

A New Subspecies of *Eurema andersoni* (Lepidoptera: Pieridae) from South India*

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Abstract. A new subspecies of *Eurema andersoni* (Moore, 1886) is described from the southern Western Ghats, South India. The dry-season form of this new subspecies is similar to those of subspp. *sadanobui* Shirôzu et Yata, 1982 from Indochina and *evansi* Corbet et Pendlebury, 1932 from the South Andamans, but distinguishable from them by the forewing black distal border with its inner edge not strongly angulate at vein 6, and the narrower hindwing black border with its inner edge more strongly projected along each vein. Information on the local distribution, habitat, and habits of the new subspecies is also given, especially in relation to sympatric species, *E. nilgiriensis* Yata, 1990.

Key words: Pieridae, *Eurema andersoni*, new subspecies, tropical forest, Nilgiri Hills, Western Ghats, S. India.

Introduction

Eurema andersoni (Moore, 1886), occurring in the Oriental Region, is the most widespread species within the *sari* group (Yata, 1981). It has been classified into 11 subspecies (Yata, 1991): *andersoni* (Moore, 1886) from the Mergui Archipelago and Myanmar, *godana* (Fruhstorfer, 1910) from Taiwan, *sadanobui* Shirôzu et Yata, 1982 from Indochina, *jordani* Corbet et Pendlebury, 1932 from Sikkim to Bhutan, *evansi* Corbet et Pendlebury, 1932 from the South Andamans, *anamba* Corbet et Pendlebury, 1932 from Anamba Islands, *nishiyamai* Shirôzu et Yata, 1981 from Nias and the Mentawais, *prabha* (Fruhstorfer, 1910) from Palawan, *albida* Shirôzu et Yata, 1982 from North Borneo, *udana* (Fruhstorfer, 1910) from Java, and *kashiwaii* Shirôzu et Yata, 1981 from East Sumba. Such widespread species usually show a marked seasonal polyphenism in higher latitudes. In this case geographical variation tends to be obscured by the seasonal variation.

Yata (1991) tentatively treated *E. andersoni* from the Nilgiri Hills, South India as subsp. *sadanobui* based on a single male specimen (dry-season form).

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After publication of this work, however, Yata found additional material (3♂1♀) of *Eurema andersoni* from the Nilgiri Hills among the pierid butterflies collected by Prof. Hiroshi Shima in 1993. Recently, we also found additional specimens preserved in the general collection of the Natural History Museum, London. After examining the general appearance and male genitalia of this material, we reached the conclusion that they represent a new subspecies together with that identified as subsp. *sadanobui* by Yata (1991). In this paper, we describe this new subspecies together with the unique habitat and habits of this South Indian *Eurema* butterfly.

Abbreviations used for the type depositories in the text are as follows: BLKU: The Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University, Fukuoka. NHM: The Natural History Museum, London. ZSIC: Zoological Survey of India, Calcutta.

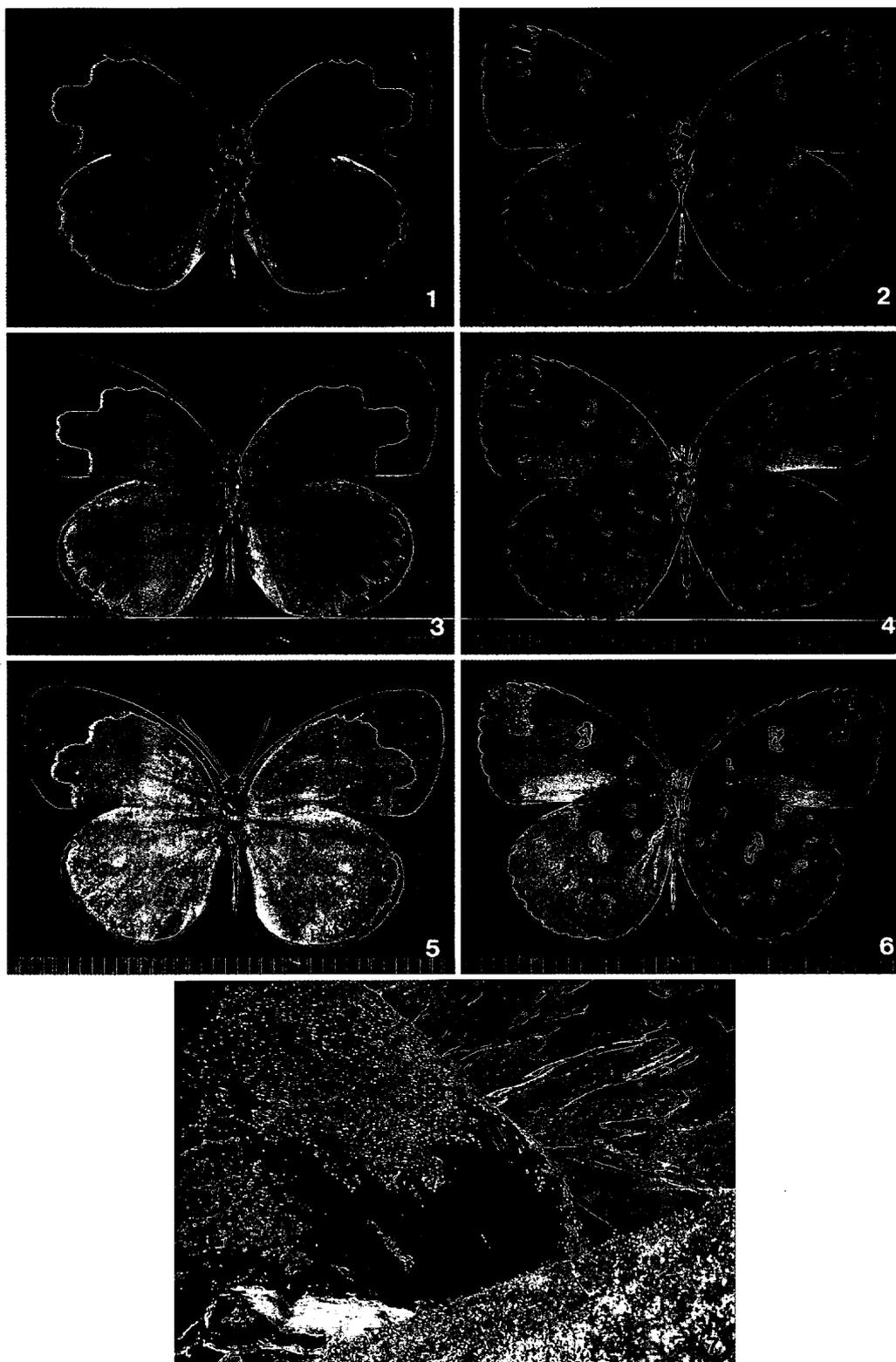
Description

Eurema andersoni shimai ssp. nov.

(Figs. 1-4)

Eurema andersoni sadanobui: Yata, 1991: 32-33, ♂, pl.12, figs. 7-8.

This subspecies is distinguished from the nomino-



Figs. 1-4. *Eurema andersoni shimai* ssp. nov. —1: Holotype♂, Coonoor, Nilgiri Hills, S. India, H. Shima leg.; 2: ditto, underside; 3: Paratype♀, same locality as holotype, H. Shima leg.; 4: ditto, underside. Figs. 5-6. *Eurema nilgiriensis* Yata, 1990. —5: Holotype♂, dry-season form, Nilgiri Hills, S. India, Tsukada Coll.; 6: ditto, underside.

Fig. 7. Habitat of *Eurema andersoni* and *E. nilgiriensis* along stream (1,500-1,800 m alt.) in Kerala, the southern Western Ghats.

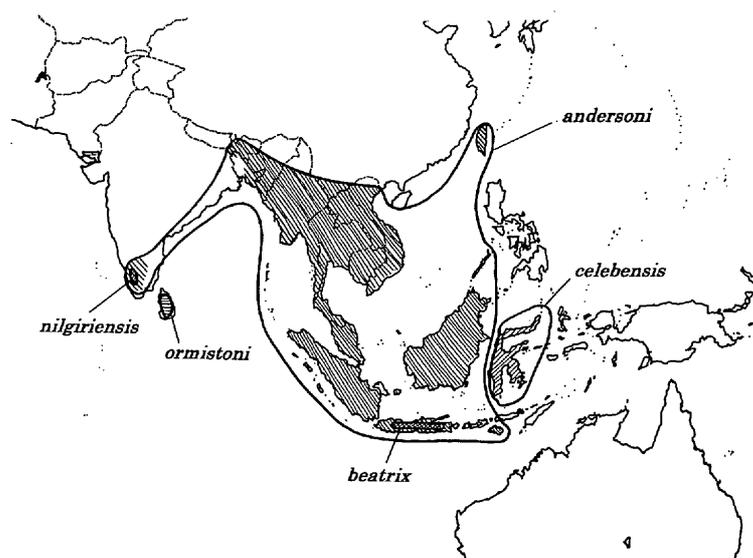


Fig. 8. Distribution of the *Eurema andersoni* complex (Yata, 1989, modified). *E. nilgiriensis* occurs sympatrically with *E. andersoni shimai*, but they segregate both vertically and bionomically. See the text for description of the habitat and localities.

typical subspecies *andersoni* from Mergui Archipelago by the following combination of features. The following description probably represents the dry-season form, because most specimens examined here were collected from September to November (nearly coincident with the Nilgiri Hills dry-season).

Dry-season form. —Male (Figs. 1–2). Upperside: Forewing black costal border barely traceable, and black distal border generally narrower, with its inner edge less deeply concaved at space 5, always right-angled at vein 4 and not sharply pointed, somewhat more deeply excavated in space 3 than in space 2, and inclined towards tornus in spaces 1a and 1b+c, not completely touching basal margin, thus evenly rounded on posterior end. Hindwing black distal border narrower, almost reduced to black line, less than 1 mm wide, but more strongly projected along each vein. Underside: Markings fainter and more poorly developed, subapical patch always sharply defined, separated by yellow veins 5 and 6, with outermargin more deeply excavated in space 6. Female (Figs. 3–4). Upperside: Forewing black costal border barely traceable, and black distal border generally narrower, with its inner edge right-angled at vein 4 and sharply pointed, equally excavated in spaces 2 and 3. Hindwing black distal border somewhat narrower, broadened towards anal angle, and more strongly projected along each vein. Underside: Markings fainter and more poorly developed; subapical patch always clearly defined, separated by yellow veins 5 and 6, with outermargin more deeply excavated in space 6.

Forewing length: Male, 18.5–20.5 mm (n=9, avg=

19.6 mm), female, 17.0–21.5 mm (n=2).

Type locality: Nilgiri Hills, the southern Western Ghats, South India.

Distribution: This subspecies is distributed from the western and southern slopes of the Western Ghats complex: Karnataka, Kerala, and Tamil Nadu (the Nilgiri Hills, and the Palni Hills complex to westwards) (Figs. 8–9).

Holotype: ♂, Coonoor, Nilgiri Hills, S. India, 500–800 m alt., 7. x. 1993, H. Shima leg. [ZSIC]

Paratypes: Same data as holotype, 2♂1♀; Nilgiri Hills, 1♂, x–xi. 1977, T. Hasegawa leg. [BLKU]; Nilgiri Hills, Kullar, 1♂, 14. ix. (1924), 1929–151, T. D. Broughton; Nilgiris, 1♂, xi. 1911?, Evans Coll. B. M. 1932, 1♀, Moore Coll. 1907–190. [NHM]. S. India, Madras Pass., 1♂, H. Latham, Brit. Mus. 1923–275; N. Areet, Javad Hills, 1♂, 10. i. 1960, A. J. Sharman Coll. B. M. 1992–128; Krishnamanaikan, Palni Hills, 1♂, 29. v. 1960, A. J. Sharman Coll. B. M. 1992–128 [NHM].

Remarks. This new subspecies is similar to subspp. *sadanobui* from Indochina and *evansi* from the South Andamans, but distinguishable from the latter two by the black distal border of the forewing upperside with its inner edge not strongly angulate at vein 6, more deeply excavated in space 3 than in space 2 and less pointed in vein 2, the narrower hindwing black border with its inner edge more strongly projected along each vein, and the fainter markings of the hindwing underside. Although the materials (3 exs.) dissected for male genitalia show slight individual variations, they are within the range of variation observed for *E.*

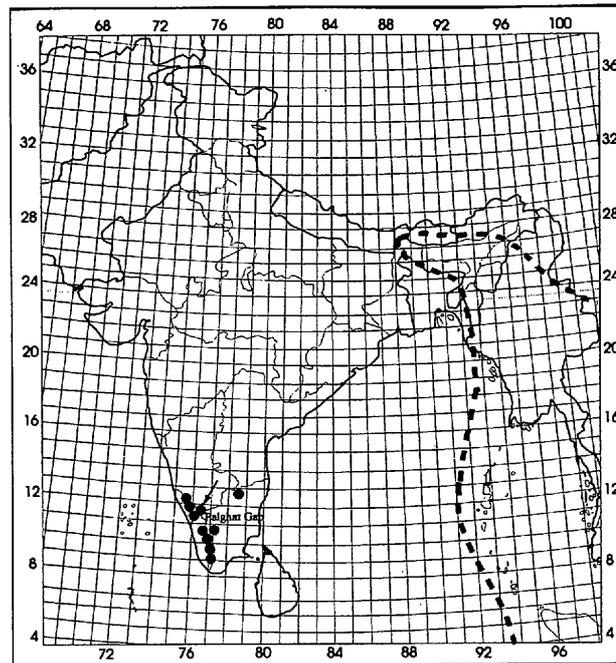


Fig. 9. Distribution of the *Eurema andersoni* complex in the Indian Region. The new subspecies *E. andersoni shimai* is distributed on the southern Western Ghats in Kerala, Tamil Nadu, and Karnataka. The localities are shown in black circles. The arrow shows the type locality (the Nilgiri Hills). The range of other subspecies of *andersoni* is shown within a dotted line, from Sikkim and Meghalaya eastwards to Myanmar and southwards to Andaman and Nicobar Islands. See text for description of the habitat and localities.

andersoni.

Etymology: The subspecific epithet, *shimai*, is derived from the name of the entomologist who collected this new taxon in the field and offered us the most important series of material for this study.

Local distribution: The new subspecies occurs in localized conditions on the western and southern slopes of the Western Ghats complex: Karnataka (Coorg District and southwards), Kerala (Silent Valley National Park, Wynad Sanctuary, and the surrounding area) (Fig. 7), Tamil Nadu (the Nilgiri Hills). All these localities are north of the Palghat Gap (Fig. 9) and form part of the Nilgiri Biosphere Reserve. South of the Palghat Gap, it occurs in Kerala (from the Annamalai Hills southwards to the Agasthyamalai Hills), and Tamil Nadu (from the Palni Hills complex to westwards). North and south of this Gap, it occurs sympatrically with *Eurema nilgiriensis* (Figs. 5–6, 8) which is a member of the *andersoni* complex (Yata, 1989). However, they segregate both vertically and bionomically (discussed below). The new subspecies is found below 1,500 m, whereas *nilgiriensis* seldom occurs at such lower altitudes. All these localities are part of the "Hotspot" area of the southern Western Ghats (Myers, 1990).

Habitat and habits: The habitat of this new subspecies is in lowland evergreen (tropical) forests, whereas

E. nilgiriensis can be found in and around highland Shola forests (up to 2,000 m) and around large tea gardens. However, in Kerala and Tamil Nadu, the lowland tropical forests have almost completely disappeared, and it is only on the western and southern slopes of the mountain sides that a contiguous forest persists. Southern Karnataka, in South Kanara and Coorg, still contains some good lowland forests, where the habitat of this species remains intact. Stray individuals can be seen outside these areas, but are never abundant. This is the only *Eurema* species found regularly in the interior of evergreen forested areas, along jungle streams, jungle paths or clearings.

According to Gaonka's observation in Silent Valley National Park in Kerala, adults were flying everyday during April–May then again October–November, though most type specimens have data labels of September–November (dry season). Adults fly very close to the ground, weak and irresolute, almost always in shadow. However, they visit both flowers and wet patches. Females were observed ovipositing on *Ventilago goughii* Gamble (Rhamnaceae), a rare climber in the southern Western Ghats. However, larvae reared in captivity at Bangalore, also accepted the flowers of *Cassia fistula* L. (Fabaceae). Usual *Eurema* type eggs were laid in batches on the upper sides of the leaves. A detailed description of the life history of this subspe-

cies will appear in the Pieridae volume of the junior author (Gaonka, in press).

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