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## Records and notes on some aculeate Hymenoptera (Apoidea, Vespidae, Pompilidae) of Mali, West Africa

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**Abstract.** Investigations at different sites in the southern parts of Mali (West Africa) revealed the presence of 26 species of Apoidea, 3 of Pompilidae and 10 of Vespidae. Most of the specimens were collected near human settlements. Watering places and gardens showed a high attraction to bees and wasps during the dry season. Until now, only *Apis mellifera* ssp. *adansonii* and *Anthidium (Icteranthidium) ferrugineum* ssp. *discooidale* were recorded in Mali. *Apis mellifera* ssp. *adansonii* is threatened by human activities. But man-made environmental changes seem to produce effects on the composition of many other aculeate Hymenoptera.

**Key words.** West Africa, Mali, Hymenoptera, Apoidea, Vespidae, Pompilidae, distribution.

### Introduction

Although most bees are important pollinators and wasps predators, the knowledge of their diversity and ecology remains very poor. Contemporary investigations of bees and aculeate wasps of the southern margin of the Sahara and the West African savannahs do not exist. But Hymenoptera, especially bees, have a large impact on the species composition of the natural savannah vegetation. Aculeate wasps are important in the regulation of other insect populations e.g. beetle larvae and caterpillars. Many species of bees and aculeate wasps of the arid and semi-arid savannahs of Africa are in danger of extinction due to increasing habitat destruction (Gess & Gess in: LaSalle & Gould 1993). During a journey through the southern part of Mali from 27th January 1995 to 27th February 1995, different species of aculeate Hymenoptera were collected by the author. All the specimens found in this study are recorded in Mali for the first time, apart from *Apis mellifera* ssp. *adansonii* and *Anthidium (Icteranthidium) ferrugineum* ssp. *discooidale*. A general work about African bees south of the Sahara was published by Friese at the beginning of the 20th century. Several recent revisions have been made for individual bee genera, e.g. *Thyreus* (Eardly 1991), *Xylocopa* (Eardley 1983), *Ceratina* (Daly 1983, 1988), *Megachile*, *Chalicodoma* and *Creightoniella* (Pasteels 1965), *Anthidium* (Pasteels 1984; Pauly 1990, 1998). Due to these studies concentrating on single genera, they present a limited picture of the situation and an overview giving precise estimates for tropical Africa is not available. Hence in this paper only a narrow spectrum of the bee fauna of Mali could be presented.

### Localities

The Republic of Mali is the largest country in West Africa measuring about 1.25 million km<sup>2</sup>. More than half of the area is extremely arid desert (part of the Sahara), the adjacent region to the south belongs to the Sahel and is arid savannah. Nearly

one third of the country is part of a semi-arid to humid savannah belt. The visited localities (see Fig. 1) Bamako (12°39' N, 7°58' W), Bla (12°56' N, 5°45' W), Bandiagara (14°20' N, 3°36' W) and Ireli (14°34' N, 3°15' W) are situated south of the Niger river. They are part of the sub-Sahalien belt with a semi-arid Sudan savannah vegetation. The capital Bamako is situated on the banks of the Niger river and is located in dense tree-savannah. The natural vegetation of Bla, Ireli and Bandiagara is an open tree-savanna seriously affected by human activities. Over-grazing and the demand for wood are the reasons for the destruction of the natural forests. During the dry winter season there is little rainfall. Hence the soil is sparsely covered with vegetation. Bees and other nectar and pollen collecting animals depend on the presence of flowering plants. During the winter, bees concentrate on blooming trees and bushes like *Guiera senegalensis*, *Citrus* spp., *Mangifera indica* and *Acacia* spp. Therefore a lot of Hymenoptera species could be observed and collected near human settlements e.g. in gardens and at watering places.



Fig. 1: Map of Mali showing the localities mentioned in the text. 1 – Bamako, 2 – Bla, 3 – Bandiagara, 4 – Ireli.

## Material and methods

Most of the material was collected by the author with a hand net and by H. Meinig by hand. The most successful location found for catching aculeate Hymenoptera was a watering place for cattle in dry savannah near the village Bla. The mud-holes around this area were highly attractive to a large variety of Hymenoptera species.

Trees and bushes in bloom are important rendezvous places for male bees, and sources of food for female bees and many other insect species. The twigs of larger trees are used as nesting sites e.g. by *Xylocopa*; roofs and walls are inhabited by different wasp species.

The specimens collected near Irelì (Falaise de Bandiagara) were also caught in the neighbourhood of human settlements.

The Apidae were determined by the author at least to the genera and when possible to the species. Notes on the distribution are included where known. The Pompilidae were determined by R. Wahis (Faculté universitaire des Sciences agronomiques, Gembloux, Belgium), the Vespidae by Dr. J. Gusenleitner (Oberösterreichisches Landesmuseum, Linz, Austria) whose data are included without further comments from the author. Further details about the distribution and ecology of the Vespidae are not available.

## Results

### Apoidea

#### Apidae

*Apis mellifera* ssp. *adansonii* Latreille, 1804

Location: Bla, Irelì and Bandiagara

Distribution: West Africa, a region spreading from Senegal to Niger in the north, to Zaire in the south.

Observed in hollow trees, mainly in open trunks of *Adansonia digitata*. The West African subspecies of the honey bee is still a wild living animal with perhaps the largest area of distribution of all honeybee races in Africa. In Mali bee-keeping with movable frames is not practiced. More common are tubes made of elephant grass placed in trees to attract swarms. But usually all combs are cut out of the trees, the whole colony being destroyed by this. Bee-keeping experiments carried out by German volunteers in 1993/94 were not very successful (Thomas Authmann pers. comm.).

Today *Apis mellifera adansonii* is endangered because of the increasing demand for honey and wax, and the contemporary decrease of old and hollow trees.

*Trigona gribodoi* Magretti, 1884

Number and sex: 9 females

Date and Location: 30.01.1995 (2 females), 06.02.1995 (4 females), Bla, 11.02.1995 (3 females) Irelì (Falaise de Bandiagara), licking sweat from human bodies

Distribution: Widespread species in subsaharan Africa.

#### Anthophoridae

*Allodape albitarsis* Friese, 1924

Number and sex: 1 male

Date and Location: 30.01.1995, Bla, human settlement, garden

Distribution: Reported in Eritrea.

*Allodape minuta* Friese, 1924

Number and sex: 3 females

Date and Location: 30.01.1995 (2 females), Bla, human settlement, garden, 09.02.1995 (1 female), Bandiagara, human settlement, near *Citrus* spp.

Distribution: unknown.

*Anthophora* nr. *albigena* Lepelletier, 1841

Number and sex: 2 males

Date and Location: 09.02.1995, Bandiagara, human settlement, garden.

Distribution: *A. albigena* is known in south and southeastern Europe and from "Palestine" (Alfken 1938).

Comment: The two collected specimens look very similar to the European species. But the colour of the face is more yellowish with two basal black spots at the clypeus and distal fringes of sternites 2-6 with white instead of black hairs and also white laterally.

*Anthophora circulata* (Fabricius, 1781)

Number and sex: 1 male

Date and Location: 11.02.1995, Ireli (Falaise de Bandiagara), near a creek in a rocky habitat.

Distribution: Africa south of the Sahara.

*Anthophora nigroclypeata* Friese, 1909

Number and sex: 2 females, 1 male

Date and Location: 01.02.1995 (1 female), 03.02.1995 (1 female/1 male), Bla, 1 female at a watering place for cattle, 1 female on blossoms of *Acacia* spp., male near the same tree.

Distribution: Reported from Togo and Accra (Ghana).

*Anthophora nubica* Lepeletier, 1841

Number and sex: 1 male

Date and Location: 09.02.1995, Bandiagara, on *Acacia* spp. in a garden.

Distribution: Reported in Senegal, Kameroun, Sao Tomé, Congo and Sudan.

*Anthophora plumipes* auct. nec (Pallas, 1772)

Number and sex: 3 females

Date and Location: 03.02.1995, Bla, watering place for cattle.

Distribution: Africa south of the Sahara.

*Ctenoceratina paulyi* Daly, 1988

Number and sex: 2 females

Date and Location: 31.01.1995, Bla, human settlement, near *Citrus* spp.

Distribution: Wooded grasslands of West Africa. Reported from Senegal, Gambia, Nigeria and Burkina Faso.

*Pithitis (Ceratina) citriphila* (Cockerell, 1935)

Number and sex: 1 male

Date and Location: 31.01.1995, Bla, near *Citrus* spp.

Distribution: Reported in Yemen, Egypt, Ethiopia, Sudan, Kenya, Uganda and Tanzania.

*Thyreus pretextus* (Vachal, 1903)

Number and sex: 1 female

Date and Location: 28.01.1995, Bamako, banks of the Niger river.

Distribution: Widespread species in subsaharan Africa. The host of this species is not known.

*Thyreus vachali* (Friese, 1905)

Number and sex: 1 female

Date and Location: 11.02.1995, Ireli (Falaise de Bandiagara), together with *Anthidium (Icteranthidium) ferrugineum* spp. *discoideale* on the blossoms of an unidentified flower.

Distribution: Africa south of the Sahara.

*Thyreus* is a genus of cleptoparasitic bees, the host is not known.

*Xylocopa citrina* Friese, 1909

Number and sex: 1 male

Date and Location: 30.01.1995, Bla, human settlement, near *Guiera senegalensis*.

Distribution: Reported from "Congo" (Friese, 1909).

*Xylocopa hottentotta* Smith, 1854.

Number and sex: 1 female

Date and Location: 09.02.1995, Bandiagara, human settlement, in a hollow twig.

Distribution: Widespread species in Africa.

*Xylocopa modesta* Smith, 1854

Number and sex: 1 female

Date and Location: 31.01.1995, Bla, human settlement, in a hollow twig.

Distribution: Widespread species in Africa.

*Xylocopa pubescence* Spinola, 1838

Number and sex: 2 females

Date and Location: 31.01.1995, Bla, human settlement, garden, 09.02.1995, Bandiagara, on *Acacia* spp.

Distribution: Widespread species in Africa.

**Megachilidae***Anthidium (Icterantheidium) ferrugineum* ssp. *discooidale* Latreille, 1809

Number and sex: 2 males, 1 female

Date and Location: 11.02.1995, Ireli (Falaise de Bandiagara), on blossoms of an unidentified flower.

Distribution: This subspecies has a wide range of distribution. It has been reported in Turkmenistan, Arabia, Turkey, Syria, Israel, Cyprus, Africa north of the Sahara (K. Warncke 1980) and south of the Sahara from Senegal, Mali, Burkina Faso and Chad (Pasteels 1984).

*Megachile (Chalicodoma) armipygata* Strand, 1911

Number and sex: 1 male

Date and Location: 09.02.1995, Bandiagara, on *Acacia* spp.

Distribution: Reported in Senegal, Ghana, Congo.

*Megachile (Chalicodoma) cyanipennis* Guérin-Meneville, 1845

Number and sex: 2 females

Date and Location: 06.02.1995, Bla, watering place for cattle.

Distribution: Reported in Senegal, Nigeria, Ghana, Egypt and Sudan.

*Megachile (Creightoniella) discolor* Smith, 1853

Number and sex: 1 male

Date and Location: 31.01.1995, Bla, watering place for cattle.

Distribution: Subsaharan Africa.

*Megachile (Chalicodoma) rufipes* Fabricius, 1781

Number and sex: 1 male

Date and Location: 30.01.1995, Bla, watering place for cattle.

Distribution: Widespread species in subsaharan Africa.

*Megachile (Eutricharaea) stellarum* Cockerell, 1920

Number and sex: 1 female

Date and Location: 31.01.1995, Bla, watering place for cattle.

Distribution: East and southeast Africa, first record for West Africa.

**Halictidae***Pseudapis (Nomia) tegulata* Vachal, 1897

Number and sex: 1 male

Date and Location: 31.01.1995, Bla, human settlement, garden.

Distribution: Reported in Senegal.

*Nomioides (Cellaria) arnoldi* Friese, 1913

Number and sex: 1 female

Date and Location: 30.01.1995, Bla, *Guiera senegalensis* Friese (1913, p. 585) described *Cellaria* as a new subgenus of *Nomioides* with only one species known from Bulawayo (Zimbabwe). C2 of the forewing of *Cellaria* is pedunculate above. The collected female specimen from Mali shows exactly the same characters as the original description of subgenus and species.

Distribution: Reported in Zimbabwe.

*Nomioides fasciatus* Friese, 1898

Number and sex: 8 females

Date and Location: 30.01.1995 (1 female), *Guiera senegalensis*, 09.02.1995 (1 female), 14.02.1995 (6 females) Bandiagara, *Citrus* spp.

Distribution: Egypt, Namibia.

**Pompilidae** (det. R. Wahis)

*Cyphononyx bretoni* (Guérin-Meneville, 1843)

Number and sex: 1 female

Date and Location: 28.01.1995, Bamako, banks of the Niger river.

Distribution: Tropical Africa (R. Wahis pers. comm.), northern Africa (Maghreb), Egypt, Syria, Palestine and southern Iberian Peninsula.

*Hemipepsis vindex* (Smith, 1855)

Number and sex: 1 female

Date and Location: 06.02.1995, Bla, watering place for cattle.

Distribution: Tropical Africa (Wahis 1966).

*Schistonyx semitestaceus* Haupt, 1930

Number and sex: 2 females

Date and Location: 03.02.1995 (1 female), Bla, watering place for cattle, 09.02.1995 (1 female), Bandiagara, banks of the Yamé river.

Distribution: Reported in Senegal and Burkina Faso, first record for Mali (R. Wahis pers. comm.).

**Vespidae** (det. J. Gusenleitner)

Eumeninae

*Delta e. emarginatum* (Linnaeus, 1758)

Number and sex: 2 females, 1 male

Date and Location: 31.01./03.02.1995, Bla, savannah.

*Delta esuriens gracile* (Saussure, 1852)

Number and sex: 2 females

Date and Location: 03.02.1995, Bla, garden, 1 female, 11.02.1995, Bandiagara.

*Delta fenestrale* (Saussure, 1852)

Number and sex: 2 females

Date and Location: 31.01./03.02.1995, Bla, nesting sites under a roof.

*Delta subfenestrale* (Giordani Soika, 1939)

Number and sex: 1 female

Date and Location: 03.02.1995, Bla, watering place for cattle.

*Tricarindynerus ventralis* (Saussure, 1890)

Number and sex: 1 female

Date and Location: 03.02.1995, Bla, savannah near human settlement.

*Rhynchium marginellum* (Fabricius, 1793)

Number and sex: 1 female

Date and Location: 03.02.1995, Bla, watering place for cattle.

*Synagris spiniventris* (Illiger, 1802)

Number and sex: 1 female

Date and Location: 09.02.1995, Bandiagara, garden.

Polistinae

*Polistes fastidiosus* Saussure, 1853

Number and sex: 1 male

Date and Location: 03.02.1995, Bla, watering place for cattle.

*Polistes marginalis* (Fabricius, 1775)

Number and sex: 1 male

Date and Location: 31.01.1995, Bla, watering place for cattle.

*Belanogaster j. juncea* (Fabricius, 1781)

Number and sex: 2 females

Date and Location: 03.02.1995, Bla, human settlement.

### Conclusion

Little is known about the order Hymenoptera in the savannahs of West Africa. Many species of aculeate Hymenoptera remain to be described and many of those species that are described are not recognizable. Only 26 specimens of the solitary bees from more than 60 collected in Mali could be determined to a species level. The majority of bees are represented by the genera *Lasioglossum* but identifying to a species level was impossible. In West Africa as in other semi-arid areas bees are perhaps the most important pollinators of angiosperms (LaSalle & Gould 1993). Though the honeybee *A. m. adansonii* is a widespread species, it is not able to pollinate every flowering plant (Guinko et al. 1992a,b). Other insect taxa like beetles (Coleoptera) and flies (Diptera) or pollinating vertebrates like sunbirds and fruitbats are less important. Nectar is the primary energy resource of adult aculeate wasps and bees. Pollen is the primary protein resource for bee larvae. Aculeate wasps of the family Vespidae are important predators providing their larvae with phytophagous insects. Eumeninae mainly prey upon pest species, e.g. foliage feeding butterflies; Pompilidae prey upon spiders. All collected Hymenoptera are dependent upon a diverse composition of vegetation and the associated insect fauna. But the presence of aculeate Hymenoptera bees and wasps depends on more than foraging requirement. The habitat must also provide a nest site and nest material. A lot of genera like *Anthophora* and all collected Pompilidae are ground nesting species. Many other wasps and bees nest within plants (e.g. *Xylocopa*, *Megachile*) or on plants (e.g. *Apis*), or in association with human settlements (e.g. *Polistes*). Water is an additional requirement as shown by the high number of species collected at a watering place for cattle in Bla. Changes in availability of nesting sites, water sources and vegetation could produce effects on the composition of Hymenoptera. In all visited localities these changes are obvious and caused by intensive agricultural land use, man-made fire and the increasing demand for wood. The natural species composition of plants, and the structure of soil in the visited localities Bla and Bandiagara are seriously affected by stock-farming and the cultivation of millet. But to get further information about the status and biology of Hymenoptera species in the semi-arid areas of Mali, much more investigation is necessary.

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### Zusammenfassung

Bei Untersuchungen an verschiedenen Orten im südlichen Teil Malis (West-Afrika) konnten 26 Arten der Apoidea, 3 der Pompilidae und 10 der Vespidae nachgewiesen werden. Die meisten Arten wurden im Bereich von Ortschaften gesammelt. Während der Trockenzeit sind Tränken und Gärten für Bienen und Wespen außerordentlich attraktiv. Bisher sind nur *Apis mellifera* ssp. *adansonii* und *Anthidium* (*Icterantheidium*) *ferrugineum* ssp. *discoideale* in Mali nachgewiesen worden. *Apis mellifera* ssp. *adansonii* ist durch menschliche Aktivitäten gefährdet. Anthropogene Umweltveränderungen wirken sich aber vermutlich auch auf eine Reihe weiterer aculeater Hymenopteren aus.

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