

Between species and ethnospecies: edible Psychidae in Tropical Africa

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After a short presentation dealing with the Psychidae family, references on consumption of caterpillars of Psychidae are quoted. The diversity of the genera *Eumeta* Walker and *Deborrea* Heylaerts for Africa are reviewed. In conclusion, only the consumption of *Eumeta cervina* is confirmed, consumption of *E. rougeoti* and *E. strandi* are possible, whilst the consumption of *E. hardenbergi* is rejected. As far as the genus *Deborrea* is concerned no conclusion may be suggested.

Keywords: Psychidae, *Eumeta*, *Deborrea*, Tropical Africa, edible caterpillars.

Entre espèces et ethno-espèces: les Psychidae comestibles d'Afrique tropicale. Après avoir présenté la famille des Psychidae, les références à la consommation de chenilles de Psychidae en Afrique sont énumérées. La diversité des genres *Eumeta* Walker et *Deborrea* Heylaerts pour ce continent est passée en revue. En conclusion, seule la consommation de *Eumeta cervina* est certaine, celle de *E. rougeoti* et *E. strandi* possible, celle de *E. hardenbergi* certainement exclue. En ce qui concerne les espèces relevant du genre *Deborrea* aucune conclusion ne peut être avancée.

Mots-clés: Psychidae, *Eumeta*, *Deborrea*, Afrique tropicale, chenilles comestibles.

1. INTRODUCTION

The family Psychidae, composed by 1,100 species, is world-wide distributed (Hättenschwiler, 1997). Young larvae build their bag immediately after the hatchling. They live within the bag until the mature stage. Psychidae larvae are commonly polyphagous. Females are winged in the most primitive genera only, losing wings, legs and other appendages during their evolutionary history.

Within Psychidae a large body of taxonomic analysis, mainly at the species rank, were performed by using male features because of the scarce presence of diagnostic features on female body, and the small literature body available on larval descriptions.

The aim of this paper is to clarify nomenclature, ecology and biology of edible Psychidae in equatorial Africa in order to assess strategies for their larger use as alternative food in Africa.

2. MATERIAL AND METHODS

A first step has consisted to identify all quotations on consumption of Psychidae larvae in tropical Africa in available literature. In a second step description and distribution of all the species belonging to the genera *Eumeta* and *Deborrea* has been assembled. These two set of data have been crossed in order to assess which taxa correspond to the ethnotaxa quoted in previous papers.

3. RESULTS

Literature on edible Psychidae

Edibility of caterpillars belonging to the Psychidae family has repetitively been reported in literature. Bequaert (1921) was the first to report that the Medje of the Democratic Republic of Congo use at least six species of Lepidoptera. One of them, the larvae of the bagworm *Eumeta*

cervina Druce, 1887 (= *moddermanni* Heylaerts, 1888) adversely affect some individuals, producing "prostration" for as long as two or three days. This information has been quoted again by Bergier (1941), Ramos-Elorduy (1991), DeFoliart (2002). In 1937, Decary wrote that "some years ago, great amounts of boiled pupae of *Deborrea malgassa* Heylaerts, 1884 extracted from their cocoon, where sold on the market of Tananarive". The consumption of caterpillars and pupae belonging to this species was also reported by Bourgogne (1984). Bergier (1941) comments on the daily consumption of *Clania moddermanni*, a large caterpillar to be found in a sheath in form of a bundle of twigs, providing some photographs (fig. 1).

Pagezi (1988), when studying the Ba-Oto and the Ba-Twa, South of Lake Tumba, Democratic Republic of Congo, noted that Psychidae larvae are only eaten by the Ba-Twa. Two ethnospecies are concerned, namely **e-lele mpolo**, a small caterpillar and **e-tebe nkoni**, a thick one that could be refer as *Eumeta* sp.

In its tremendous study "Chasse, cueillette et culture chez les Gbaya de Centrafrique", Roulon-Doko (1998) quoted some 59 edible caterpillars for the Gbaya 'Bodoe. One of them belongs to the Psychidae family; it is known as "la pisseuse" in French, "the weak-bladdered" in English! (fig. 2). Roulon-Doko informs that the caterpillar is from time to time eaten by children, but is regarded as non edible by adults, being still used as remedy

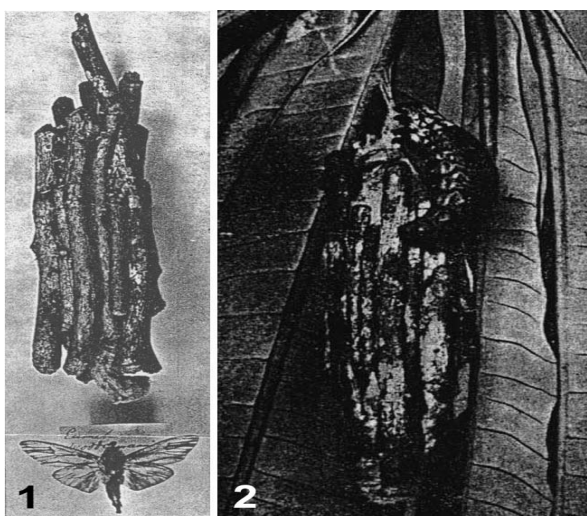


Figure 1: Photographs of the edible bagworm *Eumeta cervina* Druce 1887 (= *Clania moddermanni* Heylaerts 1888) provided by Bergier (1941). **1:** bag and adult male; **2:** larva outside its bag.



Figure 2: "La pisseuse" (*Eumeta* sp.), Ndongué village, Gbaya 'Bodoe ethno-linguistic group (Central African Republic) (photo: courtesy P. Roulon-Doko).

for children' nocturnal enuresy whilst the sheath, is keep as "lucky charm" for those that are beginning a trade. This ethnospecies belongs to *Eumeta* sp.

DeFoliart (2002) listed three Psychidae species, namely *Clania moddermanni* (Heylaerts, 1888), *Eumeta cervina* Druce 1887 and *E. rougeoti* Bourgogne 1955, as edible in Democratic Republic of Congo. Unfortunately no reference is given.

Taxonomic status of edible Psychidae

Edible African species within the family Psychidae belong to the genus *Eumeta* Walker 1855 (= *Clania* auct.) and *Deborrea* Heylaerts 1884, both belonging to the subfamily Oiketinae. To date, six species with a very similar pattern belonging to the genus *Eumeta* (Dierl, 1972) (*E. cervina* Druce 1887; *E. hardenbergi* Bourgogne 1955; *E. mercieri* Bourgogne 1966; *E. rotunda* Bourgogne 1965; *E. rougeoti* Bourgogne 1955; *E. strandi* Bourgogne 1955) and six species belonging to the genus *Deborrea*, endemic taxon for Madagascar (Bourgogne, 1984) (*D. malgassa* Heylaerts 1884, *D. humberti* Bourgogne 1984, *D. seyrigi* Bourgogne 1984, *D. cambouei* (Oberthür 1922), *D. griveaudi* Bourgogne 1982, *D. robinsoni* Bourgogne 1964) are known for Africa.

In next paragraphs a review of African species of *Eumeta* Walker 1855 and *Deborrea* Heylaerts 1884 species is given. In detail, correct nomenclature, length of fully-grown larva and its bag, length of female, wingspan of male,

geographical distribution, references useful for the identification of egg, larva, bag, male and female, flight period, and foodplants are provided.

Short review on African *Eumeta* species

***Eumeta cervina* Druce 1887** (= *Eumeta moddermanni* Heylaerts 1888) (fig. 3)

Dimensions.- Length of larva: 45-52 mm; Length of bag: ♂ 45-65 mm, ♀ 80-100 mm; Length of female: 65-95 mm; Wingspan: 30-47 mm

Distribution.- Gambia: Captain Moloney (locus typicus) (Druce, 1887); Liberia: Monrovia (locus typicus of *E. moddermanni*); Ghana: Ho (Heylaerts, 1888); Sierra Leone: Freetown (Bourgogne, 1955); Cameroun: Efulen (Bourgogne, 1955); Gabon: Oyem, Mayumba; Bibianaha (Bourgogne, 1955); Guinea Ecuatorial: Alén (locus typicus of *E. moddermanni* var. *pictipennis*) (Strand, 1912); Bioko (Bourgogne, 1955); Democratic Republic of Congo: Lubumbashi, Flandria, Tshala, Kapanga (Bourgogne, 1955); Western Nigeria (Entwistle, 1963b); Guinea: Conakry (Solntsev, 1998); Zambia: Zambezi Rapids, Ikelenge, Mwinilunga (Zoologische Staatssammlung München).

Identification references.- Egg: unknown; Larva: Entwistle, 1963a; Solntsev, 1998; Bag: Bourgogne, 1955; Solntsev, 1998; Pupa: Solntsev, 1998; Male: Gaede, 1926, as *pictipennis*; Bourgogne, 1955; Solntsev, 1998; Female: Entwistle, 1963a, b; Solntsev, 1998.

Habitat.- Forest biotopes.

Flight period.- Throughout the year.

Foodplants.- *Gossypium* spp., *Theobroma cacao* L., *Cola* spp., *Mangifera indica* L., *Casuarina equisetifolia* L., *Citrus* spp., *Guiera senegalensis* J.F. Gmel., *Cupressus* spp., etc. (Bourgogne, 1983).

***Eumeta hardenbergi* Bourgogne 1955**

Dimensions.- Length of larva: 22-25 mm; Length of bag: ♂ 25-35 mm, ♀ 30-55 mm; Length of female: 20 mm; Wingspan: 29-35 mm

Distribution.- Mocambique: Delagoa Bay (locus typicus), Montero, Rikatla, Lourenço Marques



Figure 3: *Eumeta cervina* Druce, 1887: wingspan 38 mm, Zambezi Rapids, Ikelenge, Mwinilunga (Zoologische Staatssammlung München) (photo: Ulf Buchsbaum).

(Bourgogne, 1955), along the Zambesi River (as *E. cervina*) (Junod, 1899), Delagoa Bay (as *Clania moddermanni*) (Gaede, 1926); Rep. South Africa: Pretoria, Winkle Spruit, Ladysmith, Christiana, Louis Trichardt, Hill Crest, Mid-Illovo (Hardenberg, 1919); Tanzania: Pangani (Bourgogne, 1955).

Identification references.- Egg: Hardenberg, 1919; Larva: Hardenberg, 1919; Bag: Hardenberg, 1919; Pupa: Hardenberg, 1919; Male: Bourgogne, 1955; Female: Hardenberg, 1919.

Habitat.- Forest biotopes.

Flight period.- Throughout the year.

Foodplants.- Many fruit-trees, *Quercus* spp., *Ligustrum* spp., *Rosa* spp., *Macrocarpa* spp., *Acacia* spp., *Citrus* spp., *Schinus molle* L., *Eucalyptus* spp., (Hardenberg, 1919), *Cassia* spp., etc. (Junod, 1899).

***Eumeta mercieri* Bourgogne 1966**

Dimensions.- Length of larva: unknown; Length of bag: ♂ 40-48 mm, ♀ 65 mm; Length of female: unfurnished in the original description; Wingspan: 24.5 mm

Distribution.- Angola: Cucumbi (locus typicus) (Bourgogne, 1966).

Identification references.- Egg: unknown; Larva: unknown; Bag: Bourgogne, 1966; Pupa: unknown; Male: Bourgogne, 1966; Female:

Bourgogne, 1966.

Habitat.- Herbaceous biotopes.

Flight period.- August, December.

Foodplants.- Unknown.

***Eumeta rotunda* Bourgogne 1965**

Dimensions.- Length of larva: unfurnished in the original description; Length of bag: ♂ and ♀ 39-50 mm; Length of female: 15-17.5 mm; Wingspan: 25-32 mm

Distribution.- Sénégal: Dakar; Centrafrique: Bangui; Nigeria: near Sapele (Bourgogne, 1965).

Identification references.- Egg: unknown; Larva: Bourgogne, 1965; Bag: Bourgogne, 1965; Pupa: unknown; Male: Bourgogne, 1965; Female: Bourgogne, 1965.

Habitat.- Herbaceous biotopes.

Flight period.- November-December.

Foodplants.- Unknown.

***Eumeta rougeoti* Bourgogne 1955**

Dimensions.- Length of larva: unknown; Length of bag: ♂ 40-50 mm, ♀ 41-62 mm; Length of female: unknown; Wingspan: 32-37 mm

Distribution.- Gabon: Port Gentil (locus typicus), Oyem, Lambaréné, N'Benguelila, Kangwé; Costa d'Avorio; Ghana: Ajinah, Secondi; Nigeria: Lagos; Democratic Republic of Congo: Kadjudju, Ibanda; Burundi (Bourgogne, 1955), Western Nigeria (Entwistle, 1963b); Uganda; Angola (Bourgogne, 1983).

Identification references.- Egg: unknown; Larva: unknown; Bag: Entwistle, 1963b; Pupa: unknown; Male: Bourgogne, 1955; Female: unknown.

Habitat.- Forest biotopes.

Flight period.- Throughout the year.

Foodplants.- *Persea americana* Mill., *Cola gigantea* A. Chev., *Theobroma cacao* L., *Citrus* spp. Pl., *Coffea canephora* Pierre ex Froehner,

Casuarina equisetifolia L., etc. (Entwistle, 1963b).

***Eumeta strandi* Bourgogne 1955**

Dimensions.- Length of larva: unknown; Length of bag: unknown; Length of female: unknown; Wingspan: 29-31 mm.

Distribution.- Gabon: Lambaréné (locus typicus); Guinea Ecuatorial: Alén (Bourgogne, 1955).

Identification references.- Egg: unknown; Larva: unknown; Bag: unknown; Pupa: unknown; Male: Bourgogne, 1955; Female: unknown.

Habitat.- Undeterminable.

Flight period.- September.

Foodplants.- Unknown.

The revision of the African species of the genus *Eumeta* was carried out by Bourgogne (1955) which described three new species and which put *E. moddermanni* Heylaerts, 1988 in synonymy with *E. cervina*. Bourgogne (1955) studied type specimen of *E. cervina* and specimens stored in the Heylaerts's collection labelled as *Clania moddermanni*. He concluded that Janse (1917) and Hardenberg (1919) describing morphological details of the supposed *Clania moddermanni* have in reality described those of an unknown species of *Eumeta* successively named by Bourgogne. *E. hardenbergi*. Other authors have yet made the same confusion (Heylaerts, 1890; Junod, 1899). Entwistle has described correctly both larva (Entwistle, 1963 a) and female (Entwistle, 1963 b) of *E. cervina* and *E. rougeoti*.

Morphological differences between *E. hardenbergi* and *E. cervina* are very little if we exclude that *E. cervina* is quite larger than *E. hardenbergi*. Bourgogne (1955: 131) wrote: "Etant donné l'analogie morphologique qui rapproche *hardenbergi* de *cervina*, on peut se demander si on a bien affaire à deux espèces distinctes, ou seulement à deux sous-espèces d'une même unité spécifique". Most useful characters to discriminate these species are the abdominal sternits, larger in *cervina* than in *hardenbergi*, and some morphological features of the male genitalia (Bourgogne, 1955).

In addition to the above mentioned taxa, Strand (1912) described *Clania moddermanni* var. *pictipennis*, to date quoted as *E. cervina* ssp. *pictipennis* (Dierl, 1972).

Short review on *Deborrea* species

***Deborrea malgassa* Heylaerts 1884** (= *Psyche joannisii* Mabilie 1888; *Deborrea malgassa-argentea* Oberthür 1909; *Eriopteryx funebris* Kenrick 1914) (fig. 4)

Dimensions.- Length of larva: 30-40 mm; Length of bag: ♂ and ♀ 35-55 mm; Length of female: more or less 25 mm; Wingspan: 27-43 mm.

Distribution.- Largely distributed throughout the Madagascar (Bourgogne, 1984).

Identification references.- Egg: unknown; Larva: Ramadrianonjy, 1967; Bourgogne, 1984; Bag: Ramadrianonjy, 1967; Bourgogne, 1984; Male: Ramadrianonjy, 1967; Bourgogne, 1984; Female: Ramadrianonjy, 1967; Bourgogne, 1984.

Habitat.- Forested biotopes with reasonable humidity degrees.

Flight period.- Throughout the year.

Foodplants.- *Acacia dealbata* Link., fruit trees, *Hibiscus tiliaceus* L., *Grevillea robusta* Cunn., *Dombeya* spp. pl., *Psidium* spp. pl., *Eucalyptus* spp. pl., *Cupressus lusitanicus* Miller, *Pinus patula* Schiede & Deppe, *Amygdalus persica* L., etc.

***Deborrea humberti* Bourgogne 1984**

Dimensions.- Length of larva: unfurnished in the original description; Length of bag: ♂ 35-45, ♀ 45-60 mm; Length of female: 25-35 mm; Wingspan: 37-45 mm.

Distribution.- Madagascar: Port-Bergè (locus typicus), Sakavondro, Isalo Massif, Ankazoabo Region, Lambomakandro Forest, Ifaty, Betioky, DiegoSuarez, Ankorika, Betroka (Bourgogne,

1984).

Identification references.- Egg: not described; Larva: Bourgogne, 1984; Bag: Bourgogne, 1984; Pupa: not described; Male: Bourgogne, 1984; Female: Bourgogne, 1984.

Habitat.- Forest biotopes.

Flight period.- June-August, October.

Foodplants: Leguminosae (probably *Albizzia* sp.), *Casuarina equisetifolia* L.

***Deborrea seyrigi* Bourgogne 1984**

Dimensions.- Length of larva: unknown; Length of bag: unknown; Length of female: unknown; Wingspan: 23.5-31 mm.

Distribution.- Madagascar: Bekily (locus typicus), Betroka, Ankarafantsika, Lambomakandro Forest, Zombitsy, Andranovory, Tulear, Andavadoaka, Saint Augustin, Bas Anakao, near Efoetsy, Tsimanampetsotsa lake, near Itampolo, near Ankalirano, Ampanihy, near Tranoroa, Beloha, Lavanono, Behara (Bourgogne, 1984).

Identification references.- Egg: unknown; Larva: unknown; Bag: unknown; Pupa: unknown; Male: Bourgogne, 1984; Female: unknown.

Habitat.- Undeterminable.

Flight period.- December-May, August-September.

Foodplants.- Unknown.

***Deborrea cambouei* (Oberthür 1922)**

Dimensions.- Length of larva: unknown; Length of bag: ♂ 35 mm, ♀ unknown; Length of female: unknown; Wingspan: 28 mm.

Distribution.- Madagascar: Imerina (locus typicus) (Oberthür, 1922).

Identification references.- Egg: unknown; Larva: unknown; Bag: Dierl, 1971, Bourgogne, 1984; Pupa: unknown; Male: Dierl, 1971, Bourgogne, 1984; Female: unknown.

Habitat.- Undeterminable.

Flight period.- December.

Foodplants.- Unknown.

***Deborrea griveaudi* Bourgogne 1982**

Dimensions.- Length of larva: unknown; Length of bag: unknown; Length of female: unknown; Wingspan: 18.5-27 mm.

Distribution.- Madagascar: Andranovory (locus typicus), near Sakaraha, near Tulear, Sept Lacs (Bourgogne, 1982).

Identification references.- Egg: unknown; Larva: unknown; Bag: unknown; Pupa: unknown; Male: Bourgogne, 1982, 1984; Female: unknown.

Habitat.- Undeterminable.

Flight period.- October-February.

Foodplants.- Unknown.

***Deborrea robinsoni* Bourgogne 1964**

Dimensions.- Length of larva: unknown; Length of bag: unknown; Length of female: unknown; Wingspan: 22.5-23.5 mm.

Distribution.- Madagascar: Fort-Dauphin (locus typicus), (Bourgogne, 1964), Marojejy Massif (Bourgogne, 1984).

Identification references.- Egg: unknown; Larva: unknown; Bag: unknown; Pupa: unknown; Male: Bourgogne, 1964; Female: unknown.

Habitat.- Rainforest biotopes.

Flight period.- December, March.

Foodplants.- Unknown.

Despite their similar patterns, species status within the genus *Deborrea* is much clearer than within the genus *Eumeta* because of all species were



Figure 4: Male (left) and male bag (right) of *Deborrea malgassa* Heylaerts 1884: wingspan 35 mm, Madagascar, Antokazo near Ambatosoratra, Lac Alaotra (Zoologische Staatssammlung München) (photo: Ulf Buchsbaum).

described recently with the exception of *D. malgassa*. *Deborrea malgassa* (Heylaerts, 1884), called *fangalabola*, is the most common species of the genus. Morphological features of the larva of *D. malgassa* are available in an exhaustive paper devoted to morphology and biology of this species (Ramadrianonjy 1967). Unfortunately, with the exception of *D. malgassa* and *D. humberti*, larvae of other *Deborrea* are unknown becoming impossible species identification starting from immature stages.

4. DISCUSSION

The hard nomenclature and the very similar pattern of species within the genus *Deborrea* and *Eumeta*, lead to some uncertain specific determinations in the available literature.

By checking provided photographs, just the report of *Clania moddermanni* as edible species by Bergier (1941) in Equatorial Africa is referable with certitude to *Eumeta cervina*.

In order to exclude some *Eumeta* species among eaten bagworms, we performed a geographical analysis on available citations (fig. 5). Consumptions of *Clania moddermanni* were reported by Bequaert (1921) in the Democratic Republic of Congo, while consumptions referable to *Eumeta* sp. was reported by Pagezi (1988) near the Lake Tumba, and by Roulon-Doko (1998) in Centrafrique. Geographical analysis leads us to exclude with certitude only *E. hardenbergi*, distributed in Southeast Africa.

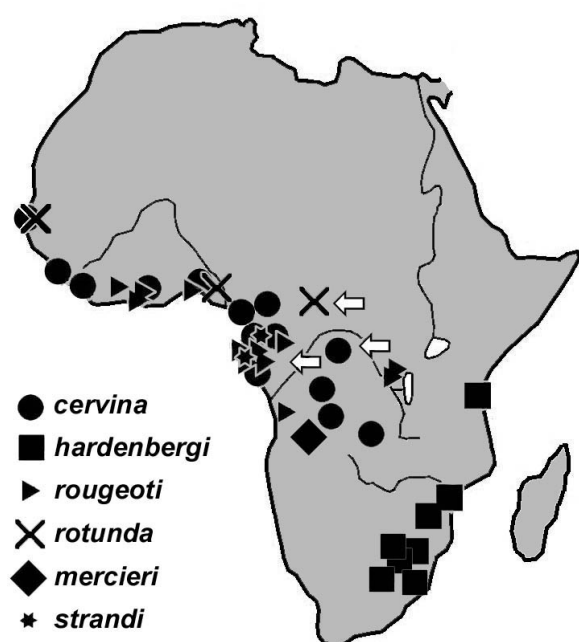


Figure 5: Distribution of African species belonging to the genus *Eumeta* Walker, 1855 and location of known consumptions of this taxon (arrows).

Bag architecture was useful to exclude with certitude *E. mercieri* and *E. rotunda* among eaten Psychidae. In fact their bags are composed by herbaceous stems (Bourgogne, 1965, 1966) while available reports on eaten Psychidae are referable to bags composed by wooden sticks. The remaining species (*E. rougeoti* and *E. strandi*) could be eaten indifferently by African people together with *E. cervina*.

Data referred to *Deborrea malgassa* (Decary 1937; Bourgogne 1984) are correct, but we cannot exclude that single individual belonging to other *Deborrea* species could be eaten. It is interesting to point out that *D. malgassa* is considered as a pest species for forest plantations becoming frequently very abundant. The abundance of this species and the large number of laid eggs (600 on average), could be do of *D. malgassa* an important alimentary source for Malgascian people. Probably, an *ad hoc* rearing could be done.

In order to clarify with certitude which species of Psychidae are eaten by African peoples, the *in-situ* collecting and/or rearing of larvae is needed.

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