

KNOWLEDGE OF THE AFRICAN-MALAGASY MAYFLIES

J. M. Elouard

IRD, BP5045
F-34032 Montpellier cedex 1, France

ABSTRACT

Actually, African Mayflies are depauperate and few diversified (81 genera and 368 species). The study of genus and species numbers described during each decades since the last century till now, associated to the number of authors working on that order and, the setting up of a map of prospected areas, proof that the poverty of Mayfly in Africa is rather due to a poor knowledge than to a real poverty.

INTRODUCTION

The African-Malagasy continent contains about 81 genera and 368 mayfly species. Taking into account the size of the continent and the richness of the biota, one could suppose that either the mayfly fauna is very depauperate or that it is poorly known.

The second proposition, which seems more realistic, leads to the two following questions:

- Are there still undiscovered genera and species?
- Are there many areas of the African continent which have been, for mayflies, investigated poorly or not at all?

Answering these two questions should indicate the degree of our knowledge of the African-Malagasy mayfly fauna.

Are there still undiscovered genera and species?

It is difficult to answer this question directly. By studying the frequency of descriptions of genera and species in the past we might gain insight into the probability of discovering new taxa.

OVERVIEW

Thirteen genera were cited from Africa during the 19th century, but only five of them were new; others were European or cosmopolitan, because the first African species discovered were tied to previously known genera. This assertion is confirmed by the fact that the first species description occurred in 1833 whereas the first true new African genus was described in 1881, that is to say nearly half a century later.

Table 1. Numbers of new genera and species and numbers and percentage of renamed species per decade.

Years	New Genera	New spec.	nb. renamed species	% renamed species
19th cent.	13	15	11	73
1900-09	1	2	2	100
1910-19	6	17	11	65
1920-29	5	17	9	53
1930-39	5	54	25	46
1940-49	2	26	15	58
1950-59	6	28	15	54
1960-69	5	37	6	16
1970-79	8	24	5	21
1980-89	8	33	11	33
1990-98	22	115	14	12
Sum	81	368	124	34

During the 1900-1989 period, 54 new genera were established, which corresponds to a mean of six new genera per decade, with a minimum during the 1900-1909 (1 genus) and 1940-1949 (2 genera) periods. The decades of maximum descriptions were 1910-1919 (7 genera), 1970-1979 (8 genera) and 1980-1989 (8 genera). During the same 1900-1989 period, the number of new species described was around 26 per decade, which corresponds to a mean of two to three per year. Among them, 99/237 (41%) were renamed. This is because of the creation of endemic African genera and the reclassification of known species into them.

During the 1990-1998 period 22 new genera and 115 new species were described. These numbers correspond respectively to 29% of the total known African genera and 31% of the African species. The newly established genera were largely due to the reclassification of previously known species, particularly in the Baetidae family, and partly to the discovery of new taxa, mainly in West Africa and Madagascar. However, in spite of the establishment of numerous genera, only 14% of the 115 new species described during those 8 years were renamed (figs. 1 and 2).

Authors

- During the 19th century, the main descriptions were done by Vayssiere (1890, 1891, 1893, 1895), Eaton (Eaton, 1868, 1871, 1881, 1883-88), McLachlan (1868) and Latreille (1833) who described mayflies from throughout the world.

- During the 1900-1919 period, Ulmer (1916), Esben-Petersen (1913), Navas (1909, 1911, 1912, 1913, 1915 a, b, c) and Eaton (1912, 1913 a, b, c) described almost all species while Navas (1922 a, b, 1926, 1927, 1929) and Lestage (1923 a, b, 1924 a, b) were the main mayfly describers between 1920-1929 (see also Ulmer, 1920).

- Barnard (1932, 1937) did the major part of the work between 1930 and 1939 (see also Ulmer, 1932; Kimmins, 1937; Lestage, 1939) and Crass (1947) and Harrison (1943, 1949 a and b) and Kimmins (1949) between 1940-1949 (see also Barnard, 1940, Lestage, 1945). The descriptions during the fifties were done mainly by Kimmins (1956, 1957), Demoulin (1952, 1955 a and b), and Gillies (1954, 1957)(see also Edmunds, 1953). The describers during the 1960-1969 period were more diversified. Demoulin (1965, 1966 a and b, 1967), Kimmins and Gillies (1960) continued to publish new species but several authors such as Agnew (1961 a, b, 1962), Schoonbe (1968) and the american teams also contributed (Allen and Edmunds, 1963; Peters and Edmunds, 1964, Peters et al., 1964; McCafferty, 1968). Gillies (1977) and Demoulin (1970, 1973) dominated during the 1970-1979 period assisted by Puthz (1971), McCafferty (1971) and Agnew (1973). During the 1980-1989

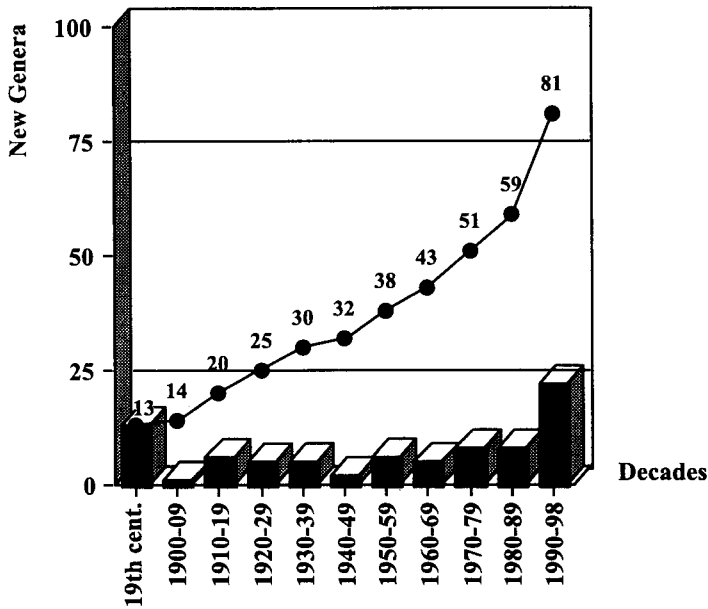


Fig. 1. Number of new genera described per decade and cumulative descriptions.

period, authors were more diversified and although Gillies (1980 a, b, 1982, 1984, 1985) and Kopelke were the main authors, Malzacher (1987) and Elouard (Elouard and Gillies, 1989) made some contributions. During the 1990-1998 period, 115 new species and 22 new genera were described. Descriptions of new genera were done principally by two teams: one from Purdue University: mainly McCafferty, Waltz and Lugo-Ortiz (Waltz and McCafferty, 1994; McCafferty and Wang, 1995; Povonsha and McCafferty, 1995; Edmunds and McCafferty, 1996, Lugo-Ortiz and McCafferty, 1996 a and b, 1997 a, b and c, 1998; Barber-James and McCafferty, 1997; McCafferty et al., 1997; Lugo-Ortiz et al. 1999) and the Orstom team associated with the Musée Zoologique de Lausanne mainly: Elouard, Wuillot, Oliarinony, Sartori, Gattolliat (Elouard et al. 1990; Elouard and Oliarinony, 1997; Elouard and Sartori, 1997; Oliarinony and Elouard, 1997; Gattolliat et al., 1999). The descriptions of most new species were done by researchers of these two teams, but three independent researchers, Gillies, Malzacher and Wuillot, also contributed greatly (Gillies, 1990; 1991, Gillies and Elouard, 1990; Gillies et al., 1990; Malzacher, 1990, 1993, 1995; Wuillot and Gillies, 1993 a, b).

Two remarks could be made:

- the more people (who) work on mayflies, the more new taxa are discovered and more taxonomic problems are solved;
- the abundance of descriptions during the 1980-1998 period point out that the African mayfly fauna was previously very poorly known.

Are mayflies well investigated in Africa and Madagascar?

We have outlined on the map (fig. 3), in dark gray those countries where the mayfly fauna is well known and in light gray countries where the mayfly fauna is only partly known. Outside of these areas, there still exist some places where a few mayflies have been recorded, but the mayfly fauna for these countries is for the large part unknown. One can see that less than one third of Africa has been really prospected.

Some areas, such as the great lakes landscape (east Zaïre, Rwanda, Burundi, Uganda), present an abundant variety of aquatic biota but still very few mayfly taxa are known from those areas.

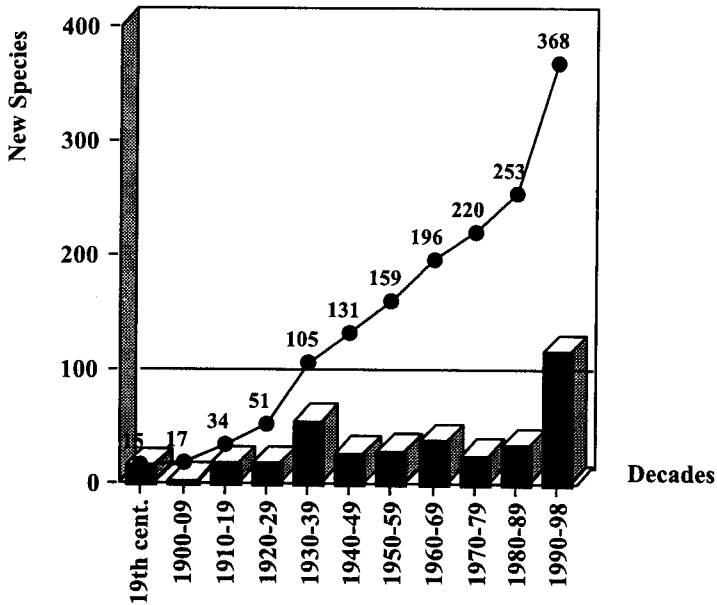


Fig. 2. Number of new species described per decade and cumulative descriptions.

Some other areas, such as West Africa and Madagascar, have been well investigated by the ORSTOM team but the majority of taxa are not yet described in the literature. We estimate that more than 250 new species are recorded and still unpublished.

To this lack of descriptions is added the lack of knowledge of the distribution of taxa. Most are known only from the type locality or for two or three stations. The South Malagasy and South African mayflies are exceptions to this situation.

CONCLUSION

The fact that well investigated areas contain numerous new genera and species indicates that the general African mayfly fauna is not depauperate but rather largely unknown.

The lack of knowledge concerns not only the cryptic or microendemic species but also large or medium-sized species, often with a more or less wide distribution. The discovery in Madagascar of two *Eatonica* and seven *Probosciodoplocia* illustrates this.

One can also note that for the majority of African taxa, only one ecophase is known, nymph or adult, and sometimes only one instar, often multiplying the number of described species (i.e.: *Machadorythus maculatus*).

In conclusion we think that the African-Malagasy mayfly fauna is largely unknown even though much progress has been made during the last two decades. To alleviate this situation, we think it is necessary to:

- intensify efforts to describe previously recorded mayflies;
- sample seriously the uninvestigated areas;
- generate distribution maps from systematic records;
- and ultimately increase rearing efforts in order to establish correspondence between nymphs and imagoes.

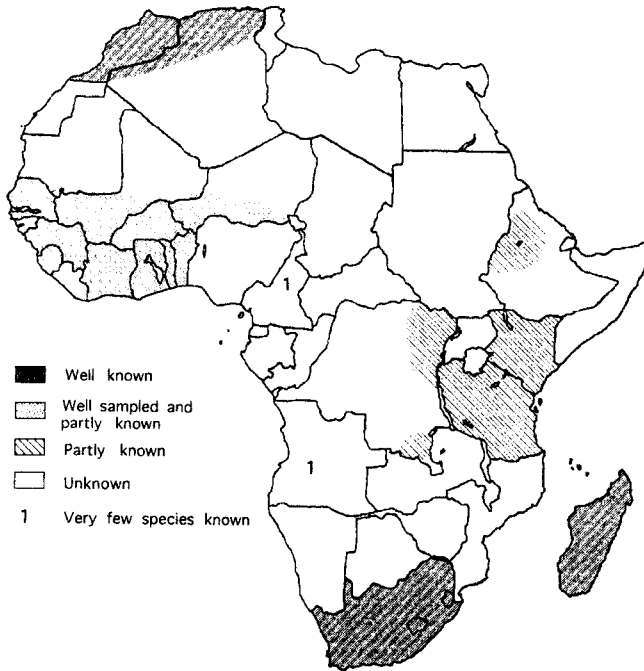


Fig. 3. Actual status of the knowledge on Ephemeroptera in Africa.

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