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# BIOLOGY AND TAXONOMIC STATUS OF THE SKIPPER, *MIMENE WARA*, FROM EASTERN PAPUA NEW GUINEA (LEPIDOPTERA: HESPERIIDAE: HESPERIINAE)

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**ABSTRACT.**— A female skipper is described from the sub-alpine forests of Mt. Gumi in the Eastern Highlands of Papua New Guinea. Some details of its morphology and life history are illustrated. The specimen is tentatively assigned to the Hesperinae genus *Mimene* (Joicey and Talbot) on the basis of adult morphology, and appears closest to the species *M. wara* (Parsons), known only from the male holotype. Discussion is given on the paucity of material and biological data of Melanesian skipper butterflies resulting in some ill-defined taxonomic placement of genera and species groups. Allied Papuan and Australian genera are compared.

**KEY WORDS:** *Anisynta*, Arecaceae, Australian, *Herimosa*, Hesperinae, *Hesperilla*, immatures, *Kobrona*, larvae, Lomandraceae, Melanesia, *Mimene*, Morobe, *Motasingha*, Oceania, *Oreisplanus*, Palmae, Papuan, *Plastingia*, *Prada*, *Rachelia*, *Sabera*, *Suniana*, *Taractrocera*, taxonomy, *Telicota*, *Tiacellia*, Trapezitinae.

Related genera (*Telicota* Moore, 1881, *Mimene* Joicey & Talbot, 1917, *Kobrona* Evans, 1934, *Sabera* Swinhoe, 1908) of Evans' (1949) species groups in the subfamily Hesperinae have greatly diversified in New Guinea, especially in montane areas. There is a paucity of biological and taxonomic data for all species, although comparative material is marginally available for related Australian taxa. Data including gender assignment, larval foodplants, juvenile morphology, distribution etc are needed to discern the specific and generic groups. Subfamily levels, such as the New Guinea Hesperinae and the mainly Australian Trapezitinae, are not clearly defined (e.g. the transitional genera *Prada* Evans, 1949, and *Tiacellia* Evans, 1949). However, Parsons (1986, 1998) has made a significant contribution to the taxonomic evaluation (and the assignment of several females) of the Papuan skipper fauna. This has laid the foundation for a positive systematic approach to related skippers of the Australasian region and beyond.

The larval foodplants of most species of the subfamily Hesperinae throughout the world are monocotyledons. Parsons (1998) advanced new information on the life history of several species of Hesperinae in New Guinea, but many more await discovery. In a recent trip (July, 1999) to Papua New Guinea, I observed juveniles of unidentified skippers (probably *Suniana* Evans, 1934, *Telicota*, *Kobrona*, *Mimene* and *Sabera*) feeding on grasses, bamboo, palms and *Cordyline*. Larvae and adults were observed from sea level on the west and east coasts to mid-high altitudes in the central cordillera of the Eastern Highlands.

In high-montane cloud forest WNW of Bulolo, a pupa of a skipper was found at the base of an unidentified species of sedge growing at the newly graded edge of a forestry track. A slightly damaged female emerged from this pupa several days later at Lae.

## *Mimene wara* (Parsons)

**Description.**— Location: Mt. Gumi (elevation 2,400m), approx. 30 km WNW of Bulolo, Morobe Province, and Papua New Guinea. (07°10' 52"S; 146°28'16"E).

**Habitat.** Primary sub-alpine moss-forest adjoining upland bamboo (*Nastus productus*) scrublands. Area approx. 4 km from summit, adjacent to a recently (about 4 months) graded forestry track.

**Date:** 15 Jul 1999.

**Foodplant:** *Carex* sp. (Cyperaceae).

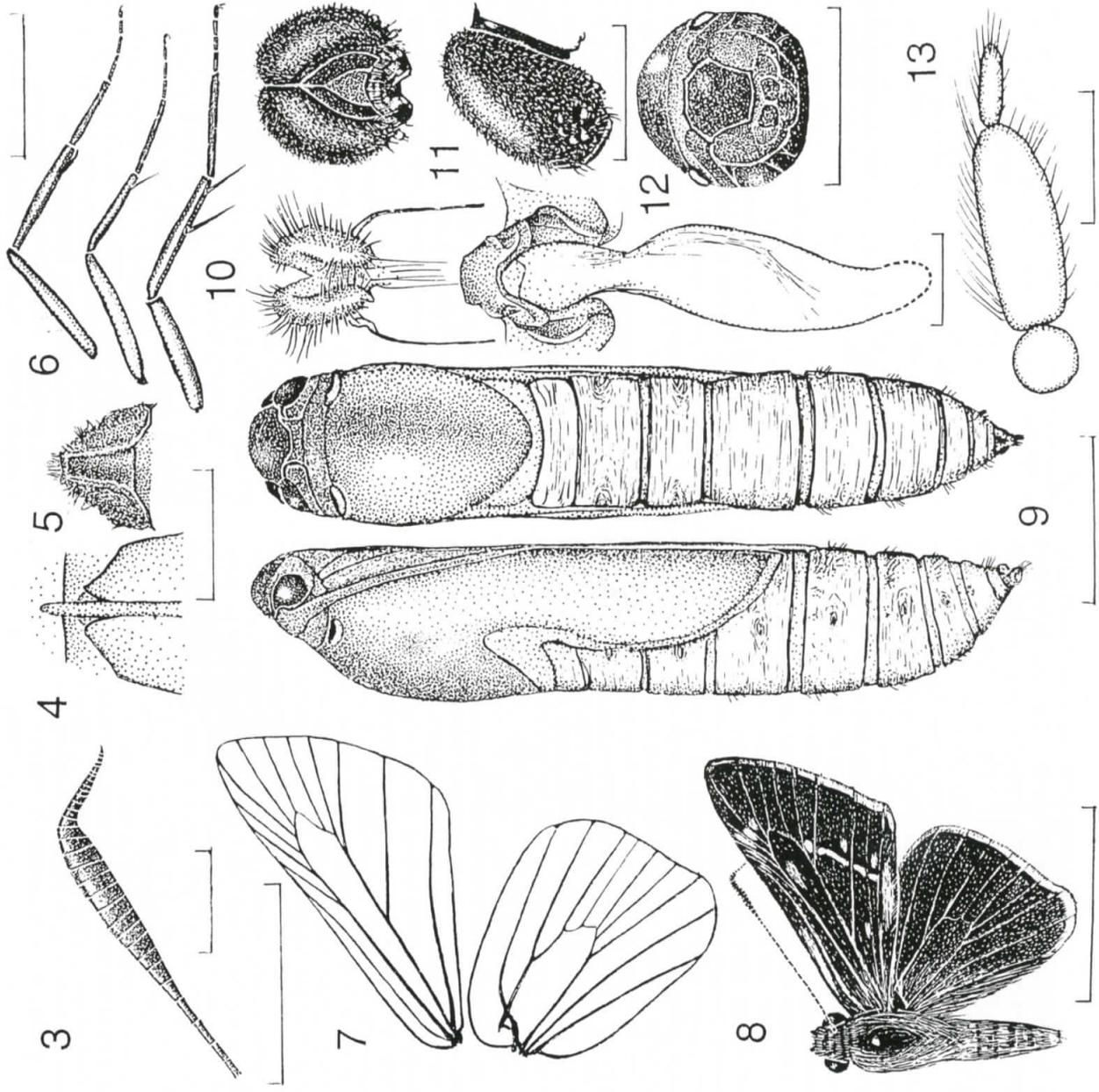
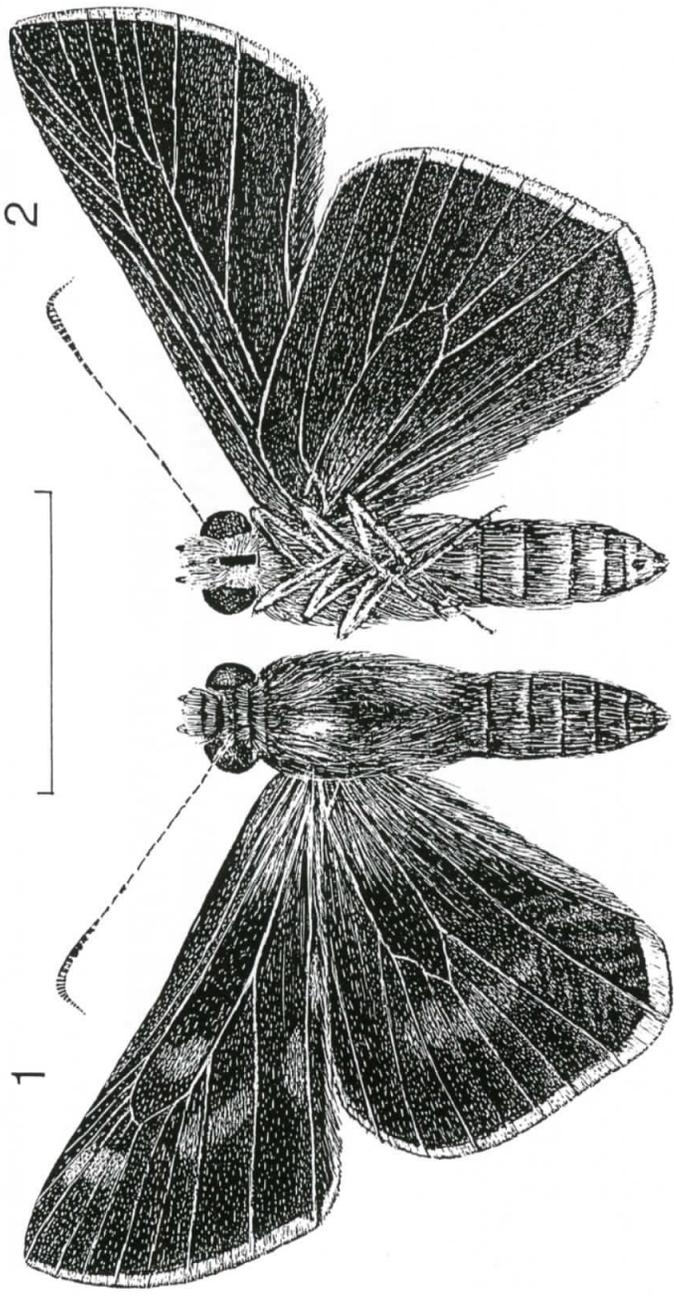
**Larval head capsule** (Fig. 11): Width 3mm; dark brown-black with lighter brown banding to frons; 4 pale laterally placed ocelli in a semi-circle distad

of a larger posterior ocelli.

**Pupa** (Fig. 5, 9, 12): Length 23mm, pale brown at posterior segments, thorax and distal section of wing cases, dark brown to black; frons sclerotized and slightly bulging, anterior head, thorax and basal section of wing cases, cream-coloured; cremaster a short heavily sclerotized, tapered process, dorsally grooved with short, simple cremaster spines; abdominal setae scattered in groups, mainly ventrally towards posterior segments.

**Adult female** (Fig. 1-3, 6-7, 13): Head dark brown with eyes black, pale yellowish-white scale tufts adjacent to eyes; antenna length 10mm, shaft black, ventrally with base of segments yellowish brown, club (Fig. 3) approx. 22 segments black, ventrally glossy pale yellowish brown, apiculus dark brown, nudum indistinguishable; Labial palpus (Fig. 13) length 2.7mm, first segment broad and rounded, second segment moderately broad and elongate, third segment narrow long and elliptical, each segment covered with long scales, dark dorsally and glossy pale fawn ventrally; Thorax dark brown with dorsal anterior covered laterally with long glossy brown hair-scales and ventrally with yellowish-grey hair-scales; abdomen similar in colour, ventral segments divided by yellowish-grey scales tending to orange-grey posteriorly; Tibia (Fig. 6) dark brown, mid tibia with one pair of long median spurs, hind tibia with two pairs of long median spurs; Wingspan 32mm; forewing length 17mm; upperside dark brown-black with slight blue lustre in median area, 4 superficial orange scaled spots at end of cell and between 1A+2A, CuA<sub>2</sub>, CuA<sub>1</sub> and M<sub>2</sub>, 3-4 diffused orange subapical spots, inner margin and median area and base of costa suffused with orange scales and hairs, cilia pale brown; underside brown-black with greenish and purple sheen, tornal area greyish-green, cilia pale fawn; Hindwing; upperside dark brown-black with suffused orange scaling in median areas Rs<sub>1</sub> - 1A+2A, cilia whitish to pale brown; underside dark brown-black with metallic purple sheen, flushed with green, tornal area grey-brown with greenish lustre, cilia pale cream. **Female genitalia** (Fig. 10) length 7mm: vaginalis plate (ostium bursae) a simple, flanged, sclerotized tube, broadening laterally and tapered posteriorly to a rounded hood-like process; papilla analis rounded, concave and flattened, decurved to sub-centrally placed slender and moderately long, slightly decurved apophysis; corpus bursae a simple elongate sac.

**Diagnosis.**— The Mt. Gumi specimen (held in the collection of the author) is assigned to the Hesperinae on the basis of wing venation (Fig. 7: decurved M<sub>2</sub> of forewing) and pupal morphology [elongate and simple operculum (Fig. 12) and short, sclerotized cremaster (Fig. 5)], and tentatively placed in the genus *Mimene*. It compares fairly closely with the description and figures of the male holotype *Mimene wara* Parsons (1986:119), Fig. 10, 27, 93-94 (" Nauti Logging Road, on creek, Grid sq. DM 59 (Bulolo), MOROBE PROV., PNG, 27-2-1983, I.F.T.A. coll. Alt. 1100m."). This specimen is held in the Natural History Museum, London (including genitalia file No. 1043). An illustration of the male holotype (based on Parsons, 1986, 1998) is given in Fig. 8.



Parsons (1998) placed *wara* (based on one male specimen only) in the "orida group 6," also containing 4 other species (*orida* Boisduval, 1832; *ozada* Parsons, 1986; *milnea* Evans, 1935; *wandammenensis* Joicey & Talbot, 1917). These are all smallish dark brown species, locally rare, mainly recorded from limited and scattered regions of medium to low altitudes. Only *M. wandammenensis* and *M. wara* are recorded from higher montane altitudes. The females of several species of *Mimene* are unknown, including all but one species of the 'orida group' (*orida*: holotype a female).

Association of females with males in many genera of the Hesperidae from New Guinea is difficult, but the character of the undersides of the hindwing is somewhat diagnostic. The female specimen from Mt. Gumi emerged crumpled and damaged but all significant features were retained, including wing shape. This specimen also appears similar to other dark brown or black species in the genus *Sabera*, and some characters also suggest an affinity to *Telicota* or related genera.

Parsons, 1998 states (for the male) "*M. wara* is an almost wholly dark brown species. The HW und bears a faint purple sheen, and the HW cilia and those of the FW tornus are creamy-white. On the FW upp the dark orange postmedian band is extremely diffuse, and a dark orange patch in the subapical region at the costa is divided into 3 sections by dark brown radial veins." This agrees with the description of the Mt. Gumi female, in particular with the subtle orange colouration of the upperside, which is effected by scattered orange scales superimposed over the dark scales (more extensively seen in species such as *M. sariba* Evans, 1935). However, Parsons (1991), and in the original description (1986), mentions a "yellow head" for *M. wara*. The head is brown above and yellow-grey beneath in this specimen, but has the pale (not white) toral cilia as described for *wara*. On the underside of the Mt. Gumi female, apart from the purplish-green sheen, there is a very obscure scattering of metallic light blue scales, but this may be an artifact. The purplish-green sheen on the underside faded from the specimen some weeks after emergence.

## DISCUSSION

The pupa was discovered in an upright shelter near the base of a moderate sized sedge tussock. This was growing at the edge of a recently graded track through medium-high altitude moss forest, just above the limits of montane bamboo scrubland. Other similar empty larval shelters (made from several stalks and leaves bound into a tube with silk) were found at the base of sedge plants nearby. Evidence (shelters on wire grass and larvae in shelters on tall broad-bladed grass tussocks) were located at the same site, but these appeared to belong to high montane Trapezitinae and *Telicota* species. Adult skippers were not observed, due undoubtedly to cool misty cloud covering at the summit and to the late afternoon visit. The location of the larval foodplant at an altitude of 2,400m places an extreme upper-montane (Parsons, 1991) record to *M. wara* (previously recorded less than half this altitude) and possibly an altitude record for the genus. It is also a new larval foodplant genus and family (*Carex*: Cyperaceae) for the *Mimene* and related genera. The only recorded foodplants for *Mimene* are for the large species *M. melie* (de Niceville, 1885), these being the palms (Arecaceae) *Licula* sp. (Coryphoideae) and possibly *Calamus* (Lepidocaryoideae) (Parsons, 1998). In Australia, the allied *Sabera dobboe autoleon*

(Miskin) is recorded from *Cordyline* (Lomandraceae: as defined by Conran, 1998), including *Cordyline* cultivars (Quick, 1982), *Cordyline australis* (G. Forster) Endl., *C. stricta* (Kunth) Endl., *C. canifolia* R.Br. and *C. terminalis* (L.) (Muller and Wood, 1999), and *Sabera caesina albifascia* (Miskin) from the palms *Calamus caryotooides* Mart (Wood, 1986), *Achontophoenix alexandriae* (F. Muell.) and *Normanbya normanbyi* (W.Hill) L. Bailey (Muller and Wood, 1999), and *Sabera fulginosa fulginosa* (Miskin) from *Calamus moti* Bailey (Muller and Wood, 1999). The genitalia of the Mt. Gumi specimen resemble those of species of Australian *Telicota*.

In his publication *Butterflies of Papua New Guinea*, Parsons (1998) refers to the interesting morphology of *M. wara*, which has the male genitalia of *Mimene*, but with external facies like that of *Sabera* (*fulginosa*). He suggests that *Mimene* may be eventually treated as a synonym of *Sabera*. He also pointed out that there was a distinct similarity of the male genitalia of *M. wara* to that of *Telicota eurotas* (a species probably misplaced in *Telicota*). It is interesting to note that *T. eurotas* (from Australia at least) has a sedge as a larval foodplant and also a "bulging" pupal frons. The upright, tubular larval and pupal shelter from Mt. Gumi differs from the elongate "pocket" shelters made by *Sabera* larvae (usually cut adrift by final instars) and may be a secondary adaptation to the cool sub-alpine climate. This tube shelter is remarkably similar to several temperate Australian Trapezitinae species in the genera *Herimosa* Atkins, *Motasingha* Watson, *Hesperilla* Hewitson, *Oreisplanus* Waterhouse and Lyell, and at least one species of *Anisyntaxa* Lower. However in these genera the cremaster is more prominent and the pupal cap is more sculptured, and is always detached from the pupal case during the emergence of the adult (pers. obsv.).

Further significant structures of the Mt. Gumi female are the slightly concave and slightly decurved  $M_2$  of the forewing, and very faint  $M_2$  of the hindwing. The relatively long antenna which equals that of the male (male and female antennae of Hesperidae are usually similar in length, although the body and wingspan of females are normally larger than males). A comparative illustration of the adult male *Mimene wara* is given in Fig. 8. The pupa exuviae has a simple attached, rounded, sclerotized operculum (Fig. 12), a slightly extended haustellum case beyond segment 5 (Fig. 4), and a somewhat unspecialised but well sclerotized cremaster (Fig. 5).

Taxonomic difficulties exist in the defining of closely related genera groups of Evan's (1949) *Taractrocer* group 'L' and *Plastingia* group 'J', that of the latter grading into the subfamily Trapezitinae (e.g., the genera *Prada* Evans, 1949 [Hesperinae], and *Rachelia* Hemming, 1964 [Trapezitinae]). The difficulty of assigning female skippers to males has been expressed by many authors (e.g. Austin and Mielke, 1998; Parsons, 1998). Character affinities of the Hesperidae have tested taxonomists; defining the higher level classification has proved difficult.

An investigation of the life histories of the skippers of New Guinea will help to clarify the taxonomy and sex assignment problems. Diagnosis of wing-venation and the morphology of male and female genitalia, in conjunction with the immature stages, adult behaviour, seasonality and geographic distribution etc., would provide a broader base of research for the systematics of skipper butterflies in the Melanesian region. More significantly, the systematic relationship of Hesperinae to the subfamily Trapezitinae

Fig. 1-7, and 9-13: Adult female and life history of *Mimene wara* Parsons from Mt Gumi Papua New Guinea (Fig. 8: illustration of male holotype *Mimene wara* Parsons): 1-2) female upperside and underside (scale bar = 10mm); 3) antennal club (scale bar = 2mm); 4) ventral view of pupal wing cases and haustellum case tip (scale bar = 2mm); 5) dorsal view of pupal cremaster (scale bar = 2mm); 6) tibia (fore, mid and hind) (scale bar = 2mm); 7) wing venation (scale bar = 10mm); 8) male holotype *Mimene wara* Parsons (from Nauti Logging Road, Bulolo, Papua New Guinea) (scale bar = 10mm) 9) lateral and dorsal view of pupa (scale bar = 4mm); 10) female genitalia (scale bar = 1mm); 11) frons and lateral view of larval head capsule (scale bar = 2mm); 12) frons of pupa (scale bar = 4mm); 13) labial palpus (scale bar = 1mm).

(which converges in the New Guinea and Madagascar faunal zones [Evans, 1949, Atkins, 1999]) may be resolved.

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