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A Revision of the Old World Species of the Genus *Eurema* HÜBNER (Lepidoptera, Pieridae)

Part IV. Description of the *hecabe* Group (part)

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Abstract Redescriptions are given at species- and subspecies levels for the *hecabe* groups (5 species) in the subgenus *Terias*. Each a new subspecies of *simulatrix* and *blanda* is described from Babi Is. off the south-eastern coast of Simeulue (Mentawai Archipelago) and from Palau Is., respectively. The following aspects of each recognized species and subspecies are presented: current combination, synonymy, diagnosis, external features, male and female genitalia, variation (seasonal and geographical), type material examined, material studied, taxonomic remarks, relationship, distribution, habitat, habits, early stages; adults of every recognized taxon, and male and female genitalia of every species are illustrated.

Contents

The *hecabe* group

Eurema simulatrix (STAUDINGER, 1891)

[Pls. 5–10]

Terias simulatrix STAUDINGER, 1891: 253, t. XLI, figs. 7, 8, ♂, 9, ♀. (Mindanao)
Terias tecmessa DE NICÉVILLE, 1895: 498, ♂. (Sumatra)
Terias grandis MOORE, 1907: 67. (Khasia Hills)

Diagnosis: Upperside of male wings lemon yellow in ground color; black distal border on forewing upperside more deeply excavated in space 2 than in space 3; forewing underside with two cell spots, the distal one of which large and prominently zigzag-shaped; sex-brand brown, long and narrow, ending slightly before origin of

vein 2; distal margin of hindwing evenly rounded; phallus sinuated in the middle.

Description: Male. *Upperside*: Ground color pale lemon yellow. Forewing black costal border usually broad and indistinct with its inner margin sharply defined; black distal border generally broad, with its inner edge irregular from costa to vein 4, more or less angled in the midway, right- to obtuse-angled at vein 4, more deeply excavated in space 2 than in space 3; black basal border undeveloped; discocellular spot absent; fringe black. Hindwing black distal border generally broad, tapering near apex and tornus, with its inner edge moderately defined, zigzag-shaped or waved; anal border undeveloped; fringe usually black. Only the bases of both wings blackish. *Underside*: Ground color almost the same as on upperside, not black dusted. On forewing dark brown subapical patch usually well developed and partially confluent with marginal black smudge; two spots in discoidal cell, distal one of which large and prominently zigzag-shaped; discocellular marking represented by an irregular slender ring, covering more than half of the discocellular vein, often accompanying a minute spot at base of space 6; tornal spot absent; sex-brand brown in various degrees, long and narrow, usually ending slightly before origin of vein 2; small vein-dots usually conjointed with black anticiliary line; fringe black mixed with yellow. Hindwing with a series of submarginal spots in spaces 1a to 8 usually faint, arranged in an irregular zigzag-line, and a submarginal spot in spaces 7 and 8 comma-shaped and directed to midway between submarginal spots and discocellular spot; circular subbasal spot present each in spaces 1b+c and 7 and in the middle of discoidal cell, always 8-shaped or represented by two minute circular spots in space 1b+c and sometimes so in space 7 and the middle of discoidal cell; a minute basal spot sometimes present in space 8; discocellular spot almost same as in forewing, but larger; faint black dots usually appearing at marginal middle point of each space in addition to vein-dots. Ultraviolet reflectance on upperside: Almost absorbed, appearing entirely black or dark gray in UV-photos (Pl. 35 (1, upper)).

Forewing somewhat rounded at apex; distal margin slightly convex. Hindwing slightly arched in the basal half of costal margin; distal margin evenly rounded; vein 7 free from cell; *mdc* somewhat less than half length of *ldc*. Antenna somewhat less than half the length of forewing, black and white-checkered, except on the postero-dorsal surface and a few apical segments, club cylindrical. Thorax and abdomen yellow, much darkened above, clothed with black and yellow hairs on thorax and base of abdomen; a black longitudinal line appearing along the lateral margin of abdominal terga.

Forewing length: 19.5–26.5 mm.

Female. Similar to male, but differing as follows. Ground color pale greenish yellow, and on underside somewhat paler. Forewing upperside with black distal border broader, especially in hindwing, with its inner edge more diffused; basal portion of forewing more extensively black dusted.

Forewing length: 19.0–26.0 mm.

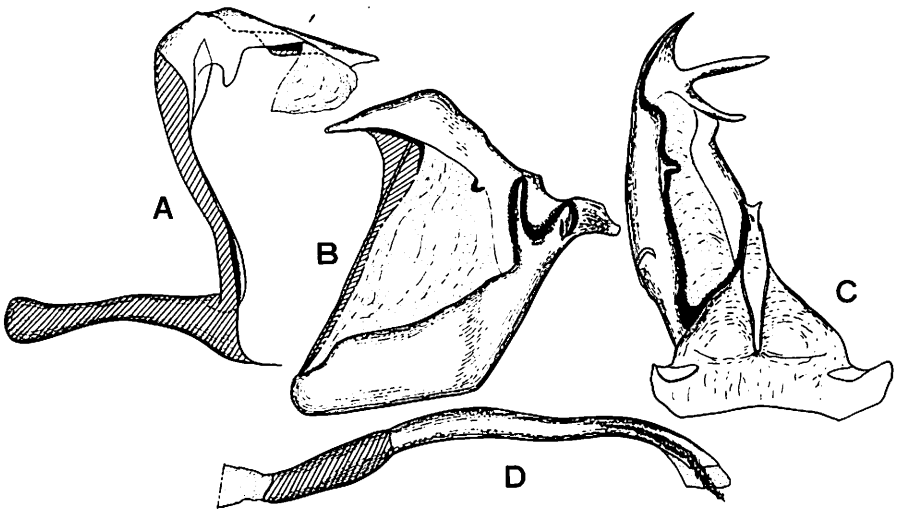


Fig. 1. Male genitalia of *Eurema simulatrix simulatrix* (STAUDINGER, 1891) from Mindanao. A: Ring (lateral). B: Valva (inner aspect of right-hand). C: Dorsum and valva (dorsal). D: Phallus (lateral).

Male genitalia (Fig. 1): Tegumen broad, triangular in dorsal aspect, somewhat concaved dorsomedially, entirely sclerotized; Valvenansatz short, usually producing downwards; vinculum not strongly arched; saccus moderately long (0.68–0.82 of ring height), angle between vinculum and saccus 80–90°. Uncus usually very short (dorsum proper 0.46–0.69 of ring height), extending somewhat downwards; uncal projection short (0.08–0.09 of ring height), projecting posteriorly, with its apex bicuspid. Valva almost as long as high; P1 weakly produced, projecting laterally, with its blunt apex; P2 only weakly produced; P3 broad and irregularly serrate; P4 represented by two processes, distal process larger than proximal one and sickle-shaped, and proximal one slightly sinuate. Phallus moderately long, slender, arched dorsally and somewhat sinuate in the middle, subzonal sheath less than 1/3 length of phallus. Juxta weakly sclerotized, consisting of a pair of broad pouches producing a short and slender median stalk.

Female genitalia (Fig. 2): Seventh abdominal sternum with nearly straight posterior margin. Lateral hollow elliptical with ventral eaves long and very deep, median groove moderately long, having a distinct eaves and situated ventral 1/2 of lateral hollow. Genital plate moderately invaginated anterodorsally; longitudinal groove weakly sclerotized, narrow and parallel sided; banks of longitudinal groove undeveloped. V-shaped wall weakly developed, straight in ventral aspect, shallow, weakly sclerotized, not forming a narrow slit anteriorly. Ostium bursae opening at the anterior end of the genital plate and exposed. Ductus bursae almost as long as cervix bursae, somewhat thick, and membranous but weakly sclerotized on anterior

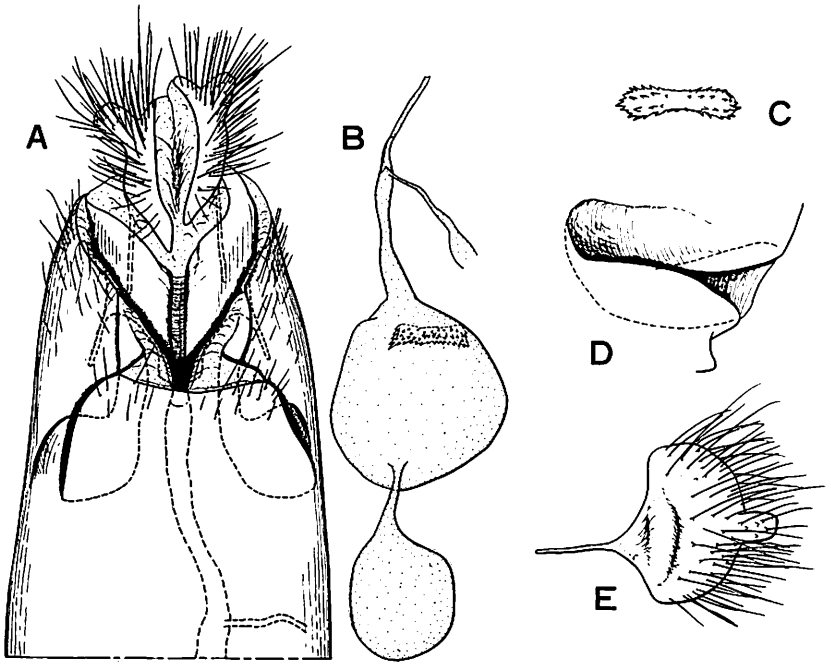


Fig. 2. Female genitalia of *Eurema simulatrix simulatrix* (STAUDINGER, 1891) from the Malay Peninsula. A: Female genitalia (ventral). B: Bursa copulatrix (ventral). C: Signum (anterior). D: Lateral hollow (lateral). E: Papilla analis (lateral).

1/3. Signum large, with many spines. Eighth abdominal tergum longitudinally very short; apophysis anterioris nearly straight, slightly longer than apophysis posterioris, with a prominent protuberance at the dorsal margin of proximal portion. Papilla analis elongate, bearing a somewhat long lobe and swollen bare-region.

Variation: This species is considerably variable geographically, especially in the developmental degrees of black distal borders of upperside and in that of subapical patch on forewing underside. The seasonal polyphenism of this species seems to be weakly marked in the populations from Indonesia to Khasi Hills.

Relationship: This species is most closely related to *irena* and these two form a monophyletic group, with which *blanda-senegalensis-floricola-alitha-halmaherana-hecabe* is united.

Distribution: This species is distributed from Mindanao across Sundaland and Indo-China to Khasi Hills.

Habitat and habits: This butterfly mainly inhabits lowland forests, and it is sometimes commonly found in forest edges or paths through forests. The abundance of adults differs considerably throughout its range; sometimes common in Malaysia, Mindanao, etc., but generally rather rare. In most localities the females are extremely rare. The males often congregate at moist spots on the roadside and river

banks. The flight is fairly swift for the genus *Eurema*. This species is multivoltine, and it seems to be found flying all the year round in the subtropical and tropical regions.

Early stages: The early stages are unknown.

Eurema simulatrix simulatrix (STAUDINGER, 1891)

Terias simulatrix STAUDINGER, 1891: 253, t. XLI, figs. 7, 8, ♂, 9, ♀. (Mindanao) [untraced]
Terias blanda simulatrix STAUDINGER; FRUHSTORFER, 1910: 169.
Eurema simulatrix simulatrix (STAUDINGER); CORBET & PENDLEBURY, 1932: 168.
Terias simulatrix simulatrix STAUDINGER; TALBOT, 1935: 567.

The nominate subspecies from Mindanao is characterized by the following combination of characters.

Male (Pl. 5 (1–2)). *Upperside*: Forewing black costal and distal borders generally broad; fringe black. Hindwing black distal border broad, with its inner edge zigzag-shaped or waved; fringe black, but sometimes mixed with yellow. *Underside*: Forewing dark brown subapical patch well developed and partially confluent with marginal black smudge. **Female** (Pl. 5 (3–4)). Similar to male of the same species, but differing as follows. *Upperside*: Ground color pale greenish yellow; black distal borders slightly broader, with its inner edge more diffused. *Underside*: Ground color somewhat paler; markings fainter.

Forewing length: Male, 23.0–26.5 mm (n=7, avg=24.3 mm), female, 26.0 mm.

Material studied: MINDANAO: Capatagan (1100 m), 1 ♂, 27. xi. 1969 (HIURA), 1 ♂ (PUSTA); Upper Baroreng-Capatagan (1100 m), 1 ♂, 1–2. xii. 1969 (MIYATAKE); Mt. Apo, Todaya (700 m), 1 ♂, 28. xi. 1969 (HIURA); Mt. Apo, Luver Varolin (550–650 m), 1 ♀, 28. xi. 1969 (PUSTA) [OMNH]; Masara, 6–8. ii. 1972 (A. MIYATA) [KUCGE]. SAMAR: Rawis, 3 ♂, 1. vi. 1975 [KUCGE]. BAZILAN: Maloong, 1 ♂, 12. x. 1981 (K. KUWASHIMA) [KUFA].

Distribution: This subspecies is confined to Mindanao and Samar in its distribution.

Eurema simulatrix tecmessa (DE NICÉVILLE, 1895)

Terias tecmessa DE NICÉVILLE, 1895: 498, ♂. (Sumatra) [untraced]
Terias blanda simulatrix STAUDINGER; FRUHSTORFER, 1910: 169.
Eurema simulatrix simulatrix (STAUDINGER); CORBET & PENDLEBURY, 1932: 168.
Terias simulatrix simulatrix STAUDINGER; TALBOT, 1935: 567.

This subspecies is distinguishable from the nominate subsp. *simulatrix* from Mindanao by the following combination of characters.

Male (Pl. 5 (5–6)). *Underside*: Forewing dark brown subapical patch more strongly developed and often almost confluent with marginal black smudge, forming

large, quadrate dark brown covering the whole of apical area. **Female** (Pl. 5 (7–8)). *Upperside*: Black distal borders broader, with its inner edge more sharply defined. *Underside*: Markings more strongly developed and subapical patch almost confluent with marginal black smudge, forming large, quadrate dark brown covering the whole of apical area.

Forewing length: Male, 22.0–24.5 mm (n=12, avg=23.5 mm), female, 19.0–26.0 mm (n=7, avg=23.1 mm).

Material studied: MALAY PENINSULA: Cameron Highland, 3♂, 25–28. ii. 1970 (S. SUZUKI) [MUFA], 2♂, i. 1973, 1♂, 1. v. 1973; Tanjong, Rambutan, 1♂, 11. viii. 1963 (TAN MIN HWA); Kg. Sahom, 2♀, i-ii. 1973 (NAKAYAMA) [KUCGE]. SINGAPORE: 2♂, 21. iv. 1969; Lambong, 1♂, 17. iv. 1969; Neesoon, 1♂1♀, 19. iv. 1969; Kluang-Mersing, 1♀, 14. iv. 1969 (G. NISHIMURA) [KUCGE]. SUMATRA: Padang, 1♂ (NISHIYAMA) [KUCGE]. BORNEO: N. Borneo, Sabah, Hot Spring, 1♂, 14. viii. 1968 [OMNH]; Seplot, 1♂, 25. viii. 1968 (G. IMADATE) [NSA]; S. Borneo, Kalimantan, 1♂, xi. 1980 (NISHIYAMA) [KUCGE].

Distribution: Widely distributed from the Malay Peninsula, Borneo, Sumatra and Java.

Eurema simulatrix sarinoides (FRUHSTORFER, 1910)

Terias hecabe grandis f. *sarinoides* FRUHSTORFER, 1910: 167. (dry f.). Holotype ♂. (N. Thailand) [BMNH, examined]
Terias lacteola sarinoides EVANS (nec FRUHSTORFER) 1932: 78. (part.)
Eurema simulatrix tecmessa f. *stockleyi* CORBET & PENDLEBURY, 1932: 167. [BMNH, Type ♂, examined]
Terias simulatrix tecmessa f. *stockleyi* TALBOT; CORBET & PENDLEBURY, 1939: 533.

This subspecies is distinguishable from the nominate subsp. *simulatrix* from Mindanao by the following combination of characters.

Male (Pl. 6 (1–6)). *Underside*: Ground color generally paler, sometimes greenish yellow; forewing black distal border narrower, especially below vein 2; hindwing black distal border much narrower, with its inner edge more distinctly zigzag-shaped. *Underside*: Most markings generally larger and clear; forewing dark brown subapical patch more strongly developed and often almost confluent with marginal black smudge, forming large, quadrate dark brown covering the whole of apical area.

Forewing length: Male, 21.0–23.0 mm (n=4, avg=22.0 mm).

Type material examined: *Terias hecabe grandis* f. *sarinoides* was described from an unstated number of specimens from Thailand by FRUHSTORFER. This holotype seems to be selected by A. S. CORBET and G. TALBOT from FRUHSTORFER's collection (7. xi. 1939). The holotype is now in the BMNH and bears the following labels; 'Type H T (red)/Siam, Hinlap, Januar, H. Fruhstorfer/Fruhstorfer Coll., B. M. 1937–285./selected as type of sarinoides Fruhs. by A. S. C. and G. T., 7. xi. 1939, there being no specimen so labeled in Coll Fruhstorfer'.

Terias simulatrix tecmessa f. *stockleyi* was described from a single male from Burma by CORBET and PENDLEBURY. The holotype is now in the BMNH and bears the following labels; 'Burma:, Up. Tenasserim, Taok Plateau, 3000ft. 5. 1. 1924, Maj. C.H. Stockley/Brit. Mus., 1924-325/♂ type of Terias stockleyii, Corbet'.

Material studied. THAILAND: N. Thai, Pactonchai, 3♂, 29. xi-6. xii. 1963; Doi Steep, 1♂, 29. iii. 1958 [KUCGE]

Distribution: This race seems to be distributed from N. Thailand across Burma to Sikkim.

Eurema simulatrix inouei SHIRÔZU & YATA, 1973

Eurema simulatrix inouei SHIRÔZU & YATA, 1973: 128-129. Holotype ♂. (S. Viet-Nam) [KUCGE, examined]

This subspecies is distinguishable from the nominate subsp. *simulatrix* from Mindanao by the following combination of characters.

Male (Pl. 6 (7-8)). *Upperside*: Ground color sometimes paler; forewing black distal border narrower, especially on hindwing. *Underside*: Forewing subapical patch usually much reduced and barely traceable.

Forewing length: Male, 20.0-23.0 mm (n=8, avg=22.3 mm).

Type materials examined: *Eurema simulatrix inouei* was described from male specimens by SHIRÔZU & YATA. The holotype is now in KUCGE and bears the following labels; 'S. Viet-Nam, Dinh Quan, 25. iii. 1962, S. Inoue leg./Eurema simulatrix inouei Shirôzu & Yata, 1973, Holotype ♂ (red)'. The KUCGE also possesses 6 males, bearing similar data labels 'Dihn Quan, 1♂, 3. iv. 1960, 1♂, 25. iii. 1962, 2♂, 1. vii. 1962; Col de Blao, 1♂, 7. x. 1962; Cambodia, Kampot, Tuk Chhou, 1♂, 17. vi. 1962 (Paratype (orange))'.

Material studied: THAILAND: 4♂ [DBA]

Distribution: This subspecies is distributed in South Viet-Nam, Cambodia and C. Thailand.

Eurema simulatrix grandis (MOORE, 1907)

Terias grandis MOORE, 1907: 67. LECTOTYPE ♂ (Khasia Hills) here designated. (part) [BMNH, examined]
Terias hecabe grandis FRUHSTORFER, 1910: 169. (Sikkim)

This subspecies is distinguishable from the nominate subsp. *simulatrix* from Mindanao by the following combination of characters.

Male (Pl. 7 (1-2, 5-6). *Upperside*: Ground color lemon yellow; forewing black distal border with its inner edge below 1b inclined towards tornus and not completely touching basal margin. *Underside*: Most markings much fainter distally and subapic-

al patch completely disappearing. **Female** (Pl. 7 (3–4, 7–8)). *Upperside*: Black distal borders somewhat broader, with its inner edge more sharply defined and on hindwing more strongly zigzag-shaped. *Underside*: Most markings much fainter distally and subapical patch barely traceable.

Forewing length: Male, 22.0–24.0 mm (n=5, avg=23.3 mm), female, 26.0 mm.

Type material examined: *Terias grandis* was described from an unstated number of male and female specimens from 'Khasi Hills' by MOORE. The BMNH now possesses a male and a female specimens. But, the female one is undoubtedly *Eurema blanda*. The male specimen bears the labels: 'Type (red)/Khasia Hills./Coll Moore. 94–67./grandis, ♂ Wet, Moore (Type)/572.1' In addition the male bears the following labels; 'Lectotype (purple)/Terias grandis Moore LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Material studied: Assam, Khasii Hill, 5♂1♀ (NAKAYAMA) [KUCGE]

Distribution: This race is confined to Khasi Hills in its distribution range.

Eurema simulatrix littorea MORISHITA, 1968

Eurema simulatrix littorea MORISHITA, 1968: 66. Holotype ♂. (Langkawi Is.) [NSM, examined]

This subspecies is distinguishable from the nominate subsp. *simulatrix* from Mindanao by the following combination of characters.

Male (Pl. 8 (1–4)). *Upperside*: Black distal borders usually somewhat narrower. *Underside*: Most markings smaller and fainter, particularly on hindwing submarginal spots usually barely traceable except for spot in space 7. Forewing dark brown subapical patch usually reduced, rarely almost traceable, while marginal black smudge more strongly developed.

Forewing length: Male, 22.0–24.5 mm (n=4, avg=23.5 mm).

Type material examined: *Eurema simulatrix littorea* was described from male specimens by MORISHITA. The holotype is now in NSM and bears the following labels; 'Lnagkawi Is., 12. v. 1966, K. Morishita leg./Eurema simulatrix littorea Morishita, 1968, Holotype ♂ (red)'. The KMNH also possesses 9 males, bearing similar data labels (Paratype (orange))'.

Material studied: West Malaysia, Langkawi Is., 3♂, 4–8. v. 1974 (NAKAYAMA) [KUCGE].

Distribution: This race is confined to Langkawi Is. in its distribution range.

Eurema simulatrix kolleri CORBET & PENDLEBURY, 1932

Eurema simulatrix kolleri CORBET & PENDLEBURY, 1932: 167. Holotype ♂. (Senggora, Java) [BMNH, examined]

Terias simulatrix kolleri TALBOT; CORBET & PENDLEBURY, 1935: 567.

Eurema simulatrix kolleri f. *javanica* CORBET & PENDLEBURY, 1932: 167. (Senggora, E. Java) [BMNH,

Holotype ♂, examined]

I have seen only three specimens of this race. According to the original description and to the photograph of type-materials preserved in the British Museum (N. H.), this subspecies seems to be distinguished from the nominate subsp. *simulatrix* from Mindanao by the narrower black distal borders which are less deeply excavated in spaces 2 and 3 on forewing, and the fainter markings on hindwing underside (Pls. 8 (5–6), 9 (1–2)). However, f. *javanica* also described by CORBET & PENDLEBURY (1932) from the mountains of East Java is apparently similar to ssp. *tecmessa* (Pl. 8 (7–8)).

Forewing length: Male, 24.0–24.5 mm (n=3, avg=24.3 mm).

Type material examined: *Eurema simulatrix kolleri* was described from a single male by CORBET and PENDLEBURY. This holotype is now in the BMNH and bears the following labels; 'Type (red)/Senggoro, Zuider Gab., Res Pasoeroear, Java, A. Koller. '99./P. I. Lathy., 1909–245./♂ type of Terias kolleri Corbet'

Eurema simulatrix kolleri f. *javanica* was described from several male specimens by CORBET & PENDLEBURY. The holotype ♂ is now in the BMNH and bears the following labels; 'Type (red)/Ongop-Ongop, 5000 ft, March 1916, Banjoewange/ Brit. Mus. 1934–80./Eurema simulatrix kolleri f. javanica Cor. & Pend., H. M. Pendlebury, det TYPE 1932'.

Materials studied: Java, Palabuan, 1♂, 1892 (H. FRUHSTORFER) [RNH].

Distribution: This race is restricted in Java in its distribution range.

Eurema simulatrix princesae MORISHITA, 1973

Eurema simulatrix princesae MORISHITA, 1973: 100–101. Holotype ♂ (Palawan). [Y. HONDA Coll., not examined]

This subspecies is distinguishable from the nominate subsp. *simulatrix* from Mindanao by the following combination of characters.

Male (Pl. 9 (3–4)). *Upperside*: Black distal borders slightly narrower. *Underside*: Most markings much fainter distally and subapical patch completely disappearing; forewing marginal veindots never conjointed with black anticiliary line. **Female**. *Upperside*: Forewing black distal border with its inner edge more sharply defined. *Underside*: Most markings much fainter and subapical patch barely traceable.

Forewing length: Male, 19.5–24.0 mm (n=3, avg=22.3 mm).

Holotype: Taot-Daram, Palawan, 1. viii. 1968 (Y. HONDA)

Material studied: PALAWAN: Balsahan, 1♂, 24. xii. 1970, 1♂, 11. i. 1971 (MIYATA) [KUCGE]. CUYO IS.: 1♂ (NISHIYAMA) [KUCGE].

Distribution: This race is restricted in Palawan and Cuyo Is. in its distribution range.

Eurema simulatrix babiensis YATA, ssp. nov.

This subspecies is distinguishable from the nominate subsp. *simulatrix* from Mindanao by the following combination of characters.

Male (Pl. 9 (5–8)). *Upperside*: Ground color greenish yellow; forewing black costal border narrower; black distal border much narrower and almost uniform, with its inner edge diffusely zigzag-shaped from costa to vein 4 and very shallowly excavated in spaces 2 and 3; hindwing black distal border much narrower with its inner edge more distinctly waved; extreme bases of both wings less black dusted; fringe greenish yellow. *Underside*: Markings smaller and fainter; forewing subapical patch disappearing; marginal vein-dots not conjointed with anticiliary black line.

Female. Unknown.

Forewing length: Male, 20.0–25.0 mm (n=15, avg=22.9 mm).

Type-locality: Babi Is.

Distribution: This subspecies occurs in Babi and Simeulue Isls.

Holotype: ♂, Babi Is., 24. vi. 1984, (H. DETANI) [KUCGE].

Paratypes: 16♂, Babi Is. [KUCGE] [BMNH] [KMNH] (KMNH IR 100,321) [RNH] [NSM] [OMNH].

Material studied: BABI: 16♂ [KUCGE]. SIMEULUE: 1♂, iii. 1983, 2♂, 8, 19. vi. 1984 [KUCGE].

Remarks. This unique subspecies most closely resembles *Eurema simulatrix princesae* from Palawan, but can be easily distinguishable from the latter by the much narrower forewing black distal border, with its inner edge distinctly zigzag-shaped from costa to vein 4 (except three specimens from Simeulue Is.) and very shallowly excavated in spaces 2 and 3, and by the greenish yellow fringe on hindwing upperside.

I found a male specimen of *simulatrix* from Nias (6. iv. 1977, (KASHIWAI) [KUCGE] in the collection of Kyushu University (KUCGE) (Pl. 10 (1–2)). This specimen is somewhat similar to subsp. *princesae* from Palawan rather than to subsp. *babiensis*, but can be distinguishable from the former by the greenish yellow ground color on upperside, the rather distinct hindwing submarginal spots, especially those in spaces 5 to 7, and the absence of subbasal spot in space 7. Judging from such characteristics of markings and its curious distribution, there is a possibility that the population from Nias may constitute one subspecies endemic to this island. Having no additional specimens from Nias, however, I cannot determine the subspecific name for it. I tentatively treat it as subsp. *babiensis* in the present paper.

Eurema irena CORBET & PENDLEBURY, 1932

[Pl. 10 (3–8)]

Eurema simulatrix irena CORBET & PENDLEBURY, 1932: 168. Holotype ♀ (Boekoera, C. Celebes)

[BMNH, examined]
Terias simulatrix irena TALBOT; CORBET & PENDLEBURY, 1935: 567.

Diagnosis: Forewing length more than 24.0 mm. Upperside of male wings yellow in ground color; black distal border on forewing upperside right- to acute-angled at vein 4, equally excavated in spaces 2 and 3 with each bottom of concavities almost straight; hindwing black distal border with its inner edge strongly zigzag-shaped; forewing underside with two cell spots, the distal one of which large and prominently zigzag-shaped; underside markings bright brown with reddish tinge and fairly diffused.

Description: Male (Pl. 10 (3–4). *Upperside*: Ground color yellow. Forewing black costal border barely traceable; black distal border broad, with its inner edge irregular from costa to vein 4, more or less angled near vein 6, right- to obtuse-angled sharply at vein 4, equally excavated in spaces 2 and 3 with each bottom of concavities almost straight, inclined towards tornus; black basal border undeveloped; discocellular spot absent; fringe black. Hindwing black distal border narrow, tapering near apex and tornus, with its inner edge, sharply defined, strongly zigzag-shaped, slightly projected along veins 6 and 7; anal border undeveloped; fringe black. Only the bases of both wings blackish, not diffused. *Underside*: Ground color almost same as on upperside, not black dusted. Most markings bright brown with reddish tinge, large and somewhat diffused. On forewing brown subapical patch usually well developed but never confluent with marginal brown smudge; two spots in discoidal cell, distal one of which large and prominently zigzag-shaped; discocellular marking represented by an irregular slender ring, covering more than half of the discocellular vein, expanded distally in its anterior half, often accompanying a minute spot at base of space 6; tornal spot absent; sex-brand brown with salmon pink tinge, long and narrow, ending slightly before origin of vein 2; vein-dots conjointed with black anticiliary line; fringe black mixed with yellow. Hindwing with a series of submarginal spots in spaces 1a to 8 developed, arranged in an irregular zigzag-line, and a submarginal spot in spaces 7 and 8 comma-shaped and directed to midway between submarginal spots and discocellular spot; circular subbasal spot well marked each in spaces 1b+c and 7 and in the middle of discoidal cell, always 8-shaped in space 1b+c and sometimes so in space 7 and the middle of discoidal cell; a minute basal spot well marked in space 8; discocellular spot almost same as in forewing, but larger and not so strongly expanded distally; small vein-dots present. Ultraviolet reflectance on upperside: Almost absorbed, appearing entirely black or dark gray in UV-photos (Pl. 35 (2, upper)).

Forewing somewhat angulate at apex; distal margin slightly convex. Hindwing slightly arched in the basal half of costal margin; distal margin evenly rounded; vein 7 free from cell; *mdc* somewhat less than half length of *ldc*. Antenna somewhat less than half the length of forewing, black and white-checkered, except on the postero-

dorsal surface and a few apical segments, club cylindrical. Thorax and abdomen yellow, much darkened above, clothed with black hairs mixed with yellow ones on thorax and base of abdomen.

Forewing length: 24.0–28.0 mm (n=7, avg=25.9 mm).

Female (Pl. 10 (5–8)). Similar to male, but differing as follows. Ground color pale yellow, and on underside somewhat darker. Forewing upperside with black distal border broader, with its inner edge more acutely angled at vein 4 and 6; hindwing black distal border narrower; basal portion of both wings less extensively black dusted. Underside markings larger and darker; subapical brown patch almost confluent with marginal brown smudge.

Forewing length: 29.0–29.5 mm (n=2, avg=29.3 mm).

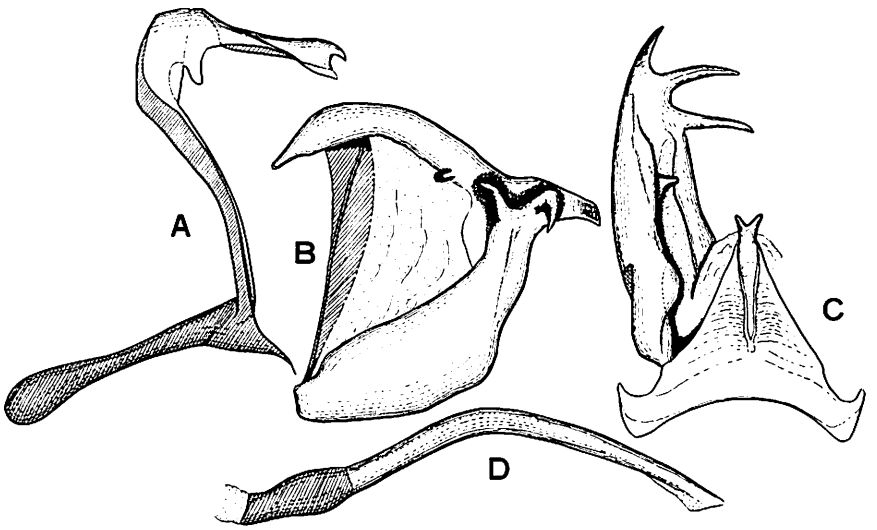


Fig. 3. Male genitalia of *Eurema irena* CORBET & PENDLEBURY, 1932 from C. Sulawesi. A: Ring (lateral). B: Valva (inner aspect of right-hand). C: Dorsum and valva (dorsal). D: Phallus (lateral).

Male genitalia (Fig. 3): Tegumen broad, triangular in dorsal aspect, somewhat concaved dorsomedially, entirely sclerotized; Valvenansatz short, usually producing downwards; vinculum not strongly arched; saccus moderately long (0.75 of ring height), angle between vinculum and saccus about 90°. Uncus very short (dorsum proper 0.53 of ring height), extending somewhat downwards; uncal projection short (0.08 of ring height), projecting postero-ventrally, with its apex bicuspid. Valva almost as long as high; P1 weakly produced, projecting laterally, with its blunt apex; P2 absent; P3 elongate and triangular; P4 represented by two processes, distal process longer than proximal one and sickle-shaped. Phallus moderately long,

slender, arched dorsally, subzonal sheath less than 1/4 length of phallus. Juxta weakly sclerotized, consisting of a pair of broad pouches producing a short and slender median stalk.

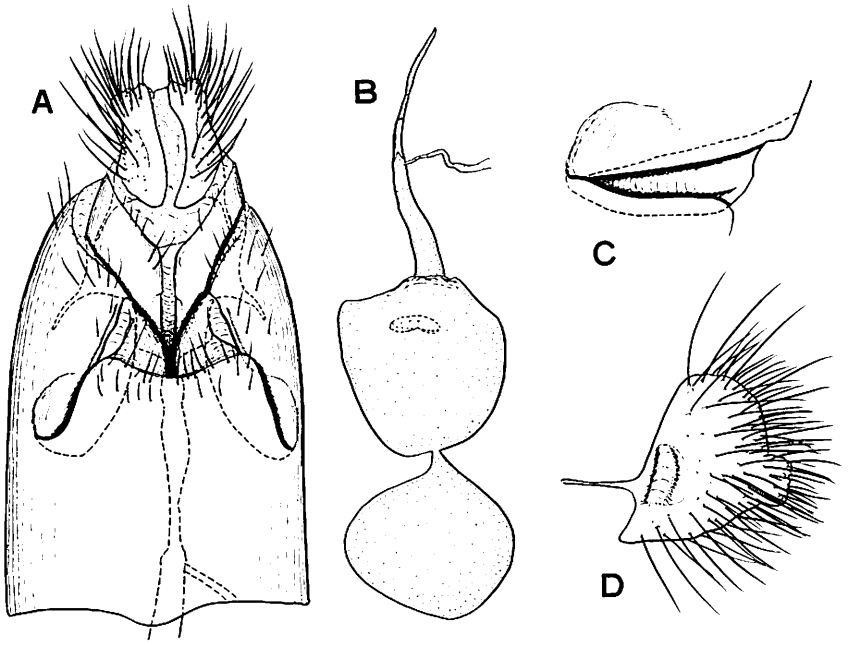


Fig. 4. Female genitalia of *Eurema irena* CORBET & PENDLEBURY, 1932 from C. Sulawesi. A: Female genitalia (ventral). B: Bursa copulatrix (ventral). C: Lateral hollow (lateral). D: Papilla analis (lateral).

Female genitalia (Fig. 4): Seventh abdominal sternum with nearly straight posterior margin. Lateral hollow elliptical with ventral eaves long and very deep, median groove moderately long, having a distinct eaves and situated ventral 1/2 of lateral hollow. Genital plate moderately invaginated anterodorsally; longitudinal groove weakly sclerotized, narrow and parallel-sided; banks of longitudinal groove undeveloped. V-shaped wall weakly developed, straight in ventral aspect, shallow, weakly sclerotized, not forming a narrow slit anteriorly. Ostium bursae opening at the anterior end of the genital plate and exposed. Ductus bursae almost as long as cervix bursae, somewhat thick, and membranous but weakly sclerotized on anterior 1/3. Signum small, with many spines. Eighth abdominal tergum longitudinally very short; apophysis anterioris nearly straight, slightly longer than apophysis posterioris, with a prominent protuberance at the dorsal margin of proximal portion. Papilla analis elongate, bearing a somewhat long lobe and swollen bare-region.

Taxonomic remark: *Eurema irena* was originally described by CORBET and PENDLEBURY from central Sulawesi as a subspecies of *E. simulatrix*. *Eurema irena* is indeed very similar to *E. simulatrix* in its underside markings of both wings. However, after carefully examining the male and female genitalia as well as the external features, I raise here *irena* to the specific rank for the first time.

Type material examined: *Eurema simulatrix irena* was described from only the female holotype from C. Sulawesi by CORBET and PENDLEBURY. The holotype is now in the BMNH and bears the following labels; 'Type (red)/Centr. Celebes: Boekoera. BM 1922–165./Boekoera/♀ Type of Terias irena, Corbet'.

Material studied: SULAWESI: C. Sulawesi, 1♂ [NSA], 5♂, xii. 1992 [KUCGE]; Palu, Lake Lindu, 1♂, 9. ii. 1982; Palopo, 1♀, 7. iii. 1978 [ET].

Relationship: This species is most closely related to *simulatrix* and these two form a monophyletic group, with which *blanda-senegalensis-floricola-alitha-halmaherana-hecabe* is united.

Distribution: This species is confined to Central Sulawesi.

Habitat and habits: The biological information on this butterfly is very scarce, but according to the labels of three specimens examined here, it seems to inhabit the mountain forests of C. Sulawesi.

Early stages: The early stages are unknown.

Eurema blanda (BOISDUVAL, 1836)

[Pls. 11–29]

Terias blanda BOISDUVAL, 1836: 672. (Batavia, Java)
Terias phanospila C. & R. FELDER, 1865: 209, ♂ (Java)
Terias silhetana WALLACE, 1867: 324, ♂. (Silhet, N. E. India)
Terias citrina MOORE, 1881: 119, pl. 45, figs. 4, 4a, ♀. (Ceylon)
Terias rotundalis MOORE, 1881: 120, pl. 46, figs. 1, 1a, ♂. (Ceylon)
Terias uniformis MOORE, 1881: 120, pl. 46, figs. 2, 2a, 2b, ♂♀. (Ceylon)
Terias laratensis BUTLER, 1883: 369, pl. 38, fig. 3, ♂. (Larat, Timor Laut)
Terias vallivolans BUTLER, 1883: 420, ♂. (Mindanao)
Terias biformis BUTLER, 1885: 196, ♂. (Amboina)
Terias heliophila BUTLER, 1885: 338, pl. 8, fig. 2. (Assam, Sikkim)
Terias moorei BUTLER, 1886: 216, pl. 5, fig. 1. (Camorta, Nicobars)
Terias templetoni BUTLER, 1886: 218 (Ceylon)
Terias hecabe var. 3, SNELLEN, 1892, pl. 2, figs. 12, 13, ♂.
Terias indecisa BUTLER, 1898: 78. (Batchian)
Terias davidsoni MOORE, 1906: 63, pl. 570, figs. 1, 1a (♂♀ types) (wet f.), 1b, 1c, ♂♀ (int. f.), d, e, ♂♀ (dry f.), f, g, ♂♀ (extr. dry f.) (Karwar, S. India)
Terias roepstorffi MOORE, 1907: 76, pl. 575, fig. 3, ♂. (Andamans)
Terias cadelli MOORE, 1907: 77, pl. 575, fig. 4, ♂. (Andamans)
Terias snelleni MOORE, 1907: 78. (Sumatra)
Terias norbana FRUHSTORFER, 1910: 171, t. 73h(4). (N. Celebes)
Terias grisea EVANS, 1932: 75. (S. Nicobars)

Diagnosis: Upperside of male wings lemon yellow in ground color; three cell spots on forewing underside; sex-brand pale salmon pink, long and narrow, ending slightly before origin of vein 2; distal margin of hindwing evenly rounded; P3 and distal process of P4 of valva serrate; V-shaped wall concaved in ventral aspect; lateral hollow large and almost rounded, with very small eaves of median groove.

Description: *Wet-season form.*—**Male.** *Upperside*: Ground color lemon yellow. Forewing black costal border usually narrow and indistinct with its inner margin somewhat diffuse; black distal border generally narrow, with its inner edge oblique and irregular from costa to vein 4, right- to obtuse angled at vein 4, equally excavated in spaces 2 and 3 or more deeply excavated in space 2 than in space 3; black basal border sometimes developed; discocellular spot absent; fringe black. Hindwing black border generally narrow, tapering near apex and tornus, with its inner edge moderately defined; anal border undeveloped; fringe black mixed with yellow, but sometimes entirely yellow. Only the extreme bases of both wings blackish. *Underside*: Ground color almost the same as on upperside, not black dusted. Forewing apical patch absent; three spots in discoidal cell, but basal one sometimes barely traceable; discocellular marking appearing by an irregular slender ring, covering more than half of the discocellular vein, often accompanying a minute triangular spot at base of space 6; tornal spot absent; sex-brand pale salmon pink, long and narrow, usually ending slightly before origin of vein 2; faint black dots appearing at marginal middle point of each space in addition to vein-dots; fringe yellow mixed with black. Hindwing with a series of submarginal spots in spaces 1a to 8 usually faint, arranged in an irregular zigzag-line, and a submarginal spot in spaces 7 and 8 comma-shaped and directed to midway between submarginal spots and discocellular spot; circular subbasal spot usually present each in spaces 1b+c and 7 and in the middle of discoidal cell, often 8-shaped in space 1b+c and in the middle of discoidal cell; a minute basal spot sometimes present in space 8; discocellular spot almost same as in forewing, but larger; small vein-dots as on forewing; fringe yellow. Ultraviolet reflectance on upperside: Almost absorbed, appearing entirely black or dark gray in UV-photos (Pl. 35 (3, upper)).

Forewing somewhat angulate at apex; distal margin slightly convex. Hindwing slightly arched in the basal half of costal margin; distal margin evenly rounded; vein 7 free from cell; *mdc* somewhat less than half length of *ldc*. Antenna somewhat less than half the length of forewing, black and white-checkered, except on the postero-dorsal surface and a few apical segments, club cylindrical. Thorax and abdomen yellow, much darkened above, clothed with black and yellow hairs on thorax and base of abdomen, a black longitudinal line appearing along the lateral margin of abdominal terga.

Forewing length: 17.5–28.0 mm.

Female. Similar to male, but differing as follows. Ground color pale lemon yellow, and on underside somewhat paler. Basal portion on upperside more heavily

and extensively black dusted. Forewing upperside with discocellular spot present or absent; black costal border broader, with its inner edge more strongly diffused; black distal border broader, with its inner edge more diffused, especially in hindwing. On underside tornal spot is absent.

Forewing length: 16.5–27.0 mm.

Dry-season form.—**Male & female.** *Upperside*: Forewing black distal border narrower and less deeply excavated than in the wet-season form, its inner edge sometimes regular; black costal border very narrow and often disappearing. Hindwing black distal border narrower than in the wet-season form and sometimes reduced to marginal vein-dots. *Underside*: Most markings more strongly developed, and usually tinged with brown in varied degrees; both wings sometimes heavily black dusted. On forewing subapical streak or patch appearing, sometimes with apical marginal smudge; tornal spot absent. Hindwing with submarginal streak in spaces 7 and 8 more strongly zigzag-shaped and almost contiguous with discocellular marking.

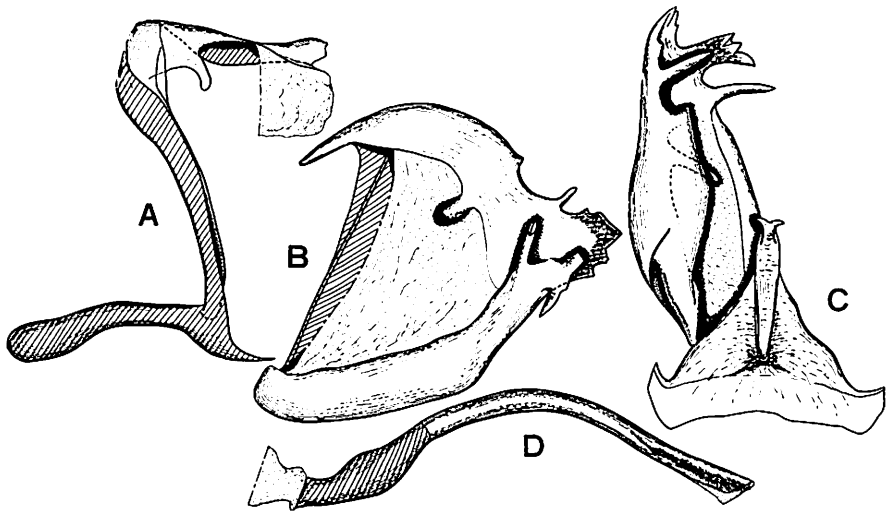


Fig. 5. Male genitalia of *Eurema blanda blanda* (BOISDUVAL, 1836) from Java. A: Ring (lateral). B: Valva (inner aspect of right-hand). C: Dorsum and valva (dorsal). D: Phallus (lateral).

Male genitalia (Fig. 5): Tegumen broad, triangular in dorsal aspect, somewhat concaved dorsomedially, entirely sclerotized; Valvenansatz short, usually producing downwards; vinculum not strongly arched; saccus somewhat short and thick (0.65–0.68 of ring height), angle between vinculum and saccus 80–90°. Uncus usually very short (dorsum proper 0.53–0.55 of ring height), extending somewhat downwards; uncal projection short (0.06–0.09 of ring height), projecting posterodor-

sally, usually somewhat swollen posteroventrally, with its apex bicuspid. Valva almost as long as high; P1 somewhat broader than P4, extending anteriorly, with its blunt apex; P2 long and slender; P3 broad and irregularly serrate; P4 represented by two processes, distal one of which is enlarged and ax-shaped, with its outer margin usually serrate. Phallus moderately long, slender and somewhat more strongly arched than in *hecabe* dorsally, subzonal sheath about as long as 1/3 length of phallus. Juxta weakly sclerotized, consisting of a pair of broad pouches producing a short and slender median stalk.

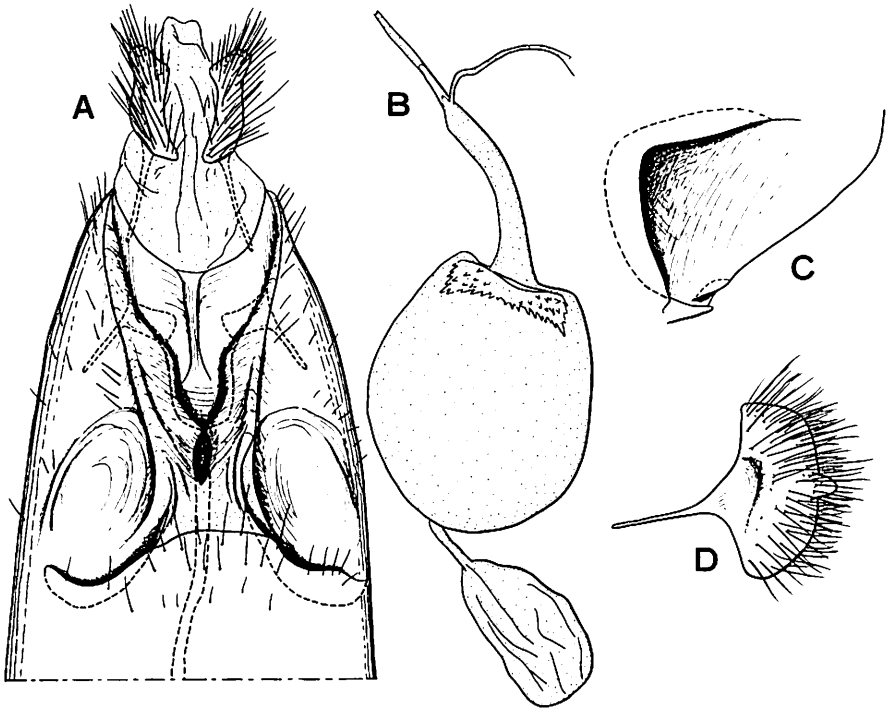


Fig. 6. Female genitalia of *Eurema blanda blanda* (BOISDUVAL, 1836) from Java. A: Female genitalia (ventral). B: Bursa copulatrix (ventral). C: Lateral hollow (lateral). D: Papilla analis (lateral).

Female genitalia (Fig. 6): Seventh abdominal sternum with slightly arched posterior margin. Lateral hollow large and almost rounded, well sclerotized entirely, with dorsoventral eaves rather long and moderately deep, median groove barely traceable, having a short and weak eaves and situated at ventral 1/3–1/5 of lateral hollow. Genital plate moderately invaginated anterodorsally; longitudinal groove well sclerotized, narrow and usually parallel sided, sometimes broadened posteriorly; banks of longitudinal groove weakly developed. V-shaped wall well developed,

weakly concaved in ventral aspect, deep, sclerotized, and almost continuous with 7th abdominal tergum, forming a narrow slit anteriorly. Ostium bursae opening at the anterior end of the genital plate and exposed. Ductus bursae somewhat shorter than cervix bursae, somewhat thick, and membranous but weakly sclerotized on anterior 1/3. Signum large, with many spines. Eighth abdominal tergum longitudinally somewhat broad; apophysis anterioris nearly straight, slightly longer than apophysis posterioris, with a prominent protuberance at the dorsal margin of proximal portion. Papilla analis elongate, bearing a somewhat long lobe and swollen bare-region.

Chromosome number: The haploid chromosome number is 25 in ssp. *arsakia* from Taiwan (MAEKI & AE, 1968).

Variation: This species is very variable geographically and seasonally next to *hecabe* in the Old World *Eurema*. The transcontinental cline from north to south found in *E. hecabe* may also be partly recognizable in the *blanda* populations from China to Indo-China. However, I have been unable to accumulate enough material from these areas, and so far the present I tentatively follow subspecific classification presented by CORBET & PENDLEBURY (1932).

The seasonal polyphenism of this species is sometimes strongly marked that the considerable number of forms (phenotypes) were considered to be distinct species. At higher latitudes, *e.g.* in Taiwan, two distinct seasonal forms, the summer and winter ones are recognizable, together with intermediate one. This species shows similar features of seasonal variation to those of the genus mentioned before, but variation in size is not so distinct.

Relationship: This species is most closely related to *hecabe-halmaherana-alitha-floricola-senegalensis*, and the two form a monophyletic group, with which *simulatrix-irena* is united.

Distribution: This species has the broadest range in the subgenus *Terias* next to *hecabe*; It is distributed almost all over the Oriental and Australian Regions.

Habitat and habits: This butterfly mainly inhabits lowland forests, but it is sometimes found in forest edges or open land. According to YOSHII (1979), it sometimes occurs in great abundance near *Albizia* plantation, and the adults often congregate in large numbers at moist spots on the roadside and river banks. The scale of the occurrence greatly fluctuates seasonally, because it seems to be correlated to sprouting of *Albizia*. The flight is fairly swift for the genus *Eurema*. This species is multivoltine, and is seen flying all the year round in the subtropical and tropical regions.

Early stages: The early stages have been described in detail by PIEPERS & SNELLEN (1909), BELL (1912–14), and TANAKA (1975), etc. Egg.—Similar to that of *hecabe* in general morphology. The eggs are laid in batch on young shoots and leaves. The larva is also similar to that of *hecabe* except for the blackened head. Gregarious throughout the larval stage. The larvae are often destructive pest of *Albizia* plantations in the Philippines and N. Borneo. The pupa is usually uniformly

blackish brown except for the tip of cephalic projection. Pupation takes place gregariously in row on a twig or along the midrib of a leaf. The larval foodplants: *Albizia falcataria* (YOSHII, 1979, N. Borneo; MORIMOTO & RAROS, 1977, Philippines), *A. Julibrissin,* (SONAN, 1922, Taiwan; KATO, 1994, Okinawa), *A. lebbek* (KATO, 1931, Taiwan), *A. Moluccana, Alstonia scholaris, Caesalpinia Bonduc* (PIEPERS & SNELLEN, 1909, Java), *C. globulorum* (FUKUDA *et al.*, 1972, Iriomote), *C. crista* (=*nuga*) (FUKUDA *et al.*, 1982, Iriomote), *Cassia fistula* ? (PIEPERS & SNELLEN, 1909, Java), *C.* sp., *Delonix* (=*Poinciana*) *regia* (BELL, 1912, India), *Macrotropis Sumatrana, Parkia* sp., *Pithecollobium Bigeminum* (PIEPERS & SNELLEN, 1909, Java), *P. lucidum* (TANAKA, 1975, Iriomote), *Sesbania grandiflora* (PIEPERS & SNELLEN, 1909, Java), *Wagatea spicata* (BELL, 1912, India) (Fabaceae).

Eurema blanda blanda (BOISDUVAL, 1836)

Terias blanda BOISDUVAL, 1836: 672. Holotype ♂ (Batavia, Java). [BMNH, examined]
Terias blanda snelleni (MOORE); FRUHSTORFER, 1910: 169. (Sumatra)
Terias blanda snelleni MOORE; DOUBLEDAY & SALVIN, 1921: 22. (Indo-China)
Eurema blanda snelleni (MOORE); CORBET & PENDLEBURY, 1932: 169, pl. 5, figs. 5, 6. (Sumatra)
Terias blanda blanda BOISDUVAL; TALBOT, 1939: 569.

The nominate subspecies *blanda* from Sundaland is characterized by the following combination of characters.

Wet-season form.—**Male** (Pl. 11 (1–4)). *Upperside*: Forewing black costal border very narrow and indistinct with its inner margin somewhat diffuse; black distal border generally narrow, with its inner edge usually right-angled at vein 4, not so deeply excavated in spaces 2 and 3, sometimes almost uniform; black basal border undeveloped; Hindwing black border very narrow, with its inner edge rather indistinct. *Underside*: Most markings rather indistinct. **Female** (Pl. 11 (5–6)). Basal portions on upperside not so heavily and extensively black dusted. Forewing upperside with black distal border rather narrow; basal border rarely developed.

Forewing length: Male, 17.5–25.0 mm (n=19, avg=22.4 mm), female, 21.0–25.0 mm (n=9, avg=23.7 mm).

Dry-season form.—**Male & female** (Pls. 11 (7–8), 8 (1–2)). *Upperside*: Forewing black distal border narrower and less deeply excavated than in the wet-season form, often its inner edge regular (Java); Hindwing black distal border very narrow, but not reduced to marginal vein-dots. *Underside*: Both wings not black dusted.

Forewing length: Male, 22.5–24.0 mm (n=5, avg=23.3 mm), female, 24.5–26.0 mm (n=3, avg=25.2 mm).

Type material examined: *Terias blanda* was described from a single male obtained by BOISDUVAL. This holotype is now in the BMNH and bears the following labels; 'Type H T (red)/ /Ex. Musaeo, Dris. Boisduval/Java/Blanda B sp.: Batavia/Ex Oberthür Coll. Brit. Mus. 1927-3'.

Material studied: JAVA: W. Java, 1♂1♀, 14–16. vi. 1966; Jakarta, 1♂1♀, 10–

14. iii. 1966, 1♂, 21. v. 1966 [NSA]; Soekaboemi, 1♂ (dry f.), 1919 (Dr. J. A. C.) [KUFA]; Tjibodas (1400 m alt.), 2♂ (dry f.), 6–8. viii. 1973, 1♀ (dry f.), 14. vi. 1973 (WAKABAYASHI) [KUCGE]; Cirebon, Mt. Tjemere (400–1400 m), 1♂1♀ (dry f.), 19–25. xi. 1973 (SHIMA) [KUCGE]; Banjuwansi, E. coast, 1♂, 23. iii. 1958 (P. JACOULET) [OMNH]. BALI: Sanur, 2♂, 7. iv. 1966, 14, 28. i. 1966 (IGARASHI) [IGARASHI coll.].

Distribution: Widely distributed from the Malay Peninsula, Borneo, Sumatra and Java.

Eurema blanda arsakia (FRUHSTORFER, 1910)

Terias blanda arsakia FRUHSTORFER, 1910: 169. LECTOTYPE ♂ (Taiwan) here designated. [BMNH, examined]
Terias blanda dry f. *aphaia* FRUHSTORFER, 1910: 169. part (♀). [BMNH, examined]
Terias blanda hobsoni TALBOT (nec BUTLER, 1889), 1924: 533, i.
Eurema blanda arsakia (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 170.

This race is similar to the nominate subsp. *blanda* from Java but is distinguished by the following combination of features.

Wet-season form.—**Male** (Pl. 12 (3–6)). Larger. *Upperside*: Ground color somewhat paler; black distal border narrower with its inner edge diffuse. **Female** (Pl. 12 (5–6)). *Upperside*: Ground color paler; black distal border broader especially in hindwing.

Forewing length: Male, 22.5–28.0 mm (n=19, avg=25.3 mm), female, 23.5–27.0 mm (n=4, avg=24.6 mm).

Dry-season form.—**Male & female** (Pls. 12 (7–8), 13 (1–4)). *Upperside*: Black distal border usually narrow and sometimes reduced to marginal vein-dots in hindwing. *Underside*: Both wings more heavily black dusted.

Forewing length: Male, 23.0–27.0 mm (n=10, avg=25.3 mm), female, 23.5–26.5 mm (n=5, avg=24.9 mm).

Type material examined: *Terias blanda arsakia* was described from an unstated number of male and female specimens from 'Taiwan' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/Formosa, Fruhstorfer/3–15 vii OS/CHIP. CHIP/blanda arsakia Fruhst./Fruhstorfer Coll., B.M. 1937–285.' In addition the male bears the following labels; 'Lectotype (purple)/Terias blanda arsakia Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype. The female specimen bears similar data labels (6–15 vii OS), and in addition the following labels; 'Paralectotype (blue)/ Terias blanda arsakia Fruhstorfer PARALECTOTYPE det. O. Yata 1993'.

Material studied: TAIWAN: loc. unknown, 8♂, 1962; Puli (HORI), 1♀, vi. 1958, 3♂2♀ (dry f.), 24. i. 1971em. (Y. SHIN) [KUCGE]. JAPAN: Ryukyus. Ishigaki Is., 1♂ (dry f.), vi. 1924 (HIRAGAMA); Iriomote Is., 3♂, 21. vi. 1972, 1♀,

11. x. 1978 [KUCGE], 1 ♂ (dry f.), 12. iii. 1964 (KUROSAWA) [NSA], Outomi-Komi, 1 ♀, 31. viii. 1970 (MIYASHITA) [KUCGE].

Distribution: This subspecies is restricted to Taiwan and the Ryukyus (Ishigaki-jima, Iriomotejima, Yonagunijima, etc.).

Eurema blanda hylama CORBET & PENDLEBURY, 1932

Eurema blanda hylama CORBET & PENDLEBURY, 1932: 121, ♂♀. Holotype ♂ (Hainan). [BMNH, examined]

I have seen only three specimens including type specimens of this race. It is much similar to the nominate subsp. *blanda* from which it is hardly distinguished. According to the original description and to the type-materials, this subspecies seems to be distinguished by the following combination of features:

Dry-season form.—**Male** (Pl. 13 (5–6)). Larger. *Upperside*: Black distal borders slightly broader in forewing, while in hindwing slightly narrower. **Female** (Pl. 13 (7–8)). *Upperside*: Black distal border broader with its inner edge more diffuse in hindwing.

Forewing length: Male, 24.5 mm.

Type material examined: *Eurema blanda hylama* was described from a male and a female specimens by A. S. CORBET. The holotype male specimen is now in the BMNH and bears the following labels; 'Type (red)/Hainan, Crowley, Bequest., 1901–78/Hainan, Whitehead/hyrama, Corbet, ♂ type'. The BMNH possesses a female paratype, which bears the following data labels 'Type T (red)/41, 20. Hainan, Interior, April 1920, C.T. Bowring/hyrama, Corbet, ♂ type./Brit Mus., 1922–203.'.

Material studied: Hainan, Tinmaim 1 ♂, 14. iv. 1908 [KUCGE].

Distribution: This subspecies is restricted to Hainan in its distribution range.

Eurema blanda silhetana (WALLACE, 1867)

Terias silhetana WALLACE, 1867: 324, ♂. LECTOTYPE ♂ (Silhet, N. E. India) here designated. [BMNH, examined]
Eurema blanda silhetana (WALLACE); CORBET & PENDLEBURY, 1932: 172.
Terias blanda silhetana WALLACE; TALBOT, 1935: 567.

This race is similar to the nominate subsp. *blanda* from Java but is distinguished by the following combination of features.

Wet-season form.—**Male** (Pl. 14 (1–2)). Larger. *Upperside*: Forewing black distal border somewhat broader, more deeply excavated in spaces 2 and 3; hindwing black distal border usually broader. **Female** (Pl. 14 (3–4)). *Upperside*: Black distal borders much broader, with its inner edge more strongly zigzag-shaped.

Forewing length: Male, 20.0–26.0 mm (n=19, avg=24.4), female, 23.0–26.0 mm (n=6, avg=25.3).

Dry-season form.—**Male & female** (Pls. 14 (5–8), 15 (1–2)). *Upperside*: Forewing black distal border broader, especially near apex, more sharply and almost right-angled at vein 4; hindwing black distal border narrower and sometimes reduced to marginal vein-dots. *Underside*: Markings generally more strongly developed, especially on subapical patch which is often confluent with marginal black smudge; both wings usually more heavily black dusted.

Forewing length: Male, 21.0–25.5 mm (n=17, avg=23.7), female, 21.5–27.5 mm (n=7, avg=23.9)

Type material examined: *Terias silhetana* was described from an unstated number of specimens from 'Silhet' by WALLACE. The BMNH now possesses a male specimen. The male specimen bears the labels: 'Type (red)/♂ Silhet,/Terias silhetana (type) Wallace/Coll. Moore, 94–67./572, 2c'. In addition the male bears the following labels; 'Lectotype (purple)/Terias silhetana Wallace LECTOTYPE det. O. Yata 1993' and hereby designated lectotype'.

Material studied: NEPAL: E. Nepal, 2♂, 3–8. vii. 1963 (FUJIOKA), 7–8. viii. 1963 (HARADA) (FUJIOKA); Pokhara, 1♂ (dry f.), 28. xi.; Butwal Sone, 1♀ (dry f.), 7. xii.; Polhara-Hyangia (800–1000 m), 1♂, 8. ix. 1971 (SUGIMOTO); Pokahara-Saranlcot, 1♂, 30. xi. (SONE) [KUCGE]. BURMA: Maymyo, 1♂ (dry f.), 29. xi. 1942, 1♂, 26. xii. 1942 (MAKIHARA) [KUCGE]. ASSAM: Khasi Hill, 1♂1♀, 1♀ (dry f.), Rangapara, 2♂, 15. xii. 1970 (HASHIMOTO) [MUFA]. N. INDIA: Majitar Riv., 1♂, 22. ix. 1970 (GUNJI) [KUCGE]. W. PAKISTAN: Mymensing, 3♂ (dry f.), 6. xi. 1969 (ISHIHARA) [KUCGE]. THAILAND: Doi Step, 1♂ (dry f.), 23. ii. 1958; Chiangmai, 1♂ (dry f.), 14. xi. 1968 (SATO), 1♂ (dry f.). 1. i. 1958 (IKOMA); Yala, 1♂, Kao Yai, 1♂ [DBA]. S. VIET-NAM: Bobla, 1♀, 30. vi. 1962, 4♂, 5–10. vii. 1962; Trang Bom, 1♂, viii. 1961, 2♀, 17. xii. 1961, 2♂, 26. i. 1962, 1♀, 7. ii. 1962; Cap St. Jacques, 2♂, 28. i. 1962; Dinh Quan, 1♂, 19. vi. 1960, 1♂, 6. v. 1962; Dalat, 1♂, 15. i. 1962, 1♂, 28. viii. 1962 (S. INOUE) [KUCGE].

Distribution: This subspecies is widely distributed from Indo-China to North India.

Eurema blanda davidsoni (MOORE, 1906)

Terias davidsoni MOORE, 1906: 63, pl. 570, figs. 1, 1a (♂♀ types) (wet-season f.), 1b, 1c, ♂♀ (f. int.), d, e, ♂♀ (dry f.), f, g, ♂♀ (extr. dry f.) LECTOTYPE ♀ (Karsar, S. India) here designated. [BMNH, examined]

Terias blanda davidsoni MOORE; FRUHSTORFER, 1910: 169.

Eurema blanda davidsoni (MOORE); CORBET & PENDLEBURY, 1932: 171.

I have seen only a few specimens of this race. It is similar to subsp. *silhetana* and it is very difficult to distinguish the former from the latter. However, according

to the original description and to the type-material (♀) preserved in the British Museum (N.H.), this subspecies seems to be distinguished by the following combination of features:

Wet-season form.—**Male** (Pl. 15 (3–4)). Ground color somewhat darker. **Female** (Pl. 15 (5–6)). *Upperside*: Black distal borders broader, with its inner edge more prominently zigzag-shaped; forewing discocellular spot well developed; both wings more heavily black dusted.

Dry-season form.—**Male** (Pl. 15 (7–8)). *Underside*: Most markings more distinct and both wings less heavily black dusted.

Forewing length: Male, 22.0–25.0 mm (n=7, avg=23.5), female, 22.0 mm.

Type material examined: *Terias davidsoni* was described from an unstated number of male and female specimens from 'Nilgiri Hills' by MOORE. The BMNH now possesses a female specimen which bears the following labels: 'Co-type (yellow)/N. KANARA/Karwar, Moore Coll., 1907–190., 2800., ♀/2800 ♀ Karwar/Davidsoni ♀ Wet Cotype Moore'. In addition the male bears the following labels; 'Lectotype (purple)/Terias davidsoni Moore LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Material studied: S. INDIA: Nilgiri Hill, 6♂, 23–28. x. 1977, 1♂, 1. xi. 1977, 1♀, 26. x. 1977 (HASEGAWA) [KUCGE].

Distribution: This subspecies is restricted to S. India in its distribution range.

Eurema blanda citrina (MOORE, 1881)

Terias citrina MOORE, 1881: 119, pl. 45, figs. 4, 4a, ♀. LECTOTYPE ♀ (Ceylon) here designated. [BMNH, examined]
Terias blanda citrinaria MOORE, FRUHSTORFER, 1910: 169.
Eurema blanda rotundalis (MOORE); CORBET & PENDLEBURY, 1932: 171.
Terias blanda citrina MOORE; TALBOT, 1935: 568.
Eurema blanda citrina (MOORE); YATA, 1981: 230.

I have seen only a few males and a female (dry-season form) specimens of this race. These are similar to the nominate subsp. *blanda* and it is very difficult to distinguish the former from the latter. However, according to the original description and to the type-materials preserved in the British Museum (N.H.), this subspecies seems to be distinguished by the following combination of features:

Wet-season form.—**Male** (Pl. 16 (1–2)). *Upperside*: Black distal borders broader, with its inner edge more distinct. **Female** (Pl. 16 (3–4)).

Dry-season form.—**Male** (Pl. 16 (5–6)). *Upperside*: Black distal borders broader. **Female** (Pl. 16 (7–8)). *Upperside*: Black distal borders narrower, especially in hindwing. *Underside*: Forewing subapical patch more strongly developed; both wings more heavily black dusted.

Forewing length: Male, 20.0–25.5 mm (n=4, avg=22.6), female, 23.0–25.5 mm

(n=2, avg=24.3).

Type material examined: *Terias citrina* was described from an unstated number of male and female specimens from 'Ceylon' by MOORE. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/ Ceylon, Moore Coll., 1907-190./Terias citrina ♂ type Moore,/(pl.) 571, 1b/citrina Moore, Dry'. In addition the male bears the following labels; 'Lectotype (purple)/ Terias citrina Moore LECTOTYPE det. O. Yata 1993' and hereby designated lectotype. The female specimen bears similar data labels ((pl.) 571, 1c), and in addition the following labels; 'Paralectotype (blue)/Terias citrina Moore PARALECTOTYPE det. O. Yata 1993'.

Material studied: Sri Lanka, 'Ceylon', 2♂, 24. xi. 1956 (H. ISHIKURA) [NIAS]; Matara, 1♂, 31. vii. 1985, 1♀, 15. ii. 1985 [KUCGE]; Kandy, 1♀, 1969 [NSA]; Pannala, 1♂, 20. i. 1985 [KUCGE].

Distribution: This subspecies is restricted to Sri Lanka in distribution range.

Eurema blanda roepstorffi (MOORE, 1907)

Terias roepstorffi MOORE, 1907: 76, pl. 575, fig. 3, ♂. (Andamans) [untraced]
Terias blanda roepstorffi MOORE, FRUHSTORFER, 1910: 169.
Eurema blanda roepstorffi (MOORE); CORBET & PENDLEBURY, 1932: 172.

I have not seen the specimens of this race. According to the original description and notes by CORBET and PENDLEBURY (1932), this subspecies seems to be distinguished by the very narrow hindwing black distal border in male whilst by the broad black distal border in female.

Distribution: This subspecies is restricted to Andaman Isls. in distribution range.

Eurema blanda moorei (BUTLER, 1886)

Terias moorei BUTLER, 1886: 216, pl. 5, fig. 1. LECTOTYPE ♂ (Camorta, Nicobars) here designated. [BMNH, examined]
Eurema blanda moorei (MOORE); CORBET & PENDLEBURY, 1932: 173.
Terias blanda moorei MOORE; TALBOT, 1935: 569.

This subspecies is distinguished from subsp. *blanda* from Java by the following combination of features.

Wet-season form.—**Male** (Pl. 17 (1-2)). *Upperside*: Ground color darker, with ocherous tinge; forewing black distal border much narrower, usually almost uniform below vein 4, with its inner edge sharply defined but sometimes extended narrowly and diffusely from tornus towards base; hindwing black distal border reduced to marginal vein-dots which are sometimes conjointed with a catenate black

anticiliary line. *Underside*: Markings generally fainter. **Female**. *Upperside*: Black distal border often extended broadly and diffusely from tornus towards base; forewing discocellular spot usually weakly appearing. *Underside*: Markings much fainter; forewing subapical patch absent.

Both wings somewhat more elongate.

Forewing length: Male, 23.0–24.5 mm (n=2, avg=23.8), female, 23.0 mm.

Dry-season from.—**Female** (Pl. 17 (3–4)).

Type material examined: *Terias moorei* was described from an unstated number of male and female specimens from N. Nicobars by BUTLER. The BMNH now possesses a male specimen bearing the following labels: 'Type (red)/Camorta, 84·67'. In addition the male bears the following labels; 'Lectotype (purple)/Terias moorei Butler LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Material studied: N. NICOBARS: Nagan, 1♂, 17. iii. 1982, 1♀, 13. ii. 1982 (T. MIYASHITA) [OHTSUKA coll.].

Distribution: This subspecies is restricted to N. & C. Nicobar Isls. in its distribution range.

Eurema blanda grisea (EVANS, 1932)

Terias blanda grisea EVANS, 1932: 75. (S. Nicobars) [untraced]
Eurema blanda grisea (EVANS); CORBET & PENDLEBURY, 1932: 173.

I have not seen the specimens of this race. According to the original description and to the descriptions by TALBOT (1939), this subspecies seems to be distinguished by the hindwing black distal border scaled with gray between the veins, and narrower than in *blanda moorei*, and much wider black distal border.

Distribution: This subspecies is restricted to S. Nicobar Isls. in its distribution range.

Eurema blanda natuna (FRUHSTORFER, 1910)

Terias blanda natuna MOORE, FRUHSTORFER, 1910: 169. LECTOTYPE ♂ (Natuna Isls.) here designated. [BMNH, examined]
Eurema blanda natuna (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 170.

According to the original description and to the type-materials preserved in the British Museum (N.H.), this subspecies seems to be distinguished by the following combination of features.

Wet-season form.—**Male** (Pl. 17 (5–6)). Ground color pale lemon yellow. *Upperside*: Black distal borders very narrow and uniform, with its inner edge somewhat diffused. *Underside*: Most markings very faint.

Forewing length: Male, 26.0 mm (n=1), female, 23.0 mm (n=1).

Type material examined: *Terias natuna* was described from an unstated number of male and female specimens from 'Natuna Is." by FRUHSTORFER. The BMNH now possesses two male specimens, though one of them is labeled as female. The specimen bears the labels: 'Type (red)/Natuna, Fruhstorfer/blanda natuna Fruhst./ Fruhstofer Coll., B.M. 1937-285'. In addition the male bears the following labels; 'Lectotype (purple)/Terias natuna Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype. The other male specimen bears similar data labels, and in addition the following labels; 'Paralectotype (blue)/Terias natuna Fruhstorfer PARALECTOTYPE det. O. Yata 1993'.

Distribution: This subspecies is restricted to Natuna and Anamba Isls. in its distribution range.

Eurema blanda visellia (FRUHSTORFER, 1910)

Terias blanda visellia FRUHSTORFER, 1910: 169. [untraced]
Eurema blanda visellia (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 173.

This subspecies is distinguished from subsp. *blanda* from Java by the following combination of features.

Wet-season form.—**Male** (Pls. 17 (7-8), 18 (1-2)). *Upperside*: Black distal borders somewhat broader; on forewing black distal border rarely extended very narrowly from tornus towards the base; black costal border more distinct; basal portion more heavily black dusted. **Female** (Pl. 18 (3-4)). *Upperside*: Black distal border usually broader, often extended diffusely towards base from tornus.

Dry-season form.—**Male**. *Underside*: Black distal borders broader. *Underside*: Most markings somewhat fainter; both wings not black dusted.

Forewing length: Male, 24.0-24.5 mm (n=4, avg=24.1), female, 25.5-26.5 mm (n=2, avg=26.0).

Material studied: LUZON: Luzon, 2♂, 7. vii. 1970 (SATO); College, 1♀, 7. v. 1973 (FUKUDA), 1♀, 21. xii. 1969 (HIURA); Mt. Maquiling, Mudspring (400 m), 1♂, 17. xii. 1969 (MIYATAKE) [OMNH]. MARINDUQUE IS.: near Boac, 1♂, x. 1972 (NAKAYAMA) [KUCGE].

Distribution: This subspecies is restricted to Luzon in its distribution range.

Eurema blanda vallivolans (BUTLER, 1883)

Terias vallivolans BUTLER, 1883: 429, ♂. LECTOTYPE ♂ (Mindanao) here designated. [BMNH, examined]
Terias blanda vallivolans BUTLER; FRUHSTORFER, 1910: 169.
Terias blanda mensia FRUHSTORFER, 1910: 169. (Central Philippines, Samar, Leyte, Bohol) **Syn nov.**
Eurema blanda vallivolans (BUTLER); CORBET & PENDLEBURY, 1932: 173.
Eurema blanda mensia (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 173.

This subspecies is distinguished from subsp. *blanda* from Java by the following combination of features.

Wet-season form.—**Male** (Pls. 18 (5–8), 19 (1–2)). *Upperside*: Black distal borders broader; on forewing black distal border often extended narrowly from tornus towards base; black costal border more distinct; basal portion more heavily black dusted. **Female** (Pl. 19 (3–8)). *Upperside*: Black distal border broader, often extended broadly and diffusely from tornus towards base.

Dry-season form.—**Female**. *Underside*: Black distal borders generally broader, sometimes extended narrowly from tornus towards base.

Forewing length: Male, 21.0–26.0 mm (n=16, avg=23.6), female, 22.0–26.0 mm (n=3, avg=24.3).

Type material examined: *Terias vallivolans* was described from an unstated number of male and female specimens from 'Mindanao' by BUTLER. The BMNH now possesses a male specimen which bears the following labels: 'Type (red)/Mindanao, 83·62'. In addition the male bears the following labels; 'Lectotype (purple)/Terias vallivolans LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Material studied: MINDANAO: Davao, 2♂, 18. xii. 1969, 3♂, 6–8. ii. 1972; Mt. Apo, 1♂1♀, 29–30. xi. 1969, (450 m), 1♀, 7–14. xii. 1969 [KUCGE]. SAMAR: Rawis, 4♂, 31. v. 1975, 1♂ (ab.), 1. vi. 1975 [KUCGE]. S. LEYTE: 1♂, 21. v. 1978 (MEDICIELO) [KUCGE]. BAZILAN: 1♂, 6. viii. 1931, 1♀. 8. x. 1931 (K. KUWASHIMA) [KUFA]. PALAWAN: Palawan, 1♂1♀, 17. iii. 1970 (G. NISHIMURA); Irawan, 1♂, 28. xi. 1970 (SAKAGUCHI); Taguliat, 1♂, 4. i. 1972 (MIYATA); Puerto Princesa, 1♂, 31. x. 1970, 1♂, 7. ii. 1970, 14, 20. xi. 1970 (SAKAGUCHI) [KUCGE].

Distribution: This subspecies is distributed from Mindanao, Samar, Leyte, Bohol, Bazilan and Palawan.

Eurema blanda kishidai YATA, ssp. nov.

This new subspecies is distinguished from subsp. *blanda* from Java by the following combination of features.

Wet-season form.—**Male** (Pl. 20 (1–4)). *Upperside*: Black costal border broader and more distinct; forewing black distal border sometimes extended very narrowly from tornus towards base; hindwing black distal border somewhat broader, with its inner edge more strongly zigzag-shaped; basal portions more heavily black dusted. *Underside*: Markings much fainter. **Female** (Pls. 20 (5–8), 21 (1–2)). *Upperside*: Black distal border sometimes broader, often extended broadly and diffusely from tornus towards base; hindwing black distal border often broader, with its inner margin more strongly zigzag-shaped. *Underside*: Markings fainter.

Both wings somewhat more elongated. Forewing apex and termen slightly more rounded.

Forewing length: Male, 19.0–24.0 mm (n=20, avg=21.3), female, 16.5–24.0 mm (n=10, avg=21.9).

Dry-season form.—**Female** (Pl. 21 (3–4)). *Underside*: Markings somewhat less developed.

Type-locality: Palau Isls.

Distribution: This subspecies occurs from Palau, Mariana to Caroline Isls.

Holotype: ♂, Palau Isls., 28. i. 1918 (WATANABE) [NSM].

Paratypes: PALAU ISS.: Koror, 1♀1♀, 28. i. 1918 [NSM]. MARIANAS.: Pagan Is., 2♂, 27. vii. 1951 (R.M. BOHART); Saipan Is., 1♂, 25. vi. 1951 (R. M. BOHART), 2♂2♀, 5. v. 1940 (YASU & YOSHI), 1♂, 2. ii. 1936, 1♂, 22. iv. 1940 [Bishop Mus.]. GUAMS.: Guam, 3♂1♀, 20. iii. 1945. (J. CONORER) [Bishop Mus.], 1♂, 7–8. xii. 1944 (W. H. WAGNER), 2♂4♀, 12. v. 1974 (UEMATSU); Tanion beach, 8♂2♀, 2. ix. 1977 (TARA)[KUCGE] [KMNH] (KMNH IR 100,322~323).

Remarks. This subspecies is similar to subsp. *indecisa* from Halmahera, but distinguishable from the latter by the black distal border more deeply excavated in spaces 2 and 3, and the basal border less frequently developed.

Eurema hecabe marginata was described from Palau by KISHIDA. In Palau *E. hecabe* is actually sympatric with *E. blanda* and *E. brigitta*. Since KISHIDA did not show the type depository in the original description of this subspecies, I could not trace them for examination. In this connection, the subspecific name *marginata* has been often used for *E. blanda* from Palau and Mariana regions based on the original description of *marginata* (YATA, 1981, etc.). Recently, however, some photographs of KISHIDA's butterfly specimens were found by chance among those possessed by the late Prof. Teiso ESAKI (Kyushu University). According to identifying labels attached to these photographs, the specimens contain almost all the species described by KISHIDA on the journal "Rigakkai" in 1932. Moreover, there are also some specimens whose external feature is essentially consistent with the original description. At present, when the KISHIDA's type specimens cannot be located, it seems reasonable to consider these photographs to be type series used for description. All the specimens of the type series, however, have proved to be *E. hecabe*. Thus the population of *blanda* occurring from the above regions has no scientific name. I described therefore it as a new subspecies.

The subspecific name *kishidai* is dedicated to Mr. KISHIDA who first conducted the comprehensive systematic study on the butterflies from Palau Isls.

Eurema blanda norbana (FRUHSTORFER, 1910)

Terias norbana FRUHSTORFER, 1910: 171, t. 73h (4). LECTOTYPE ♂ (N. Celebes) here designated. [BMNH, examined]

Terias norbana sulaensis JOICEY & TALBOT, 1922: 347, ♀. (Sula Isls.) (part) **Syn. nov.**

Eurema blanda norbana (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 173.

Terias blanda norbana FRUHSTORFER; TALBOT, 1935: 570.

This subspecies is distinguished from subsp. *blanda* from Java by the following combination of features.

Male (Pls. 21 (5–8), 22 (1–6)). *Upperside*: Black distal borders much broader; forewing black distal border acute-angled at vein 4, more deeply excavated in spaces 2 and 3; black basal border always well developed, usually occupying in spaces 1a and 1b; black costal border more distinct; basal portion more heavily black dusted; hindwing black distal border gradually broader towards tornus, with its diffused inner margin strongly zigzag-shaped. *Underside*: Markings generally fainter; forewing subapical patch disappearing. **Female** (Pl. 22 (7–8)). Similar to male, but differing as follows. Upperside black distal borders more broadly developed and more strongly diffused in its inner edge.

Forewing length: Male, 23.0–25.0 mm (n=5, avg=24.2), female 26.0 mm.

Type material examined: *Terias norbana* was described from an unstated number of male and female specimens from 'N. Sulawesi' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/Nord Celebes, H. Fruhstorfer/norbana Fruhst./♂ nom ♀.=♀ norbana Fruhst, ♂ type of norbana, (as Fig. do in Seitz, not in Coll Fruhst. (G.T.)'. In addition the male bears the following labels; 'Lectotype (purple)/Terias norbana Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype. The female specimen bears the labels: 'Type A. T. (green)/June, July, September 1918/ Soela Is., W. J. C. Frost. 1918/spec figured/Terias norbana sulaensis J. & T., type ♀ A.T.'), and in addition the following labels; 'Paralectotype (blue)/Terias norbana Fruhstorfer PARALECTOTYPE det. O. Yata 1993'.

Material studied: SULAWESI: N. & W. Sulawesi, Menado, 3♂, 21. ii. 1967 (IGARASHI), 2♂, 14. ii. 1967 (IGARASHI) (M. HARADA) [IGARASHI coll.].

Distribution: This subspecies is distributed in North and West Sulawesi, Sula Isls. and Sangi Is.

Eurema blanda odinia (FRUHSTORFER, 1910)

Terias norbana odinia FRUHSTORFER, 1910: 171, t. 73h (1). LECTOTYPE ♂ (S. Celebes) here designated. [BMNH, examined]
Eurema blanda odinia (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 173.
Terias blanda odinia FRUHSTORFER; TALBOT, 1935: 570.

This subspecies is distinguished from subsp. *blanda* from Java by the following combination of features.

Male (Pl. 23 (1–4)). *Upperside*: Black distal borders much broader, but less broader than in ssp. *norbana* on hindwing; forewing black distal border acute-angled at vein 4, more deeply excavated in spaces 2 and 3; black basal border always well developed, usually occupying in spaces 1a and 1b; black costal border more distinct; basal portions more heavily black dusted, but less than in ssp. *norbana*; hindwing

black distal border sometimes gradually broader towards tornus, with its inner margin strongly zigzag-shaped. *Underside*: Markings generally fainter; forewing subapical patch disappearing. **Female** (Pl. 23 (5–6)). Similar to male, but differing as follows. *Upperside*: Black distal borders more broadly developed, especially on hindwing.

Forewing length: Male, 23.0–27.5 mm (n=8, avg=25.9), female, 21.5 mm.

Type material examined: *Terias norbana odinia* was described from an unstated number of male and female specimens from 'S. Celebes' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/S. Celebes, Patunuang, Jan. 1896, H. Fruhstorfer/norbana odinia Fruhstorfer./Fruhstorfer Coll., B.M. 1937–285'. In addition the male bears the following labels; 'Lectotype (purple)/Terias norbana odinia Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Material studied: S. Sulawesi, Bantimurung, 4♂, 6–9. xii. 1972, 2♂, 6–7. iv. 1973, 1♂, 28. iv. 1973 (IGARASHI) [IGARASHI coll.]; Makkassar, 1♂1♀, 9. xii. 1972 (Y. GUNJI) [KUCGE].

Distribution: This subspecies is restricted to South Sulawesi in its distribution range.

Eurema blanda indecisa (BUTLER, 1898)

Terias indecisa BUTLER, 1898: 78. LECTOTYPE ♂ (Batchian) here designated. [BMNH, examined]
Terias blanda indecisa BUTLER; FRUHSTORFER, 1910: 169.
Terias norbana salegos BUTLER; FRUHSTORFER, 1910: 171. (Halmaheira)
Eurema blanda indecisa (BUTLER); CORBET & PENDLEBURY, 1932: 174.

This subspecies is distinguished from subsp. *blanda* from Java by the following combination of features.

Male (Pls. 23 (7–8), 24 (1–4)). *Upperside*: Black distal borders more or less broader; on forewing black distal border sometimes extended narrowly from tornus towards base; black costal border more distinct; basal portions sometimes more heavily black dusted; hindwing black distal border more distinctly zigzag-shaped in its inner edge. **Female** (Pl. 24 (5–8)). *Upperside*: Black distal border generally broader, often extended broadly and diffusely from tornus towards base; forewing discocellular spot weakly appearing. *Underside*: Forewing subapical patch usually disappearing.

Forewing length: Male, 21.0–25.5 mm (n=8, avg=22.9), female, 22.0–23.5 mm (n=5, avg=22.4).

Type material examined: *Terias indecisa* was described from an unstated number of male and female specimens from 'Batchian' by BUTLER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/

Batchian, (Wallace), 85–110'. In addition the male bears the following labels; 'Lectotype (purple)/Terias indecisa Butler LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Material studied: HALMAHERA: Djailolo, 3♂1♀, 1–10. i. 1973, 1♂3♀, 26–31. xii. 1972 (GUNJI) [KUCGE] [IGARASHI coll.]. TERNATE IS.: 1♂, 19–21. i. 1974 (T. A. & S. Y.), 3♂1♀, 18–20. xii. 1972 (GUNJI) [KUCGE].

Distribution: This subspecies is distributed in Ternate Is., Halmahera and Batchian.

Eurema blanda biformis (BUTLER, 1884)

Terias biformis BUTLER, 1884: 196, ♂♀. LECTOTYPE ♂ (Amboina) here designated. [BMNH, examined]
Terias hecabe biformis BUTLER; FRUHSTORFER, 1910: 168.
Terias blanda cungata FRUHSTORFER, 1910: 169. (Amboina)
Terias norbana depicta FRUHSTORFER, 1910: 171. (Amboina)
Eurema blanda biformis (BUTLER); CORBET & PENDLEBURY, 1932: 174.
Terias blanda biformis BUTLER; TALBOT, 1935: 570.

This subspecies is distinguished from subsp. *blanda* from Java by the following combination of features.

Male (Pl. 25 (1–4)). *Upperside*: Ground color darker, with ocherous tinge; forewing black distal border usually somewhat narrower, usually almost uniform below vein 4, but sometimes extended narrowly and diffusely from tornus towards base; hindwing black distal border more distinctly zigzag-shaped in its inner edge. *Underside*: Markings generally fainter. **Female** (Pl. 25 (5–8)). *Upperside*: Black distal border often extended broadly and diffusely from tornus towards base; forewing discocellular spot usually weakly appearing. *Underside*: Markings much fainter; forewing subapical patch absent.

Both wings somewhat more elongate.

Forewing length: Male, 22.0–24.0 mm (n=7, avg=22.6), female, 20.5–25.0 mm (n=6, avg=23.0).

Type material examined: *Terias biformis* was described from an unstated number of male and female specimens from 'Amboina' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/Amboina, 83·62'. In addition the male bears the following labels; 'Lectotype (purple)/Terias biformis Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Material studied: AMBON: Amboina, 2♂1♀, 28. xii. 1972 (E. HAMANO) [NSA]; Ambon (0–150 m), 1♂, 2. xii. 1973 (SHIMA), 11♂, 31. i. 1973 (GUNJI), 2♀, 1–2. ii. 1973 (GUNJI) [KUCGE]. CERAM: Kamarian, 3♂3♀, 23-26. i. 1973 (GUNJI) [KUCGE].

Distribution: This subspecies is restricted to Ambon, Ceram and Buru in its

distribution range.

Eurema blanda anios (FRUHSTORFER, 1910)

Terias norbana anios FRUHSTORFER, 1910: 171. LECTOTYPE ♂ (Obi) here designated. [BMNH, examined]
Eurema blanda anios (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 174.
Terias blanda anios MOORE; TALBOT, 1935: 570.

According to the original description and to the type-material preserved in the British Museum (N.H.), this subspecies seems to be very similar to subsp. *indecisa* from Batchan and Halmahera, but may be distinguished by the well-developed basal border and broader hindwing distal border with its inner edge distinctly zigzag-shaped (Pl. 26 (1–2)). However, according to the descriptions by CORBET & PENDLEBURY (1932), 'examples of this race are pale in colour with narrow bordering and usually no basal border or basal dusting is present'.

Forewing length: Male, 22.0 mm (Lectotype).

Type material examined: *Terias norbana anios* was described from an unstated number of male and female specimens from 'Obi' by FRUHSTORFER. The BMNH now possesses a male specimen which bears the following labels: 'Type (red)/Obi, H. Fruhstorfer/anios fruhstor./Fruhstorfer Coll., B.M. 1937–285'. In addition the male bears the following labels; 'Lectotype (purple)/Terias norbana anios Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Distribution: This subspecies is restricted to Obi in its distribution range.

Eurema blanda sanapati (FRUHSTORFER, 1910)

Terias blanda sanapati FRUHSTORFER, 1910: 169. LECTOTYPE ♂ (Lombok) here designated. [BMNH, HUMB, examined]
Eurema blanda sanapati (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 175.

This race is similar to the nominate subsp. *blanda* from Java but is distinguished by the following combination of features.

Wet-season form.—**Male** (Pl. 26 (3–4)). *Upperside*: Forewing black distal border narrower and almost uniform below vein 4; hindwing black distal border usually narrower.

Dry-season form.—**Male** (Pl. 26 (5–8)). *Upperside*: Black distal border much narrower and uniform. *Underside*: Markings fainter, especially on subapical patch which is barely traceable; both wings not black dusted. **Female**. *Upperside*: Black distal borders much narrower, especially in hindwing. *Underside*: Markings more strongly marked, especially on subapical patch.

Forewing length: Male, 19.0–24.0 mm (n=8, avg=21.6), female, 23.0 mm.

Type material examined: *Terias blanda sanapati* was described from an unstated number of male and female specimens from 'Lombok' by FRUHSTORFER. The BMNH now possesses a male specimen which bears the following labels: 'Type (red)/Lombok, Sapit 2000'/May-Juni 1896, H. Fruhstorfer/Selected from 4 paratypes (G.T.)/blanda sanapati Fruhst./Fruhstorfer Coll., B.M. 1937-285'. In addition the male bears the following labels; 'Lectotype (purple)/Terias blanda sanapati Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype. The other male specimens preserved in Humboldt-Universität zu Berlin bear similar data labels (Lombok, Sambalum 4000' April 1896), and in addition the following labels; 'Paralectotype (blue)/Terias blanda sanapati Fruhstorfer PARALECTOTYPE det. O. Yata 1993'.

Material studied: SUMBA: Keluwa, 1♂1♀, 17-30. vi. 1980 [KUCGE]. FLORES: Lekebai (900 m), 1♂, 17. xii. 1973 (KANO) [KUCGE]. ALOR: Pulan, 1♂, 10. ii. 1980 [ET].

Distribution: This subspecies is distributed in Lombok, Sumbawa, Sumba, Flores and Alor.

Eurema blanda cantideva (FRUHSTORFER, 1910)

Terias blanda cantideva FRUHSTORFER, 1910: 169. LECTOTYPE ♂ (Wetter) here designated. [BMNH, examined]
Eurema blanda cantideva (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 175.

According to the type-materials preserved in the British Museum (N.H.), this subspecies seems to be very similar to subsp. *laratensis* from Timor Laut (=Tanimbar), but may be distinguished by the broader black distal borders with deeper excavation in spaces 2 and 3 (Pl. 27 (1-6)).

Forewing length: Male, 21.0 mm (Lectotype), female, 23.0 mm (Paralectotype).

Type material examined: *Terias blanda cantideva* was described from an unstated number of male and female specimens from 'Wetter' by FRUHSTORFER. The BMNH now possesses a male and a female specimens. The male specimen bears the labels: 'Type (red)/Lombok, Sapit 2000'/May-Juni 1896, H. Fruhstorfer/Selected from 4 paratypes (G.T.)/blanda sanapati Fruhst./Fruhstorfer Coll., B.M. 1937-285'. In addition the male bears the following labels; 'Lectotype (purple)/Terias blanda sanapati Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype. The female specimen bears similar data labels, and in addition the following labels; 'Paralectotype (blue)/Terias blanda cantideva Fruhstorfer PARALECTOTYPE det. O. Yata 1993'.

Distribution: This subspecies is restricted to Wetter and Timor in its distribution range.

Eurema blanda laratensis (BUTLER, 1883)

Terias laratensis BUTLER, 1883: 369, pl. 38, fig. 3, ♂. LECTOTYPE ♂ (Timor Laut =Tanimbar) here designated. [BMNH, examined]
Terias hecabe laratensis BUTLER; FRUHSTORFER, 1910: 168.
Terias blanda dosithea HULSTAERT., 1923: 228. (Tanimber)
Eurema blanda laratensis (BUTLER); CORBET & PENDLEBURY, 1932: 175.
Terias blanda laratensis BUTLER; TALBOT, 1935: 571.

According to the original description and to the type-materials preserved in the British Museum (N.H.), this subspecies seems to be distinguished from nominate subsp. *blanda* from Java by the narrower black distal borders (Pl. 27 (7–8)).

Forewing length: Male, 21.5 mm (Lectotype).

Type material examined: *Terias laratensis* was described from an unstated number of male and female specimens from 'Timor Laut' by BUTLER. The BMNH now possesses a male specimen which bears the labels: 'Type (red)/Larat, Timor Laut, 83·29, 1948'. In addition the male bears the following labels; 'Lectotype (purple)/ Terias laratensis Butler LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Distribution: This subspecies is restricted to Tanimbar in its distribution range.

Eurema blanda saraha (FRUHSTORFER, 1910)

Terias blanda saraha FRUHSTORFER, 1912: 35. LECTOTYPE ♂ (Dutch New Guinea) here designated. [BMNH, examined]
Terias blanda saraha (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 175.
Terias blanda saraha FRUHSTORFER; TALBOT, 1935: 571.

This race is similar to the nominate subsp. *blanda* from Java but is distinguished by the following combination of features.

Wet-season form.—**Male** (Pl. 28 (1–4)). *Upperside*: Hindwing black distal border with its inner edge more distinctly zigzag-shaped. *Underside*: Markings much fainter and barely traceable; forewing marginal vein-dots conjointed with a fine black anticiliary line; hindwing subbasal spots always disappearing in discoidal cell.

Dry-season form.—**Male** (Pl. 28 (7–8)). *Upperside*: Forewing black costal border distinctly traceable; forewing black distal border usually broader, always more or less excavated in spaces 2 and 3; hindwing black distal border usually broader. *Underside*: Most markings fainter except for forewing subapical patch which is sometimes almost confluent with marginal smudge, forming large and quadrate brown covering the whole of apical area; forewing marginal vein-dots almost conjointed with a fine black anticiliary line; both wings not black dusted. **Female** (Pl. 29 (1–2)). *Upperside*: Black distal borders slightly narrower, especially in hindwing. *Underside*: Markings slightly fainter except for forewing subapical patch which is

always almost confluent with marginal smudge, forming large and quadrate brown covering the whole of apical area.

Forewing length: Male, 19.0–25.0 mm (n=6, avg=22.3 mm), female, 23.0–24.0 mm (n=3, avg=23.7 mm).

Type material examined: *Terias blanda saraha* was described from an unstated number of male and female specimens from 'Dutch New Guinea' by FRUHSTORFER. The BMNH now possesses a male and a female specimens. The male specimen bears the labels: 'Type (red)/Neu Guinea, Kapar Doherty, ex coll. H. Fruhstorfer/ blanda saraha Fruhst./Fruhstorfer Coll., B.M. 1937–285'. In addition the male bears the following labels; 'Lectotype (purple)/Terias blanda saraha Fruhstorfer LECTOTYPE det. O. Yata 1993' and hereby designated lectotype. The female specimen bears the insufficient data label (Local ?).

Material studied: NEW GUINEA: W. Irian, Manokuwari, 1♂(dry f.)1♂, 21. ii. 1918; Waoboe, 1♂, 7. v. 1918 (NIIMURA) [NSA]; Mt. Bair River, 1♂(dry f.), 25. xii. 1970 (SHINKAWA); Papua New Guinea, Tapini, 1♂3♀, vi. 1968 [KUCGE]. BIAK IS.: 1♂, 27. v. 1973 (IGARASHI) [IGARASHI coll.].

Distribution: This subspecies is distributed in New Guinea in its distribution range.

Eurema blanda wuwulana (FRUHSTORFER, 1910)

Terias blanda wuwulana FRUHSTORFER, 1912: 35. (Matty Is., north of Admiralty Is.) [untraced]
Eurema blanda wuwulana (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 175.
Terias blanda wuwulana FRUHSTORFER; TALBOT, 1935: 571.

This race is similar to the nominate subsp. *blanda* from Java but is distinguished by the following combination of features.

Male (Pl. 29 (3–6)). *Upperside*: Forewing black distal border usually broader, always more or less excavated in spaces 2 and 3; hindwing black distal border usually broader. *Underside*: Markings much fainter, forewing subapical patch represented by small cloud if present; forewing marginal vein-dots almost conjointed with a fine black anticiliary line; hindwing subbasal spots in space 7 and in discoidal cell disappearing or barely traceable; both wings not black dusted. **Female** (Pl. 29 (7–8)). *Upperside*: Black distal borders slightly narrower, especially in hindwing, with its inner edge more distinctly zigzag-shaped. *Underside*: Markings fainter, forewing subapical patch represented by small cloud; forewing marginal vein-dots almost conjointed with a fine black anticiliary line; hindwing subbasal spots in space 7 and in discoidal cell disappearing or barely traceable.

Forewing length: Male, 22.5–23.5 mm (n=3, avg=23.0 mm), female, 24.0–24.5 mm (n=2, avg=24.3 mm).

Type material examined: *Terias blanda wuwulana* was described from an unstated number of male and female specimens from 'Matty Is.' by FRUHSTORFER. The

BMNH now possesses a male specimen which bears the labels: 'Type (red)/Matty, Fruhstorfer/blanda wuwulana F'. However, this male type undoubtedly belongs to *E. hecabe*.

As for remaining specimens of the type series, no information is available to determine whether they are really *blanda* or not. Therefore, I decided to tentatively use the subspecific name of *wuwulana* for the population occurring from Bismark and Solomon Isls. I have no specimens of *blanda* from Matty Is., type locality of *wuwulana*, but materials from New Britain and Solomon Isls. (6 males, 1 female), at least, are quite similar to *E. blanda saraha*.

Material studied: SOLOMON ISS.: Bougainville, Buin, 2♂1♀, viii. 1972 (NAKAYAMA) [KUCGE]. NEW BRITAIN: Rabaul, 1♂1♀, 30. x. 1968 (T. HARUTA) [KUCGE].

Distribution: This subspecies is distributed in Bismarck and Solomon Isls.

Eurema senegalensis (BOISDUVAL, 1836)

[Pls. 30–31]

Terias senegalensis BOISDUVAL, 1836: 672. Holotype ♂ (Senegal). [BMNH, examined]
Terias brenda DOUBLEDAY & HEWITSON, 1847, pl. 9, fig. 6. (W. Africa) [BMNH, Type ♂, examined]
?*Terias brenda* ab. *alba* DUFRANE, 1945: 93. (Kamituga, Congo)
?*Terias brenda* ab. *subalba* DUFRANE, 1945: 93. (Kamituga, Congo)
?*Terias brenda* ab. *marginata* DUFRANE, 1947: 68. ♂. (Seguela-Man, Côte d'Ivoire)
?*Terias brenda* ab. *maureli* DUFRANE, 1947: 68. ♂. (Harrar, Ethiopia)

Diagnosis: Upperside of male wings greenish yellow in ground color; black distal border on hindwing upperside reduced to marginal vein-dots; underside of wings not black dusted; forewing somewhat angulate at apex; distal margin of hindwing almost rounded; P1 and P3 processes of valva very broad; lateral hollow large, with long and deep dorsal furrow.

Description: *Wet-season form.*—**Male** (Pl. 30 (1–6)). *Upperside*: Ground color usually greenish yellow. Forewing black costal border very narrow and indistinct, sometimes barely traceable; black distal border generally narrow, disappearing in space 1a, with its inner edge oblique and irregular from costa to vein 4, usually obtuse-angled at vein 4, equally and weakly excavated in spaces 2 and 3, always inclined towards tornus; basal border absent; fringe black, but yellowish near tornus. Hindwing black distal border reduced to a series of marginal triangular vein-dots; anal border undeveloped; fringe greenish yellow. Only the extreme bases of both wings narrowly blackish. *Underside*: Ground color somewhat paler than on upperside, not black dusted. Forewing apical patch absent; two spots in discoidal cell; discocellular marking, appearing by an irregular slender ring, covering more than half of the discocellular vein; tornal spot absent; sex-brand brown, long and narrow, usually ending a point of origin of vein 2; small vein-dots present; fringe greenish

yellow. Hindwing with a series of submarginal spots in spaces 1a to 8 arranged in an irregular zigzag-line, and a submarginal spot in spaces 7 and 8 longer than the others; circular subbasal spot usually present each in spaces 1b+c and 7 and usually in the middle of discoidal cell; a minute basal spot sometimes in space 7; discocellular spot almost same as in forewing, but larger; small vein-dots present; fringe greenish yellow. Ultraviolet reflectance on upperside: Structurally reflective almost on yellow area, appearing bright-white in UV-photos, but its reflective area of hindwing reduced to discal portion (Pl. 35 (4–5, upper)).

Forewing somewhat angulate at apex; distal margin slightly convex. Hindwing somewhat arched in the basal half of costal margin; distal margin almost rounded; vein 7 free from cell; *mdc* somewhat less than half length of *ldc*. Antenna somewhat less than half the length of forewing, black and white-checkered, except on the posterodorsal surface and a few apical segments, club cylindrical. Thorax and abdomen greenish yellow, somewhat darkened above, clothed with greenish yellow hairs on thorax and base of abdomen, a fine black longitudinal line rarely traceable along the lateral margin of abdominal terga.

Forewing length: 23.0–26.0 mm (n=8, avg=24.4 mm).

Female (Pls. 30 (7–8), 31 (1–2)). Similar to male, but differing as follows. *Upperside*: Ground color milky-white with greenish yellow tinge. Black distal border on forewing upperside somewhat broader, usually right-angled at vein 4, with its inner edge more diffused. *Underside*: Ground color greenish yellow. Ultraviolet reflectance on upperside: Moderately reflective on yellow area, appearing gray in UV-photos (Pl. 35 (4–5, lower)).

Forewing length: 20.0–22.5 mm (n=3, avg=21.5 mm).

Dry-season form. **Male & female** (Pl. 31 (3–4)). Similar to the wet-season form, but differing as follows. *Upperside*: Marginal vein-dots less developed. *Underside*: Most markings more strongly developed and usually tinged with brown in varied degrees. Subapical streak or patch on forewing appearing.

Forewing length: Male, 22.0–24.0 mm (n=2, avg=23.0 mm), female, 25.0 mm.

Male genitalia (Fig. 7): Tegumen broad, triangular in dorsal aspect, somewhat concaved dorsomedially, entirely sclerotized; Valvenansatz short, usually producing downwards; vinculum not strongly arched; saccus moderately long (0.72–0.75 of ring height), angle between vinculum and saccus about 80–90°. Uncus usually very short (dorsum proper 0.64 of ring height), extending somewhat downwards; uncal projection short (0.11 of ring height), projecting posteriorly, with its apex bicuspid. Valva almost as long as high; P1 very large, extending almost laterally, with its apex sharply pointed; P2 long and slender; P3 broad, with its apex rounded; P4 represented by two processes which are similar to each other in length and shape. Phallus moderately long, but slightly longer than in *hecabe*, slender and somewhat strongly arched dorsally, subzonal sheath about as long as 1/3 length of phallus. Juxta weakly sclerotized, consisting of a pair of broad pouches producing a short and

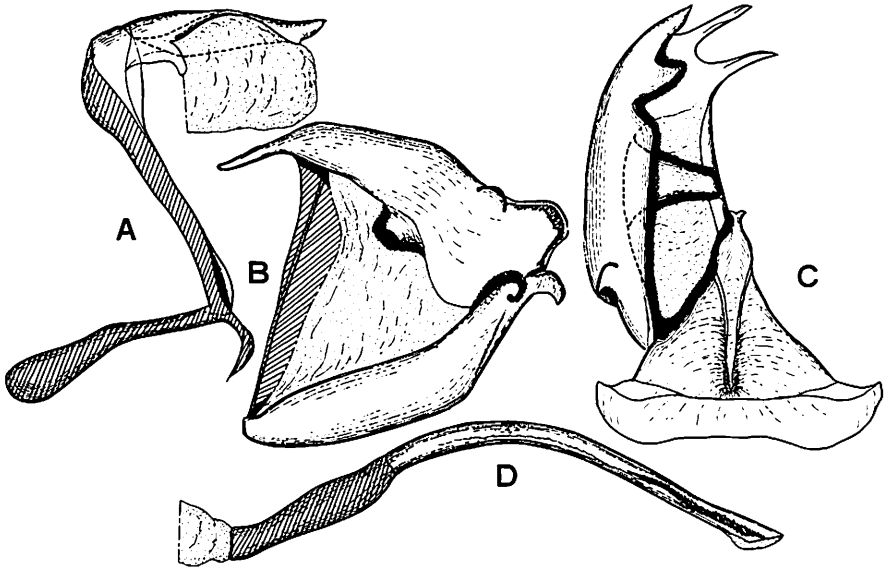


Fig. 7. Male genitalia of *Eurema senegalensis* (BOISDUVAL, 1836) from Uganda. A: Ring (lateral). B: Valva (inner aspect of right-hand). C: Dorsum and valva (dorsal). D: Phallus (lateral).

slender median stalk.

Female genitalia (Fig. 8): Seventh abdominal sternum with nearly straight posterior margin. Lateral hollow large and elliptical, with dorsal eaves rather long and moderately deep, dorsal groove strongly developed, ventral eaves long and deep, median groove furrow long and well developed, having a deep eaves and situated ventral 1/3 of lateral hollow. Genital plate strongly invaginated anterodorsally, obtuse-angled on its anterolateral corner in ventral aspect, not producing a pair of small concavities near ostium bursae; longitudinal groove well sclerotized, narrow and usually parallel sided; banks of longitudinal groove well developed, immediately compressed at the middle of genital plate. V-shaped wall well developed, straight in ventral aspect, deep, sclerotized, and almost continuous with 7th abdominal tergum, forming a narrow slit anteriorly. Ostium bursae opening at the anterior end of the genital plate. Membranous ductus bursae about as long as 1.2 length of cervix bursae, somewhat thick, and membranous but weakly sclerotized on anterior half. Signum large, with many spines. Eighth abdominal tergum longitudinally very short; apophysis anterioris nearly straight, slightly longer than apophysis posterioris, with a prominent protuberance at the dorsal margin of proximal portion. Papilla analis elongate, bearing a short lobe and swollen bare-region.

Variation: Although this species shows little intra-specific variation in wing markings, its seasonal variation is fairly marked as in *E. floricola*.

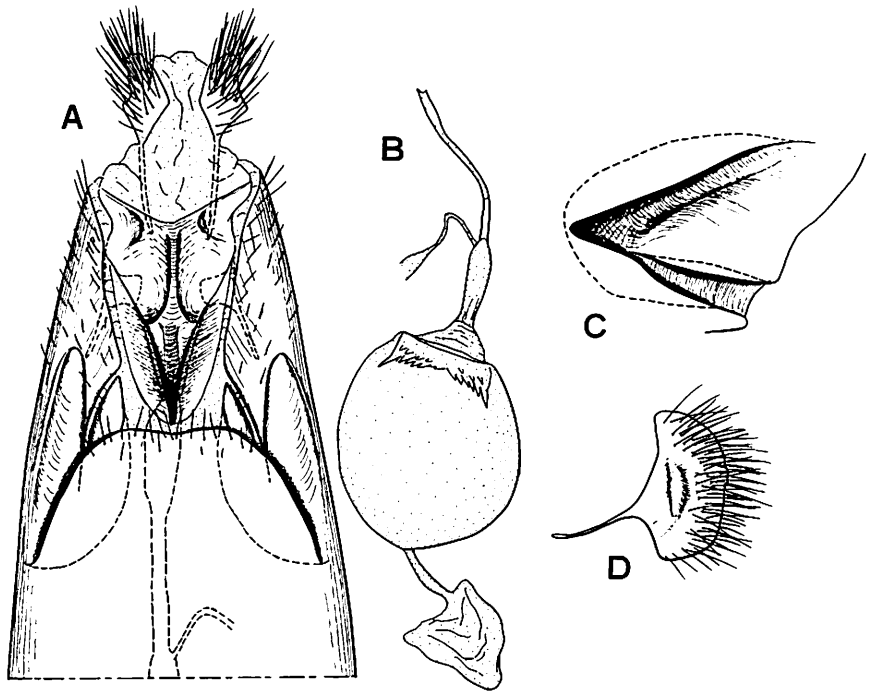


Fig. 8. Female genitalia of *Eurema senegalensis* (BOISDUVAL, 1836) from Uganda. A: Female genitalia (ventral). B: Bursa copulatrix (ventral). C: Lateral hollow (lateral). D: Papilla analis (lateral).

Type material examined: *Terias senegalensis* was described from a male specimen by BOISDUVAL. This holotype is now in the BMNH and bears the following labels; 'Type H T (red)/Ex. Musaeo, Dris. Boisduval/Senegalensis BD, Sénégal/Ex Oberthür Coll. Brit. Mus. 1927-3'.

Material studied: CONGO: Kisangani, 1♂1♀, 7-8. ii. 1972; Kinshasa, Black River, 1♂, 22. xi. 1969, 1♂, 17. v. 1970, 1♂, 21. xi. 1971; Kisantu, 1♀, 6. xii. 1970 (S. INOUE) [KUCGE]. UGANDA: 1♂, 1♂ (dry f.) [NSA]. CAMERRONS: Bitye, 1♂ [KUFA]. NIGERIA: 1♂, 28. xi. 1976, 1♀, 6. xi. 1976, 1♀ (dry f.), 30. i. 1977 (S. SHINONAGA) [KUCGE].

Taxonomic remarks: This butterfly has been confused with both *Eurema hecabe* and *E. floricola* due to their similar externals. However, *E. senegalensis* is very unique in male and female genital structure.

Relationship: This species is closely related with *hecabe-halmaherana-alitha-floricola*, and these five form a monophyletic group, with which *blanda* are united. The former five species are very closely resemble each other, so that some authors have been regarded them conspecific. As PAULIAN & BERNARDI (1951) and some other authors pointed out, however, they can be identified by not only external features, but also

morphological ones (male and female genitalia).

Distribution: This species is widely distributed from tropical Africa and Madagascar (PAULIAN & BERNARDI, 1951), but I have not seen any specimens from the latter. Its range almost corresponds to that of *E. floricola*. Although this pierid is essentially a lowland species, it also flies in mountain zone up to 1000 m.

Habitat and habits: This butterfly seems to mainly inhabit open country of lowlands or grassland and is almost sympatric with *E. floricola* and *E. hecabe*. This species is supposed to be multivoltine, because the adults can be seen flying all the year round.

Early stages: The early stages are unknown.

Eurema floricola (BOISDUVAL, 1833)

[Pls. 31–34]

Xanthidia floricola BOISDUVAL, 1833: 21. (Madagascar) [untraced]
Terias floricola (BOISDUVAL); BOISDUVAL, 1836: 671. (Mauritius, Bourbon)
Terias smilacina C. & R. FELDER, 1865: 208. ("New Granada")
Terias leonis BUTLER, 1886: 17, p. 222, pl. 5, fig. 6. (S. Leone)
Terias bewsheri BUTLER, 1879: 190. (Johanna Is.)
Terias dentilimbata BUTLER, 1879: 190. (Johanna Is.)
Terias anjuana BUTLER, 1879: 189. (Johanna Is.)
Terias decipiens BUTLER, 1883: 189. (Johanna Is.)
Terias ceres BUTLER, 1883, Ann. Mag. N. H. (5), 17: 218. dry form. (Mauritius)

Diagnosis: Upperside of male wings deep bright yellow in ground color; black distal border on forewing upperside usually obtuse-angled at vein 4; black distal border on hindwing upperside usually reduced to marginal vein-dots; underside with silvery discocellular spot (in Madagascar) and that of hindwing prominently expanded in space 5; underside of wings not black dusted; sex-brand very long and much broad, always ending a point of origin of vein 2; forewing rather rounded at apex; distal margin of hindwing somewhat angulate at space 3; uncus long and tapering posteriorly and uncal projection poorly developed, projecting posteriorly; genital plate with a pair of small concavities in each side of longitudinal groove near ostium bursae.

Description: *Wet-season form.*—**Male.** *Upperside*: Ground color usually deep bright yellow. Forewing black costal border very narrow and indistinct, sometimes barely traceable; black distal border generally narrow, especially below vein 4, with its inner edge oblique and irregular from costa to vein 4, obtuse-angled at vein 4, equally and weakly excavated in spaces 2 and 3; basal border absent; fringe black, but yellowish near tornus. Hindwing black distal border fairly broad, tapering near apex and tornus, with its inner edge generally zigzag-shaped and sharply defined; anal border undeveloped; fringe usually black mixed with yellow. Hindwing black distal border usually reduced to a series of marginal vein-dots; anal border unde-

veloped; fringe yellow. Only the extreme bases of both wings narrowly blackish. *Underside*: Ground color somewhat paler than on upperside, not black dusted. Forewing apical patch absent; two spots in discoidal cell; discocellular marking usually silvered, appearing by an irregular slender ring, somewhat expanded in its anterior half, covering more than half of the discocellular vein; tornal spot absent; sex-brand light gray, very long and much broad, always ending a point of origin of vein 2; small vein-dots present; fringe yellow. Hindwing with a series of submarginal spots in spaces 1a to 8 arranged in an irregular zigzag-line, and a submarginal spot in spaces 7 and 8 sometimes longer than the others; silvered circular subbasal spot usually present each in spaces 1b+c and 7 and in the middle of discoidal cell; a minute basal spot sometimes in space 7; discocellular spot almost same as in forewing, but more broadly expanded in its anterior half, appearing mushroom-like; small vein-dots present; fringe yellow. Ultraviolet reflectance on upperside: Structurally reflective on yellow area except for tornal to anal region of hindwing, appearing bright-white in UV-photos (Pl. 35 (6, upper)).

Forewing somewhat rounded at apex; distal margin slightly convex. Hindwing somewhat arched in the basal half of costal margin; distal margin somewhat angulate at space 3; vein 7 free from cell; *mdc* somewhat less than 1/3 length of *ldc*. Antenna somewhat less than half the length of forewing, black and white-checkered, except on the posterodorsal surface and a few apical segments, club cylindrical. Thorax and abdomen yellow, darkened above, clothed with black and yellow hairs on thorax and base of abdomen, a black longitudinal line rarely traceable along the lateral margin of abdominal terga.

Forewing length: 15.0–22.0 mm.

Female. Similar to male, but differing as follows. Upperside ground color milky-white with greenish yellow tinge to pale yellow. Basal portion on upperside almost not black dusted. On forewing upperside discocellular spot absent; black costal border disappearing; black distal border somewhat broader, usually barely traceable below vein 2, with its inner edge more diffused. Underside ground color somewhat paler. Ultraviolet reflectance on upperside: Moderately reflective on yellow area, appearing gray in UV-photos (Pl. 35 (6, lower)). On underside tornal spot is sometimes present.

Forewing length: 15.0–22.0 mm.

Dry-season form.—**Male & female.** Similar to the wet-season form, but differing as follows. On underside most markings more strongly developed and usually tinged with brown in varied degrees. On forewing subapical streak or patch appearing.

Male genitalia (Fig. 9): Tegumen broad, triangular in dorsal aspect, somewhat concaved dorsomedially, entirely sclerotized; Valvenansatz short, usually producing downwards; vinculum not strongly arched; saccus moderately long (0.83 of ring height), angle between vinculum and saccus about 60°. Uncus usually long (dorsum

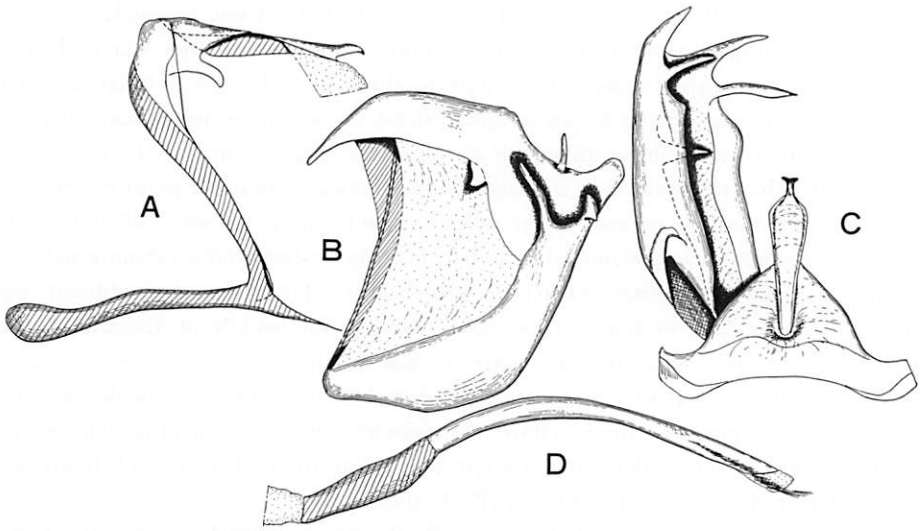


Fig. 9. Male genitalia of *Eurema floricola floricola* (BOISDUVAL, 1833) from Madagascar. A: Ring (lateral). B: Valva (inner aspect of right-hand). C: Dorsum and valva (dorsal). D: Phallus (lateral).

proper 0.62 of ring height), tapering towards the apex, extending somewhat downwards; uncal projection long and narrowed (0.10 of ring height), projecting posteroventrally, with its apex weakly bicuspid. Valva almost as long as high; Pl stout, slightly broader and shorter than P4, extending almost laterally, with its apex blunt or usually apex; P2 long and slender; P3 broad and triangular, with a pointed apex; P4 represented by two processes which are similar to each other in length and shape. Phallus moderately long, slender and somewhat strongly arched dorsally, subzonal sheath about as long as 1/3 length of phallus. Juxta weakly sclerotized, consisting of a pair of broad pouches producing a short and slender median stalk.

Female genitalia (Fig. 10): Seventh abdominal sternum with nearly straight posterior margin. Lateral hollow elliptical, with dorsal eaves rather long and moderately deep, dorsal groove weakly developed, ventral eaves long and deep, median groove long, having a deep eaves and situated ventral 1/3 of lateral hollow. Genital plate strongly invaginated anterodorsally, obtuse-angled on its anterolateral corner in ventral aspect, producing a pair of small concavities on each side of longitudinal groove near ostium bursae; longitudinal groove well sclerotized, narrow and usually parallel sided; banks of longitudinal groove weakly developed. V-shaped wall well developed, straight in ventral aspect, deep, sclerotized, and almost continuous with 7th abdominal tergum, not forming a narrow slit anteriorly. Ostium bursae opening at the anterior end of the genital plate and usually concealed by the posterior margin of 7th abdominal sternum. Membranous ductus bursae

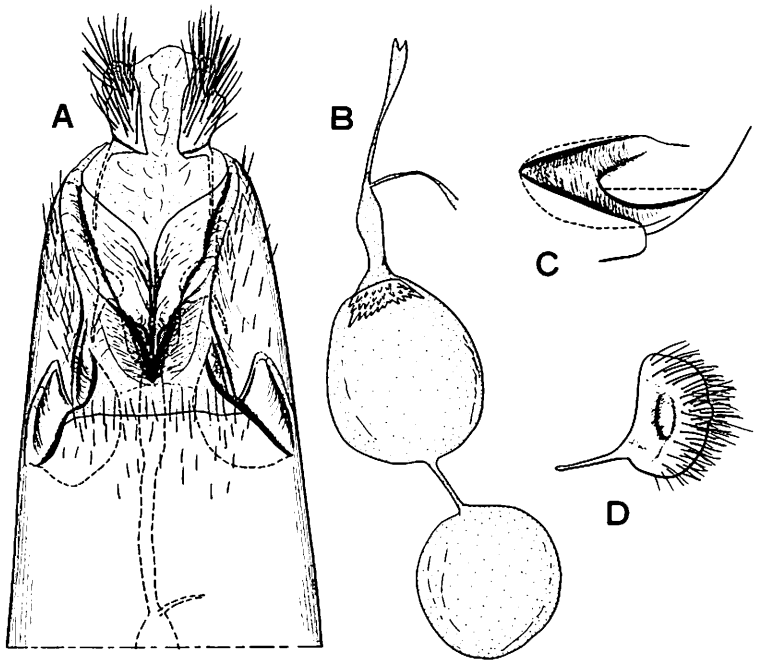


Fig. 10. Female genitalia of *Eurema floricola floricola* (BOISDUVAL, 1833) from Madagascar. A: Female genitalia (ventral). B: Bursa copulatrix (ventral). C: Lateral hollow (lateral). D: Papilla analis (lateral).

about as long as 1.6 length of cervix bursae, somewhat thick, and membranous but weakly sclerotized on anterior 1/3. Signum large, with many spines. Eighth abdominal tergum longitudinally very short; apophysis anterioris nearly straight, slightly longer than apophysis posterioris, with a prominent protuberance at the dorsal margin of proximal portion. Papilla analis elongate, bearing a short lobe and swollen bare-region.

Variation: The populations occurring from Madagascar (including its neighboring islands) are rather different from those from Africa in always having silvery discocellular spots on undersides. This species also shows seasonal variation, though generally less marked than in *hecabe*.

Taxonomic remarks: This butterfly has been confused with both *Eurema hecabe* and *E. senegalensis* due to their similar externals, especially in Africa. However, *E. floricola* undoubtedly quite resembles *E. alitha* in male genital structure.

Relationship: This species is closely related with *E. alitha*, and these two form a monophyletic group (*alitha-floricola*), with which *hecabe* and *halmaherana* are united. These four species resembling very closely each other, have been regarded as conspecific by some authors. As PAULIAN & BERNARDI (1951) and some other

authors pointed out, however, these species can be identified by not only external features, but also morphological ones (male and female genitalia).

Distribution: This species is widely distributed from Madagascar to tropical Africa. Its range almost corresponds to that of *E. senegalensis*. Although this pierid is essentially a lowland species, it flies in mountain zone up to 1000 m.

Habitat and habits: This butterfly seems to mainly inhabit open country of lowlands or grassland, and is almost sympatric with *E. senegalensis* and *E. hecabe*. This species is supposed to be multivoltine, because the adults can be seen flying all the year round. According to PAULIAN and BERNARDI (1951), in Madagascar the wet-season form can be seen from January to March and the dry-season one from May to June.

Early stages: The early stages were reported for the populations from Tananarive (Madagascar) by PAULIAN and BERNARDI (1951). The period of pupal stage was 6–10 days in January. *Entenda abyssinia* and *Mimosa* sp. (Fabaceae) were recorded as the larval foodplant.

Eurema floricola floricola (BOISDUVAL, 1833)

Xanthidia floricola BOISDUVAL, 1833: 21. (Madagascar) [untraced]
Terias hecabe floricola (BOISDUVAL); CORBET, 1934: 277.
Eurema floricola floricola (BOISDUVAL); D'ABRERA, 1980: 55.

This nominate subspecies is characterized by the following combination of characters.

Wet-season form.—**Male** (Pl. 31 (5–6)). *Upperside*: Ground color deep bright yellow. Forewing black distal border narrow and regular, especially below vein 4, much obtuse-angled at vein 4. *Underside*: Forewing with discocellular marking silvered, prominently expanded in its anterior half; circular subbasal spots usually silvered; discocellular spot also silvered, much broadly expanded in its anterior half, appearing mushroom-like. **Female**. Similar to the male of same species, but differing as follows. Upperside ground color milky-white with greenish yellow tinge. On underside forewing small and faint subapical patch present.

Forewing length: Male, 15.0–22.0 mm (n=5, avg=17.5 mm).

Dry-season form.—**Male & female** (Pl. 31 (7–8)). Similar to the wet-season form, but differing as follows. *Upperside*: Ground color of female generally pale yellow. *Underside*: Most markings more strongly developed and usually tinged with brown in varied degrees; forewing subapical patch well developed and sometimes partially confluent with marginal black smudge.

Forewing length: Male, 16.0–23.0 mm (n=4, avg=19.3 mm), female, 18.0–22.0 mm (n=4, avg=19.5 mm).

Type material examined: *Terias floricola* was described from unstated number of specimens by BOISDUVAL. I examined the female specimen, which was selected by

G. TALBOT in 1942, in the BMNH bearing the following labels; 'Type AT (red)/Ex. Musaeo, Dris. Boisduval/selected as ♀, allotype of floricola Boisd. (S. T., 1942)/Ex Oberthür Coll. Brit. Mus. 1927-3'. However, I found this selected specimen is not Madagascan *Eurema* species but undoubtedly Oriental *E. hecabe* (dry-season form)! Because, diagnostic characters described in the original description of *E. floricola* quite agree with those of *hecabe* type species from Madagascar, not with those of any *Eurema* species from Indo-Australian Region. I failed to find the other types of *floricola* used by BOISDUVAL in the original description.

Material studied: MADAGASCAR: Madagascar, 3♂3♀ (dry f.); Moramango, 1♂ (dry f.), iii. 1971; Anki, 1♀, v. 1967; Baj Fiheranam, 3♂, 27. ii. 1966; Tananarive, 1♂, 2. i. 1963 (NAKAYAMA) [KUCGE].

Distribution: This nominate subspecies occurs in Madagascar.

Eurema floricola ceres (BUTLER, 1883)

Terias ceres BUTLER, 1883: 218. dry form. LECTOTYPE ♀ (Mauritius) here designated. [BMNH, examined]
Terias floricola winter f. *ceres* BUTLER; AURIVILLIUS, 1925: 64.
Eurema floricola ceres (BUTLER); PAULIAN & BERNARDI, 1951: 151.

This subspecies is distinguished from subsp. *floricola* from Madagascar by narrower black distal border and hindwing black distal border which is not reduced to vein-dots in male. According to PAULIAN & BERNARDI (1951), the ground color of female is always yellow with ocherous tinge, not yellowish white (Pl. 32 (1-8)).

Forewing length: Male, 20.0-20.5 mm (n=2, avg=20.3 mm), female, 19.0-23.0 mm (n=2, avg=21.0 mm).

Type material examined: *Terias ceres* was described from an unstated number of male and female specimens from Mauritius by BUTLER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/ Mauritius, 50·39/Terias ceres ♂ type Butler'. In addition the male bears the following labels; 'Lectotype (purple)/Terias ceres Butler LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Materials studied: MAURITIUS: 1♂, 4. iv. 1905, 1♂, 17. iii. 1904, 1♀, 3. ix. 1905 (MAUDERS) [NSM]. REUNION: 1♂, Saint-Phillipe, 31. i. 1955 (P. VIETTE), 1♀, St.-Phillipe, Majastive, i. 1912 (P. CARIÉ), 1♀, Bois Blanc, 29. iv. 1921 (P. CARIÉ) [MNHN].

Distribution: This subspecies is known only from Mauritius and la Réunion Is.

Eurema floricola anjuana (BUTLER, 1879)

Terias anjuana BUTLER, 1879: 189. (Johanna Is.) [untraced]
Terias senegalensis f. *anjuana* BUTLER; AURIVILLIUS, 1925: 64.
Terias floricola f. *anjuana* BUTLER; TALBOT: 563.

Eurema floricola ceres (BUTLER); PAULIAN & BERNARDI, 1951: 151.

I have seen only three specimens of this race. According to the original description and to the photograph of two male and three female sepcimens preserved in the Muséum National d'Histoire Naturelle, Paris, this subspecies is distinguished from subsp. *floricola* from Madagascar by the narrower black distal border of forewing from costa to vein 4, the broader hindwing black distal border which is not reduced to vein-dots, and the 'bright yellow' in upperside ground color of female (Pl. 33 (1–4)).

Forewing length: Male, 17.0–20.0 mm (n=2, avg=18.5 mm), female, 17.0–19.5 mm (n=3, avg=18.2 mm).

Materials studied: ANJUAN: 1♂, i. 1979 [MNHN]. MAYOTTE: 1♂3♀, ii. 1922 (P. CARIÉ) [MNHN].

Distribution: This subspecies is restricted to Comores Archpelago (Comoro, Anjuan, Mayotte Isls.).

Eurema floricola aldabrensis BERNARDI, 1968

Eurema floricola aldabrensis BERNARDI, 1961: 274. Holotype ♀ (Aldabra). [MNHN, examined]
Eurema floricola aldabrensis BERNARDI: 194. (Aldabra)

According to the original description and type materials, this subspecies is smaller in size than the other, and the male of this subspecies is very similar to subsp. *floricola* and *ceres,* but the female is distinguished from subsp. *floricola* by the brighter ground color. It is also said to differ from subsp. *anjuana* having most bright and clear yellow ground color and from *ceres* with ochre ground color (Pl. 33 (5–8)).

Forewing length: Male, 15.0–15.5 mm (n=2, avg=15.3 mm), female, 14.5–16.0 mm (n=3, avg=15.2 mm).

Type material examined: *Eurema floricola aldabrensis* was described from a male and a female specimens by BERNARDI. The holotype male specimen is now in the Museum Nat. Hist. Naturelle and bears the following labels; 'Holotype ♀, Aldabra, xi.1953 [C. Prola] (red)'. The Muséum National d'Histoire Naturelle, Paris also possesses 2 male and 2 female paratypes, bearing similar data labels 'v/vi 1954, G. Cherbonnier (Paratype (orange))'.

Distribution: This subspecies is restricted to Aldabra Is. in its distribution range.

Eurema floricola leonis (BUTLER, 1886)

Terias leonis BUTLER, 1886: 17, p. 222, pl. 5, fig. 6. LECTOTYPE ♂ (♂ Wadelai, ♀ Tobbo) here designated. [BMNH, examined]
Terias floricola ab. *alba* DUFRANE, 1945: 93. ♀. (Kamituga, Congo)

Terias floricola ab. *mariae* DUFRANE, 1945: 93. ♀. (Kamituga, Congo)
Terias floricola ab. *marginata* DUFRANE, 1947: 68. ♂. (Macenta, Guinea)

This subspecies is distinguishable from subsp. *floricola* by the following combination of characters.

Wet-season form.—**Male** (Pl. 34 (1–2)). *Upperside*: Ground color sometimes slightly paler. Forewing black distal border broader, nearly right- to obtuse-angled at vein 4, usually deeply excavated in spaces 2 and 3. *Underside*: Discocellular markings of fore and hindwings and circular subbasal spots usually not silvered; discocellular marking of hindwing not so expanded in its anterior half. **Female** (Pl. 34 (3–4)). Similar to the male of same species, but differing as follows. Upperside ground color white with greenish yellow tinge or greenish yellow.

Forewing length: Male, 18.5–21.5 mm (n=5, avg=20.1 mm), female, 15.0–22.0 mm (n=5, avg=19.3 mm).

Dry-season form.—**Male & female** (Pl. 34 (7–8)). Similar to the wet-season form, but differing as follows. On underside most markings more strongly developed and usually tinged with brown; forewing subapical patch weakly developed, not confluent with marginal black smudge.

Forewing length: Male, 19.5–20.0 mm (n=2, avg=19.8 mm), female, 14.5 mm.

Type material examined: *Terias leonis* was described from an unstated number of male and female specimens from 'S. Leone' by BUTLER. The BMNH now possesses a male and female specimens. The male specimen bears the labels; 'Type (red)/S. Leone, 58–166/Terias leonis ♂, type Butler/58·166, S. Leone'. In addition the male bears the following labels; 'Lectotype (purple)/Terias leone Butler LECTOTYPE det. O. Yata 1993' and hereby designated lectotype.

Material studied: CONGO: Kinshasa, Lac Ma Valee, 1♂1♀, 25. vii. 1971; River, 1♂, 29. viii. 1971, 30. x. 1971; Kisantu, 23. i. 1972, 1♂1♀, 2–6. xii. 1970, (S. INOUE) [KUCGE]. KENYA: 1♂ (dry f.), 23. ix. 1961, 1♂ (dry f.), 26. x. 1961 (NAKANISHI) [KUCGE]. NIGERIA: 1♂, 1. xii. 1936, 1♀, 13. ix. 1977, 1♀ (dry f.), 19. ii. 1977 (S. SHINONAGA) [KUCGE].

Distribution: This subspecies is widely distributed in Africa mainland.

(to be continued)

A Revision of the Old World Species of the Genus *Eurema* HÜBNER (Lepidoptera, Pieridae)

Part IV. Description of the *hecabe* Group (part)

Osamu YATA

Plates 5–35.

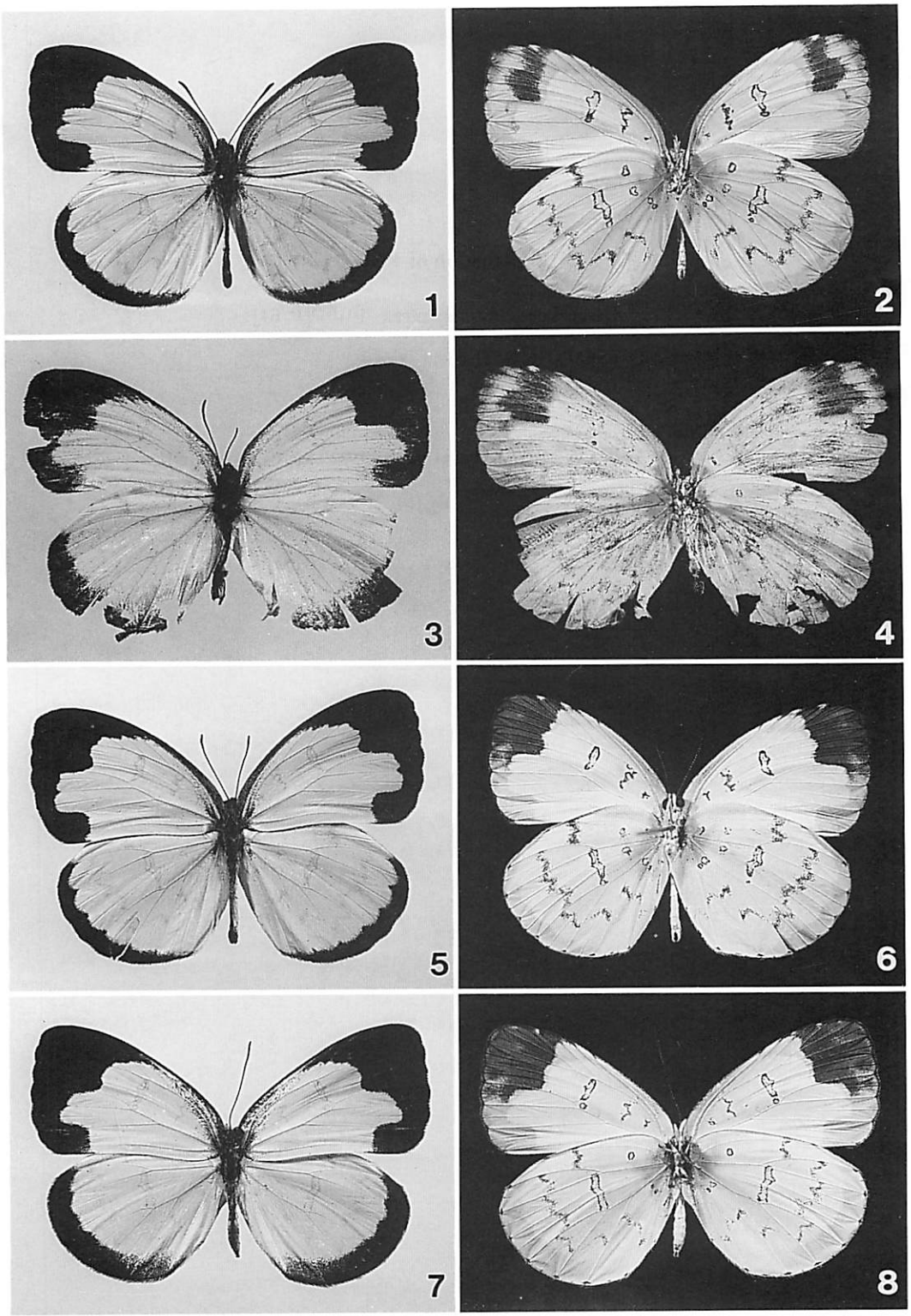
Explanation of Plate 5

Eurema simulatrix simulatrix (STAUDINGER, 1891) [P. 63]

1. ♂. Mindanao.
2. Ditto, underside.
3. ♀. Mindanao.
4. Ditto, underside.

Eurema simulatrix tecmessa (DE NICÉVILLE, 1895) [P. 63]

5. ♂. Malay Peninsula.
6. Ditto, underside.
7. ♀. Malay Peninsula.
8. Ditto, underside.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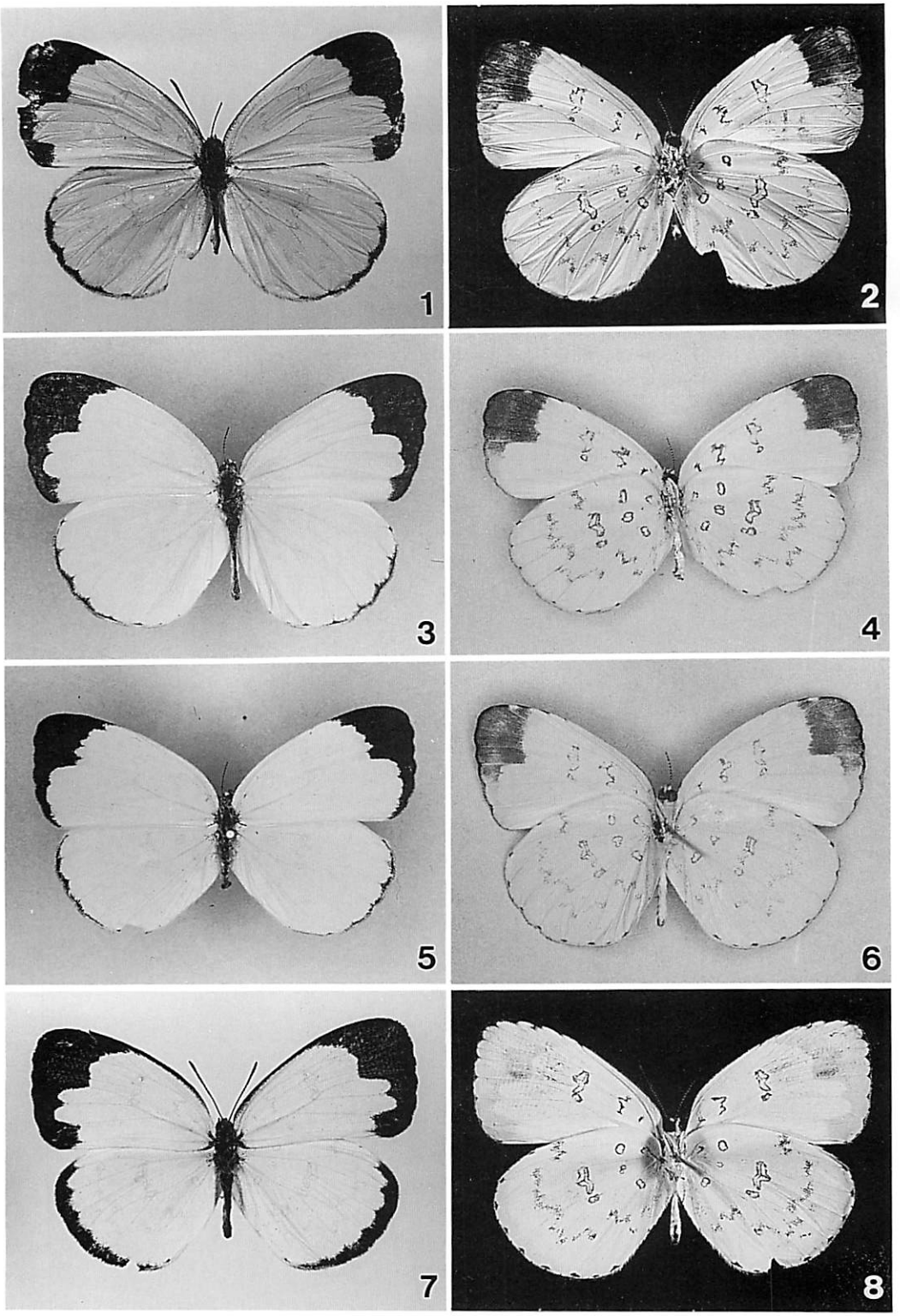
Explanation of Plate 6

Eurema simulatrix sarinoides (FRUHSTORFER, 1910) [P. 64]

1. ♂, holotype [BMNH]. N. Thailand.
2. Ditto, underside.
3. ♂. N. Thailand.
4. Ditto, underside.
5. ♂, (f. *stockleyi* CORBET & PENDLEBURY, 1932, lectotype) [BMNH]. Burma.
6. Ditto, underside.

Eurema simulatrix inouei SHIRÔZU & YATA, 1973 [P. 65]

7. ♂, holotype [KUCGE]. S. Viet-Nam.
8. Ditto, underside.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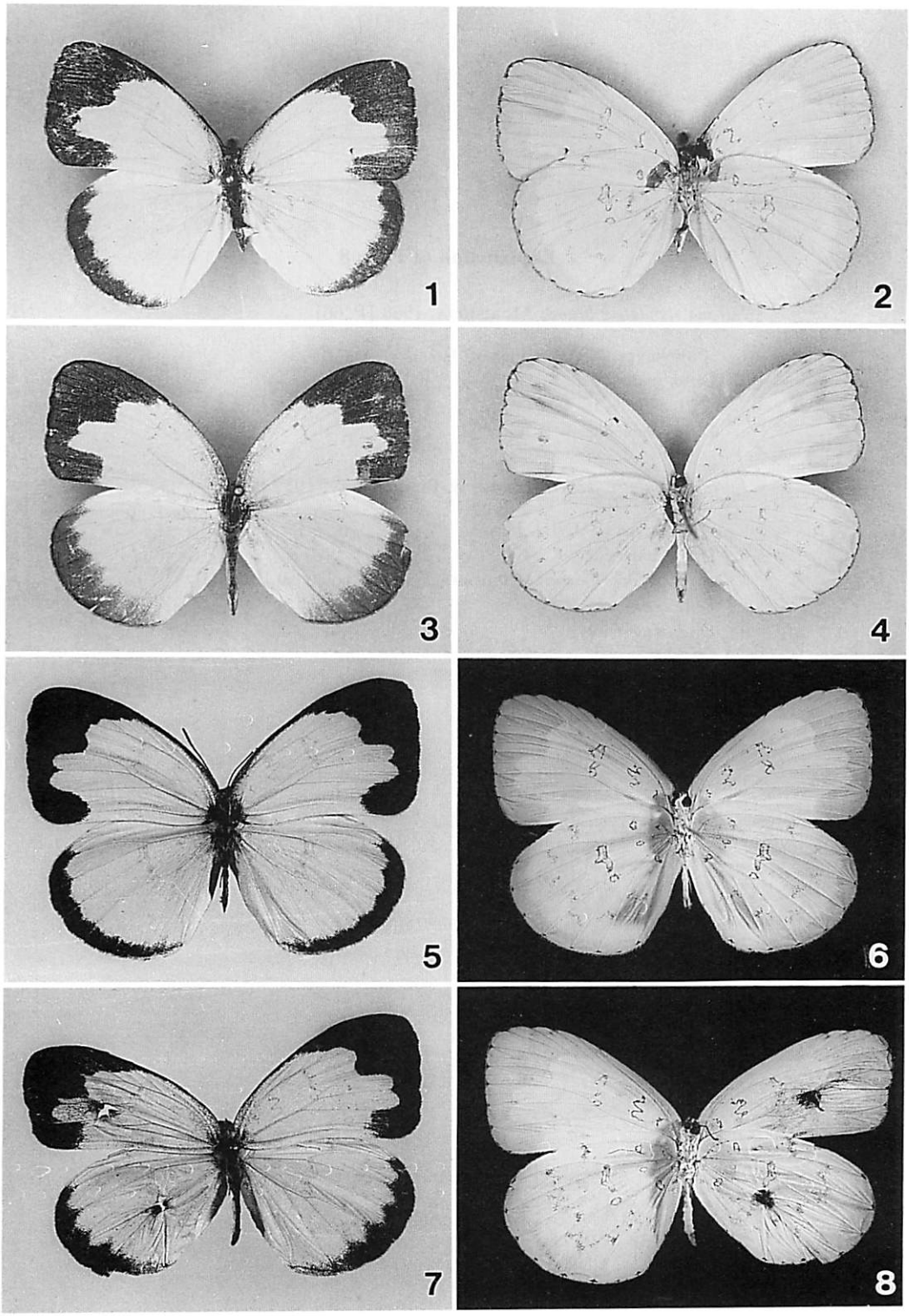
Explanation of Plate 7

Eurema simulatrix grandis (MOORE, 1907) [P. 65]

1. ♂, lectotype [BMNH]. Khasi Hills.
2. Ditto, underside.
3. ♀, paralectotype [BMNH]. Khasi Hills.
4. Ditto, underside.
5. ♂. Khasi Hills.
6. Ditto, underside.
7. ♀. Khasi Hills.
8. Ditto, underside.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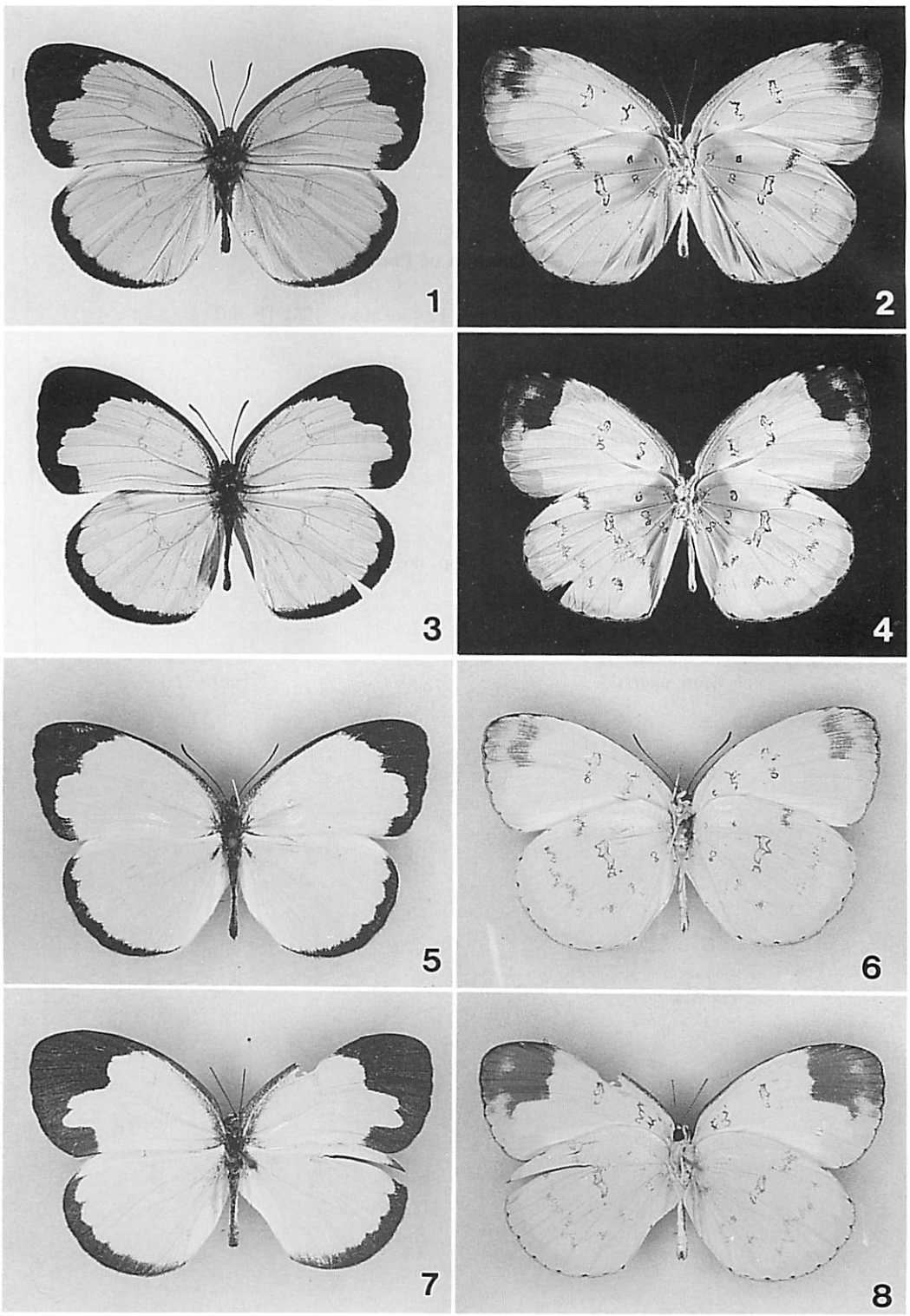
Explanation of Plate 8

Eurema simulatrix littorea MORISHITA, 1968 [P. 66]

1. ♂, holotype [NSM]. Langkawi Is.
2. Ditto, underside.
3. ♂. Langkawi Is.
4. Ditto, underside.

Eurema simulatrix kolleri CORBET & PENDLEBURY, 1932 [P. 66]

5. ♂, holotype [BMNH]. Java.
6. Ditto, underside.
7. ♂, (f. *javanica* CORBET & PENDLEBURY, 1932, holotype) [BMNH]. E. Java.
8. Ditto, underside.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Explanation of Plate 9

Eurema simulatrix kolleri CORBET & PENDLEBURY, 1932 [P. 66]

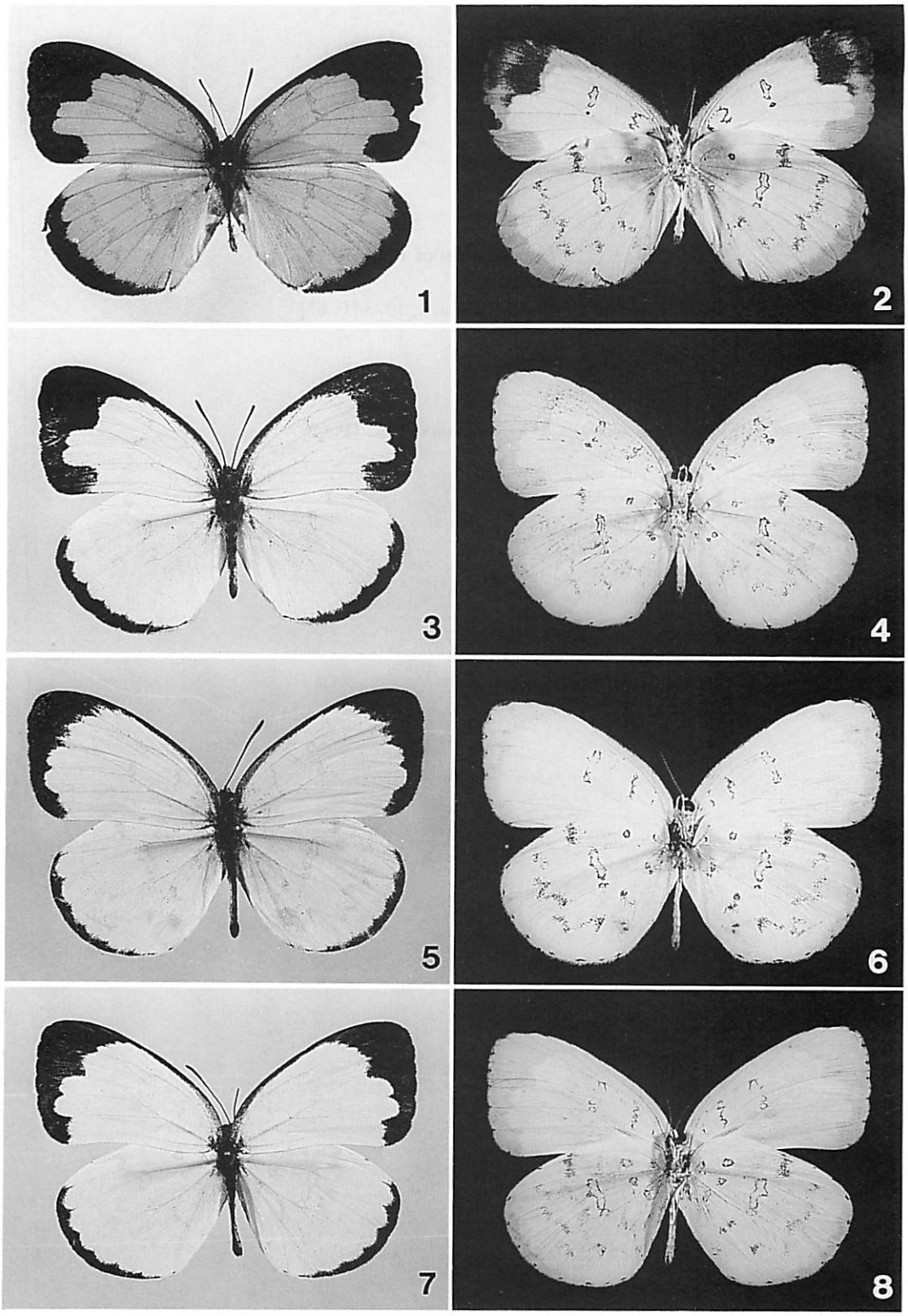
1. ♂, [RNH]. Java.
2. Ditto, underside.

Eurema simulatrix princesae MORISHITA, 1973 [P. 67]

3. ♂. Palawan.
4. Ditto, underside.

Eurema simulatrix babiensis YATA, ssp. nov. [P. 68]

5. ♂, holotype [KUCGE]. Babi Is.
6. Ditto, underside.
7. ♂. Simeulue Is.
8. Ditto, underside.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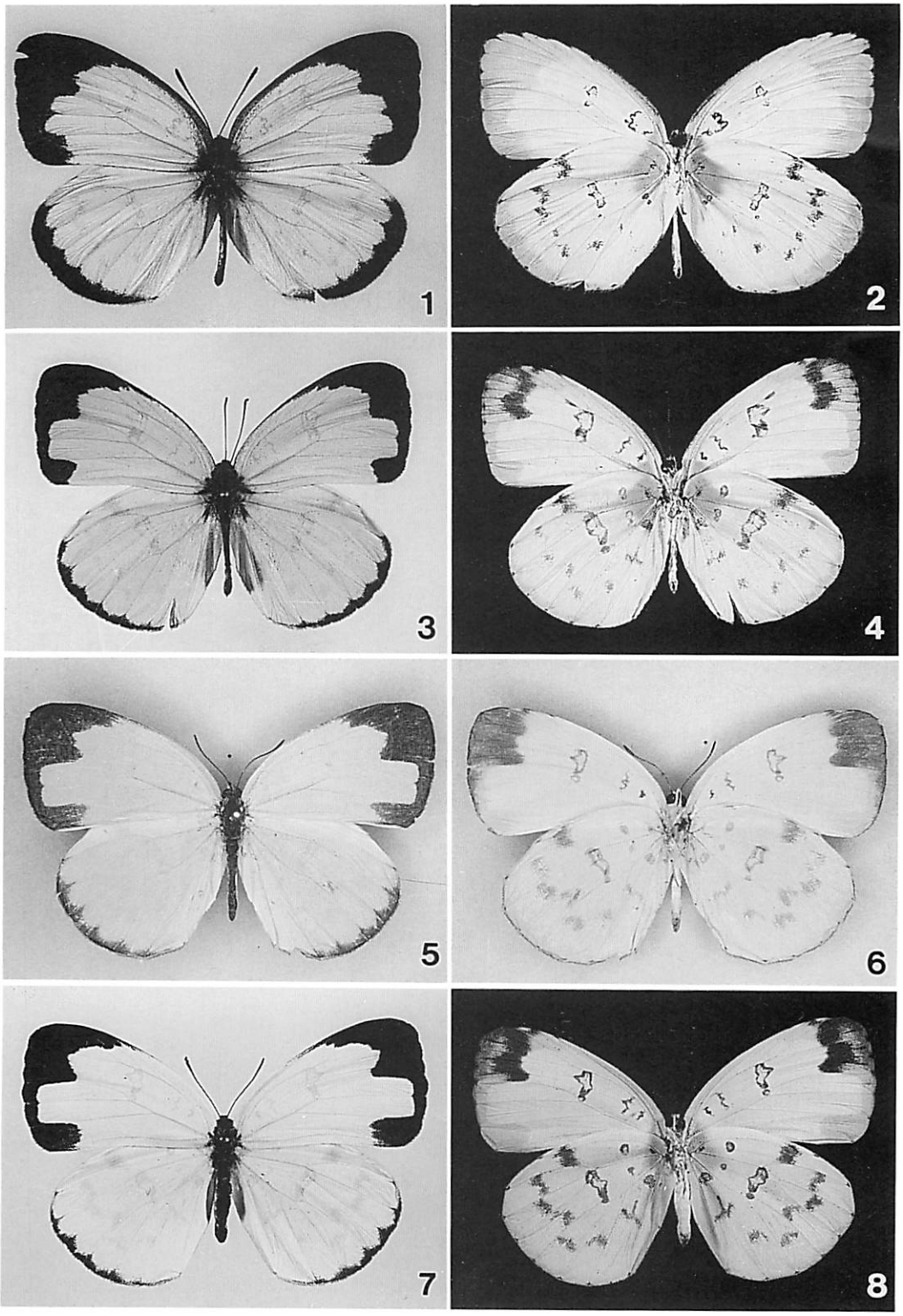
Explanation of Plate 10

Eurema simulatrix princesae MORISHITA, 1973 [P. 67]

1. ♂. Nias.
2. Ditto, underside.

Eurema irena CORBET & PENDLEBURY, 1932 [P. 68]

3. ♂. C. Sulawesi.
4. Ditto, underside.
5. ♀, holotype [BMNH]. C. Sulawesi.
6. Ditto, underside.
7. ♀. C. Sulawesi.
8. Ditto, underside.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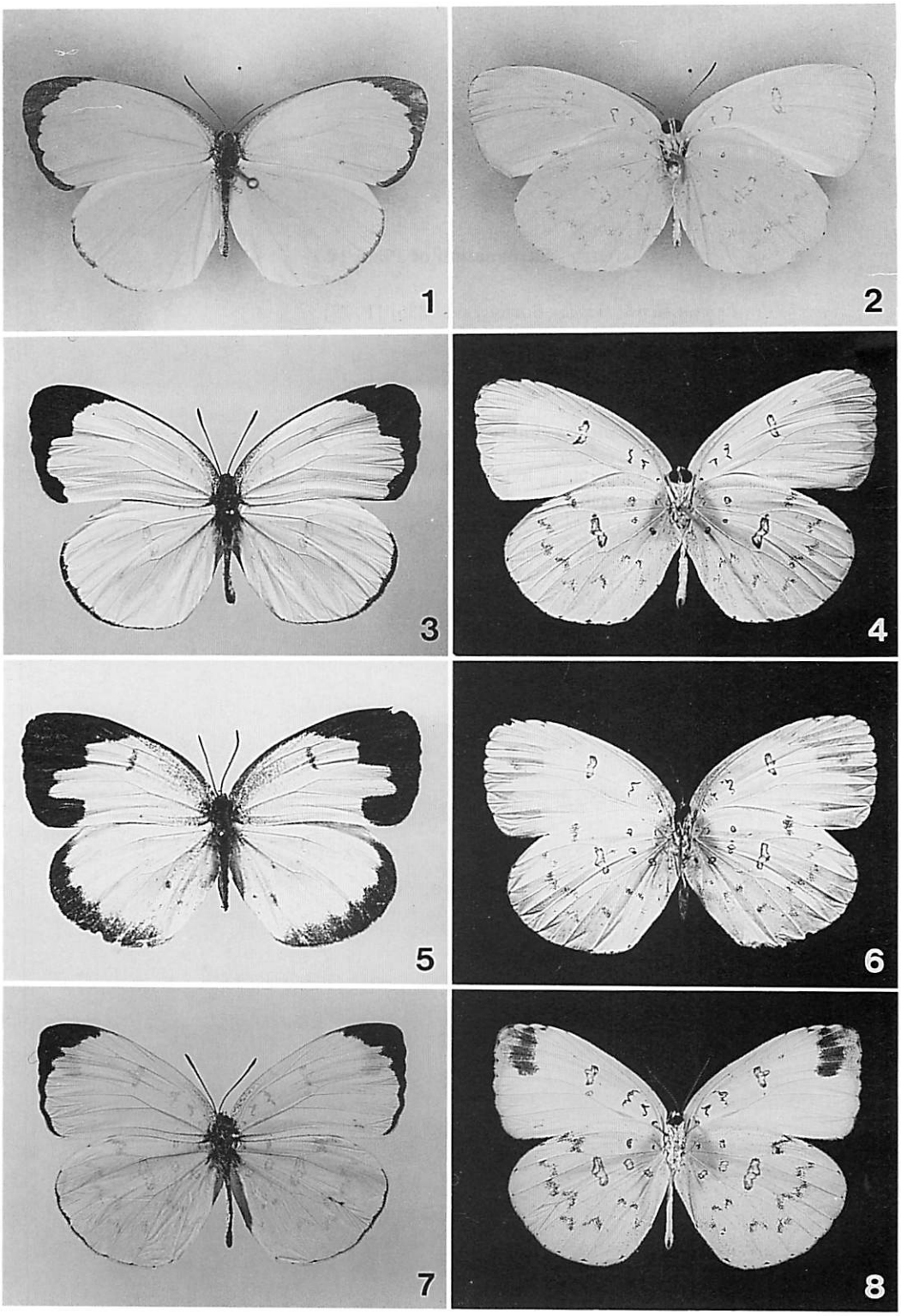
Explanation of Plate 11

Eurema blanda blanda (BOISDUVAL, 1836) [P. 77]

1. Wet-season form. ♂, holotype [BMNH]. Java.
2. Ditto, underside.
3. Wet-season form. ♂. Malay Peninsula.
4. Ditto, underside.
5. Wet-season form. ♀. Java.
6. Ditto, underside.
7. Dry-season form. ♂. Java.
8. Ditto, underside.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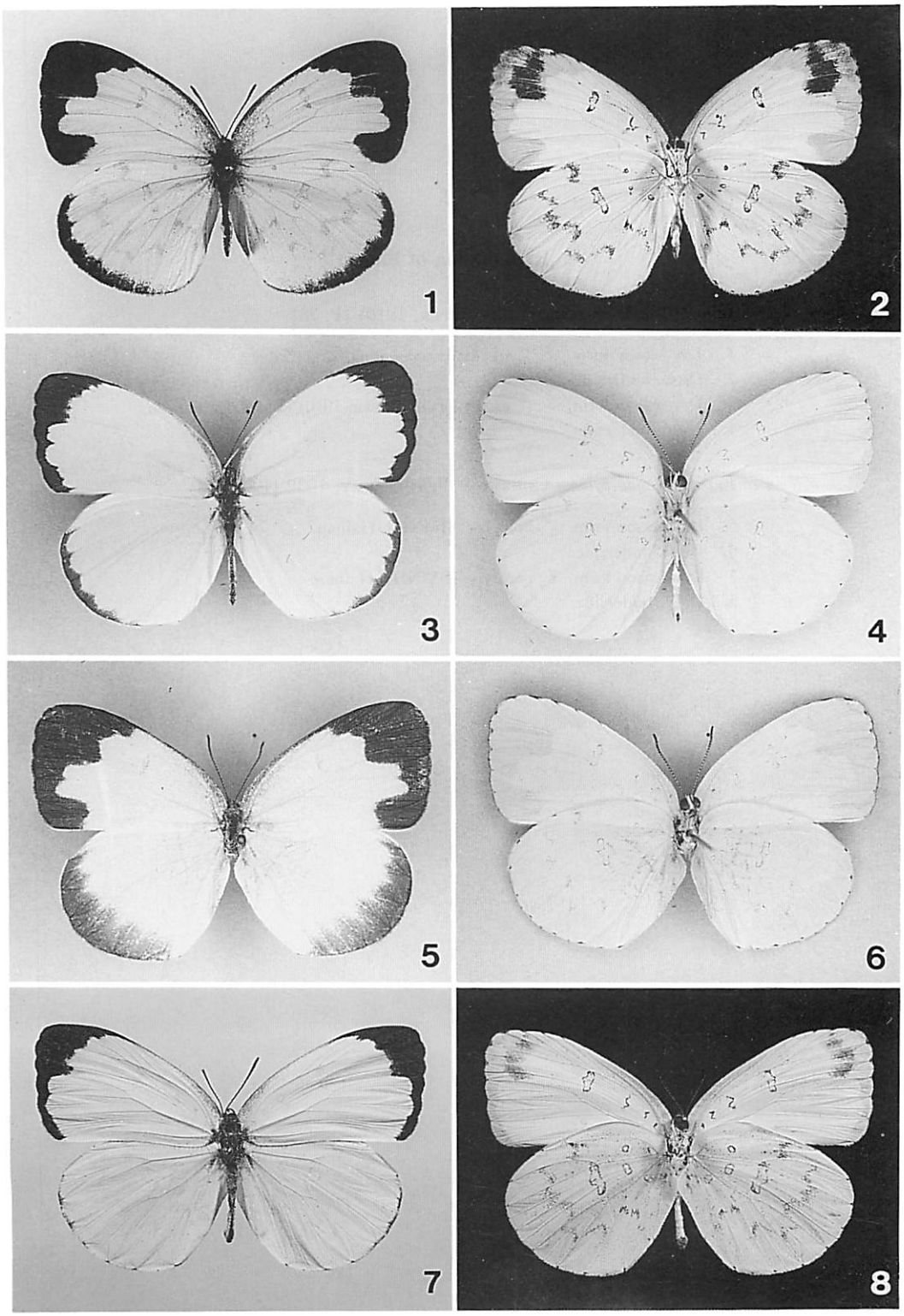
Explanation of Plate 12

Eurema blanda blanda (BOISDUVAL, 1836) [P. 77]

1. Dry-season form. ♀. Java.
2. Ditto, underside.

Eurema blanda arsakia (FRUHSTORFER, 1910) [P. 78]

3. Wet-season form. ♂, lectotype [BMNH]. Taiwan.
4. Ditto, underside.
5. Wet-season form. ♀, paralectotype [BMNH]. Taiwan.
6. Ditto, underside.
7. Dry-season form. ♂. Taiwan.
8. Ditto, underside.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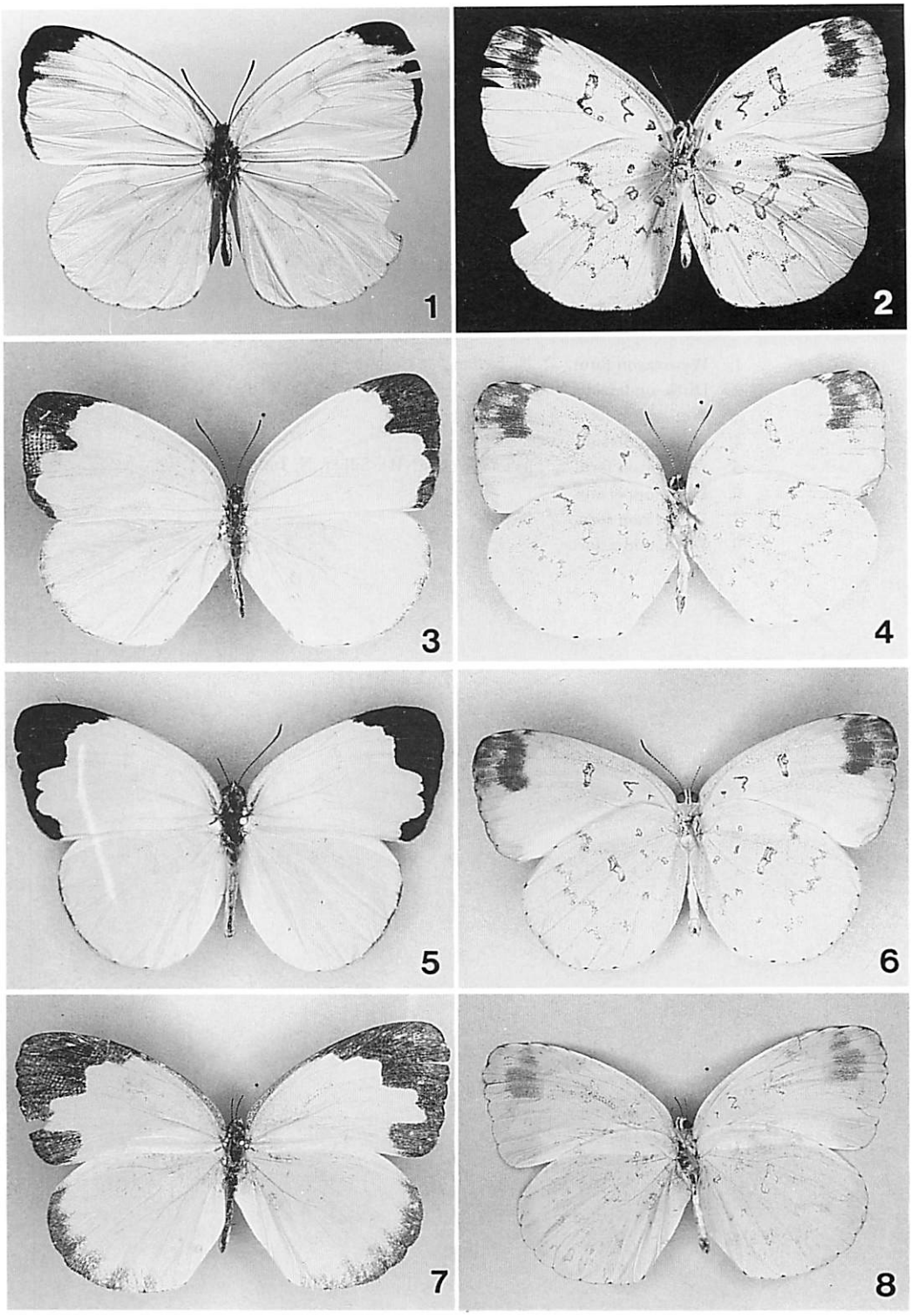
Explanation of Plate 13

Eurema blanda arsakia (FRUHSTORFER, 1910) [P. 78]

1. Dry-season form. ♂. Ryukyus, Iriomotejima.
2. Ditto, underside.
3. Dry-season form. ♀, (f. *aphaia* FRUHSTORFER, 1910) [BMNH]. Taiwan.
4. Ditto, underside.

Eurema blanda hylama CORBET & PENDLEBURY, 1932 [P. 79]

5. Dry-season form. ♂, holotype [BMNH]. Hainan.
6. Ditto, underside.
7. Dry-season form. ♀, paratype [BMNH]. Hainan.
8. Ditto, underside.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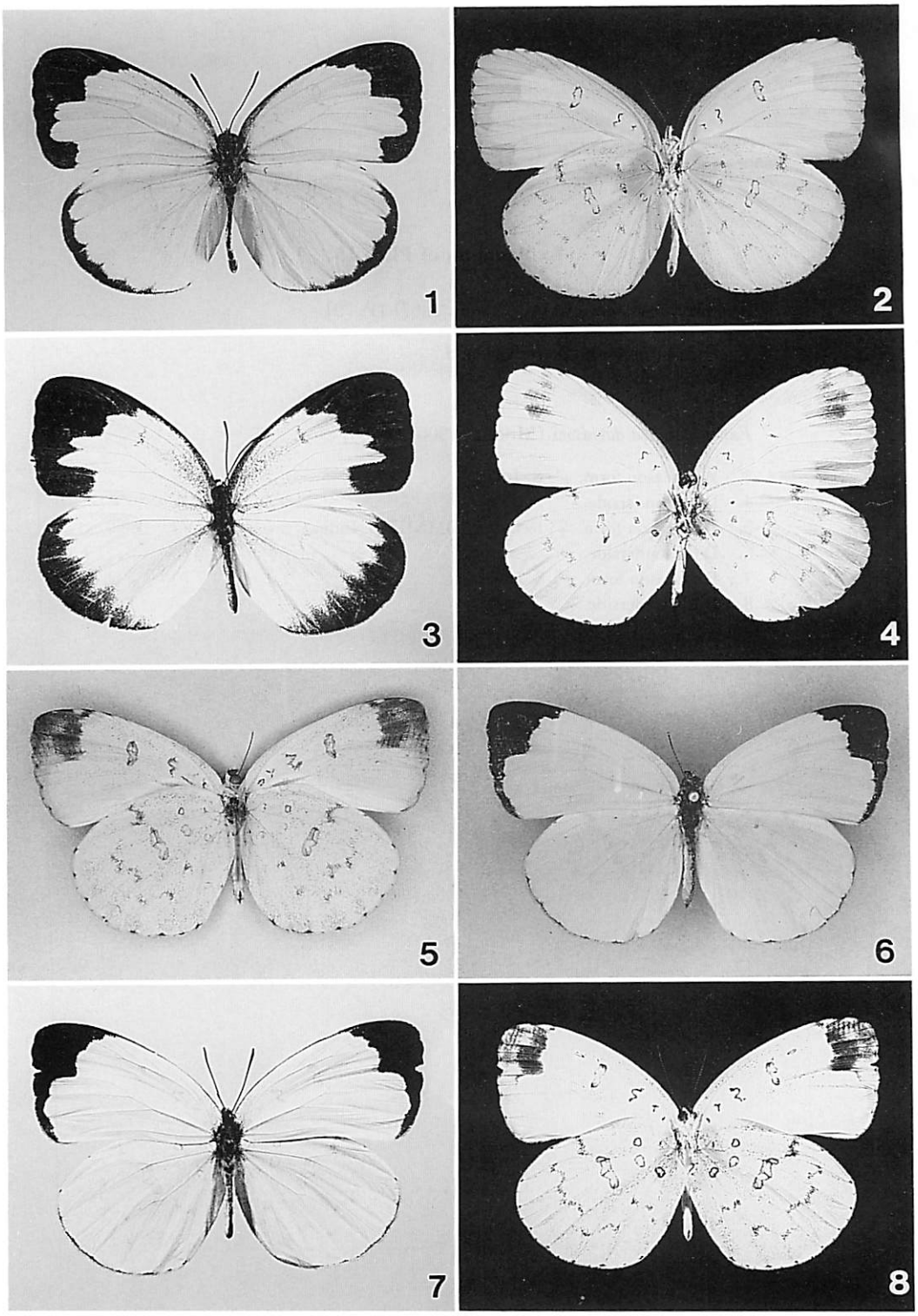
Explanation of Plate 14

Eurema blanda silhetana (WALLACE, 1867) [P. 79]

1. Wet-season form. ♂. N. India.
2. Ditto, underside.
3. Wet-season form. ♀. Nepal.
4. Ditto, underside.
5. Dry-season form. ♂, lectotype [BMNH]. Silhet, N. India.
6. Ditto, upperside.
7. Dry-season form. ♂. Nepal.
8. Ditto, underside.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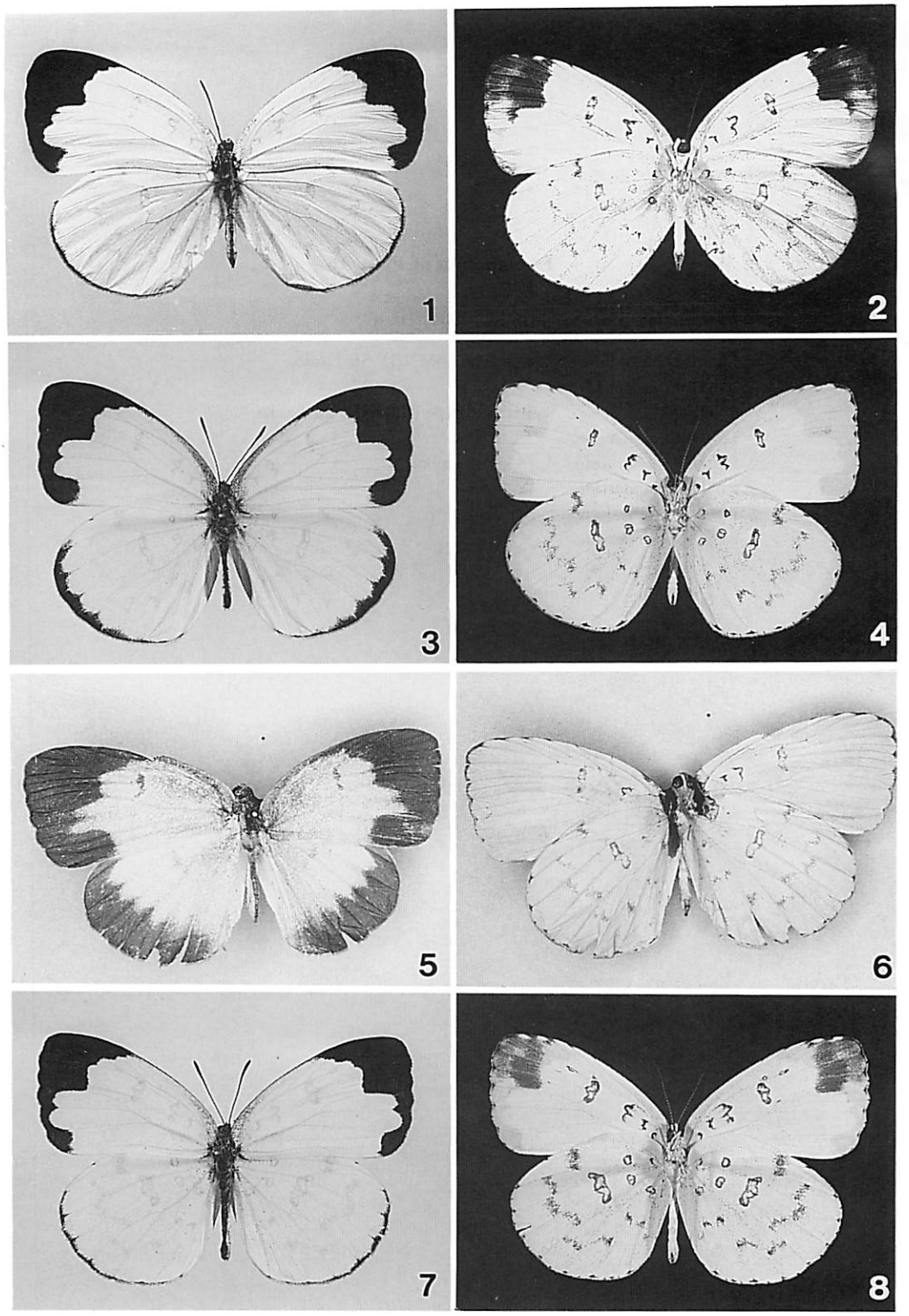
Explanation of Plate 15

Eurema blanda silhetana (WALLACE, 1867) [P. 79]

1. Dry-season form. ♀. N. Thailand.
2. Ditto, underside.

Eurema blanda davidsoni (MOORE, 1906) [P. 80]

3. Wet-season form. ♂. S. India.
4. Ditto, underside.
5. Wet-season form. ♀, lectotype [BMNH]. S. India.
6. Ditto, underside.
7. Dry-season form. ♂. S. India.
8. Ditto, underside.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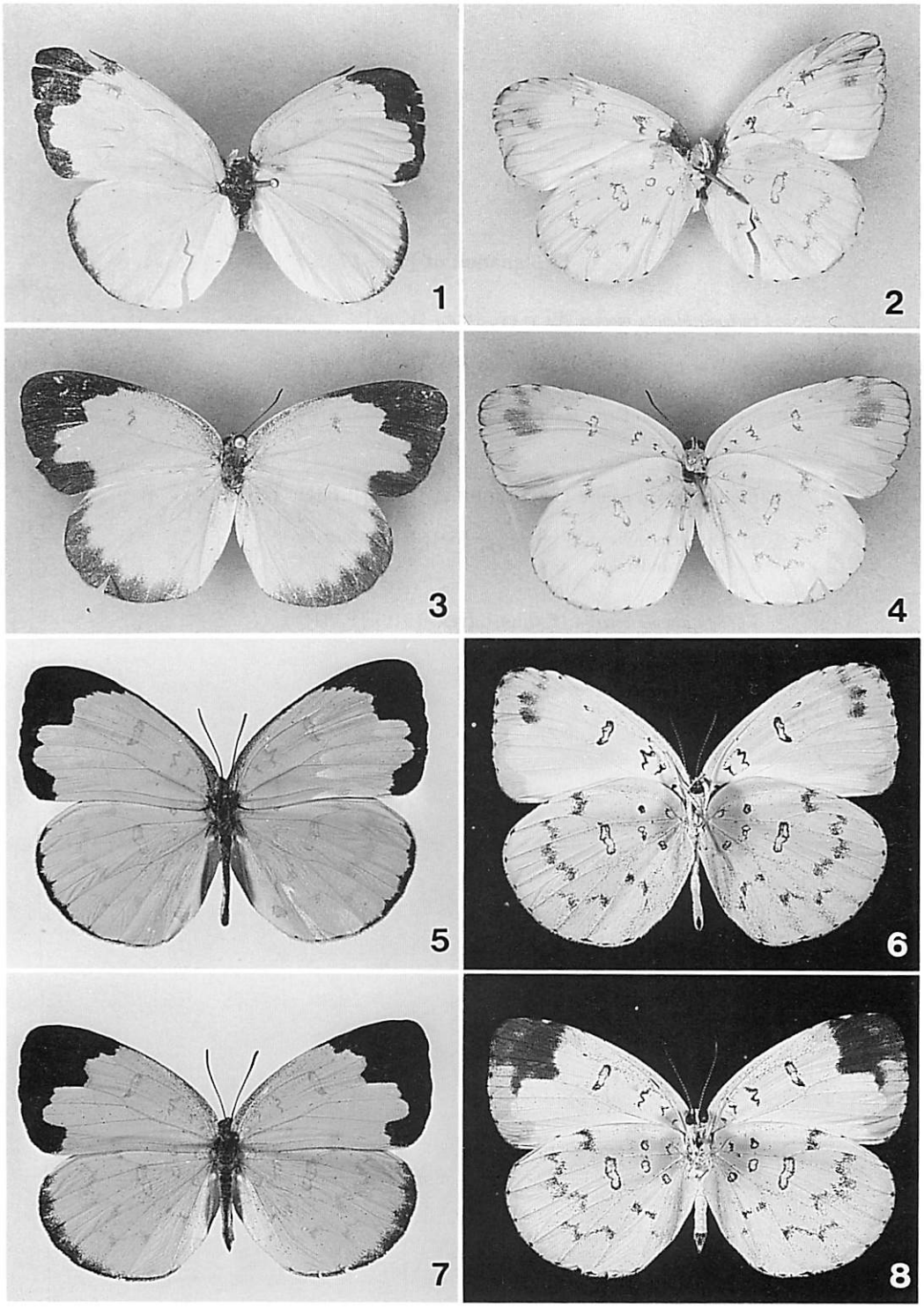
Explanation of Plate 16

Eurema blanda citrina (MOORE, 1881) [P. 81]

1. Wet-season form. ♂, lectotype [BMNH]. Sri Lanka.
2. Ditto, underside.
3. Wet-season form. ♀, paralectotype [BMNH]. Sri Lanka.
4. Ditto, underside.
5. Dry-season form. ♂, [SI]. Sri Lanka.
6. Ditto, underside.
7. Dry-season form. ♀. Sri Lanka.
8. Ditto, underside.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Explanation of Plate 17

Eurema blanda moorei (BUTLER, 1886) [P. 82]

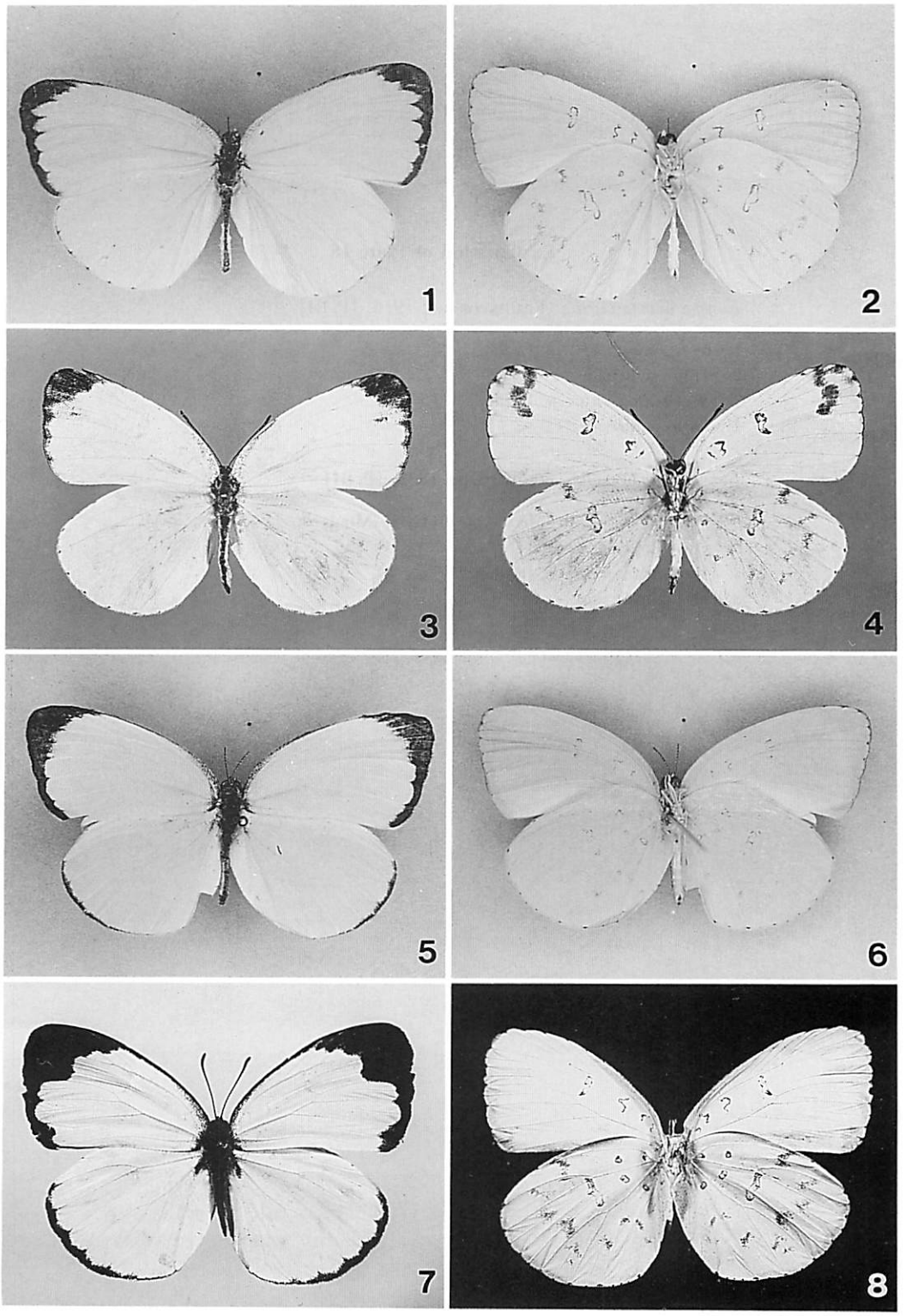
1. Wet-season form. ♂, lectotype [BMNH]. Nicobars.
2. Ditto, underside.
3. Dry-season form. ♀, [OHTSUKA coll.]. N. Nicobars.
4. Ditto, underside.

Eurema blanda natuna (FRUHSTORFER, 1910) [P. 83]

5. Wet-season form. ♂, lectotype [BMNH]. Natuna Is.
6. Ditto, underside.

Eurema blanda visellia (FRUHSTORFER, 1910) [P. 84]

7. Wet-season form. ♂. Luzon
8. Ditto, underside.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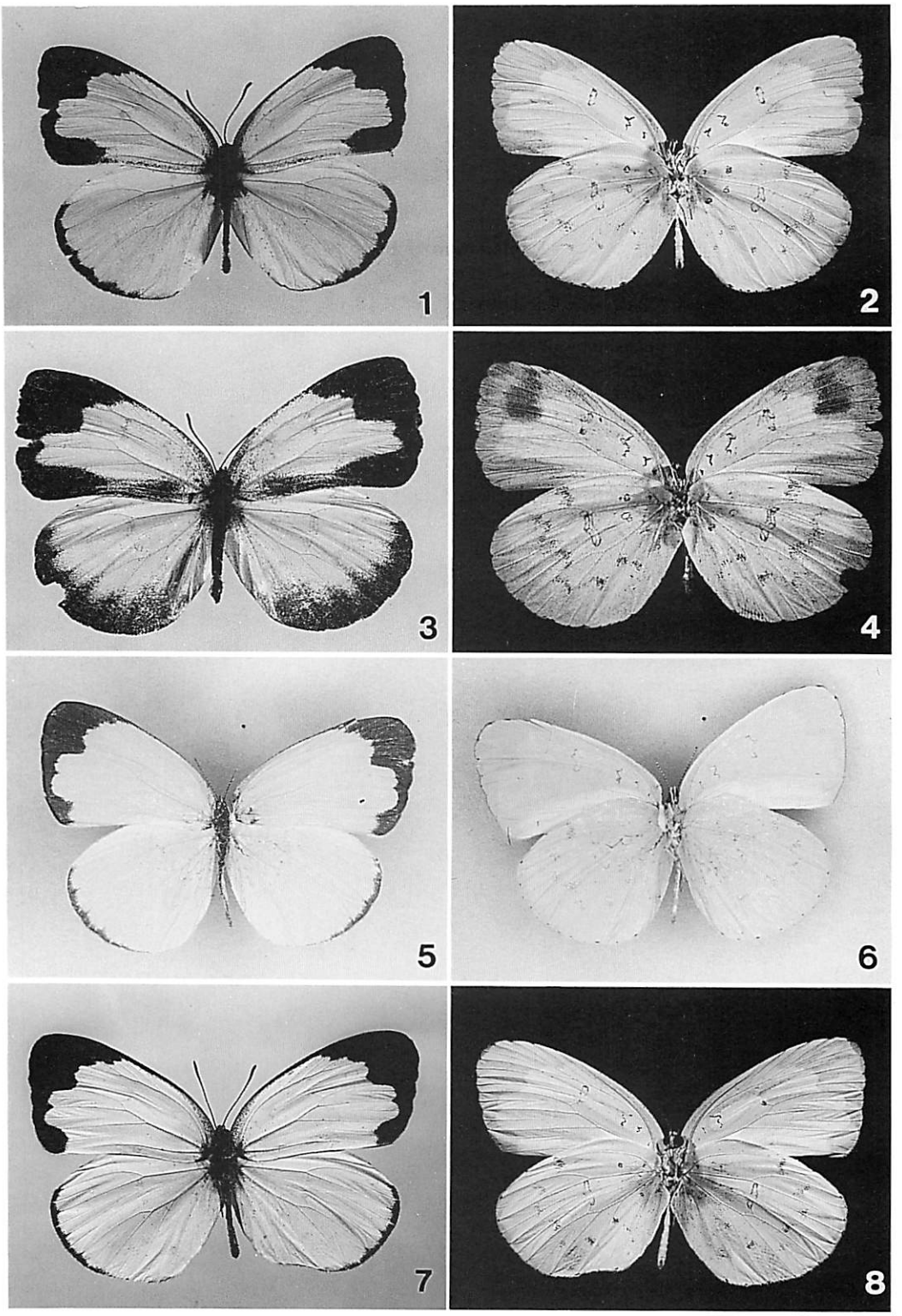
Explanation of Plate 18

Eurema blanda visellia (FRUHSTORFER, 1910) [P. 84]

1. Wet-season form. ♂. Luzon.
2. Ditto, underside.
3. Wet-season form. ♀. Luzon.
4. Ditto, underside.

Eurema blanda vallivolans (BUTLER, 1883) [P. 84]

5. Wet-season form. ♂, lectotype [BMNH]. Mindanao.
6. Ditto, underside.
7. Wet-season form. ♂. Bazilan.
8. Ditto, underside.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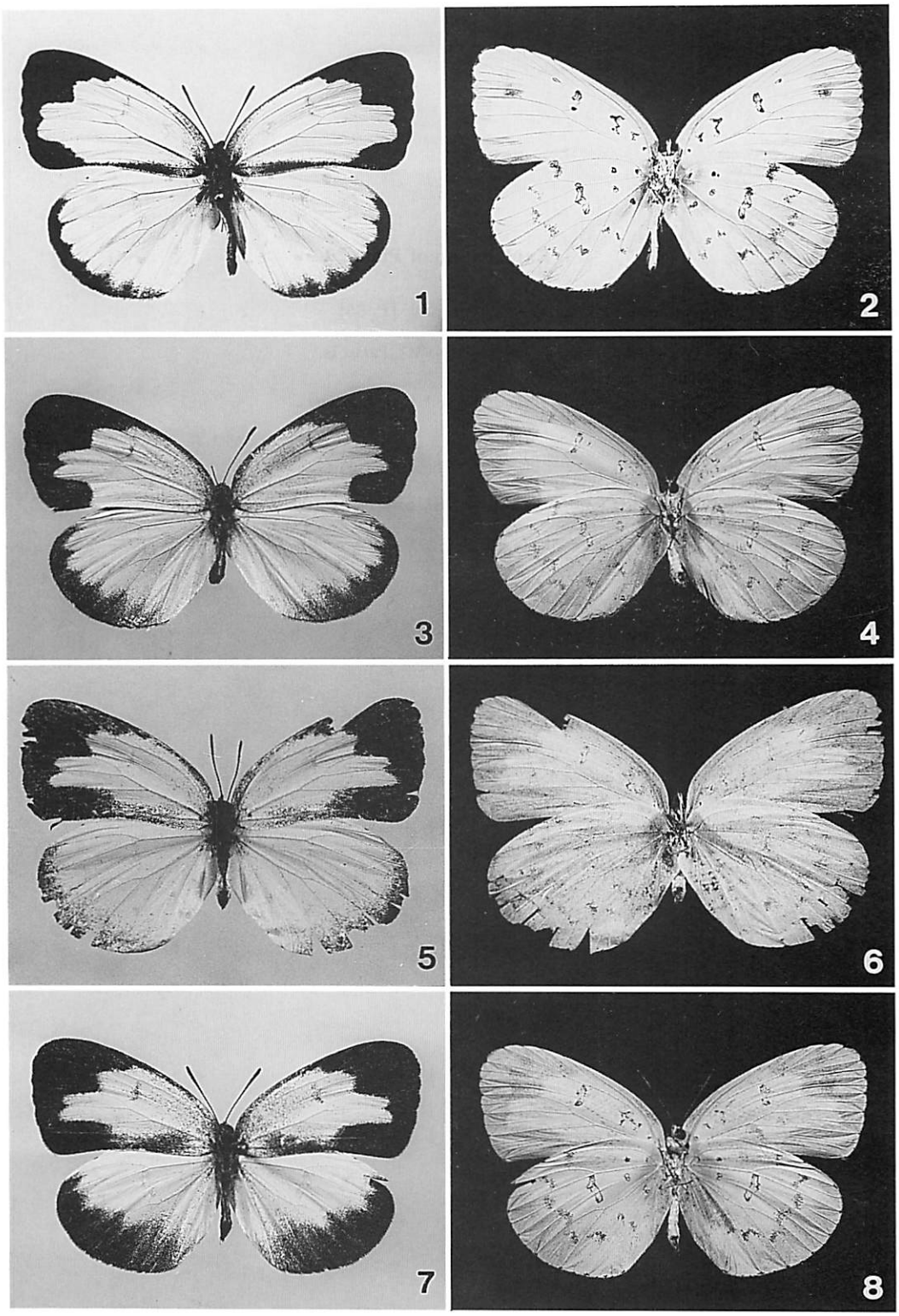
Explanation of Plate 19

Eurema blanda vallivolans (BUTLER, 1883) [P. 84]

1. Wet-season form. ♂. Mindanao.
2. Ditto, underside.
3. Wet-season form. ♀. Bazilan.
4. Ditto, underside.
5. Wet-season form. ♀. Mindanao.
6. Ditto, underside.
7. Wet-season form. ♀. Palawan.
8. Ditto, underside.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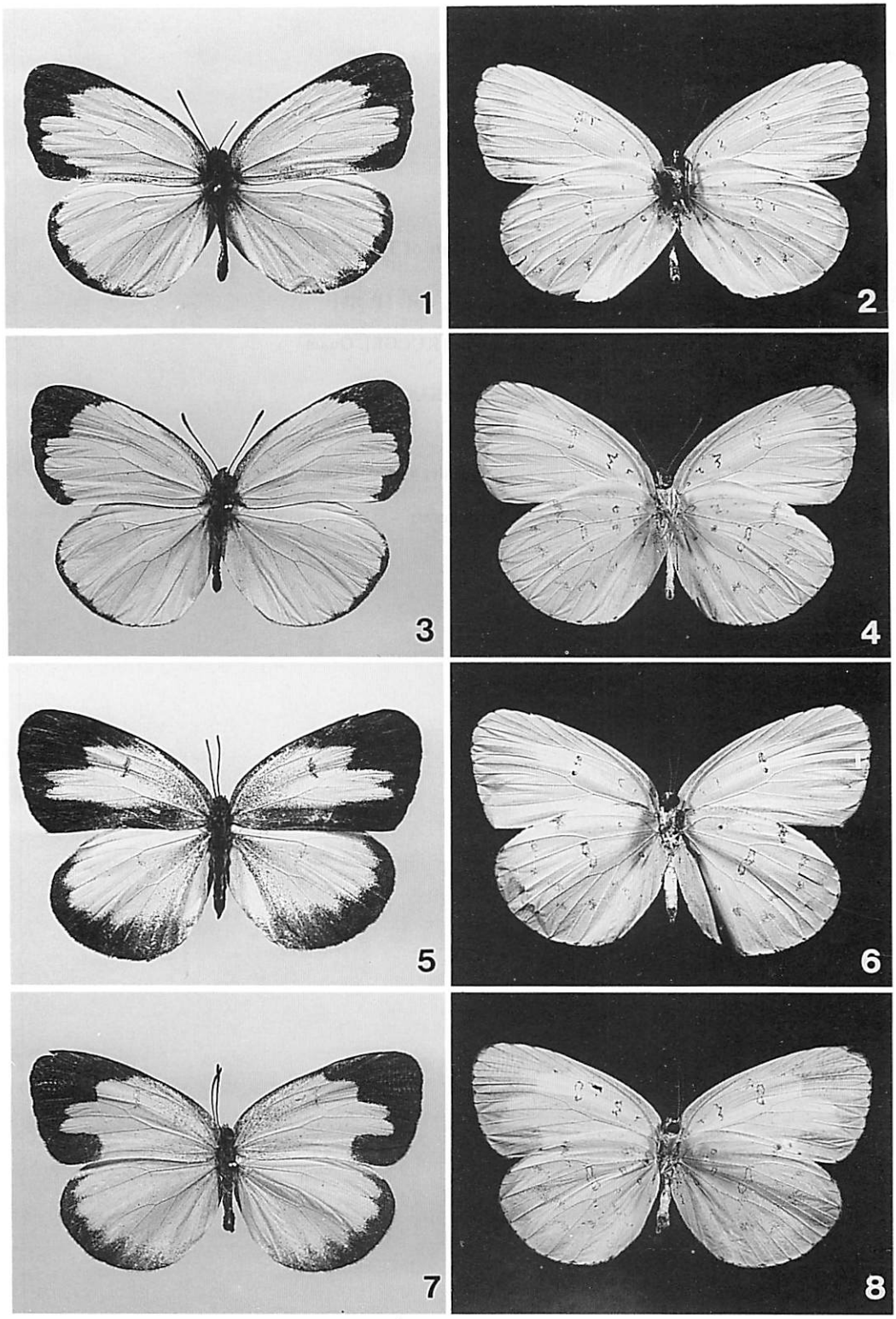
Explanation of Plate 20

Eurema blanda kishidai YATA, ssp. nov. [P. 85]

1. Wet-season form. ♂, holotype [NSM]. Palau Is.
2. Ditto, underside.
3. Wet-season form. ♂, paratype [KUFA]. Marianas.
4. Ditto, underside.
5. Wet-season form. ♀, paratype [NSM]. Palau Is.
6. Ditto, underside.
7. Wet-season form. ♀, paratype [KUFA]. Saipan, Marianas.
8. Ditto, underside.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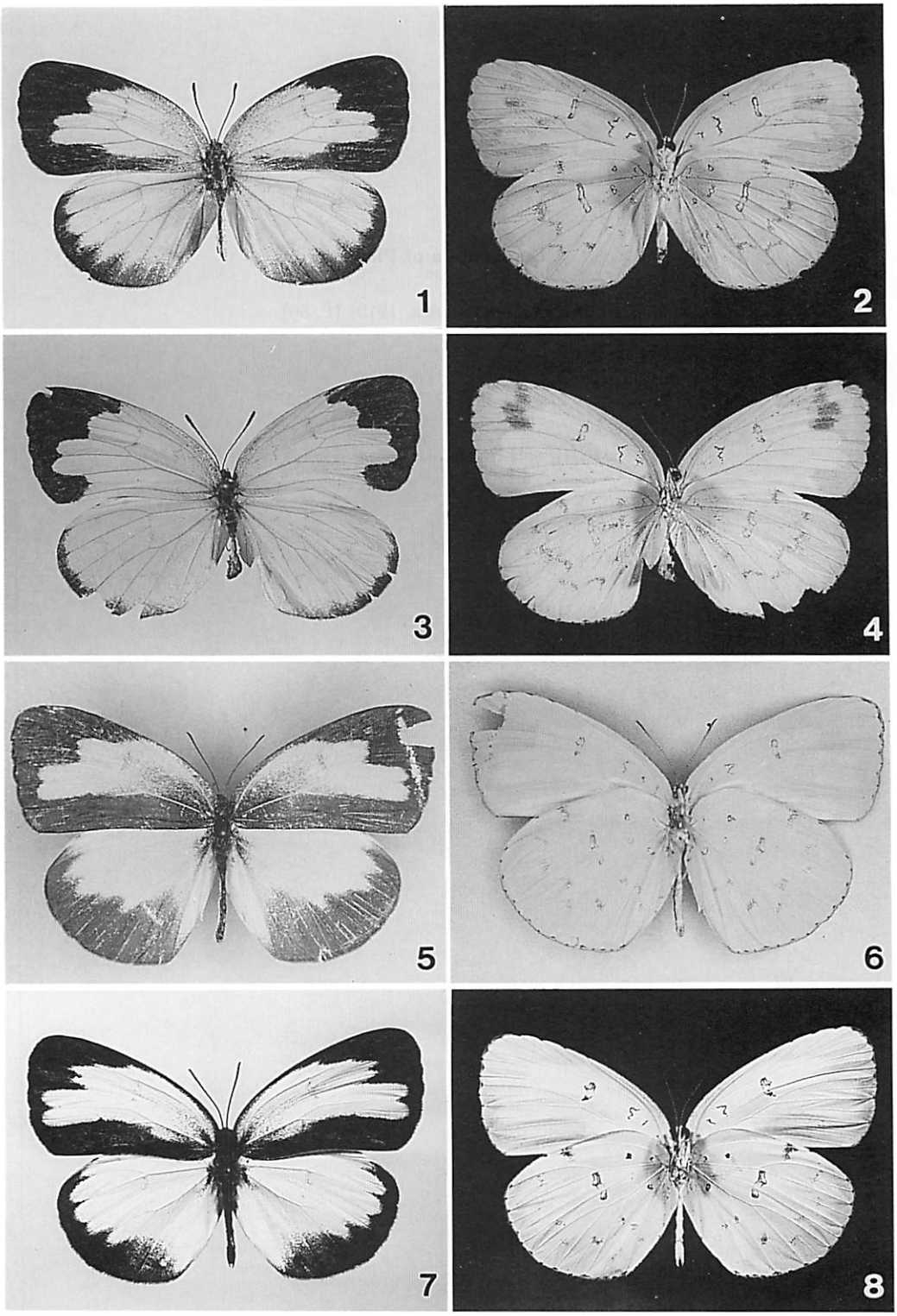
Explanation of Plate 21

Eurema blanda kishidai YATA, ssp. nov. [P. 85]

1. Wet-season form. ♀, paratype [KUCGE]. Guam.
2. Ditto, underside.
3. Dry-season form. ♀, paratype [KUCGE]. Guam.
4. Ditto, underside.

Eurema blanda norbana (FRUHSTORFER, 1910) [P. 86]

5. ♂, lectotype [BNMH]. N. Sulawesi.
6. Ditto, underside.
7. ♂. N. Sulawesi.
8. Ditto, underside.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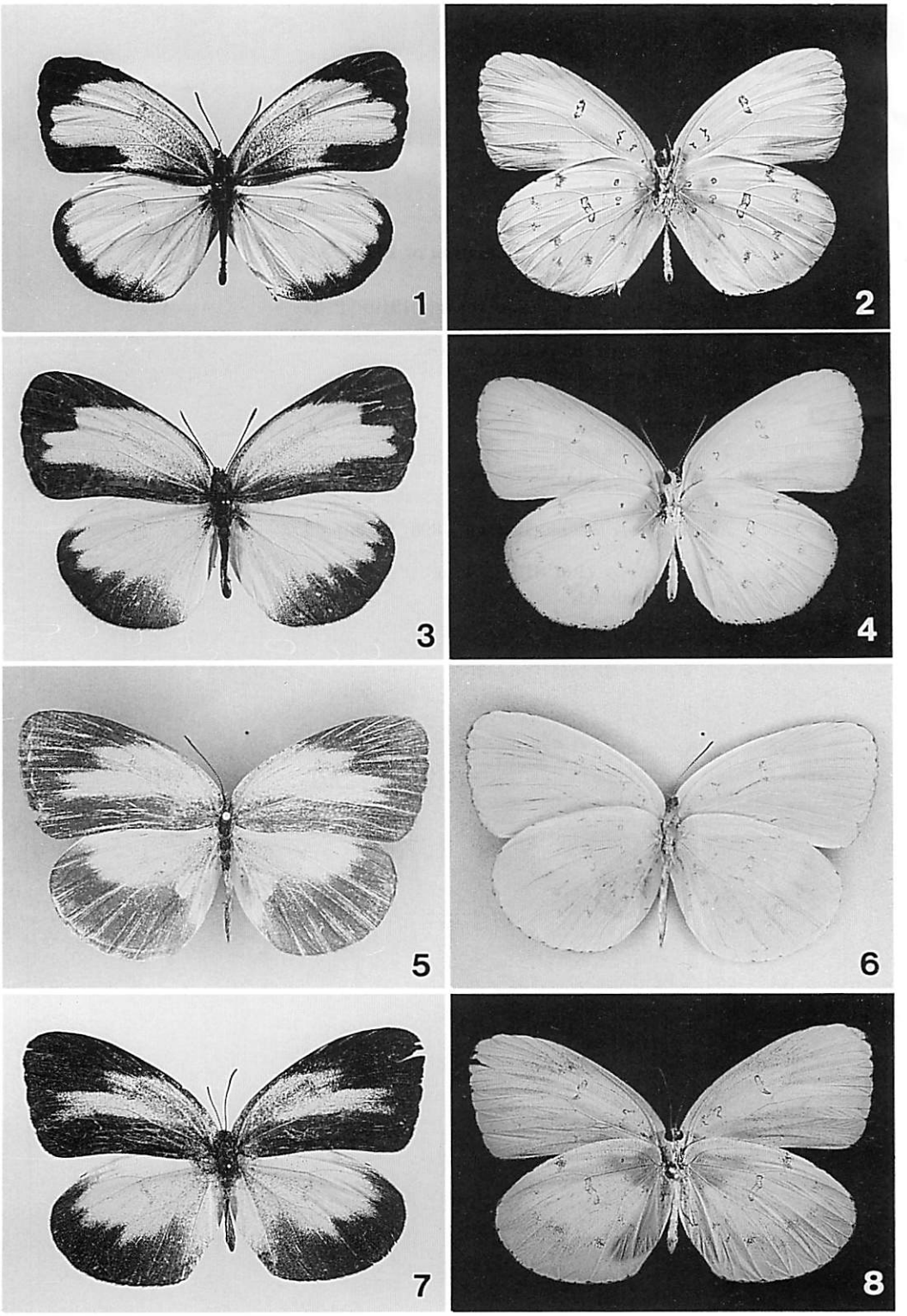
Explanation of Plate 22

Eurema blanda norbana (FRUHSTORFER, 1910) [P. 86]

1. ♂. N. Sulawesi.
2. Ditto, underside.
3. ♂. Sangi.
4. Ditto, underside.
5. ♂, type [BMNH]. Sula Isls. (*Terias norbana sulaensis* JOICEY & TALBOT, 1922)
6. Ditto, underside.
7. ♀. N. Sulawesi
8. Ditto, underside.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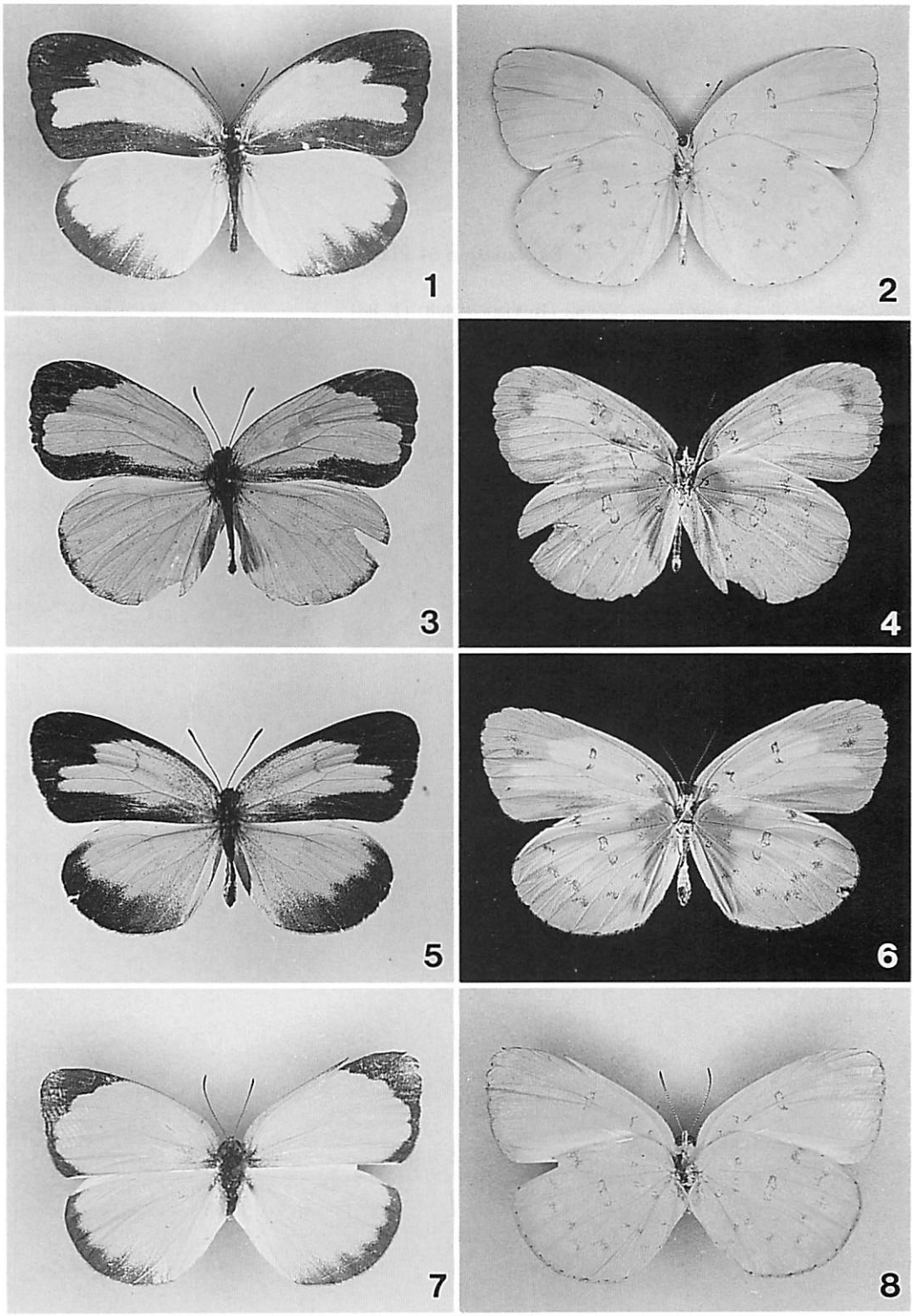
Explanation of Plate 23

Eurema blanda odinia (FRUHSTORFER, 1910) [P. 87]

1. ♂, lectotype [BMNH]. S. Sulawesi.
2. Ditto, underside.
3. ♂. S. Sulawesi.
4. Ditto, underside.
5. ♀. S. Sulawesi.
6. Ditto, underside.

Eurema blanda indecisa (BUTLER, 1898) [P. 88]

7. ♂, lectotype [BMNH]. Batchian.
8. Ditto, underside.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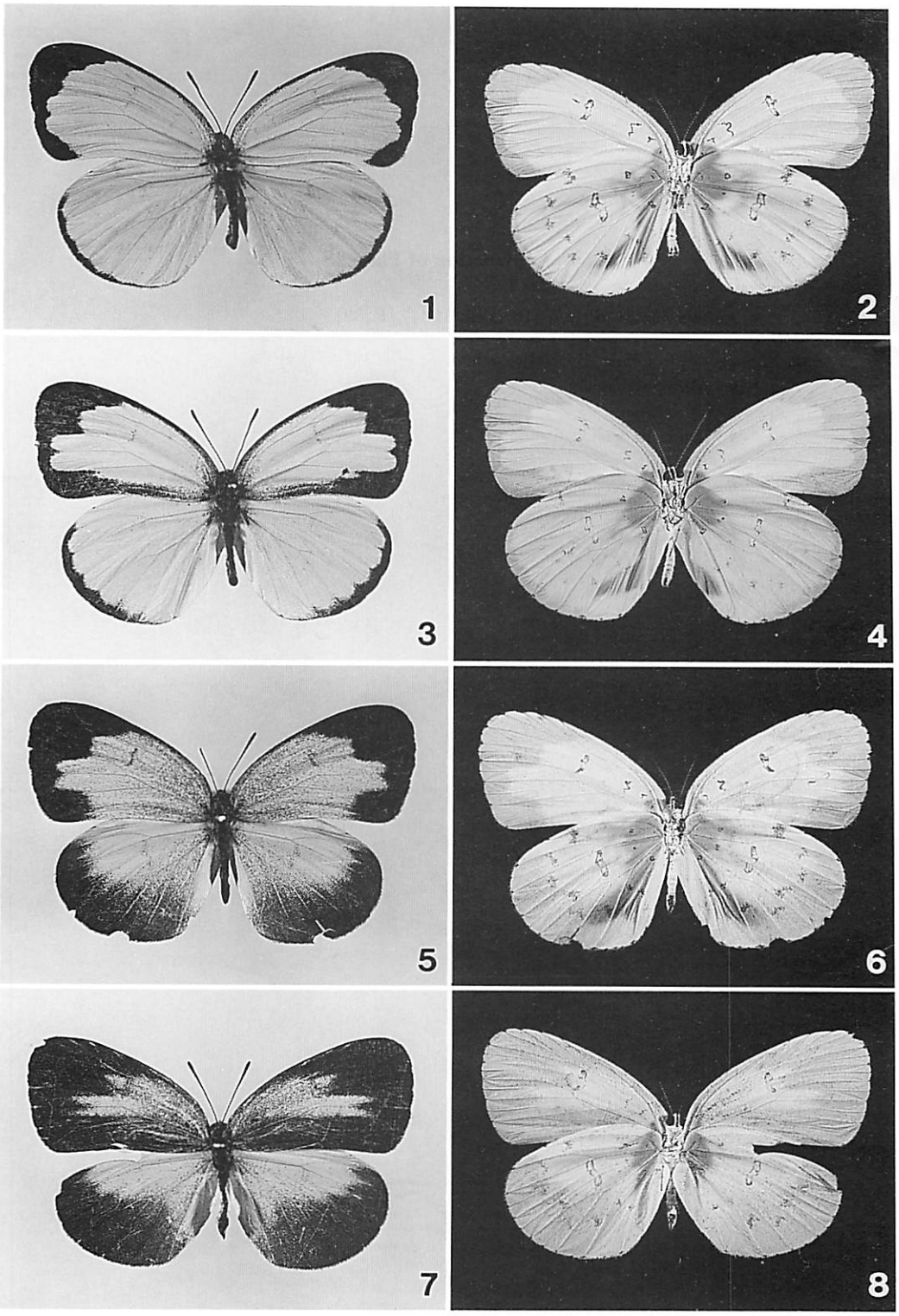
Explanation of Plate 24

Eurema blanda indecisa (BUTLER, 1898) [P. 88]

1. ♂. Halmahera.
2. Ditto, underside.
3. ♂. Halmahera.
4. Ditto, underside.
5. ♀. Halmahera.
6. Ditto, underside.
7. ♀. Halmahera.
8. Ditto, underside.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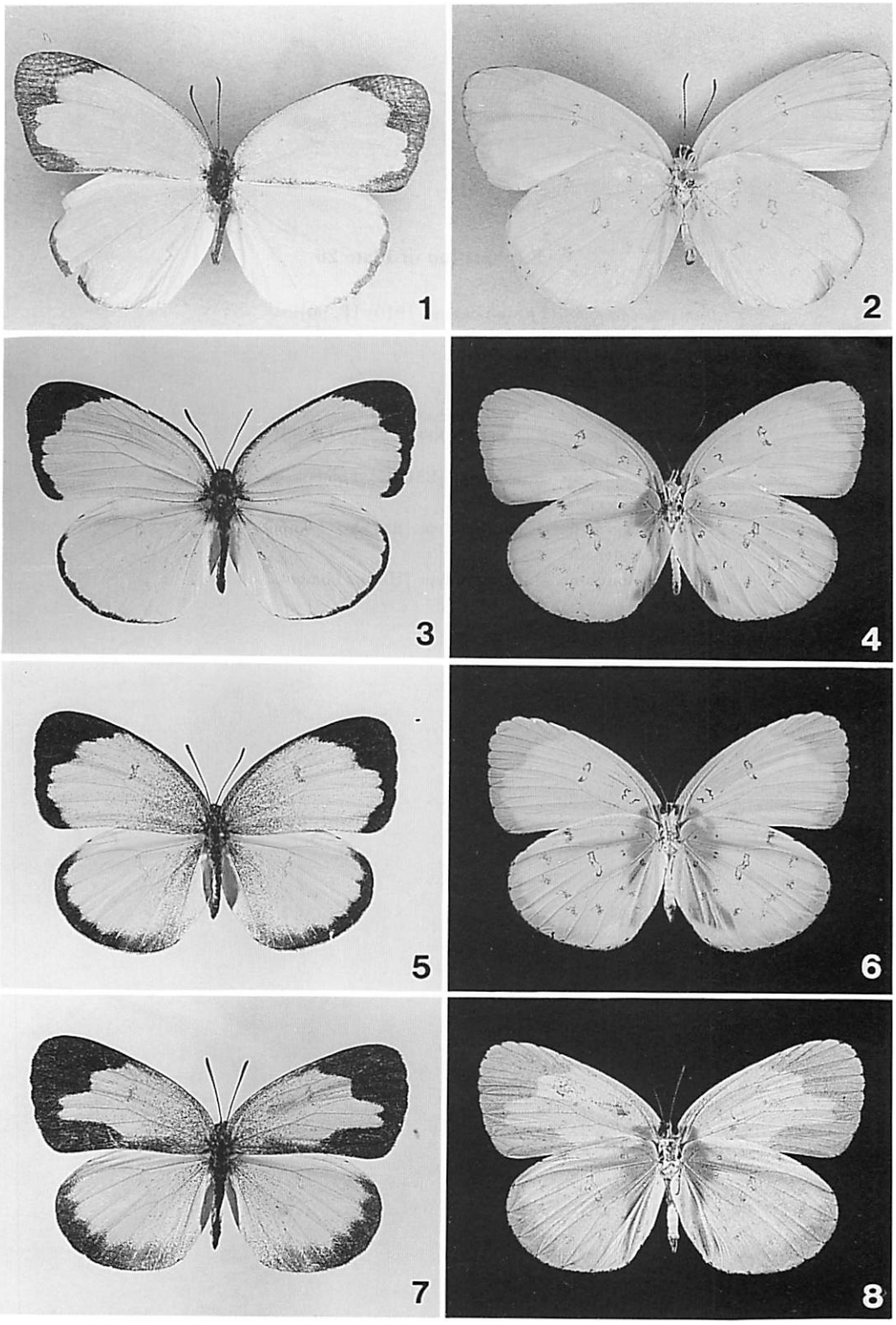
Explanation of Plate 25

Eurema blanda biformis (BUTLER, 1884) [P. 89]

1. ♂, lectotype [BMNH]. Ambon.
2. Ditto, underside.
3. ♂. Ambon.
4. Ditto, underside.
5. ♀. Ambon.
6. Ditto, underside.
7. ♀. Ambon.
8. Ditto, underside.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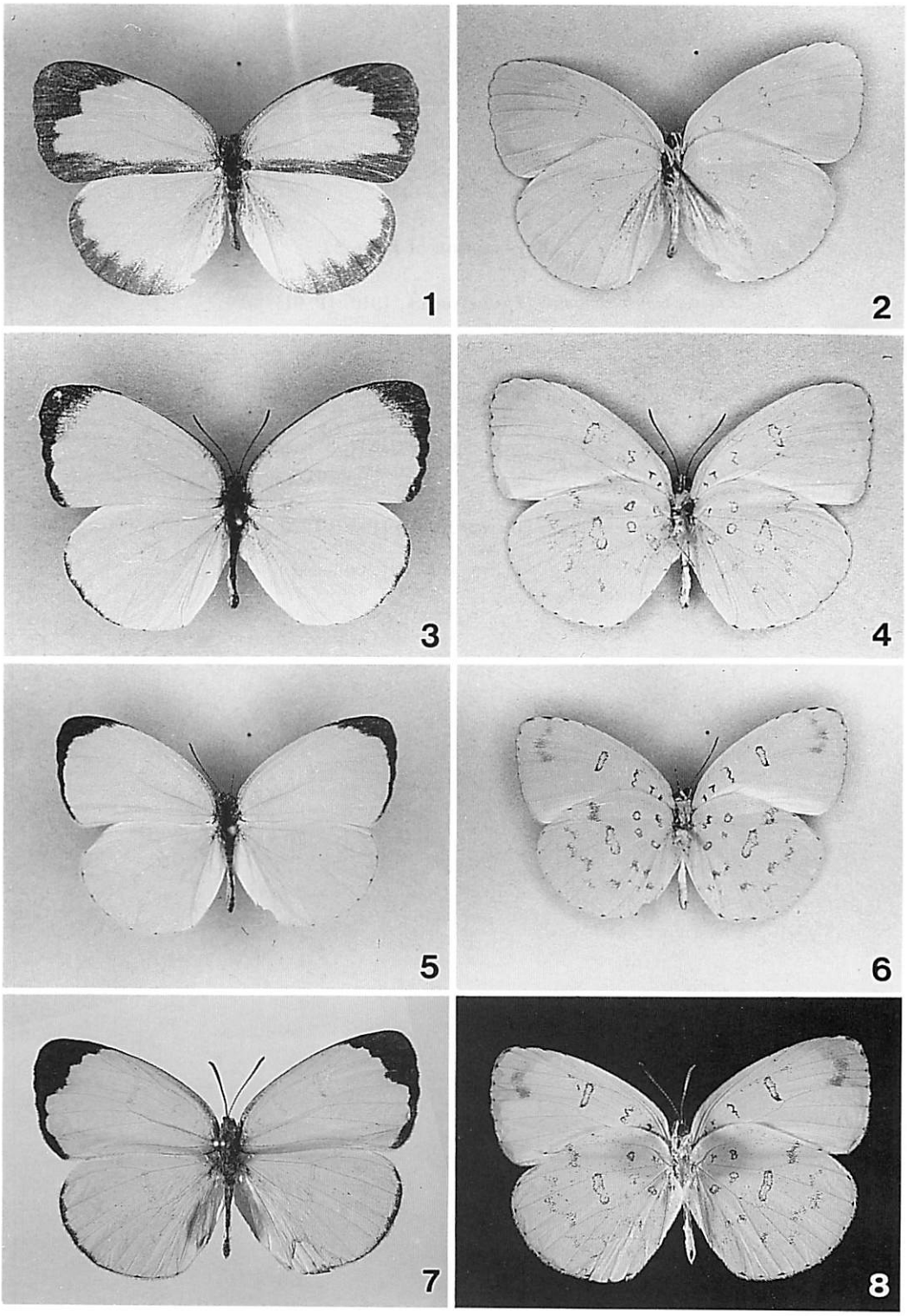
Explanation of Plate 26

Eurema blanda anios (FRUHSTORFER, 1910) [P. 90]

1. ♂, lectotype [BMNH]. Obi.
2. Ditto, underside.

Eurema blanda sanapati (FRUHSTORFER, 1910) [P. 90]

3. Wet-season form. ♂, lectotype [BMNH]. Lombok.
4. Ditto, underside.
5. Dry-season form. ♂, paralectotype [BMNH]. Lombok.
6. Ditto, underside.
7. Dry-season form. ♂, paralectotype [HUB]. Lombok.
8. Ditto, underside.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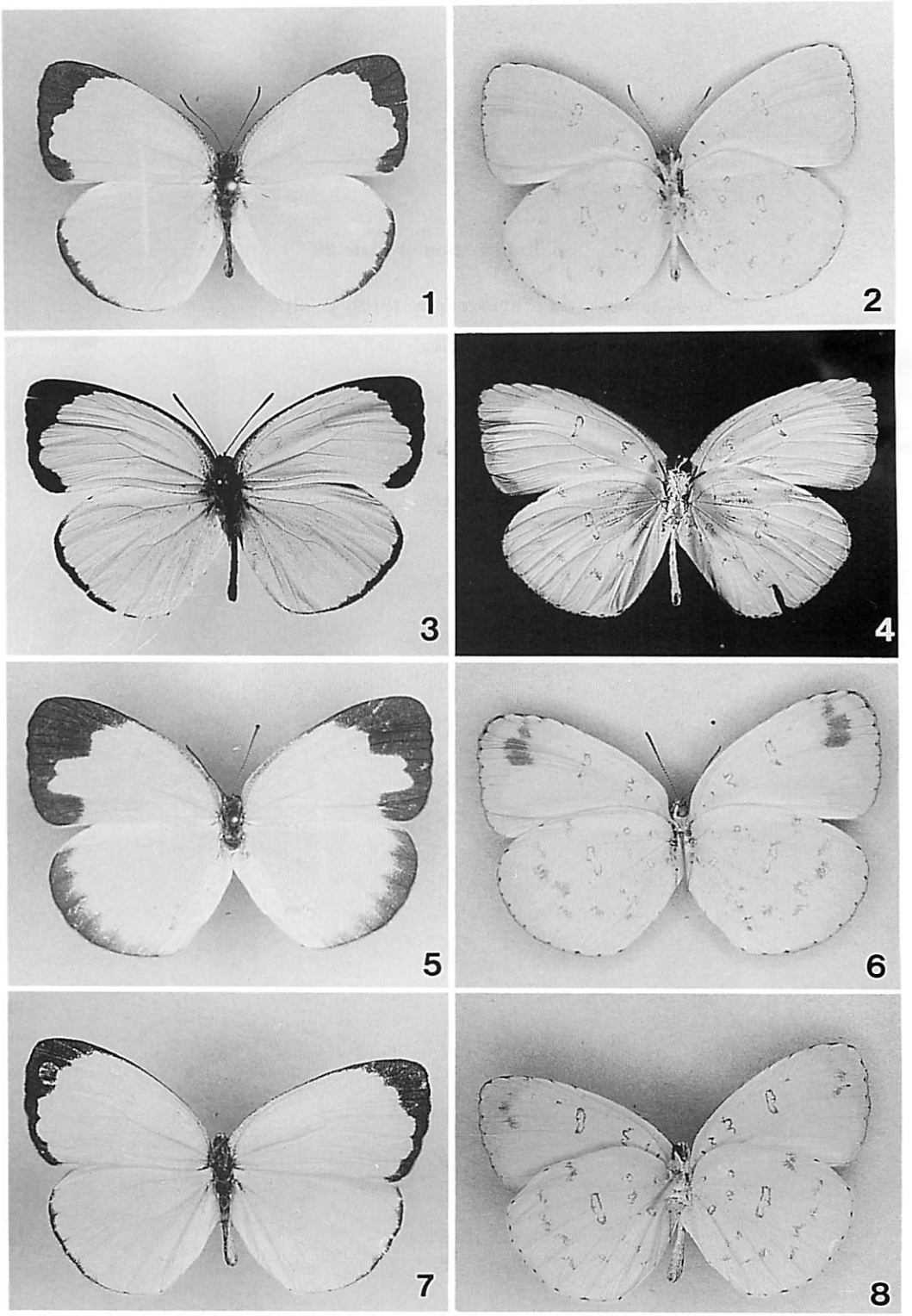
Explanation of Plate 27

Eurema blanda cantideva (FRUHSTORFER, 1910) [P. 91]

1. Wet-season form. ♂, lectotype [BMNH]. Wetter.
2. Ditto, underside.
3. Wet-season form. ♂. W. Timor.
4. Ditto, underside.
5. Wet-season form. ♀, paralectotype [BMNH]. Wetter.
6. Ditto, underside.

Eurema blanda laratensis (BUTLER, 1883) [P. 92]

7. Dry-season form. ♂, lectotype [BMNH]. Tanimbar.
8. Ditto, underside.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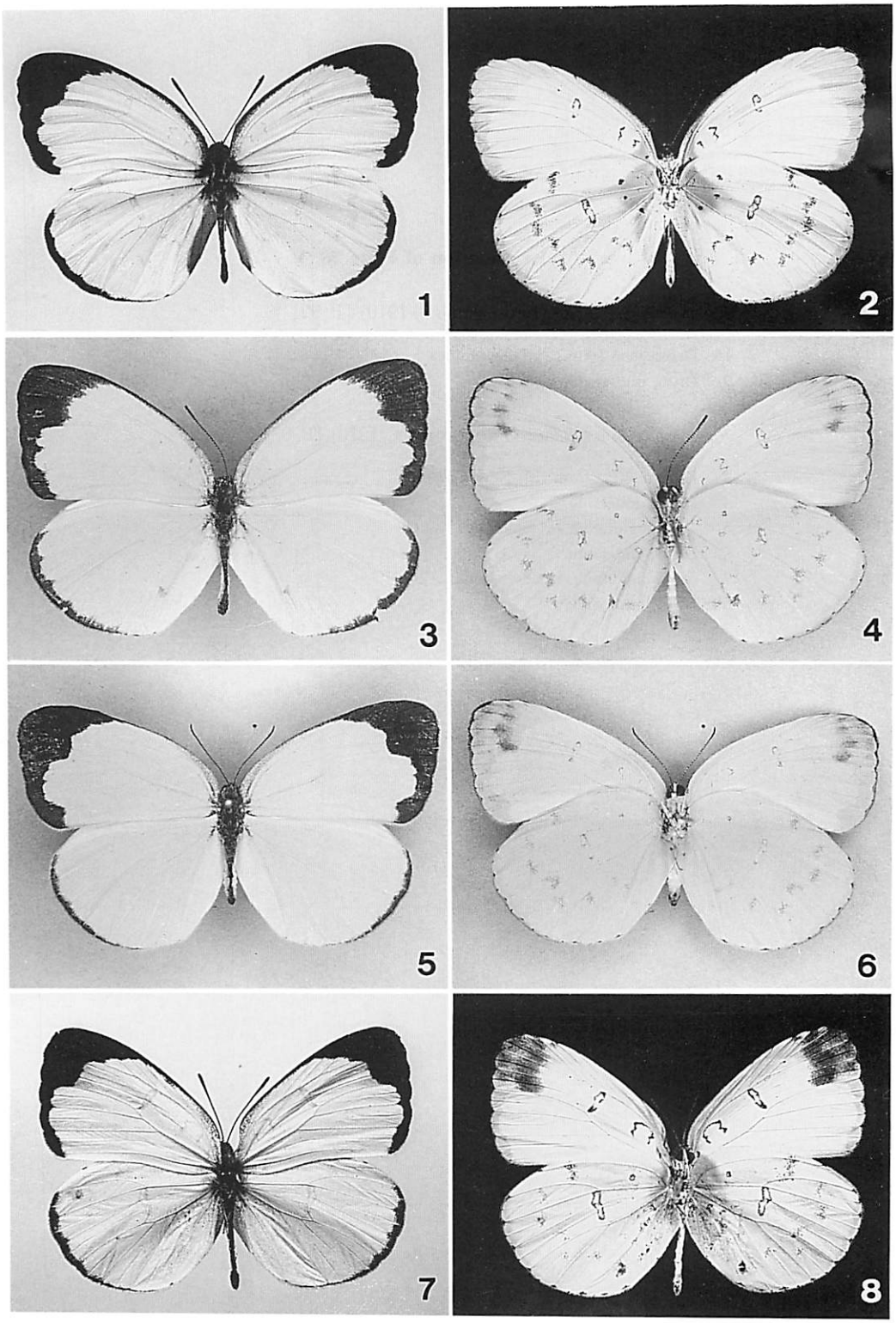
Explanation of Plate 28

Eurema blanda saraha (FRUHSTORFER, 1910) [P. 92]

1. Wet-season form. ♂. New Guinea.
2. Ditto, underside.
3. Wet-season form. ♂, lectotype [BMNH]. West Irian.
4. Ditto, underside.
5. Wet-season form. ♀, type [BMNH]. New Guinea.
6. Ditto, underside.
7. Dry-season form. ♂. New Guinea.
8. Ditto, underside.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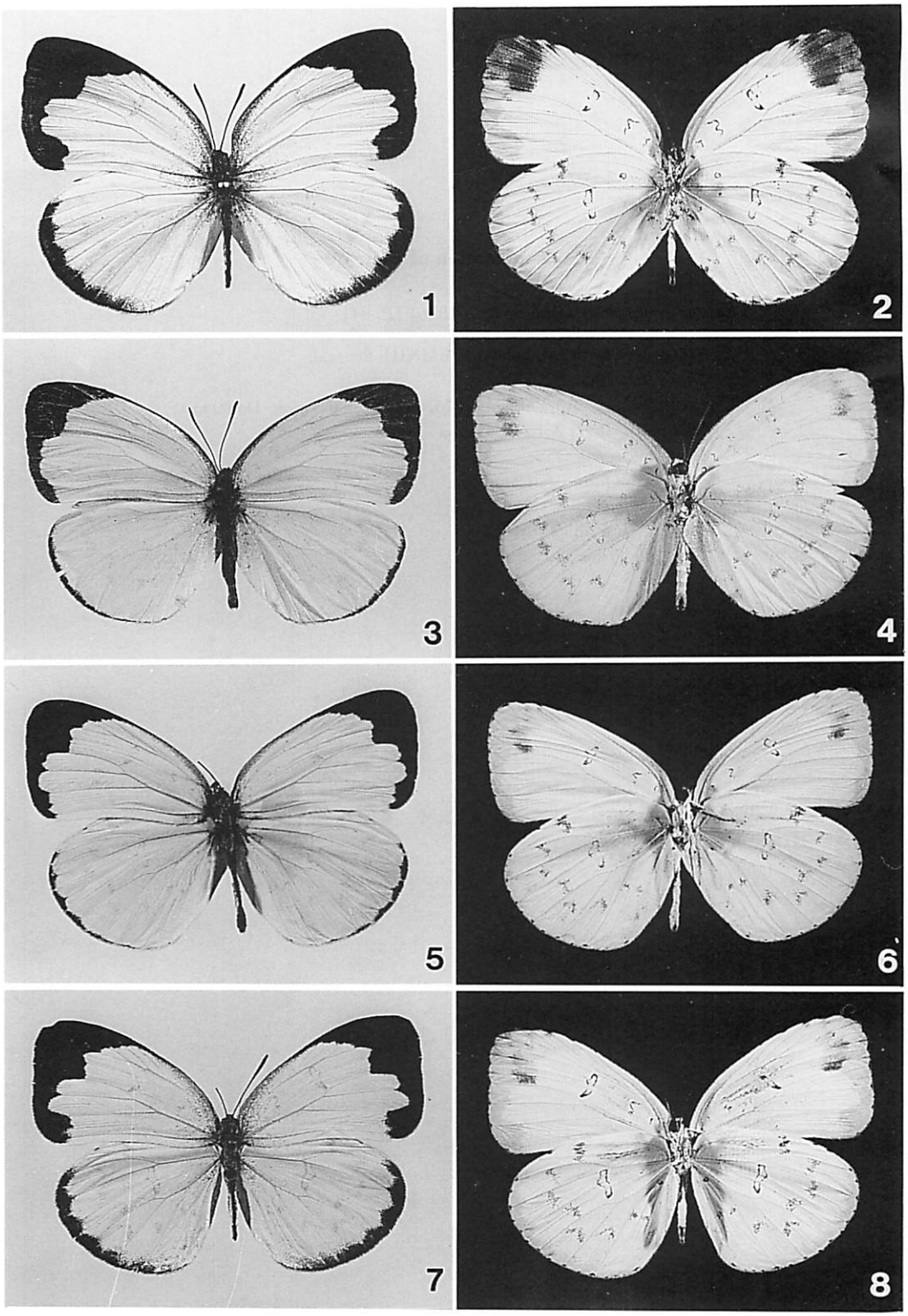
Explanation of Plate 29

Eurema blanda saraha (FRUHSTORFER, 1910) [P. 92]

1. Dry-season form. ♀. New Guinea.
2. Ditto, underside.

Eurema blanda wuwulana (FRUHSTORFER, 1910) [P. 93]

3. Intermediate form. ♂. New Britain.
4. Ditto, underside.
5. ♂. Bougainville Is., Solomons.
6. Ditto, underside.
7. ♀. Bougainville Is., Solomons.
8. Ditto, underside.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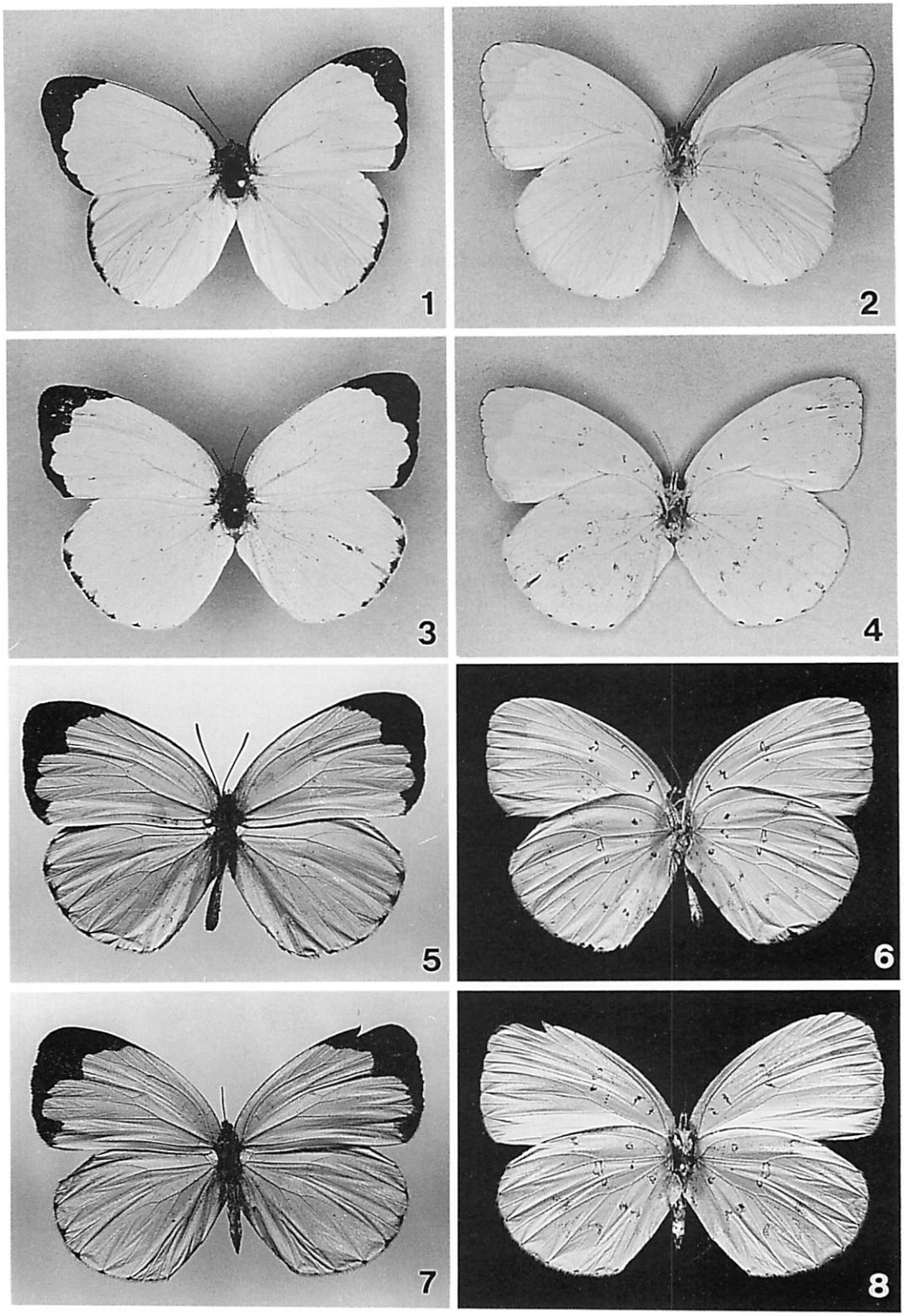
Explanation of Plate 30

Eurema senegalensis (BOISDUVAL, 1836) [P. 94]

1. Wet-season form. ♂, holotype [BMNH]. Senegal.
2. Ditto, underside.
3. Wet-season form. ♂, type [BMNH]. (*Terias brenda* DOUBLEDAY & HEWITSON, 1847) Ashanti, Ghana.
4. Ditto, underside.
5. Wet-season form. ♂. Cameroon.
6. Ditto, underside.
7. Wet-season form. ♀. Africa.
8. Ditto, underside.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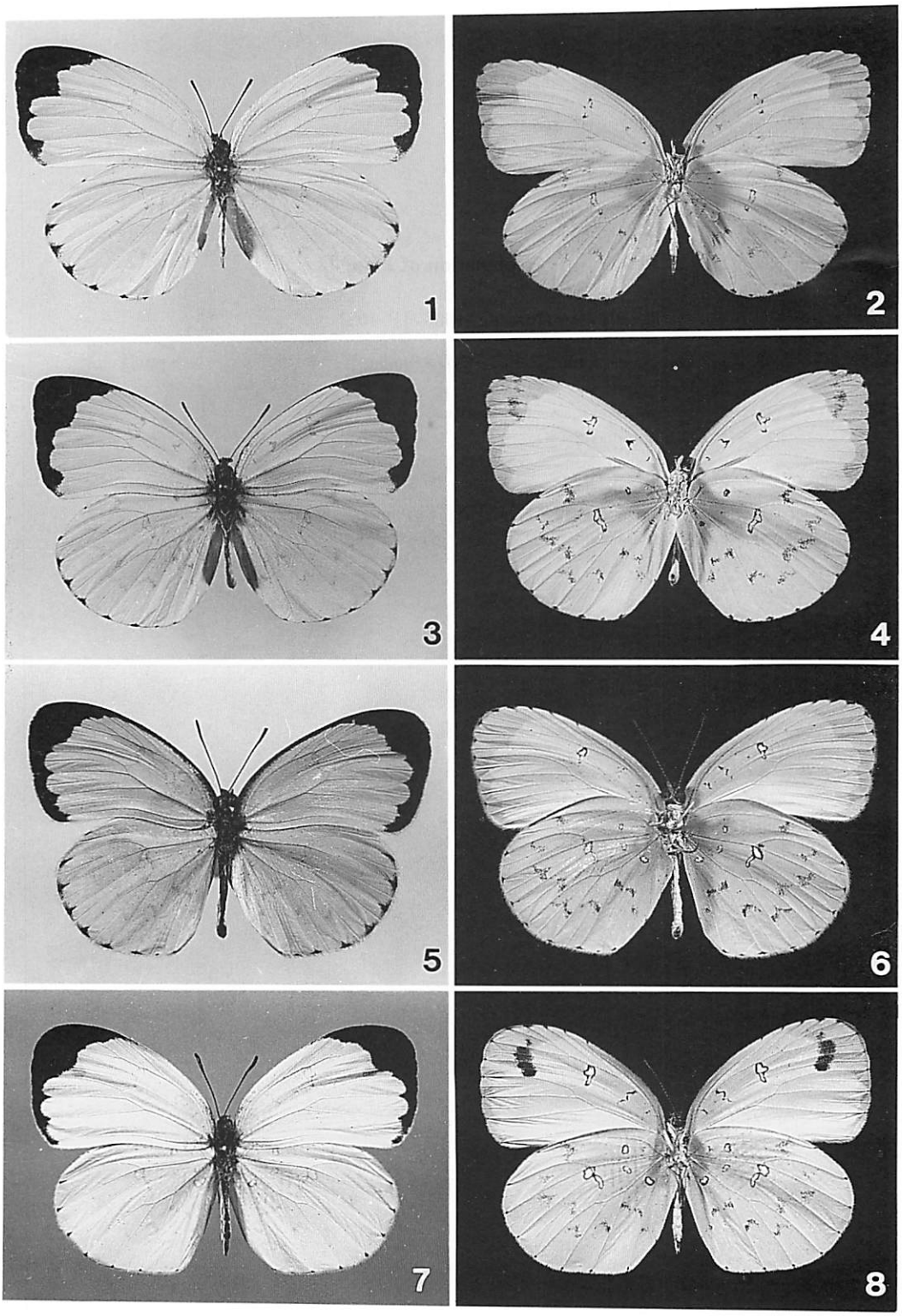
Explanation of Plate 31

Eurema senegalensis (BOISDUVAL, 1836) [P. 94]

1. Wet-season form. ♀. Congo.
2. Ditto, underside.
3. Dry-season form. ♂. Congo.
4. Ditto, underside.

Eurema floricola floricola (BOISDUVAL, 1833) [P. 102]

5. Wet-season form. ♂. Madagascar.
6. Ditto, underside.
7. Dry-season form. ♀. Madagascar.
8. Ditto, underside.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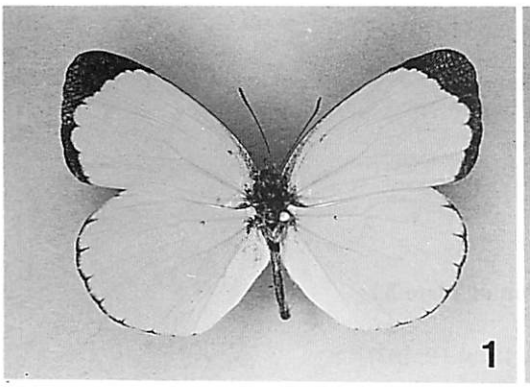
Explanation of Plate 32

Eurema floricola ceres (BUTLER, 1883) [P. 103]

1. Wet-season form. ♂, [MNHN]. Réunion.
2. Ditto, underside.
3. Intermediate form. ♂. Mauritius.
4. Ditto, underside.
5. Dry-season form. ♀, [MNHN]. Mauritius.
6. Ditto, underside.
7. Dry-season form. ♀, [MNHN]. Réunion.
8. Ditto, underside.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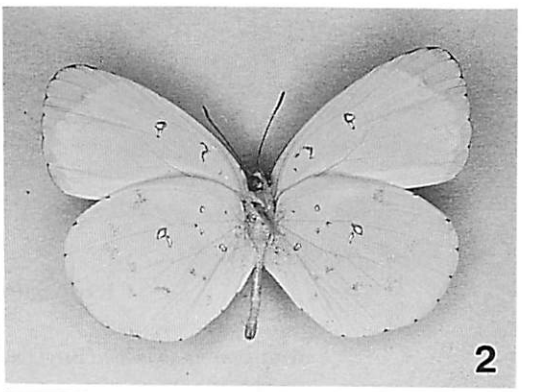
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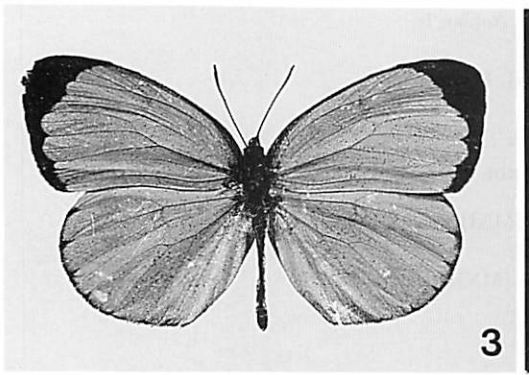
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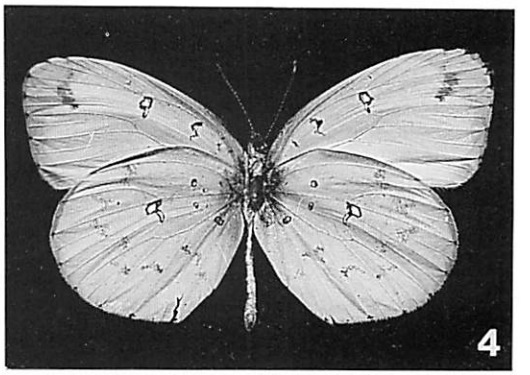
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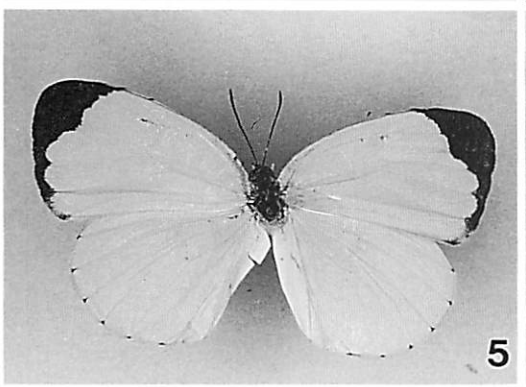
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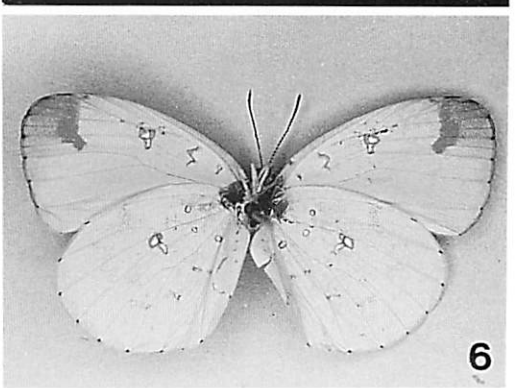
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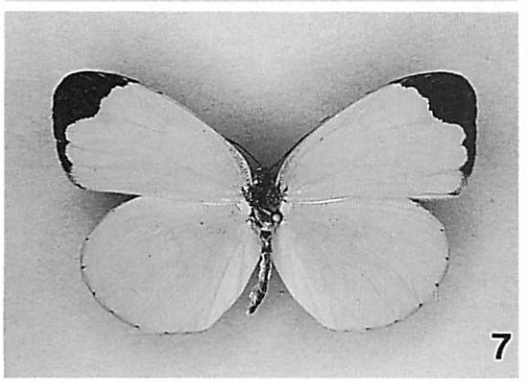
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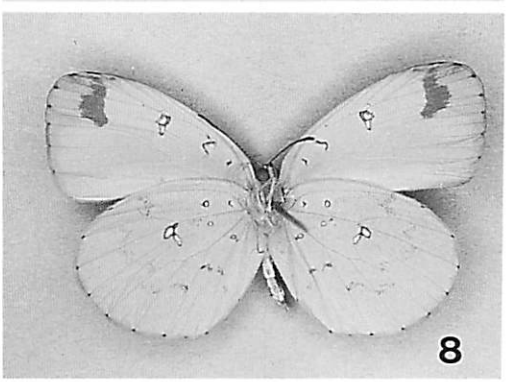
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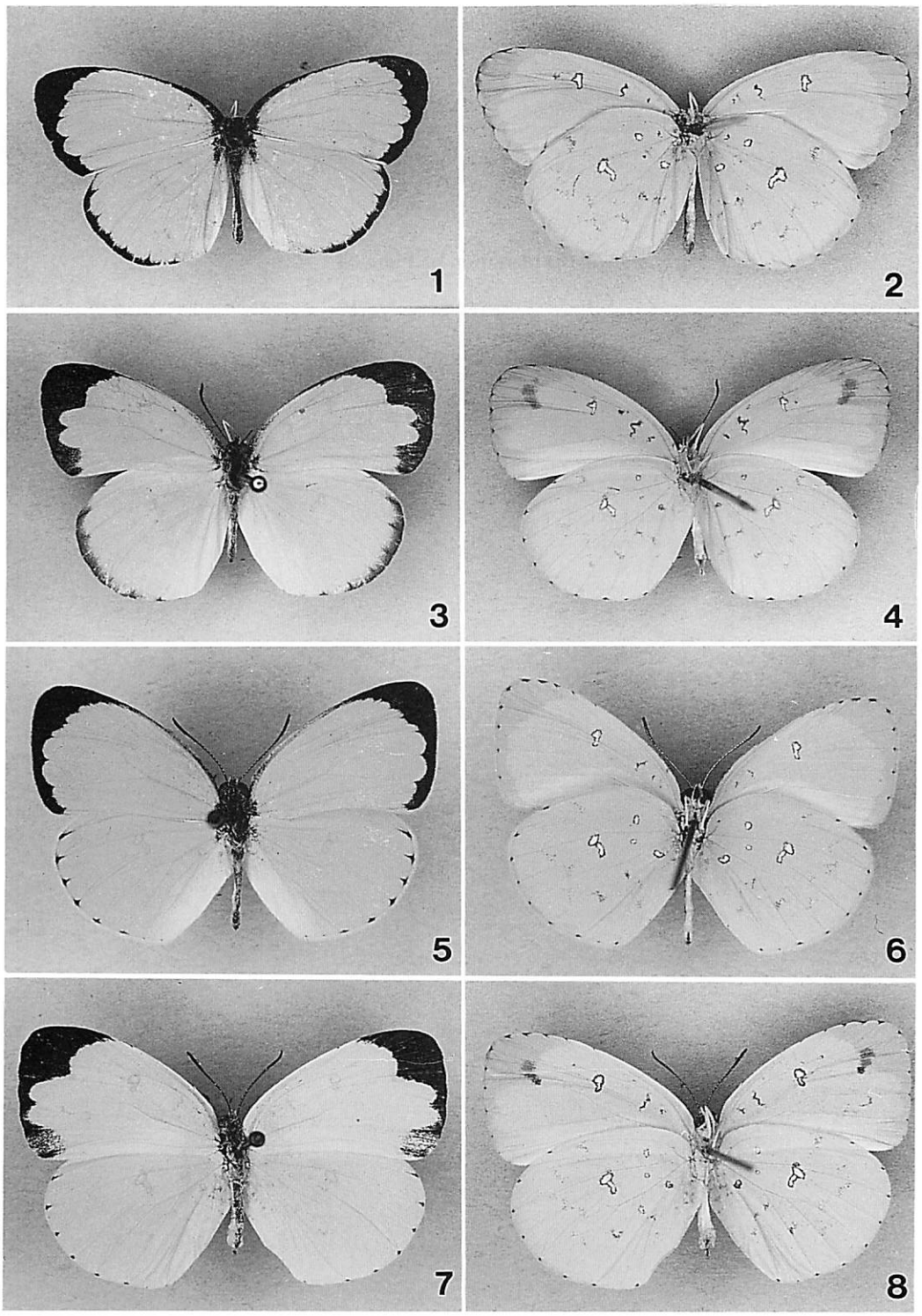
Explanation of Plate 33

Eurema floricola anjuana (BUTLER, 1879) [P. 103]

1. Wet-season form. ♂, [MNHN]. Anjuan Is.
2. Ditto, underside.
3. Intermediate form. ♀, [MNHN]. Mayotte Is.
4. Ditto, underside.

Eurema floricola aldabrensis BERNARDI, 1968 [P. 104]

5. Wet-season form. ♂, paratype [MNHN]. Aldabra.
6. Ditto, underside.
7. Intermediate form. ♀, holotype [MNHN]. Aldabra.
8. Ditto, underside.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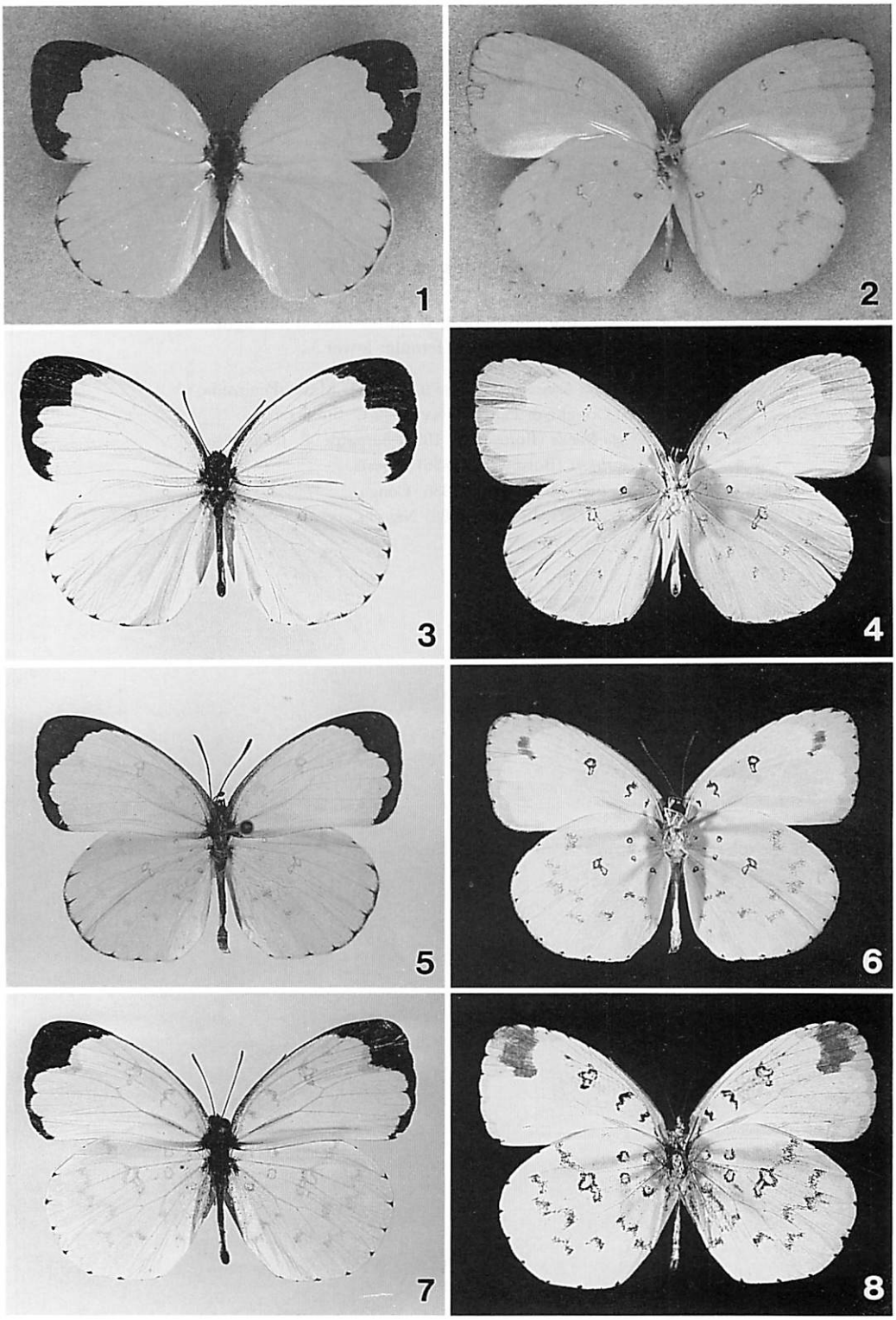
Explanation of Plate 34

Eurema floricola leonis (BUTLER, 1886) [P. 104]

1. Wet-season form. ♂, lectotype [BMNH]. S. Leone, Africa.
2. Ditto, underside.
3. Wet-season form. ♀. Congo.
4. Ditto, underside.
5. Intermediate form. ♂. Africa.
6. Ditto, underside.
7. Dry-season form. ♂. Congo.
8. Ditto, underside.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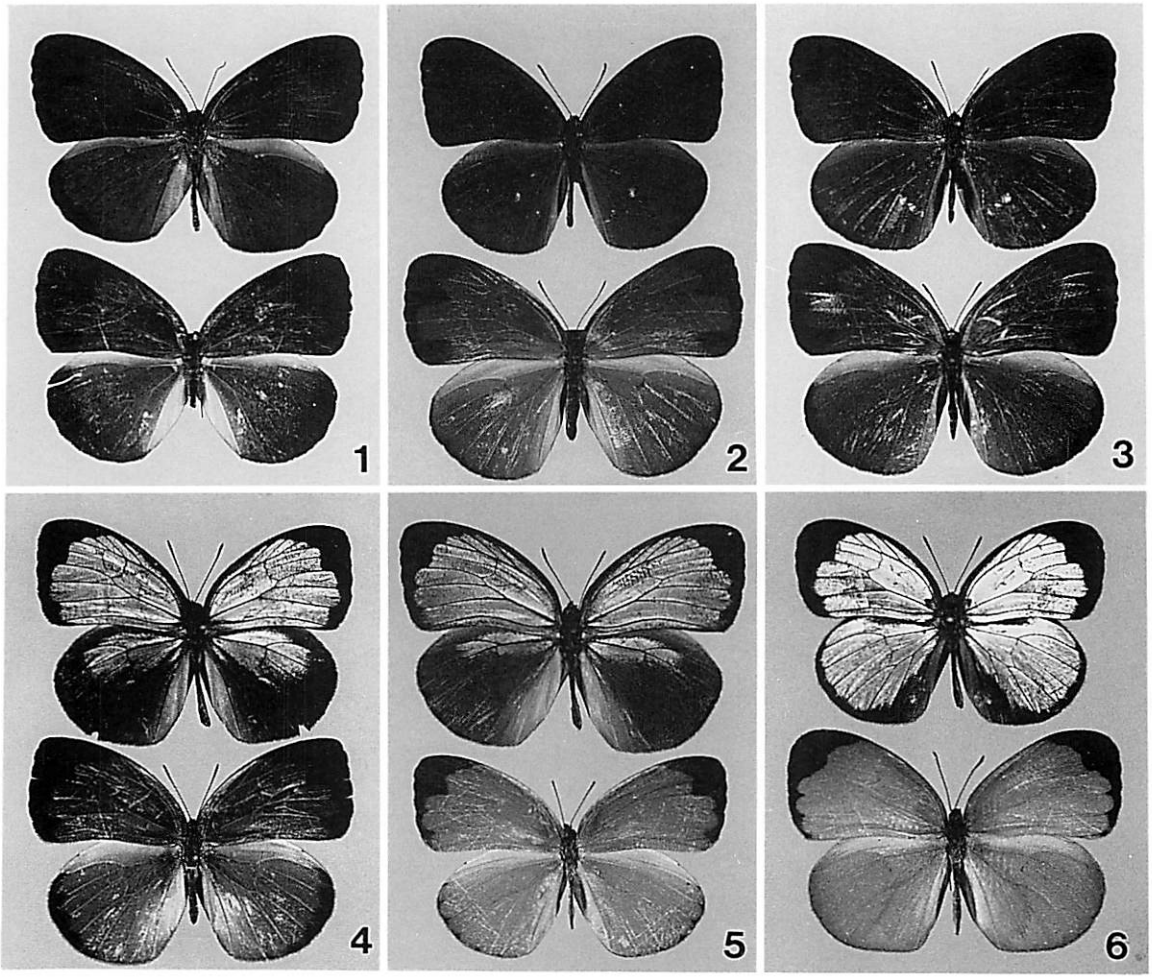
Explanation of Plate 35

Adults of *Eurema* spp. photographed under ultraviolet light.
(Male: upper, female: lower.)

1. *Eurema simulatrix tecmessa* (DE NIĆEVILLE, 1895) Malay Peninsula.
2. *Eurema irena* CORBET & PENDLEBURY, 1932 C. Sulawesi.
3. *Eurema blanda blanda* (BOIDSUVAL, 1836) Sumatra ♂, Java ♀.
4. *Eurema senegalensis* (BOISDUVAL, 1836) Nigeria.
5. *Eurema senegalensis* (BOISDUVAL, 1836) Congo.
6. *Eurema floricola leonis* (BUTLER, 1888) Nigeria.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