A new species of *Miletus* from the extreme south of Yunnan, China

(Lepidoptera, Lycaenidae)

by

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Abstract: A new species of the Lycaenid genus *Miletus* is described from the Xi-shuang-ban-na area, the extreme south of Yunnan.

Introduction

The genus *Miletus* Hübner, 1819 is distributed from India to south China and through the Malay Archipelago and Philippines to New Guinea, it has been well known as a true SE Asian genus because all the 25 previously known species within the genus are mainly distributed in the principal part of SE Asian Subregion, with a few species extending to the north as far as south China but are not endemic there. It is amazing that a new species of *Miletus* has been found in the Xi-shuang-ban-na area, the extreme south of Yunnan, China, which is rather distant from the principal part of SE Asian Subregion. Such a discovery may add proof to the viewpoint that the forest in Xi-shuang-ban-na belongs to the true tropical rain forest, which was considered by some Chinese botanists based upon their studies on the flora of this area. Concerning the zoogeography of butterflies, such a discovery may suggest the extreme south of Yunnan (as well as Northern Laos and Northern Vietnam) to be either a part of centres of speciation for Sino-Himalayan elements or for SE Asian elements.

For an analysis in zoogeography, the concentrated distribution of a genus (distributional centre of a genus, the smallest area inhabited by all species of the genus) is more important than the present distribution of the genus (the area covering the distributions of all species in the genus). To divide the faunas of vast areas into zoogeographical areas (such as regions and subregions), considering the dispersal of insects, the survey on the concentrated distributions of genera, instead of the survey on present distributions of genera, often shows some dividing lines clearly defining some areas. The concentrated distribution of a genus, instead of the present distribution of that genus, more or less indicates the centre of speciation within the genus (centre of differentiation of species, the area where most species in the genus differentiated during the near history). Before the discovery of *Miletus bannanus* (spec. nov.), the concentrated distribution of *Miletus* ranged from S. Burma and S. Indo-China to Malay Peninsula and throughout the SE. Asian Islands, excluding any part of China. However, since the discovery of the new species in China, the concentrated distribution of *Miletus* has to include the extreme south of Yunnan as a part. Because there are a few endemic species found in Northern Laos and Northern Vietnam belonging to Sino-Himalayan genera (such as *Chrysozephyrus, Euaspa* and the subgenus *Kulua* etc.), the area around the extreme south of Yunnan and northern Indo-China should be regarded as either a part of centres of speciation for Sino-Himalayan elements or for SE Asian elements. The delimitation between the Sino-Himalayan and SE Asian Subregions is blunt here and we can not find out a clear dividing line.

Miletus bannanus spec. nov. (col. pl. XIIa, fig. 1, 2)

Holotype ♂: LF 18 mm, 20 km west of Meng-la, Xi-shuang-ban-na, the extreme south of Yunnan, China, July 20th 2003, leg. H. Huang. The holotype specimen will be deposited in the Entomological Museum, Institute of Zoology, Chinese Academy of Science, Beijing, China.

This new species is named after its type locality: Xi-shuang-ban-na, which is called Ban-na for short.

Diagnosis

This new species is only similar to the sympatric *M. mallus* (Fruhstorfer, 1913) in external features on

the upperside of the wings, but can be easily distinguished from the latter by the underside of the hindwing with postdiscal markings in spaces 4 and 5 much closer to termen than end-cell, and by the male genitalia with inner costal ridge of valva much longer, juxta and phallus much broader in dorsal view, and coecum of phallus not swollen ventrally in lateral view.

Discussion

In the light of J. N. ELIOT's revisional works (1961, 1986), all species of *Miletus* have been divided into four species-groups mainly according to male genital structures, this new species should be included into the *M. chinensis* C. FELDER, 1862-group, in having distal third of valva subspatulate, with dorsal margin less convex than ventral margin in lateral view, and with a terminal hook (though very minute) at the apex.

It can be at once distinguished from all the species of the *M. symethus* (CRAMER, [1777])-group by the male forewing vein 4 (vein M3) unswollen and male valva with a minute terminal hook at the apex.

It is very easily distinguishable from the species of the *M. boisduvali* MOORE, [1858]-group, because the latter is characterized in male genitalia by the distal third of valva somewhat rectangular and edges curved inwards to form a U-shaped trough.

However, ELIOT's division in shape of valva seems not to be very clear between *M. chinensis* (figs. 6, 7e) and *M. zinckenii* C. & R. FELDER, 1865 groups. Both groups have distal third of valva somewhat spatulate and have a terminal hook at the apex, the only difference introduced by ELIOT is whether the dorsal margin of the valva is less convex than the ventral margin. In my experience of dissection, such difference is only confined to lateral view for the observer. The distal third of valva changes its shape according to the observing view. Such as in *M. chinensis*, the dorsal margin is clearly less convex than the ventral margin in lateral view but curved in nearly the same degree as the ventral margin in dorsolateral view. Therefore a discussion on the external difference between *M. bannanus* (spec. nov.) and all species of the *M. zinckenii*-group is necessary here as well as of the *M. chinensis*-group.

Hitherto only four species of the *M. zinckenii*-group are known, namely *M. gopara* (DE NICEVILLE, 1890), *M. zinckenii, M. valeus* (FRUHSTORFER, 1913) and *M. gaetulus* (DE NICEVILLE, 1894); the new species differs from *M. gopara* and *M. zinckenii* in having vein 4 on upperside of forewing unswollen, without specialised scales, from *M. valeus* in having the white colouring on the upperside of the forewing restricted to the discal area as a series of small spots interrupted by veins, not extending to most areas of the forewing as in *valeus*, and from *M. gaetulus* in having the upperside of the hindwing uniform dark brown, not white as in *gaetulus*, and the white coloration on the upperside of the forewing much more reduced.

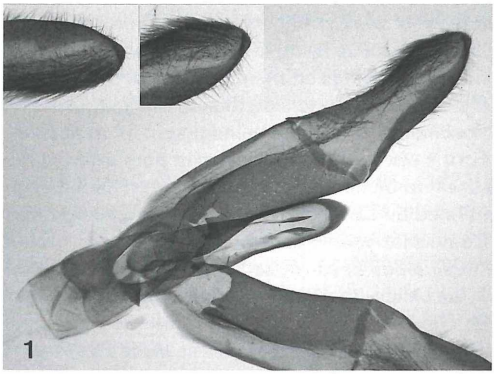
Within the *M. chinensis*-group, five species have been described, viz. *M. chinensis, M. croton* (DOHERTY, 1889), *M. mallus, M. nymphis* (FRUHSTORFER, 1913) and *M. gaesa* (DE NICEVILLE, 1895). The new species differs from *chinensis* (col. pl. XIIa, fig. 5), with which it is sympatric, in having forewing vein 4 unswollen, postdiscal band in spaces 4 and 5 on the underside of the hindwing much closer to termen than end-cell, inner costal ridge of valva longer, and juxta and phallus much broader in dorsal view, from *croton* in having the underside of the hindwing uniform pale greyish brown, not that dark and variegated brown as in *croton*, with markings only slightly more brownish than ground colour, not that reddish brown as in *croton*, and postdiscal band in spaces 4 and 5 on the underside of the hindwing much closer to termen than end-cell, from *nymphis* in having the white markings on the upperside of the forewing much narrower, comprising a patch beyond end-cell and separate spots in spaces 1b–3, not a continuous broad white band as in *nymphis*, and postdiscal band in spaces 4 and 5 on the underside of the hindwing much closer to termen than end-cell, and from *gaesa* in having the white markings on the upperside of the forewing clearly marked, not absent or faintly discernible as in *gaesa*, and postdiscal band in spaces 4 and 5 on the underside of the hindwing much closer to termen than end-cell.

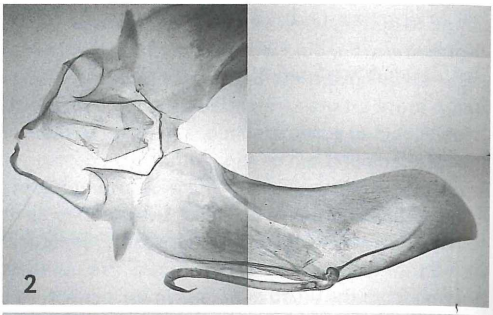
Considering both external features and male genitalia structures, *M. mallus* is undoubtedly the closest species to *bannanus*. *M. mallus* was originally described from S. Vietnam, the holotype taken in the dry season. Thereafter only two further subspecies were described, ssp. *gethusus* (FRUHSTORFER, [1917]) (col. pl. XIIa, figs. 3, 4) from Tonkin, N. Vietnam on specimens taken in wet season and ssp. *shania* (EVANS, 1932) from Burma. ELIOT at first treated both *mallus* and *gethusus* as seasonal forms of a

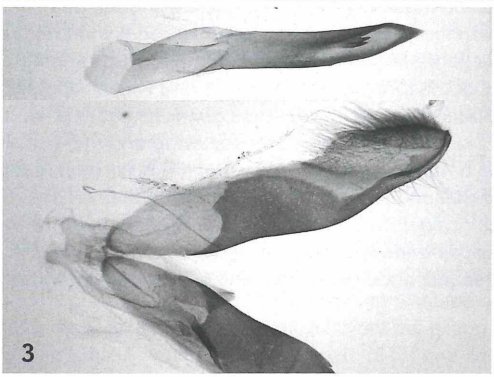
single taxon, however after examination of more material of *mallus* from wet season, he considered that *gethusus* should be reinstated as a valid subspecies of *mallus* flying in N. Vietnam. The males of ssp. *mallus* have quite better developed whitish postdiscal markings on the upperside of the forewing and a more extensive blackish area in and beneath the cell on the underside than in ssp. *gethusus*. We have collected some specimens from three different localities in S. Yunnan belonging to *M. mallus* and identified all of them as ssp. *gethusus* according to Eliot's works, the examination of both external features and male genitalia of these specimens proves them to be different constantly from the holotype of *bannanus* in several important characters as mentioned in "Diagnosis". Judging from the figures in recent literature, we believe that ssp. *gethusus* is somewhat widely distributed in the area around N. Vietnam, S. Yunnan and N. Laos. The nominate *mallus* has been revised and illustrated by Eliot; judging from the illustrated specimen in Eliot's work, we believe that *mallus* differs from *bannanus* as well as *gethusus* does. The remaining *shania* may be questionable, because no figure has been published concerning the type material or the specimen from the type locality. However, since Eliot has revised this genus, we have no reason to consider that he made mistakes in grouping *shania, gethusus* and *mallus* into a single species, considering *bannanus* is sharply different from both *mallus* and *gethusus* in both underside wing-markings and male genitalia. Moreover, according to the original description, *shania* has whitish spots on the upperside of the forewing equal in size and whitish spots on the underside of the forewing extending to base in spaces 1a and 1b, whereas *bannanus* has the whitish spot in space 1b smaller than the spot in space 2 on the upperside of the forewing and the whitish spots on the underside of the forewing not extending to the base in spaces 1a and 1b. According to the reliable information in literature, all of *mallus, gethusus* and *shania* have the whitish spots on the underside of the forewing more or less extending to the wing-base in the same colour for some distance, with a clear whitish streak just above dorsum, whereas *bannanus* has such spots becoming greyer towards the wing-base for a short distance and the area just above dorsum being greyish, not so whitish as in the postdiscal spots.

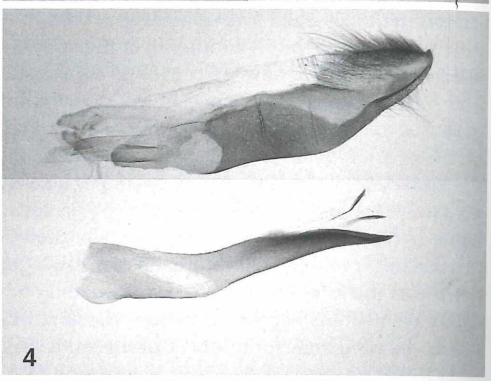
Description

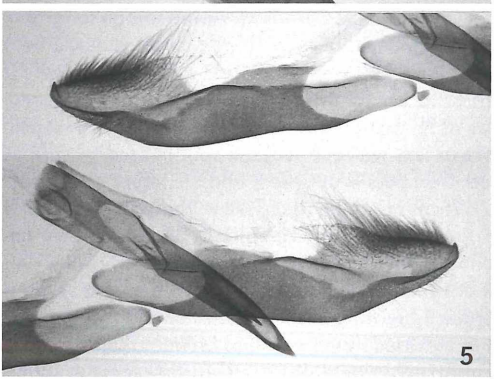
Eyes, frons and labial palpi exactly as in the sympatric *M. mallus gethusus*. Antennae as long as in *gethusus*, mostly blackish but tipped with brown as in *gethusus*. Body and legs same-coloured as in *gethusus*. Wing shape similar to that of *gethusus*, but with forewing costa and termen more convex causing apex less pointed than in *gethusus*. Length of forewing: 18 mm. Forewing vein 4 unswollen and clothed with common blackish scales. Upperside of forewing: ground colour blackish brown as in *gethusus*; only four small whitish spots present, more or less well-defined; the spot in space 4 just beyond end of cell, being the largest and better defined, the spots in spaces 2 and 3 smaller and dusted with black scales, these three spots almost in a line directed to the end of vein 2, the spot in space 1B much smaller and just below the spot in space 2. Upperside of hindwing uniform blackish brown and unmarked. Underside of forewing: ground colour almost uniform greyish brown, apparently paler than in *gethusus* from the same season, appearing more brownish at the end of spaces 3 and 4; a series of black submarginal dots as in *gethusus*; a series of spots appearing in the postdiscal and costal areas, almost of the same colour as the ground colour, but all outlined by whitish lines on both their inner and outer sides, costal spots in spaces 8, 9 and 10 same-marked as in *gethusus*; postdiscal spots in spaces 4, 5 and 6 similar to those of *gethusus*, but with margins more smooth than in *gethusus*; postdiscal spot in space 3 well marked and distant from termen, which is absent or ill-defined and close to termen in *gethusus*; two spots in cell and one spot at the end of cell same-marked as in *gethusus*; whitish spots on the upperside repeated in same position and enlarged, the white spots in spaces 1b and 2 not extending basad in white colour, but only extending basad for a short distance in grey colour, space 1a above dorsum greyish in colour; base of spaces 1b, 2 and 3 extensively blackish, much darker than ground colour; a sub-tornal dark spot similar to that of *gethusus*, but reaching vein 2 and crossing space 2 in greyer colour, not restricted below vein 2 as in *gethusus*. Underside of hindwing: ground colour as on forewing, rather pale greyish brown and uniform, appearing a little more brownish at the end of spaces 3 and 4; a series of blackish submarginal dots same-marked as in *gethusus*; all other spots marked nearly in the same position as those of *gethusus*, outlined by whitish lines on both their inner and outer sides, similar to those of *gethusus* but only a little more brownish than ground colour,











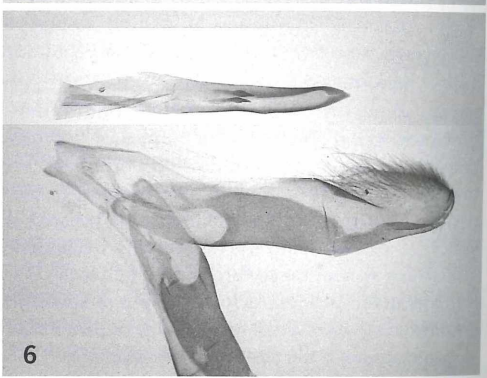


Fig. 1: Male genitalia of *Miletus bannanus* (holotype) consisting of right valva, juxta and phallus flattened (the feature of right valva corresponding to the natural shape of inner side of right valva in dorsolateral view, the feature of juxta and phallus corresponding to the natural shape of juxta and phallus in dorsal view) (right), of tip of left valva flattened (left top) and of tip of right valva flattened (central top).
Fig. 2: Male genitalia of *Miletus bannanus* (holotype) consisting of ring and dorsum spread.
Fig. 3: Male genitalia of *Miletus mallus gethusus* (Cang-yuan, specimen illustrated) consisting of right valva and juxta flattened (bottom), and of phallus in dorsal view (top).
Fig. 4: Male genitalia of *Miletus mallus gethusus* (Ye-xiang-gu, specimen illustrated) consisting of right valva and juxta flattened (top), and of phallus in lateral view (bottom).
Fig. 5: Male genitalia of *Miletus mallus gethusus* (Meng-la, specimen not illustrated) consisting of right valva, phallus and juxta flattened (bottom), and of left valva flattened (top).
Fig. 6: Male genitalia of *Miletus chinensis* (Hainan, specimen illustrated) consisting of right valva and juxta flattened (bottom), and of phallus in dorsal view (top).

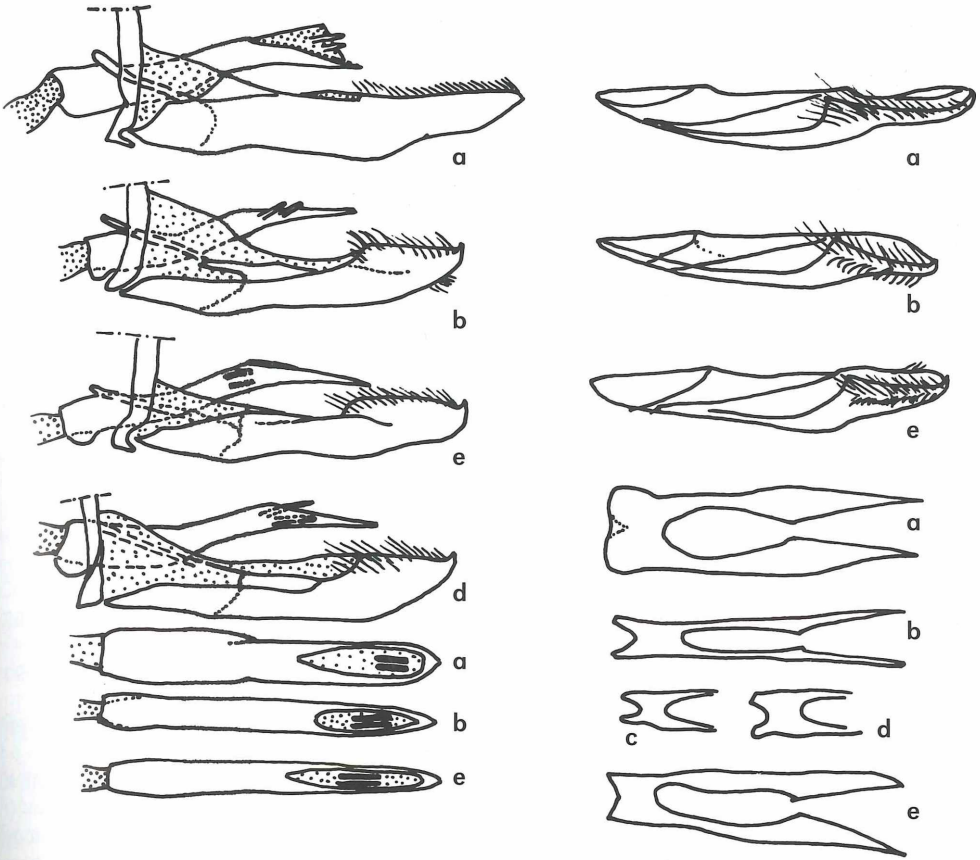


Fig. 7: Male genitalia drawings of *Miletus* species consisting of lower half of ring, juxta, phallus and left valva in lateral view (left top), of phallus in dorsal view (left bottom), of left valva in dorsal view (right top), and of juxta in dorsal view (right bottom): a – *Miletus bannanus* (holotype); b – *Miletus mallus gethusus* (Meng-la, specimen not illustrated); c – *Miletus mallus gethusus* (Ye-xiang-gu, specimen illustrated); d – *Miletus mallus gethusus* (Cang-yuan, specimen illustrated); e – *Miletus chinensis* (Hainan, specimen illustrated).

not so apparently brownish as in *gethusus*; all these spots apparently wider than in *gethusus*, with margins more smooth than in *gethusus*, the postdiscal series placed much closer to termen than to end-cell. Ciliae brownish as in *gethusus*, only a little bit paler than in *gethusus* on the underside of the hindwing.

Genitalia (figs. 1, 2, 7a): valva with dorsal margin less convex than ventral margin in lateral view, and with a terminal hook at the apex, inner costal ridge of distal portion of valva much longer than in *gethusus* (figs. 3–5, 7b–d), juxta and phallus much broader in dorsal view than in *gethusus*, phallus with two spine-like cornuti as in *gethusus*.

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Colour plate XIIa

HUANG, H. & XUE, Y.-P.: A new species of *Miletus* from the extreme south of Yunnan, China (Lepidoptera, Lycaenidae). – Neue Entomologische Nachrichten **57**: 155–160.

Fig. 1: *Miletus bannanus* Holotype ♂ (LF: 18 mm, Meng-la, Xi-shuang-ban-na, S. Yunnan, July 2003) upperside.
Fig. 2: *Miletus bannanus* Holotype ♂ (LF: 18 mm, Meng-la, Xi-shuang-ban-na, S. Yunnan, July 2003) underside.
Fig. 3: *Miletus mallus gethusus* ♂ (LF: 17 mm, Ye-xiang-gu, Xi-shuang-ban-na, S. Yunnan, July 2003) upperside (left half) and underside (right half).
Fig. 4: *Miletus mallus gethusus* ♂ (LF: 20 mm, Ban-hong, Cang-yuan, S. Yunnan, July 2003) upperside (left half) and underside (right half).
Fig. 5: *Miletus chinensis* ♂ (LF: 18 mm, Hainan, Feb. 1981) upperside (left half) and underside (right half).

1	2	3
4	5	6

Colour plate XIIb

HUANG, H. & ZHAN, CH.-H.: Notes on the genera *Thoressa* and *Pedesta*, with description of a new species from South China (Lepidoptera, Hesperiidae). – Neue Entomologische Nachrichten **57**: 179–186.

Fig. 1: *Thoressa nanshaona* Holotype ♂ upperside.
Fig. 2: *Thoressa nanshaona* Holotype ♂ underside.
Fig. 3: *Thoressa gupta leechii* ♂ (Guangdong) upperside.
Fig. 4: *Thoressa gupta leechii* ♂ (Guangdong) underside.
Fig. 5: *Thoressa xiaoqingae* Holotype ♂ upperside.
Fig. 6: *Thoressa xiaoqingae* Holotype ♂ underside.

1	3	5
2	4	6