate wing venation. *Odonatologica* **25**: 59-72.

VICK, G. S. 1996. *Umma mesumbei* spec. nov., with records of some other dragonfly species from the south-west Province of Cameroon (Zygoptera: Calopterygidae). *Odonatologica* **25**: 167-178.

VICK, G. S. 1999. A checklist of the dragonflies of the South West Province of Cameroon, with a description of *Phyllogomphus corbetae* spec. nov. (Anisoptera: Gomphidae). *Odonatologica* **28**: 219-256.

VICK, G. S. 2000. *Mesumbethemis takamandensis* gen. nov., spec. nov., a new genus and species of the Tetrathemistinae from Cameroon, with a key to the African genera of the subfamily. *Odonatologica* **29**: 225-237.

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Appendix List of genera of African Odonata. Classification follows Davies & Tobin (1984, 1985), except Gomphidae (Carle 1986). Abbreviations: **n** = number of valid species, in many cases a rough estimate; **e** = genus endemic (or near-endemic if between brackets) to a particular region (- = also found outside Africa; **A** = sub-Saharan Africa; **Ci** = Côte d'Ivoire; **Cm** = Cameroon Highlands; **Cp** = Cape Region; **Ec** = East Coast Forest from Kenya to Mozambique; **Md** = Madagascar and Comoros; **Ml** = Malawi; **Mr** = Mauritius; **Ms** = Mascarenes; **Sc** = Seychelles; **Sl** = Sierra Leone; **Tn** = Tanzania; **Wc** = forests of West and central Africa), **t** = taxonomic status (**?** = status of endemic genus or placement of species in non-endemic genus requires study; **+** = review of (parts of) genus required; **++** = revision of genus urgently required); **b** = interesting for study of African biogeography. The number of species discussed in each reference is given between brackets.

(Sub)family	Genus	n	e	t	b	Remark/ reference
Amphipterygidae: Rimanellinae	*Pentaphlebia* Förster, 1909	2	Cm		+	Asahina 1956 (1); Parr 1977 (2)
Calopterygidae: Calopteryginae	*Phaon* Sélys, 1853	2	A			
	Sapho Sélys, 1853	5	Wc	?		
	Umma Kirby, 1890	11	(Wc)	?	+	Pinhey 1969b (10); Vick 1996 (+1)
Chlorocyphidae	*Africocypha* Pinhey, 1961	1	Cm	?		Pinhey 1971c
	Chlorocypha Fraser, 1928	31	A	+	+	Pinhey 1967a (26)
	Platycypha Fraser, 1949	8	A	?	+	Pinhey 1967a (8)
Lestidae	*Lestes* Leach, 1815	14	-			Pinhey 1980b (14)
Perilestidae	*Nubiolestes* Fraser, 1945	1	Cm		+	Schmidt 1943
Synlestidae	*Chlorolestes* Sélys, 1862	7	(Cp)		+	(extends to Ml) Pinhey 1951 (5)
	Ecchlorolestes Barnard, 1973	2	Cp		+	Pinhey 1951 (2)
Megapodagrionidae: Argiolestinae	*Allolestes* Sélys, 1868	1	Sc	?	+	Blackman & Pinhey 1967
	Amanipodagrion Pinhey, 1962	1	Tn			Pinhey 1962b
	Nesolestes Sélys, 1891	17	(Md)	+	+	(one species in Cm) Fraser 1955a (11)
	Neurolestes Sélys, 1882	1	(Cm)	?	+	(Cm to Gabon) Fraser 1955b; Gambles 1970
	Protolestes Förster, 1899	8	Md	+	+	Aguesse 1967 (7)
Megapodagrionidae: Coryphagrioninae	*Coryphagrion* Morton, 1924	1	Ec		+	Kimmins 1931; Fraser 1955b
Megapodagrionidae: Megapodagrioninae	*Tatocnemis* Kirby, 1889	10	Md	+	+	Fraser 1960a (7)
Coenagrionidae: Agriocnemidinae	*Agriocnemis* Sélys, 1869	16	-			Pinhey 1974a (16)
	Argiocnemis Sélys, 1877	2	-	?		Pinhey 1966b (1); 1970b (1)
	Coenagriocnemis Fraser, 1949	4	Ms			
	Mortonagrion Fraser, 1920	1	-	?		Pinhey 1974a
Coenagrionidae: Ischnurainae	*Aciagrion* Sélys, 1891	14	-	+		Pinhey 1972 (10)
	Enallagma Charpentier, 1840	21	-	+		species to be relegated to endemic genera
	Ischnura Charpentier, 1840	5	-	+		
	Millotagrion Fraser, 1953	1	Md	?		Fraser 1953b; Lieftinck 1965
Coenagrionidae: Pseudagrioninae	*Argiagrion* Sélys, 1876	1	Sl	?		Pinhey 1966b
	Ceriagrion Sélys, 1876	22	-	+		Pinhey 1963 (13)
	Pseudagrion Sélys, 1876	96	-	+	+	Pinhey 1964a (72)
	Teinobasis Kirby, 1890	3	-	+		Schmidt 1951a (1); Pinhey 1966a (2)
Platycnemididae: Calicnemiinae	*Allocnemis* Sélys, 1863	2	(Cp)		+	(one species in Katanga)
	Leptocnemis Sélys, 1886	1	Sc		+	Blackman & Pinhey 1967
	Mesocnemis Karsch, 1891	4	A	+		Legrand 1982 (3); Lempert 1992 (+1)
	Metacnemis Sélys, 1863	3	(Cp)		+	(one species in Md) Pinhey 1980a
	Oreocnemis Pinhey, 1971	1	Ml		+	Pinhey 1971a
	Paracnemis Martin, 1902	1	Md		+	Schmidt 1951a
	Stenocnemis Sélys, 1886	1	(Cm)		+	Schmidt 1951b

Appendix cont. (*vide* Figure legend for abbreviations)

(Sub)family	Genus	n	e	t	b	Remark/ reference
Platycnemididae: Platycnemidinae	*Platycnemis* Burmeister, 1839	19	-	++	+	Schmidt 1951a (7)
Protoneuridae	*Chlorocnemis* Sélys, 1863	12	A		+	Pinhey 1969a (10)
	Elattoneura Cowley, 1935	15	-	+		Lindley 1976 (11); Legrand 1980 (3), 1985 (6)
	Isomecocnemis Cowley, 1936	3	(Wc)	+		
	Prodasineura Cowley, 1934	6	-	+		Pinhey 1981a
Aeshnidae: Aeshninae	*Aeshna* Fabricius, 1775	9	-	+		
	Anaciaeschna Sélys, 1878	1	-			
	Anax Leach, 1815	11	-			includes *Hemianax*
	Gynacantha Rambur, 1842	20	-	++		Fraser 1962 (20)
	Heliaeschna Sélys, 1882	9	-	++		Fraser 1939 (5)
Gomphidae: Austrogomphinae	*Lestinogomphus* Martin, 1911	5	A	++		Legrand & Lachaise 2002 (2)
Gomphidae: Epigomphinae	*Microgomphu*s Sélys, 1857	7	-	+		includes *Africogomphus*, Pinhey 1961c
Gomphidae: Gomphinae	*Neurogomphus* Karsch, 1890	10	A	++		Pinhey 1967c (7)
	Notogomphus Hagen, 1857	19	A	++	+	
Gomphidae: Lindeniinae	*Cinitogomphus* Pinhey, 1964	1	A	?		Pinhey 1964b, 1970d
	Diastatomma Burmeister, 1839	7	Wc	++		
	Gomphidia Sélys, 1854	7	-	++		
	Ictinogomphus Cowley, 1934	3	-			Kimmins 1958 (3)
Gomphidae: Onychogomphinae	*Cornigomphus* Martin, 1907	1	Wc	?		
	Crenigomphus Sélys, 1892	6	A			Fraser 1960b (6)
	Nepogomphoides Fraser, 1952	1	(Tn)		+	(extends to Ml) Fraser 1952
	Onychogomphus Sélys, 1854		12	-	++	
	Paragomphus Cowley, 1934	31	-	++		
	Tragogomphus Sjöstedt, 1899	5	Wc	+		Pinhey 1961b (3)
Gomphidae: Phyllogomphinae	*Ceratogomphus* Sélys, 1854	2	(Cp)		+	(extends to Katanga)
	Isomma Sélys, 1892	1	Md		+	Fraser 1946
	Malgassogomphus Cammaerts,1987	1	Md		+	Cammaerts 1987
	Phyllogomphus Sélys, 1854	20	A	++	+	Fraser 1957 (9)
Corduliidae: Corduliinae	*Libellulosoma* Martin, 1907	1	Md	?	+	
	Hemicordulia Sélys, 1870	3	-			Fraser 1949b (3)
Corduliidae: Gomphomacromiinae	*Nesocordulia* McLachlan, 1882	6	Md		+	Fraser 1956 (5); Legrand 1984b (+1)
	Syncordulia Sélys, 1882	2	Cp		+	Barnard 1933 (2); Lieftinck 1961 (1)
Corduliidae: Idomacromiinae	*Idomacromia* Karsch, 1896	2	Wc		+	Legrand 1984a (2)
Corduliidae: Macromiinae	*Phyllomacromia* Sélys, 1878	41	A	++	+	Fraser 1954b (26); Gambles 1979 (12)
Corduliidae: Neophyinae	*Neophya* Sélys, 1881	1	Wc		+	
Libellulidae: Brachydiplacinae	*Anectothemis* Fraser, 1954	1	Wc	?		Fraser 1954a
	Chalcostephia Kirby, 1889	1	A			
	Congothemis Fraser, 1953	1	Wc	?		Fraser 1953a
	Eleuthemis Ris, 1910	2	(Wc)	+		
	Hemistigma Kirby, 1889	2	A			
	Porpacithemis Fraser, 1954	3	Wc	+		Fraser 1958 (2)
	Porpax Karsch, 1896	4	A			Pinhey 1966c (4)
	Thermochoria Kirby, 1889	2	A			

Appendix cont. (*vide* Figure legend for abbreviations)

(Sub)family	Genus	n	e	t	b	Remark/ reference
Libellulidae: Libellulinae	*Aethiothemis* Ris, 1908	9	A	++		
	Hadrothemis Karsch, 1891	7	A	+		
	Lokia Ris, 1919	7	A	+		Fraser 1953a (5); Lieftinck 1969 (+2)
	Nesciothemis Longfield, 1955	5	A	+		Gambles 1966 (4); Pinhey 1971b (5)
	Orthetrum Newman, 1833	29	-			Pinhey 1970a (28), 1979 (+1)
	Oxythemis Ris, 1909	1	(Wc)			
	Thermorthemis Kirby, 1889	2	Md			
	Viridithemis Fraser, 1961	1	Md	?		
Libellulidae: Palpopleurinae	*Palpopleura* Rambur, 1842	5	-			
Libellulidae: Sympetrinae	*Acisoma* Rambur, 1842	2	-			
	Brachythemis Brauer, 1868	4	-			
	Bradinopyga Kirby, 1893	2	-			
	Crocothemis Brauer, 1868	6	-			Lohmann 1980 (5)
	Cyanothemis Ris, 1915	1	Wc			Ris 1915
	Diplacodes Kirby, 1889	5	-	+		Pinhey 1976 (5)
	Philonomon Förster, 1906	1	A	?		
	Sympetrum Newman, 1833	4	-	?		
Libellulidae: Tetrathemistinae	*Allorrhizucha* Karsch, 1890	3	(Wc)	?	+	
	Archaeophlebia Ris, 1909	1	Md		+	
	Calophlebia Sélys, 1896	2	Md		+	
	Eothemis Ris, 1909	1	Wc	?	+	
	Malgassophlebia Fraser, 1956	6	(Wc)	+	+	(two species in Md) Legrand 1986 (3), 2002 (+2)
	Mesumbethemis Vick, 2000	1	Cm		+	Vick (2000): with key to genera subfamily
	Micromacromia Karsch, 1890	3	A		+	
	Monardithemis Longfield, 1947	1	A	?	+	Longfield 1947
	Neodythemis Karsch, 1889	8	A		+	
	Notiothemis Ris, 1919	2	A		+	Fraser 1944 (2)
	Sleuthemis Fraser, 1951	1	Wc	?	+	Fraser 1951; Aguesse 1968
	Tetrathemis Brauer, 1868	10	-	+	+	Fraser 44 (6); Legrand 77 (4)
Libellulidae: Trameinae	*Parazyxomma* Pinhey, 1961	1	A			
	Pantala Hagen, 1861	1	-			
	Tholymis Hagen, 1867	1	-			
	Trameа Hagen, 1861	2	-			
	Rhyothemis Hagen, 1867	6	-			
	Zyxomma Rambur, 1842	2	-			
Libellulidae: Trithemistinae	*Atoconeura* Karsch, 1899	2	A	+	+	Longfield 1953 (2)
	Thalassothemis Ris, 1912	1	Mr		+	Pinhey 1955
	Trithemis Brauer, 1868	37	-	+		Pinhey 1970c (35)
Libellulidae: Urothemistinae	*Aethriamanta* Kirby, 1889	1	-			
	Macrodiplax Brauer, 1868	1	-			
	Selysiothemis Ris, 1897	1	-			
	Urothemis Brauer, 1868	4	-			
Libellulidae: Zygonychinae	*Olpogastra* Karsch, 1895	4	A			
	Zygonychidium Lindley, 1970	1	Ci			Lindley 1970
	Zygonyx Hagen, 1867	17	-	+	+	Lieftinck 1963 (4); Pinhey 1964b (11)