

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

Part V. Description of the *hecabe* group (part)

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Abstract Redescriptions are given at species- and subspecies levels for the *hecabe* groups (3 species) in the subgenus *Terias*. A new subspecies of *alitha* is described from Kai Is. 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. References for all the parts of this revision are included.

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The *hecabe* group

Eurema alitha (C. & R. FELDER, 1862)

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- Terias alitha* C. & R. FELDER, 1862: 289. (Mindanao)
Terias lorquini C. & R. FELDER, 1865: 209. (Macassar)
Terias zita C. & R. FELDER, 1865: 210. (Menado)
Terias zama C. & R. FELDER, 1865: 210. (Lutangan Is.)
Terias tilaha DRUCE (nec HORSFIELD), 1873: 354. (Borneo)
Terias invida BUTLER, 1883: 418. (Mindanao) [BMNH, Syntypes ♂, examined]
? *Eurema rahel* STAUDINGER (nec C. & R. FELDER), 1885: 28, t. f6, ♂. (Celebes)
Terias gradiens BUTLER, 1886: 223, pl. 5, fig. 9. (N. Borneo)
Terias amplexa BUTLER, 1887: 523. (Christmas Is.)
Terias hecabe STAUDINGER (nec LINNAEUS), 1889: 18. (Palawan)

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Terias brevicostalis BUTLER, 1898: 76, ♂ (Timor)

Terias sp. EECHE, 1929: 385, figs. II, IV. (Buru)

Eurema esakii SHIRÔZU, 1953: 152-154, pl. 19. (Taiwan)

Diagnosis: Upperside of male wings deep bright yellow in ground color; black distal border on forewing upperside usually obtuse-angled at vein 4 (especially in male); 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; lamella postvaginalis without a pair of protuberances near ostium bursae.

Description: *Wet-season form.*—**Male.** *Upperside:* Ground color deep bright yellow. Forewing black costal border broad and distinct with its inner margin sharply defined; black distal border generally broad, with its inner edge oblique and irregular from costa to vein 4, usually obtuse-angled at vein 4, equally excavated in spaces 2 and 3; basal border developed in some subspecies from Mindanao, Sulawesi and its adjacent islands; fringe usually black. 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. Only the extreme bases of both wings blackish. *Underside:* Ground color somewhat paler than on upperside, not black dusted. Forewing apical patch absent; two spots in discoidal cell, but sometimes barely traceable; discocellular marking represented by an irregular slender ring, covering more than half of the discocellular vein; tornal spot usually absent, if present barely traceable; sex-brand light gray, very long and much broad, always ending a point of origin of vein 2; small vein-dots present, but in forewing they are often conjoined with a fine black anticiliary line; fringe yellow. Hindwing with a series of submarginal spots in spaces 1a to 8 usually somewhat spotted, arranged in an irregular zigzag-line, and a submarginal spot in spaces 7 and 8 somewhat elongate; 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 8; discocellular spot almost same as in forewing, but larger; 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. 34 (1-4)).

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 half length of *ldc*. Antenna somewhat less than half the length of forewing, black and white-checked, except on the posterodorsal 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: 15.0–24.0 mm.

Female. Similar to male, but differing as follows. Upperside ground color pale greenish yellow to pale yellow. Basal portion on upperside more heavily and extensively black dusted. Forewing upperside with or without discocellular spot; black costal border broader and its inner edge more strongly diffused; black distal border broader, with its inner edge more diffused especially in hindwing. Underside ground color somewhat paler, usually with milky whitish luster especially in hindwing. On underside tornal spot is sometimes present. Ultraviolet reflectance on upperside: Moderately reflective on yellow areas, appearing gray in UV-photos (Pl. 34 (1–4)).

Forewing length: 16.0–24.0 mm.

Dry-season form.—**Male & female.** *Upperside:* Forewing black distal border narrower and less deeply excavated than in the wet-season form; black costal border indistinct or barely traceable. 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 sometimes tinged with brown in varied degrees. On forewing subapical streak or patch appearing, but apical marginal smudge absent; tornal spot sometimes appearing. Hindwing with distal streak in spaces 7 and 8 more strongly zigzag-shaped and almost contiguous with discocellular marking.

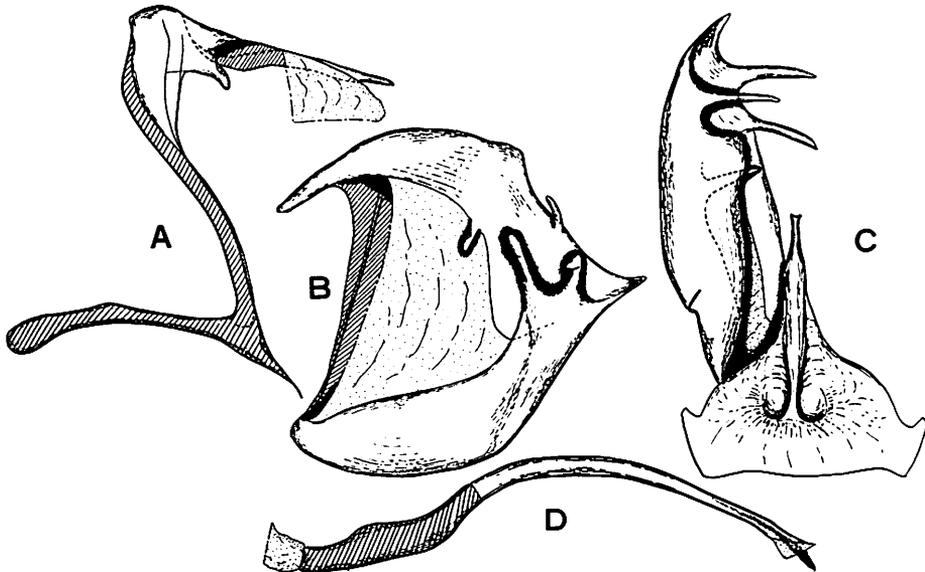


Fig. 1. Male genitalia of *Eurema alitha alitha* (C. & R. FELDER, 1862) from Mindanao. A: Ring (lateral). B: Valva (inner aspect of right-hand). C: Dorsum and valva (dorsal). D: Phallus (lateral).

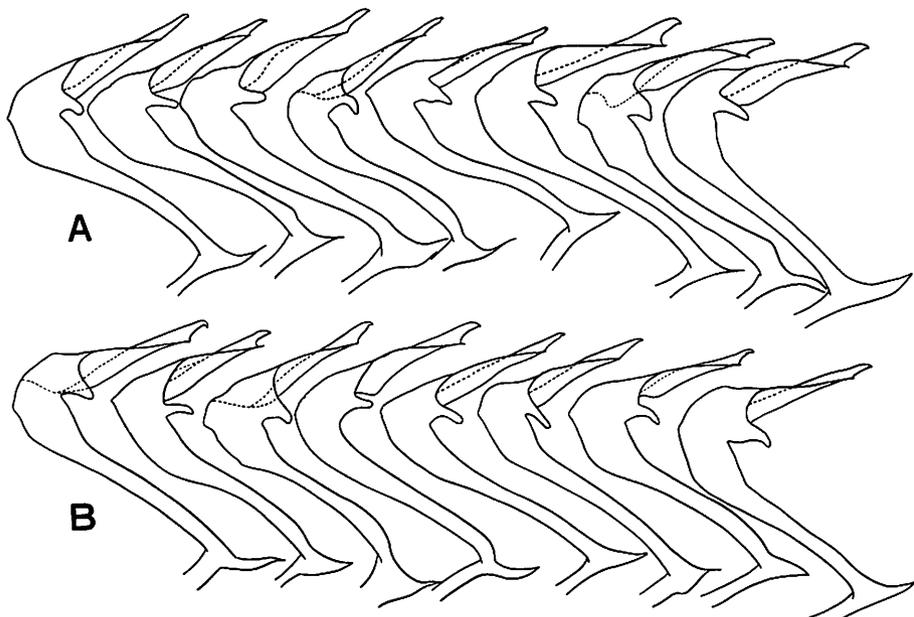


Fig. 2. Ring of male genitalia (lateral) of *Eurema alitha*. A: Taiwan, Luzon, Bohol, Mindanao, Sumatra, Java, Christmas Is., Sulawesi; B: Tanahjampea, Banggai, Talaut, Flores, Timor, Ambon, Sumbawa, New Guinea, from left.

Male genitalia (Figs. 1–2): Tegumen broad, triangular in dorsal aspect, somewhat concaved dorsomedially, entirely sclerotized; Valvenansatz short, usually producing downwards; vinculum not strongly arched; saccus moderately long (0.5–0.7 of ring height), angle between vinculum and saccus about 60° . Uncus usually long, (dorsum proper 0.62–0.72 of ring height), tapering towards the apex, extending somewhat downwards; uncal projection long (0.1 of ring height) and narrowed, projecting posteroventrally, with its apex weakly bicuspid. Valva almost as long as high; P1 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. 3): Seventh abdominal sternum with nearly straight posterior margin. Lateral hollow elliptical, with dorsal eaves rather long and moderately deep, ventral eaves long and deep, median groove long, having a weak eaves and situated ventral $1/3$ of lateral hollow. Genital plate strongly invaginated anterodorsally, acute-angled on its anterolateral corner in ventral aspect, not produc-

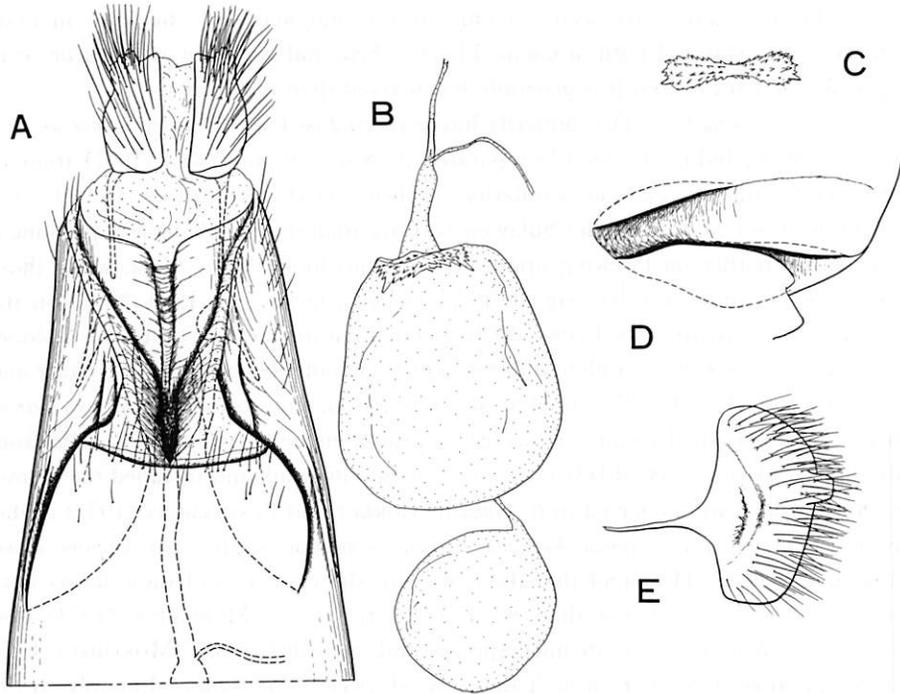


Fig. 3. Female genitalia of *Eurema alitha alitha* (C. & R. FELDER, 1862) from Mindanao. A: Female genitalia (ventral). B: Bursa copulatrix (ventral). C: Signum (anterior). D: Lateral hollow (lateral). E: Papilla analis (lateral).

ing a pair of concavities near ostium bursae; longitudinal groove well sclerotized, narrow and usually parallel sided, sometimes broadened at the middle or posterior portion; banks of longitudinal groove weakly developed. V-shaped wall well developed, straight in ventral aspect, deep, sclerotized, and almost continuous with 7th abdominal tergum, forming a somewhat 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 almost as long as cervix bursae, somewhat thick, and membranous but weakly sclerotized on anterior 1/2. 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 inner to dorsal margin of proximal portion. Papilla analis elongate, bearing a short lobe and swollen bare-region.

Chromosome number: The haploid chromosome number is 30 in ssp. *esakii* from Taiwan (MAEKI & AE, 1968).

Variation: Populations occurring in Wallacea (Mindanao, Sulawesi, Banggai Isls., Sangir Isls., etc.) show a remarkable geographical variation in development of the forewing black basal border, for example. The characteristic features of the

geographical variation are seen not only in size and markings, but also in male genitalia (the relative length of uncus, Fig. 2). Seasonal variation also can be seen, especially in Taiwan, but it is generally less marked than in *hecabe*.

Taxonomic remarks: This butterfly has been confused with *Eurema hecabe* as well as *E. tilaha* (including *E. nicevillei* separated by SHIRÔZU and YATA (1977) from *E. tilaha* s.lat.) due to extreme similarity of their external features. That is, the subspecies from Mindanao and Sulawesi with its adjacent islands have a prominent black basal border on forewing upperside and thus look like *E. tilaha*, while those from other localities are very similar to *E. hecabe* in facies. In 1929, based on the male genital structure, VAN EECKE (1929) pointed out for the first time that *E. hecabe* from Buru consists of two different forms, which undoubtedly correspond to *hecabe* and *alitha*, respectively. In 1953 SHIRÔZU, separating from *hecabe*, described a new *Eurema* species, *esakii*, from Taiwan. However, it proved to be a synonym of *alitha* from Mindanao. HOLLOWAY (1973) raised *alitha* to specific rank and included the following forms which were referred to *E. tilaha* by CORBET and PENDLEBURY (1932) in this species: *alitha*, *gradiens*, *garama*, *bazilana*, *leytensis*, *samarana*, *sangira*, *zita*, *lorquini*, *djampena* and *sanama*. He found that the male genitalia of several of these forms were close to those of *E. hecabe* than to those of *E. tilaha*. MORISHITA (1973) also considered *alitha* to be a distinct species and regarded *hondai* MORISHITA from Palawan and *esakii* SHIRÔZU from Taiwan as subspecies of *alitha* based mainly on the male genital structure. In recent years, SHIRÔZU and YATA (1981) described 3 new subspecies, *gunjii* (Ceram), *halmaherana* (Halmahera) and *novaguineensis* (New Guinea), and also included the following forms which were referred to *E. hecabe* in *alitha*: *bidens*, *sankapura*, *chemys* and *jalendra*. Furthermore, we propose here two additional subspecies, *amplexa* (Christmas Is.) and *brevicostalis* (Timor) belonging to *E. alitha*.

Relationship: This species is closely related with *E. floricola*, and forms with it a monophyletic group (*alitha-floricola*), with which *hecabe* and *halmaherana* are united. These four species are very closely resemble each other, so that some authors have regarded them conspecific (CORBET, 1934; WILLIAMS, 1969; PETERS, 1952; SAVID GIFFORD, 1965; DICKSON, 1978, etc.). As PAULIAN and BERNARDI (1951), and some other authors pointed out, however, these species can be identified by not only external, but also morphological (male and female genitalia) features.

Distribution: This species is distributed from Taiwan, across the Philippines, Sulawesi, Java, S. E. Sumatra and Lesser Sundas to New Guinea. Its range almost represents so called "Melanesian element" (HOLLOWAY, 1973). Although this pierid is essentially a lowland species, in Mindanao it flies in mountain zone up to 1300 m in summer (HIURA & ALAGAR, 1974).

Habitat and habits: This butterfly mainly inhabits open country of lowlands where the human activities have changed the primary vegetation to artificial grassland. *E. alitha* is almost sympatric with *E. hecabe*, and these two species often fly mixed together. However, the habitat seems to be more restricted than in *hecabe*.

According to FUKUDA's observation (1973) at Los Banōs, Luzon, they showed differences in preferences for oviposition plants; The larval foodplants of *hecabe* are *Sesbania sesban*, *Aeschynomene indica*, *Leucaena glabra* (HIURA & ALAGAR, 1974), etc., while that of *alitha* is *Pithecollobium dulce* (FUKUDA, 1973). *E. hecabe* seldom flies in a habitat of *alitha*, a zone on Lake Alligator where *Pithecollobium dulce* is planted, and thus their habitat segregation was recognized there.

The flight is fairly swift for this genus. This species seems to be multivoltine, because the adults can be seen flying all the year round.

Early stages: The early stages were reported by FUKUDA (1973) for populations from Luzon. They were quite similar to those of *hecabe* except that the mature larva is more strongly tinged with bluish green. *Pithecollobium dulce* BENTH. (Fabaceae) was recorded as the larval foodplant on Lake Alligator in the suburb of Manila by FUKUDA (1974).

***Eurema alitha alitha* (C. & R. FELDER, 1862)**

Terias alitha C. & R. FELDER, 1862: 289. (Mindanao) [untraced]

Eurema tilaha alitha (C. & R. FELDER); CORBET & PENDLEBURY, 1932: 184.

Eurema alitha alitha (C. & R. FELDER); HOLLOWAY, 1973: 148.

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

Male (Pl. 1 (1-6)). *Upperside:* Forewing black distal border always obtuse-angled at vein 4, equally excavated in spaces 2 and 3 or somewhat more deeply excavated in space 2 than in space 3; basal border usually continued from tornus to base, but sometimes reduced to in various degree; fringe usually black. Hindwing black distal border broadened towards tornus, with its inner edge generally indistinct; basal portion distinctly blackish. *Underside:* Forewing with two spots in discoidal cell, but sometimes barely traceable, especially in basal one; small vein-dots present, but in forewing they are often conjoined with a fine black anteciliary line; fringe yellow. On hindwing a series of discal spots in spaces 1a to 8 usually indistinct and clouded shaped, arranged in an irregular zigzag-line, and a discal spot in spaces 7 and 8 somewhat larger than the other ones; circular subbasal spot usually present each in spaces 1b+c and 7, and sometimes in the middle of discoidal cell; a minute basal spot in space 8 barely traceable; small vein-dots present. Forewing somewhat elongate. **Female** (Pls. 1 (7-8), 2 (1-8)). Similar to male, but differing as follows. Basal portion on upperside more heavily and extensively black dusted, sometimes almost entirely on the ground. Forewing black basal border much broader, extended more deeply into discoidal cell. Forewing subapical patch and tornal spot usually present. Most markings more strongly developed.

Forewing length: Male, 17.0-21.5 mm (n=13, avg=20.6), female, 19.5-22.5 mm (n=8, avg=21.1).

Material studied: MINDANAO: Davao, 2♂1♀, 31. vii-l. viii. 1970 (AË); Todaya, 1♂3♀, 26-31. vii. 1970 (M. SATO); Zamboanga, 1♂, 11. ii. 1972 (MIYATA), 7♂3♀, 12-19. xii. 1965 (R. WADA); Masara, 1♀, 6-8. ii. 1972 [KUCGE]; Ozemis, i-ii. 1979 [ET]. CEBU: Cebu Is., 1♂, i. 1971 (A. YAMAMOTO) [KUCGE].

Distribution: This subspecies occurs in Mindanao and Cebu.

Eurema alitha esakii (SHIRÔZU, 1953)

Eurema andersoni godana ESAKI (nec FRUHSTORFER), 1932: 140. (Chushinron-Rokki, Takao Pref., S. Taiwan)

Eurema esakii SHIRÔZU, 1953: 152-154, pl. 19. Holotype ♂, Naihon rokugoe (Fujieda-Rokki) Holotype ♂ (S. Taiwan). [KUF, examined]

Eurema alitha esakii SHIRÔZU; MORISHITA, 1973: 99-105.

This subspecies is distinguishable from the nominate ssp. *alitha* from Mindanao by the following combination of characters.

Wet-season form.—**Male** (Pl. 3 (1-2)). *Upperside:* Forewing black distal border generally broad, with its inner edge oblique and irregular from costa to vein 4, always obtuse-angled at vein 4, equally excavated in spaces 2 and 3; basal border absent. Hindwing black distal border fairly broad, with its inner edge zigzag-shaped; two spots in discoidal cell. Hindwing with a series of discal spots in spaces 1 to 8 usually well developed and somewhat cloud shaped; a minute basal spot in space 8 barely traceable. **Female** (Pl. 3 (3-4)). Similar to male, but differing as follows. Upperside ground color pale greenish yellow. Basal portion on upperside more heavily and extensively black dusted. Forewing black costal border somewhat narrower with its inner edge more indistinct. Forewing subapical patch and tornal spot usually absent. Vein-dots less distinct. Most markings poorly developed.

Dry-season form.—**Male & female** (Pl. 3 (5-8)). *Upperside:* Most markings more prominent and brownish colored. On forewing subapical patch well developed; tornal spot well developed, especially in female. Hindwing with a series of submarginal spots sometimes represented by brownish lunulae in male.

Forewing length: Male, 18.5-23.0 mm (n=23, avg=21.0), female, 19.0-23.0 mm (n=5, avg=21.2).

Type material examined: *Eurema esakii* was described from male specimens by SHIRÔZU. The holotype (Forewing length: 22.0 mm) is now in KUF and bears the following labels; 'Formosa, Noaihonrokugoe (Takao-shû), Fujieda-Rokki, 19. vii. 1932, Teiso Esaki, Holotype ♂, *Eurema esakii*, T. Shirôzu, 1953 (red)'.

Material studied: TAIWAN: loc. unknown, 6♂1♀, 1962, 1♂, vi. 1958, 1♂1♀ (dry f.); Nanshanchi, 2♂, 8. vi., 1♀ (dry f.), 17. v. 1969 (S. HISAMATSU); Jenai(Musha), 3♂ (dry f.), v. 1957 [KUCGE].

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

***Eurema alitha jalendra* (FRUHSTORFER, 1910)**

Terias hecabe jalendra FRUHSTORFER, 1910: 167. LECTOTYPE ♂ (Palawan) here designated. [BMNH, examined]

Eurema hecabe jalendra FRUHSTORFER; MORISHITA, 1973: 99. (Palawan)

Eurema alitha jalendra (FRUHSTORFER); SHIRÔZU & YATA, 1981: 61. (PALAWAN)

This subspecies is distinguished from subsp. *esakii* from Taiwan by the following combination of features.

Male (Pl. 4 (1-2, 5-6)). Forewing black distal border somewhat broader and darker. On underside most marking less prominent. Marginal vein-dots more distinctly developed and sometimes conjoined with scattered black scales between them on forewing. **Female** (Pl. 4 (3-4, 7-8)). Upperside black distal borders broader; forewing basal portion more heavily and extensively black dusted. On underside basal portions of both wings more heavily and widely black dusted.

Forewing length: Male, 18.0-24.0 mm (n=17, avg=22.0 mm), female, 19.5-23.0 mm (n=10, avg=21.9 mm).

Type material examined: *Terias hecabe jalendra* was described from an unstated number of male and female specimens from 'Palawan' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/Palawan, Jan 94 Fruhstorfer/hecabe jalendra Fruhst. /Fruhstorfer Coll., B.M. 1937-285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias hecabe jalendra* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. The female specimen bears similar data labels (Palawan, 1898 Doherty, ex co H. Fruhstorfer), and in addition the following labels; 'Paralectotype (blue)/*Terias hecabe jalendra* Fruhstorfer PARALECTOTYPE det. O. Yata 1994'.

Material studied: LUZON: Pili, 1 ♂, 21. viii. 1970 (KAWARABATA); near Baguio, Asin Hot Spring, 1 ♂, 7. vii. 1970 (Ae); Quezon, 1 ♀, 30. vii. 1965 (R. WADA)[KUCGE]; Manila, 1 ♀, 1963 (N. KUNIOKA) [NSA]. MARINDUQUE IS.: near Boac, 2 ♂ ♀, x. 1972 (NAKAYAMA) [KUCGE]. CEBU: Talanban, 2 ♂ 1 ♀, 3. viii. 1970 (OKADOME) [MUFA], 1 ♂ (Ae), 1 ♀, 24. vii. 1970; Guadarupe, 5 ♂ 1 ♀, 14. vii. 1970 (M. SATO)[KUCGE]. BOHOL: Bilar, 1 ♂, 3. viii. 1974 (Ae). PALAWAN: Puerto Princesa, 4 ♂ ♀, 23. xi. 1970 (SAKAGUCHI); Prawn, 1 ♂ 1 ♀, 28. xi. 1970 (SAKAGUCHI) [KUCGE].

Distribution: This subspecies is known from Palawan, Balabac and Luzon.

***Eurema alitha samarana* (FRUHSTORFER, 1910)**

Terias invida samarana FRUHSTORFER, 1910: 170. (Samar) [untraced]

Terias tilaha samarana (FRUHSTORFER); TALBOT, 1935: 574.

Eurema tilaha samarana (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 184. (Samar, C. Philippines)

Eurema alitha samarana (FRUHSTORFER); HOLLOWAY, 1973: 148.

This subspecies may be distinguished from subsp. *alitha* from Mindanao by 'a roundish, isolated patch at the hindmargin of the forewing, such as is shown by no other *Terias*' (from the original description by FRUHSTORFER). However, I found in TSUKADA's collection two specimens (1 ♂1 ♀) from Samar which have not any basal patch on the forewing upperside and are very similar to *esakii* (YATA, 1981, pl. 5, 18).

Material studied: SAMAR: Bagacay, 1 ♂, 3. viii. 1979; W. Samar, 1 ♀ (ab.), 19. viii. 1980 [ET].

Distribution: This subspecies is restricted to Samar in its distributional range.

Eurema alitha leytensis (FRUHSTORFER, 1910)

Terias invida leytensis FRUHSTORFER, 1910: 170. (Leyte) [untraced]

Eurema tilaha leytensis (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 184. (Leyte)

Terias tilaha leytensis (FRUHSTORFER); TALBOT, 1935: 574. (Leyte)

Eurema alitha leytensis (FRUHSTORFER); HOLLOWAY, 1973: 148.

This subspecies is characterized by 'the continuous black anal margin of the forewing and the blackish basal tinge of the median vein of the hindwing' (from the original description by FRUHSTORFER). However, I found in TSUKADA's collection a specimen from S. Leyte, one of which has no basal border, and the rather fine black dusting from distal border in space 1a continued along the basal margin, extending towards the base for half the basal margin on the forewing upperside (Pl. 5 (1-4)).

Forewing length: Male, 20.5-22.5 mm (n=4, avg=21.4 mm), female, 24.0 mm.

Material studied: LEYTE: S. Leyte, Cabalian, 2 ♂1 ♀, 25. viii. 1974 (AE); Catmon, 1 ♂, 2. vii. 1978 (NISHIYAMA); 1 ♂, 9. vii. 1978 [KUCGE].

Distribution: This subspecies occurs in Leyte Is.

Eurema alitha bazilana (FRUHSTORFER, 1900)

Terias alitha bazilana FRUHSTORFER, 1900: 31. LECTOTYPE ♂ (Bazilan) here designated. [BMNH, examined]

Terias alitha bazilana f. *aebutia* FRUHSTORFER, 1910: 171. (Bazilan) [BMNH, examined]

Eurema tilaha bazilana (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 184. (Bazilan)

Eurema alitha bazilana (FRUHSTORFER); HOLLOWAY, 1973: 125(2): 148.

This subspecies is quite similar to ssp. *alitha* from Mindanao, but may be distinguished from the latter by the very broad black distal border of hindwing nearly reaching to the discoidal cell and the upperside ground color being much paler milky-white with pale yellow tinge (Pl. 5 (5-8))

Forewing length: Male, 20.0-22.0 mm (n=4, avg=21.4 mm), female, 21.5-22.5 mm (n=5, avg=22.1 mm).

Type material examined: *Terias alitha bazilana* was described from an unstated

number of male and female specimens from 'Bazilan' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/H. Fruhstorfer/Fruhstorfer Coll., B.M. 1937-285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias alitha bazilana* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. The female specimen bears similar data labels, and in addition the following labels; 'Paralectotype (blue)/*Terias alitha bazilana* Fruhstorfer PARALECTOTYPE det. O. Yata 1994'.

Materials examined: BAZILAN: Bazilan Is., Maloong, 4 ♂³ ♀, ix-vii. 1931, 1 ♀, 6. iii. 1932, 1 ♀, 10. v. 1932 (K. KUWASHIMA) [KUFA].

Distribution: This subspecies is known only from Bazilan.

Eurema alitha garama (FRUHSTORFER, 1910)

Terias tilaha grama FRUHSTORFER, 1910: 170. (Sulu Iss., Jolo Archip.) [untraced]

Terias alitha bozonis FRUHSTORFER, 1913: 92. (Sulu Archip.)

Eurema tilaha garama CORBET & PENDLEBURY (nec FRUHSTORFER), 1932: 183. (Sulu Archip.)

Terias tilaha garama TALBOT (nec FRUHSTORFER), 1935: 574. (Sulu Iss.)

Terias tilaha garama HOLLOWAY (nec FRUHSTORFER), 1973: 148.

I have not seen the specimens of this race. According to the original description, this subspecies seems to be characterized by the elongate forewing, the light yellow ground color and very narrow black distal border. CORBET and PENDLEBURY (1936) stated that 'the female is heavily black dusted as in *bazilana* but has more rounded forewing' other than above mentioned features.

Distribution: This subspecies is known from Sulu and Jolo Archipelago.

Eurema alitha gradiens (BUTLER, 1886)

Terias gradiens BUTLER, 1886: 223, pl. 5, fig. 9. LECTOTYPE ♂ (N. Borneo) here designated. [BMNH, examined]

Terias tilaha gradiens BUTLER; FRUHSTORFER, 1910: 170. (N. Borneo)

Eurema tilaha gradiens (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 183. (Borneo)

Terias tilaha gradiens BUTLER; TALBOT, 1935: 574. (Sulu Isls.)

Eurema alitha gradiens (FRUHSTORFER); HOLLOWAY, 1973: 148.

This subspecies is quite similar to ssp. *alitha* from Mindanao, but may be distinguished from the latter by the narrower black basal border of forewing upperside and its inner margin usually almost straight, never arched, and by the narrower hindwing black distal border with its inner edge more uniform (Pl. 6 (1-4)).

Type material examined: *Terias gradiens* was described from an unstated number of male and female specimens from 'N. Borneo' by BUTLER. The BMNH now possesses a male specimen bearing the labels: 'Type (red)/Borneo, 79/64/*Terias gradiens* ♂, type Butler' In addition the male bears the following labels; 'Lectotype (purple)/

Terias gradiens Butler LECTOTYPE det. O. Yata 1994' and hereby designated lectotype.

Material studied: BORNEO: 1 ♂, N. Borneo, Sandakan (PRYER) (GODMAN-SALVIN Coll.96.-12.); 1 ♀ Borneo (PRYER?)/*gradiens* ♀/Coll. Moore 94-67. [BMNH?]

Distribution: This subspecies is known from N. Borneo.

Eurema alitha sangira (FRUHSTORFER, 1910)

Terias alitha sangira FRUHSTORFER, 1910: 171. Holotype ♂ (Sangira). [BMNH, examined]
Eurema tilaha sangira (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 184. (Sangir Is., N. Celebes)
Terias tilaha sangira FRUHSTORFER; TALBOT, 1935: 574. (Sangir Is.)
Eurema alitha sangira (FRUHSTORFER); HOLLOWAY, 1973: 148.

This subspecies is distinguished from subsp. *alitha* from Mindanao by the following combination of features.

Male (Pl. 6 (5-6)). Ground color darker. Forewing black distal border distinctly broader, especially from costa to vein 4; black basal border much broadened, with its inner margin more strongly arched, as the result black basal border more widely occupied in the discoidal cell and space 2. Hindwing black distal border much broadened. On underside marginal vein-dots less prominent. Both wings distinctly rounder. **Female** (Pl. 6 (7-8)). Ground color darker. Forewing black distal and basal borders extremely broadened, as the result the pale yellow ground color only recognized as two elongate patches which are situated on anterior margin of discoidal cell and basal portions of spaces 4-6. Hindwing black distal border somewhat broader; ground surface always heavily dusted. Underside markings distinctly fainter except tornal spot.

Forewing length: Male, 21.0-22.5 mm (n=3, avg=21.8 mm), female, 21.0-22.5 mm (n=2, avg=21.8 mm).

Type material examined: *Terias alitha sangira* was described from a single male from 'Sangier' by FRUHSTORFER. This holotype is now in the BMNH and bears the following labels: 'Type (red)/Sangier Fruhstorfer/alitha sangira Fr.'

Material studied: SANGIHE: Sangir Is., 1 ♂, 26. vi. 1975, 1 ♂ 1 ♀, 28. vi. 1975, 1 ♂ 1 ♀, 1. vii. 1975 (IGARASHI) [IGARASHI coll.].

Distribution: This subspecies is known only from Sangir Is.

Eurema alitha zita (C. & R. FELDER, 1865)

Terias zita C. & R. FELDER, 1865: 210. (Menado) [untraced]
Terias zama f. *zamida* FRUHSTORFER, 1908: 63. (N. Celebes) [BMNH, Type ♂, examined]
Terias zita f. *zamida* FRUHSTORFER, 1910: 171.
Eurema tilaha zita (C. & R. FELDER); CORBET & PENDLEBURY, 1932: 184. (Celebes)
Terias tilaha zita (C. & R. FELDER); TALBOT, 1935: 575. (North Celebes)

Eurema alitha zita (C. & R. FELDER); HOLLOWAY, 1973: 148.

This subspecies is distinguished from subsp. *alitha* from Mindanao by the following combination of features.

Male (Pl. 7 (1–4)). Ground color darker. Forewing black distal border somewhat more strongly angulate, more deeply excavated in spaces 2 and 3; black basal border distinctly broader, with its inner margin more strongly arched, as the result black basal border more widely occupied in discoidal cell and space 2. Hindwing black distal border somewhat broadened. On underside marginal vein-dots less prominent. Both wings somewhat rounder. **Female** (Pl. 7 (3–4, 7–8)). Ground color darker. Forewing black distal and basal borders much broader, as the result the pale yellow ground color recognized as two elongate arched band. Hindwing black distal border somewhat broader; ground surface heavily black dusted.

Terias alitha sanama FRUHSTORFER has been treated as a subspecies of *alitha* from Sula Iss. (HOLLOWAY, 1973; YATA, 1979, etc.). However, our examination of photograph of type-material of this race (preserved in the Natural History Museum, London) revealed that it was in fact a subspecies of *hecabe* from Sula Iss. Not having enough specimens to be examined, we tentatively treated the race from Sula Isls. as ssp. *zita*.

Forewing length: Male, 17.5–21.5 mm (n=9, avg=6 mm).

Material studied: N. & W. SULAWESI: Menado, 4 ♂, 17–24. ii. 1967 (IGARASHI) [IGARASHI coll.], 1 ♂, 21. ii. 1967 (HARADA)[NSA]; Donggala, 2 ♂, ii. 1913 (NIRE) [KUFA], 1 ♀, 15. xii. 1972 (GUNJI) [KUCGE]. BANGGAI: Lambioet, 1 ♂, 28. ii. 1933, 1 ♂, 8. x. 1933 (BERGH) [RNH].

Distribution: This subspecies is known from north Sulawesi and Sula Iss.

Eurema alitha lorquini (C. & R. FELDER, 1865)

Terias lorquini C. & R. FELDER, 1865: 209. (Macassar) [untraced]

?*Terias lorquini* f. *marosiana* FRUHSTORFER, 1908: 46. (Maros)

Terias alitha lorquini FRUHSTORFER, 1910: 171. (N. Celebes)

Terias alitha marosiana FRUHSTORFER, 1910: 171. t. 73g. (S. Celebes) [BMNH, Syntypes ♂ ♀, examined]

Eurema tilaha lorquini (C. & R. FELDER); CORBET & PENDLEBURY, 1932: 184. (Celebes)

Terias tilaha lorquini (C. & R. FELDER); TALBOT, 1935: 575. (N. Celebes)

Eurema alitha lorquini (C. & R. FELDER); HOLLOWAY, 1973: 148.

This subspecies is distinguished from subsp. *alitha* from Mindanao by the following combination of features.

Male (Pl. 8 (1–2)). Forewing black distal border somewhat narrower, more deeply excavated in spaces 2 and 3, often almost right-angled at vein 4; black basal border broader or almost the same in depth, with its inner margin more strongly

arched; fringe yellow mixed with black. Hindwing black distal border usually somewhat broadened; fringe yellow. On underside marginal vein-dots less prominent. Both wings somewhat rounder. **Female** (Pl. 8 (3-4)). Forewing black distal borders somewhat narrower, more deeply excavated in spaces 2 and 3, often almost right-angled at vein 4; black basal border broader or almost the same in depth, with its inner margin more strongly arched; fringe yellow mixed with black. On hindwing fringe yellow. Both wings less heavily black dusted. On underside most markings distinctly fainter; forewing subapical and tornal spots sometimes absent.

Forewing length: Male, 20.5-25.5 mm (n=11, avg=22.3 mm), female, 20.5-23.0 mm (n=6, avg=21.7 mm).

Material studied: S. SULAWESI: Bantimurung, 4 ♂♂ 5 ♀♀, 6-9. xii. 1972, 1 ♂, 3. vii. 1973, 2 ♂, 9-12. viii. 1973 (IGARASHI)[IGARASHI coll.], 1 ♂, 15. vii. 1965 (SAKAGUCHI)[KUCGE], 1 ♂, 10. ii. 1967 (HARADA)[NSA]; Makassar, 1 ♂, 28-30. vi. 1973 (50m alt.)(KANO), 1 ♂, 11-12. xii. 1973 (SHINONAGA)[KUCGE], 1 ♀, 28. x. 1968 (TSUCHIYA)[NSA].

Distribution: This subspecies is known from South Sulawesi.

Eurema alitha djampeana (FRUHSTORFER, 1908)

Terias alitha djampeana FRUHSTORFER, 1908: 46. p.63 (Tanah Djampea) [untraced]
 ?*Terias hecabe dentyris* FRUHSTORFER, 1910: 168. (Tanah Djampea) [BMNH, examined] (part)
Eurema tilaha djampeana (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 185. (Tanah Djampea)
Terias tilaha djampeana FRUHSTORFER; TALBOT, 1935: 575. (Tanah Djampea)

According to the original description and to one male specimen that I examined, this subspecies is similar to subsp. *lorquini* from S. Sulawesi but may be distinguished from the latter by its black fringe in both wings upperside and fainter markings on underside (Pl. 8 (5-8)). However, I found that a male type specimen of *hecabe dentyris* FRUHSTORFER, 1910 from Tanah Djampea has no any basal border on the forewing upperside and is very similar to *sankapura*.

Forewing length: Male, 20.5 mm.

Material studied: 1 ♂, Tanah Djampea [RNH].

Distribution: This subspecies is known only from Tanah Djampea.

Eurema alitha sankapura (FRUHSTORFER, 1910)

Terias hecabe sankapura FRUHSTORFER, 1910: 167. LECTOTYPE ♂ (Bawean) here designated. [BNMH, examined]
 ?*Terias hecabe dendera* FRUHSTORFER, 1910: 168. (Sumba)
Eurema hecabe sankapura (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 157.
Eurema alitha sankapura (FRUHSTORFER); SHIRÔZU & YATA, 1981: 61.

This subspecies is distinguished from subsp. *esakii* (wet-season form) from

Taiwan by the following combination of features.

Male (Pl. 9 (1–4)). Forewing black costal and distal border distinctly narrower. Hindwing black distal border narrower, with its inner margin more sharply defined. The extreme base of both wings more narrowly and weakly darkened. Underside most markings somewhat fainter. Marginal vein-dots more distinctly developed and sometimes conjoined with scattered black sales between them in forewing. **Female** (Pl. 9 (5–8)). Ground color darker, pale yellow to pale lemon yellow. Upperside black distal borders somewhat narrower, almost right-angled at vein 4; forewing basal portion usually less heavily black dusted. On undersides most marking usually more prominent; forewing subapical and tornal spots usually present, just as in the dry-season form of *esakii*. forewing marginal vein-dots conjoined with a catenate black anticiliary line, sometimes so on hindwing.

Forewing length: Male, 18.5–24.0 mm (n=15, avg=21.8 mm), female, 17.0–24.0 mm (n=15, avg=21.7 mm).

Type material examined: *Terias hecabe sankapura* was described from an unstated number of male and female specimens from 'Bawaea' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type(red)/Bawean, Juli-Sept. Fruhstorfer/hecabe sankapura Fruhst./Fruhstorfer Coll., B.M. 1937–285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias hecabe sankapura* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. The female specimen bears similar data labels, and in addition the following labels; 'Paralectotype (blue)/*Terias hecabe sankapura* Fruhstorfer PARALECTOTYPE det. O. Yata 1994'.

Material studied: W. JAVA: Jakarta, 1 ♂² ♀, 16–26. v. 1966 [NSA]. BALI: Sanur, 1 ♀, 27. iii. 1966, 2 ♀, 7–8. iv. 1966, 2 ♀, ix-x. 1966 (IGARASHI) [IGARASHI coll.], 1 ♂, 15. iv. 1966 [NSA]. LOMBOK: Mt. Pusuk (300m alt.), 1 ♂, 23. xii. 1973 (SHINONAGA) [KUCGE]. E. SUMBA: Lewa, Kempong Raja, 3 ♂, 9–10. ix. 1979 (NISHIYAMA)[KUCGE]. E. SUMBAWA: Bima, 1 ♂, 20. x. 1978 [ET].

Distribution: This subspecies is distributed from Bawean, Java, Bali, Lombok, Sumbawa and Sumba.

Eurema alitha bidens (BUTLER, 1886)

Terias bidens BUTLER, 1886: 222. pl. 5, fig. 7, ♂. LECTOTYPE ♀ (Sumatra) here designated. [BNMH, examined]

Terias semifusca BUTLER, 1886: 222. pl. 5, fig. 8, ♂. (Sumatra) [BNMH, Type ♂ examined]

Eurema alitha bidens (BUTLER); SHIRÔZU & YATA, 1981: 61.

This subspecies is distinguished from subsp. *esakii* from Taiwan (wet-season form) by the following combination of features.

Male (Pl. 10 (1–2)). Forewing black costal border more indistinct; black distal border broader, nearly right-angle at vein 4. Hindwing black distal border broader,

with its inner margin more prominently zigzag-shaped and more sharply defined. The extreme base of both wings more narrowly and weakly darkened. On underside most markings somewhat fainter; marginal vein-dots more strongly developed and sometimes conjoined with scattered black scales between them in forewing. **Female** (Pl. 10 (3–8)). Ground color somewhat darker, pale yellow to lemon yellow. Upperside black distal border much broader, with its inner margin sometimes irregular and diffused, almost right-angled at vein 4. Hindwing black distal border much broader, with its inner margin more prominently zigzag-shaped and more strongly diffused. Basal portions of both wings usually more heavily black dusted. On underside forewing marginal vein-dots sometimes conjoined with scattered black scales between them. Most markings usually more strongly developed; forewing subapical and tornal spots usually present, just as in the dry-season form of *esakii*.

Forewing length: Male, 15.0–24.0 mm (n=11, avg=20.4 mm), female, 21.0–2.0 mm (n=4, avg=21.6 mm).

Type material examined: *Terias bidens* was described from a single female obtained by HEWITSON. This holotype is now in the BMNH and bears the following labels; 'Type, *Terias bidens* Butler (red)/Sumatra, Hewitson Coll., 79 69., *Terias hecabe* 6./Sumatra, *Terias bidens* Butler ♀'

Material studied: SUMATRA: T. Rampung, 4 ♂4 ♀, 1–25. xii. 1973, 4 ♂, 13–20. I. 1974 (HISAKAWA)[KUCGE].

Distribution: This subspecies is known from S. E. Sumatra.

Eurema alitha amplexa (BUTLER, 1887)

Terias amplexa BUTLER, 1887: 523. LECTOTYPE ♂ (Christmas Is.) here designated. [BNMH, examined]

Terias moorei amplexa BUTLER; FRUHSTORFER, 1910: 169. (Christmas Is.)

Eurema hecabe amplexa (BUTLER); CORBET & PENDLEBURY, 1932: 158. (Christmas Is.)

Terias hecabe amplexa BUTLER; TALBOT, 1935: 560.

This remarkable subspecies is easily distinguished from all other subspecies of *alitha* by the following combination of features.

Male (Pl. 11 (1–4)). Forewing black costal border narrower and its inner margin more indistinct; black distal border much narrower and evenly broadened from costa to basal margin, with its inner margin almost equally concaved in each space. Hindwing black distal border much narrower, but not reduced to vein-dots, with its inner margin zigzag-shaped. The extreme base of both wings more narrowly and weakly darkened. Underside most markings somewhat fainter; marginal small vein-dots not conjoined with scattered black scales between them. **Female** (Pl. 11 (5–6)). On upperside black distal borders much narrower and almost evenly broadened from costa to basal margin, somewhat more deeply excavated in spaces 2 and 3. Hindwing black distal border much narrower. The base of both wings

more narrowly and weakly darkened. On underside markings generally fainter, but subapical patch present; marginal vein-dots not conjoined with black anticiliary line.

Forewing length: Male, 19.0 mm, female, 21.0 mm.

Type material examined: *Terias amplexa* was described from an unstated number of male and female specimens from 'Christmas Is.' by BUTLER. The BMNH now possesses a male type specimen. The male specimen bears the labels: 'Type (red)/Christmas Isld., Indian Ocean, 87.56/*Terias amplexa* ♂, type Butler.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias amplexa* Butler LECTOTYPE det. O. Yata 1994' and hereby designated lectotype.

Material studied: CHRISTMAS: Christmas Is. (northern off Java), 1 ♂, 1919 (C. W. ANDREWS), 1 ♀, 29. xii. 1897 [BMNH].

Distribution: This subspecies is known only from Christmas Is. south of Java.

This subspecies has been confused with *Eurema hecabe* and *E. moorei* (= *blanda*) due to their very similar externals. After carefully examining the type materials and the male genitalia, however, I concluded that *amplexa* should be treated as a subspecies of *E. alitha*.

Eurema alitha chemys (FRUHSTORFER, 1910)

Terias hecabe chemys FRUHSTORFER, 1910: 167. LECTOTYPE ♂ (Alor) here designated. [BNMH, examined]

Eurema hecabe chemys (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 163. (Alor, Sumbawa, Flores)

Eurema alitha chemys (FRUHSTORFER); SHIRÔZU & YATA, 1981: 61.

This subspecies is distinguished from subsp. *esakii* (wet-season form) from Taiwan by the following combination of features.

Male (Pls. 11 (7–8), 12 (1–2)). Forewing black costal border narrower and its inner margin more indistinct; black distal border somewhat narrower from costa to vein 2, while rather broader below vein 2, almost right-angled at vein 4, with its inner margin more sharply defined. Hindwing black distal border somewhat narrower, with its inner margin more prominently zigzag-shaped and more sharply defined. The extreme base of both wings more narrowly and weakly darkened. Underside most markings much fainter; marginal vein-dots more distinctly developed and sometimes conjoined with scattered black scales between them in forewing. **Female** (Pl. 12 (3–4)). Ground color darker, pale yellow to pale lemon yellow. On upper-side black distal borders somewhat narrower, right-angled at vein 4, more deeply excavated in spaces 2 and 3. Hindwing black distal border somewhat narrower, but more strongly zigzag-shaped and more prominently diffused in its inner margin. On underside forewing marginal vein-dots conjoined with a catenate black anticiliary line.

Forewing length: Male, 20.5–22.5 mm (n=3, avg=21.7 mm), female, 20.0–24.0 mm (n=4, avg=21.4 mm).

Type material examined: *Terias hecabe chemys* was described from an unstated number of male and female specimens from 'Alor' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/Alor, Marr. 97. Fruhstorfer/hecabe chemys Fr./Fruhstorfer Coll., B.M. 1937-285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias hecabe chemys* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. The female specimen bears similar data labels, and in addition the following labels; 'Paralectotype (blue)/*Terias hecabe chemys* Fruhstorfer PARALECTOTYPE det. O. Yata 1994'.

Material studied: ALOR: Pulan, 1 ♂, 10. ii. 1980 [ET]. FLORES: Maumere (10m alt.), 1 ♂, 18. xii. 1973 (KANO); W. Flores, Ruteng, 1 ♂1 ♀, 8-29. i. 1981 [KUCGE], 1 ♀, 23-25. xi. 1979, 1 ♀, 21-31. xii. 1979; E. Flores, Ndona, near Endek, 1 ♀, 14-16. ix. 1979 [ET].

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

Eurema alitha brevicostalis (BUTLER, 1898)

Terias brevicostalis BUTLER, 1898: 76. LECTOTYPE ♂ (Timor) here designated. [BNMH, examined] *Terias hecabe brevicostalis* BUTLER; FRUHSTORFER, 1910: 168. (Timor, Wetter, Babber, Dammer, Kisser, Key)

This subspecies is distinguished from subsp. *esakii* (wet-season form) from Taiwan by the following combination of features.

Male (Pls. 12 (5-8), 13 (1-2)). Forewing black costal border narrower and its inner margin more indistinct; black distal border distinctly narrower, nearly right-angled at vein 4, with its inner margin more sharply defined. Hindwing black distal border much narrower, with its inner margin more prominently zigzag-shaped. The extreme base of both wings more narrowly and weakly darkened. Underside most markings much fainter; marginal vein-dots more developed and sometimes conjoined with scattered black scales between them in forewing. **Female** (Pl. 13 (3-4)). Ground color darker. On upperside black distal borders distinctly narrower, right-angled at vein 4, more deeply excavated in spaces 2 and 3. Hindwing black distal border much narrower, but more strongly zigzag-shaped in its inner margin. On underside forewing marginal vein-dots conjoined with a catenate black anticiliary line. Most markings usually more prominent; forewing subapical and tornal spots usually present, just as in the dry-season form of *esakii*.

Forewing length: Male, 16.0-20.5 mm (n=4, avg=19.5 mm), female, 19.0-19.5 mm (n=4, avg=19.3 mm).

Type material examined: *Terias brevicostalis* was described from an unstated number of male and female specimens from 'Timor' by BUTLER. The BMNH now possesses three male and a female specimens. The male specimen bears the labels:

'Type (red)/Semaó I., 5/90 J.J.W/Coll. Walker., 90-126/Terías brevicostalis, type Butler' In addition the male bears the following labels; 'Lectotype (purple)/Terías brevicostalis Butler LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. Two other male specimens bears similar data labels (Co. type (yellow)), and in addition the following labels; 'Paralectotype (blue)/Terías brevicostalis Butler PA-RALECTOTYPE det. O. Yata 1994'. The female specimen bears different data labels; 'Type (red)/Ternate, 92-14., XIÑ91./T. brevicostalis ♀, Dry season form/Ternate, 11/91 JJW'.

Material studied: TIMOR: 4 ♂4 ♀, 28. ix. 1967 [NSA]. WETTER: 4 ♂3 ♀.

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

Eurema alitha gunjii SHIRÔZU & YATA, 1981

Terías biformis BUTLER, 1884: 196. [BMNH, Type ♀, examined] (part)

Eurema alitha gunjii SHIRÔZU & YATA, 1981: 55-57. figs. 29-32. Holotype ♂. [KUCGE, examined]

This subspecies is distinguished from subsp. *esakii* (wet-season form) from Taiwan by the following combination of features.

Male (Pl. 13 (5-6)). Forewing black distal border with its inner margin more strongly dentate from costa to vein 4, and less deeply excavated in spaces 2 and 3 where each bottom of concave sharply or bluntly pointed, almost right-angled at vein 4. The extreme base of both wings more narrowly darkened. Underside most markings much fainter; marginal vein-dots more distinctly developed and sometimes conjoined with a catenate black anticiliary line, and sometimes so in hindwing. Forewing apex and hindwing distal margin somewhat rounder. **Female** (Pl. 13 (7-8)). Ground color darker, slightly pale yellow on upperside. On upperside black distal borders less deeply excavated in spaces 2 and 3 where each bottom of concave usually sharply pointed, almost right-angled at vein 4. Hindwing black distal border more strongly zigzag-shaped and sharply projected along each vein. On underside forewing marginal vein-dots conjoined with a catenate black anticiliary line.

Forewing length: Male, 18.0-20.5 mm (n=5, avg=19.3 mm), female, 19.5 mm (n=2, avg=19.5 mm).

Type material examined: *Eurema alitha gunjii* was described from male and female specimens by SHIRÔZU and YATA. The holotype male specimen is now in KUCGE and bears the following labels; 'Ceram, Kamarian, 26. i 1973, Gunji leg. *Eurema alitha gunjii* SHIRÔZU & YATA, 1981, Holotype ♂ (red)'. The KUCGE also possesses 4 male and 3 female specimens, bearing similar data labels '(Paratype (orange))' and 3 males, bearing the labels: 'Ambon, 18.i-2.ii 1973, Gunji leg. Paratype (orange)'.

Distribution: This subspecies occurs in Ceram and Ambon.

***Eurema alitha kaiensis* YATA, ssp. nov.**

This subspecies is distinguished from subsp. *esakii* (wet-season form) from Taiwan by the following combination of features.

Male (Pl. 14 (1–2)). Forewing black distal border somewhat broader, nearly right-angled at vein 4, with its inner margin more sharply defined. Hindwing black distal border broader, with its inner margin more prominently zigzag-shaped. The extreme base of both wings more narrowly and weakly darkened. Underside most markings much fainter except marginal vein-dots. **Female** (Pl. 14 (3–4)). Ground color darker yellow. On upperside forewing black distal border with its inner edge right-angled at vein 4, more deeply excavated in spaces 2 and 3. Hindwing black distal border more strongly zigzag-shaped in its inner margin. The extreme base of both wings more narrowly and weakly darkened. On underside forewing marginal vein-dots conjoined with a catenate black anticiliary line. Most markings usually more prominent; forewing subapical and tornal spots usually present, just as in the dry-season form of *esakii*.

Forewing length: Male, 19.0–21.5 mm (n=12, avg=20.3 mm), female, 20.0–23.0 mm (n=4, avg=21.1 mm).

Type-locality: Kai Is.

Distribution: This subspecies is restricted to Kai Is. in its distributional range.

Holotype: ♂, Kai Is. (Key I., Pre. by DE NICÉVILLE 1900–46/Terias photophila, Butler) [BMNH].

Paratypes: KAI IS.: Key Is., 1 ♀, Pre. by DE NICÉVILLE 1900.46., 11 ♂3 ♀, x. 1990? [KUCGE], 2 ♂1 ♀, x. 1990? [KMNHIR 100, 324–326].

Remarks. This new subspecies is similar to subsp. *brevicostalis* from Timor, but distinguishable from the latter by the somewhat broader black distal borders of upperside, with its inner edge less deeply excavated in spaces 2 and 3 on forewing upperside in male.

As the result of the present finding of *alitha* from Kai Is., *Eurema hecabe* (subsp. *photophila*) and *E. alitha* occur sympatrically in the island. KUCGE possesses 17 male and 9 female specimens of *hecabe* and the present type series of *alitha*. In contrast, in Aru we have only the specimens of *hecabe* (1 ♂4 ♀).

***Eurema alitha novaguineensis* SHIRÔZU & YATA, 1981**

Eurema alitha papuana SHIRÔZU & YATA, 1981: 59, figs. 37–40. Holotype ♂. [NSM, examined]

Eurema alitha novaguineensis Shirôzu & YATA, nom. nov. 1982: 25.

This subspecies is distinguished from subsp. *esakii* (wet-season form) from Taiwan by the following combination of features.

Male (Pl. 14 (5–6)). Forewing black distal border with its inner margin more strongly dentate from costa to vein 4, and less deeply excavated in spaces 2 and 3

where each bottom of concave sometimes bluntly pointed, almost right-angled at vein 4. Hindwing black distal border more strongly zigzag-shaped and usually projected along each vein. The extreme base of both wings more narrowly darkened. *Underside*: Most markings much fainter; marginal vein-dots more distinctly developed and sometimes conjoined with a catenate black anticiliary line. Forewing apex and hindwing distal margin somewhat rounder. **Female** (Pls. 14 (7–8), 15 (1–2)). Ground color somewhat darker, pale yellow on upperside. On upperside black distal borders less more deeply excavated in spaces 2 and 3, right-angled at vein 4. Hindwing black distal border more strongly zigzag-shaped.

This subspecies is quite similar to ssp. *gunjii* from Ceram and Ambon, but may be distinguished from the latter by the forewing black distal border with its inner margin evenly excavated in spaces 2 and 3 and paler ground color in female.

Forewing length: Male, 16.0–21.0 mm (n=5, avg=19.4 mm), female, 16.0–19.5 mm (n=3, avg=17.3 mm).

Type material examined: *Eurema alitha novaguineensis* was described from male and female specimens by SHIRÔZU and YATA. The holotype male specimen is now in NSM and bears the following labels; 'W. Irian, Manokwari, 26. ii. 1918, Niimura leg./*Eurema alitha novaguineensis* SHIRÔZU & YATA, 1981, Holotype ♂ (red)'. The KUCGE also possesses 2 males and 1 female, bearing the following data labels '1 ♂, W. Irian, Sorong, 16. ii. 1973, Gunji leg.; 1 ♂, New Guinea, Sogeei, 14. xii. 1970, Sibatani leg., 1 ♂ 2 ♀, Port Moresby, 13-14. xii. 1970, Sibatani leg., 1 ♀, Lae, 19. i. 1974, Shinonaga leg./*Eurema alitha novaguineensis* Shirôzu & Yata, 1981, Paratype (orange)'.

Distribution: This subspecies is distributed from New Guinea and northern Australia.

***Eurema halmaherana* SHIRÔZU & YATA, 1981**

[Pl. 15 (3–8)]

Eurema alitha halmaherana SHIRÔZU & YATA, 1981: 57, 59, figs. 33–36. Holotype ♂ (Halmahera). [KUCGE, examined]

This species is endemic to North Moluccas, Halmahera and Ternate Is., which is very unusual within the *hecabe* subgroup consisting of many widely distributed species.

Diagnosis: Upperside of male wings bright yellow in ground color; forewing black distal border not completely touching basal margin, as a result evenly rounded in its posterior end, with deep concavities in spaces 2 and 3, each bottom of which is sharply pointed; hindwing black distal border narrowly interrupted at the middle of each space; underside of wings not black dusted; sex-brand very long and much broad, ending a point of origin of vein 2; distal margin of hindwing somewhat angulate at space 3; uncus very short, with uncal projection strongly bicuspid.

Description: Male (Pl. 15 (3–6)). *Upperside*: Ground color bright yellow. Forewing black costal border narrow and indistinct; black distal border generally broad, not completely touching basal margin, as a result evenly rounded in its posterior end, with its inner edge oblique and irregular from costa to vein 4, almost right-angled at vein 4, equally excavated in spaces 2 and 3 and their excavation sharply pointed in each bottom, irregular and almost perpendicular to basal margin below vein 2; basal border absent; discocellular spot absent; fringe black, but yellowish near tornus. Hindwing black distal border rather narrow, tapering near apex and tornus, narrowly interrupted at the middle of each space, with its inner margin distinctly zigzag-shaped and not sharply defined; anal border undeveloped; fringe yellow. Only the extreme bases of both wings somewhat blackish. *Underside*: Ground color almost the same as on upperside, not black dusted. Forewing subapical patch sometimes represented by a series of faint spots from spaces 4 to 7; 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 light brownish gray, very long and much broad, usually ending at 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 usually well defined, arranged in an irregular zigzag-line, and a submarginal spot in spaces 7 and 8 somewhat larger than the others; circular small subbasal spot present each in spaces 1b+c and 7 and in the middle of discoidal cell; a minute basal spot sometimes in space 8; discocellular spot almost same as in forewing, but larger; 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. 34 (5, upper)).

Forewing somewhat rounded at apex; distal margin more or less convex. Hindwing somewhat arched in the basal half of costal margin; distal margin angulate at space 3; 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-checked, 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 broken line appearing along the lateral margin of abdominal terga.

Forewing length: 18.5–23.0 mm (n=11, avg=20.9 mm).

Female (Pl. 15 (7–8)). Similar to male, but differing as follows. Ground color pale yellow, and on underside somewhat paler. Basal portion on upperside more weakly darkened, but somewhat more extensively black dusted. Forewing upperside with discocellular spot absent; black costal border barely traceable; black distal border broader, more deeply excavated in spaces 2 and 3, with its inner edge more indistinct. Hindwing black distal border distinctly projected along each vein, with its inner margin more strongly diffused. On underside tornal spot absent. Ultraviolet reflectance on upperside: Moderately reflective on yellow areas, appearing gray

in UV-photos (Pl. 34 (5, lower)).

Forewing length: 18.3–21.0 mm (n=2, avg=19.7 mm).

Male genitalia (Fig. 4): Tegumen somewhat broad, almost trapezoidal in dorsal aspect, somewhat concaved dorsomedially, entirely sclerotized; Valvenansatz short, usually producing downwards; vinculum not strongly arched; saccus moderately long (0.64 of ring height), angle between vinculum and saccus 80–90°. Uncus usually very short (dorsum proper 0.52 of ring height), extending somewhat downwards; uncal projection short (0.09 of ring height), somewhat projecting posterodorsally, with its apex strongly bicuspid. Valva almost as long as high; P1 somewhat broader and shorter than P4, extending almost laterally, with its pointed apex; P2 long and slender; P3 broad and triangular, with a bluntly pointed apex; P4 represented by two processes which are similar to each other in length and shape. Phallus moderately long, slender and arched dorsally, subzonal sheath about as long as 1/3 length of phallus. Juxta broad and weakly sclerotized, consisting of a pair of broad pouches producing, a short and slender median stalk.

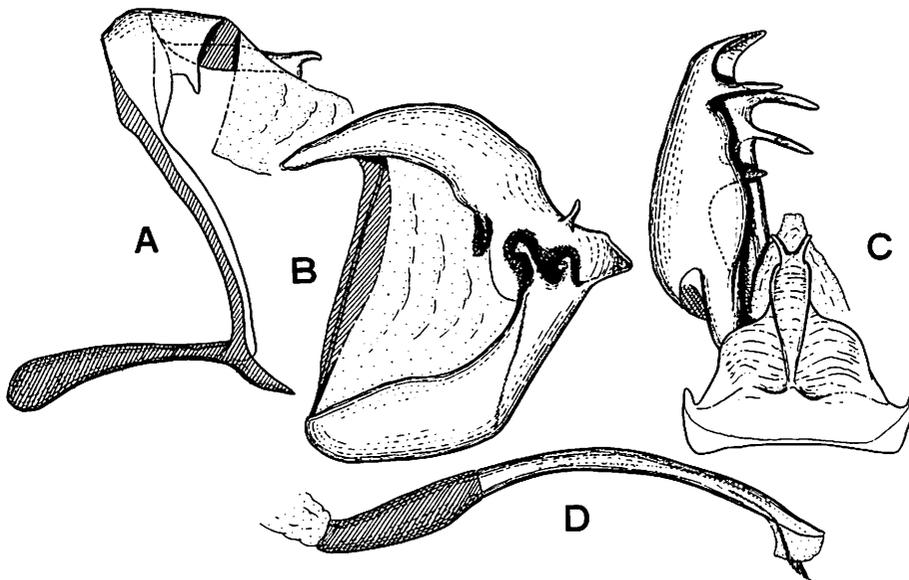


Fig. 4. Male genitalia of *Eurema halmaherana* SHIRÔZU & YATA, 1981 from Halmahera. A: Ring (lateral). B: Valva (inner aspect of right-hand). C: Dorsum and valva (dorsal). D: Phallus (lateral).

Female genitalia (Fig. 5): Seventh abdominal sternum with nearly straight posterior margin. Lateral hollow elliptical, with dorsal eaves rather long and moderately deep, ventral eaves long and deep, median groove long, having a weak 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, sometimes broadened at the middle or posterior portion; banks of longitudinal groove weakly developed. 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 and usually concealed by the posterior margin of 7th abdominal sternum. Membranous ductus bursae almost as long as cervix bursae, somewhat thick, and membranous but weakly sclerotized on anterior 1/2. Signum somewhat thickened. Eighth abdominal tergum longitudinally very short; apophysis anterioris nearly straight, slightly longer than apophysis posterioris, with a prominent protuberance at the inner to dorsal margin of proximal portion. Papilla analis elongate, bearing a short lobe and swollen bare-region.

Variation: This species shows less prominent variation than the other species of the *hecabe* subgroup. But female polymorphism is found from Halmahera; the females can be divided into two forms, pale yellow and whitish yellow ones.

Type material examined: *Eurema alitha halmaherana* was described from male and female specimens by SHIRÔZU and YATA. The holotype male specimen is now in KUCGE and bears the following labels; 'Halmahera, Djailolo, 23. xii. 1972, Y. Gunji leg./*Eurema alitha halmaherana* SHIRÔZU & YATA, 1982, Holotype ♂ (red)'. The KUCGE also possesses 2 males and 3 females, bearing similar data labels '(Paratype (orange))', and 9 males and a female, bearing the labels, 'Ternate Is., 18. xii. 1972-20. i. 1973., Y. Gunji leg./*Eurema alitha halmaherana* Shirôzu & Yata, 1982, Paratype (orange)'.

Taxonomic remarks: In 1981 SHIRÔZU and I described this species as the subspecies of *Eurema alitha* from Halmahera based on external features and distributional pattern. After carefully examining the general appearance and male and female genitalia, however, I concluded that *Eurema alitha halmaherana* should be raised to specific rank.

Relationship: This species is most closely related to *E. hecabe* and *E. alitha*, but it is very difficult to infer the precise relationships between them based solely on morphological information.

Distribution: This species is one of the most local species within the *hecabe* complex. It occurs only in northern Moluccas, Halmahera and Ternate Is. This species seems to be a lowland perid in Halmahera and Ternate Is.

Habitat and habits: This butterfly mainly inhabits the open country of lowlands where the human activities have changed the primary vegetation to artificial grassland. *E. halmaherana* seems to occupy the ecological niche of *E. alitha* in northern Moluccas; the former almost sympatric with *E. hecabe*, and these two species often fly mixed together.

Early stages: The early stages and larval foodplant are unknown.

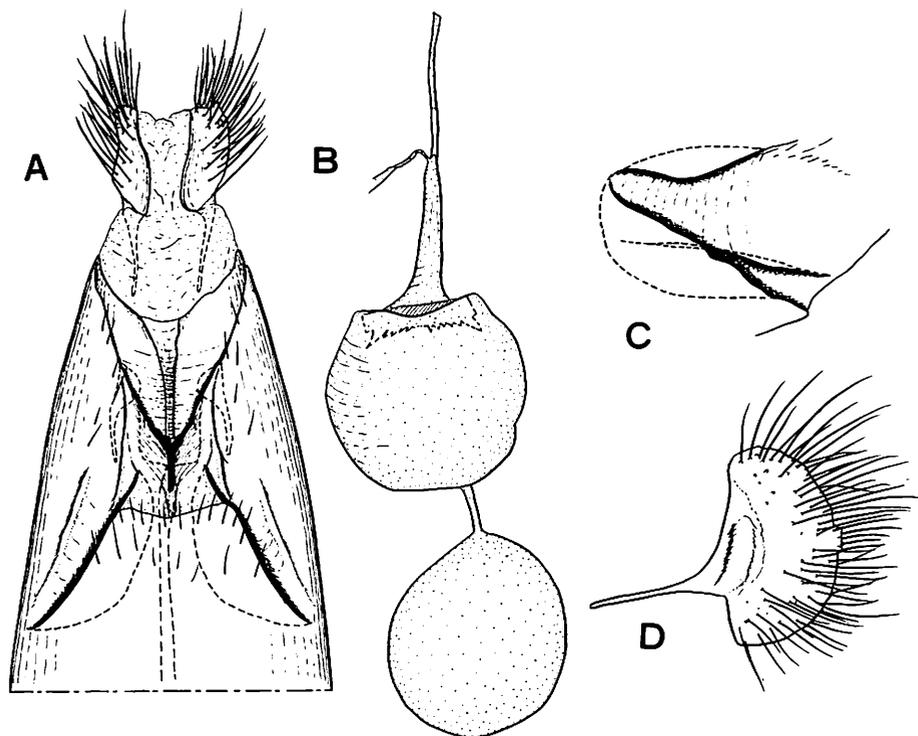


Fig. 5. Female genitalia of *Eurema halmaherana* SHIRÔZU & YATA, 1981 from Halmahera. A: Female genitalia (ventral). B: Bursa copulatrix (ventral). C: Lateral hollow (lateral). D: Papilla analis (lateral).

***Eurema hecabe* (LINNAEUS, 1758)**

[Pls. 16–35]

Papilio hecabe LINNAEUS, 1758: 470. (lectotype ♀ designated by VANE-WRIGHT (1975), Canton, China) [untraced]

Papilio luzoniensis LINNAEUS, 1764: 249. (Luzon)

Papilio rahel FABRICIUS, 1787: 22. (India)

Papilio chrysopterus GMELIN, 1790: 2261, no. 883. (?S. E. China)

Terias hecabe (LINNAEUS); SWAINSON, 1821, Zool. III. 1, pl. 22.

?*Terias sinensis* LUCAS, 1852, 4: 429. (China)

Terias hecabeoides MÉNÉTRIÈS, 1855: 85, pl. 2, fig. 2. (?Haiti) [BMNH ♂, examined]

Terias aesiope MÉNÉTRIÈS, 1855: 85, pl. 2, fig. 3. (?Haiti) [BMNH ♀, examined]

Terias anemone C. & R. FELDER, 1862: 23. (Ningpo, N. & C. China)

Terias fimbriata WALLACE, 1867: 323. (Mussooree, N. & W. Himalayas) [BMNH ♂, examined]

Terias diversa WALLACE, 1867: 324. (Bouru)

Terias mandarina DE L'ORZA, 1869: 18. (Japan)

Eurema chrysopterus (GMELIN); KIRBY, 1971: 450. (?S. E. China)

Terias latimargo HOPFFER, 1874: 25. (N. W. Celebes)

Terias solifera BUTLER, 1875: 396. (W. Africa)

- Terias sulphurata* BUTLER, 1875: 617. (Mare, Loyalty Iss.) [BMNH, examined]
Terias hebridina BUTLER, 1875: 617, pl. 67, fig. 8. (New Hebrides) [BMNH, examined]
Terias pumilaris BUTLER, 1875: 617, pl. 67, fig. 7. (New Hebrides) [BMNH, examined]
Terias varieta BUTLER, 1875: 617, pl. 67. (New Hebrides) [BMNH, examined]
Terias inanata BUTLER, 1875: 617, pl. 67. (New Hebrides) [BMNH, examined]
Terias sinapina BUTLER, 1877: 355. (Loyalty Iss.) [BMNH, examined]
Terias lifuana BUTLER, 1877: 355. (Loyalty Iss.) [BMNH, examined]
Terias aprica BUTLER, 1877: 420, male. (Tongabatu) (Loyalty Iss.) [BMNH, examined]
Terias suava BOISDUVAL, 1878: 836. (Burma) [BMNH, ♂♀, examined]
Terias subdecorata MOORE, 1878: 699. (Hainan)
Terias arcuata MOORE, 1878: 700. (Hainan) [BMNH, ♂♀, examined]
Terias bewsheri BUTLER, 1879: 190. (Johanna Is.) [BMNH, ♂♀, examined]
Terias mandarina wet f. mariesi BUTLER, 1880: 198, pl. 6, fig. 1. (Nikko, Japan) [BMNH ♂♀, examined]
Terias hybrida BUTLER, 1880: 199, pl. 6, fig. 7. (Nikko, Japan) [BMNH, examined]
Terias connexiva BUTLER, 1880: 199, pl. 6, fig. 12. (Nikko, Japan) [BMNH ♂, examined]
Terias unduligera BUTLER, 1880: 668, ♂. (Formosa) [BMNH ♂, examined]
Terias simulata MOORE, 1881: 119, pl. 45, figs. 2, 2a, b. (Ceylon) [BMNH ♂♀, examined]
Terias excavata MOORE, 1882: 273. (Cashmere) [BMNH ♂♀, examined]
Terias purrea MOORE, 1882: 252. (Kangra)
Terias apicalis MOORE, 1882: 253, pl. 12, fig. 2. (Kangra)
Terias irregularis MOORE, 1882: 253, pl. 12. (Kangra) [BMNH ♂♀, examined]
Terias asphodelus BUTLER, 1883: 151, pl. 24, fig. 13. (Mhow) [BMNH ♂♀, examined]
Terias narcissus BUTLER, 1883: 151. (Mhow) [BMNH ♂, examined]
Terias maroensis BUTLER, 1883: 368, pl. 38, fig. 2, ♀. (Maroe Is.)
? *Terias chalcomiaeta* BUTLER, 1884: 485. (Arabia)
Terias curiosa SWINHOE, 1884: 508, pl. XLVII, fig. 3. (Karachi) [BMNH ♂, examined]
Terias photophila BUTLER, 1884: 196. LECTOTYPE ♂ (Ké Delan, Key Is.) here designated. [BMNH, examined]
Terias multiformis PRYER, 1882: 489. (Japan)
Terias simplex BUTLER, 1886: 217, pl. 5, fig. 2. (Kangra, N. W. Himalaya) [BMNH ♀, examined]
Terias latilimbata BUTLER, 1886: 221, pl. 5, fig. 5. (Sumatra) [BMNH ♂, examined]
Terias anguligera BUTLER, 1886: 224, pl. 5, fig. 10. (Tondano, Sulawesi) [BMNH ♂, examined]
Terias contubernatis MOORE, 1886: 46. (Mergui) [BMNH ♂♀, examined]
Terias patruelis MOORE, 1886: 46, pl. 4, fig. 5. (Mergui) [BMNH ♂♀, examined]
Terias fraterna MOORE, 1886: 46, pl. 4, fig. 6. (Mergui) [BMNH ♂♀, examined]
Terias merguiana MOORE, 1886: 47, pl. 4, fig. 7. (Mergui) [BMNH ♂♀, examined]
Terias kana MOORE, 1886: 48, pl. 4, fig. 9. (Mergui) [BMNH ♂♀, examined]
Terias swinhoei BUTLER, 1886: 216. (Bombay) [BMNH ♂, examined]
Terias phoebus BUTLER, 1886: 221, pl. 5, fig. 4. (New South Wales)
? *Terias boisduvaliana* MABILLE, 1887: 23. (S. Africa)
Terias orientis BUTLER, 1888: 71. (♂ Wadelai, ♀ Tobbo)
Terias aethiopica TRIMEN, 1889: 21. (S. Africa) [BMNH ♂♀, examined]
Terias butleri TRIMEN, 1889: 23. (S. Africa) [BMNH ♂♀, examined]
Terias kerawara RIBBE, 1898: 85. (New Britain)
Terias aesiopoides MOORE, 1906: 60, pl. 569, figs. 1, 1a, b, 1c, d. (Karachi) [BMNH ♂♀, examined]
Terias blairiana MOORE, 1907: 75, pl. 575, figs. 1, male, 1a, female. (Andamans)
Terias andamana MOORE, 1907, 7: 75, pl. 575, figs. 2(male), 2b,c(female). (Andaman)

Diagnosis: Upperside of male wings bright yellow in ground color; black distal border on forewing upperside almost right-angled at vein 4; underside of wings somewhat black dusted; sex-brand long and broad, ending slightly before origin of vein 2; forewing somewhat angulate at apex; distal margin of hindwing somewhat

angulate at space 3; uncus usually very short, with uncal projection poorly developed, projecting posterodorsally.

Description: *Wet-season form.*—**Male.** *Upperside:* Ground color bright yellow. Forewing black costal border usually broad with its inner margin somewhat diffuse; black distal border generally broad, with its inner edge oblique and irregular from costa to vein 4, almost right-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 undeveloped except in ssp. *latimargo* (N. Sulawesi); discocellular spot absent; fringe usually yellow, mixed with black. Hindwing black border generally broad, tapering near apex and tornus, with its inner edge moderately defined, usually more or less projected along each vein; anal border undeveloped; fringe yellow. Only the extreme bases of both wings blackish. *Underside:* Ground color somewhat paler than on upperside, somewhat black dusted. Forewing apical patch absent; two spots in discoidal cell, but sometimes disappearing; discocellular marking appearing by an irregular slender ring, covering more than half of the discocellular vein, sometimes accompanying a minute triangular spot at base of space 6; tornal spot usually absent, if present barely traceable; sex-brand light gray, sometimes with a slight purplish tinge, long and broad, usually ending a point of origin of vein 2 or slightly before it; small vein-dots present; fringe 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 bisinuate and directed towards the discocellular spot; 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 8; discocellular spot almost same as in forewing, but larger; 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 (Pls. 34 (7, 9, upper), 35(1–9, upper)).

Forewing somewhat angulate at apex; distal margin slightly convex. Hindwing slightly arched in the basal half of costal margin; distal margin angulate at space 3; 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-checked, except on the posterodorsal 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: 15.5–26.5 mm. (n=498, avg=21.8 mm).

Female. Similar to male, but differing as follows. Ground color pure white to pale 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 indistinct, especially in

hindwing. On underside tornal spot sometimes present. Ultraviolet reflectance on upperside: Usually structurally reflective on yellow areas in forewing basally, appearing bright-white in UV-photos, but in the white-form structural reflectance absent (Pls. 34 (7, 9, lower), 35(1-9, lower)).

Forewing length: 15.5-27.5 mm (n=267, avg=21.7 mm).

Dry-season form.—**Male & female.** *Upperside:* Forewing black distal border narrower and less deeply excavated than in the wet-season form, sometimes its inner edge regular; black costal border very narrow and much diffused. 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 more heavily black dusted entirely. On forewing subapical streak or patch appearing, but apical marginal smudge absent; tornal spot sometimes present; in female vein-dots sometimes conjoined with a fine black anteciliary line. Hindwing with distal streak in spaces 7 and 8 more strongly zigzag-shaped and almost contiguous with discocellular marking.

Forewing more angulate at apex; distal margin more straight. Hindwing more angulate at space 3 than in the wet-season form.

Male genitalia (Figs. 6-8): Tegumen broad, triangular in dorsal aspect, somewhat concaved dorsomedially, entirely sclerotized; Valvenansatz short, usually producing downwards; vinculum not strongly arched; saccus moderately long (0.51-0.65 of ring height), angle between vinculum and saccus 80-90°. Uncus usually very short (dorsum proper 0.49-0.61 of ring height), extending somewhat downwards; uncal projection short (0.94-0.11 of ring height), projecting posterodorsally, with its

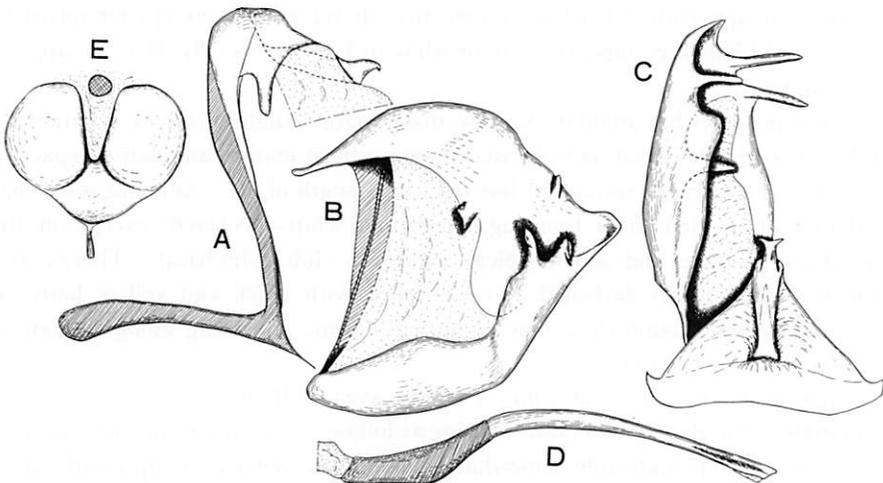


Fig. 6. Male genitalia of *Eurema hecabe hecabe* (LINNAEUS, 1758) from Hongkong. A: Ring (lateral). B: Valva (inner aspect of right-hand). C: Dorsum and valva (dorsal). D: Phallus (lateral). E: Juxta (posterior)

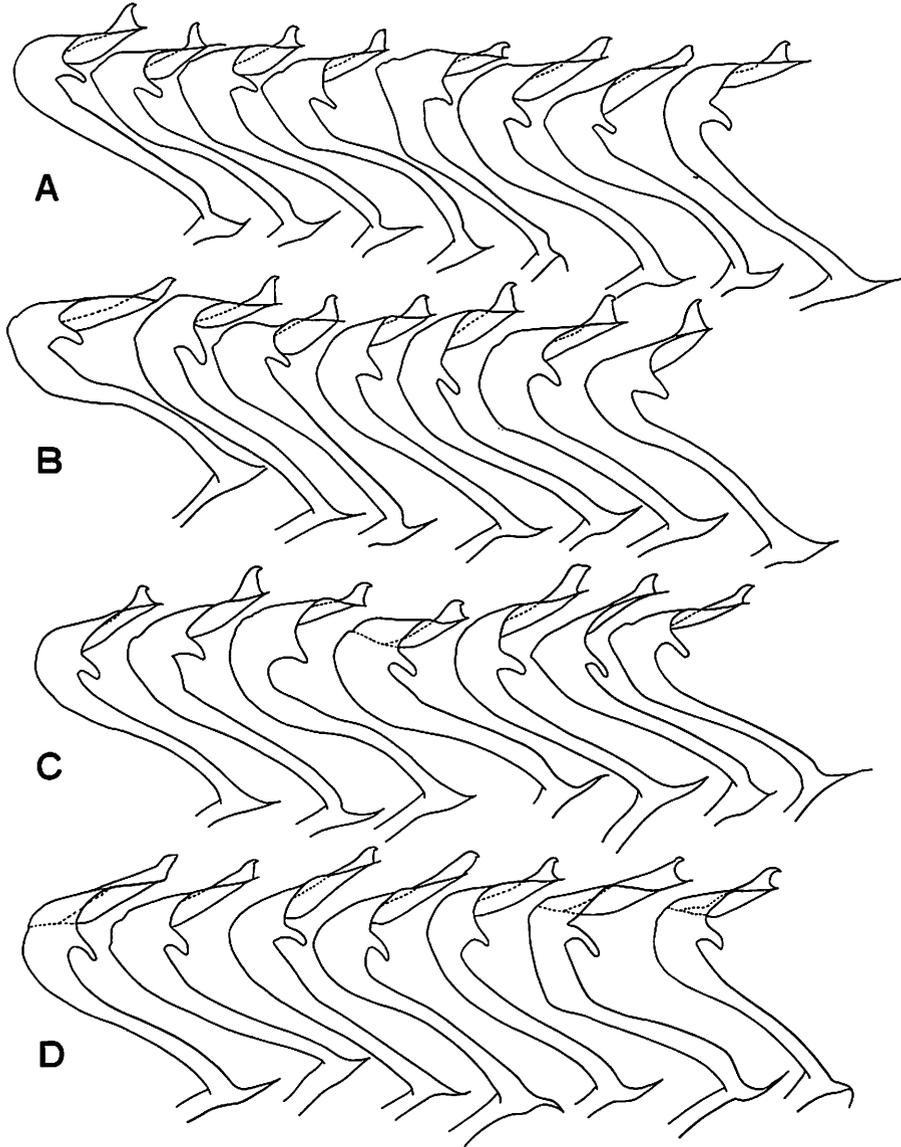


Fig. 7. Rings of male genitalia (lateral) of *E. hecabe*. A: 1st-7th, Japan, 8th, W. Pakistan; B: Taiwan, Taiwan, Luzon, Malay Peninsula, Sumatra, Java, Mindanao; C: Sri Lanka?, Bali, Sulawesi, Banggai, Palau Is., Ambon, Halmahera; D: Timor, New Guinea, New Caledonia, New Britain, Australia, Congo, Kenya, from left.

apex bicuspid. Valva almost as long as high; P1 somewhat broader and shorter than P4, extending almost laterally, with its blunt or somewhat serrate apex; P2 long and slender; P3 broad and triangular, with a pointed apex; P4 represented by two

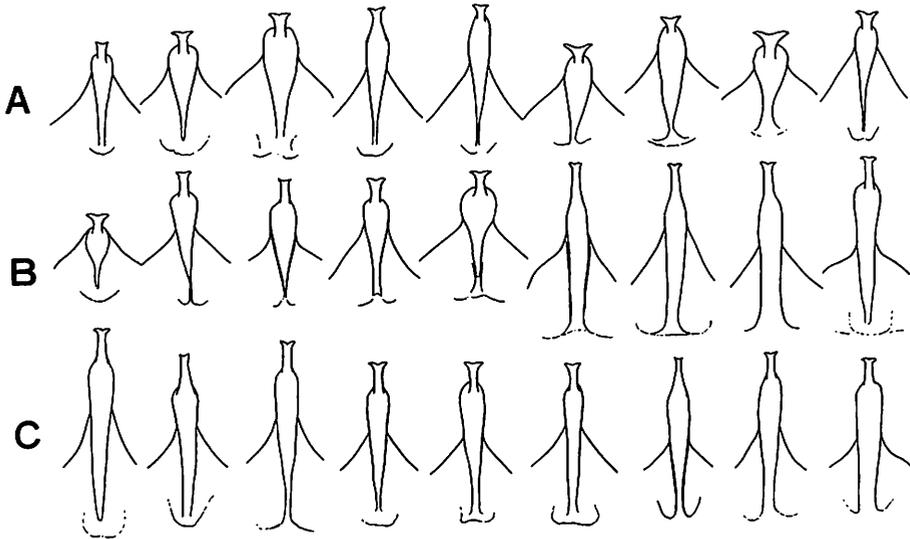


Fig. 8. Dorsum of male genitalia (dorsal) of *E. hecabe*, and *Eurema alitha*. A: *E. hecabe*, 1st-5th Japan, Nepal, Luzon, Malay Peninsula, Sulawesi; B: 1st-5th *E. hecabe*, Banggai, Ambon, Halmahera, New Britain, Congo, 6th-9th *E. alitha*, Taiwan, Bohol, Mindanao, Java; C: *E. alitha*, Bali, Christmas, Sulawesi, Tanahjampea, Banggai, Talaut, Ambon, Timor, New Guinea, from left.

processes which are similar to each other in length and shape. Phallus moderately long, slender and arched dorsally, subzonal sheath about as long as 1/3 length of phallus or shorter. Juxta weakly sclerotized, consisting of a pair of broad pouches producing a short and slender median stalk.

Female genitalia (Fig. 9): Seventh abdominal sternum with nearly straight posterior margin. Lateral hollow elliptical, with dorsal eaves rather long and moderately deep, ventral eaves long and deep, median groove long, having a weak 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, sometimes broadened at the middle or posterior portion; banks of longitudinal groove weakly developed. 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 and usually concealed by the posterior margin of 7th abdominal sternum. Ductus bursae almost as long as cervix bursae, somewhat thick, and membranous but weakly sclerotized on anterior 1/2. 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 inner to dorsal margin of proximal portion. Papilla

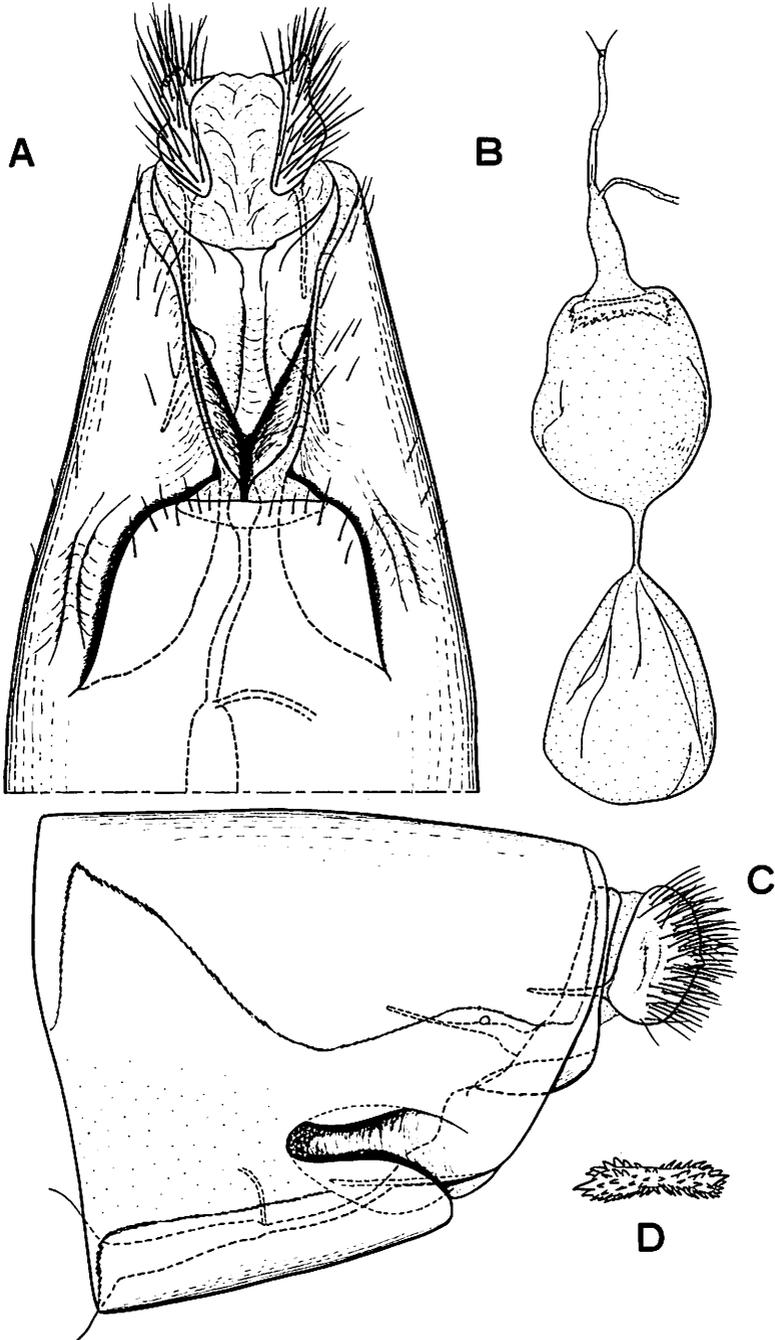


Fig. 9. Female genitalia of *Eurema hecabe hecabe* (LINNAEUS, 1758) from Hongkong. A: Female genitalia (ventral). B: Bursa copulatrix (ventral). C: Female genitalia (lateral). D: Signum (anterior).

analis elongate, bearing a short lobe and swollen bare-region.

Chromosome number: The haploid chromosome number is 31 based on subsp. *hecabe* from Japan, Taiwan and Himalayas (MAEKI, 1953, 1958, 1959; MAEKI & AE, 1966). Later, SAITOH and KUDOH (1972) reported that the number is 30 on the materials from West Malaysia.

Variation: This species is most variable geographically and seasonally in the Old World *Eurema*. Basically it has a long north-south ("transequator") cline from Japan across China, Indo-China, Sundaland, Lesser Sundas and New Guinea to Australia. The transcontinental cline from north to south may also be found in the African populations. On the other hand, the populations occurring from Wallacea to the Papuan Subregion show a considerable degree of geographical variations even in the wet-season form, and they can not be assigned to a cline, and such variations are found not only in size and markings of the wings, but also in the male genitalia (the relative length of uncus).

The seasonal polyphenism of this species is so strongly marked that the considerable number of forms (phenotypes) were considered to be distinct species until PRYER (1886) proved some of them to be conspecific by rearing. At higher latitudes, *e.g.* in Japan, two distinct seasonal forms, the summer and autumn ones are recognizable, together with intermediate one which is rather few and appears in late summer to early autumn. This species shows similar features of seasonal variation to those of the genus mentioned before, but variation of size is rather slight.

Female polymorphism is found in the populations ranging from Moluccas to the Papuan Subregion. In this area the females usually can be divided into two distinct forms, yellow and white ones.

Relationship: This species is most closely related to *E. halmaherana*, *alitha* and *floricola*, and these four form a monophyletic group, with which *E. senegalensis* is united. These five species very closely resemble each other, so that some authors regarded them conspecific (CORBET, 1934; PETERS, 1952; GIFFORD, 1965; DICKSON, 1978, etc.). However, they can be distinguished not only by external, but also by male genital features.

E. hecabe is almost sympatric with *E. alitha*, *E. floricola* and *E. senegalensis*. Furthermore, *E. hecabe* and *alitha* have almost the same habitat, the open spaces of lowlands. According to FUKUDA's observation (1973) at Los Banōs, Luzon, they fly together, but they showed differences in preferences for oviposition plants; The larval foodplants of *hecabe* are *Sesbania sesban*, *Aeschynomene indica*, *Leucaena glabra* (HIURA & ALAGAR, 1974), etc., while that of *alitha* is *Pithecollobium dulce* (FUKUDA, 1973).

Distribution: This species has the broadest range in the genus *Eurema*; It is distributed almost all over the Oriental, Australian and Afrotropical Regions, and extends into the cool-temperate zone of the Eastern Palaearctic Region, *e.g.* the northern part of Honshu, Japan (up to 40°N). Although this species is essentially a lowland pierid in Japan, it flies in mountain zone up to 1900 m in summer. This

common species is most abundant in the Old World *Eurema* species in most parts of its range.

Habitat and habits: This butterfly flies from seashore to lower mountains and mainly inhabits open country of lowlands where the human activities have changed the primary vegetation to artificial grassland.

The flight is fairly swift for this genus. The adults often congregate at moist spots on the roadside and river banks. According to WILLIAMS (1930), the migratory flights of this species were recorded from Sri Lanka and India. It migrates together with other migrants such as *Papilio*, *Catopsilia* and *Appias albina*.

This species is multivoltine even in the northernmost area of its range, and it is found flying all the year round in the subtropical and tropical regions. It hibernates in the adult stage in higher latitudes such as Japan.

Early stages: The early stages are described in detail by MOORE (1889–1881), PIEPERS & SNELLEN (1909), BELL (1912–14), SHIRÔZU & HARA (1962), etc. Egg.—Diameter 0.50–0.53, height 1.25–1.33 mm; color creamy white when deposited, changing to yellowish or dirty white just before hatching; shape elongate, spindle-shaped, flattened at base; lateral surface with many fine longitudinal ridges extending from base to apex. The eggs are laid singly on young shoots and leaves. Final instar larva.—Length 22–30 mm; maximum width of the abdomen about 3 mm; head more or less rounded in anterior view, pale green; dorsal half of cranium with short and thick secondary setae with their tips characteristically clavate; basal tubercles of setae on head green; body cylindrical, slightly narrowed anteriorly and posteriorly; posterior margin of 10th abdominal dorsum not bifurcate. Ground color yellowish to pale green dorsally, increasing a whitish tinge towards spiracular line which is entirely white; dorsal line more or less darker than ground color, but rather indistinct; D_1 and XD_1 setae on prothorax short; thick and short secondary setae colorless, resembling those on the dorsal half of head; basal tubercles of setae poorly developed, usually colorless; spiracles white. The larvae after middle instar usually rest along the midrib of upper surface of the leaf. Pupa.—Length 19–21 mm; the maximum width 3.5 mm, cephalic projection about 1.7 mm; shape so-called “the wing-bulged type”, somewhat compressed laterally, wing-sheaths strongly bulged ventrally near the middle of body; ground color pale green, more or less black dusted, sometimes entirely darkened; dorsal line grayish white; spiracles white.

The larval foodplants: *Acacia Baileyana* (SHIRÔZU, 1975, Japan), *A. concinna* (MELL, 1943, China), *Aeschynomene indica* (CHIN, 1935; HOFFMAN, *et al.*, 1938, China) *Albizia Julibrissin*, (SHIRÔZU, 1975, Japan) *A. lebbek* (COMMON, 1972, Australia; ROBINSON, 1975, Fiji; SHIRÔZU, 1975, Okinawa), *A. Moluccana*, *Alstonia Scholaris*, *Caesalpinia Bonduc* (PIEPER & SNELLEN, 1909, Java), *C. sepiaria* (SHIRÔZU, 1975, Japan), *Cassia coronilloides* (COMMON, 1972, Australia), *C. fistula* (SHIRÔZU, 1975, Japan), *C. Florida* (PIEPER & SNELLEN, 1909, Java), *C. obtusifolia* (KERSHAW, 1907; CHAN & POTTER, 1938, Hongkong; SHIRÔZU, 1975, Japan), *C. siamea* (SHIRÔZU, 1975, Japan), *C. surattensis*,

Chan *et al.*, 1938, Hongkong; SHIRÔZU, 1975, Okinawa; COMMON, 1972, Australia), *C. tora* (ROBINSON, 1975, Fiji), *Cratxylon polyanthum* (KERSHAW, 1907; CHAN & POTTER, 1938, Hongkong; HOFFMAN, *et al.*, 1938, China), *Gleditschia japonica*, *Indigofera pseudo-tinctoria*, *Kummerovia striata*, *Lespedeza juncea* (WONG & TAO, 1933, C.China), *L. bicolor* (WONG & TAO, 1933, C.China; SHIRÔZU, 1975, Japan), *L. Buergeri*, *L. cuneata*, *L. cyrtobotrya*, *L. penduliflora*, *L. virgata* (SHIRÔZU, 1975, Japan), *Leucaena gar*, 1976 in Luzon), *Macrotropis Sumatrana* (PIEPER & SNELLEN, 1909), *Ormocarpum cochinchinense* (SHIRÔZU, 1975, Amami, Okinawa) *Parkia* sp., *Pithecollobium Bigeminum* (PIEPER & SNELLEN, 1909, Java), *P. dulce* (HOFFMAN, *et al.*, 1938, China), *Robinia pseudo-Acacia* (SHIRÔZU, 1975, Japan), *Sesbania aculeata* (BINGHAM, 1907; FLETCHER, 1914, India), *S. cannabina* (COMMON, 1972, Australia), *S. grandiflora* (FLETCHER, 1914, India; ROBINSON, 1975, Fiji), *S. oegyptiaca* (FLETCHER, 1914, India), *S. Sesban* (LEECH, 1892-94), *Wagatea* sp. (TALBOT, 1939, India) (Fabaceae), *Rhamnus lineata*, *R. dahurica*, (SHIRÔZU, 1975, Japan; MELL, 1943, China) *R. japonica* (SHIRÔZU, 1975, Japan), *Phyllanthus tenellus* (Rhamnaceae), *Breybnia disticha* (ROBINSON, 1975, Fiji), *B. cernua*, *B. nivosa*, *B. oblongifolia* (COMMON, 1972, Australia) and *B. fruticosa* (KERSHAW, 1907, Hongkong; MELL, 1943, China) (Euphorbiaceae).

***Eurema hecabe hecabe* (LINNAEUS, 1758)**

- Papilio hecabe* LINNAEUS, 1758: 470. (Canton, China, 'in Asia') [untraced]
Terias subdecorata dry f. *attenuata* MOORE, 1878: 700. (Hainan)
Terias hecabe anemone C. & R. FELDER; FRUHSTORFER, 1910: 167. (C. & N. China)
Terias hecabe simulata MOORE, 1910: 167. (Ceylon)
Terias hecabe blairiana MOORE; FRUHSTORFER, 1910: 167. (Andamans)
Terias hecabe andamana MOORE; FRUHSTORFER, 1910: 167. (Andamans)
Terias hecabe nicobariensis C. & R. FELDER; FRUHSTORFER, 1910: 167. (Nicobars)
Terias hecabe grandis f. *apicalis* MOORE; FRUHSTORFER, 1910: 168. (Kangra, N. W. Himalaya)
Terias hecabe simplex BUTLER; FRUHSTORFER, 1910: 167. (N. W. Himalaya)
Terias hecabe subdecorata MOORE; FRUHSTORFER, 1910: 167. (Hainan)
Terias hecabe subdecorata f. *attenuata* MOORE; FRUHSTORFER, 1910: 167. (Hainan) [BMNH, Type ♂, examined]
Terias hecabe hobsoni BUTLER; FRUHSTORFER, 1910: 167. (Formosa)
Terias hecabe enganica FRUHSTORFER, 1910: 167. (Engano)
Terias hecabe luzoniensis (LINNAEUS); FRUHSTORFER, 1910: 168. (Luzon)
Terias hecabe sintica FRUHSTORFER, 1910: 167. (Mindoro)
Terias hecabe borneensis FRUHSTORFER, 1910: 167. (Borneo)
Terias hecabe locana FRUHSTORFER, 1910: 167. (Natuna Iss.)
Terias hecabe latilimbata BUTLER; FRUHSTORFER, 1910: 168. (Sumatra)
Terias hecabe oeta FRUHSTORFER, 1910: 167. (New Guinea) [BMNH, type ♂ ♀ examined]
Terias blanda acandra FRUHSTORFER, 1910: 169. (Hongkong) [BMNH, type ♀, examined]
Terias blanda dry f. *aphaia* FRUHSTORFER, 1910: 169. part (♂)
Terias hecabe hobsoni f. *paroeana* STRAND, 1922: 19. (Formosa)
Terias lacteola yaksha FRUHSTORFER, 1910: 179. (Natuna Is.)
Terias hecabe rotunda KISHIDA, 1932: 22. (Koror, Palau Isls.)
Eurema hecabe latilimbata (BUTLER); CORBET & PENDLEBURY, 1932: 157. (Sumatra)
Eurema hecabe borneensis (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 158. (Borneo)

- Eurema hecabe anemone* (C. & R. FELDER); CORBET & PENDLEBURY, 1932: 159. (N. & C. China)
Eurema hecabe mandarina (L'ORZA); CORBET & PENDLEBURY, 1932: 159. (Japan)
Eurema hecabe fimbriata (WALLACE); CORBET & PENDLEBURY, 1932: 160. (Mussooree, N. & W. Himalayas)
Eurema hecabe subdecorata (MOORE); CORBET & PENDLEBURY, 1932: 160. (Hainan)
Eurema hecabe luzoniensis (LINNAEUS); CORBET & PENDLEBURY, 1932: 161. (Luzon)
Eurema hecabe sintica (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 161. (Mindoro)
Eurema hecabe locana (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 158. (Natuna Isls.)
Eurema hecabe hobsoni (BUTLER); CORBET & PENDLEBURY, 1932: 159. (Formosa)
Eurema hecabe simulata (MOORE); CORBET & PENDLEBURY, 1932: 160. (Ceylon)
Eurema hecabe nicobariensis (C. & R. FELDER); CORBET & PENDLEBURY, 1932: 161. (Nicobar Isls.)
Eurema hecabe blairiana (MOORE); CORBET & PENDLEBURY, 1932: 161. (Andaman Isls.)
Eurema hecabe photophila (BUTLER); CORBET & PENDLEBURY, 1932: 164. (Key Isls.)
Eurema hecabe oeta (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 164. (New Guinea)
Eurema hecabe contubernalis (MOORE); TALBOT, 1939: 527. (Mergui)
Eurema hecabe telloana CORBET, 1941: 499. (Pulau Tello, Mentawis) **Syn. nov.** [BMNH, ♂ ♀]
Eurema hecabe cephrens CORBET, 1941: 499. (Siberut, Mentawis) **Syn. nov.** [BMNH, ♂ ♀]
Eurema hecabe phoebus (BUTLER), COMMON & WATERHOUSE, 1972: 273. (Australia)

The nominate subspecies is distinguishable from other subspecies by the following combination of characters.

Wet-season form.—**Male** (Pls. 16 (1–2), 17 (1, 3, 5, 7), 18 (1, 3, 5, 7)). On upperside forewing black costal border usually broad and somewhat diffused; black distal border usually broad, with its inner margin usually evenly concaved in spaces 2 and 3; fringe yellow to black; black basal border undeveloped. On upperside hindwing black distal border usually broad, with its inner edge more or less pointed along each vein. **Female** (Pl. 16 (3–6)). *Upperside* ground color usually pale yellow, but sometimes whitish, usually not heavily black dusted; black basal border usually undeveloped.

Forewing length: Male, 16.5–26.5 mm (n=230, avg=21.9 mm), female, 15.0–27.5 mm (n=102, avg=21.6 mm).

Dry-season form.—**Male & female** (Pls. 16 (7–8), 17 (2, 4, 6, 8), 18 (2, 4, 6, 8)). On upperside forewing black costal border sometimes almost disappearing; black distal borders variable. On underside ground color often heavily black dusted; forewing subapical patch usually well developed.

Forewing length: Male, 17.5–26.5 mm (n=113, avg=22.6 mm), female, 16.5–26.5 mm (n=98, avg=22.3 mm).

Material studied: Numerous ♂♂ and ♀♀ from Japan, Taiwan, China, Hainan, Nepal, Afghanistan, Indo-China (S. Viet-Nam, Thailand, Cambodia), Burma, Malay Peninsula, Singapore, Borneo, Sumatra, Siberut, Java, Sri Lanka, Andamans, Nicobars, Luzon, Mindoro, New Guinea, Bismark, Solomons, Palau, New Britain and Australia.

Distribution: Widely distributed from Japan across China, Indo-China, India, Sundaland, Lesser Sundas and New Guinea to Australia.

Taxonomic remarks: The nominate subspecies has been regarded as the Asian

continental race by the previous authors (FRUHSTORFER, 1910; CORBET & PENDLEBURY, 1932; YATA, 1981, etc.). As stated before, however, this subspecies has a long north-south ("transequator") cline from Japan across Sundaland to Australia. Therefore, I consider that these clinal populations should be included in a single taxonomic category, subspecies *hecabe*.*

Eurema hecabe satellitica (FRUHSTORFER, 1910)

Terias hecabe satellitica FRUHSTORFER, 1910: 167 LECTOTYPE (Nias) here designated. [BMNH, examined]

Eurema hecabe satellitica (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 157.

This race is similar to subsp. *hecabe* from Indo-China, but is distinguished by the following combination of features.

Wet-season form.—**Male** (Pl. 19 (1–4)). On upperside basal portions of both wings distinctly black dusted; underside with well developed sex-brand extending to origin of vein 2. **Female** (Pl. 19 (5–6)). On upperside ground color pale yellow, both wings entirely black dusted; black distal border broader especially in hindwing.

Forewing length: Male, 21–13.5 mm (n=6, avg=22.1 mm), female, 17–22.5 mm (n=6, avg=20.8 mm).

Type material examined: *Terias hecabe satellitica* was described from an unstated number of male and female specimens from 'Nias' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/Nias, ex. coll. hecabe satellitica Fruhstorfer Coll., B.M. 1937–285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias hecabe satellitica* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. The female specimen bears similar data labels (?), and in addition the following labels; 'Paralectotype (blue)/*Terias hecabe satellitica* Fruhstorfer PARA-

* KATO (1993) studied *Eurema hecabe* from Japan using experimental methods and suggested it can be divided into at least two forms from the morphological, physiological and ecological aspects: the one is "Japanese form" occurring in Honshu, Shikoku and Kyushu, and the other "Okinawajima form" in Amamioshima, Okinawajima and the southern regions. The two forms are different in coloration of forewing fringe, foodplant, courtship behavior, genetic composition of allozyme, etc. He also suggested that these two may have reached the species level, because they occur sympatrically in Okinawajima.

Based on the finding that two extreme forms of *hecabe*, the Japanese- and Malayan populations, are united by transitional local populations, I included subsp. *mandarina* from Japanese mainland in the nominotypical subsp. *hecabe* (YATA, 1989, pp. 17–18). Examining in more details, however, there seems to be a distinct gap between Japanese mainland population (subsp. *mandarina*) and those from Ryukyus across central China to tropical Asia, which may be regarded as "stepped cline". I think therefore that at least *mandarina* has to be treated in the traditional manner, that is as a good subspecies. For consistency of my opinion in general part of this revision, however, I included *mandarina* in the clinal variations of subsp. *hecabe*.

LECTOTYPE det. O. Yata 1994'.

Material studied: NIAS: Nias, 1 ♂ ♀, 5. iv. 1977 (KASHIWAI); S. Nias, Telukdalam, 5 ♂ ♀, 6. 1979 (NISHIYAMA) [KUCGE].

Distribution: This subspecies occurs only in Nias.

***Eurema hecabe latimargo* (HOPFFER, 1874)**

Terias latimargo HOPFFER, 1874: 25. (N. & W. Sulawesi) [untraced]

Terias latimargo latimargo HOPFFER; FRUHSTORFER, 1910: 168.

Terias hecabe latimargo f. *accentifera* MARTIN, 1920: 199. (W. Celebes) [BMNH, examined]

Eurema hecabe latimargo (HOPFFER); CORBET & PENDLEBURY, 1932: 161.

Terias hecabe latimargo HOPFFER; TALBOT, 1935: 560.

This prominent subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pl. 20 (1–6)). Upperside black distal borders broader; on forewing black distal border extended narrowly from tornus towards the base for 2/3 of the basal margin; black costal border broader; basal portion more heavily black dusted; hindwing with a series of discal spots somewhat more prominent. **Female** (Pl. 20 (7–8)). Upperside black borders as in male; on forewing a prominent discocellular speck usually appearing; basal portion more heavily black dusted, sometimes entirely in discoidal cell.

Dry-season form.—**Male & female**. On underside most markings fainter; ground color not black dusted.

Forewing length: Male, 20.5–26 mm (n=14, avg=23.1), female, 19–26 mm (n=5, avg=23.7).

Material studied: N. & W. SULAWESI: Menado, 15 ♂ ♀, 11–24. ii. 1967 (IGARASHI) [IGARASHI coll.], 1 ♀, 15. xii. 1972 (GUNJI) [KUCGE].

Distribution: This subspecies is restricted to North and West Sulawesi in its distribution range.

***Eurema hecabe sinda* (FRUHSTORFER, 1910)**

Terias hecabe sinda FRUHSTORFER, 1910: 168. (Peak of Bonthain) [untraced]

Terias latimargo nesos FRUHSTORFER, 1910: 168, t. 73e, f. (Peak of Bonthain) [BMNH, Syntypes ♂ ♀, examined]

Terias latimargo f. *sophrona* FRUHSTORFER, 1910: 168. (S. Celebes)

Eurema hecabe sinda (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 162. [BMNH, Syntypes ♂ ♀, examined]

This subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pl. 21 (1–2)). In forewing upperside black distal

border somewhat broader, especially in spaces 1a and 1b, extending much narrowly along the basal margin; black costal border somewhat broader. **Female** (Pl. 21 (3–4)). Upperside ground color more heavily black dusted.

Dry-season form.—**Male & female** (Pl. 21 (5–8)). Hindwing upperside with black distal border broader. On underside both wings less black dusted; forewing subapical patch larger and more prominent; hindwing with a series of discal spots larger and more prominent.

Forewing length: Male, 19–24 mm (n=13, avg=22.1 mm).

Material studied: S. Sulawesi, 3 ♂ (dry f.), 12. viii. 1969 (M. INOUE)[KUCGE]; Bantimurung, 10 ♂ 1 ♀, 6–9. xii. 1972 (IGARASHI) [IGARASHI coll.]

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

Eurema hecabe pylos (FRUHSTORFER, 1910)

Terias latimargo pylos FRUHSTORFER, 1910: 168. LECTOTYPE ♂ (Sula Mangoli) here designated. [BMNH, examined]

Terias alitha sanama FRUHSTORFER, 1913: 92. LECTOTYPE ♀ (Sanama, Sula Isls.) **Syn. nov.** [BMNH, examined]

Terias norbana sulaensis JOICEY & TALBOT, 1922: 347. Holotype ♂ (Sula Islands) [BMNH, examined]

Terias hecabe pylos FRUHSTORFER; TALBOT, 1935: 561.

Terias tilaha sanama FRUHSTORFER; TALBOT, 1935: 575.

Eurema hecabe pylos (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 162.

This subspecies, with the almost black female, is quite unique in facies, being easily distinguished from ssp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pl. 22 (1–4)). On upperside forewing black distal border much broader, extending to wing base, often completely occupying spaces 1a and 1b; black costal border much broader; discocellular spot sometimes appearing; black stripe sometimes appearing along radius from base towards discocellular in discoidal cell; hindwing black distal border much broader posteriorly, continued to base, almost occupying space 1a. On underside discocellular ring somewhat broader; markings fainter. **Female** (Pl. 22 (5–8)). On upperside black marginal borders extremely broadened, so ground color appearing only in cell and its around, much diffused with black. Underside markings somewhat fainter.

Forewing length: Male, 19.5–24 mm (n=4, avg=22.4 mm), female, 22–24 mm (n=3, avg=23 mm).

Type material examined: *Terias latimargo pylos* was described from an unstated number of male and female specimens from ‘Sula Mongori’ by FRUHSTORFER. The BMNH now possesses a male specimen bearing the following labels: ‘Type (red)/ Sula Mongoli, Oct.-Nov. Doherty, ex coli. H. Fruhstorfer / latimargo pylos Fruhst./Fruhstorfer Coll., B.M. 1937–285.’ In addition the male bears the following

labels; 'Lectotype (purple)/*Terias latimargo pylos* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. *Terias alitha sanama* was described from an unstated number of male and female specimens from 'Sanana, Sula Iss.' by FRUHSTORFER. The BMNH now possesses a female specimen bearing the following labels: 'Type (red)/Sanana, Sula/alitha sanama Fruhst./Fruhstorfer Coll., B.M. 1937-285.' In addition the female bears the following labels; 'Lectotype (purple)/*Terias alitha sanama* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. *Terias norbana sulaensis* was described from a male and a female specimens obtained by JOICEY and TALBOT. The holotype male specimen is now in the BMNH and bears the following labels; 'Type HT (red)/Soela Is., W.J.C.Frost, 1918/June July Sept, 1918/Spec. figured/T. norbana sulaensis, J. T., 1922/Joicey, Bequest., Brit Mus., 1934-120'. The BMNH possesses a female paratype, which bears similar data labels '(Type AT (red))'.

Material studied: BANGGAI: Banngai, 1 ♀, ii. 1933; 3 ♂ ♀, ii-iv. 1938 (ROEPKE)[RNH]; Benda, Peleng Is., 4. xi. 1982 (DETANI) [KUCGE].

Distribution: This subspecies occurs in Banggai and Sula Isls.

Eurema hecabe tamiathis (FRUHSTORFER, 1910)

Terias hecabe tamiathis FRUHSTORFER, 1910: 167. LECTOTYPE ♂ (Bazilan) here designated. [BMNH, ♂ ♀ examined]

Eurema hecabe tamiathis (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 161.

This subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pl. 23 (1-4)). Forewing upperside with fringe black mixed with yellow. Hindwing underside with a series of discal spots usually more prominent, especially those in spaces 5, 6 and 7. **Female** (Pl. 23 (5-8)). On upperside black distal borders broader; forewing basal portion more heavily and extensively black dusted.

Dry-season form.—**Male & female** (Pl. 24 (1-4)). Underside less black dusted; hindwing with a series of discal spots more prominent.

Forewing length: Male, 20.5-23 mm (n=8, avg=21.6 mm), female, 20.5-23.0 mm (n=3, avg=21.8 mm).

Type material examined: *Terias tamiathis* was described from an unstated number of male and female specimens from 'Bazilan' by FRUHSTORFER. The BMNH now possesses a male and female specimens. The male specimen bears the labels: 'Type (red)/Philippinen, Bazilan II-III. 98, Doherty/ex coll. H. Fruhstorfer/Fruhstorfer Coll., B.M. 1937-285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias hecabe tamiathis* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. The female specimen bears similar data labels, and in addition the following labels; 'Paralectotype (blue)/*Terias tamiathis* Fruhstorfer

PARALECTOTYPE det. O. Yata 1994'.

Material studied: Many ♂♂ and ♀♀ from Cebu (SATO, OKADOME)[MUFA] [KUCGE], Leyte (AE, KUWASHIMA) [KUFA] and Mindanao (TSUCHIYA, SATO, MIYATA, HIURA, MIYATAKE) [NSM] [KUCGE] [OMNH].

Distribution: This subspecies is known from Bazilan Is., Jolo Is., Mindanao, Cebu, Negros and Leyte.

***Eurema hecabe kalidupa* (FRUHSTORFER, 1910)**

Terias hecabe kalidupa FRUHSTORFER, 1932: 168. LECTOTYPE ♂♀ (Kalidupa) here designated. [BMHN, ♂♀ examined]

Eurema hecabe kalidupa (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 163.

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 by the following combination of features:

The ground color in male deeper yellow and black distal border narrower than in that of subsp. *maroensis*, and its forewing more rounded apically and more elongated than usual. In the female both wings heavily black dusted and the veins broadly covered with black, and a prominent discocellular spot appearing in forewing upperside (Pl. 24 (5-8)).

Forewing length: Male, 17.5 mm (lectotype), female, 19.0 mm (paralectotype).

Type material examined: *Terias hecabe kalidupa* was described from an unstated number of male and female specimens from 'Kalidupa' by FRUHSTORFER. The BMNH now possesses a male and a female specimens. The male specimen bears the labels: 'Type (red)/Kalidupa, Fruhstorfer/hecabe kalidupa Fruhst./Fruhstorfer Coll., B.M. 1937-285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias kalidupa* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. The female specimen bears the same data labels, and in addition the following labels; 'Paralectotype (blue)/*Terias kalidupa* Fruhstorfer PARALECTOTYPE det. O. Yata 1994'.

Distribution: This subspecies is known only from Kalidupa.

***Eurema hecabe asanga* (FRUHSTORFER, 1910)**

Terias hecabe asanga FRUHSTORFER, 1910: 168. LECTOTYPE ♂ (Batjan) here designated. [BMHN, ♂ examined]

Eurema hecabe asanga (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 163.

This subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—Male (Pl. 25 (1-4)). On upperside black distal borders

narrower, especially in hindwing; on forewing black costal border broader and more sharply defined; fringe always black. On underside both wings not black dusted. **Female** (Pl. 25 (5–8)). On upperside forewing faint discocellular speck always present. On underside both wings not black dusted. Distal margin of forewing rounder.

Dry-season form.—**Male & female** (Pl. 25 (7–8)). On upperside hindwing black distal border narrower broader. On underside most markings fainter; both wings not black dusted.

Forewing length: Male, 18–22.5 mm (n=8, avg=20.7 mm), female, 19–24 mm (n=9, avg=22.1 mm).

Type material examined: *Terias asanga* was described from an unstated number of male and female specimens from 'Batjan (♂) and Halmahera (♀)' by FRUHSTORFER. The BMNH now possesses a male specimen bearing the following labels: 'Type (red)/Batjan, ex coll. Fruhstorfer /hecabe asanga Fruhst./Fruhstorfer Coll., B.M. 1937–285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias asanga* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype.

Material studied: HALMAHERA: Djailolo, xii. 1972-i. 1973 (Gunji) [KUCGE] [IGARASHI coll.]. TERNATE: Ternate Is., 1 ♂, K. Kalimata, 9. v. 1972 (IGARASHI), 1 ♂, N. Maluku, 19–21. i. 1974 (T. A. & S. Y.), 2 ♂ ♀, xii. 1972-i. 1973 (GUNJI) [KUCGE] [IGARASHI coll.]

Distribution: This subspecies is known from Halmaheira, Batchan and Ternate Is.

Eurema hecabe diversa (WALLACE, 1867)

Terias diversa WALLACE, 1867: 324. LECTOTYPE ♂ (Buru) here designated. [BMHN, examined]

Terias hecabe diversa WALLACE; FRUHSTORFER, 1910: 168.

Eurema hecabe diversa (WALLACE); CORBET & PENDLEBURY, 1932: 163.

This subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pl. 26 (1–4)). On upperside forewing black distal border somewhat narrower, less deeply excavated in spaces 2 and 3; black costal border broader; fringe always black; hindwing with inner margin of black distal border almost uniform. On underside both wings not black dusted; forewing with vein-dots prominent, and conjoined with a fine black anticiliary line near apex. In the male genitalia the uncus is usually somewhat longer. **Female** (Pl. 26 (5–6)). Ground color pure white with greenish yellow tinge on upperside, and milky white with greenish yellow tinge on underside. Smaller in size.

Dry-season form.—**Male & female** (Pl. 26 (7–8)). On underside most markings fainter; both wings not black dusted.

Forewing length: Male, 15.5–22 mm (n=9, avg=18.8 mm), female, 17–23 mm (n=12, avg=20.1 mm).

Type material examined: *Terias diversa* was described from an unstated number of male and female specimens from 'Bouru' by WALLACE. The BMNH now possesses a male specimen bearing the labels: 'Type(red) /Bouru/Bourov, Hewitson Coll., 79.69., *Terias diversa*. 7.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias diversa* Wallace LECTOTYPE det. O. Yata 1994' and hereby designated lectotype.

Material studied: BURU: Maluccas, 3 ♂4 ♀, ix-x. 1974 (IGARASHI) [KUCGE] [IGARASHI coll.]. AMBON: 0–150 m, 3 ♂, 2. xii. 1973 (SHINONAGA), 1 ♂, 23. xi. 1974 (NAGATOMI), 2 ♂10 ♀, xii. 1972-ii. 1973 (GUNJI) [KUCGE]. CERAM: Kairatu, 1 ♂, 2–5. xii. 1973 (SHINONAGA); Kamarian, 4 ♀, i. 1973 (GUNJI) [KUCGE].

Distribution: This subspecies is known from Buru, Obi, Ambon and Ceram.

***Eurema hecabe bandana* (FRUHSTORFER, 1910)**

Terias hecabe bandana FRUHSTORFER, 1910: 168. (Banda) [BMNH, ♂ ♀ examined]

Eurema hecabe bandana (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 163.

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 subsp. *diversa* by the forewing black distal border with its inner margin more deeply excavated in spaces 2 and 3, the strongly yellowish tinge in fringe of hindwing upperside, and pale yellow upperside ground color in female (Pl. 27 (1–4)).

Forewing length: Male (lectotype), 20.0 mm; female (paralectotype), 17.0 mm.

Type material examined: *Terias hecabe bandana* was described from an unstated number of male and female specimens from 'Banda Is.' by FRUHSTORFER. The BMNH now possesses a male and a female specimens. The male specimen bears the labels: 'Type (red)/Banda, Kuhn, Fruhstorfer/hecabe bandana Fruhst./Fruhstorfer Coll., B. M. 1937–285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias hecabe bandana* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype. The female specimen bears similar data labels, and in addition the following labels; 'Paralectotype (blue)/*Terias hecabe bandana* Fruhstorfer PARALECTOTYPE det. O. Yata 1994'.

Distribution: This subspecies is known from Banda Is.

***Eurema hecabe maroensis* (BUTLER, 1883)**

Terias maroensis BUTLER, 1883: 368, pl. 38, fig. 2 female. LECTOTYPE ♀ (Maroe Is.) here designated. [BMNH, examined]

Terias hecabe dendera FRUHSTORFER, 1910, 9: 168. (Sumba)

Eurema hecabe maroensis (BUTLER); CORBET & PENDLEBURY, 1932: 164.

This subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pl. 27 (1–2)). On upperside ground color somewhat darker; in forewing black distal border somewhat broader, more deeply excavated in spaces 2 and 3; hindwing black distal border much broader, with its inner margin more sharply defined with more prominent projection along each vein; basal portions of both wings more extensively black dusted. On underside markings generally much fainter, so cell spots in forewing usually disappearing; forewing vein-dots sometimes almost conjoined with a fine black anteciliary line. **Female** (Pl. 28 (3–4)). Wings generally broader and rounder at apex in forewing and near space 3 in hindwing. On upperside forewing black distal border more deeply excavated in spaces 2 and 3. On underside markings much fainter, so cell spots in forewing disappearing. Smaller in size.

Forewing length: Male, 20–21 mm (n=6, avg=20.7 mm), female, 17.5–18.5 mm (n=2, avg=18 mm).

Type material examined: *Terias maroensis* was described from an unstated number of female specimens from 'Maroe Is.' by BUTLER. The BMNH now possesses a female specimen bearing the labels: 'Type (red)/Maroe Id., Timor-Laut, 83.29, 1999/*Terias maroensis* Butler.' In addition the female bears the following labels; 'Lectotype (purple)/*Terias maroensis* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype.

Material studied: TIMOR: W. Timor, 5 ♂♂ 1 ♀, 11–14.v.1973; Kupang, Timor, 1 ♂ 1 ♀, 16.xii.1973 (SHINONAGA) [KUCGE].

Distribution: This subspecies is known from Maroe Is., Timoraut (=Tenimbar), Timor, Wetter, Babber, Dammer and Kisser.

Eurema hecabe kerawara (RIBBE, 1898)

Terias kerawara RIBBE, 1898: 85. (Bismarck) [untraced]

Terias hecabe kerawara RIBBE; FRUHSTORFER, 1910: 168.

Eurema hecabe kerawara (RIBBE); CORBET & PENDLEBURY, 1932: 164.

This subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pl. 28 (5–6)). On upperside forewing black distal border slightly narrower, less deeply excavated in spaces 2 and 3; black costal border broader; fringe always black; hindwing with inner margin of black distal border almost uniform. On underside both wings not black dusted; forewing with vein-dots prominent, and conjoined with a fine black anteciliary line near apex. **Female** (Pl. 28 (7–8)). Ground color pale yellow or milky white with greenish yellow tinge on upperside, and milky white with greenish yellow tinge on underside. Smaller in size.

Forewing length: Male, 19.0–22.0 mm (n=7, avg=19.7 mm), female, 17–17.5 mm (n=2, avg=17.3 mm).

Material studied: NEW BARIAIN: Rabaul, 1 ♂, 1. ix. 1958 (T. TOKIOKA), 4 ♂ 1 ♀, 14. viii. 1968 (G. KOGA), 1 ♀, 8. i. 1971, 1 ♂, 9. i. 1971 (T. SHINKAWA) [KUCGE].

Distribution: This subspecies is known from Bismark Archipelago including New Britain, New Ireland, New Hanover, French Is. and St. Mathias Is.

***Eurema hecabe marginata* (KISHIDA, 1932)**

Terias hecabe marginata KISHIDA, 1932: 22. [KUCGE, ESAKI's photograph (♂ ♀), examined]
Eurema hecabe angusta (KISHIDA): YATA, 1981: 225.

This subspecies is distinguished from subsp. *kerawara* from New Britain by the following combination of features.

Wet-season form.—**Male** (Pl. 29 (1–6)) On upperside forewing black distal border narrower, especially in the specimens from Yap Isls., usually less deeply excavated in spaces 2 and 3; black costal border somewhat narrower; hindwing black distal border sometimes much narrower in the specimens from Yap Isls. **Female** (Pl. 29 (7–8)). Ground color pale yellow without greenish yellow tinge on upperside, almost not black dusted. Forewing somewhat less rounded at apex.

Forewing length: Male, 17–19 mm (n=16, avg=18.2 mm); female, 17–22.0 mm (n=6, avg=20.3 mm).

Eurema hecabe marginata was described from Palau Is. by KISHIDA in 1932. Since KISHIDA did not show any figures of the types and the type depository in the original description, I could not trace the subspecies for examination. As I mentioned in the description of *Eurema blanda kishidai* (YATA, 1994, P. 85), I found by chance a photograph which seems reasonable to consider as the type series of ssp. *marginata*. Thus, I regard the populations of *hecabe* from Palau and Caroline Isls. as subsp. *marginata*.

Material studied: PALAU: Almidu, 1 ♂, 6. viii. 1917; Krorr-Arabaketsu, 2 ♂, 18. xi. 1967, 1 ♂, 3. iv. 1968, 1 ♂, 28. iii. 1968; Babeldaob, Marukyoku-Arukoron, 1 ♂ 1 ♀, 26. ii. 1966 (T. ESAKI), Marukyoku-Ngiwal, 1 ♂, 5. ii. 1988 [KUFA]. CAROLINE ISS. Yap Isls., 1 ♂, 16. v. 1936 (S. OTOMO), 1 ♂, 21. v. 1936 (Z. ONO), 6 ♂, vii.-viii. 1950 (R. J. Goss) [Bishop Mus.], Okao, 1 ♀, 11. vii. 1917 (OMAGARI), Dokor, 1 ♀, 18. vii. 1917 [NSM].

Distribution: This subspecies is distributed in Palau and Yap Isls.

***Eurema hecabe magna* (RIBBE, 1898)**

Terias magna RIBBE, 1898, Iris, 11: 85. (Mioko, Bismarck Is.) [untraced]
Terias hecabe magna RIBBE; FRUHSTORFER, 1910: 168.

Eurema hecabe magna (RIBBE); CORBET & PENDLEBURY, 1932: 164.

I have not seen the specimens of this race. According to the original description and to CORBET and PENDLEBURY (1932), this subspecies is similar to subsp. *hecabe* from Bismarck Archipelago, but may be distinguishable from the latter by its larger size.

Distribution: This subspecies is known only from Mioko.

***Eurema hecabe nivaria* (FRUHSTORFER, 1910)**

Terias hecabe nivaria FRUHSTORFER, 1910: 168. LECTOTYPE ♀ (Solomons) here designated. [BMHN, examined]

Eurema hecabe nivaria (FRUHSTORFER); CORBET & PENDLEBURY, 1932: 165.

This subspecies is distinguished from subsp. *kerawara* from News Britain by the following combination of features.

Wet-season form.—**Male** (Pl. 30 (1–2, 5–6)). On upperside forewing black distal border somewhat narrower. On underside discocellular spots more prominent. **Female** (Pl. 30 (3–4, 5–6)). Upperside ground color pure white with greenish yellow tinge, more heavily black dusted basally. Hindwing black distal border narrower. Underside somewhat black dusted. Somewhat larger in size.

Forewing length: Male, 17.5–22 mm (n=30, avg=20.2 mm), female, 20–22 mm (n=3, avg=20.7 mm).

Type material examined: *Terias nivaria* was described from an unstated number of female specimens from 'Solomons' by FRUHSTORFER. The BMNH now possesses a female specimen bearing the labels: 'Type (red)/Solomons. Jns., H. G. Smith, ex coll. Fruhstorfer/hecabe nivaria Fruhst./Fruhstorfer Coll., B. M. 1937–285.' In addition the male bears the following labels; 'Lectotype (purple)/*Terias hecabe nivaria* Fruhstorfer LECTOTYPE det. O. Yata 1994' and hereby designated lectotype.

Material studied: SOLOMONS: Ysabel Is., 2 ♂ 1 ♀, iii. 1972; Nissan Is., 1 ♀, 2. ii. 1971 (SHINKAWA); Kolonbarga Is., 1 ♂, iii. 1972; Bougainville Is., Bun, 1 ♂, 31. xii. 1970, 1 ♂ 2 ♀, 12. i. 1971 (SHINKAWA).

Distribution: This subspecies is known from Solomons.

***Eurema hecabe novaecaledoniae* CORBET & PENDLEBURY, 1932**

Eurema hecabe novaecaledoniae CORBET & PENDLEBURY, 1932: 165. Holotype ♂ (New Caledonia). [BMHN, examined]

Terias hecabe novaecaledoniae (CORBET & PENDLEBURY); TALBOT, 1935: 563.

This subspecies is distinguished from subsp. *hecabe* from Bismarck Archipelago by the following combination of features.

Wet-season form.—**Male** (Pl. 31 (1–4)) Ground color fairly deeper yellow.

Forewing somewhat more angulate at apex. **Female** (Pl. 31 (5–6)). According to the original description and to the photograph of type-materials preserved in the British Museum (N. H.), this subspecies seems to be characterized by the pale yellow ground color heavily black dusted on upperside and the small and faint markings on underside.

Forewing length: Male, 16–20 mm (n=9, avg=18.1 mm).

Type material examined: *Eurema hecabe novaecaledoniae* was described from male and female specimens by CORBET and PENDLEBURY. The holotype male specimen is now in the BMNH and bears the following labels; 'Type (red)/Loc. Mt. Mou, Date 16.3 14 Sex 635, Coll. P D Montague, New Caledonia Exped./New Caledonia, P. D. Montague, 1918–87/ ♂ type of *Terias novaecaledoniae* Corbet'. The BMNH also possesses a female paratype, bearing similar data labels (♂ type of *Terias novaecaledoniae* Corbet)'.

Material studied: NEW CALEDONIA: Vao Ile des Pins, 2 ♂, 9–10. vi. 1958 (TOKIOKA); La Foa, 1 ♂, 11. vi. 1958 (TSUTSUI) [OMNH].

Distribution: This subspecies is known only from New Caledonia.

Eurema hecabe aprica (BUTLER, 1877)

Terias aprica BUTLER, 1877: 420, male. LECTOTYPE ♂ (Tongabatu) [BMNH, examined]

Terias hecabe sulphurata BUTLER; TALBOT, 1935: 562.

Eurema hecabe sulphurata (BUTLER); CORBET & PENDLEBURY, 1932: 165.

This subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pls. 31 (7–8), 32 (1–2)). On upperside ground color somewhat paler; forewing black distal borders somewhat narrower, more weakly excavated in spaces 2 and 3; hindwing black distal border usually reduced to vein-dots. On underside most markings fainter. Forewing termen slightly rounder. **Female** (Pl. 32 (3–4)). Ground color somewhat paler, almost not black dusted. Forewing black distal border more deeply excavated in spaces 2 and 3. Hindwing black distal border reduced to vein-dots conjoined with scattered black scales between them. On underside most markings fainter.

Forewing length: Male, 14.5–19.5 mm (n=12, avg=17.6 mm), female, 16.5–20.5 mm (n=4, avg=18.1 mm).

Type material examined: *Terias aprica* was described from an unstated number of male specimens from 'Tongabatu' by BUTLER. The BMNH now possesses a male specimen bearing the labels: 'Type (red)/Tongabatu, 83.61/Terias aprica Butler type'. In addition the male bears the following labels; 'Lectotype (purple) /Terias aprica Butler LECTOTYPE det. O. Yata 1994' and hereby designated lectotype.

Material studied: FIJI: Fiji Is., Mt. Victoria, Viti Levu, 2 ♂ ♂, 4 ♀ ♀.iii.1978 (H. SHIMA), Namalai, 1 ♂, 10. ix. 1969, Suva, 2 ♂ ♂, 5. x. 1969 (R. WADA) [KUCGE].

Distribution: This subspecies occurs in Mare, Loyalty Isls. and New Hebrides.

***Eurema hecabe solifera* (BUTLER, 1875)**

Terias solifera BUTLER, 1875: 396. LECTOTYPE ♂ (W. Africa) here designated. [BMHN, examined]

Terias hecabe senegalensis dry f. *bisinuata* BUTLER, 1876: 485. (Atbara) [BMNH, type ♂, examined]

Terias butleri TRIMEN, 1889: 23. Holotype ♂ (S. Africa). [BMNH, examined]

Terias senegalensis dry f. *maculata* AURIVILLIUS, 1910: 64, t. 22c.

?*Terias senegalensis* f. *parva*, ROTHSCCHILD, 1921: 152. (Nigeria)

Eurema hecabe solifera (BUTLER); D'ABRERA, 1980: 54.

This African subspecies shows remarkable geographical and seasonal variations just as subsp. *hecabe* does. I also regards these variations as a long transcontinental cline from low to high latitudes. This subspecies is distinguished from subsp. *hecabe* from Indo-China by the following combination of features.

Wet-season form.—**Male** (Pls. 32 (5–8), 33 (1–4)). On upperside ground color lemon yellow; forewing black distal border always more deeply excavated in space 2 than in space 3, with its inner edge inclined slightly towards tornus in spaces 1a and 1b; costal border narrower and more diffused in its inner margin; hindwing black distal border somewhat narrower, with its inner margin more diffused. On underside most markings somewhat larger and more clearly defined; both wings not black dusted. **Female** (Pl. 33 (5–6)). Ground color much paler, milky-white with greenish yellow tinge in forewing. On forewing upperside black distal border always more deeply excavated in space 2 than in space 3, with its inner edge inclined slightly towards tornus in spaces 1a and 1b; hindwing black distal border somewhat narrower. On underside ground color pale greenish yellow; markings generally much fainter.

Dry-season form.—**Male & female** (Pl. 33 (7–8)). Ground color somewhat paler. On upperside forewing black distal border abruptly narrowed below vein 4, with its inner edge forming a fairly regular curve; hindwing distal border usually reduced to a series of marginal vein-dots. On underside both wings not black dusted.

Forewing somewhat rounder at apex and termen; hindwing somewhat rounder at space 3.

Forewing length: Male, 19–22.5 mm (n=10, avg=21.1 mm), female, 19–22 mm (n=5, avg=20.6 mm).

Type material examined: *Terias solifera* was described from an unstated number of male and female specimens from 'W. Africa' by BUTLER. The BMNH now possesses a male specimens bearing the labels: 'Type (red)/Ambriz, 73.66/*Terias solifera* ♂ type Butler'. In addition the male bears the following labels; 'Lectotype (purple)/*Terias solifera* Butler LECTOTYPE det. O. Yata 1994' and hereby designated lectotype.

Material studied: CONGO: Kinshasa, 3 ♂, v, x, xi. 1969, 2 ♂, i. v. 1970, 1 ♂ 1 ♀, ii. xii. 1971, 2 ♂ (dry f.), ix, xi. 1971 (S. INOUE) [KUCGE]. NIGERIA: 2 ♂ 1 ♀, xi. 1976, 1 ♀, v. 1977 (SHINONAGA) [KUCGE]. UGANDA: vii. 1921 (NISHIKAWA) [SNM]. KENYA: Kibwezi, 1 ♂ 1 ♀ (dry f.), ii. 1921 [SNM]. NATAL: Durkan, 1 ♂ (dry f.), 3. vii. 1974 [KUCGE]. ETHIOPIA: Abalti, 1 ♀, 22. x. 1963 (OHSE) [KUCGE]; Eritrea, 1 ♂ (dry f.) [SNM]. TRANSVAAL: E. Transvaal, Strydom Tunnel, 2 ♂, i. 1975 (NAKAYAMA); N. Transvaal, 1 ♂, vii. 1973 (SHIRAHATA) [KUCGE].

Distribution: This subspecies is known from the whole Ethiopian Region except the extreme south-west of Cape Province.

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of the Genus *Eurema* HÜBNER
(Lepidoptera, Pieridae)

Part V. Description of the *hecabe*
group (part)

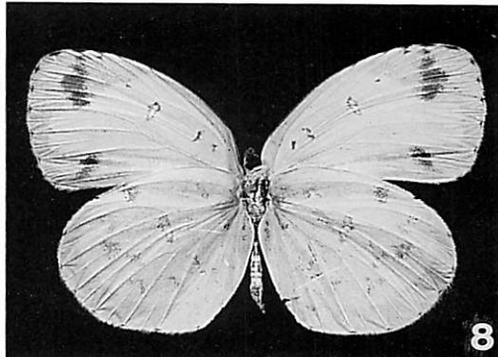
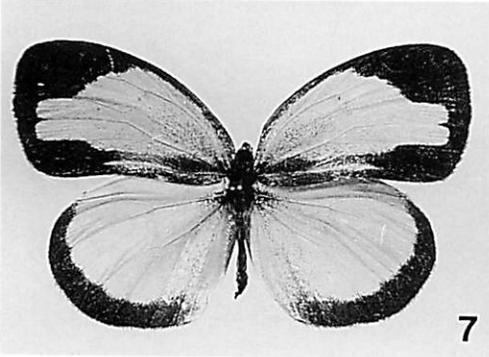
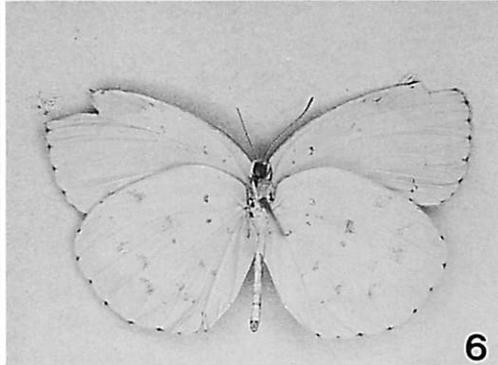
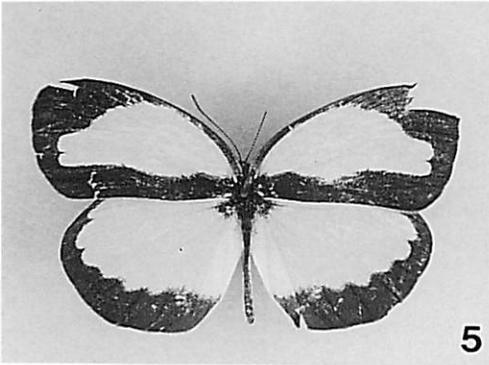
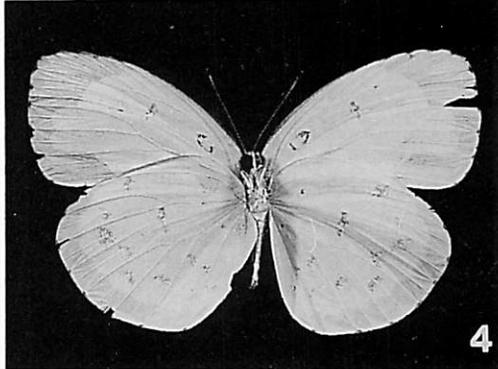
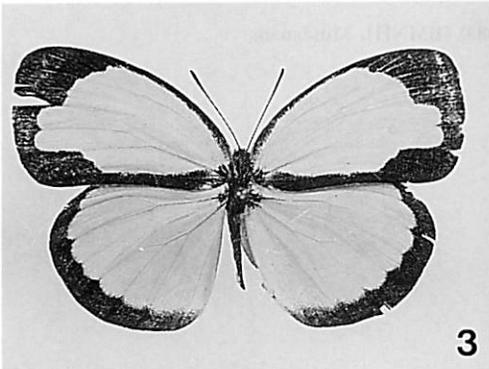
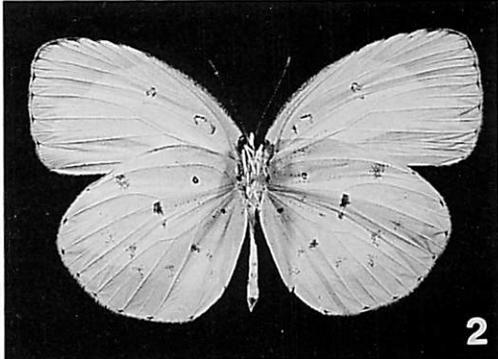
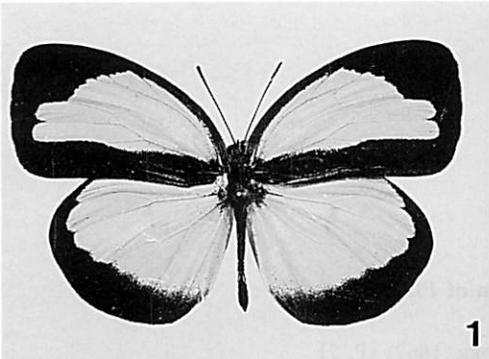
Osamu YATA

Plates 1–35.

Explanation of Plate 1

Eurema alitha alitha (C. & R. FELDER, 1862) [P. 7]

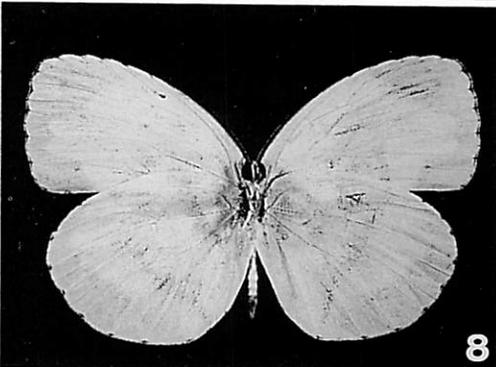
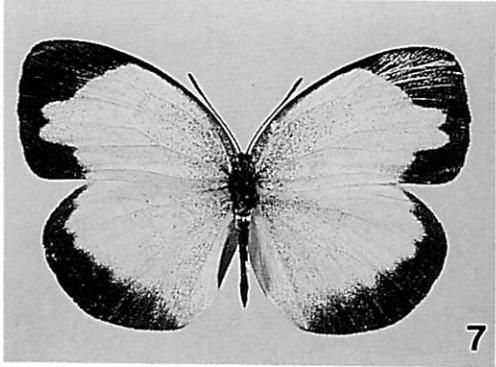
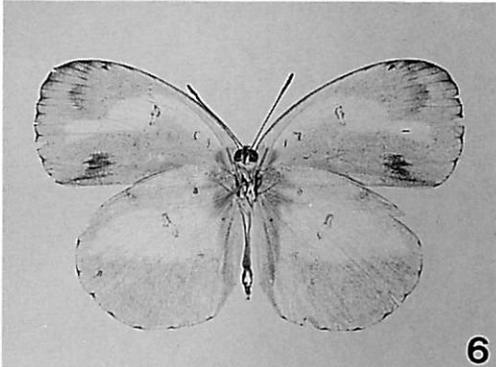
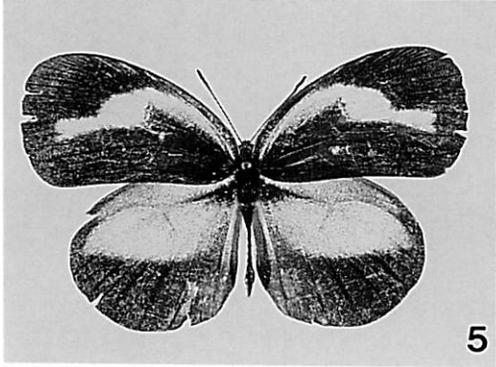
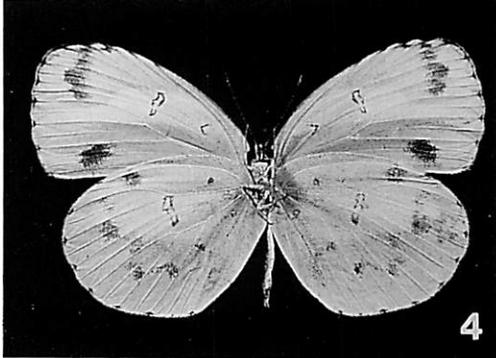
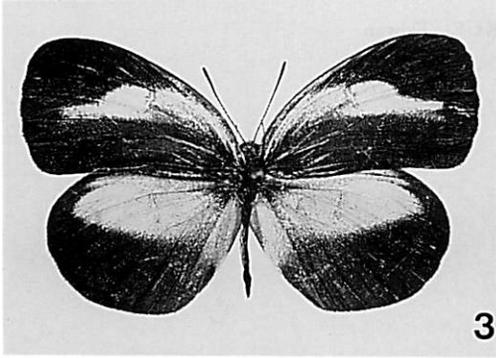
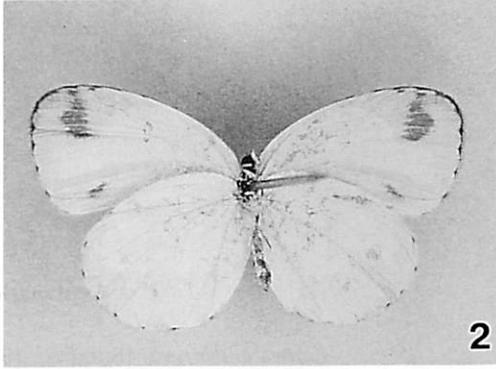
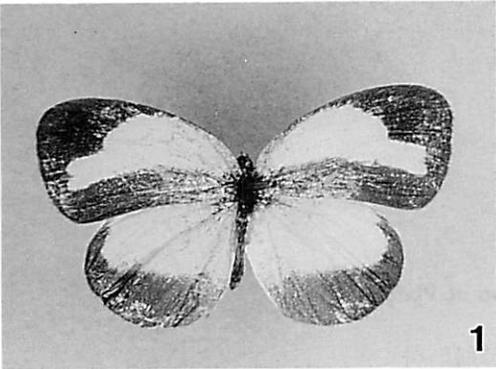
1. ♂. Mindanao.
2. Ditto, underside.
3. ♂. Mindanao.
4. Ditto, underside.
5. ♂, type (*Terias invida* BUTLER, 1883) [BMNH]. Mindanao.
6. Ditto, underside.
7. ♀. Mindanao.
8. Ditto, underside.



Explanation of Plate 2

Eurema alitha alitha (C. & R. FELDER, 1862) [P. 7]

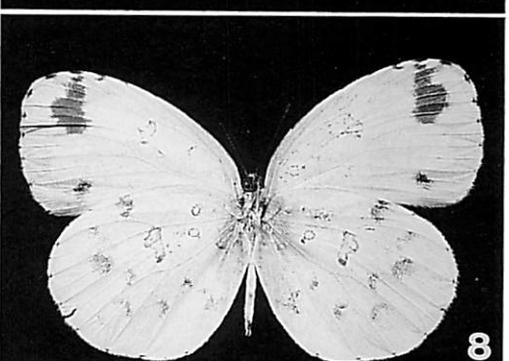
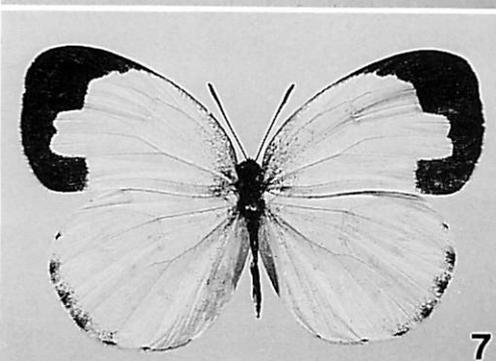
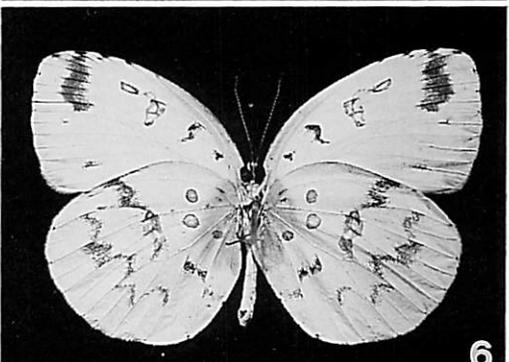
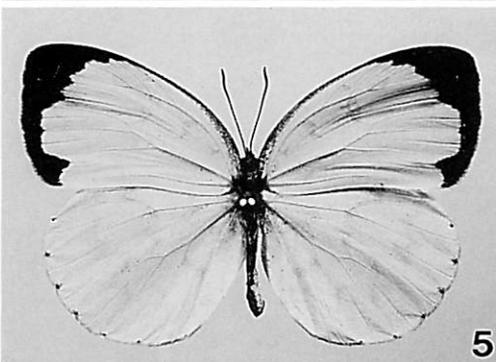
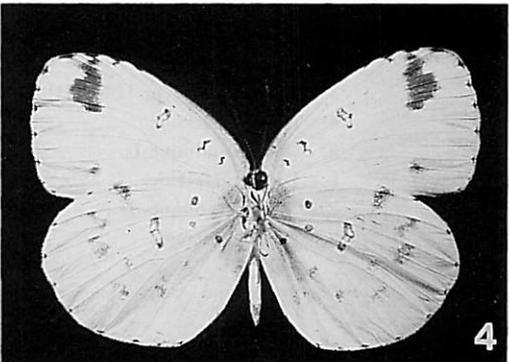
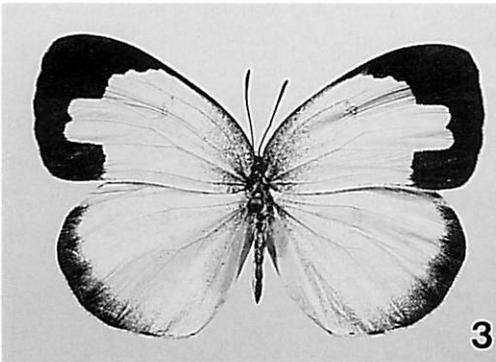
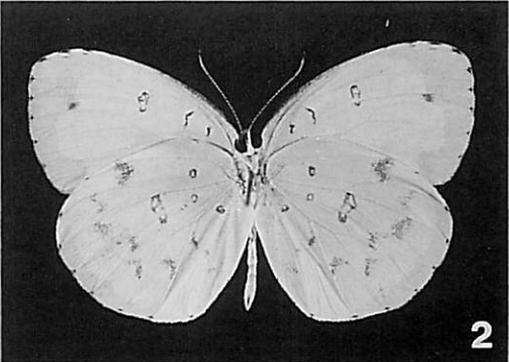
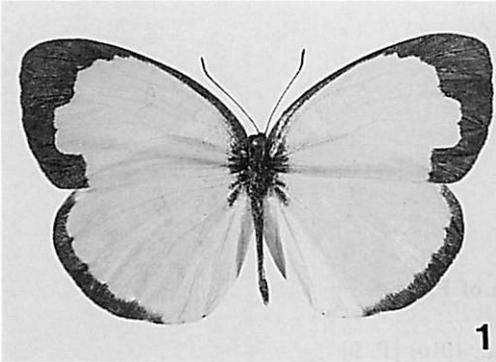
1. ♀, type (*Terias invida* BUTLER, 1883) [BMNH]. Mindanao.
2. Ditto, underside.
3. ♀. Mindanao.
4. Ditto, underside.
5. ♀. Mindanao.
6. Ditto, underside.
7. ♀. Mindanao.
8. Ditto, underside.



Explanation of Plate 3

Eurema alitha esakii (SHIRÔZU, 1953) [P. 8]

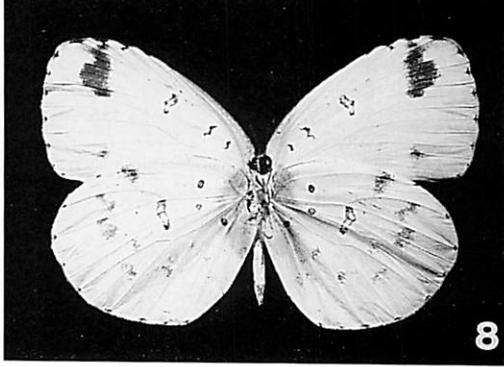
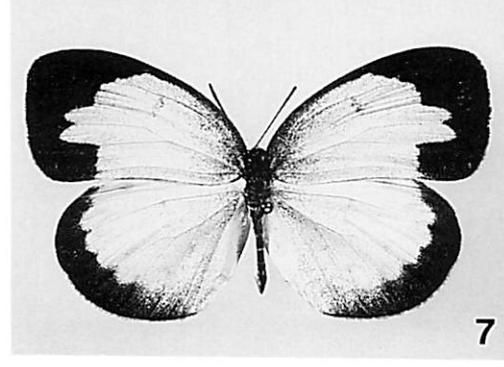
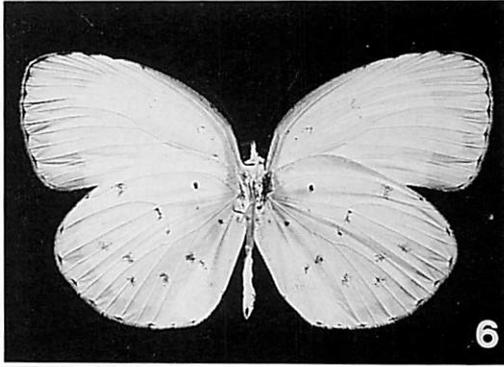
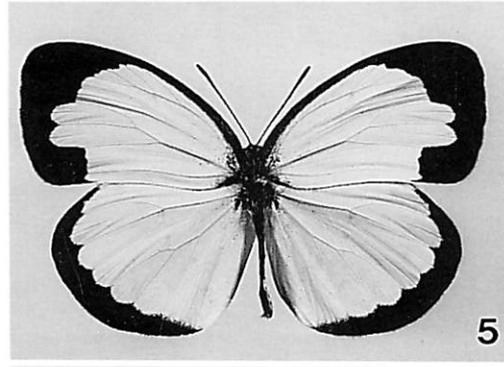
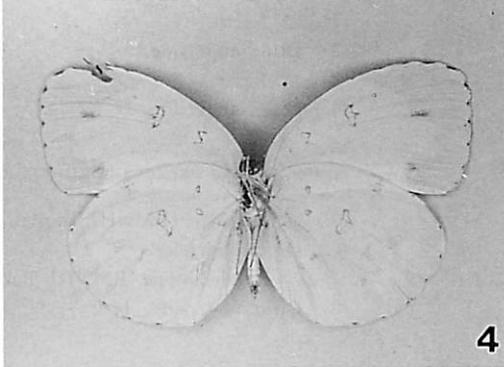
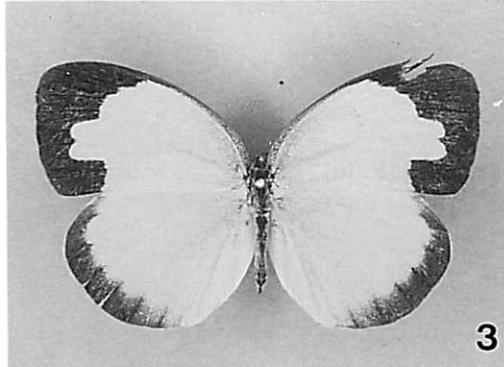
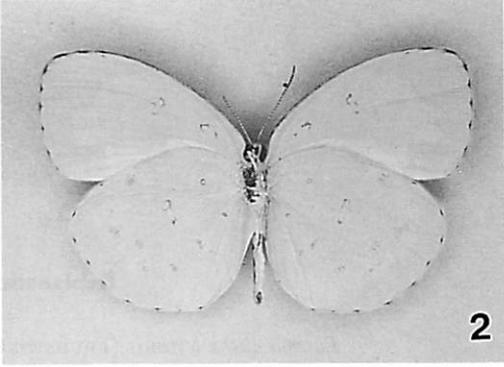
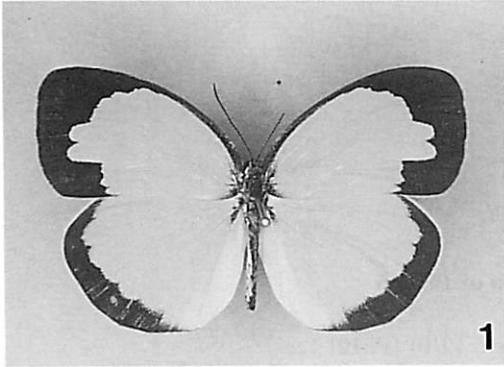
1. Wet-season form. ♂, holotype [KUF]. Taiwan.
2. Ditto, underside.
3. Wet-season form. ♀. Taiwan.
4. Ditto, underside.
5. Dry-season form. ♂. Taiwan.
6. Ditto, underside.
7. Dry-season form. ♀. Taiwan.
8. Ditto, underside.



Explanation of Plate 4

Eurema alitha jalendra (FRUHSTORFER, 1910) [P. 9]

1. ♂, lectotype [BMNH]. Palawan.
2. Ditto, underside.
3. ♀, paralectotype [BMNH]. Palawan.
4. Ditto, underside.
5. ♂. Marinduque Is.
6. Ditto, underside.
7. ♀. Marinduque. Is.
8. Ditto, underside.



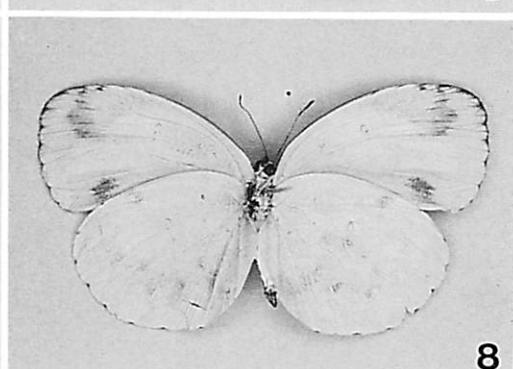
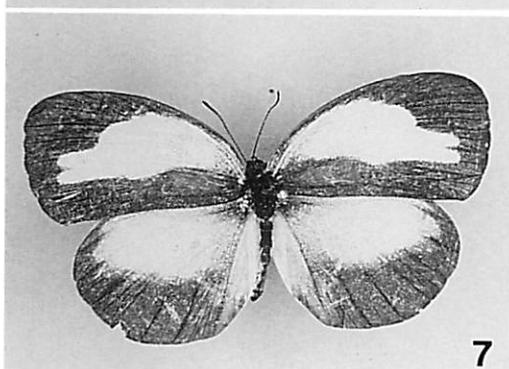
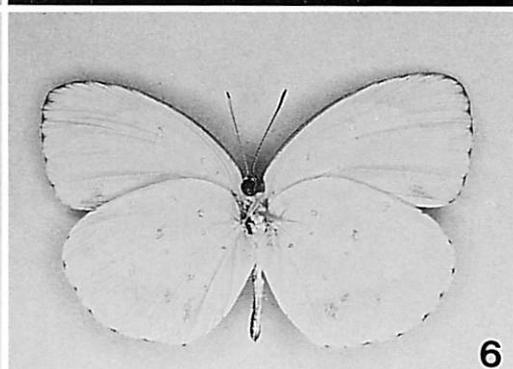
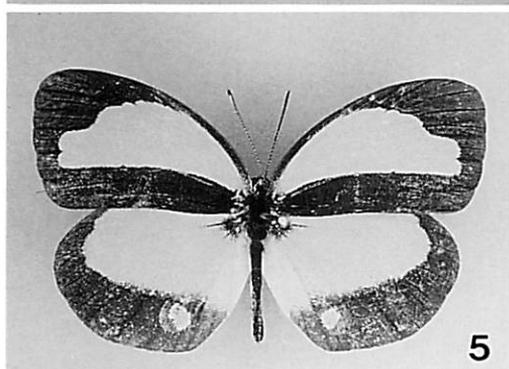
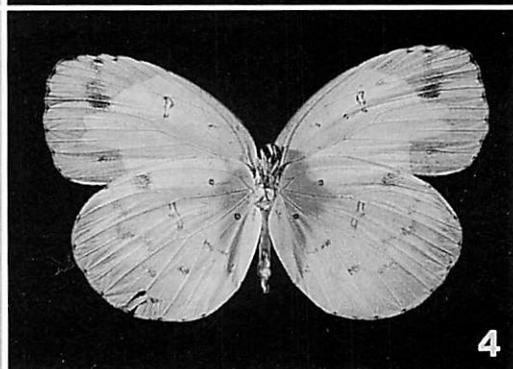
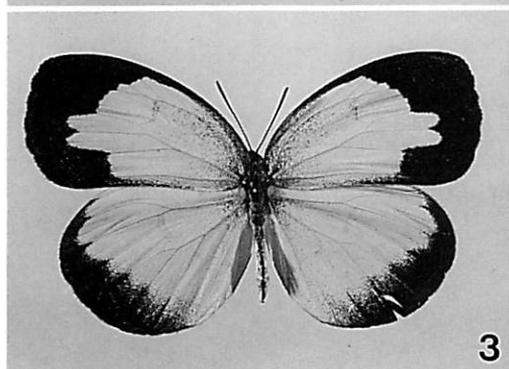
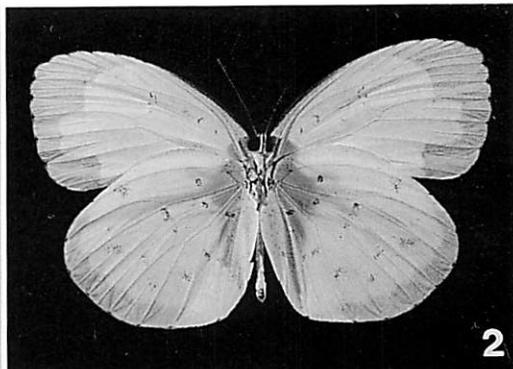
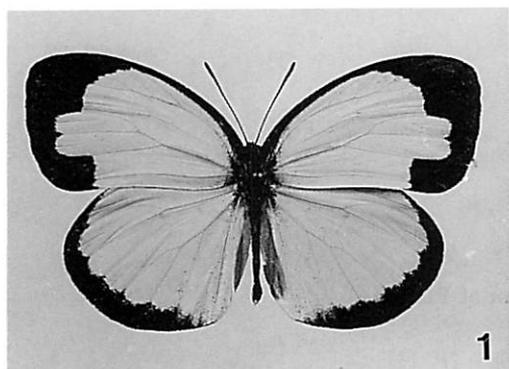
Explanation of Plate 5

Eurema alitha leytensis (FRUHSTORFER, 1910) [P. 10]

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

Eurema alitha bazilana (FRUHSTORFER, 1900) [P. 10]

5. ♂, lectotype [BMNH]. Bazilan.
6. Ditto, underside.
7. ♀. paralectotype [BMNH]. Bazilan.
8. Ditto, underside.



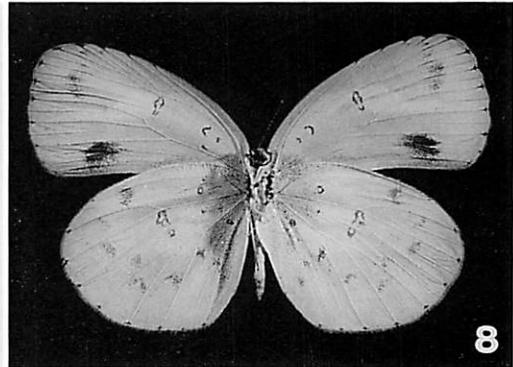
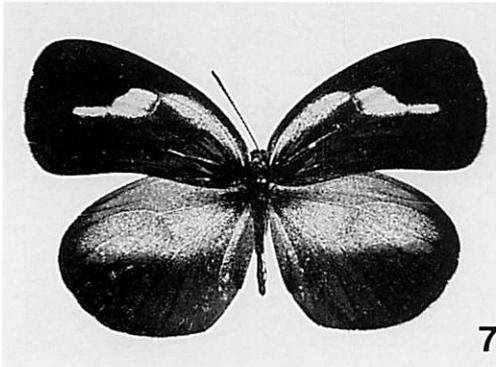
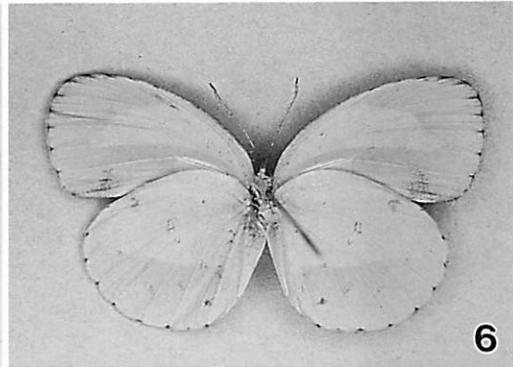
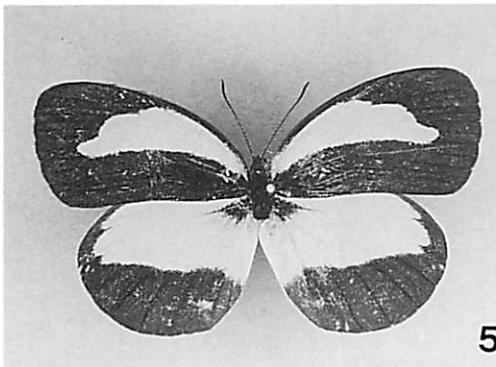
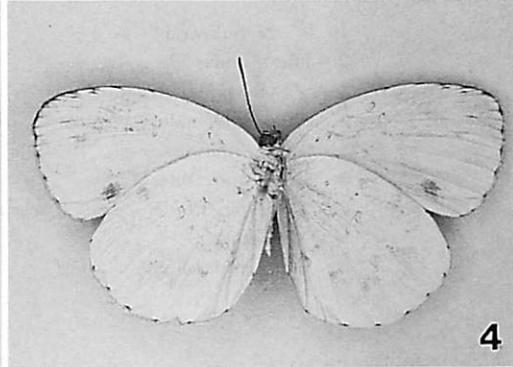
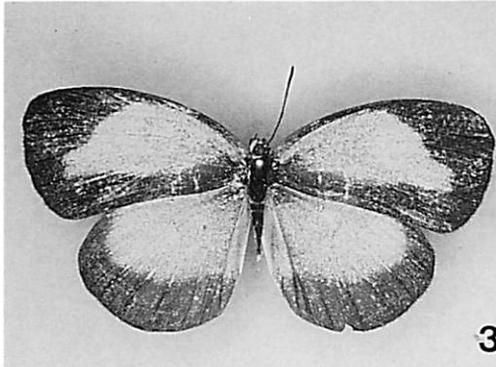
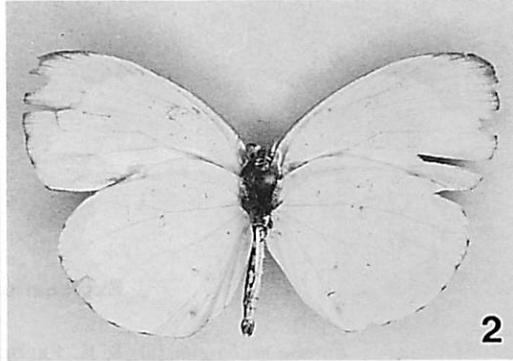
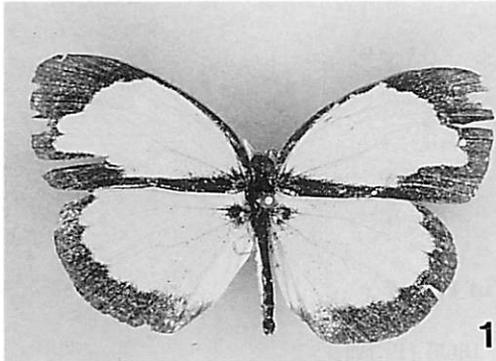
Explanation of Plate 6

Eurema alitha gradiens (BUTLER, 1886) [P. 11]

1. ♂, lectotype [BMNH]. N. Borneo.
2. Ditto, underside.
3. ♀, [BMNH]. N. Borneo.
4. Ditto, underside.

Eurema alitha sangira (FRUHSTORFER, 1910) [P. 12]

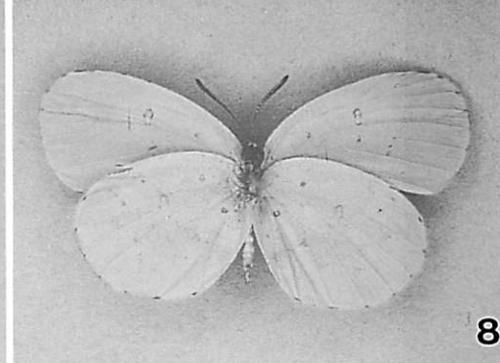
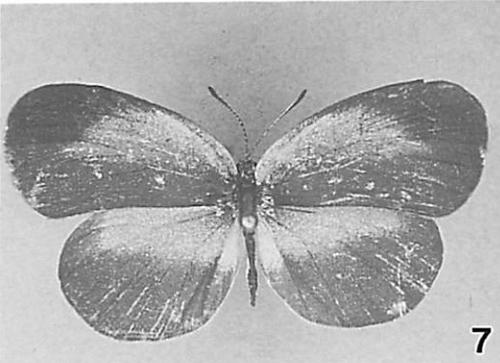
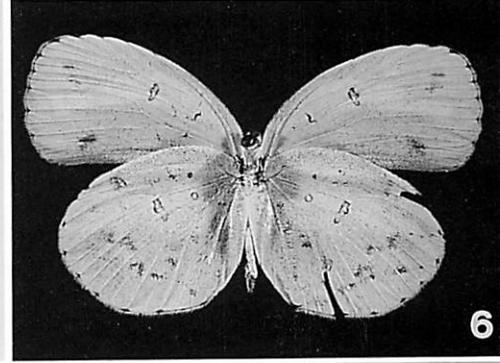
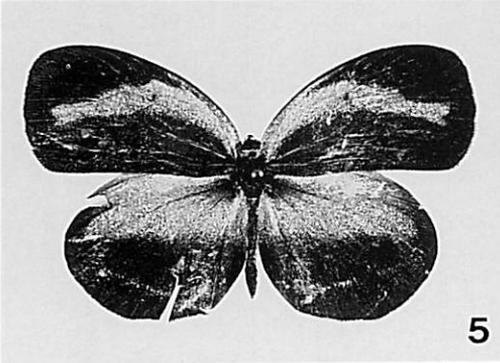
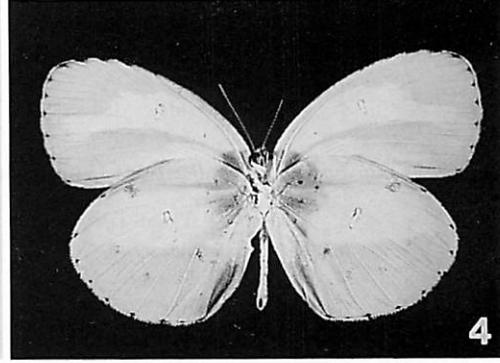
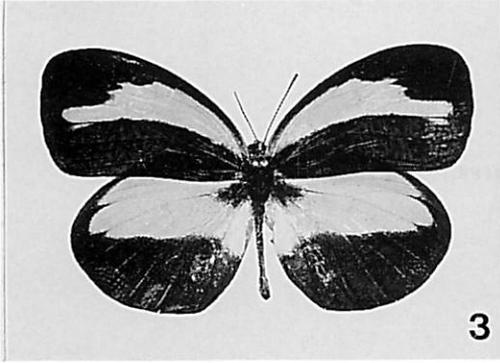
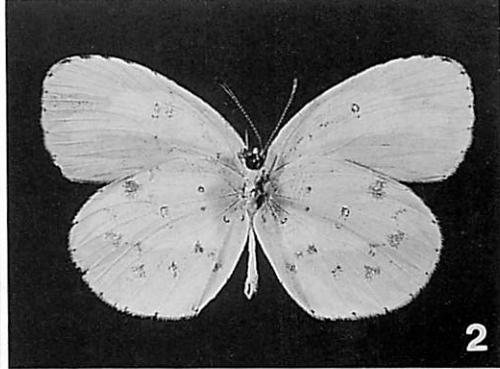
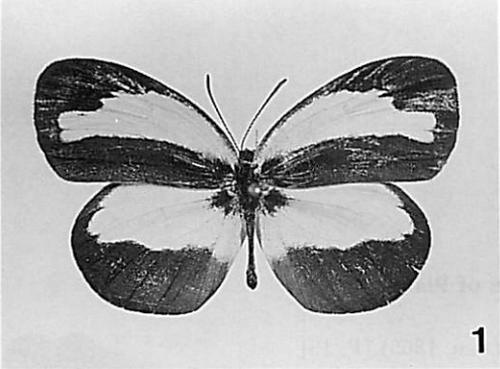
5. ♂, lectotype [BMNH]. Sangir Is.
6. Ditto, underside.
7. ♀, Sangir Is.
8. Ditto, underside.



Explanation of Plate 7

Eurema alitha zita (C. & R. FELDER, 1865) [P. 12]

1. ♂. N. Sulawesi.
2. Ditto, underside.
3. ♂, [RNH]. Banggai.
4. Ditto, underside.
5. ♀. N. Sulawesi.
6. Ditto, underside.
7. ♀, type (*Terias zama* f. *zamida* FRUHSTORFER, 1908) [BMNH].
Mindanao.
8. Ditto, underside.



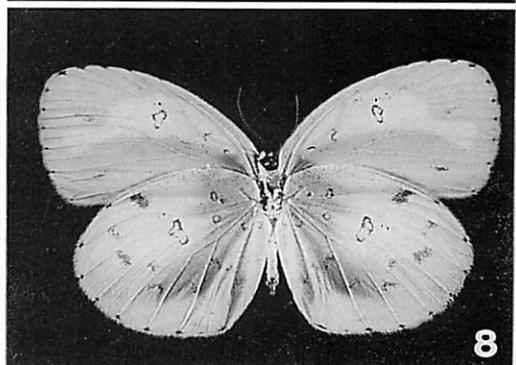
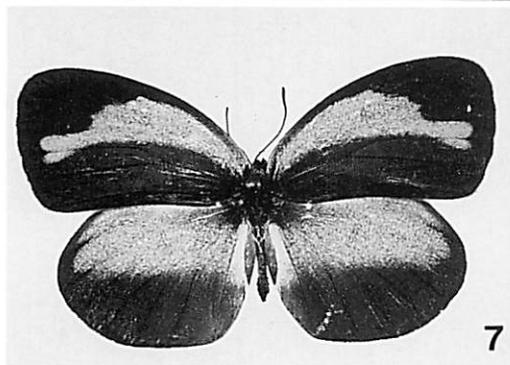
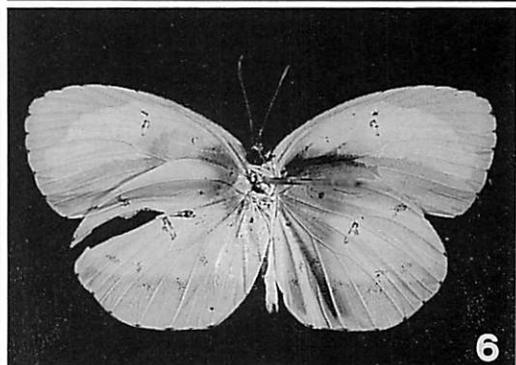
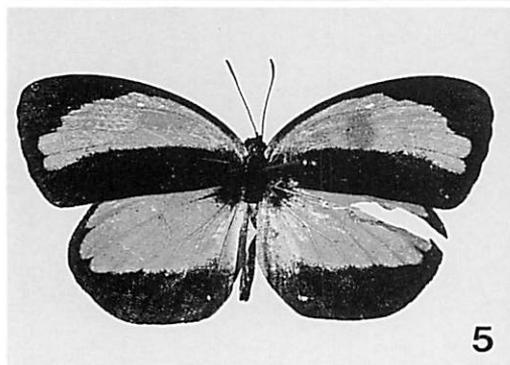
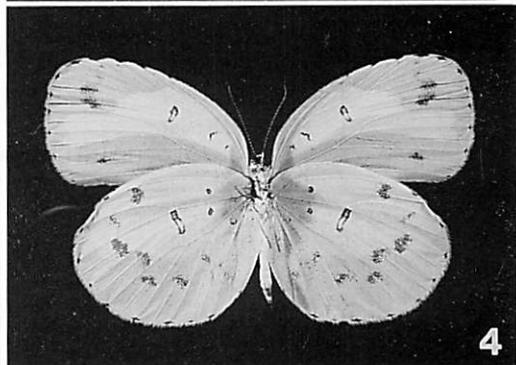
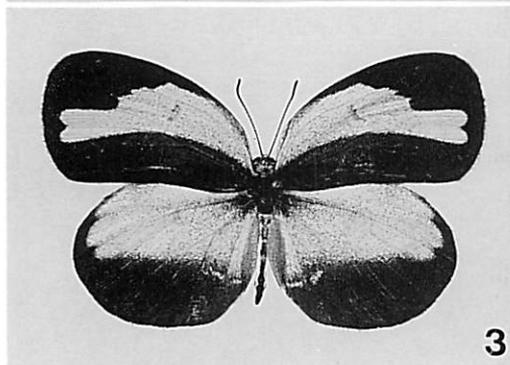
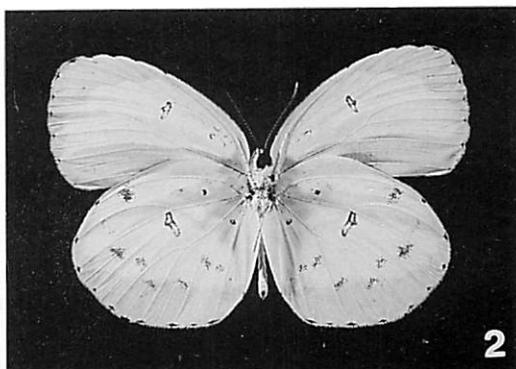
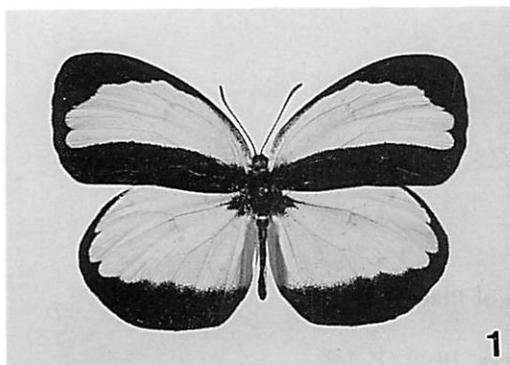
Explanation of Plate 8

Eurema alitha lorquini (C. & R. FELDER, 1865) [P. 13]

1. ♂. S. Sulawesi.
2. Ditto, underside.
3. ♀. S. Sulawesi.
4. Ditto, underside.

Eurema alitha djampeana (FRUHSTORFER, 1908) [P. 14]

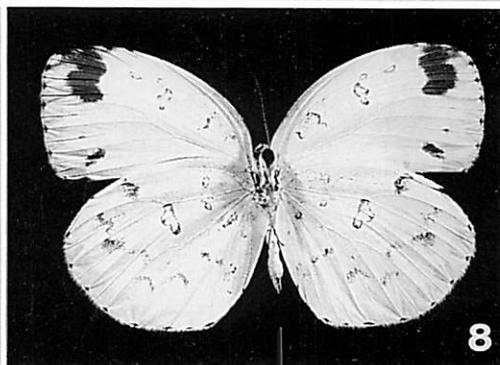
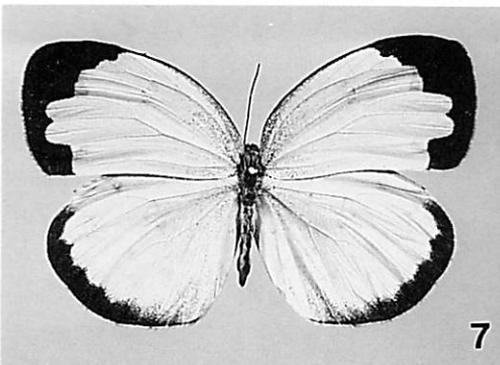
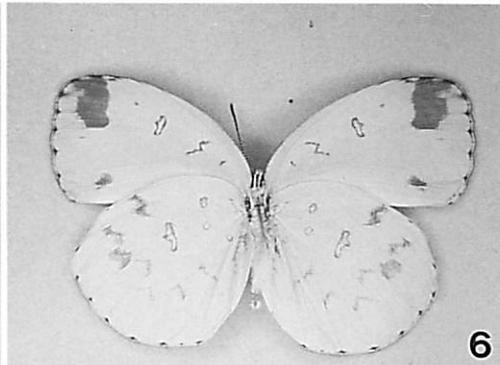
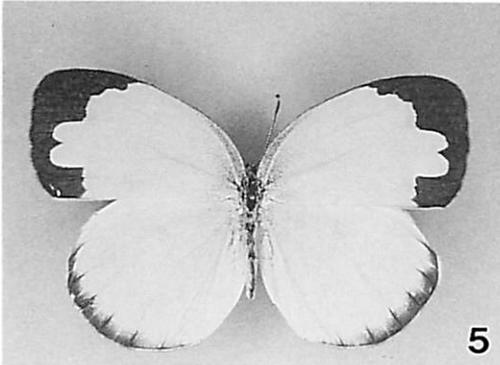
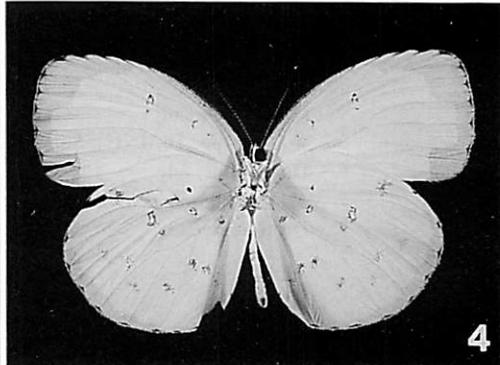
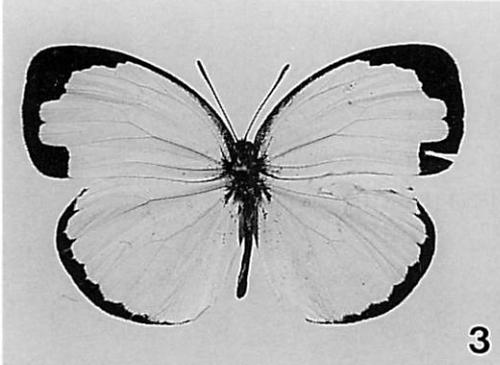
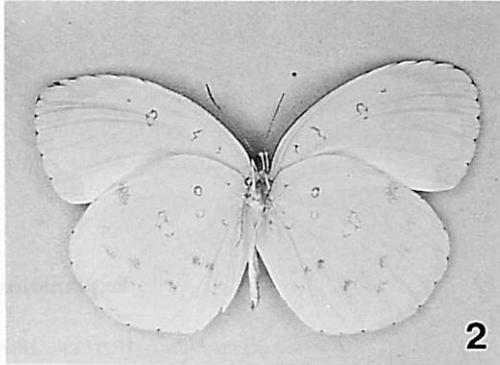
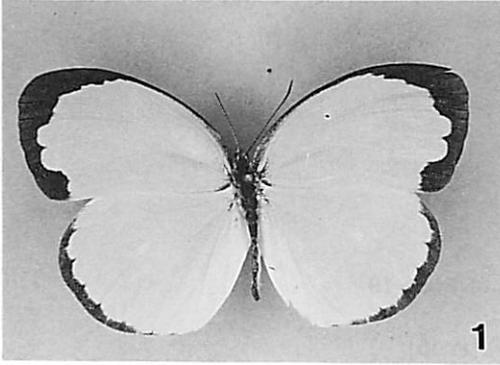
5. ♂, [RNH]. Tanah Djampea.
6. Ditto, underside.
7. ♀, [RNH]. Saleyer.
8. Ditto, underside.



Explanation of Plate 9

Eurema alitha sankapura (FRUHSTORFER, 1910) [P. 14]

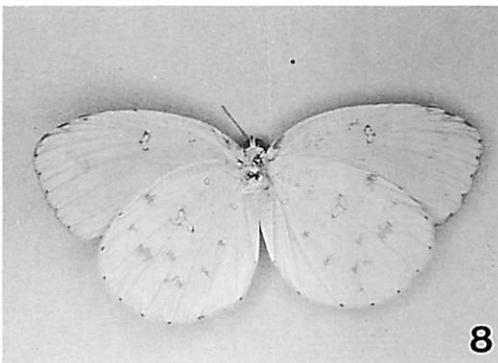
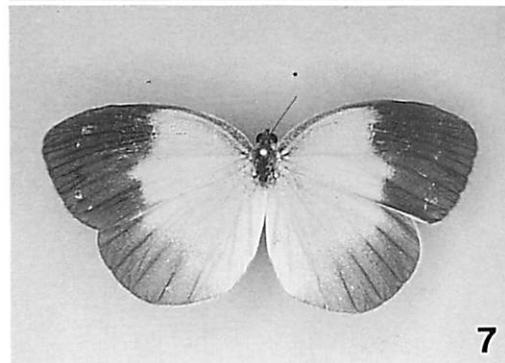
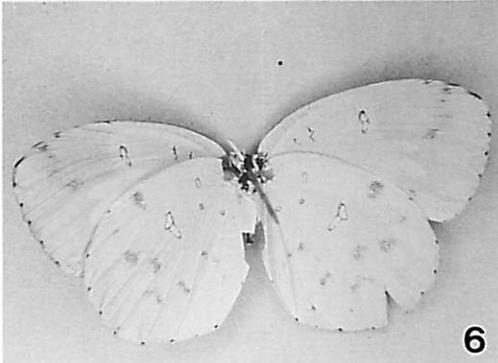
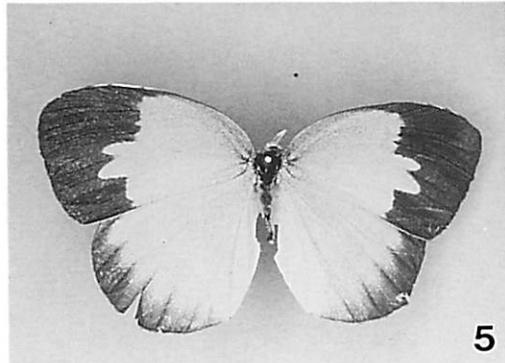
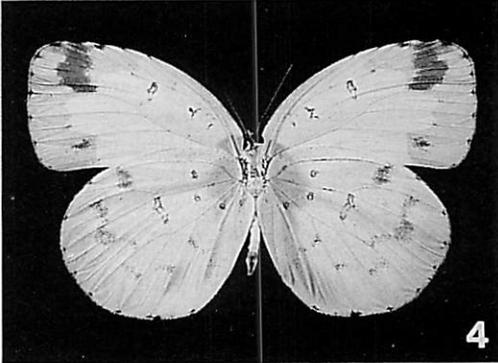
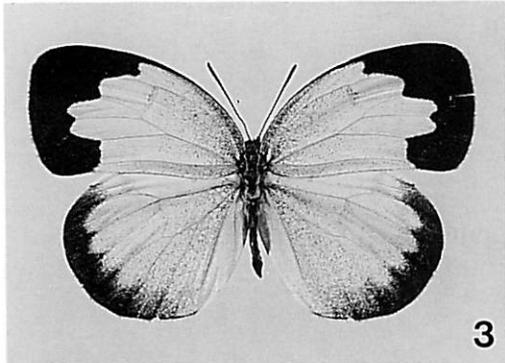
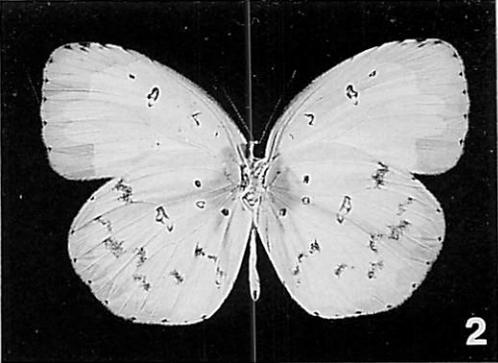
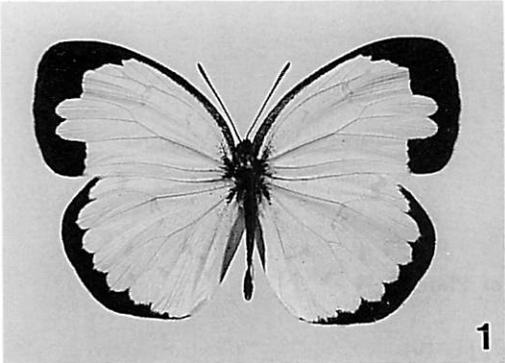
1. ♂, lectotype [BMNH]. Java.
2. Ditto, underside.
3. ♂. Lombok.
4. Ditto, underside.
5. ♀, paralectotype [BMNH] Bawean.
6. Ditto, underside.
7. ♀. W. Java.
8. Ditto, underside.



Explanation of Plate 10

Eurema alitha bidens (BUTLER, 1886) [P. 15]

1. ♂. S. E. Sumatra.
2. Ditto, underside.
3. ♀. Sumatra.
4. Ditto, underside.
5. ♀, lectotype [BMNH]. Sumatra.
6. Ditto, underside.
7. ♀, type (*Terias semifusca* BUTLER, 1886) [BMNH]. Sumatra.
8. Ditto, underside.



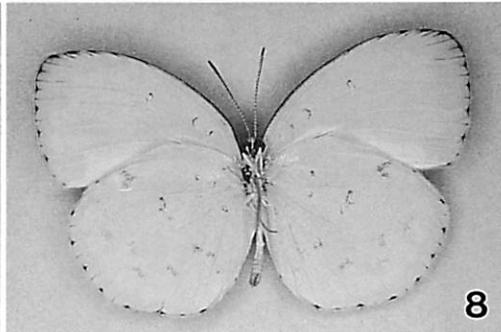
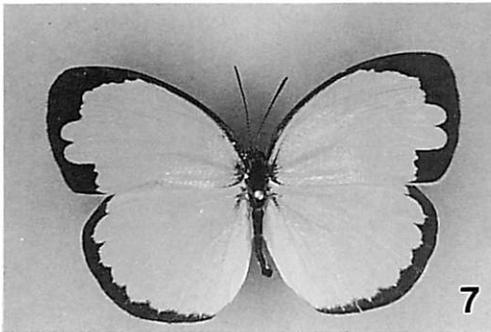
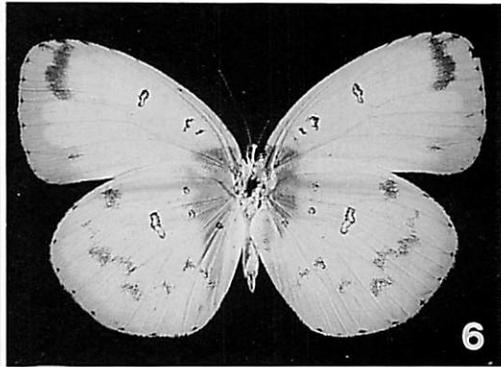
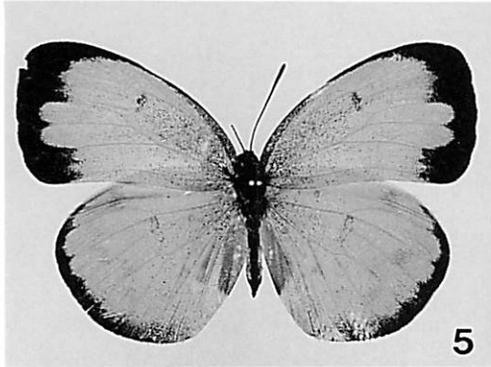
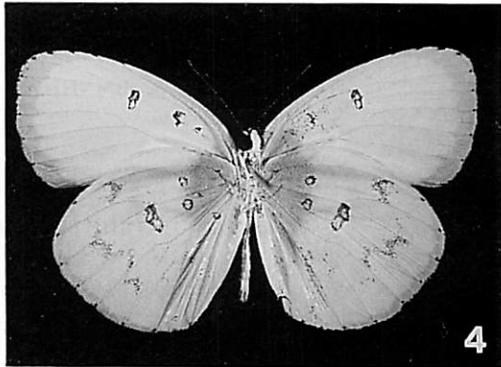
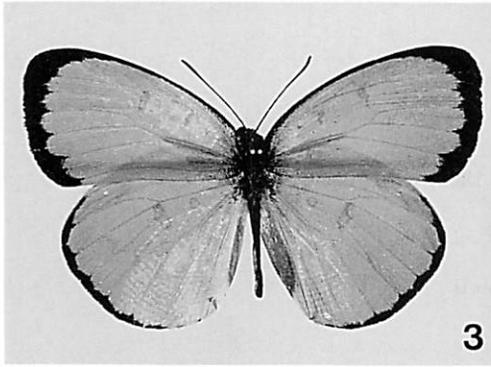
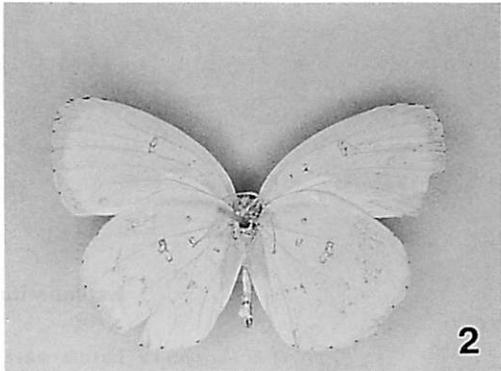
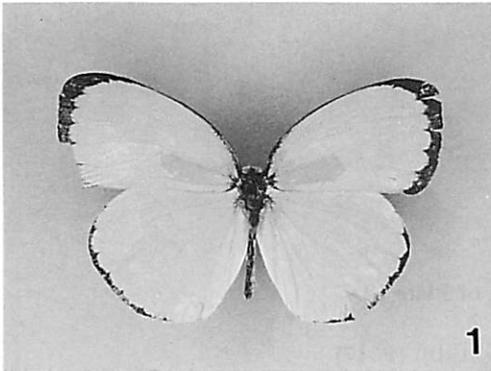
Explanation of Plate 11

Eurema alitha amplexa (BUTLER, 1887) [P. 16]

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

Eurema alitha chemys (FRUHSTORFER, 1910) [P. 17]

7. ♂, lectotype [BMNH]. Alor.
8. Ditto, underside.



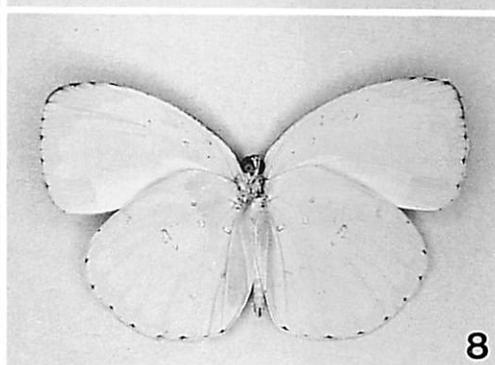
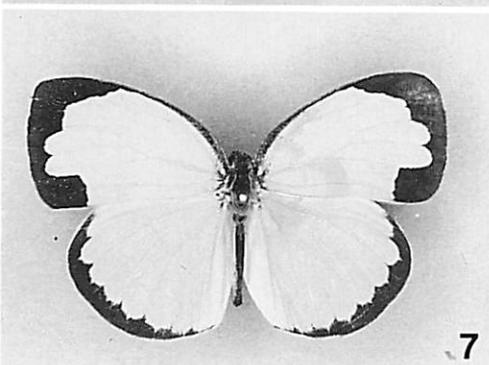
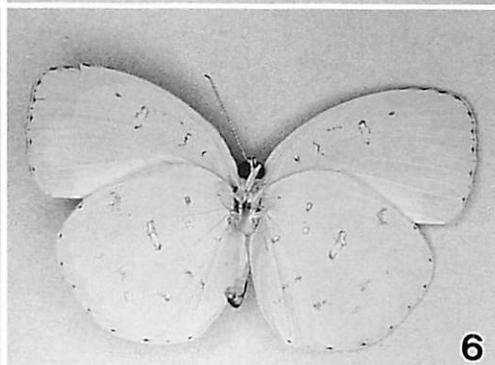
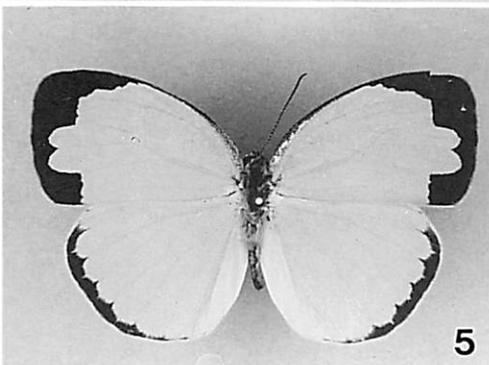
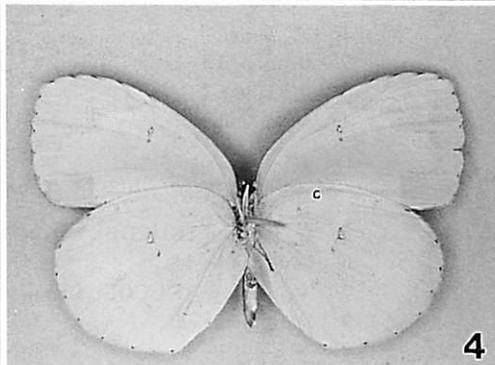
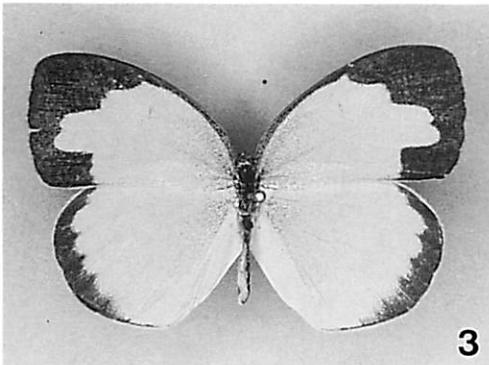
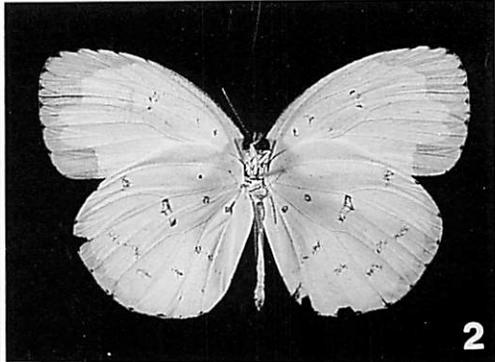
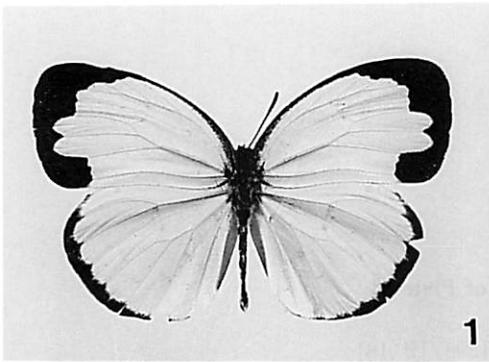
Explanation of Plate 12

Eurema alitha chemys (FRUHSTORFER, 1910) [P. 17]

1. ♂. Flores.
2. Ditto, underside.
3. ♀, paralectotype [BMNH]. Alor.
4. Ditto, underside.

Eurema alitha brevicostalis (BUTLER, 1898) [P. 18]

5. ♂, lectotype [BMNH]. Blemao Is.
6. Ditto, underside.
7. ♂, paralectotype [BMNH]. Semaos Is.
8. Ditto, underside.



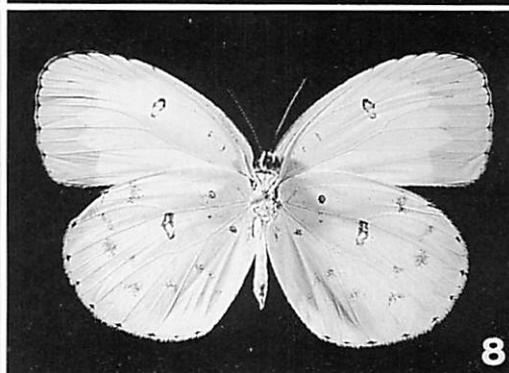
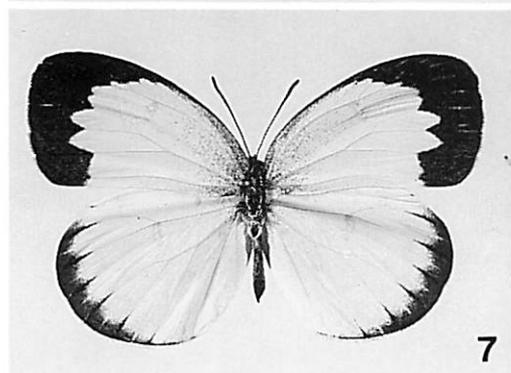
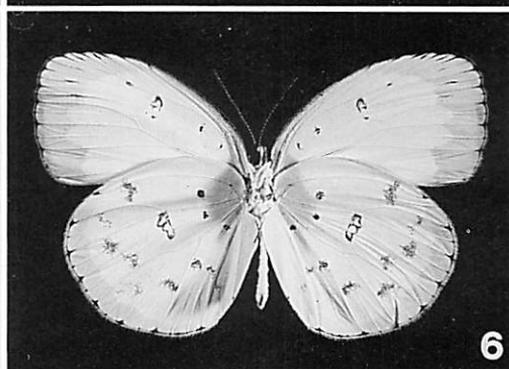
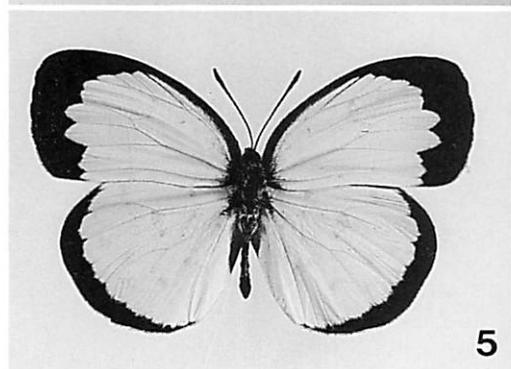
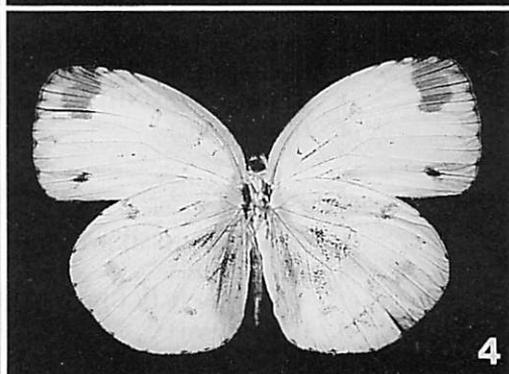
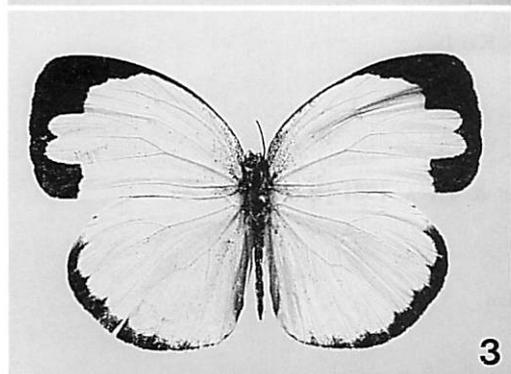
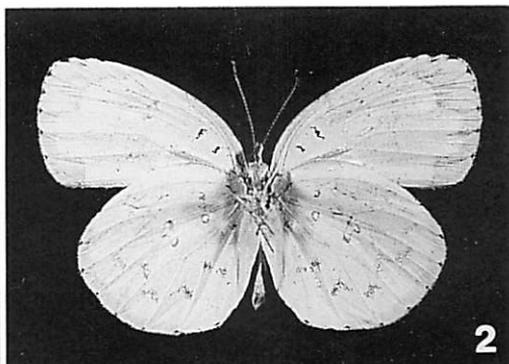
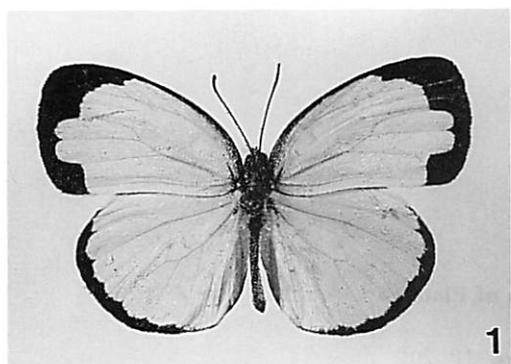
Explanation of Plate 13

Eurema alitha brevicostalis (BUTLER, 1898) [P. 18]

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

Eurema alitha gunjii SHIRÔZU & YATA, 1981 [P. 19]

5. ♂, holotype [KUCGE]. Ceram.
6. Ditto, underside.
7. ♀, paratype [KUCGE]. Ceram.
8. Ditto, underside.



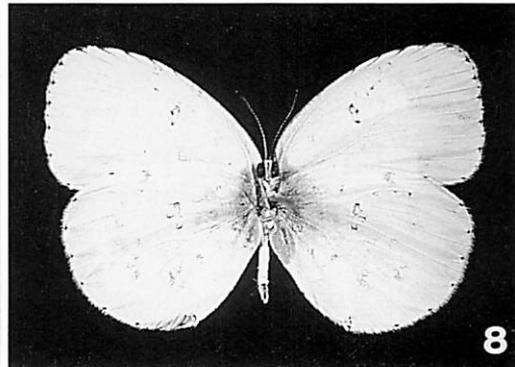
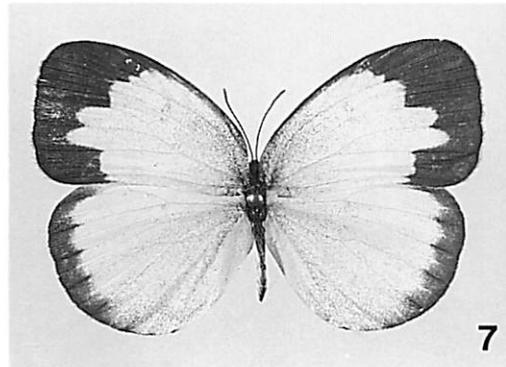
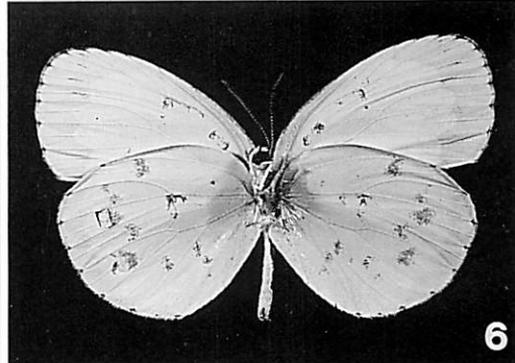
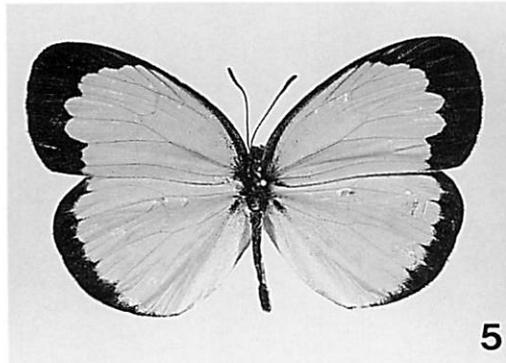
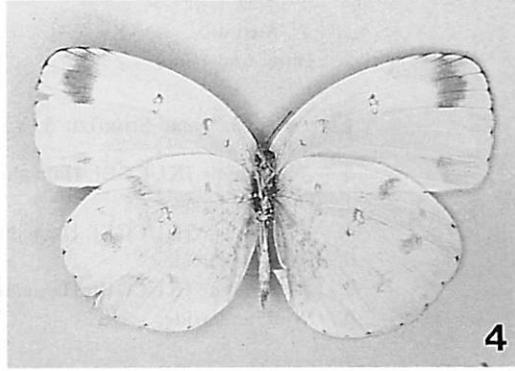
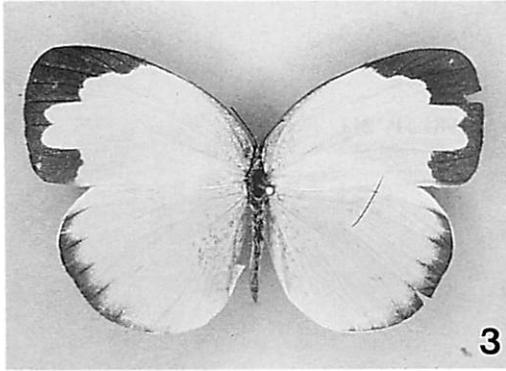
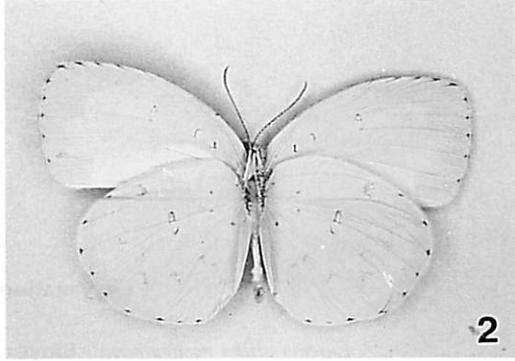
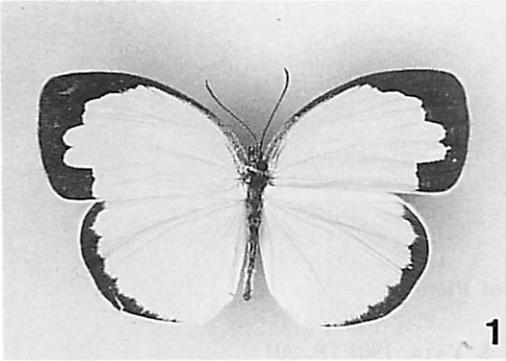
Explanation of Plate 14

Eurema alitha kaiensis YATA, ssp. nov. [P. 20]

1. ♂, holotype [BMNH]. Kè Dulan, Kai Is.
2. Ditto, underside.
3. ♀, paratype [BMNH]. Kai Is.
4. Ditto, underside.

Eurema alitha novaguineensis SHIRÔZU & YATA, 1981 [P. 20]

5. ♂, holotype [NSM]. West Irian.
6. Ditto, underside.
7. ♀, paratype [KUCGE]. West Irian.
8. Ditto, underside.



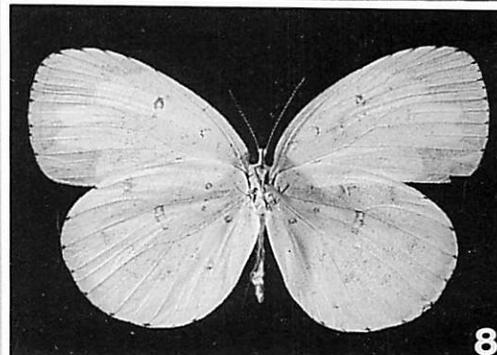
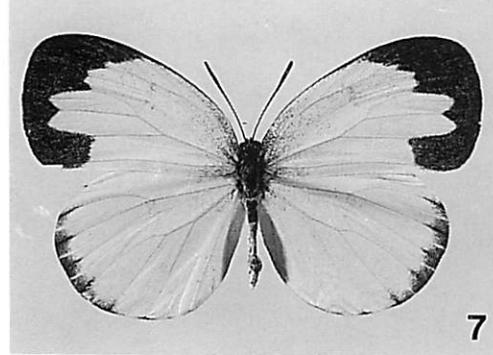
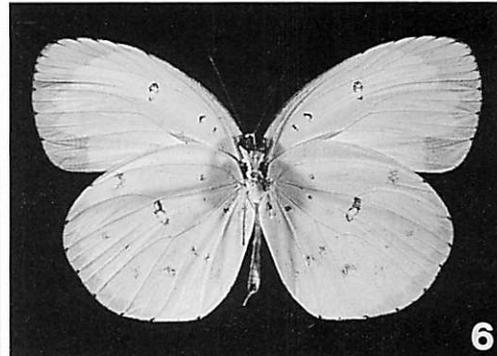
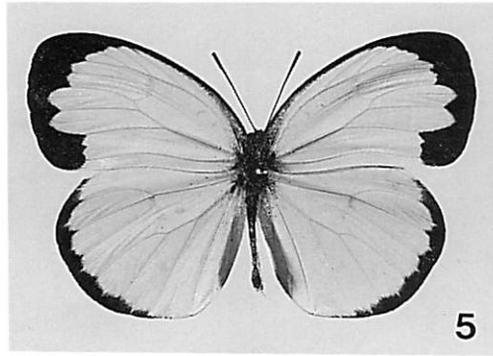
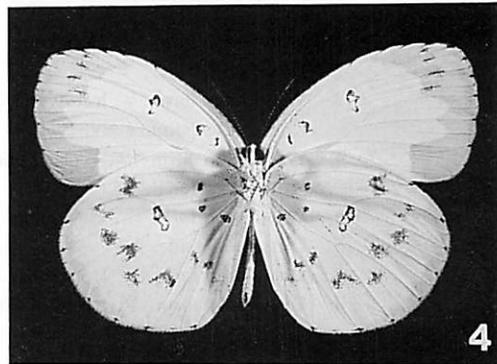
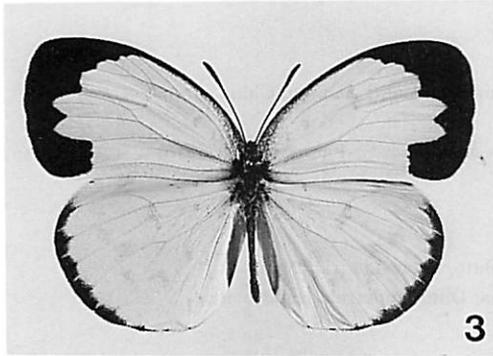
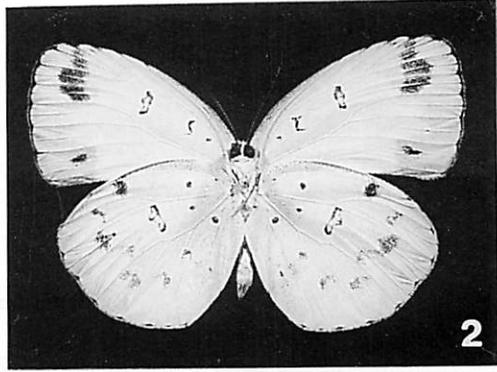
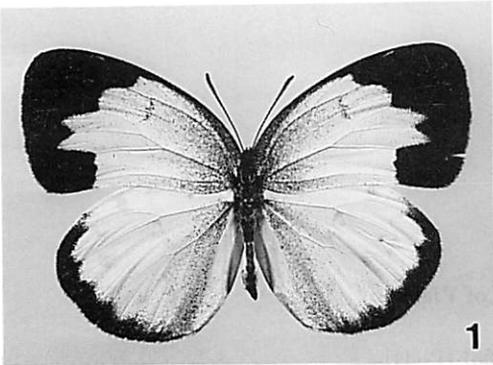
Explanation of Plate 15

Eurema alitha novaguineensis SHIRÔZU & YATA, 1981 [P. 20]

1. ♀. Australia.
2. Ditto, underside.

Eurema halmaherana SHIRÔZU & YATA, 1981 [P. 21]

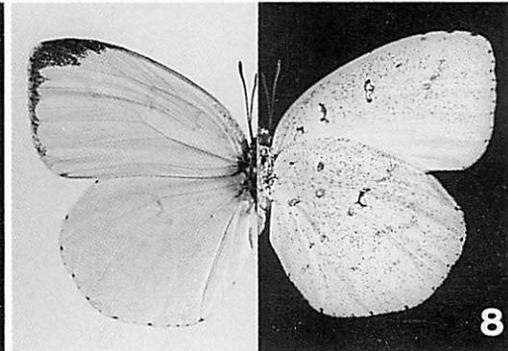
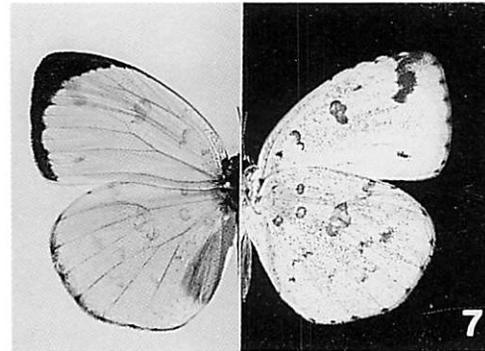
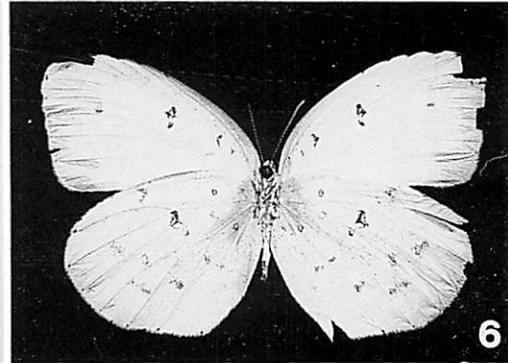
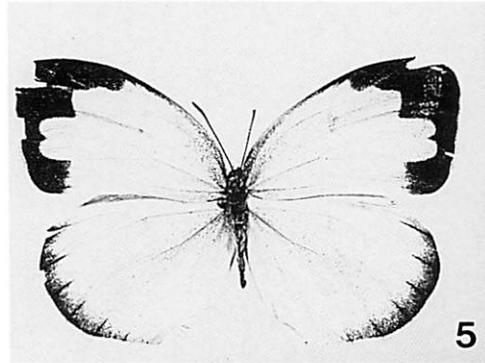
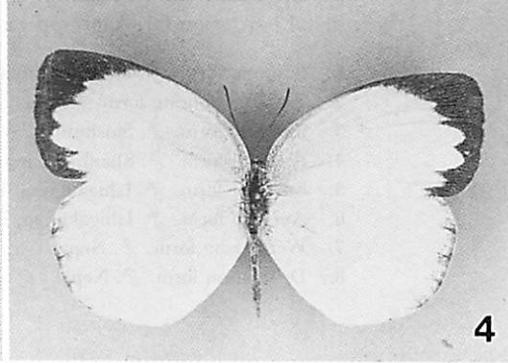
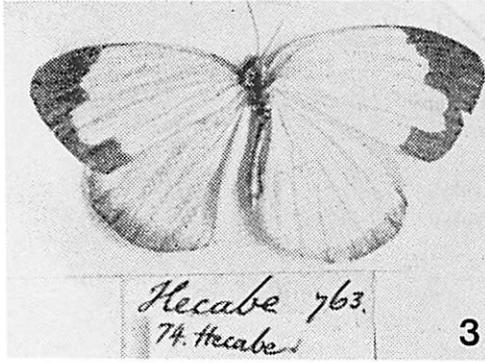
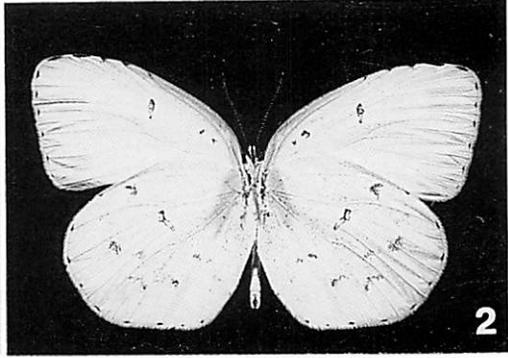
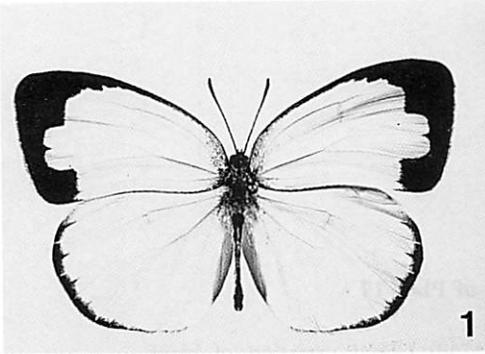
3. ♂, holotype [KUCGE]. Halmahera.
4. Ditto, underside.
5. ♂, paratype [KUCGE]. Halmahera.
6. Ditto, underside.
7. ♀, paratype [KUCGE]. Halmahera.
8. Ditto, underside.



Explanation of Plate 16

Eurema hecabe hecabe (LINNAEUS, 1758) [P. 34]

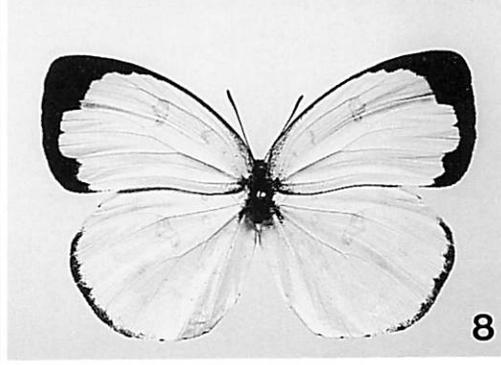
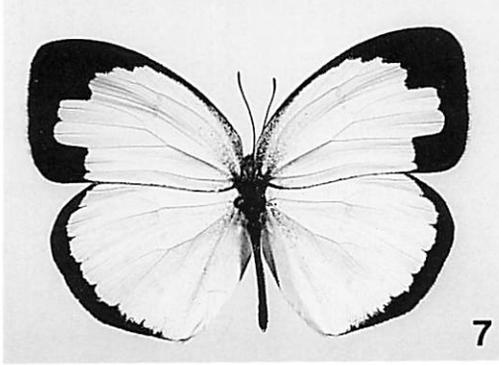
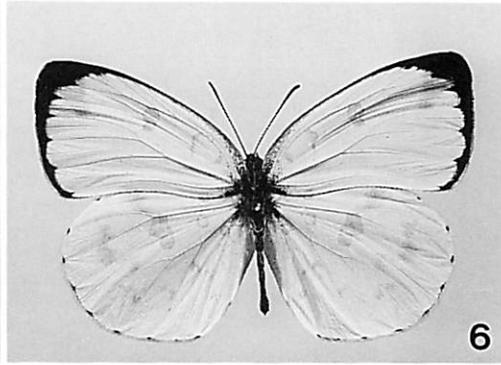
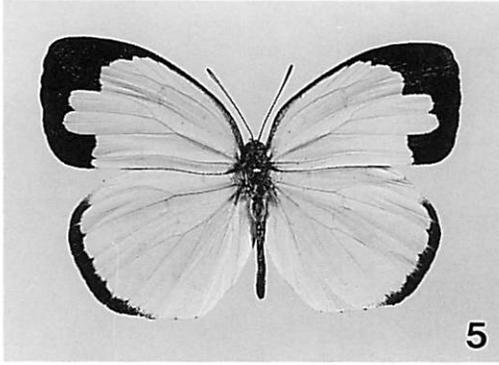
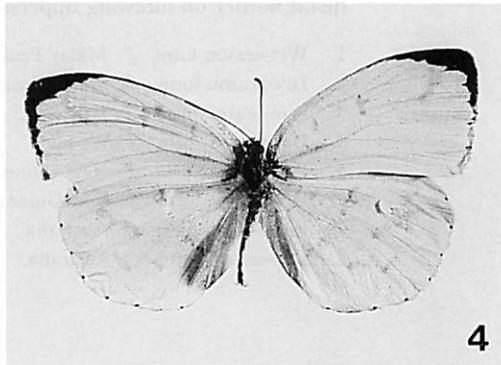
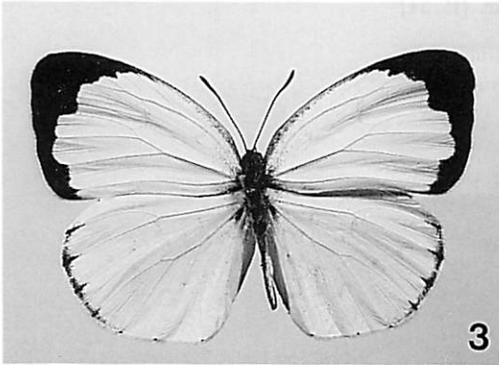
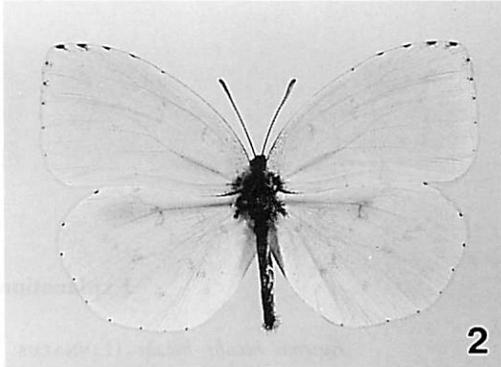
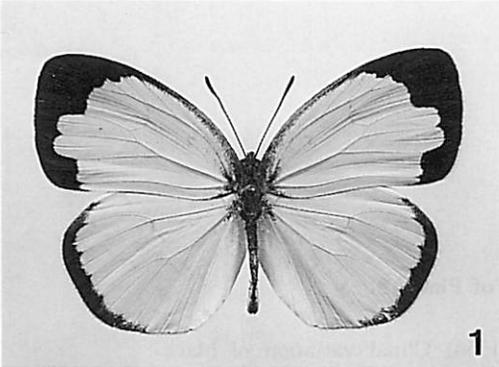
1. Wet-season form. ♂. Hongkong.
2. Ditto, underside.
3. Wet-season form. ♀, lectotype [Linnaean Coll.]. Canton, China. (from CORBET & PENDLEBURY, 1956)
4. Wet-season form. ♀, type (*Terias blanda acandra* FRUHSTORFER, 1910) [BMNH]. Hongkong.
5. Wet-season form. ♀. Hongkong.
6. Ditto, underside.
7. Dry-season form. ♀. Hongkong; Ditto, underside (right half).
8. Dry-season form. ♀. Koshu, China; Ditto, underside (right half).



Explanation of Plate 17

Eurema hecabe hecabe (LINNAEUS, 1758) Clinal variation of black distal border on forewing upperside. [P. 34]

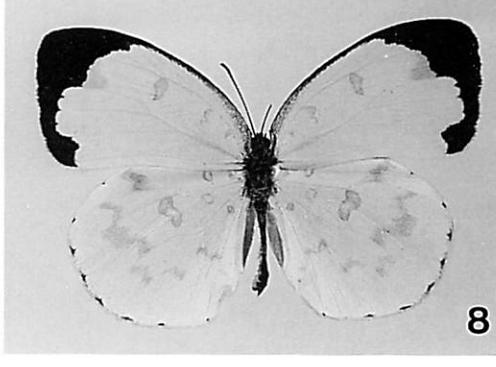
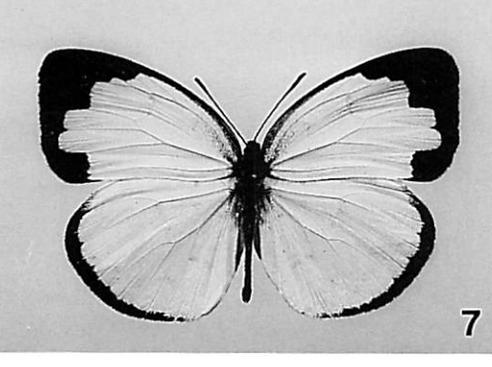
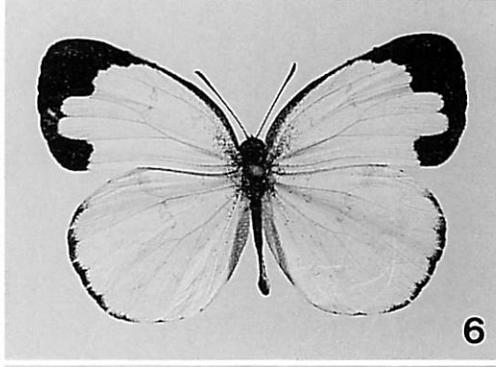
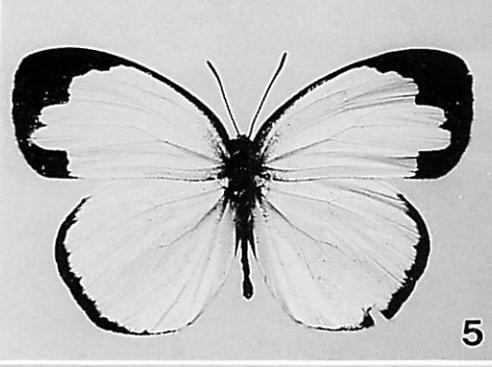
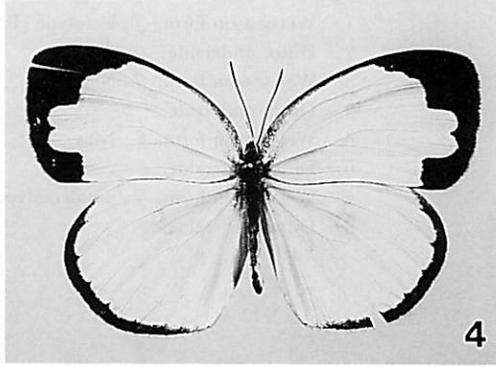
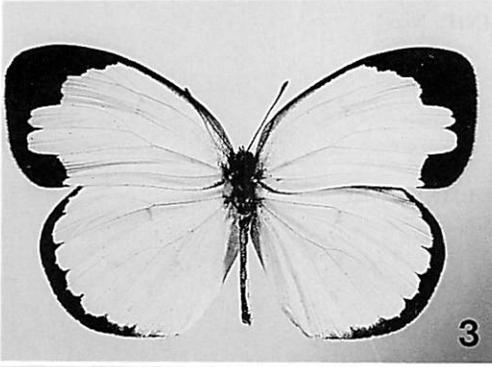
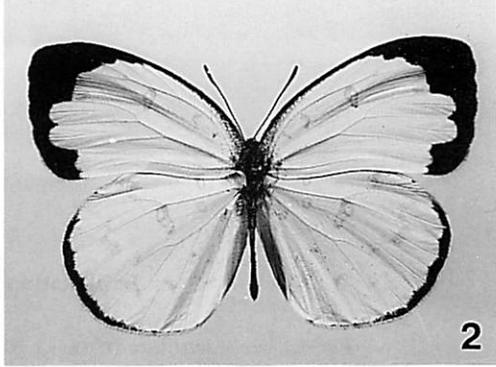
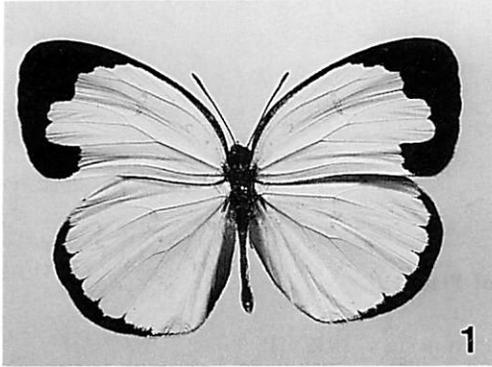
1. Summer form. ♂. Fukuoka, Japan.
2. Extreme autumn form. ♂. Fukuoka, Japan.
3. Summer form. ♂. Saishuto, Corea.
4. Autumn form. ♂. Shanhai, China.
5. Summer form. ♂. Ishigakijima, Ryukyu.
6. Autumn form. ♂. Ishigakijima, Ryukyu.
7. Wet-season form. ♂. Nepal.
8. Dry-season form. ♂. Nepal.



Explanation of Plate 18

Eurema hecabe hecabe (LINNAEUS, 1758) Clinal variation of black distal border on forewing upperside. [P. 34]

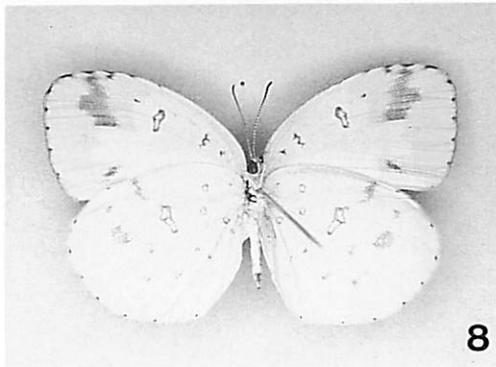
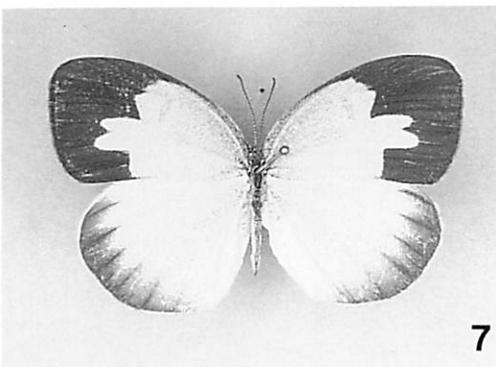
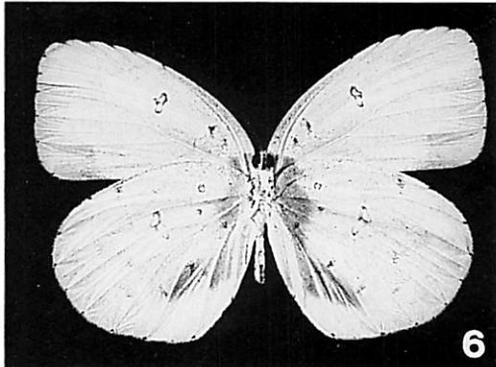
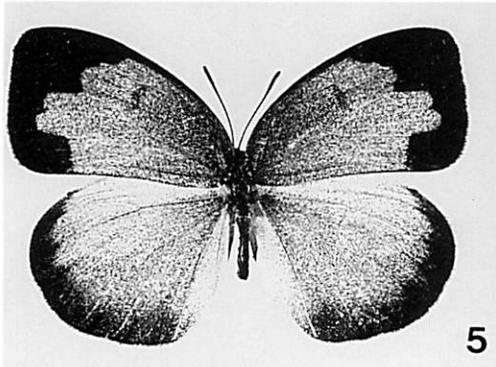
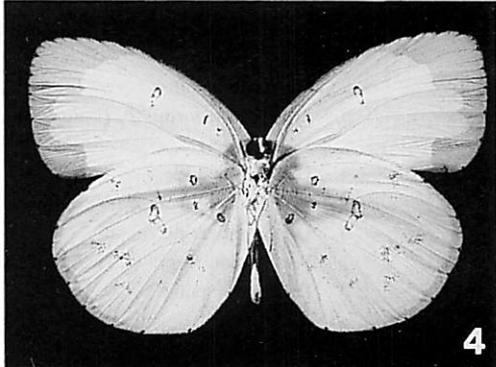
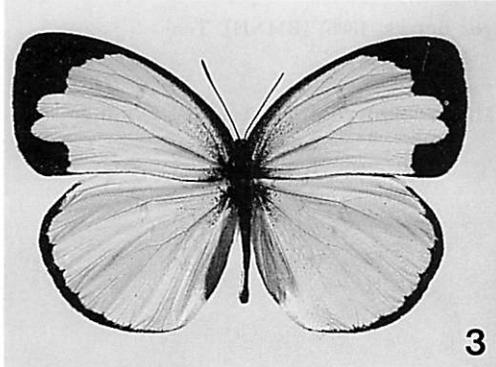
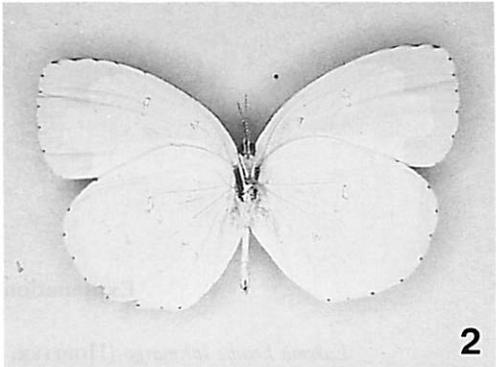
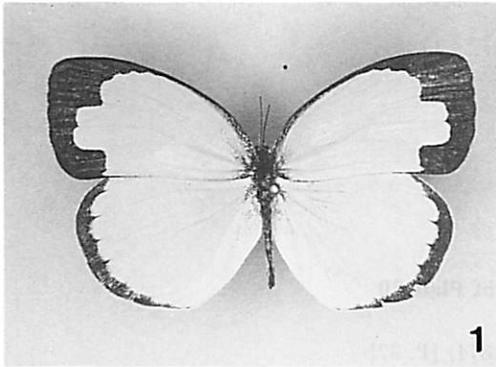
1. Wet-season form. ♂. Malay Peninsula.
2. Dry-season form. ♂. Malay Peninsula.
3. Wet-season form. ♂. Bali.
4. Dry-season form. ♂. W. Java.
5. Wet-season form. ♂. New Guinea.
6. Dry-season form. ♂. New Guinea.
7. Wet-season form. ♂. Australia.
8. Dry-season form. ♂. Australia.



Explanation of Plate 19

Eurema hecabe satellitica (CORBET & PENDLEBURY, 1932) [P. 36]

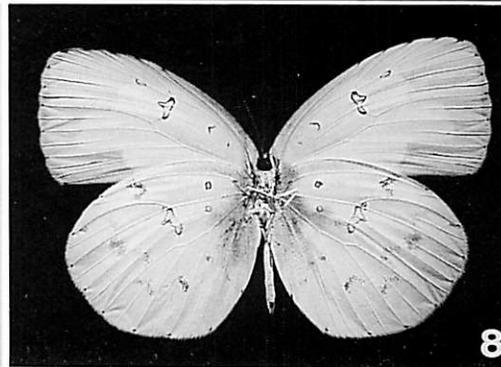
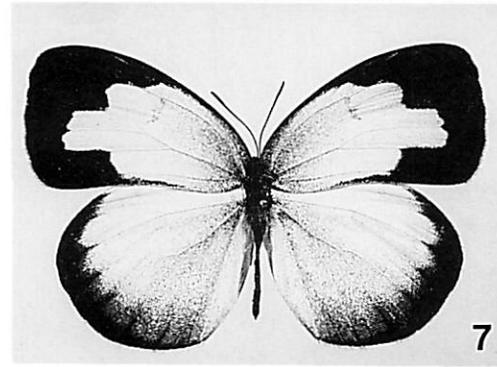
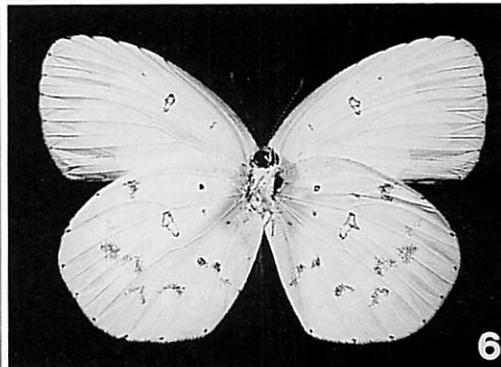
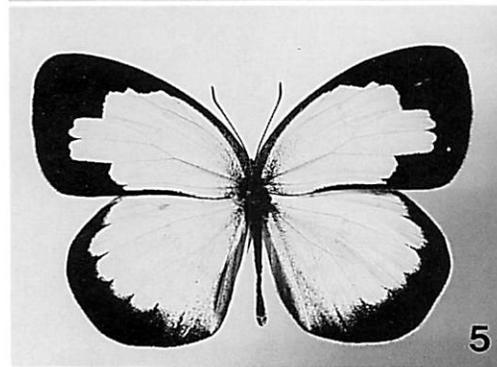
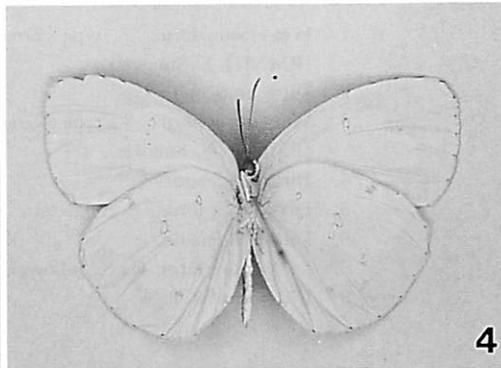
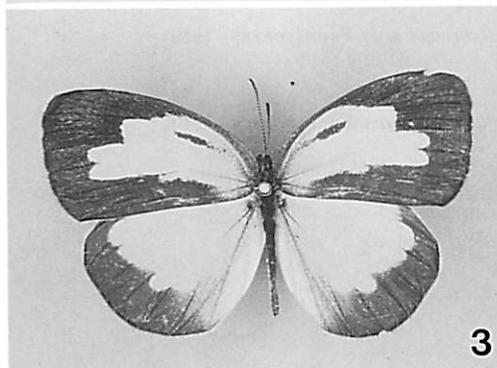
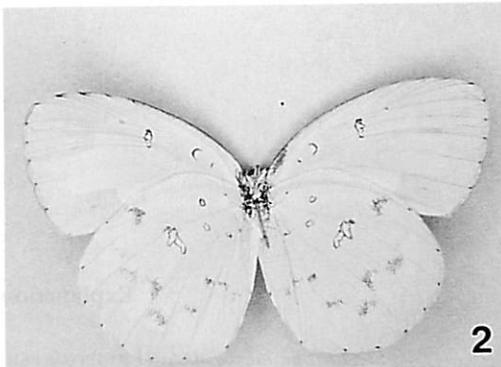
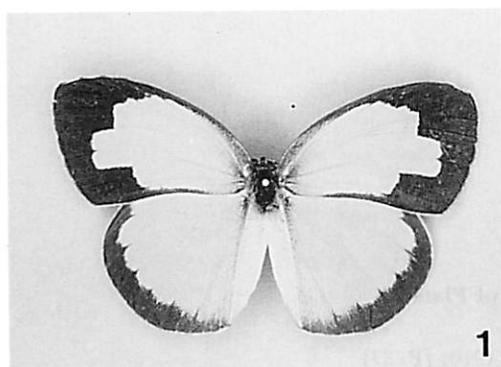
1. Wet-season form. ♂, lectotype [BMNH]. Nias.
2. Ditto, underside.
3. Wet-season form. ♂. Nias.
4. Ditto, underside.
5. Wet-season form. ♀. Nias.
6. Ditto, underside.
7. Wet-season form. ♀, paralectotype [BMNH]. Nias.
8. Ditto, underside.



Explanation of Plate 20

Eurema hecabe latimargo (HOPFFER, 1874) [P. 37]

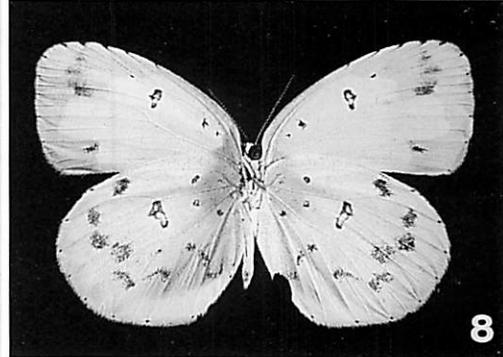
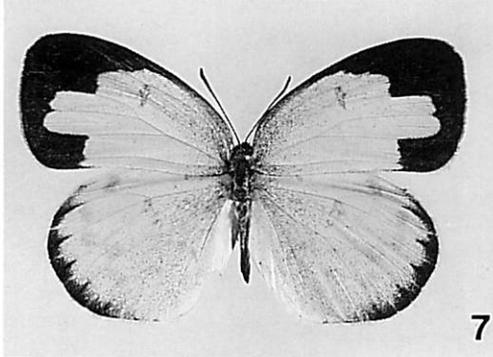
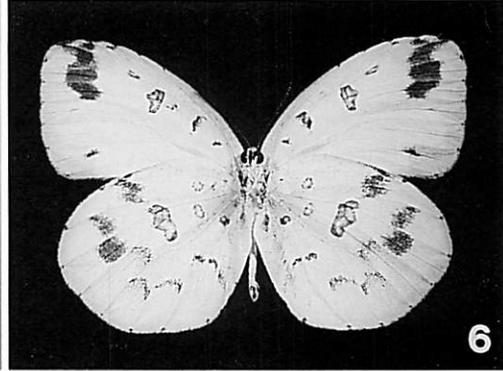
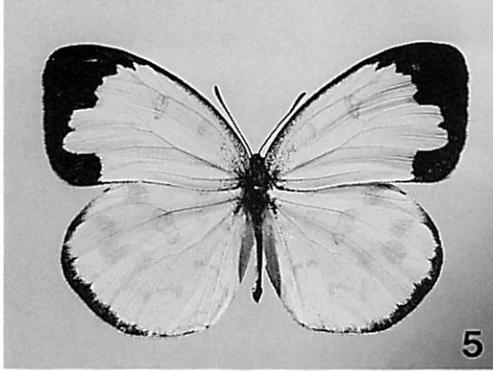
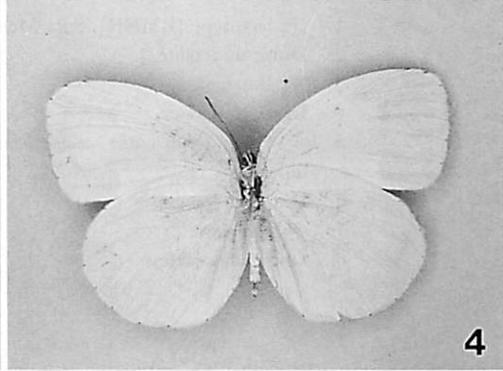
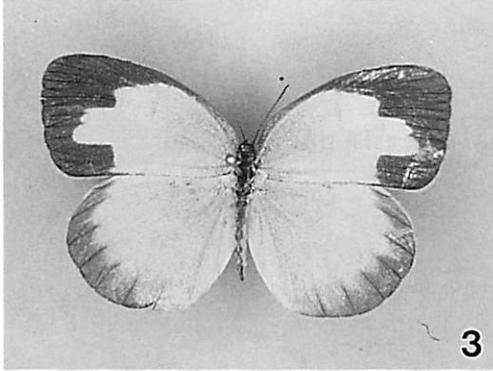
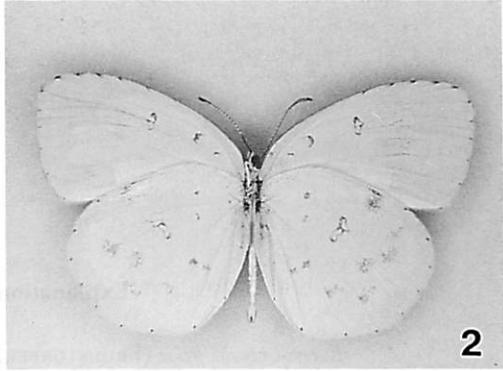
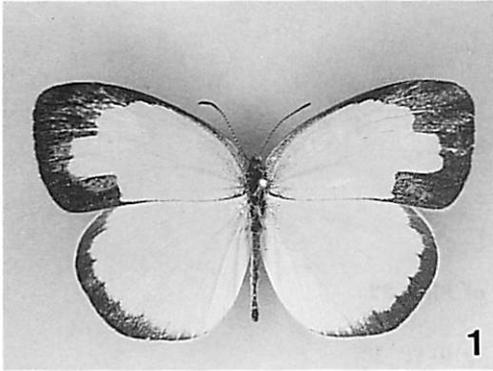
1. Wet-season form. ♂, (*Terias anguligera* BUTLER, 1886) [BMNH]. Tondano, Sulawesi.
2. Ditto, underside.
3. Wet-season form. ♂, (f. *accentifera* MARTIN, 1920) [BMNH]. Tondano, W. Sulawesi.
4. Ditto, underside.
5. Wet-season form. ♂. N. Sulawesi.
6. Ditto, underside.
7. Wet-season form. ♀, N. Sulawesi.
8. Ditto, underside.



Explanation of Plate 21

Eurema hecabe sinda (FRUHSTORFER, 1910) [P. 37]

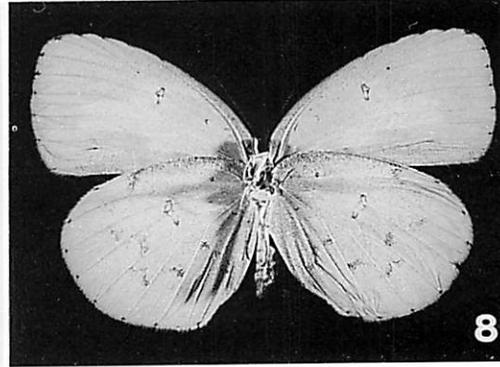
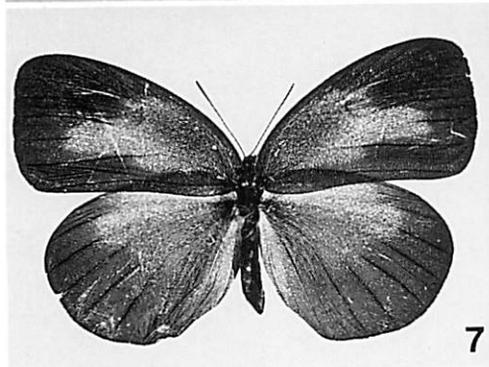
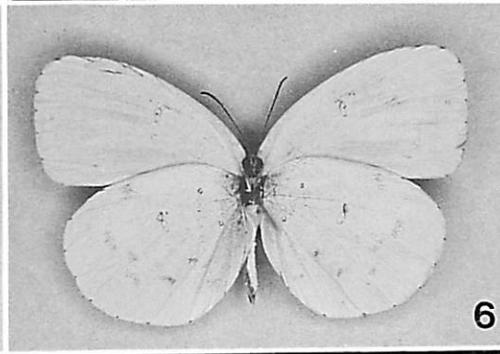
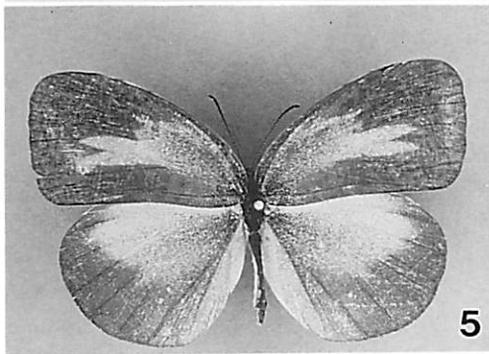
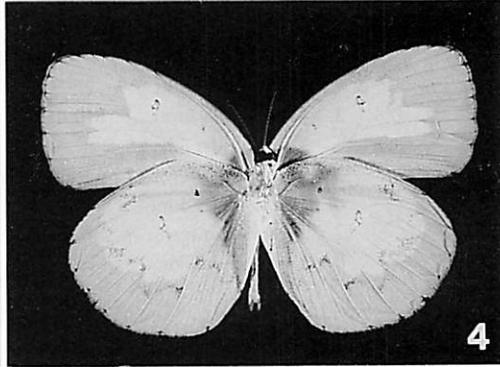
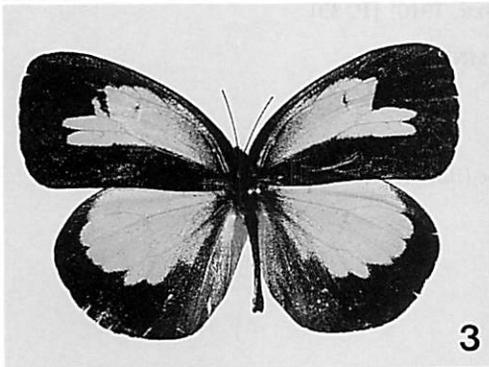
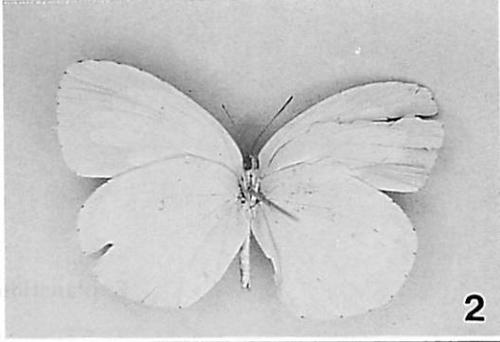
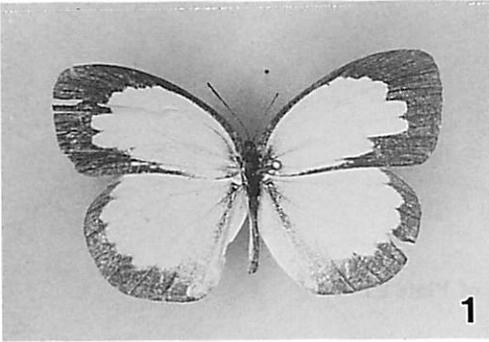
1. Wet-season form. ♂, type (*Terias latimargo nesos* FRUHSTORFER, 1910) [BMNH]. S. Sulawesi.
2. Ditto, underside.
3. Wet-season form. ♀, type (*Terias latimargo nesos* FRUHSTORFER, 1910) [BMNH]. S. Sulawesi.
4. Ditto, underside.
5. Dry-season form. ♂. Sulawesi.
6. Ditto, underside.
7. Dry-season form. ♀, S. Sulawesi.
8. Ditto, underside.



Explanation of Plate 22

Eurema hecabe pylos (FRUHSTORFER, 1910) [P. 38]

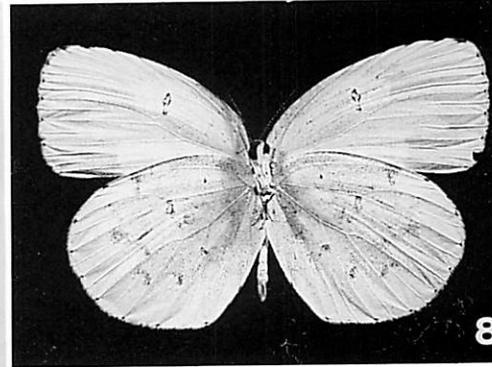
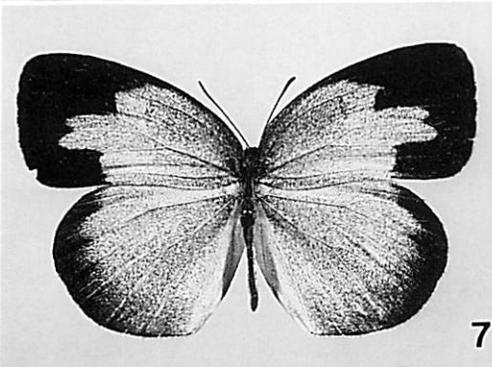
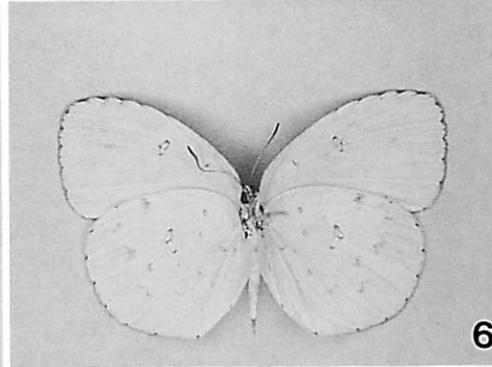
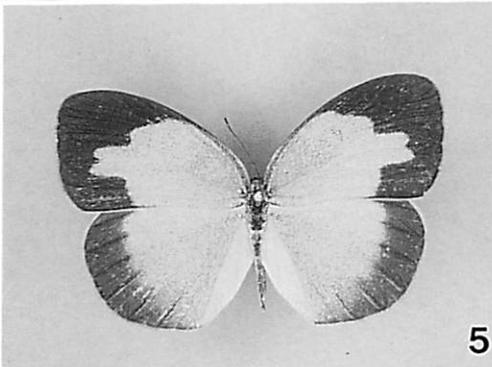
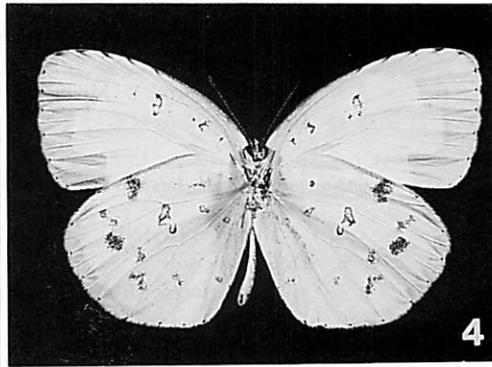
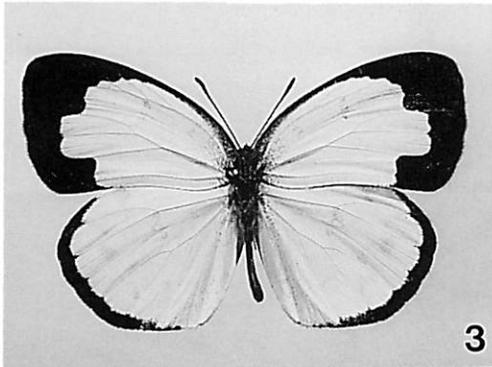
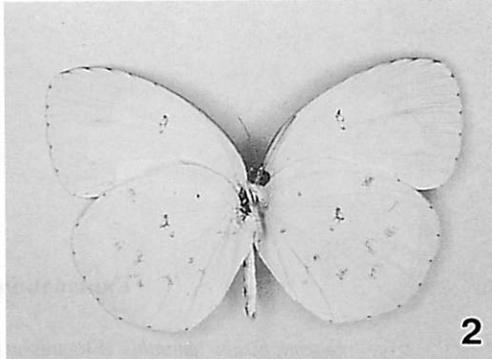
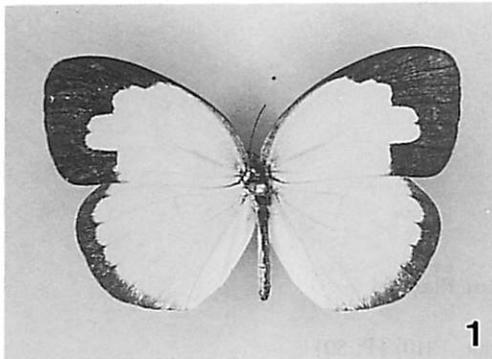
1. ♂, lectotype [BMNH]. Sula Mongoli.
2. Ditto, underside.
3. ♂. Banggai.
4. Ditto, underside.
5. ♀, type (*Terias alitha sanama* FRUHSTORFER, 1913) [BMNH]. Sanama, Sula Isls.
6. Ditto, underside.
7. ♀. Banggai.
8. Ditto, underside.



Explanation of Plate 23

Eurema hecabe tamiathis (FRUHSTORFER, 1910) [P. 39]

1. Wet-season form. ♂, lectotype [BMNH]. Bazilan.
2. Ditto, underside.
3. Wet-season form. ♂. Mindanao.
4. Ditto, underside.
5. Wet-season form. ♀, paralectotype [BMNH]. Bazilan.
6. Ditto, underside.
7. Wet-season form. ♀. Mindanao.
8. Ditto, underside.



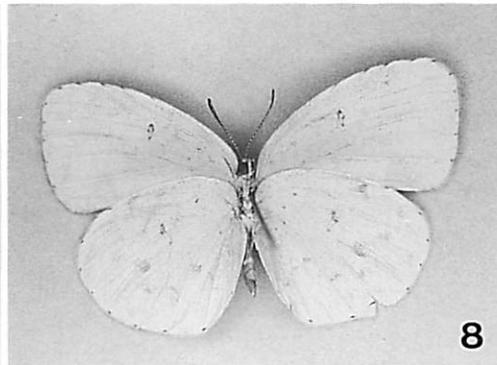
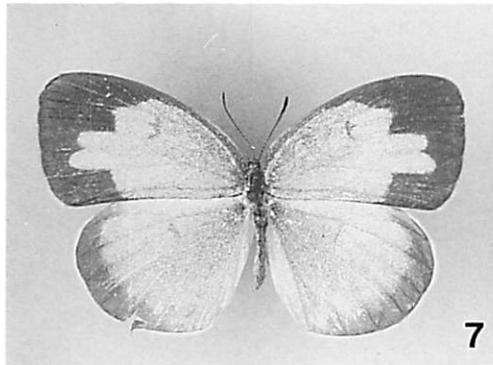
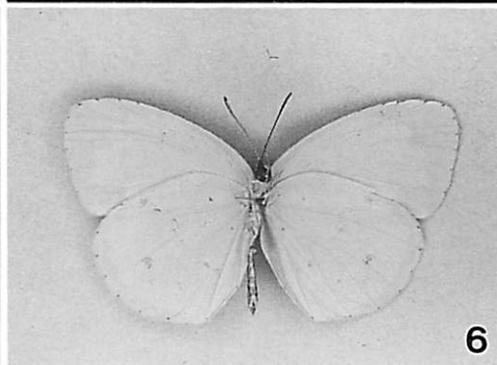
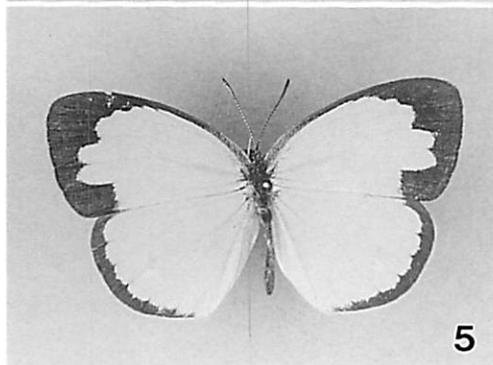
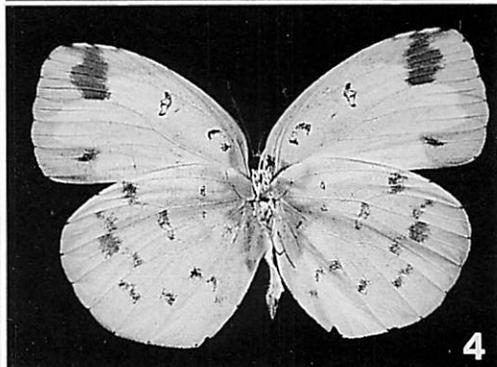
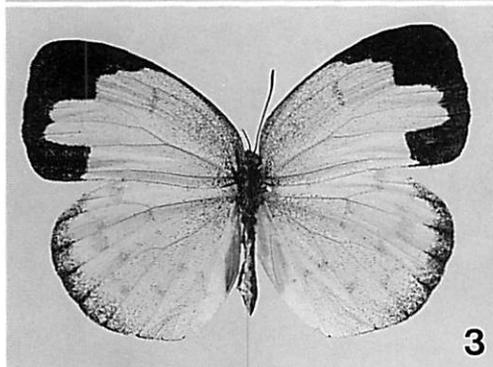
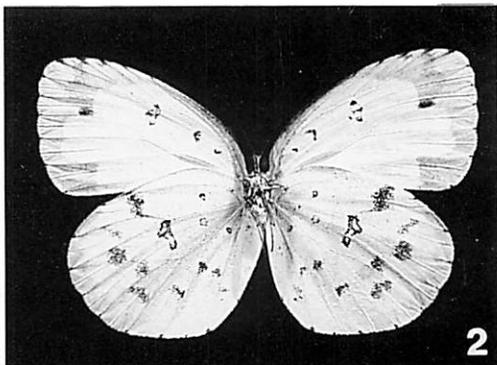
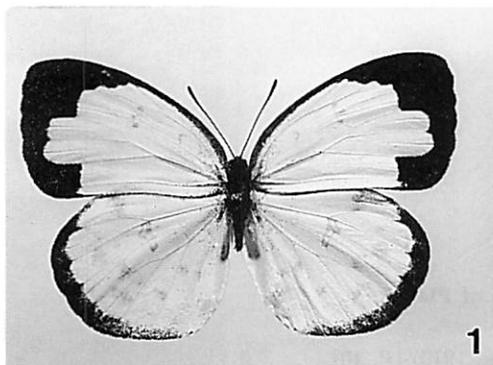
Explanation of Plate 24

Eurema hecabe tamiathis (FRUHSTORFER, 1910) [P. 39]

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

Eurema hecabe kalidupa (FRUHSTORFER, 1910) [P. 40]

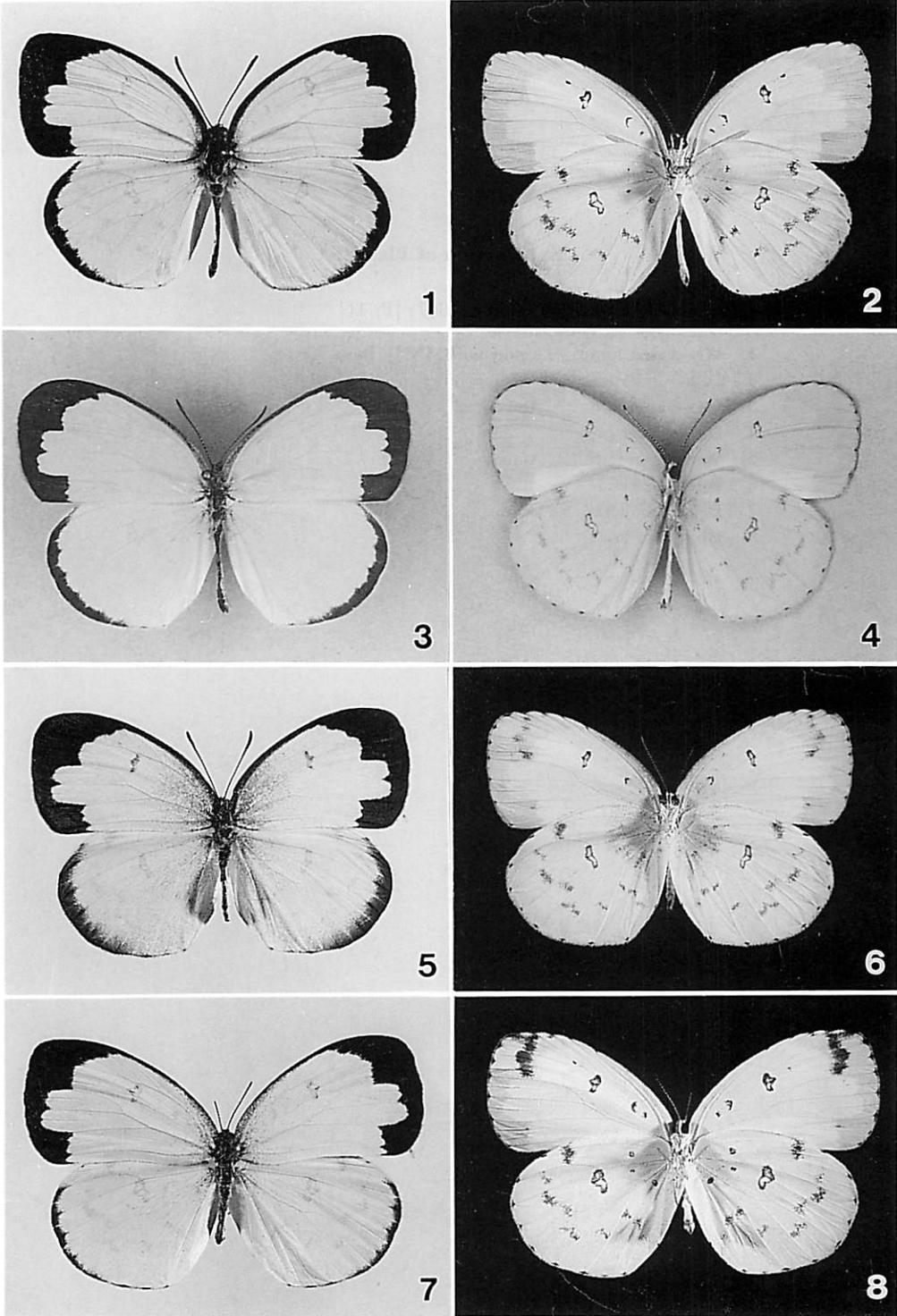
5. ♂, lectotype [BMNH]. Kalidupa.
6. Ditto, underside.
7. ♀, paralectotype [BMNH]. Kalidupa.
8. Ditto, underside.



Explanation of Plate 25

Eurema hecabe asanga (FRUHSTORFER, 1910) [P. 40]

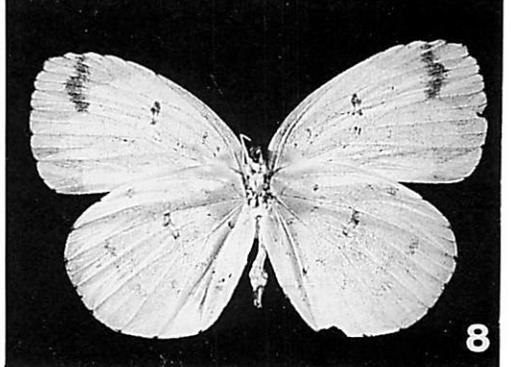
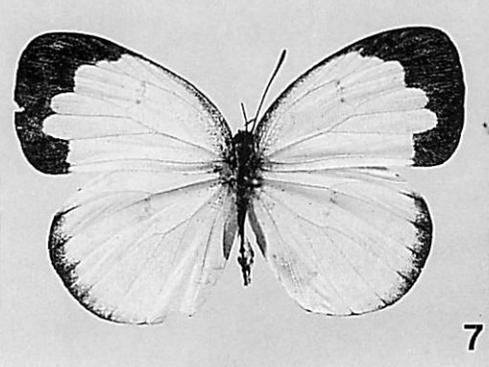
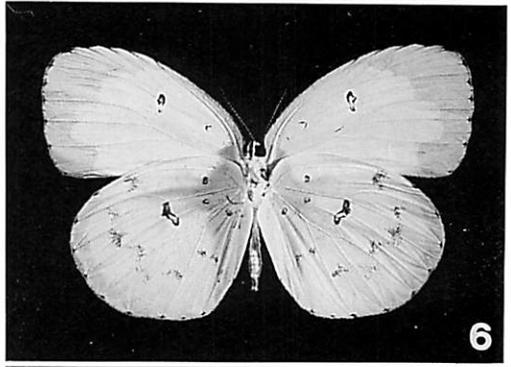
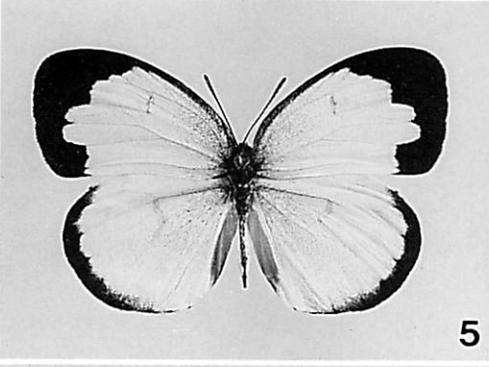
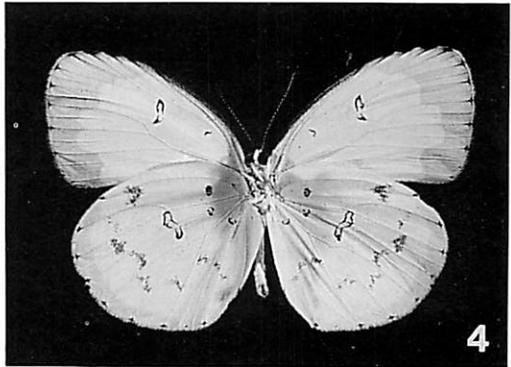
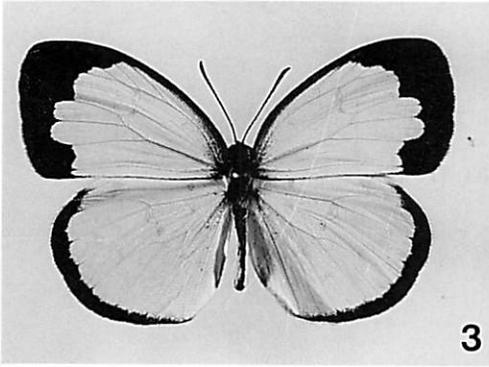
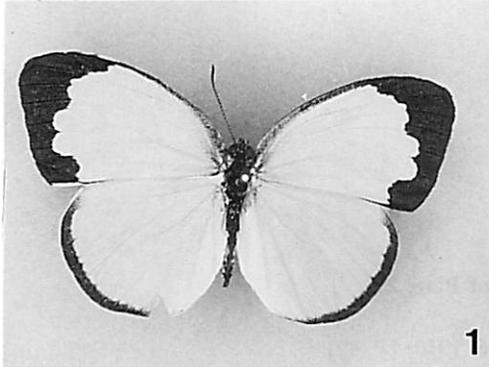
1. Wet-season form. ♂. Halmahera.
2. Ditto, underside.
3. Wet-season form. ♂, lectotype [BMNH]. Bachan.
4. Ditto, underside.
5. Wet-season form. ♀. Halmahera.
6. Ditto, underside.
7. Dry-season form. ♀. Halmahera.
8. Ditto, underside.



Explanation of Plate 26

Eurema hecabe diversa (WALLACE, 1867) [P. 41]

1. Wet-season form. ♂, lectotype [BMNH]. Buru.
2. Ditto, underside.
3. Wet-season form. ♂. Ambon.
4. Ditto, underside.
5. Wet-season form. ♀. Ambon.
6. Ditto, underside.
7. Dry-season form. ♀. Ceram.
8. Ditto, underside.



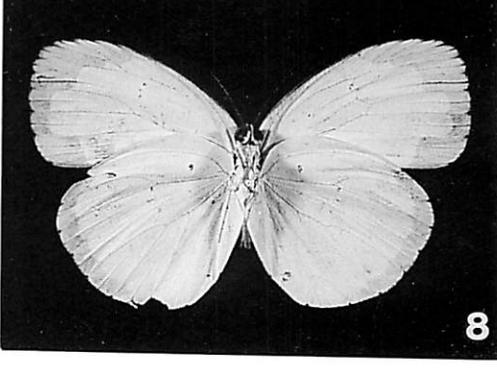
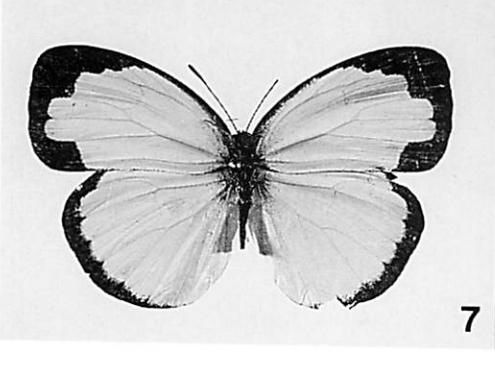
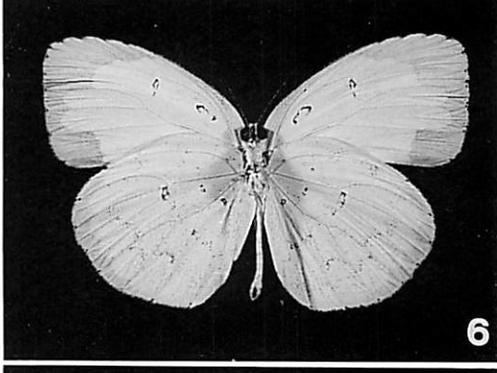
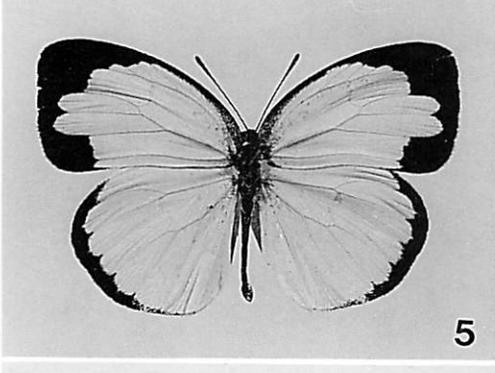
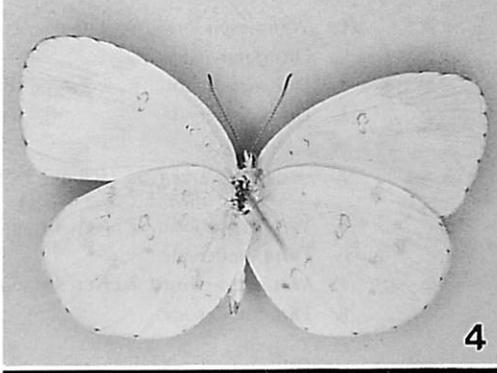
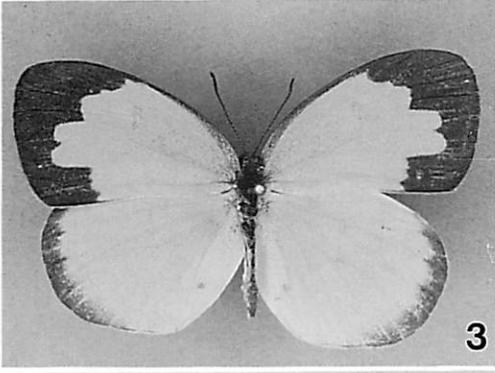
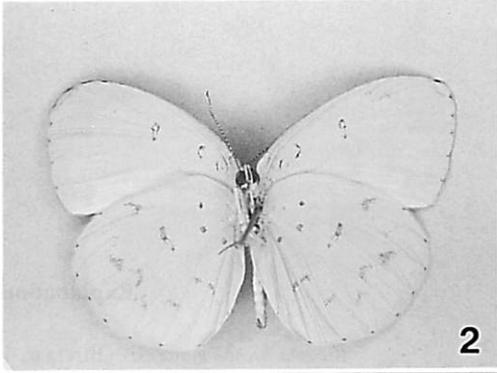
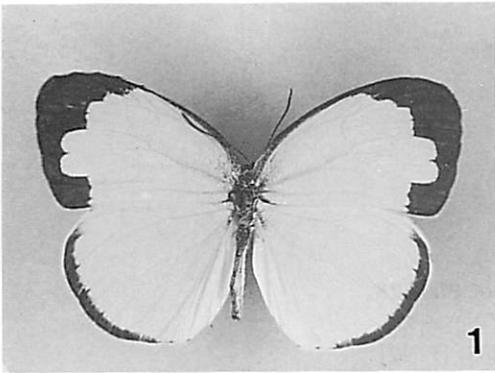
Explanation of Plate 27

Eurema hecabe bandana (FRUHSTORFER, 1910) [P. 42]

1. ♂, lectotype [BMNH]. Banda.
2. Ditto, underside.
3. ♀, paralectotype [BMNH]. Banda.
4. Ditto, underside.

Eurema hecabe maroensis (BUTLER, 1883) [P. 42]

5. Wet-season form. ♂. Timor.
6. Ditto, underside.
7. Wet-season form. ♂. Timor.
8. Ditto, underside.



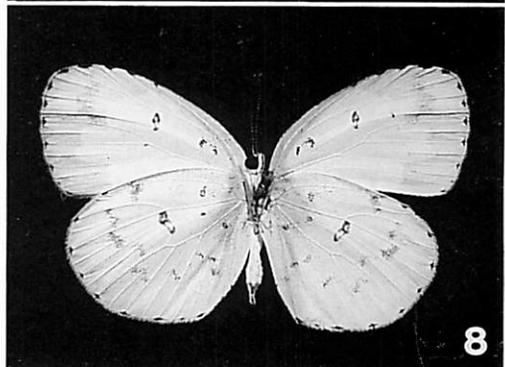
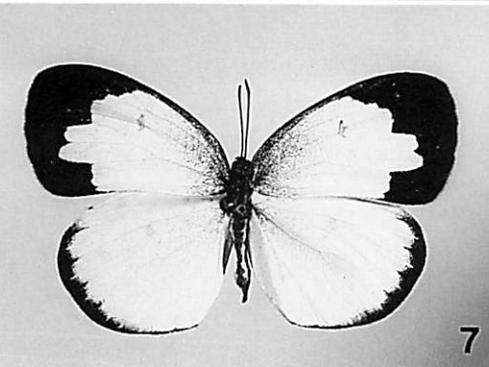
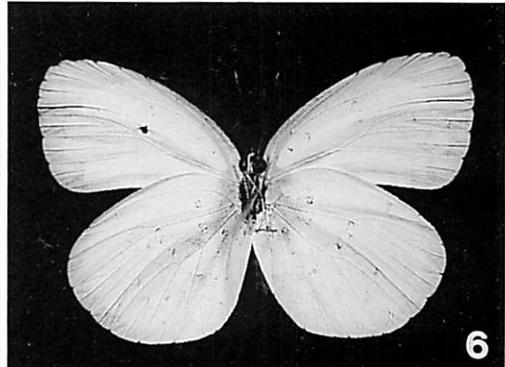
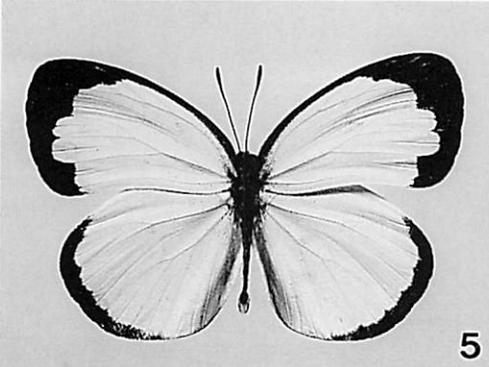
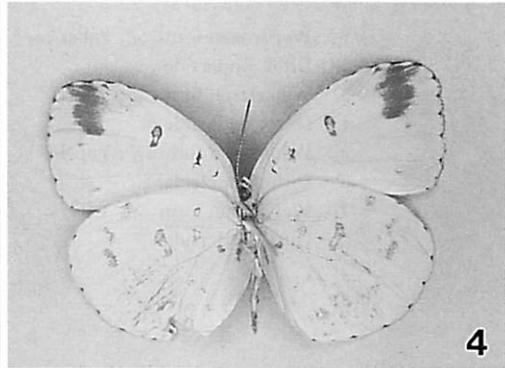
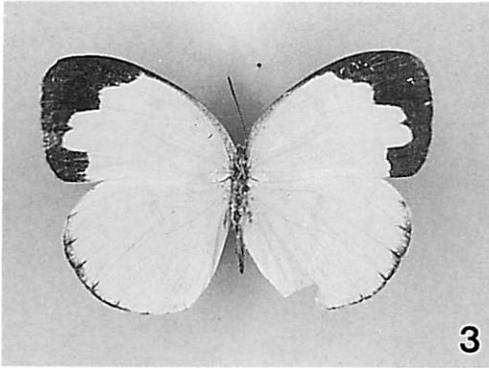
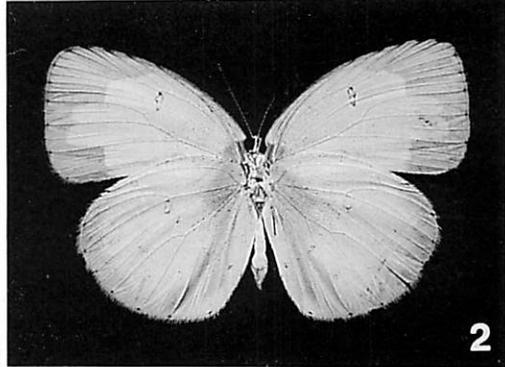
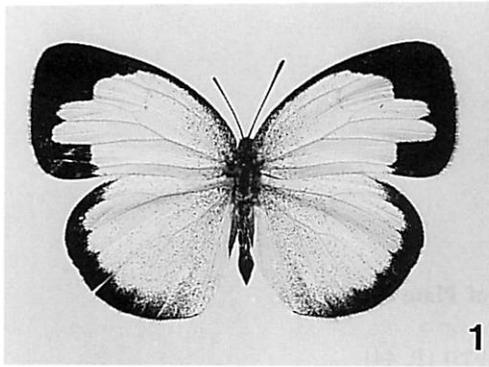
Explanation of Plate 28

Eurema hecabe maroensis (BUTLER, 1883) [P. 42]

1. Wet-season form. ♀. Timor.
2. Ditto, underside.
3. Dry-season form. ♀, lectotype [BMNH]. Maroe Is., Taninbar.
4. Ditto, underside.

Eurema hecabe kerawara (RIBBE, 1898) [P. 43]

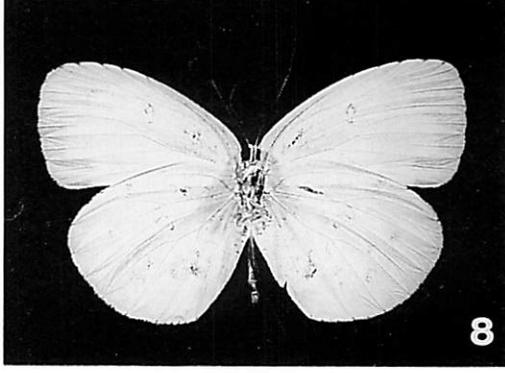
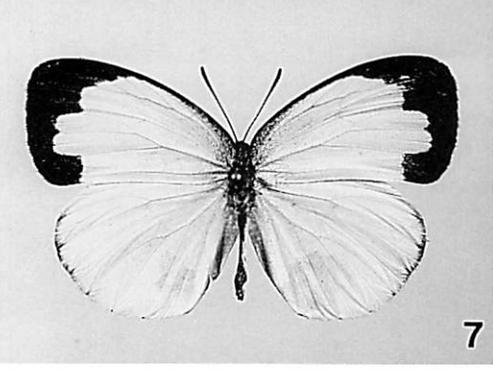
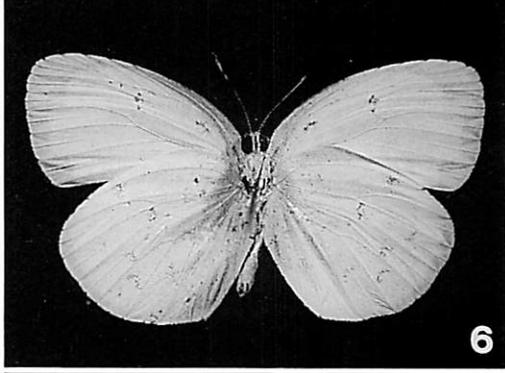
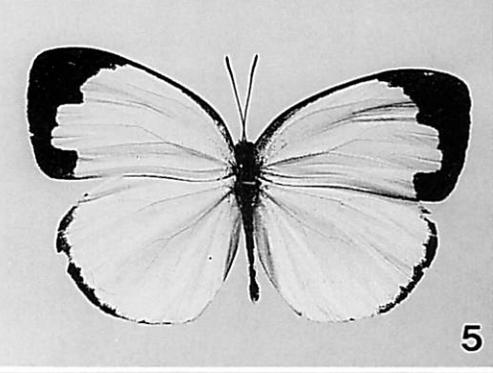
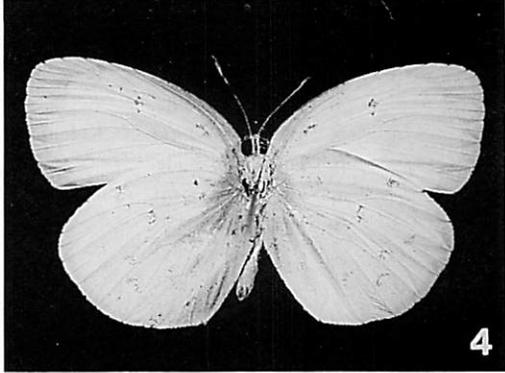
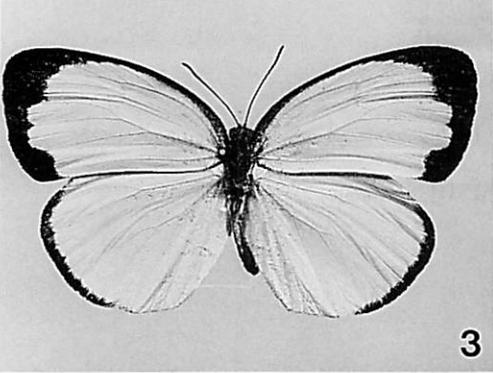
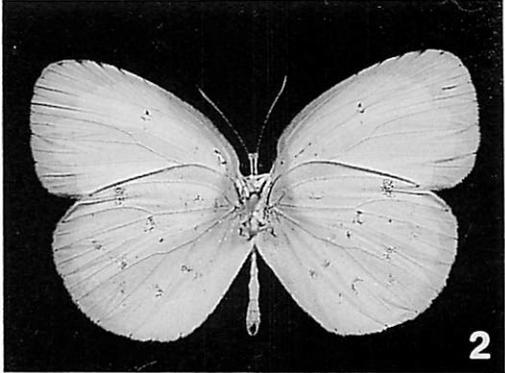
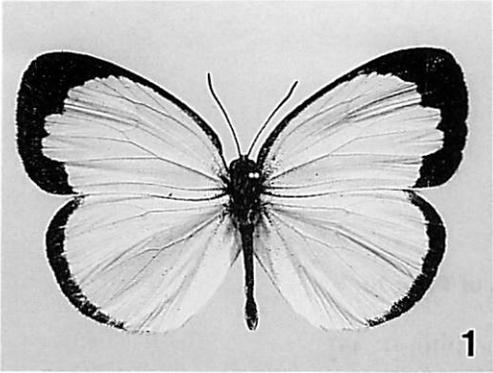
5. Wet-season form. ♂. New Britain.
6. Ditto, underside.
7. Wet-season form. ♀. New Britain.
8. Ditto, underside.



Explanation of Plate 29

Eurema hecabe marginata (KISHIDA, 1933) [P. 44]

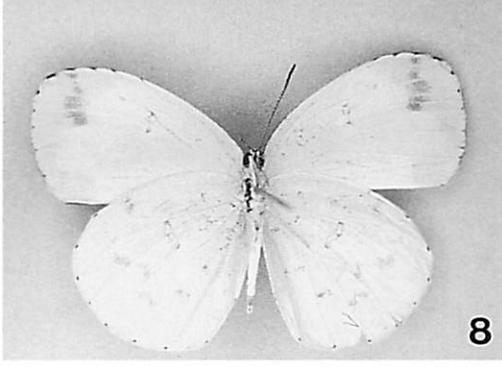
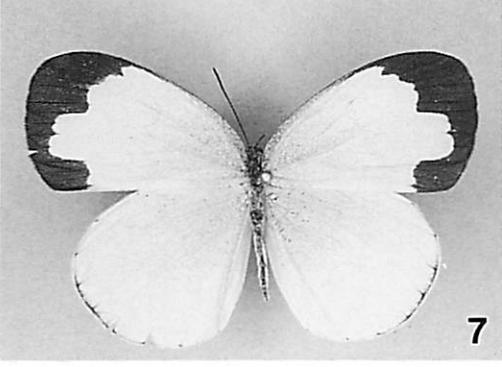
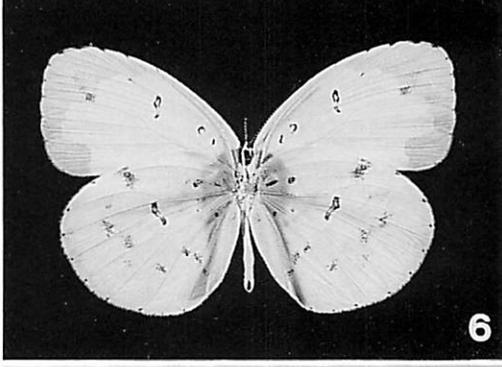
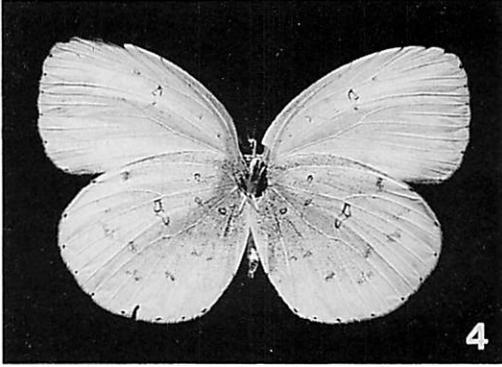
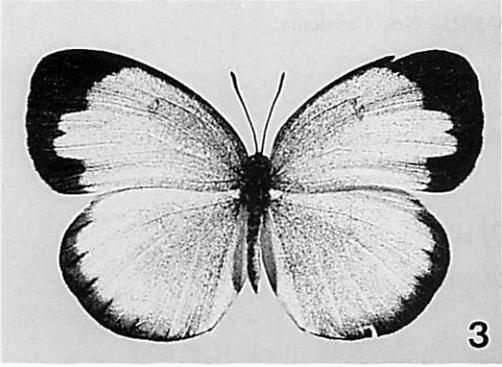
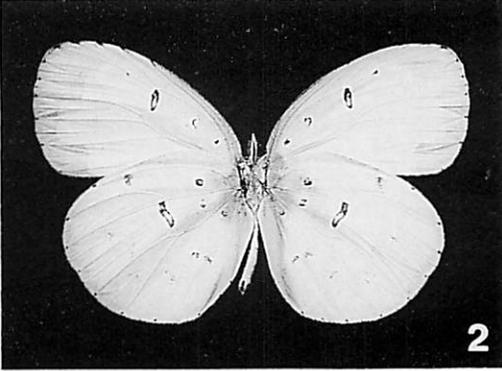
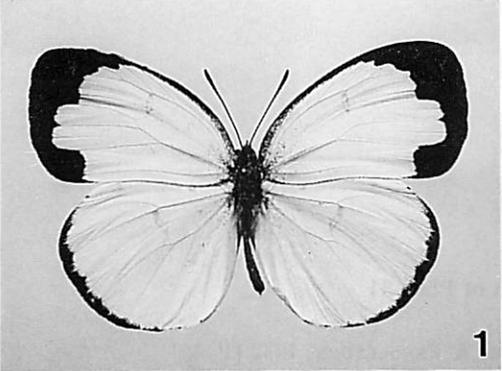
1. Wet-season form. ♂. Palau Is.
2. Ditto, underside.
3. Wet-season form. ♂. Yap Is.
4. Ditto, underside.
5. Wet-season form. ♂. Yap Is.
6. Ditto, underside.
7. Wet-season form. ♀. Yap Is.
8. Ditto, underside.



Explanation of Plate 30

Eurema hecabe nivaria (FRUHSTORFER, 1910) [P. 45]

1. Wet-season form. ♀. Ysabel Is., Solomons.
2. Ditto, underside.
3. Wet-season form. ♀. Bougeinville Is., Solomons.
4. Ditto, underside.
5. Wet-season form. ♂. Kolonbanga Is., Solomons.
6. Ditto, underside.
7. Dry-season form. ♀, lectotype [BMNH]. Solomons.
8. Ditto, underside.



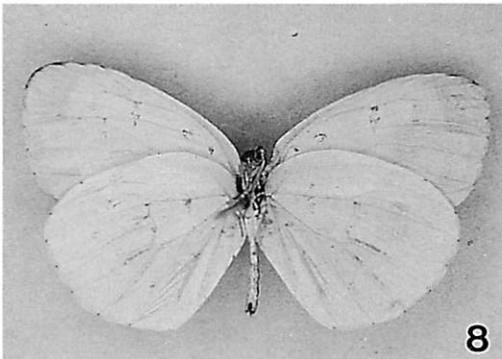
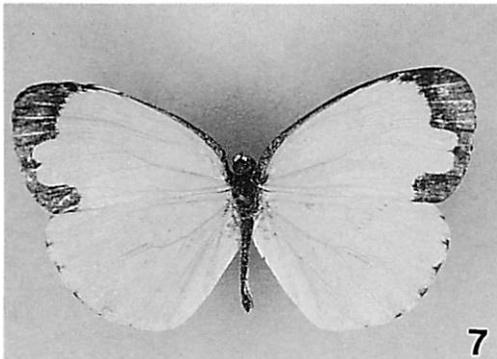
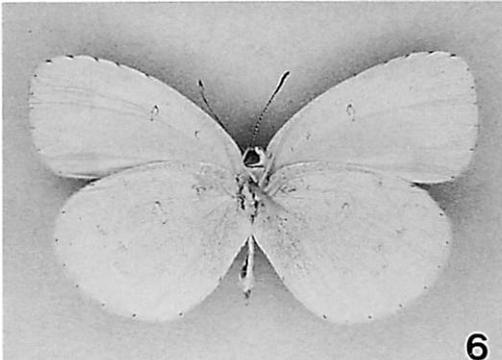
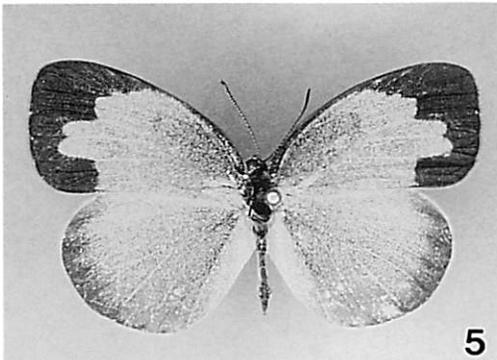
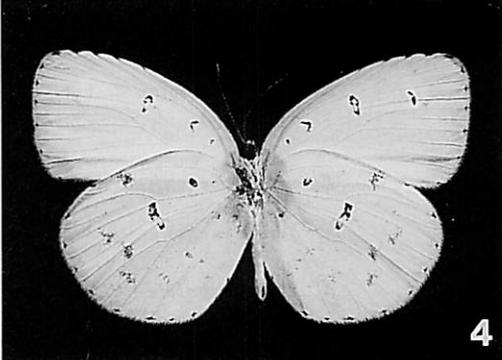
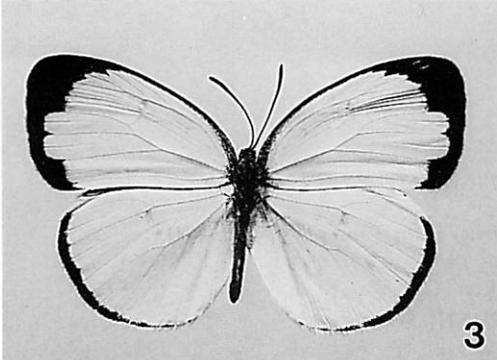
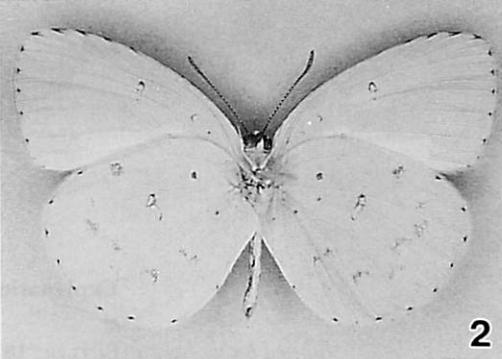
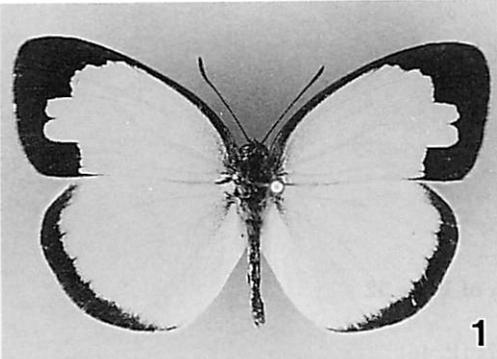
Explanation of Plate 31

Eurema hecabe novaecaledoniae CORBET & PENDLEBURY, 1932 [P. 45]

1. Wet-season form. ♂, holotype [BMNH]. New Caledonia.
2. Ditto, underside.
3. Wet-season form. ♂. New Caledonia.
4. Ditto, underside.
5. Wet-season form. ♀, paratype [BMNH]. New Caledonia.
6. Ditto, underside.

Eurema hecabe aprica (BUTLER, 1877) [P. 46]

7. Wet-season form. ♂, lectotype [BMNH]. Tonga.
8. Ditto, underside.



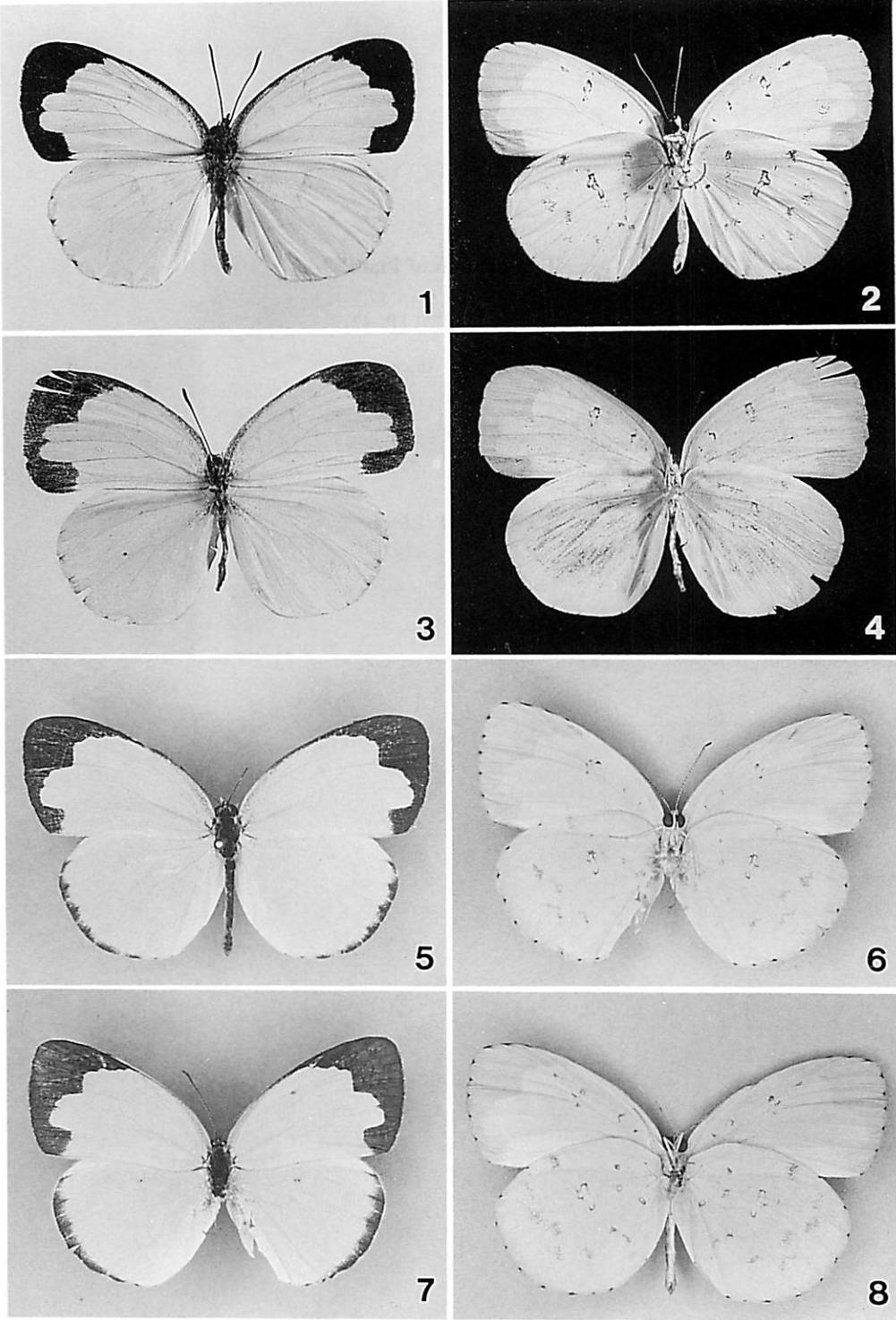
Explanation of Plate 32

Eurema hecabe aprica (BUTLER, 1877) [P. 46]

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

Eurema hecabe solifera (BUTLER, 1875) [P. 47]

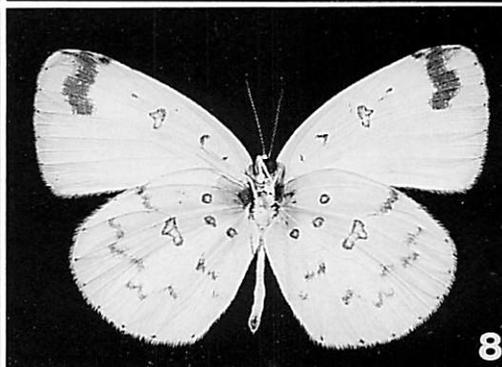
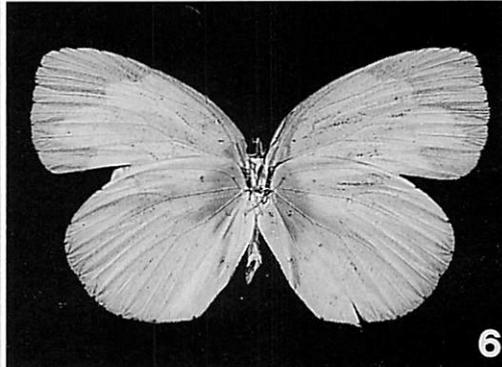
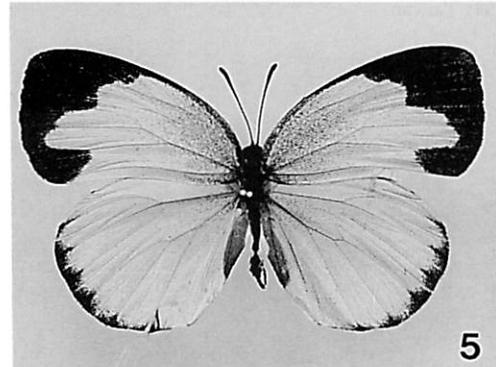
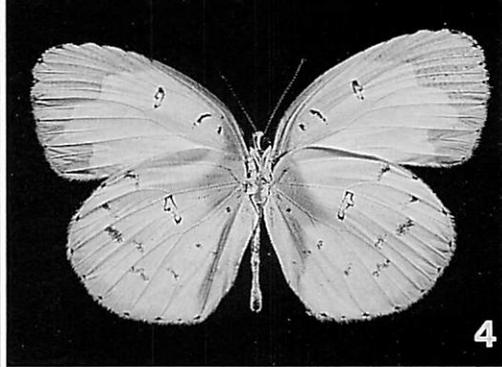
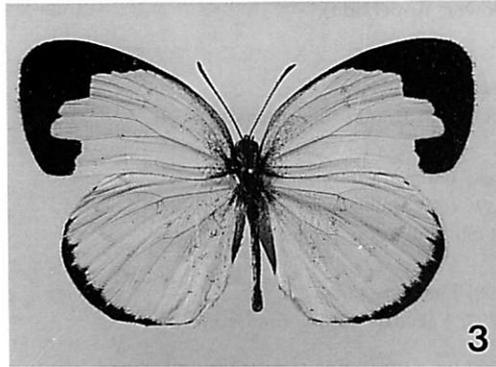
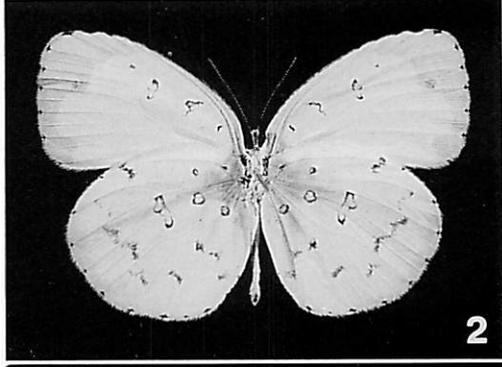
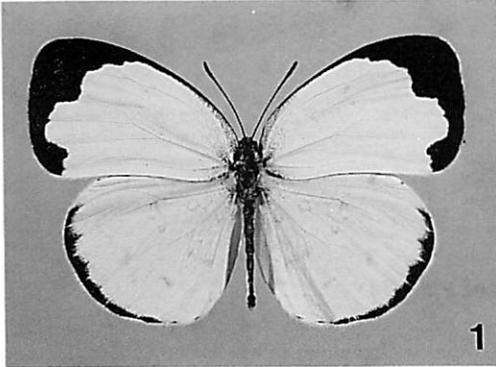
5. Wet-season form. ♂, holotype (*Terias butleri* TRIMEN, 1889) [BMNH]. S. Africa.
6. Ditto, underside.
7. Wet-season form. ♂, lectotype [BMNH]. W. Africa.
8. Ditto, underside.



Explanation of Plate 33

Eurema hecabe solifera (BUTLER, 1875) [P. 47]

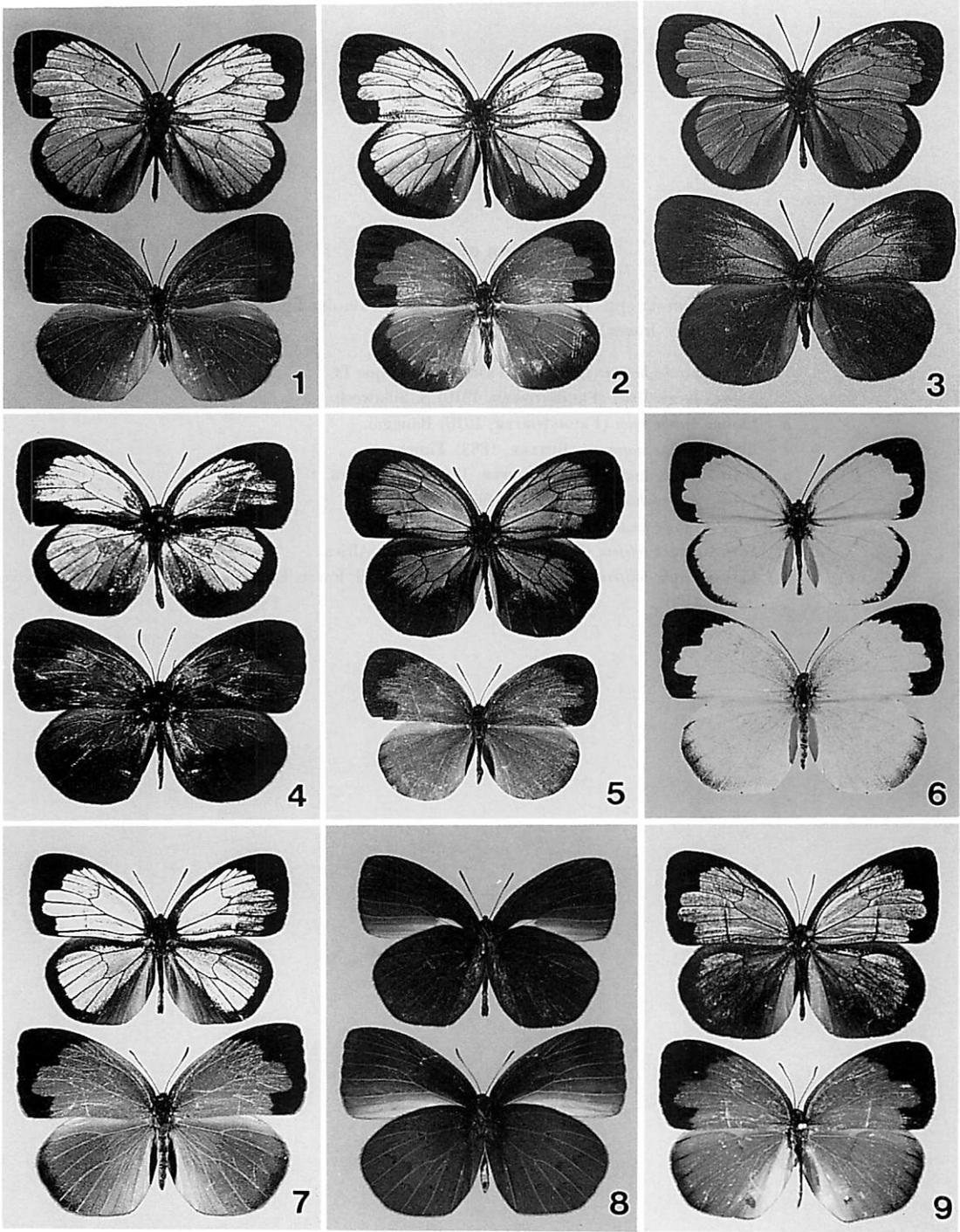
1. Wet-season form. ♂. Transvaal, Africa.
2. Ditto, underside.
3. Wet-season form. ♂. Congo.
4. Ditto, underside.
5. Wet-season form. ♀. Congo.
6. Ditto, underside.
7. Dry-season form. ♂. Eritrea, N.E. Africa.
8. Ditto, underside.



Explanation of Plate 34

Adults of *Eurema* spp. photographed under ultraviolet light. (except for Fig. 6) (Male: upper, female: lower, upperside)

1. *Eurema alitha esakii* SHIRÔZU, 1953 Taiwan.
2. *Eurema alitha jalendra* (FRUHSTORFER, 1910) Palawan.
3. *Eurema alitha gunjii* SHIRÔZU & YATA, 1981 Ceram (upper) and Ambon (lower).
4. *Eurema alitha alitha* (C. & R. FELDER, 1862) Marinduque Is.
5. *Eurema halmaherana* SHIRÔZU & YATA, 1981 Halmahera.
6. *Eurema hecabe hecabe* (LINNAEUS, 1758) Fukuoka, Japan. (under glow lumps by comparison with Fig. 7)
7. *Eurema hecabe hecabe* (LINNAEUS, 1758) Fukuoka, Japan.
8. *Eurema hecabe hecabe* (LINNAEUS, 1758) Fukuoka, Japan. (undersides by comparison with Fig. 7)
9. *Eurema hecabe hecabe* (LINNAEUS, 1758) Taiwan.



Explanation of Plate 35

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

1. *Eurema hecabe hecabe* (LINNAEUS, 1758) Marinduque Is.
2. *Eurema hecabe sinda* (FRUHSTORFER, 1910) S. Sulawesi.
3. *Eurema hecabe pylos* (FRUHSTORFER, 1910) Banggai.
4. *Eurema hecabe maroensis* (BUTLER, 1883) Timor.
5. *Eurema hecabe asanga* (FRUHSTORFER, 1910) Halmahera.
6. *Eurema hecabe diversa* (WALLACE, 1867) Buru.
7. *Eurema hecabe hecabe* (LINNAEUS, 1758) Australia.
8. *Eurema hecabe solifera* (BUTLER, 1875) Congo, W. Africa.
9. *Eurema hecabe solifera* (BUTLER, 1875) (upper, Natal; lower, Ethiopia)

