

A REVISION OF *CHOASPES XANTHOPOGON* (KOLLAR)
WITH DESCRIPTION OF A NEW SUBSPECIES,
C. X. CHRYSOPTERUS
(LEPIDOPTERA: HESPERIIDAE)

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Yu-Feng Hsu (1988) A revision of *Choaspes xanthopogon* (Kollar) with description of a new subspecies, *C. x. chrysopterus*. *Bull. Inst. Zool., Academia Sinica* 27(4): 235-244. This paper revises the four subspecies of *Choaspes xanthopogon* (Kollar). Among them, one is described as a new subspecies from Taiwan, and two are revised from *C. estrella* de Jong. Based on the geographical distribution of this species, an evidence to support the existence of the land bridge between the Philippines, Taiwan and the Asiatic Mainland can be concluded.

Key words: *Choaspes xanthopogon*, Land bridge.

Choaspes xanthopogon (Kollar 1844), a larger skipper, has hitherto been regarded as a continental species in the past. In the summer of 1986, the author found a new subspecies from Lala mountain, Taoyuan Prefecture, Taiwan. More materials have been collected from the same region since then and hence more information on the subspecies has been accumulated. On the other hand, the Philippine races, *C. estrella* de Jong, 1980 and *C. estrella pallens* Schröder & Treadaway, 1986 can be treated as subspecific level of *C. xanthopogon* according to its morphologies of male genitalia. Although they seem different from *C. xanthopogon* in appearance, the diversified appearance is a common phenomenon in *Choaspes* species. Evans (1949) stated that *C. hemixanthus* is composed of "4 very different sub-species with similar genitalia." In fact, according to his accounts to the other *Choaspes* species, all of the species of *Choaspes* are of the

correspondence with this statement. So in this paper the taxa of *xanthopogon*, *estrella*, *pallens*, and the newly found subspecies are regarded as a polytypic species.

MATERIALS AND METHODS

The eggs of the new subspecies were collected from the jungle of Mt. Lala, and brought to the laboratory of the Department of Plant Pathology & Entomology, National Taiwan University. Rearing was conducted in an uncontrolled laboratory temperatures. Eggs were put into small plastic cases; hatched larvae were reared in 9.0×6.3×3.9 cm plastic cases with an abundant supply of the leaves of the hostplant (*Sabia transarisanens*); pupae were left in the case to emerge. Of the insects from the Philippines and the Asiatic Mainland, the dried adult specimens were examined and compared with the Taiwanese materials.

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SYSTEMATIC ACCOUNTS

Choaspes xanthopogon (Kollar, 1844)

Hesperia xanthopogon Kollar, 1844: 453, pl. XVIII, figs. 1-2. Type-locality: Himalaya.

Choaspes similis Evans, 1932: 321.

Choaspes xanthopogon (Kollar); Evans, 1949: 76, pl. 2, fig. A. 5.4; Kawazoé, 1976: 7, fig. 8; Sakaguti, 1981: 236, pl. 59, fig. 4; Pinratana, 1985: 24, pl. 8, fig. 28.

Choaspes estrella de Jong, 1980: 263-267. Abb. 1-4.

Choaspes estrella pallens Schröder & Treadaway, 1986: 349-351. Abb. 1.

♂ forewing length: 22.0-27.0 mm

Male—Head: Antenna black; apiculus bent-over, reaches beyond 1/2 of the costa of the forewing. Labial palpus densely covered with orange hairs, and ventrally mixed with a few black hairs; II segment erect, stout; III porrect, far slender than II. Compound eyes hairy. Thorax and abdomen: Dorsal side covered with greenish brown hairs; but yellow to orange along ventral line. Mid tibia with one pair of apical spines. Hind tibia with one pair of apical and one pair of subapical spines, and bears an erectile long hair tuft fitting into a thoracic pouch. Forewing: Upperside ground colour uniform brown to dark brown; steely or not, covered with yellow to green basal hairs. Underside ground colour green to bluish green but gray at the bottom. Cilia brown. Mid cell almost equal to dorsum. Hindwing: Upperside similar in the ground colour and the basal hairs to forewing, but yellow to orange along the anal angle. A blackish band or some blackish spots exist at the outer half. Underside yellow to orange at tornal area. Four black spots present this area; two in cell Cu_1 , two in cell Cu_2 . A grayish black 'tongue' in cell 2A, connected with Cu_2 black spots. Cilia same colour as the adjacent wing-portion. Tornus lobed or tailed. Male genitalia: Dorsum narrow; a membranous area at the middle portion of fenestrula. Valva oblong; harpe well-developed, with numerous obvious sclerotic teeth and forming a clasp at the

hind tip of valva; sacculus wide, entirely connected with harpe; ampulla weak. Numerous long trichomes exist on the surface of outside of valva and dorsal side of uncus.

♀ forewing length: 20.0-28.0 mm.

Female—Similar in the body to the male; however, surface covered with bluish gray instead of greenish brown. Hind tibia lacking hair tuft. Wings: Upperside ground colour brown to black or steely black with blue or steely blue basal hairs. Underside similar to the male; however, ground colour bluer or greener than the male.

Choaspes xanthopogon is distributed in the Asiatic Mainland, Taiwan, and the Philippines. One mainland and three insular subspecies have been recognized.

Key to the subspecies of *Choaspes xanthopogon* (Kollar)

1. Hindwing tornal area orange, tornus lobed. 2
- Hindwing tornal area yellow tornus tailed. 3
2. ♂ upperside wing not steely. M_2 located at the middle between M_1 and M_3
..... *C. xanthopogon xanthopogon*
- ♂ upperside wing steely. M_2 near M_1 at the base.
..... *C. xanthopogon chrysopterus* subsp. nov.
3. Yellow tornal area well-developed, reaching centre of the hindwing.
..... *C. xanthopogon estrella*
- Yellow tornal area limited by anal angle
..... *C. xanthopogon pallens*

Choaspes xanthopogon xanthopogon (Kollar, 1844)

(Figs. 1-2)

Forewing length: 24.3-25.0 mm

♂ wing: Upperside ground colour uniform brown with green basal hairs. Underside green; tornal area orange, in the area outer black spot in cell Cu_2 against Cu_2 . Tornus lobed. ♀ wing: Similar to the male, but upperside ground colour black with blue

basal hairs. Early stages unknown. Hostplant unknown.

Specimen examined: 1 ♂, labeled 'Naga Hill, 5500' Assam, India/Gen. No. 67199' in Kawazoé's Collection, Japan.

Distribution: W. China, Kashmir, Nepal, Sikkim, Assam, N. India and N. Thailand.

Choaspes xanthopogon chrysopterus
subsp. nov.

(Figs. 3-6, 16-23)

Forewing length: 20.0-22.0 mm.

This new taxon is very similar to the preceding taxon, but can be separated with following points:

- 1) ♂ upperside wing obviously steely.
- 2) M_2 obviously nearer to M_1 at the base, not located at the middle between M_1 and M_3 .

Early stages: The egg measures 1.10 ± 0.02 mm in diameter and 0.79 ± 0.02 mm in height. Almost hemispherical in shape; about 30-35 vertical ridges on the surface and many minute horizontal-arranged linear substance between the ridges. Ground colour yellowish, and becoming grayish white before hatching. Usually laid on the underside of the hostplant leaf, particularly on leaf edge; rarely on the upperside of leaf or on shoot. The larva is cylinder, but tapers slightly towards both ends. Just after hatching, it is pale yellowish brown in color. Later on, the ground color of body becomes darker and darker with its growth. Finally it changes into black with a series of yellow bullet-shaped dorsal spots and two series of white elliptical sub-dorsal spots. The larva's skull is of the same color as its body at first, and becomes orange with six black spots on the surface when the larva grows up. Spiracle is black. Total term of larval stages gives five instars. The width of skull from the first instar to the 5th instar is 0.69 ± 0.01 mm ($n=22$); 1.07 ± 0.04 mm ($n=18$); 1.73 ± 0.07 mm ($n=17$); 2.82 ± 0.09 mm ($n=11$); 4.15 ± 0.17 mm ($n=10$) respectively. According to these data, skull growth approximately follo-

ws Dyar's rule (1890), and can be described by this equation: $\ln y = -0.8263 + 0.4557 x$; $r = 0.9993$. From the first instar onwards, the larva hinds itself in a nest. The size of nest varies according to the stages of the larva. Young larva cuts from the margin of leaf by two directions, and makes a triangular nest. Grown-up larva cuts across one side of the leaf from the margin to the midrib, and then binds both margins of the leaf to make a bag-shaped nest. The nest usually possesses several cavities at the top. The pupa measures about 25.0 mm in length. Body is almost cylinder but tapers towards caudal end. An obvious projection is at the head and several black spots arrange on the wing and abdomen. White wax-like substances scatter on the surface of body. It resembles that of *C. benjaminii*, but body is far slender and black spots much more developed. Hostplant is *Sabia transari-sanens* Hayata (Fig. 15), an endemic plant of Taiwan. Li (1977) described that this plant exists in forests and thickets from about 1550-3300 m altitude.

Natural enemies: During the rearing, two natural enemies were observed. On the one hand, many eggs were parasitized by *Trichogramma* (Trichogrammatidae). The colour of these eggs changed into gray, and a number of trichogrammatid adults emerged from the eggs. On the other hand, a fatal bacteria disease infected most of the larvae. These larvae ceased feeding and diapause to die.

Holotype: 1 ♂, TAIWAN, Taoyuan, Mt. Lala, 1500-1700 m, emerged on 12 October 1986. Yu-Feng Hsu leg. Stock no. NTUIM-2003.

Paratype: 1 ♀, same locality as holotype, emerged on 12 August 1987. Yu-Feng Hsu leg. Stock no. NTUIM-2004.

Distribution: Taiwan.

Type materials deposit in the Insect Museum, Department of Plant Pathology & Entomology, National Taiwan University.

Choaspes xanthopogon estrella
de Jong, 1980

(Figs. 7-10)

Forewing length: 25.4-26.7 mm.

♂ wing: Upperside ground colour uniform brown; but paler than the preceding two taxa, with green to yellowish brown basal hairs. Underside ground colour bluish green; tornal area yellow, in the area outer black spot in cell Cu_2 not against Cu_2 . Tornus lobed. ♀ wing: Upperside ground colour dark brown, with pallid blue basal hairs. Underside ground colour green.

According to the following points, this taxon is treated as a subspecies of *C. xanthopogon* in this paper.

1) ♂ genitalia of *estrella* is similar to that of *xanthopogon* in structure.

2) The diversified appearance is a common phenomenon in subspecific level of *Choaspes* species.

3) The preceding two taxa and this taxon are allopatric each other.

Early stages unknown. Hostplant unknown.

Specimens examined: 1 ♂, labeled 'Mt. St. Tomas, Luzon, 29-III-1976, Coll. Otani' in Kawazoé's Collection, Japan. 1 ♂ genitalia, labeled 'Mt. St. Tomas, N. Luzon, Aug. 1976.'

Distribution: Luzon, the Philippines.

Choaspes xanthopogon pallens Schröder &
Treadaway, 1986

Forewing length: 25.0-28.0 mm.

This taxon is similar to subsp. *estrella*, but ground colour of the wings is paler and yellow tornal area is not as developed as that of *estrella*; only limited anal angle nearby. Early stages unknown. Hostplant unknown.

Specimen examined: Unfortunately the author cannot examine any actual material of this taxon, nevertheless Schröder & Treadaway (1986) supplies enough information to regard the taxon as a good subspecies of *C. xanthopogon*.

Distribution: Negros & Leyte, the Philippines

DISCUSSION

According to the shape of hindwing tornus, the 4 taxa can be divided into 2 subgroups. Subgroup I is of orange lobed hindwing tornus, and composed of *x. xanthopogon* and *x. chrysopterus* (subsp. nov.); group II is of yellow tailed hindwing tornus, and composed of *x. estrella* and *x. pallens*. There are lots of evidence to support that the Philippines were connected with the Asiatic Mainland and Taiwan in Tertiary, Cenozoic Era. and the flora and fauna could

Figs. 1-14. Subspecies of *Choaspes xanthopogon* (Kollar) 1-2: *C. xanthopogon xanthopogon* (Kollar). 1. ♂, upperside; 2. Ditto, underside. 3-6: *C. xanthopogon chrysopterus* subsp. nov. 3. Holotype ♂, upperside; 4. Ditto, underside; 5. Paratype ♀, upperside; 6. Ditto, underside. 7-10: *C. xanthopogon estrella* (de Jong) 7. ♂, upperside; 8. Ditto, underside; 9. Paratypes ♀, upperside; 10. Ditto, underside. 11-14: *C. xanthopogon pallens* (Schröder & Treadaway). 11. Holotype ♂, upperside; 12. Ditto, underside; 13. Paratype ♀, underside; 14. Ditto, underside.

Fig. 15. *Sabia transarisanens* Hayata, the hostplant of *C. xanthopogon chrysopterus* subsp. nov.

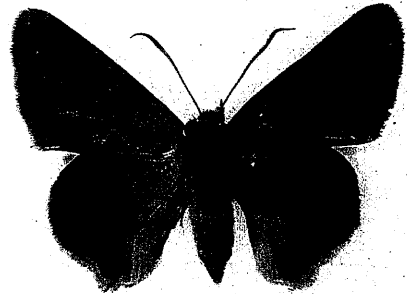
Figs. 16-23. Early stages of *C. xanthopogon chrysopterus* subsp. nov. 16. Ovum; 17. Egg shell; 18. 1st instar larva; 19. 4th instar larva; 19. 5th instar larva (mature larva). 21-23. Pupa. 21. Lateral view; 22. Dorsal view; 23. Ventral view.

Figs. 24-25. The location of M_2 . 24. That of subsp. *xanthopogon* (Kollar); 25. That of *chrysopterus* subsp. nov.

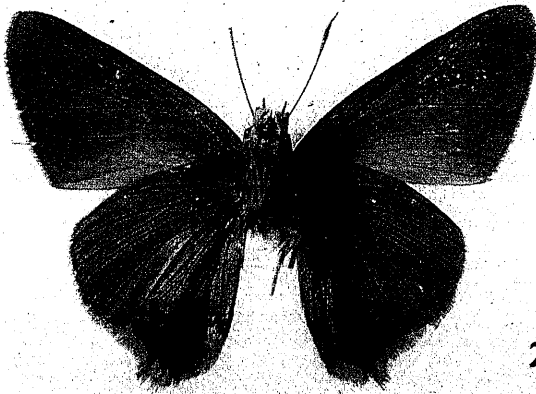
* Data for figs. 9-14., 9-10. THE PHILIPPINES, N. LUZON, Mt. St. Tomas, 25 February 1978. R. Lumawig leg. 11-12. THE PHILIPPINES, NEGROS IS., Valencia, Malabo, 3 August 1984. R. Lumawig leg. 13-14. THE PHILIPPINES, LEYTE, Mabaplag, Balocaue, 600 m, 11 May 1986. Th. Borrromeo leg. The six figures are photographed by Mr. T. Treadaway.



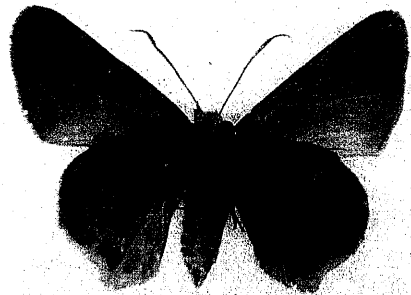
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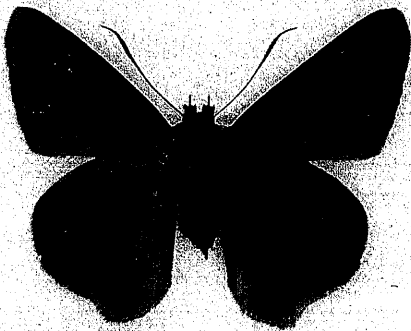
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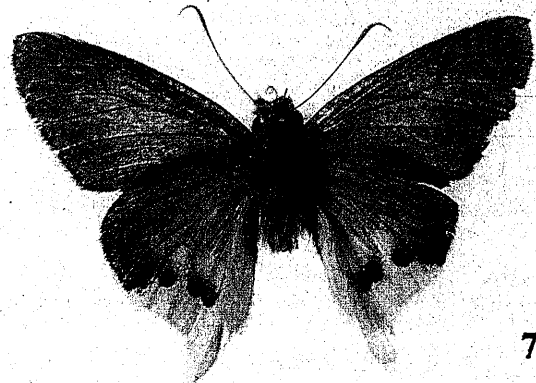
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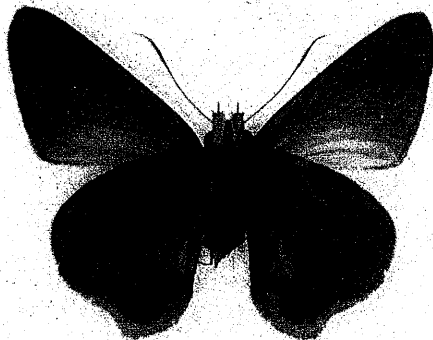
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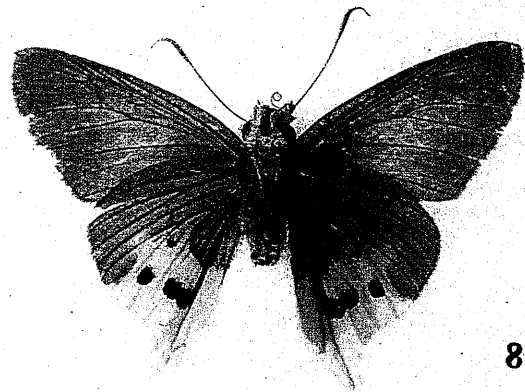
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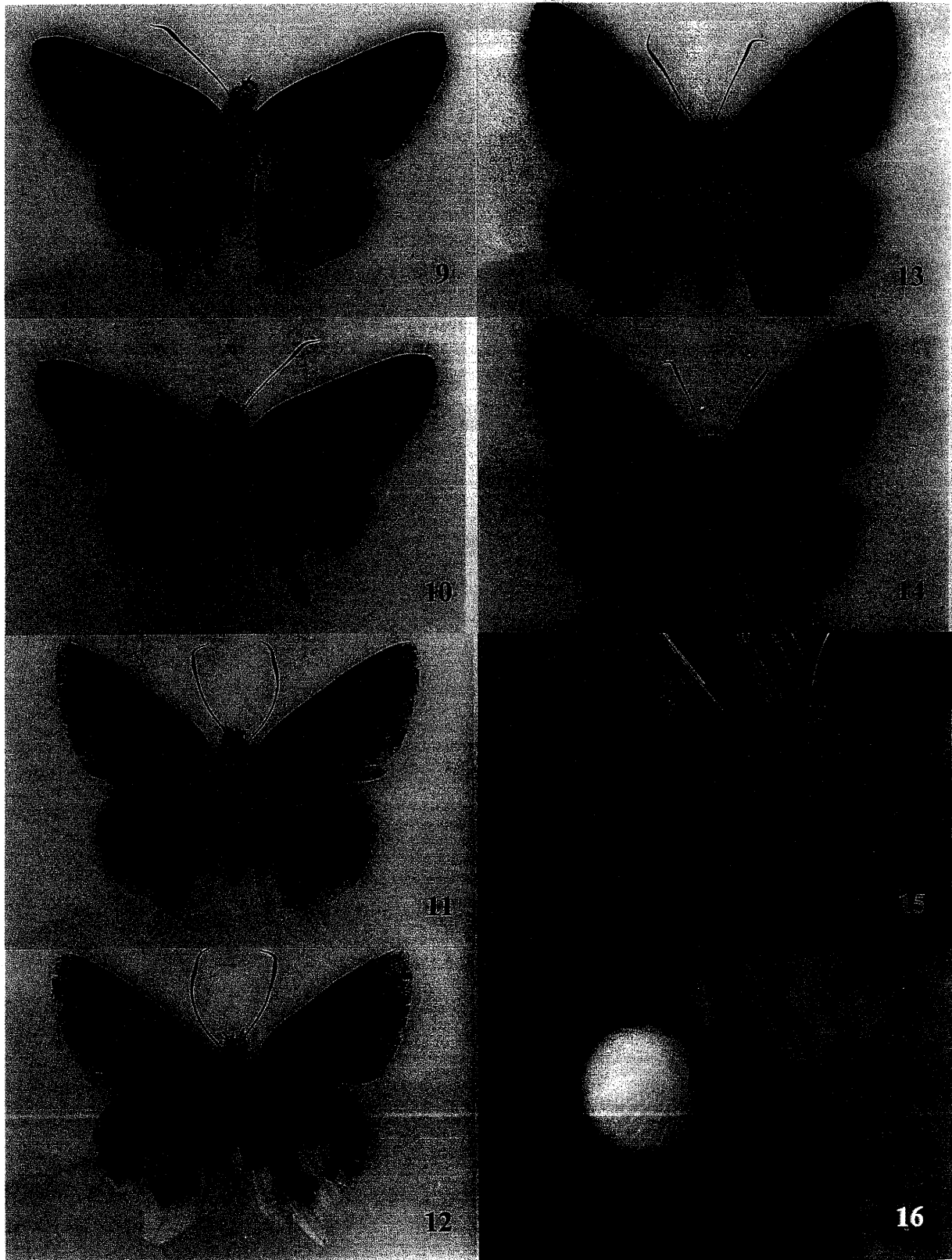
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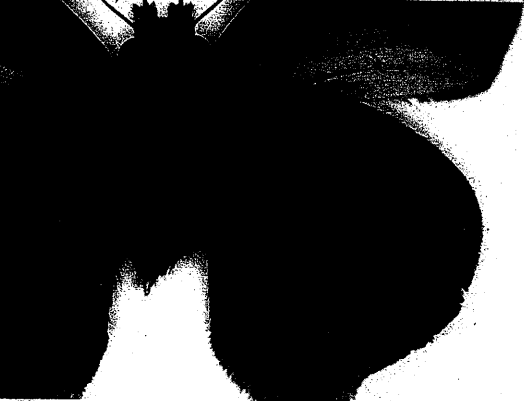
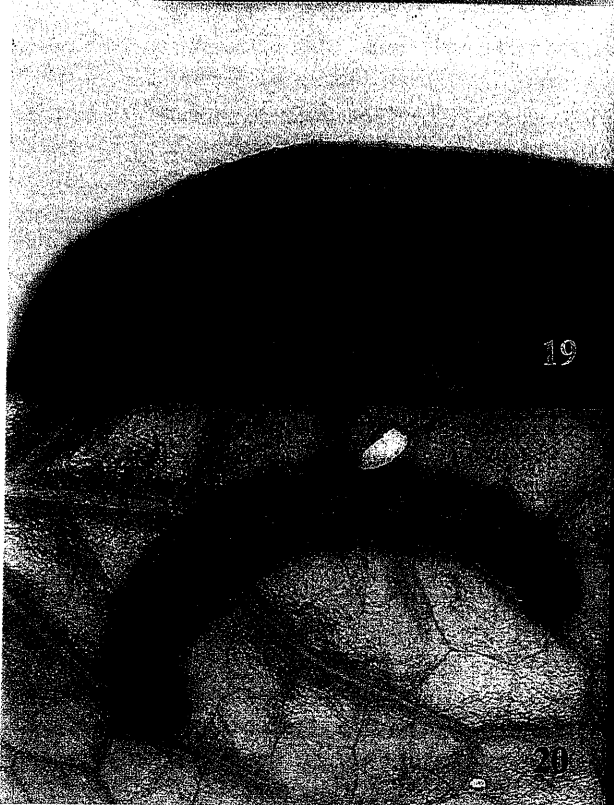
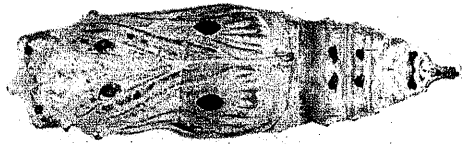
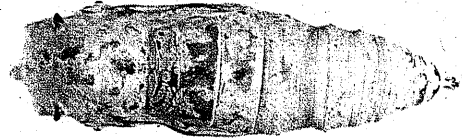
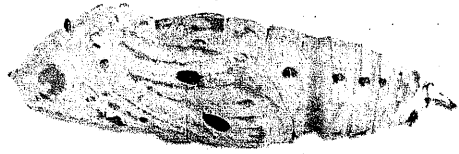
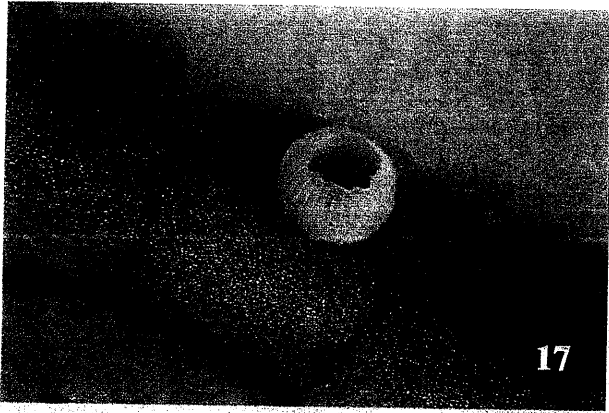


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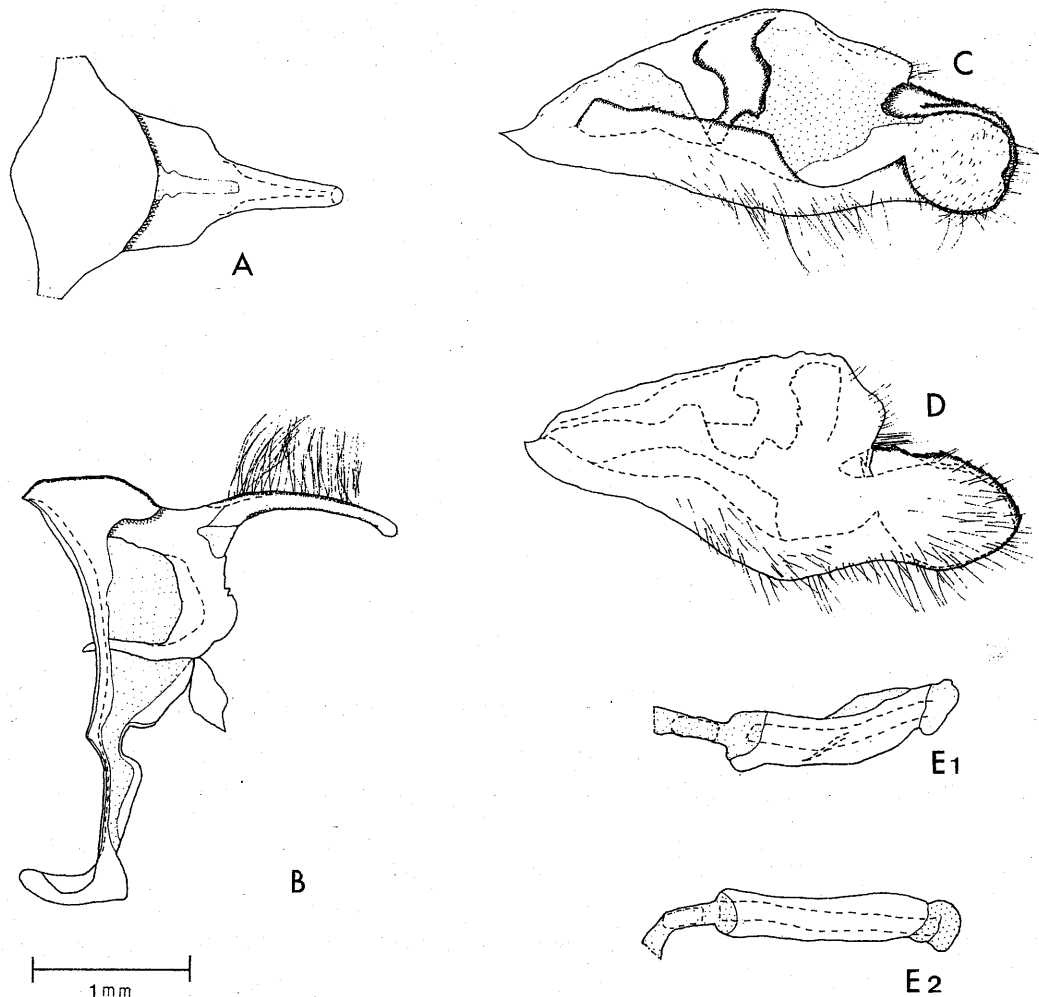


Fig. 26. ♂ genitalia of *C. xanthopogon*, based on which of *chrysopterus* subsp. nov. A, Dorsum; B, Ring & Juxta; C, Right valva; D, Left valva; E1 & E2, Phallus.

enter the Philippines by way of Taiwan from the Asiatic Mainland (Merrill, 1926; Dickerson, 1928; Jumalon, 1969). The divergence between group I and group II occurred after the disappearance of land bridge between the Old Philippine District and the Old Asiatic Mainland-Taiwan District. Further divergence in group I and in Group II occurred in the later period while advanced separation arose in the districts. Then the original population divided into the 4 homogeneous subspecies level populations as seen today (Fig. 27), and the two Philippine subspecies of *C. xanthopogon* are relic elements. The 4 populations are undoubtful

stepping toward speciation.

The hostplant of the new subspecies, *Choaspes xanthopogon chrysopterus*, is *Sabia transarisanens* Hayata. It is intriguing that this subspecies utilizes this Taiwanese endemic plant as its larval host. It would be interesting to know the evolution of those *Sabia* spp. and whether the other three subspecies utilize different closely related endemic plants as their larval hosts in their own habitats. There may exist a coevolutionary relationship between the insect and its larval hostplant.

Acknowledgements: The author is deeply

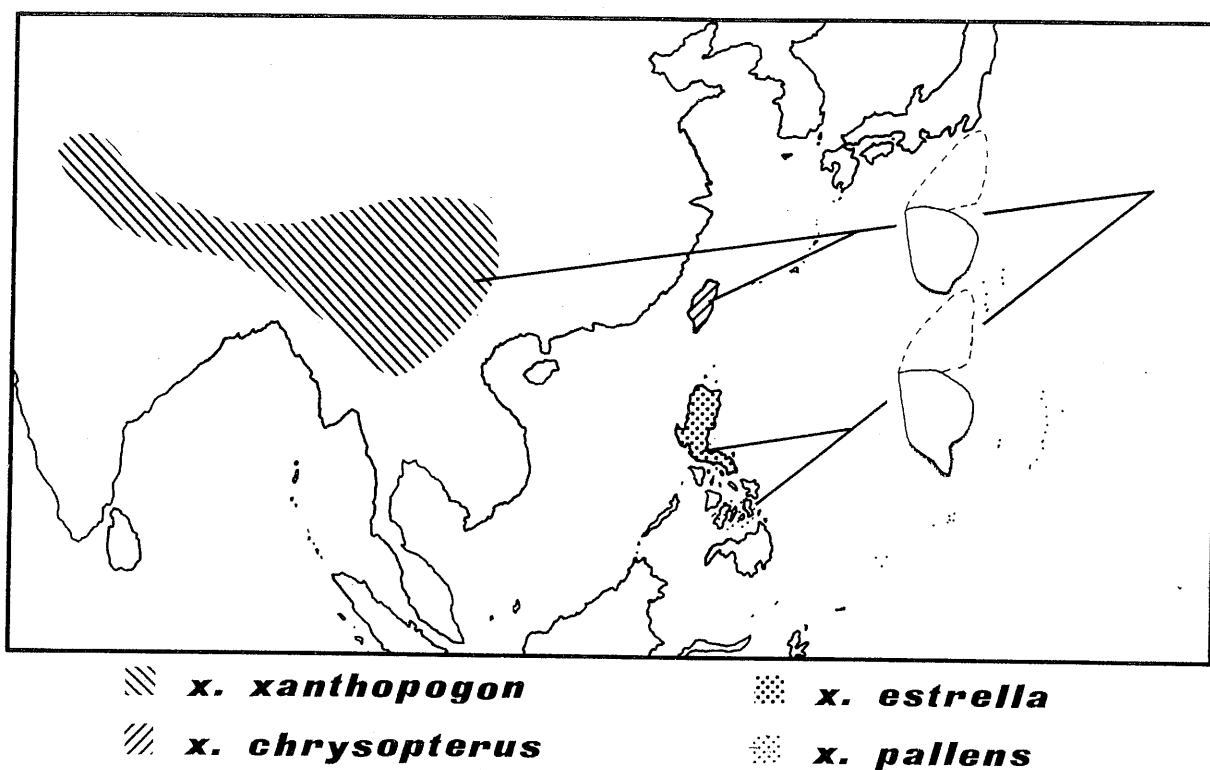


Fig. 27. Distribution map.

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記褐翅綠弄蝶 *Choaspes xanthopogon* 的一新亞種

徐 堉 峰

本文描述褐翅綠弄蝶 *Choaspes xanthopogon* Kollar 的四亞種，其中包括臺灣的一新亞種 *C. x. chrysopterus*。並指出這一種昆蟲的分布狀態可提供證明以支持新生代 (Cenozoic) 的第三紀 (Tertiary) 時，中國大陸、臺灣、菲律賓之間有陸橋存在的說法。