

A new wasp-mimicking species of the genus *Euclimacia* from Thailand (Neuroptera, Mantispidae)¹

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Abstract: A new species of wasp-mimicking Mantispidae, *Euclimacia horstaspoecki* nov. spec., from Thailand is described. A diagnosis with comparison to potentially related species, a description, critical discussion of the validity of color-based species discrimination in *Euclimacia*, and summary of the known life history are provided. The specific color pattern of the wings of *Euclimacia horstaspoecki* nov. spec. is unique in the genus.

Key words: Neuroptera, Mantispidae, *Euclimacia*, southeast Asia, wasp-mimics.

Introduction

Euclimacia is a genus of mostly large, handsome mantispids that ranges from India to northern Australia. 31 species are currently placed in the genus (OHL in press), but many are known from a few individuals or even from only the type specimens. Species of *Euclimacia* have a distinctive, colorful appearance (see Fig. 11–13) and are considered to be wasp mimics. Also the new species has been observed in close association with similar looking aculeate wasps. Most species of *Euclimacia* have been described on the basis of differences in coloration and wing venation, and both undescribed species and unrecovered synonymies can be anticipated in the entire distribution range of *Euclimacia*.

A few photographs of a spectacular looking mantispid from Thailand were sent to me recently. The specimen, a member of the genus *Euclimacia*, has a distinctive wing color pattern, apparently unique in the genus. Upon my request, one of the collectors, Tobias Schulze, donated the specimen to the Museum für Naturkunde in Berlin. I closely examined the specimen and compared it with several species of *Euclimacia* in various museum collections (including a number of types), and with the original descriptions of all species in the genus. It turns out that this specimen does indeed represent an undescribed species. It is the first record of *Euclimacia* from Thailand.

Terminology

Morphological terminology generally follows FERRIS (1940) and LAMBKIN (1986a). In order to facilitate comparison of the new species with already described species, I also use the standardized measurements and ratios in-

troduced by LAMBKIN (1986a) for Australian Mantispidae, which he applied to the description of *Euclimacia superba* LAMBKIN 1987. A few measurements were added for a more detailed description. For convenience, LAMBKIN's (1986a) abbreviations are added in brackets after the descriptions (e.g., „minimum frontal eye distance [WBE]“).

Material

Specimens of the following museum collections were studied for comparison (if possible, the name of the person, who arranged the loan, is given in parentheses): Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany; Deutsches Entomologisches Institut, Eberswalde, Germany (R. Gaedike); Phyllodrom, Leipzig, Germany (W. Guidetti); California Academy of Sciences, San Francisco, USA (N. D. Penny); and Smithsonian Institution, Washington, USA (O. S. Flint, Jr.).

Euclimacia horstaspoecki nov. spec.

Diagnosis: In the absence of a comprehensive revision of *Euclimacia*, comparison with other species in the genus is difficult. I have studied about 20 species present in the museum collections mentioned above, examined the preliminary revision of HANDSCHIN (1961), and studied the original descriptions of all species in *Euclimacia*. I conclude that *E. horstaspoecki* differs from all of its congeners in having a unique wing color pattern. Both wings are completely yellow (somewhat darker in anterior one-third), except for the tip of the wings, which is black. The black area is rather sharply delimited at a right angle to the costal margin (Fig. 1, 5–6, 12).

¹ I dedicate this paper and the name of the new species to Horst Aspöck on the occasion of his 65th birthday. He is one of the legends of modern neuropterology.

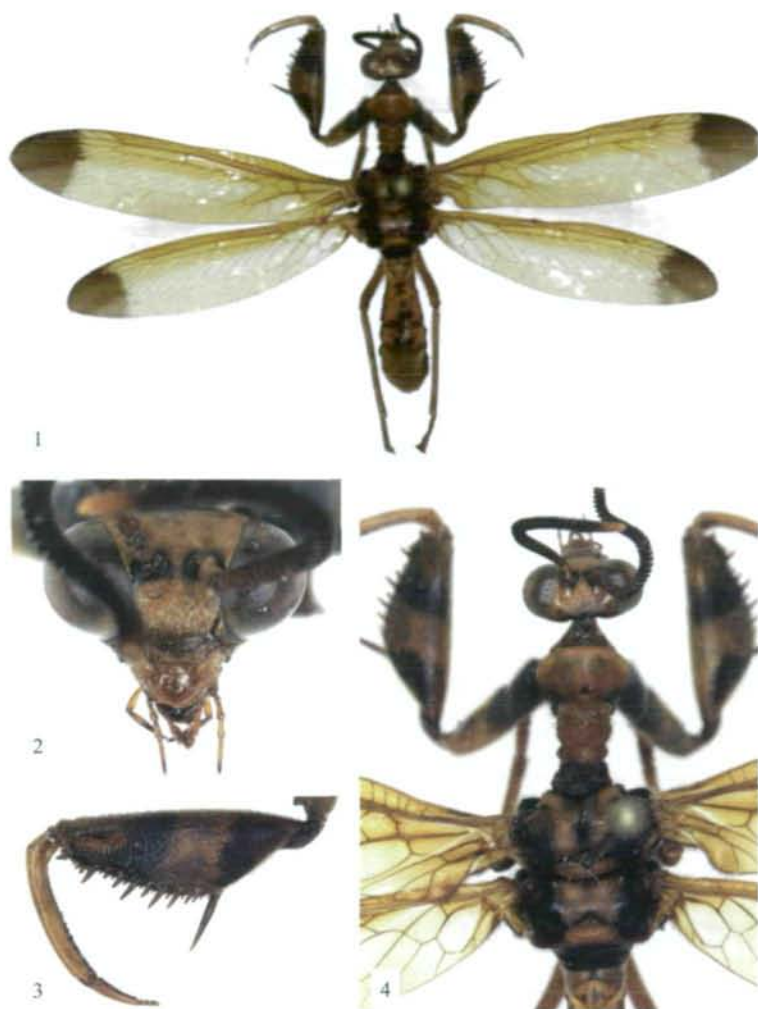


Fig. 1–5: *Euclimacia horstaspoecki*, holotype; (1) habitus, dorsal view; (2) head, frontal view; (3) left forefemur, external side; (4) head and thorax, dorsal view.

A number of *Euclimacia* with the wing tips more or less dark have been described. The black area is either connected to the anterior longitudinal band that extends at least into 2R1 (as in Fig. 9-10) (black area isolated at wing tip and barely reaching middle of 3R1 in *E. horstaspoecki*, Fig. 5-6); or, if the wing is not, or is indistinctly dark anteriorly, the apical spot is only weakly delimited and obliquely oriented to the costal margin (Fig. 8) (black area distinctly delimited at a right angle to the costal margin in *E. horstaspoecki*). If the wing apex is infumate at all, the black marking hardly extends to the distal pieces of Rs branches that arise from 2R1 (Fig. 7-10), whereas it covers most of the distal pieces of Rs branches that arise from 2R1 in *E. horstaspoecki* (Fig. 5-6).

HANDSCHIN (1961: 275) divided the species of *Euclimacia* known to him into seven informal groupings based on color patterns. *Euclimacia horstaspoecki* clearly belongs in Handschin's grouping of „*E. nigra* HANDSCHIN – *E. grandis* (GUÉRIN-MÉNEVILLE) – *E. partita* ENDERLEIN“ (all exclusively known from Indonesia), which is characterized by the combination of the following characters: subcostal space proximal to pterostigma not hyaline, the

wings not uniformly infumate or yellow, and the longitudinal wing band (if present) apically darker than basally. *Euclimacia grandis* (from Ambon and the Moluccas) is similar to *E. horstaspoecki* in having yellowish wings with a rather isolated black apical marking (as in Fig. 8). However, in *E. horstaspoecki*, the black wing spot is sharply delimited at a right angle to the costal margin (diffuse in *E. grandis*), and the body and legs are considerably orange with scattered black markings (largely black with some minor dark to yellowish red markings on various parts in *E. grandis*). *Euclimacia nigra* (from Java) and *E. partita* (from Sulawesi) have the wing apex considerably darkened (Fig. 7), but the dark marking extends anteriorly to the base of 2R1 (hardly reaching middle of 3R1 in *E. horstaspoecki*), and the body is completely black in *E. nigra* and almost completely ochraceous in *E. partita* (considerably orange in *E. horstaspoecki*). In all three species, the apical black wing area hardly extends to the distal pieces of Rs branches that arise from 2R1 (Fig. 7-10), whereas it covers most of the distal pieces of Rs branches that originate from 2R1 in *E. horstaspoecki* (Fig. 5-6).

Euclimacia horstaspoecki is the first and hitherto only record of *Euclimacia* from Thailand.

Description (based on the holotype, a male, only):

Measurements [in mm] and Ratios: Minimum frontal eye distance [WBE]: 4.5. Maximum frontal head width including eyes [WAE]: 1.5. Pronotal length, measured along dorsal midline [LP]: 5.5. Pronotal width at maculae [WAM]: 2.0. Maximum forefemoral length [LFF]: 7.8. Maximum forefemoral width [WFF]: 2.6. Forefemoral ratio (length : width) [LFF : WFF]: 3.1. Maximum midfemoral length [LMF]: 4.6. Midfemoral ratio (midfemoral length : head width including eyes) [LMF : WAE]: 3.1. Maximum forewing length [LFW]: 25.0. Maximum forewing width (measured near pterostigma) [WFW]: 5.7. Forewing ratio (length : width) [LFW : WFW]: 4.4. Maximum length of forewing 2R1 [L2R₁]: 5.2. Maximum width of forewing 2R1 [W2R₁]: 0.8. Forewing 2R1 ratio (length : width) [L2R₁ : W2R₁]: 6.9. Maximum hindwing length: 22.2. Maximum hindwing width: 5.6. Hindwing ratio (length : width): 4.0. Total body length (excluding appendages): 25.9.

Coloration: Body largely orange (considerably darker in the dead than in the living specimen; compare Fig. 1-5 and 11-13). The following are black: Head: narrow marking around antennal socket; transverse band at posterior margin of vertex. Pronotum: tiny medial spot, large black markings ventrolateral of maculae, two small spots laterobasally. Mesothorax: medial and posterolateral mesoscutal markings, anepisternum, anepimeron partly, preepisternum. Metathorax: scutum laterally, episternum, anepimeron partly. Foreleg: coxa, trochanter basally, two femoral bands externally, one femoral spot inter-

nally. Mid- and hindlegs: coxae, tibia with tiny median marking on outer side. Abdomen: segment I, medial spots on terga III-V, basal and terminal sterna partly, terga IX-X partly. Most antennal articles at mid-length brown, fading to dark orange basally, 6-8 apical articles clearly orange.

Wings yellow to orange, wing base and M cells darker and with darker yellow longitudinal band in anterior one-third of wings (including costal space). Slightly darker yellow posterior to gradate series than anterior to it. Wing apex black, rather sharply delimited at right angle to costal margin. Apical black area includes most of distal pieces of Rs branches that originate from cell 2R1, although slightly paler than remaining dark area.

Morphology: Antennae: Left antenna with 49 articles (apical articles of right antenna missing). Wings (characters apply to both fore- and hindwing if not stated otherwise): Costal space proximal to pterostigma with 13 (forewings) and 12 and 14 (hindwings) crossveins. Numbers of branches that arise from R1 cells: 1R1: 4-5; 2R1: 5-6; 3R1: 4-5. Distal piece of CuP with single branch. Forewing: Distal pieces of MA and MP branches double but not forked; Rs branches mostly forked. Hindwing: Distal pieces of MA, MP, and Rs branches forked. Forewing: CuA with two branches.

Discussion: Species of *Euclimacia* are probably all wasp mimics, and some examples of mimetic complexes of mantispids and social wasps were described and illustrated by SHELFORD (1903 [1902]: 236, pl. 19). As has been pointed out by HANDSCHIN (1961), members of *Euclimacia* seem to be structurally very similar. Color and wing venation are usually the only characters used for species discrimination in the genus. For example, LAMBKIN (1987) could not exclude that future work may prove that the three Australian *Euclimacia*, which are also based on color differences only, may all be model-dependent color morphs of a single species. OPLER (1981) demonstrated for a New World species of wasp-mimicking Mantispidae, *Climaciella brunnea* (SAY), that significantly different color morphs occur depending on the specific wasp model available. Other examples of putative polymorphic Batesian mimicry in a population of wasp-mimicking mantispids were summarized and commented upon by REDBORG (1998).

Since the species in the genus are apparently rare in collections, almost nothing is known about intraspecific variability. Comparative studies of genitalia have not been conducted in *Euclimacia* yet, and this is beyond the scope of the present paper. Since I could not find significant structural differences between *E. horstaspoecki* and other species of *Euclimacia*, the description of the new species is almost exclusively based on color differences as well. The color pattern particularly of the wings of *E. horstaspoecki* is obviously unique among the species in the

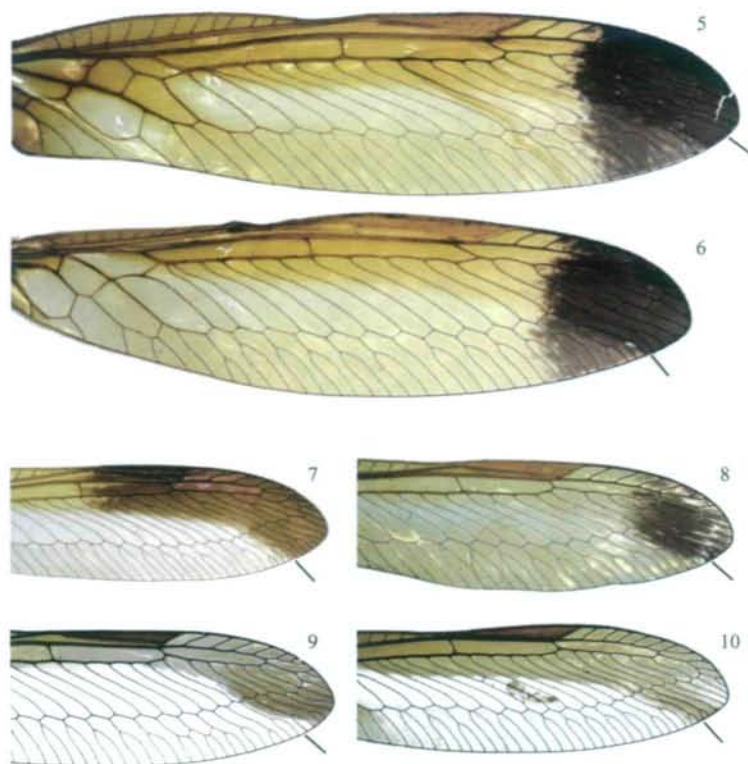


Fig. 5–10: Wings of various species of *Euclimacia*; (5–6) *E. horstaspoecki*, holotype, right fore- and hindwing; (7–10) apical part of right forewings, (7) *E. nigra* Handschin; (8) *E. sp.* (near *E. grandis*), Indonesia (Sumatra) (Phyllodrom, Leipzig); (9) *E. flavocincta* Stitz, holotype, Solomon Islands (Museum für Naturkunde, Berlin); (10) *E. sauteri* Navás, holotype, Taiwan (Deutsches Entomologisches Institut, Eberswalde). Black lines point to the border between section of Rs branches that arise from 2R1 and section of those that arise from 3R1.

genus, and, based on the material that I studied, I presume that it is highly unlikely that this distinctive pattern is just one extreme of a hypothetically broad phenotypic range of any of the known species.

Behavior: Information on the behavior of *E. horstaspoecki* is based exclusively on the observations by Tobias Schulze. He observed numerous insects of similar appearance flying in open areas of a rain forest in Thailand. The holotype specimen was flying along low vegetation beside a gravelly walkway to a bat cave (Fig. 14), which is a regional tourist attraction. The specimen frequently paused on twigs or leaves in direct sunlight about one meter above ground for a moment only to finally start its rapid searching flight again (Fig. 11–13). The antenna moved rapidly up and down, when the specimen was either moving or when a potential prey was sighted (Fig. 13). The specimen was almost continuously in motion, and its flight is extremely fast and agile. Tobias Schulze was able to keep the specimen alive for five weeks and could observe its prey-seeking behavior. He fed the mantispid with calliphorid flies, one or frequently several of which were immediately captured and eaten. In some cases, the mantispid used to catch two flies almost simultaneously, one each with the two forelegs. It



Fig. 11–14: *Euclimacia horstaspoecki*; (11–13) holotype, photographs of the living specimen in Thailand; (14) type locality.

was usually moving around even when holding the prey or feeding on it. Based on the observations of *E. horstaspoecki* in Thailand and in captivity, it can be concluded that this species is an active, flying, diurnal (only?) hunter.

Euclimacia horstaspoecki could be observed in proximity to aculeate wasps, which were strikingly similar in almost identical overall coloration, body size, and movement. Unfortunately, none of the wasps has been collected and no observations of wasp-mantispid interactions were made. James M. CARPENTER (pers. comm., March 2004) suggested that it seems to come closest to the species of the *stigma* (FABRICIUS) species group of the social wasp genus *Polistes*, not just in wing markings, but in body coloration as well. The *stigma* species group is widely distributed in southeast Asia, ranging from India to Australia (CARPENTER 1996).

Material: Holotype: male, THAILAND, DC: Nakhon Ratchasima, Umgebung von Pak Chong, 14°31'60N 101°21'03E, ~400m, „Way to Batcave“, leg. S. Materna & T. Schulze, 23 Sept 2003–08 Oct 2003. Holotype deposited in Museum für Naturkunde, Berlin.

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Tobias SCHULZE and Sören MATERNA are the collectors of the holotype who sent Reinhard EHRMANN some of their photographs of the mantispid. Reinhard EHRMANN pointed my interest to this beautiful insect. Without hesitation, T. SCHULZE and S. MATERNA provided all of their images and information, and upon my request, T. SCHULZE donated the specimen to the Museum für Naturkunde, Berlin. Oliver S. FLINT, Jr., and Norman D. PENNY kindly but vainly searched the Neuroptera collections of the Smithsonian Institution, Washington, and the California Academy of Sciences, San Francisco, for additional material of *Euclimacia horstaspoecki*. James M. CARPENTER informed me

about southeast Asian social wasps as possible candidates for a model for *Euclimacia horstaspoecki*. Norman D. PENNY reviewed the manuscript linguistically and eliminated many errors.

Zusammenfassung

Eine neue Mantispiden-Art aus Thailand, *Euclimacia horstaspoecki* spec. nov., wird beschrieben. Wie wohl alle Arten der Gattung *Euclimacia* imitiert sie das generelle Färbungsmuster von sozialen Wespen. Die Arbeit umfaßt eine Diagnose mit Vergleich mit möglicherweise nahverwandten Arten, die Beschreibung, eine kritische Diskussion der in der Regel auf Farbdifferenzen begründeten Artunterscheidung bei *Euclimacia* und eine Zusammenfassung der Beobachtungen zur Lebensweise dieser Art. Das spezifische Farbmuster der Flügel von *Euclimacia horstaspoecki* spec. nov. ist einzigartig in der Gattung.

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