**Bracca olafhenkeli** sp. nov., a new species of the Ennominae (Lepidoptera: Geometridae) from Sulawesi (Indonesia)

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**Abstract**

*Bracca olafhenkeli* sp. nov. is described from the island of Sulawesi, Indonesia, to which it is considered endemic. Morphological characters such as the basic pattern and coloration as well as the genitalia clearly indicate that the species is a typical member of the genus *Bracca* Hübner, but large, white apical spots on the forewings and extremely broad, white marginal bands on the hindwings render it unmistakable among its congeners. The new species is abundant in montane areas of North, Central and South Sulawesi and seems to be restricted to primary forests. The biology is unknown.

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**Keywords:** Geometridae; Ennominae; New species; *Bracca olafhenkeli* sp. nov.; Sulawesi

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**Introduction**

Species in *Bracca* Hübner, [1820] are distributed in the Oriental tropics; the geographic range of the genus extends from the extreme south of Thailand to tropical Australia. One to three species are known from peninsular Malaysia, Borneo, Sumatra, Java, Ceram, Ambon, Buru, Luzon, Mindanao and some other Philippine islands, five species inhabit Sulawesi, and 14 species New Guinea and the surrounding islands. Four species are recorded from NE Australia (McQuillan and Edwards 1996). Holloway (1984, 1991) published some preliminary observations on species of *Bracca* of the Tropical Pacific and later provided a full taxonomic account and cladistic treatment of this genus. He synonymized five genera (*Cosmethis* Hübner, *Duga* Walker, *Arycanda* Walker, *Panaethia* Guenée, *Tigridoptera* Herrich-Schäffer) with *Bracca*. He also made the first mention of the new species described below (Holloway 1991; as *Bracca* sp. n. 14097). Holloway [1994] gave a detailed description of the generic characters and recorded three species from Borneo. Sommerer and Stüning (1997) described a conspicuously different Sumatran subspecies of *Bracca exul* Herrich-Schäffer, [1856] (the nominotypical subspecies is restricted to Java), and discussed the phenomenon of strikingly different island-races that has been found so explicit only in the genus *Bracca*. Parsons et al. (1999) listed a total of 26 species in the genus.

**Taxonomic section**

*Bracca* Hübner

Facies features of the species presently included in *Bracca* are very diverse, but the genus is well defined by the following morphological characters:

1. male antennae ciliate;
2. fovea present on forewing;
(3) tibia of hind leg not dilated, without hair pencil;
(4) sternites 1 + 2 without lateral, sterno-tympanal process, tympanal cavities very small;
(5) abdominal sternite 3 without setal comb;
(6) coremata present mid-ventrally between sternites 6, 7 and 8 (but lacking in a group of species endemic to New Guinea); they may be bifurcate or quadrifurcate, the anterior pair may be reduced;
(7) male genitalia with uncus frequently bifid (but entire in a group including the type species); gnathos present but often with the central part reduced; valve costa centrally with a strong, flattened, dorsal lobe bearing long curved hair setae, and with a second lobe opposite to the former, situated more distally and ventrally, with variable ornamentation of few to many strong spines; transverse band of sclerotisation between costa and sacculus with a digitate, densely spined lobe at dorsal edge, often pointing basad; distal end of sacculus with further ornamentation of one to many strong spines; aedeagus simple, vesica without ornamentation or moderately dentate;
(8) female genitalia with a sclerotized band on bursa copulatrix, consisting of transverse, minutely dentate ridges, in addition to a dentate signum that frequently is semi-circular; sterigma with variable ornamentation.

**Bracca olafhenkeli** sp. nov.

**Etymology**

The species is named after Hans-Off Henkel, in recognition of his merits as president of the Leibniz Gemeinschaft, acknowledging his commitment to basic and applied sciences, and for his support of natural history collections.

**Type-material**


Paratypes. 1 ♀, same data as holotype; 1 ♀, same data except 2°55'S 120°05'E, 900–1300 m, i.1997, leg. local collector (ex coll. Dr. R. Brechlin, ex coll. Museum Witt); 1 ♀, same as preceding except x.1997; 3 ♀, same data, iv.1998; 3 ♀, “Sud Sulawesi, Rte. de Rantepeao à

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**Fig. 1.** Adults of *Bracca olafhenkeli* sp. nov., paratypes. (A, B) ♂, “Sempuraga”, Central Sulawesi; A: upperside, B: underside. (C) ♀, S. Sulawesi, “Bantimurung”. (D, E) ♀, (G, H) ♂, S. Sulawesi, Polo Polo, 2200 m. (F, I) ♂, Gunung Ambang Reserve, North Sulawesi.


**Description**

**Male** (Fig. 1A): Wing span 48–53 mm, length of forewing 26–28 mm. Apex of forewing evenly curved to hind margin, tornus inconspicuous. Hindwing with margin evenly rounded.

Both wings of a dull, pale bluish-grey ground colour, spotted black, with three longitudinal, dull brownish-olive bands, a shorter one extending from the discoidal...
patch to the terminal row of black spots, two longer ones parallel to the hind margin. Black spotting on forewings concentrated in the basal and postmedial areas, arranged as four transverse fasciae in the latter. On hindwings there is no basal spotting. Black spots situated on veins, with a few exceptions along costa and hind margin, and with exception of the terminal fascia where spots are situated between veins. The latter fascia highlighted by a white or light grey line towards marginal area of forewing which is dark grey. There is a large, oval, white patch at the apex. Marginal one-third of the hindwings covered by a broad, white band that is equally visible on the underside (Fig. 1B), as is the white patch of the forewing apex. Rest of the wing surface dark grey, with three indistinct fasciae of the black spots. Discoidal spots on underside large, round, more distinct than on upperside.

Head with frons distinctly narrower than eye diameter, pale bluish-grey, covered with narrow, elongate scales, curved to the middle at bottom. Vertex scales of the same colour, larger, obliquely upright. A row of whitish scales towards thorax. Chaetosemata separate, round, distinct. Palps upcurved, reaching base of frons, of the same colour. Basal segment broad by almost vertically projecting scales; second segment narrower; terminal segment very small, hardly visible, tapering. Proboscis well developed.

Antennae ciliate, with two separate groups of short ciliae on each segment.

Thorax (including extreme base of forewings) yellowish-brown, spotted black. Underside of thorax as well as legs pale bluish-grey. Abdomen of the same colour, with a pair of black, subdorsal spots on first tergite. Segments 6–8 and outer surface of genitalia scaled brightly yellow.

Male genitalia and pregenital abdomen. Abdomen with two large coremata mid-ventrally between segments 6–7 and 7–8, the anterior one quadrifurcate, with a short, broad common base, two processes covered with long hair-scales, the other two shorter and unscaled (Fig. 2A; unscaled tubes not clearly visible by means of preparation). Posterior corema with a long common base and a long pair of scaled tubular processes.
(Fig. 2B). [Very similar conditions have been found in Bracca exul (Sommerer and Stüning 1997, p. 27, Figs. 17 and 18). Fully everted, these coremata reach more than half the length of the entire abdomen.]

Genitalia (Fig. 3A) with distal part of uncus rather long, narrow, deeply bifurcate. Gnathos with strong bases of the lateral arms, the remaining part vestigial. Dorsal lobe of costa moderately large, opposite ventral lobe small, with 8–10 short spines on a commom, roundish base. Sclerotized band between saccus and costa narrow, elongate, extending longitudinally across valve lamina, digitate process at dorsal end rather large. Saccus distally with 5–6 strong, curved spines, increasing in length towards ventral margin of valve. Membranous apical part of valve very short. Juxta with triangular base and a long central process with a pair of sclerotized bands (but not furcate). Aedeagus small, narrow, slightly curved dorso-ventrally, with a sclerotized, elongate apical process on one side. Bulbus ejaculatorius small, cap-like. Vesica everted laterally, narrow, with a short, dentate diverticulum at base.

Female (Fig. 1C): Similar to male, but larger. Wing span 54–58 mm, length of forewing 28–31 mm. Forewings broader, costa curved rather than straight, strongly bent at base. Hindwings also broader, the white marginal band slightly more extended. Antennae fasciculate. Yellow tip of abdomen shorter, including 7th segment and posterior half of 6th sternite.

Female genitalia (Fig. 3B) and abdomen. The latter without corematal or other conspicuous structures, 7th tergite very large. Ovipositor elongate, smooth, apophyses strong, the anterior approx. two-thirds the length of the posterior. Sterigma consisting of two large, triangular, lateral plates (lamella postvaginalis), separated mid-ventrally by a folded membrane. Bursa copulatrix pyriform, hyalinous, with a rather short sclerotised band dorsally and a strongly dentate, semicircular signum on ventral side near anterior tip of bursa. Ductus bursae short, continued by a narrow, elongate colliculum.

Diagnosis

Externally distinguishable from the congeners by the white, oval patch at the forewing apex and the broad white marginal band on the hindwing. Diagnostic characters of the male genitalia are the narrow, longitudinally extended, sclerotised band on the valve lamina and the shape as well as number and size of spines of the ventral costal process and the tip of the saccus. The female genitalia differ from those in other species by the simple, triangular, lateral plates of the sterigma (lamella postvaginalis), without further ornamentation.

Geographic variation

There are slight differences between several populations from southern, central and eastern Sulawesi, and rather strong differences between these and an upper montane population found at Polo Polo (2200 m, north of Rantepao, central Sulawesi). Specimens from eastern Sulawesi (Tambusisi Mts.) are smaller than those from central and southern Sulawesi, but otherwise similar. The Polo Polo population exhibits strongly reduced pattern elements (Figs. 1D, E, G, H); the most proximal of the postmedial transverse lines is completely reduced in most specimens, the dots building the remaining lines are reduced in size and streak-like. The dull brownish-olive bands of the lower montane form are faint and almost colourless. Three males collected at 1700 m between Rantepao and Palopo are very similar. Even two males from “Sempuraga” (1500/1700 m) belong to this form that probably can be considered a high-elevation form. No genitalic differences were found.

The population from North Sulawesi (Figs. 1F, I) has shorter forewings with shallower apical patches, and a narrower marginal white band on the hindwing. It may deserve subspecific separation, as there are also slight differences in the male genitalia, but the number of specimens and collecting sites is too small to answer this...
question with certainty. The variation may also be clinal.

Distribution and bionomics

Bracca olafhenkeli sp. nov. is endemic to Sulawesi, but widely distributed on the island (Fig. 4). Most specimens were collected in the central and eastern central regions. There are no records from the southern and southeastern peninsulas, except for “Bantimurung” which is a well-known trading-place for butterflies and moths, but almost certainly not the proper collecting site. It is yet unclear if the population in North Sulawesi is isolated from the other populations. The species occurs at elevations between 700 and 2200m and seems to be restricted to montane (primary) forests. Flight time probably extends throughout the year (though so far there are no records from August and November).

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References


