

Early Stages of *Yamamotozephyrus kwangtungensis* (Forster) (Insecta, Lepidoptera, Lycaenidae) with Notes on Its Systematic Position

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Abstract: The genus *Yamamotozephyrus* Saigusa is a monobasic genus with *Y. kwangtungensis* (Forster) as the type species. Early stages of the genus are reported for the first time from the Nanling Mountains, S. China. The food plant of the species is *Castanopsis* sp. The species has one generation per year, with adults flying in May and June.

Key words: Lepidoptera; Lycaenidae; *Yamamotozephyrus kwangtungensis*; early stages; biology; food plant

CLC number: Q969

Document code: A

Article ID: 1001-411X (2009)03-0069-03

虎灰蝶幼期及分类地位

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摘要: 虎灰蝶属是基于虎灰蝶 *Yamamotozephyrus kwangtungensis* 而建立的单种属, 报道了产自广东南岭的虎灰蝶幼期。该蝶寄主植物为壳斗科白锥 *Castanopsis* sp., 年发生1个世代, 成虫出现于5—6月。

关键词: 鳞翅目; 灰蝶科; 虎灰蝶; 幼期; 生物学; 寄主植物

The lycaenid tribe Theclini is predominantly distributed in Sino-Himalaya Region with species extending to S. E. Asia, Europe and N. America. The tribe currently consists of 184 species belonging to 50 genera^[1-2].

The immature stages of butterflies are well studied among insects. This is also true in the tribe Theclini due to its showy and aesthetic value among amateurs and researchers. About 138 species have documented immature stages, completely or fragmentary. The adults of the tribe are regarded as flying jewelry for their bril-

liant metallic green color on the upperside of the wings.

The genus *Yamamotozephyrus* Saigusa is a monobasic genus with *Zephyrus kwangtungensis* Forster as the type species. Though the discovery of its immature stages have absorbed the attentions for a long time due to its characteristic wing pattern, it remained unsuccessful before our study.

Y. kwangtungensis was originally described from N. Guangdong. Current distributional records include China (Guangdong, Guangxi, Hunan, Fujian, Jiangxi, Hainan), Myanmar and Vietnam (Fig. 1).

Received date: 2008-12-18

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Foundation item: The study is supported by the National Natural Science Foundation of China (30570211)

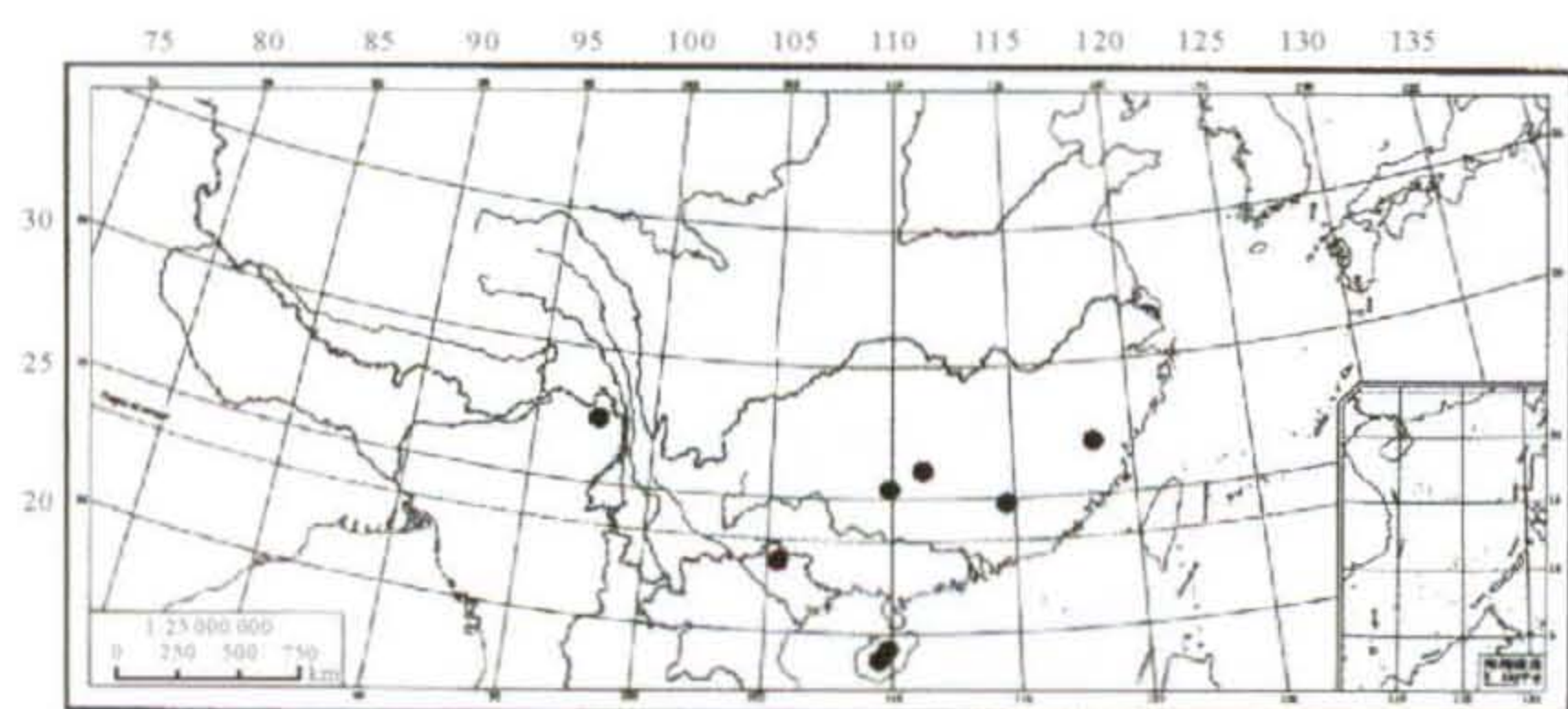


Fig. 1 Distribution of *Yamamotozephyrus kwangtungensis*

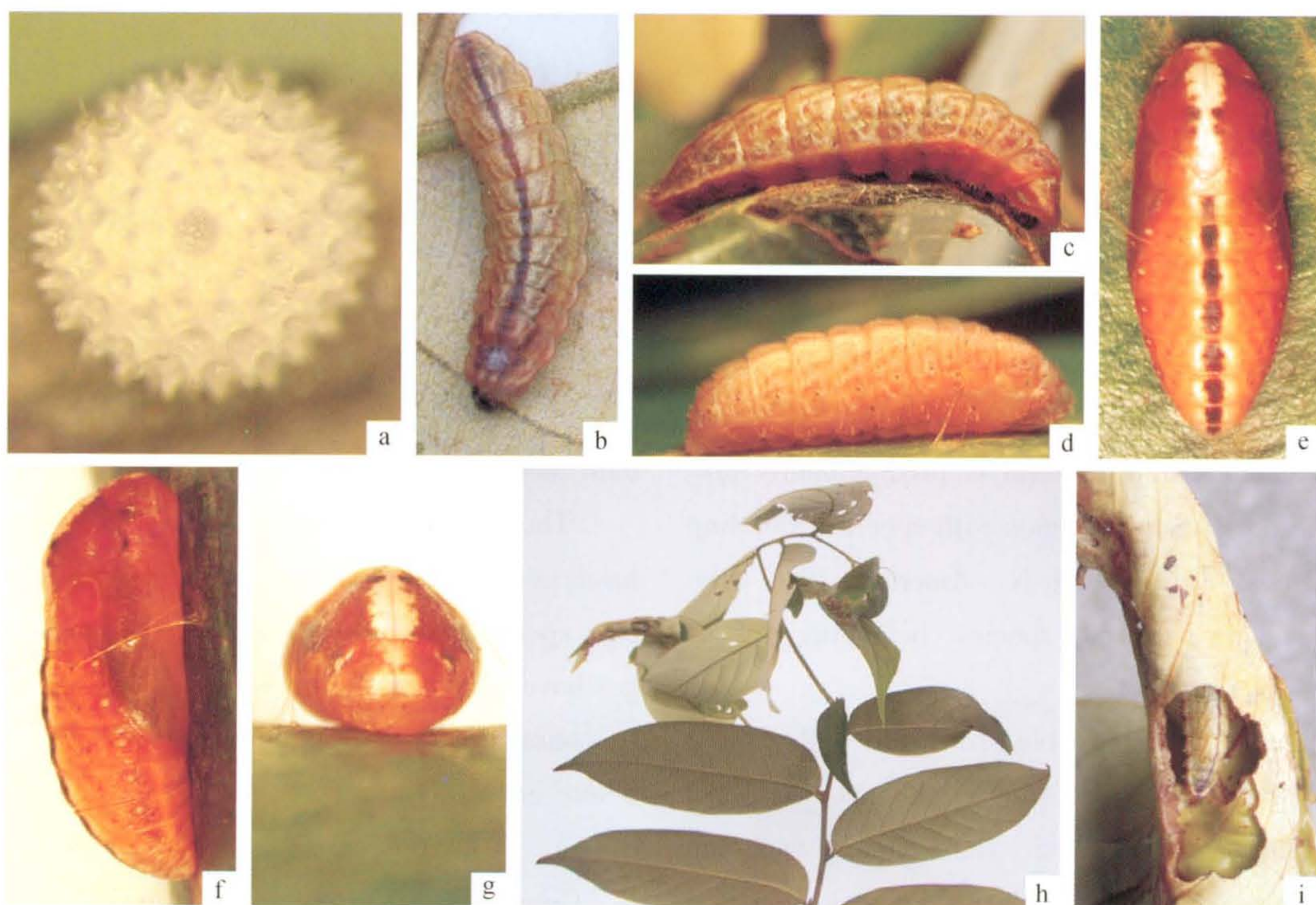
1 Materials and Methods

In 2005, five final instar larvae were collected in Nanling National Nature Reserve on April 26 at an altitude of 1 000 m and taken back to Guangzhou for breeding in the laboratory at normal temperature. Eggs were discovered subsequently in a winter survey in November. One final instar larva and 4 eggs were kept in 75% (mass fraction) ethanol, and deposited in the Insect Collections of South China Agricultural University. The description was based on fresh and preserved specimens. Measurements were carried out on fresh and preserved eggs, larvae and pupae. External characters

were examined under a stereo microscope. Photos were taken by a Nikon Coolpix 990 digital camera. Eggs were photographed with a microscope and camera.

2 Morphology

Egg (Fig. 2a): white, height about 0.6 mm, width 0.9 mm ($N=9$). Nearly spherical, flattened at base. In the outer view, exochorion of the eggshell is distinguished by a network constituting of raised, intersecting ridges, which form the external decoration of the egg, between the ridges on the surface is deeply depressed and relatively concaved. The conjoined points of the ridges consist of the longer and pointed processes. So, the eggs look like a little compressed semicircular ball, armed with many pits on the surface. Apart from the micropylar region, the pits on the shell almost equal in size, with about diameter 0.08 mm, and 0.04 mm depth. The micropylar area is consisted of a slightly larger pit than other ones on the top of the eggshell, with the concaved surface armed minute ridges.



a: Egg; b: Dorsal view of matured larvae; c: Lateral view of matured larvae; d: Prepupa; e: Dorsal view of pupae; f: Lateral view; g: Frontal view; h, i: Nests of food plant making by the caterpillar

Fig. 2 Early stages of *Yamamotozephyrus kwangtungensis* (Forster)

Final instar larva (Figs. 2b – 2d): length 15 mm, width 6.5 mm. Head black and small, completely concealed under the prothorax. Body pale green, scat-

tered with short hairs, prothorac shield red brown, spiracles white yellow, dorsal line much broader, dark red brown, with the part on thorax is prominently broader

than the remaining on abdomen. The dorsal line is accompanied bilaterally with fine white lines. Between the dorsal and spiracles lines there is a slant gray white line laterally, which is lined lowerly with dark brown.

Pupa (Figs. 2e – 2g): length 11.5 mm, breadth 4 mm, body yellow brown, cylindrical with broad dorsal line. The part of dorsal line on thorax is nearly white, with two small brown spots on mesothorax, the remaining part on abdomen is also white, but covered with broad black line medially. Wings slightly darker. Spiracles light yellow. Silk girth fine and whitish. Head without prominent horn projections.

3 Biology

Oviposition behavior: No oviposition was observed directly in the field. According to the eggs found in nature, the female seems to prefer younger trees growing in shady places for egg-laying. The eggs were laid singly at the base of, or on the underside of leaves.

Food plants: The food plant of *Y. kwangtungensis* is *Castanopsis* sp. (Fagaceae). There are over 50 species of *Castanopsis* in China^[3], and 18 species occur in Nanling Nature Reserve.

Life cycle: The butterfly has one generation in a year as do other Theclini species. Adults appeared at the beginning of May and lasted until June. It seems that the species development is correlated with the appearance of young leaves of the food plant, probably the caterpillars can only use the younger leaves as food, as old leaves of *Castanopsis* sp. are rather tough.

Habitat of early stages: The eggs were laid in early summer, remained in diapause until the following year in nature, and hatched out when the young leaves of *Castanopsis* sp. came out.

Final instar larva (Fig. 2h – 2i): The larva stayed in rolled up leaves, in a nest constituting of several young leaves, and the larva consumed the leaves nearby. No ant associated with the final instar larva was observed in nature.

Pupa: Pupation occurs on the underside of a leaf.

4 Discussion

The genus is similar to *Ravenna* Shirōzu et Yamamoto^[1,4-5], and *Leucantigius* Shirōzu et Muray-

ama^[4] based on the wing markings and genitalia features. The genitalia indicate that the genus is closed to *Ravenna*, but the morphological features of early stages show some discrepancy. Both the caterpillar and pupa of *Yamamotozephyrus* are more similar to those of *Leucantigius* than to *Ravenna*. These features suggest that the species has some combining characteristics of *Ravenna* and *Leucantigius*. It would be helpful to use some other techniques to confirm its systematic position.

The species is listed as a national protected species with beneficial, economic and scientific value issued by the Forestry Department of China, due to its rarity. According to our experience in Yinggeling, Hainan, the species can be rather abundant in one locality in the core area. So the species will be preserved if the forest where it lives in could be protected.

Acknowledgements: We thank Mr. S. Koiwaya, Dr. T. Fujikoa (Japan), Dr. K. Ueda (Kitakyushu Museum, Japan), and Prof. Yu-Feng Hsu (National Taiwan Normal University) for references. We are also indebted to Dr. M. Owada (National Science Museum, Tokyo) and Prof. O. Yata (Kyushu University, Fukuoka) for constant discussions and kind help on literature for this study. Finally we extend our thanks to Mr. Yue-Ning Gong and Ya-Zhang Zhou (Administration of Nanling Nature Reserve and Yinggeling Nature Reserve) for facilitating the field work.

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