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A review of the East-Palaearctic taxa of the *Melitaea didyma* (Esper, 1779)-group
1. The *M. ala* Staudinger, 1881-*M. chitralensis* Moore, 1901-complex

(Lepidoptera, Nymphalidae)

by

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Summary: The *M. ala-M. chitralensis* taxa complex is distinguished on the base of the morphology of the male genitalia. The specific status of *M. enarea* Fruhstorfer and *M. kotshubeji* Sheljuzhko is confirmed. Data on morphology, variation and distribution of the species of the complex in question are summarized. Three new subspecies are described: *M. kotshubeji bundeli, M. kotshubeji kugarti* and *M. enarea gromenkoi*.

The distinctive features of the complex of taxa comprising various forms of the Central Asian species *M. ala* Staudinger, 1881 - *M. citralensis* Moore, 1901 consist in the structure of the male genitalia (the ringwall[1] is produced into a projection). Females of this complex have a more or less divided antevaginal plate (in *M. didyma* Esp. and similar species it is undivided).
M. ala was described by Staudinger (1881) from Ala-Tau Mts. as a variety of *M. didyma* and was regarded either under that status (Alpheraky, 1881; Rühl, 1895; Staudinger, 1901) or as a subspecies of *M. didyma* (Seitz, 1908; Bramson, 1910) up to the beginning of our century. The specific rank of *M. ala* was pointed out by Sushkin (1913) on the base of the male genital armature. The form *bicolor* Seitz (1908), described as an aberration of *M. didyma*, was attributed to *M. ala* also by this author. Sheljuzhko (1929) was the first who tried to make a review of the geographical variation of *M. ala*. Besides the typical form, he recognized ssp. *bicolor* (Inner Tian-Shan, Alexander Mts.), ssp. *kotshubeji* Sheljuzhko, 1929 (Peter the Great Mts.), included *latonia* Grumm-Grshimailo (a form of *didymoides* Eversmann which does not belong to the complex in question) and two aberrations: *latemarginata* Sheljuzhko, 1929 and *immodulata* Sheljuzhko, 1929. Later, the taxa *kotshubeji* and *bicolor* were also considered as subspecies of *M. ala* (Bryk, 1940). During the following years a number of forms similar to this species was described by different authors: *ninae* Sheljuzhko, 1935 (with several forms), *rosea* Higgins, 1938 (described as a separate species), *allah* Bryk, 1940, *sheljuzhkoi* Bryk, 1940, *determinata* Bryk, 1940, *strandi* Bryk, 1940, *ella-claudia* Bryk, 1940.
The status of the taxon *enarea* Fruhstorfer, 1916 (Garm), which was described and considered later (Bryk, 1940) as a subspecies of *M. didyma* or as a subspecies of *M. chitralensis* (Higgins, 1941), was unclear. At the same time Sheljuzhko (1929) described (also as a subspecies of *M. didyma*) two forms, similar to *enarea*: *shugnana* and *ishkashima* from the South-West Pamirs. He pointed out that the last one was very similar to *M. chitralensis* and females of *shugnana* were similar to females of *M. ala*.

1 The term ringwall (Ventralplatten—in Sushkin, 1913) was introduced by Zander (1903) for the designation of a chitinized plate (IX sternite) connecting valvae and saccus. Later, this term was accepted by the researchers of the genus *Melitaea* (Higgins, 1941).

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M. chitralensis was described as a separate species and is known only from Chitral. We examined a small series (3 ♂♂, 3 ♀♀) of this species in the Zoological Institute of the Russian Academy of Sciences (St. Petersburg). These specimens are very similar externally to the photo of the holotype of *M. chitralensis* which is at our disposal (the type series is in the Natural History Museum, London), and the structure of the genital armature of the male corresponds to the male genitalia figured by HIGGINS (1941).
In BRYK's review (1940) dedicated to the *M. didyma*-group only *M. didyma* and *M. ala* had specific rank and part of the taxa (*chitralensis, ishkashima, shugnana, ninae, rosea*) were not regarded at all. The revision of the genus *Melitaea* was published by HIGGINS (1941). He established the synonymy and distinguished three species within the complex under present consideration: 1. *M. ala* with ssp. *bicolor*, 2. *M. chitralensis* with ssp. *enarea* (= *shugnana*, = *ishkashima*) (however pointing out the differences in the structure of the male genitalia of the last one), modifications *kotshubeji* and *permuta* HIGGINS, 1941 (Hazret-Sultan Mts.), and 3. *M. pseudoala* SHELJUZHKO, 1928 (= *ninae*, = *rosea*)[2] on the base of external features and morphology of the male genitalia.

The forms described by BRYK (1940) were dealt with by HIGGINS in 1955. He believed *ella-claudia* to be a synonym of *pseudoala* and classified the form *sheljuzhkoi* as *M. ala bicolor*. He considered the males of *allah* and *strandi* not to be correctly placed with *M. ala* and not to belong to the *ala-chitralensis* complex (he believed that *allah* represents a specimen of *M. transcaucasica* TURATI and *strandi* was a form near *didymina* STAUDINGER) but females of these two forms belonged to *M. ala bicolor*. The name *determinata* was the only one which had possible value and represented a modification which seemed to be common in the Eastern Tian-Shan, with characters somewhat intermediate between the typical form and *bicolor*. Later, HIGGINS (1981) united the taxa in question with other species of the *didyma*-group in the genus *Didymaeformia* VERITY with *M. didyma* as the type species.
In spite of that, up to the present time the status of the taxa in question is unclear. This problem was reflected in the catalogues of KORSHUNOV (1972) and TUZOV (1993), where some of the taxa were absent or attributed to other species.
The analysis of a rather large material shows that we deal with five separate (but related) species with rather constant characteristic features, which form a number of subspecies in different parts of their distribution area.

2 The situation with *M. ninae*, described by SHELJUZHKO from the western Tian-Shan as subspecies of *M. ala* is tangled. The specific rank of it was pointed out by HIGGINS (1941) under the name *pseudoala* (which he considered to be the oldest valid name). The form *pseudoala* was described by SHELJUZHKO from Kamtshi (near Tashkent) as an aberration of a single female of *M. didyma turkestanica* SHELJUZHKO with heavily suffused forewings with grey and red-brown hindwings. The name *alboocellata* is based upon the same specimen, and refers to white little spots inside orange submarginal macules on the under surface of hind-wing. This female stands as the type of both names, but the name *pseudoala* comes first in the description. We examined the monotype of *pseudoala* + *alboocellata* (in the Zoological Museum of the Kiev University). Undoubtedly the form *pseudoala* is a melanic variety of *M. didyma*. The name *pseudoala* was established in literature for this species (HIGGINS, 1955; KORSHUNOV, 1972; HIGGINS, 1981; TUZOV, 1993) after HIGGINS' publication. The name *ninae* was correctly restored by LUKHTANOV (LUKHTANOV & LUKHTANOV, 1994) but without indication of reasons for regarding the name *pseudoala* as a synonym.

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The present study is based upon the collections of the following institutions: Zoological Museum of the Moscow State University, Zoological Institute of Russian Academy of Sciences (St. Petersburg), State Darwin Museum (Moscow), Zoological Museum of the Kiev University, Zoological Museum of Zoological Institute of Ukraine (Kiev), and collections of a number of amateur collectors.

The scheme of the wing pattern of *M. ala* is illustrated in fig. 1. In terminology of wing pattern, wing venation and genitalia we mainly follow HIGGINS (1941).

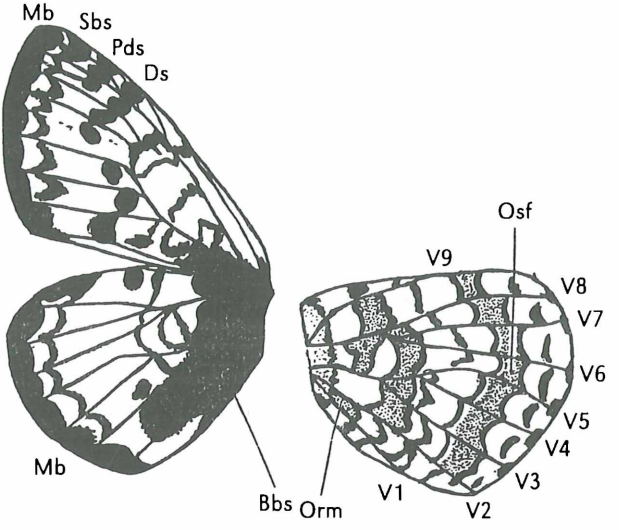

Fig. 1: scheme of the wing pattern: *M. ala ala* STGR.
Mb - marginal band
Sbs submarginal series
Pds - postdiscal series
Ds - discal series
Bbs - black basal suffusion
Osf - orange submarginal fascia
v - vein.

Abbreviations:

FW	- forewing
HW	- hindwing
UPS	- upperside
UNS	- underside
UPF	- upperside of forewing
UPH	- upperside of hindwing
UNH	- underside of hindwing
Mts.	- mountains
coll.	- collection
ZMMU	- Zoological Museum of Moscow State University
ZISP	- Zoological Institute of Russian Academy of Sciences (St. Petersburg)
ZMKU	- Zoological Museum of the Kiev University
BMNH	The Natural History Museum (London)

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Key for the species of the *M. ala*-complex based on external characters and morphology of the male genitalia:

1 Aedeagus enlarged in the central part. UNH black postdiscal lunules in the cellules between veins 3 and 5 outwardly concave. Ringwall produced distally into a large conical or oval projection.. 2
Aedeagus slender, slightly curved. UNH black postdiscal lunules in the cellules between veins 3 and 5 inwardly concave. Ringwall produced distally into a rounded projection. 4

2 Ringwall produced distally into a big oval projection *M. kotshubeji* SHELJUZHKO
Ringwall produced distally into a conical projection.. 3

3 Distal projection of ringwall with a central apical notch. Aedeagus with a sharpened projection on the ventral side. UPS ground-colour yellow-orange.
M. enarea FRUHSTORFER
Distal projection of ringwall without a central apical notch. Aedeagus without a sharpened projection on the ventral side. UPS ground-colour deep orange-red.
M. chitralensis MOORE

4 Ringwall produced distally into a small projection not extends to the tegumen. UPS ground-colour not pink. *M. ala* STAUDINGER
Ringwall produced distally into a large projection extends to the tegumen. UPS ground-colour pinkish. *M. ninae* SHELJUZHKO

Key for the species of *M. ala*-complex based on external characters and morphology of the female genitalia:

1 Antevaginal plate deeply divided into lobes (figs. 11, 14).. 2
Antevaginal plate not deeply divided into lobes (figs. 10, 12, 13). 3

2 Antrum projected into the base of the antivaginal plate, forming a depression. Postvaginal plate not wider than antevaginal plate, as a rule. UPH ground-colour deep orange-red. UPF greenish-grey suffusion well developed, as a rule
M. kotshubeji SHELJUZHKO
Antrum not projected into the base of the antevaginal plate. Postvaginal plate wider than antivaginal plate. UPH ground-colour orange-yellow. UPF grey suffusion poorly developed, as a rule.. *M. enarea* FRUHSTORFER

3 UNH black postdiscal lunules in the cellules between veins 3 and 5 inwardly concave
M. ala STAUDINGER
UNH black postdiscal lunules in the cellules between veins 3 and 5 outwardly concave. 4

4 Postvaginal plate oval and wider than antivaginal plate. UPF grey suffusion well developed. UPH ground-colour deep red, submarginal and discal series well developed.
M. chitralensis MOORE
Postvaginal plate trapezium-shaped. UPF grey suffusion not well developed. UPH ground-colour pinkish. UPH submarginal and discal series absent, as a rule.
M. ninae SHELJUZHKO

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1. *Melitaea ala* (STAUDINGER, 1881)

Male: 38–44 mm. UPS ground-colour orange or orange-red; black marginal border wide (2 mm), fused with internervural marginal black spots. UPF submarginal series often complete and formed by black sharp lunules, often connected with the black marginal border; the postdiscal series represented by one or two black spots near costa. UPF discal series regular, formed by black spots, sometimes fused near costa, on UPH it is often absent or represented by two spots: near costa and anal border. UPH submarginal series (if not reduced) is formed by black rounded lunules; wide black basal suffusion covers discal spot near anal angle. UNH postdiscal lunules forming the proximal edge of orange submarginal fascia in the cellules between veins 3 and 5 inwardly concave; there is a small orange macule in cellule between veins 2 and 1 near the base.
Female: 38–43 mm. UPF ground-colour pale-yellow; black pattern and greenish-grey suffusion well developed. UPH more or less look like in male but black basal suffusion is wider and reaches submarginal lunules near anal angle. UNH orange submarginal fascia is represented by separate rounded macules indicated by black scales. Pale area between submarginal fascia and proximal black lunules is well developed. Proximal black lunules in the cellules between veins 3 and 5 inwardly concave.

Male genitalia (fig. 2, A–C): Saccus more or less conical, with a depression in the apical part. Ringwall produced distally into a small rounded projection. Valva oval, slightly elongated, with a small spine on the dorsal surface in its distal part. Caudal process long with a row of small teeth on its ventral side. Large harpe without teeth on ventral surface. Aedeagus slender, slightly curved. Genitalia of males show no differences within the distribution area.
Female genitalia (fig. 10): Postvaginal plate oval and not wider than antevaginal plate, as a rule; it is sclerotized in the central part near the outer side. Antevaginal plate strongly chitinized with an opening slightly dividing it into lobes. Antrum quadrangular, ductus narrow, with a sclerotized fork-shaped area.

Distribution (map 1): East, West (Talassky Ala-Tau), North and Inner Tian-Shan, Dzhungarsky Ala-Tau Mts., Saur Mts. and South Altai (LUKHTANOV & LUKHTANOV, 1994). The record from Amdo (HIGGINS, 1941) is highly doubtful. We have no material from this locality.

Geographical variation and subspecies: The variation of *M. ala* is great. A number of forms was described from different localities by different authors (SEITZ, 1907; SHELJUZHKO, 1928; BRYK, 1940). However the majority of these forms most likely reflects climatic and individual variation, and they are not likely to pretend to the subspecific status.

1a. *Melitaea ala ala* (STAUDINGER, 1881)
(colour plate VI, figs. 1–4)

M. didyma var. *ala* STAUDINGER, 1881, Stettin. ent. Ztg. **42**: 288 (Lepsa, Ala-Tau).
M. ala STAUDINGER; SUSHKIN, 1913, Zeitschr. f. wiss. Insektenbiologie **9**: 171, f. 5–6 (genital.).
M. ala STAUDINGER; WAGNER, 1913, Ent. Mitteil. **2**: 91–93 (Burhan, Usek).

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M. ala ala STAUDINGER; SHELJUZHKO, 1929, Mitth. Münch. Ent. Ges. **19**: 368 (Dzhungarsky Ala-Tau, Tian-Shan oc.).
M. ala ab. *immodulata* SHELJUZHKO, 1929 (loc. cit.): 366 (Dzharkent).
M. ala ala STAUDINGER; BRYK, 1940, Folia Zoologica et Hydrobiologica **10** (2): 346.
M. ala allah BRYK, (loc. cit.): 346, Taf. 3, Fig. 23; Taf. 6, Fig. 57 ("Siberia").
M. ala STAUDINGER; HIGGINS, 1941, Trans. ent. Soc. Lond. **91** (7): 242-244, pl. 2 figs. 4, 10.
M. ala STAUDINGER; LUKHTANOV & LUKHTANOV, 1994, Herbipoliana, Buchreihe zur Lepidopterologie, Bd. **3**: 184-185, Taf. 36, Fig. 5, 6 (S. Altai).

Type locality: Lepsa, Ala-Tau (Dzhungarsky Ala-Tau, Lepsy river).

Male (colour plate VI, figs. 1, 2): 37-40 mm. UPS ground-colour deep orange-red, black pattern often well developed: submarginal series complete on both wings, as a rule, outlined by black scales and connected with the black marginal border. UPF discal series represented by black spots, often fused near the costa. UPH discal series sometimes reduced. The UNH black postdiscal lunules forming the proximal edge of the orange submarginal fascia are connected with each other. UNH veins indicated by black scales.
Female (colour plate VI, figs. 3, 4): 37-42 mm. UPF black pattern and greenish-grey suffusion well developed. UPH discal and submarginal series often complete. The UNH black postdiscal lunules forming the proximal edge of the orange submarginal fascia connected. UNH veins often indicated by black scales.

Distribution: South Altai (LUKHTANOV & LUKHTANOV, 1994), Saur Mts. (Gemenay), Dzhungarsky Ala-Tau (Tekeli, Tentek river, Lepsy river, Kok-su river), Burchansarytau Mts. (Enbekshi, Burhan), Tyshkantau Mts. (Tyshkan, Usek river), Koiandy-Tau (Arasan), Horgos river, Altyn-Emel Mts.

Taxonomic notes: The male specimens from the southern part of the Dzhungarsky Ala-Tau (Tyshkantau, Burchan-Sarytau ect.) have a partly reduced black pattern. Moreover, the specimens with characters of ssp. *bicolor* are found among specimens with typical characters. However, the majority of the examined material tends to the nominate subspecies.
The status of specimens recorded by LUKHTANOV (LUKHTANOV & LUKHTANOV, 1994) from South Altai (Irtysh Valley, the mouth of river Buchtarma, southern parts of Narym and Kurtshum Mts. and Bukombai Mts.) is unclear. These specimens may be classified as ssp. *bicolor*, judging from the figures (Taf. 35, Fig. 5-6), but it was pointed out in the description, that the UNH veins are indicated by black scales. We did not examine material from this locality but there is a small series of *M. ala* (6 ♂♂ in the collection of S. CHURKIN) from Saur Mts at our disposal. These specimens are very similar externally to the typical form.
The male of the form *allah* described by BRYK with the label "Siberia" is not likely to be classified as *M. transcaucasica* (as HIGGINS, 1955, suggested). We believe that this form belongs to *M. ala* and has characters of the nominate subspecies. The data of the label are probably wrong.
Ab. *immodulata*, described by SHELJUZHKO (1929) from three specimens, is a female variety with yellowish-orange ground-colour of both wings.

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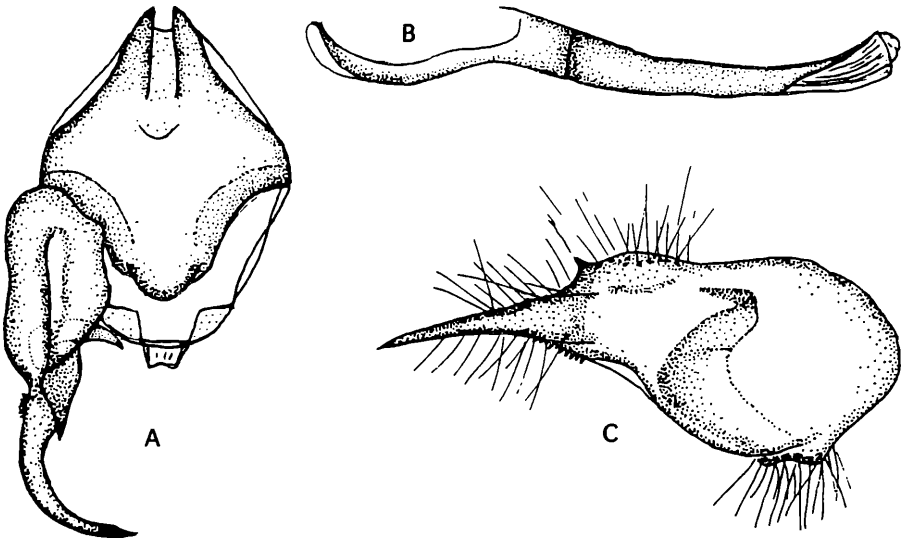

Fig. 2: male genitalia of *M. ala ala* STGR. Dzhungarsky Ala-Tau, Kok-su river. A - General view from the ventral side (the shape of ringwall); B - Aedeagus; C - Valva, lateral view from the outside.

Biology: Unknown. Flies in one generation in June-July in the mountains up to 1000-2000 m. In Altai found only in dry stony desert foothills up to 420-650 m (LUKHTANOV & LUKHTANOV, 1994).

Material examined: 106 ♂♂ and 38 ♀♀ including the type of f. *immodulata* SHELJUZHKO, 1929 (Dzharkentskij ujesd, Tyshkan - ZMKU).

1b. *Melitaea ala bicolor* (SEITZ, 1907)
(colour plate VI, figs. 5-7)

M. didyma ab. *bicolor* SEITZ, 1907, Grossschm. Erde **1**: 219, t. 66, f. 7-8 (Karagatai Mts.).
M. ala bicolor SEITZ; SUSHKIN, 1913, Zeitschr. f. wiss. Insektenbiologie **9**: 172.
M. ala bicolor SEITZ; SHELJUZHKO, 1929, Mitt. Münch. Ent. Ges. **19**: 368 (Karagai-tau Mts, Naryn, Alexandri-mts.).
M. ala ab. *latemarginata* SHELJUZHKO, 1929 (loc. cit.): 366-367, Taf. 28, Fig. 7-8 (Naryn).
M. ala bicolor SEITZ; BRYK, 1940, Folia Zoologica et Hydrobiologica **10** (2): 347-348 (Karaigatan Gbge. südl. Narynsk. Issykul mer.).
M. ala bicolor SEITZ; HIGGINS, 1941, Trans. ent. Soc. Lond. **91** (7): 244, pl. 6, fig. 6, 12.

Type locality: Karagatai Mts (? Naryn-Too Mts.).

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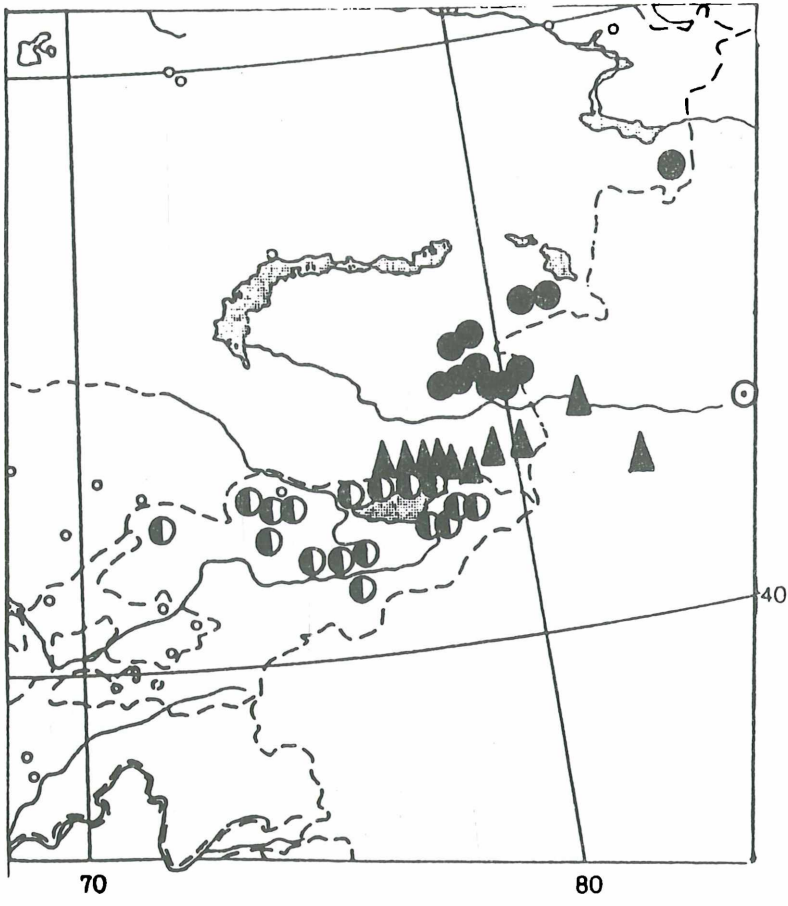

Map 1 (distribution of *M. ala* Stgr.): ● - *M. ala ala* Stgr.; ◐ - *M. ala bicolor* Seitz; ▲ *M. ala* with intermediate characters; ○ - *M. ala* Stgr. of unclear subspecific status.

The name *bicolor* was introduced by Seitz (1907) for a female variety which had a pale UPF and red UPH. This name was used traditionally by different authors (Sushkin, 1913; Shelyuzhko, 1929; Bryk, 1940; Higgins, 1941) as subspecific for *M. ala* from southern parts of the area. We could not identify the type locality (Karagatai Mts.) of this form on any map. The authors mentioned believed that the Karagaitau Mts. (old name of Naryn-Too Mts.) is the type locality of this form. Shelyuzhko (1928) found that females from Naryn were similar to the form *bicolor*, figured in Seitz. The males of *M. ala* from Inner Tian-Shan have good external differences from the typical form. We consider it reasonable to use the name *bicolor* as subspecific.

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Male (colour plate VI, figs. 5, 6): 37–42 mm. UPS ground-colour orange or orange-red. Black pattern partly reduced on both wings: UPF submarginal series often not complete, formed by black crescents not connected with the black marginal border, UPH submarginal series absent. UPF discal series formed by small black spots, UPH discal series usually reduced or represented by two spots (near the costa and near the anal angle). UPH black basal suffusion less developed than in the typical form. UNH black postdiscal lunules forming the proximal edge of the orange submarginal fascia are disconnected with each other. UNH veins not indicated by black scales.
Female (colour plate VI, fig. 7): 40–42 mm. UPF black pattern and greenish-grey suffusion less developed than in the nominate subspecies. UPH discal and submarginal series often absent. UNH veins not indicated by black scales.

Distribution: Kungey Ala-Tau Mts. (Chon-Urukty, Kok-Bulak, Chon-Aksu, Kegen, Cholpon-Ata, Kintyk, Grigorievka, Kelsai lake), Kirgizsky Mts (Chai-Sandyk, Ala-Archa, Chon-Kurchak, Usun-Gyr, Kara-Balta river, near Orto-Tokoi lake), Suusamyr valley, Suusamyr Mts. (Kokomeren river), Talassky Ala-Tau Mts. (Kara-Bura river), Terskey Ala-Tau Mts. (Pokrovka, Karakol, Chon-Kisylsu, Kere-Getash, Dzhety-Ogus, Ak-Suu), Baidullu Mts. (near Dolon pass), Moldo-Too Mts. (Korogo, Eki-Naryn, Kurtka river), Sonkel-Too Mts. (near Son-Kel pass), Naryn-Too Mts. (Naryn).

Taxonomic notes: In our opinion the specimens from Zailiisky Ala-Tau Mts. (Talgar, Turgen river, Ak-tuz, Almaatinka river, Medeo, Kok-Dzhailau, Issik river) and Ketmen Mts. (Bolshoi ketmen, Timerlik) have intermediate status between the typical form and ssp. *bicolor*: UPS black pattern often similar to the typical form, but UNH veins not or less indicated by black scales. It is necessary to point out that the specimens with intermediate characters occur in the Kirgizsky Mts. (with the exception of the extremely eastern part of it).
The specimens distributed in the western part of Chinese Tian-Shan (Kouldja—type locality of *sheljuzhkoi* Bryk— and Juldus) also have intermediate status between the typical form and ssp. *bicolor* (there are 8 ♂♂ from Juldus and 3 ♂♂ from Kouldja at our disposal from ZMMU and ZISP): UPH submarginal and discal series often represented, UNH veins slightly indicated by black scales.
The forms described by Bryk (1941) from the extremely eastern part of Chinese Tian-Shan are of great interest. The form *strandi* (Nan-Shan(?), Urumtshi) may be classified as ssp. *bicolor* judging from the photo. We have no material of *M. ala* from this locality. The form *determinata* (Fu-Shu-Shi) is characterized by the large size of both sexes, UPS black pattern of the male is well developed, and UPH discal area of the female has no markings. We examined a little series (5 ♂♂ and 12 ♀♀, in ZISP) of *M. ala*, taken by Groum-Grzhimailo in Bogdo-Ola Mts. Their subspecific status is unclear, because the material is not sufficient. The specimens examined look like the specimens from Kouldja and Juldus. We believe their characters to be intermediate between the typical form and ssp. *bicolor*. However, it is possible that the form *determinata* has subspecific status. Identification should be confirmed by examination of supplementary material from this locality.

Biology: Unknown. Flies in one generation in June–July in the mountains up to 1000–2500 m in dry meadows and steppe-like slopes (Lukhtanov & Lukhtanov, 1994).

Material examined: 310 ♂♂ and 137 ♀♀ including the type of f. *latemarginata* Sheljuzhko, 1929 (Naryn) (ZMKU).

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2. *Melitaea kotshubeji* (Sheljuzhko, 1929)

Male: 38–47 mm. UPS ground-colour deep orange-red; black marginal border wide (2 mm), fused with internervural marginal black spots on both wings. UPF submarginal series often complete and usually formed by black sharp lunules, often connected with the black marginal border; discal series regular, formed by usually rather small black spots. UPH discal series often complete; submarginal series (if not reduced) formed by black sharp lunules connected with the black marginal border; wide black basal suffusion covers discal spot near anal angle. UNH submarginal orange fascia rather wide; postdiscal lunules forming the proximal edge of this fascia in cellules between veins 3 and 5 outwardly concave; small orange macules in cellule between veins 2 and 1 near the base absent.
Female: 40–50 mm. UPF ground-colour variable: from pale-pink to pale-yellow; black pattern and greenish-grey suffusion well developed. UPH ground-colour similar to male; submarginal series (if not reduced) formed by black rounded or sharp-pointed lunules; discal series sometimes absent; wide black basal suffusion reaches submarginal lunules near anal angle. UNH orange submarginal fascia represented by separate rounded macules; the pale area between this fascia and proximal black lunules is often developed. UNH proximal black lunules in the cellules between veins 3 and 5 outwardly concave.

Male genitalia (figs. 3–5, A–C): Saccus more or less conical with a depression in the apical part. Ringwall produced distally into a large oval projection with a little notch in the distal part. Valva wide and oval, caudal process long. Large harpe without teeth. Aedeagus straight, enlarged in the central part, a small spine may be present in its distal part near apex.
Female genitalia (fig. 11): Postvaginal plate oval and sclerotized in the central part near the outer side. Antevaginal plate strongly chitinized and deeply divided into wide rounded lobes. The conical antrum projects into the base of the antevaginal plate. Ductus narrow, with a sclerotized fork-shaped area.

Distribution: Peter the Great Mts., northern part of Hazreti-Sho Mts., western parts of Zaalaisky Mts., southern slopes of Alaisky Mts., south-western slopes of Fergansky Mts., south-eastern slopes of Chatkalsky Mts.

Geographical variation and subspecies: only the nominate subspecies (Peter the Great Mts., Tuptshek) was known until now. Two new subspecies are described below.

2a. *Melitaea kotshubeji kotshubeji* (Sheljuzhko, 1929)
(colour plate VI, figs. 8–11)

M. didyma var. *ala* Groum-Grschimajlo, 1890, in Romanoff, Mem. Lep. **4**: 430 (Touptshek).
M. ala kotshubeji Sheljuzhko, 1929, Mitt. Münch. Ent. Ges. **19**: 364, T. 27, F. 1–4 (Touptshek).
M. ala kotshubeji Sheljuzhko; Bryk, 1940, Folia Zoologica et Hydrobiologica **10** (2): 348.
M. chitralensis mod. *kotshubeji* Sheljuzhko; Higgins, 1941, *Trans. ent. Soc. Lond.* **106**: 248, pl. 6, figs. 4, 10.
M. ala bicolor Seitz; Shchetkin, 1981, Ent. Obozr. Tajikistana: 163–164 (Surkhob valley).

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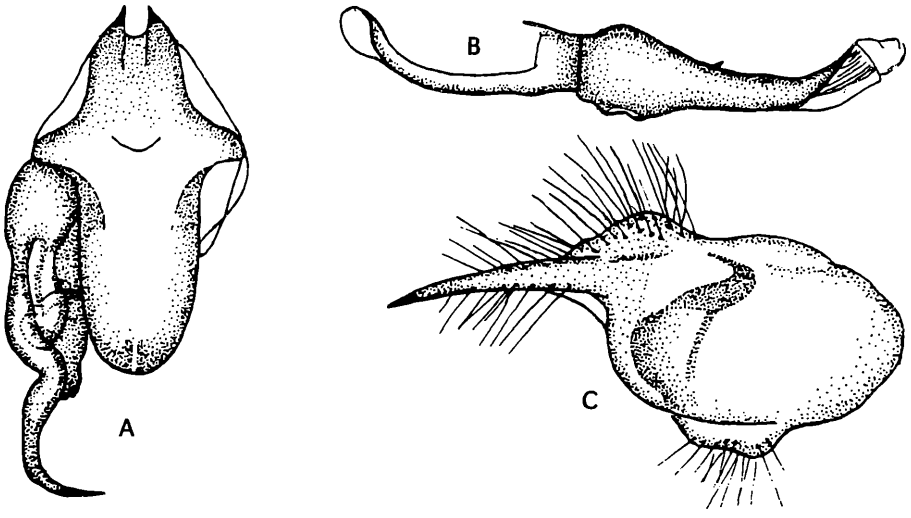

Fig. 3: male genitalia of *M. kotshubeji kotshubeji* Shel. – Peter the Great Mts., Ganishou. A – General view from the ventral side (the shape of ringwall); B – Aedeagus; C – Valva, lateral view from the outside.

M. ala kotshubeji Sheljuzhko; Tuzov, 1993, The synonymic list of butterflies from the ex-USSR: 48 (Darvaz, Alai).

Type locality: Touptshak (Peter the Great Mts., Tuptshek).

Male (colour plate VI, figs. 8, 9): 40–45 mm. UPS ground-colour deep orange-red. Submarginal series complete on both wings and formed by black sharp lunules, connected with the black marginal border. UPF postdiscal series represented by one or two spots near costa. UPF and UPH discal series regular and formed by usually rather small black spots. UPH black basal suffusion covers discal spot near anal angle. UNH black postdiscal lunules forming proximal edge of orange submarginal fascia are connected with each other. UNH veins more or less indicated by black scales.
Female (colour plate VI, figs. 10, 11): 42–47 mm. UPF ground-colour pale-pink, black pattern and greenish-grey suffusion well developed. UPH submarginal series regular and complete, formed by black rounded lunules connected with marginal border; discal series not reduced, as a rule; black basal suffusion wide and reaching submarginal lunules near anal angle. On the UNH pale area developed between orange submarginal fascia and postdiscal black lunules forming proximal edge of this fascia. UNH veins more or less indicated by black scales.

Male genitalia (fig. 3, A–C): Distal projection of ringwall wide and massive. Valva often without a small spine on the dorsal surface in its distal part. A small spine always present near apex on dorsal surface of aedeagus.

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Distribution (map 2): Peter the Great Mts. (Ganishou, Kulika river, Damou, Novabad, Songvor, Tuptshek, Dari-Nushor, Dzhilandy), Hazreti-Sho Mts. (Sary-ob river), Zaalaisky Mts. (Maidun-Tau).

Taxonomic notes: At our disposal there are three specimens of *M. kotshubeji* from the extremely western part of Alaisky Mts. (Maidun-Tau) which have more or less intermediate characters between the typical form and *bundeli* subspec. nov.): UPS submarginal lunules not complete, but UPH discal series regular and complete.

Biology: Unknown. Flies in one generation in June-July in the mountains up to 2500-3000 m. Food plant: *Ligularia thompsonii* Clarcke (Shchetkin, 1981).

Material examined: 68 ♂♂ and 24 ♀♀, including the type of *M. ala ssp. kotshubeji* Sheljuzhko, 1929 (ZMKU).

2b. *Melitaea kotshubeji* **bundeli subspec. nov.**
(colour plate VI, figs. 12, 13)

Material: Holotype ♂, Alaisky Mts., near Daraut-Kurgan, 3000, 6.-14.VII.1993, leg. A. Sotchivko. Paratypes: 12 ♂♂, 3 ♀♀ with the same labels; 2 ♂♂, 4 ♀♀, Zaalaisky Mts., Svis river, 3100, 30.VII.1953, leg. A. Bundel (ZMMU); 4 ♂♂, 2 ♀♀ with the same labels (ZISP); 1 ♀, Zaalaisky Mts, Kulduk pass, 3500, 20.VII.1953, leg. A. Bundel (ZMMU); 3 ♂♂, Mts. Alaiensis Cl. mer. Fl. Kitschi-karamuk, 2600, 6.VIII.1965, leg. A. Bundel (ZISP); 1 ♂, 2 ♀♀, Mts. Alaiensis Cl. merid. Fl. Duvana, 3500, 28.VII.1965, leg A. Bundel (ZISP). Holotype in ZMMU.

Description
Male (colour plate VI, figs. 12, 13): 38-40 mm. UPS ground-colour deep orange-red, sometimes bright orange-red. UPS black pattern partly reduced. Black marginal border often narrow and fused with internervural marginal black spots. UPF submarginal series often formed by black sharp crescents not connected with the black marginal border, UPH submarginal series absent. UPF postdiscal series represented by one or two black spots near costa, discal series complete, formed by rather small black spots not connected near the costa. UPH discal series often absent; black basal suffusion covers discal spot near the anal angle. UNH pattern looks like that of the typical form but veins are less indicated by black scales. Specimens from the eastern localities (Daraut-Kurgan) have UNH postdiscal lunules disconnected.
Female: 42-45 mm. UPF ground-colour, black pattern and greenish-grey suffusion similar to the nominate subspecies. UPH ground-colour variable: from deep orange-red to bright orange-red; submarginal and discal series often absent, black basal suffusion developed as in the typical form. UNH pattern similar to the typical form. UNH veins more or less indicated by black scales.

Male genitalia (fig. 4, A-C): Distal projection of ringwall shorter than in the nominate subspecies. Valva without a spine on the dorsal surface in its distal part, as a rule. A small spine near apex on the dorsal surface of aedeagus often absent.

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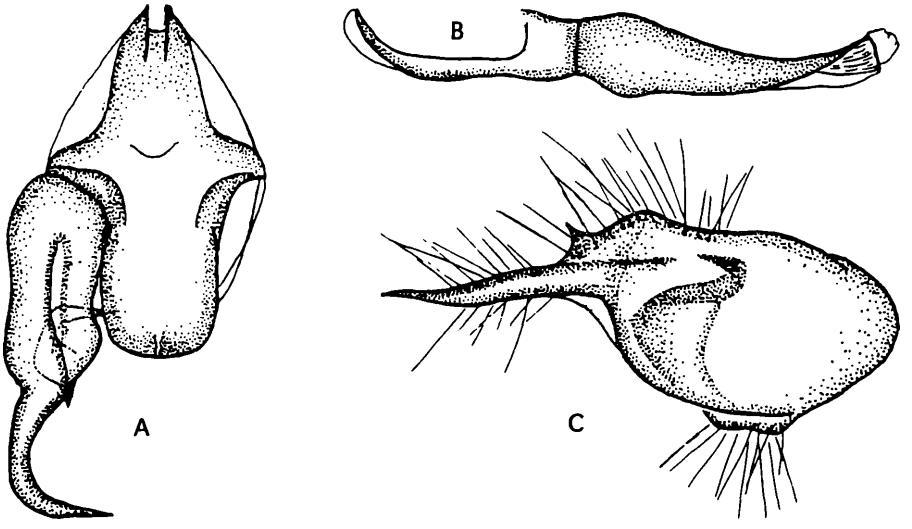

Fig. 4: male genitalia of *M. kotshubeji bundeli* subspec. nov. - Alaisky Mts., Daraut-Kurgan. A General view from the ventral side (the shape of ringwall); B - Aedeagus; C - Valva, lateral view from the outside.

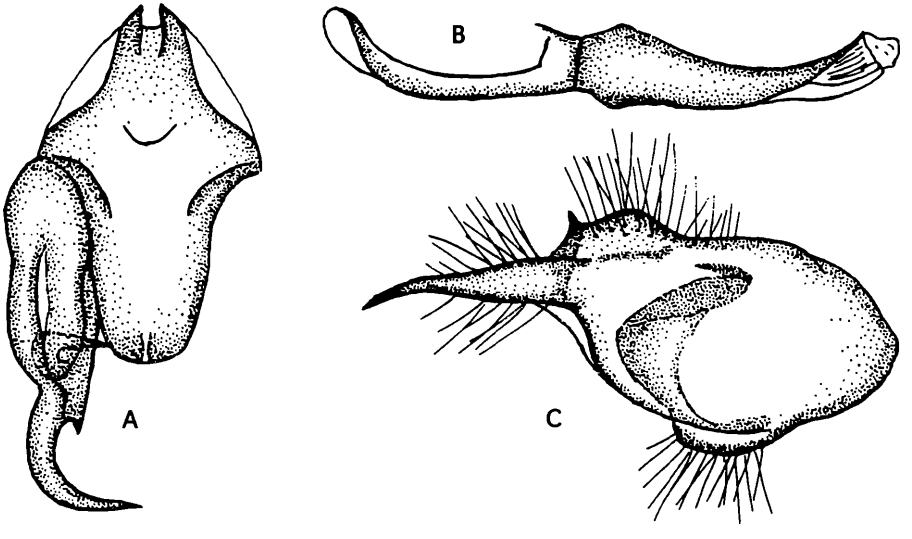

Fig. 5: male genitalia of *M. kotshubeji kugarti* subspec. nov. - Fergansky Mts., r. Kugart. A - General view from the ventral side (the shape of ringwall); B - Aedeagus; C - Valva, lateral view from the outside.

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Distribution (map 2): western part of Zaalaisky and southern slopes of Alaisky Mts.

Taxonomic notes: Distinguished from other subspecies of *M. kotshubeji* by UPS partly reduced black pattern (looking like *M. ala bicolor*) and by differences in the male genitalia.

Biology: Unknown. Flies in one generation in June-July in the mountains up to 2500-3000 m.

2c. *Melitaea kotshubeji* ***kugarti*** **subspec. nov.**
(colour plate VI, figs. 14-17)

Material: Holotype ♂, Fergansky Mts., Kugart river, 2000, 15.VI.1995, leg. S. Churkin. Paratypes: 27 ♂♂, 7 ♀♀ with the same labels; 2 ♂♂, 4 ♀♀, Alai Mts., Tar river, Kysyldjar, 2300, 9.VII.1992, leg. G. Samodurov; 1 ♀, Fergansky Mts., Iassy river, 1700-2000, 6.VI.1954, leg. Zhelohovtsev (ZMMU); 2 ♂♂, Fergana Sept. Namangan Fl. Padscha-ata Toste 31.V.1908, leg. Grigoriev (ZISP); 2 ♂♂, 1 ♀, Fergana, near Arslanbob, 1900, 15.-19.VII.48, leg. A. Bundel (ZISP); 40 ♂♂, 12 ♀♀, Mts. Tschatkalensis merid. Lacus Sary-Tschilek, 2100, 16.VII.1954, leg. A. Bundel (ZISP). Holotype is in ZMMU.

Description
Male (colour plate VI, figs. 14, 15): 38-47 mm. Size, shape of FW and UPF black pattern variable. UPS ground-colour deep orange-red. UPS black pattern well developed, as a rule. Black marginal border of both wings wide and fused with internervural marginal black spots. UPS submarginal series complete and formed by black sharp lunules outlined by black scales and often fused with the black marginal border. UPF postdiscal series complete and represented by black spots enlarged near costa. Discal series complete on both wings, as a rule; UPH discal spots often fused with each other near costa. UPH black basal suffusion wide and covering discal spot near the anal angle. UNH black postdiscal lunules forming the proximal edge of the orange submarginal fascia are disconnected with each other; veins slightly indicated by black scales.
Female (colour plate VI, figs. 16, 17): 40-48 mm. UPF ground-colour pale-yellow or yellow, black pattern well developed. UPF greenish-grey suffusion in female specimens from more northern localities (Arslanbob, Sary-Chilek) often reduced. UPH ground-colour yellow-orange; submarginal series regular and complete, formed by black sharp-pointed lunules fused with marginal border; discal series complete, as a rule; black basal suffusion wide and reaching submarginal lunules near the anal angle. UNH orange submarginal fascia represented by separate rounded macules, indicated by black scales; pale area between orange submarginal fascia and black postdiscal lunules (forming the proximal edge of this fascia) developed.

Male genitalia (fig. 5, A-C): Distal projection of ringwall wide and large. Valva with a small spine on the dorsal surface in its distal part. No spine near apex on the distal surface of aedeagus.

Distribution (map 2): northern slopes of eastern part of Alaisky Mts, Fergansky and Chatkalsky Mts.

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Taxonomic notes: Distinguished from other subspecies of *M. kotshubeji* by well developed UPS black pattern and by differences in the male genitalia. The speciemens from Sary-Chilek are small (37–40 mm), but the general wing pattern and the structure of the male and female genitalia evidence for their attribution to ssp. *kugarti.*

Biology: Unknown. Flies in one generation in June–July in the mountains up to 1700–2000 m.

3. *Melitaea ninae* (Sheljuzhko, 1935)
(colour plate VII, figs. 18–21)

M. ala ninae Sheljuzhko, 1935, Mitt. Münch. Ent. Ges. **25**: 28, T. 3, Fig. 1–4 (Tian-Shan, Tshimgan).
M. ala ninae f. *magnifica* Sheljuzhko, 1935 (loc. cit.) T. 3, Fig. 5.
M. ala ninae ab. *oblongomaculata* Sheljuzhko, 1935 (loc. cit.) T. 3, Fig. 6.
M. ala ninae ab. *elongatoconfluens* Sheljuzhko, 1935 (loc. cit).
M. rosea Higgins, 1938, Entomologist **71**: 34 (Aulie-Ata).
M. ala ella-claudia Bryk, 1940, Folia Zoologica et Hydrobiologica **10** (2): 351, Taf. 5, Fig. 49, 50; Taf.6, Fig. 54 (Aulie-Ata, Talas Alatau).
M. pseudoala Sheljuzhko; Higgins, 1941, Trans. ent. Soc. Lond. **91** (7): 245, pl. 4, fig. 12; pl. 16, fig. 4.
M. pseudoala Sheljuzhko; Higgins, 1955, Trans. ent. Soc. Lond. **106**: 116 (Pskem).
M. pseudoala Sheljuzhko; Higgins, 1981, Bull. Brit. Mus. (Nat. Hist.) **43** (3): 166.
M. pseudoala Sheljuzhko; Korshunov, 1972, Ent. Obozr. **51**: 355.
M. pseudoala Sheljuzhko; Tuzov, 1993, The synonymic list of butterflies from the ex-USSR: 48.
M. ninae Sheljuzhko; Lukhtanov & Lukhtanov, 1994, Herbipoliana, Buchreihe zur Lepidopterologie, Bd. **3**: 85, Taf. 36, Fig. 7, 8.

Type locality: Tian-Shan, Tshimgan (W. Tian-Shan, Chimgan).

Male (colour plate VII, figs. 18, 19): 42–45 mm. UPS ground-colour bright pink. Black marginal border wide (2 mm) on both wings, fused with internervural marginal black spots. UPF submarginal series complete and formed by black triangular sharp spots disconnected with the black marginal border; postdiscal series absent or represented by one or two black spots near the costa. UPF discal series regular, complete and formed by black spots sometimes fused near costa, UPH discal series often absent or represented by two spots: near costa and anal border. UPH submarginal series absent, as a rule; wide black basal suffusion covering the discal spot near the anal angle. UNH orange submarginal fascia represented by separate rounded macules; postdiscal lunules forming the proximal edge of this fascia are disconnected with each other and in cellules between veins 3 and 5 inwardly concave.
Female (colour plate VII, figs. 20, 21): 43–46 mm. UPF ground-colour pink-orange; black pattern well developed. UPH ground-colour pink. UPH submarginal and discal series absent, as a rule; black basal suffusion wide and often reaching the submarginal lunules near the anal angle. UNH orange submarginal fascia represented by separate rounded macules sometimes indicated by black scales. The pale area between submarginal fascia and proximal black lunules (not concave inwardly in the cellules between veins 3 and 5) weekly developed.

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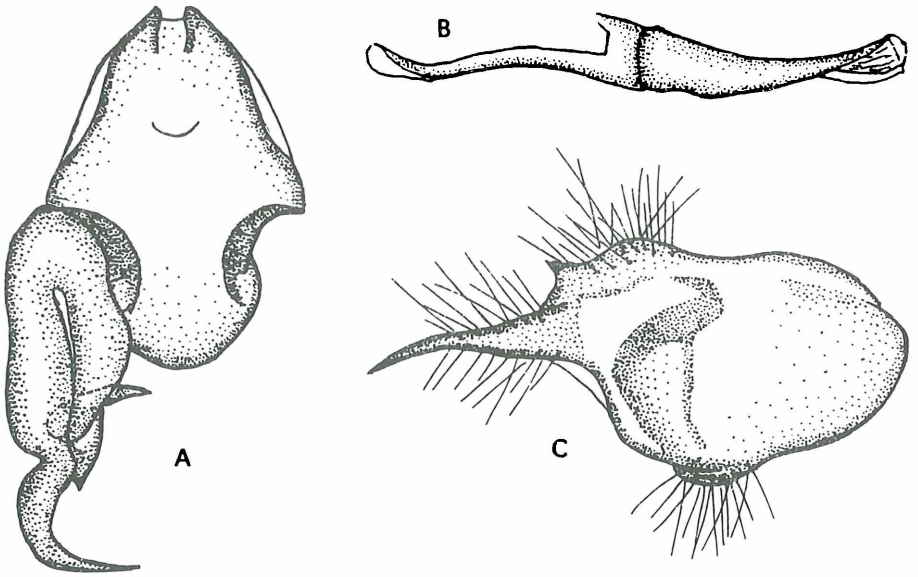

Fig. 6: male genitalia of *M. ninae* SHEL. - Western Tian-Shan, Tchimgan. A - General view from the ventral side (the shape of ringwall); B Aedeagus; C - Valva, lateral view from the outside.

Male genitalia (fig. 6, A-C): Saccus wide, more or less cylindrical with a depression in the apical part. Ringwall produced distally into a large and wide rounded projection. Valva oval, enlarged in dorso-ventral direction, with a small spine on the dorsal surface in its distal part. Caudal process long. Large harpe without teeth. Aedeagus slender, slightly curved. Genitalia of males show no differences within the distribution area.
Female genitalia (fig. 12): Postvaginal plate trapezium-shaped, slightly sclerotized in the central part near the outer side. Antevaginal plate strongly chitinized and not deeply divided into wide rounded lobes. Base of antevaginal plate wide. Antrum quadrangular; ductus with a sclerotized fork-shaped area.

Distribution (map 2): Chatkalsky Mts. (Chimgan, near Kanysh-Kia), Pskemsky Mts. (Pskem), Ugamsky Mts., Kuraminsky Mts. (Kamtchik), Talassky Ala-Tau Mts. (Kara-Bura river, near Kara-Bura pass), Vissokoe, Chandalakshsky Mts. (Iangibasar, near Kanysh-Kia).

Geographical variation and subspecies: Variation of *M. ninae* is not great. Butterflies have rather constant characteristical features. *Elongatoconfluens, magnifica* and *oblongomaculata*, described by SHELIUZHKO (1935) are aberrational forms of *M. ninae*.
There is a photo of the holotype of *M. rosea*, described by HIGGINS (1938) from Aulie-ata (Talassky Alatau), at our disposal. This form has no distinctive external differences from *M. ninae*. HIGGINS (1941) synonymized *rosea* with *M. ninae* (*pseudoala* - in HIGGINS).
The form *ella-claudia* from Talass Alatau (Aulie-ata) described by BRYK does not differ from *M. ninae* judging from the photo and description.

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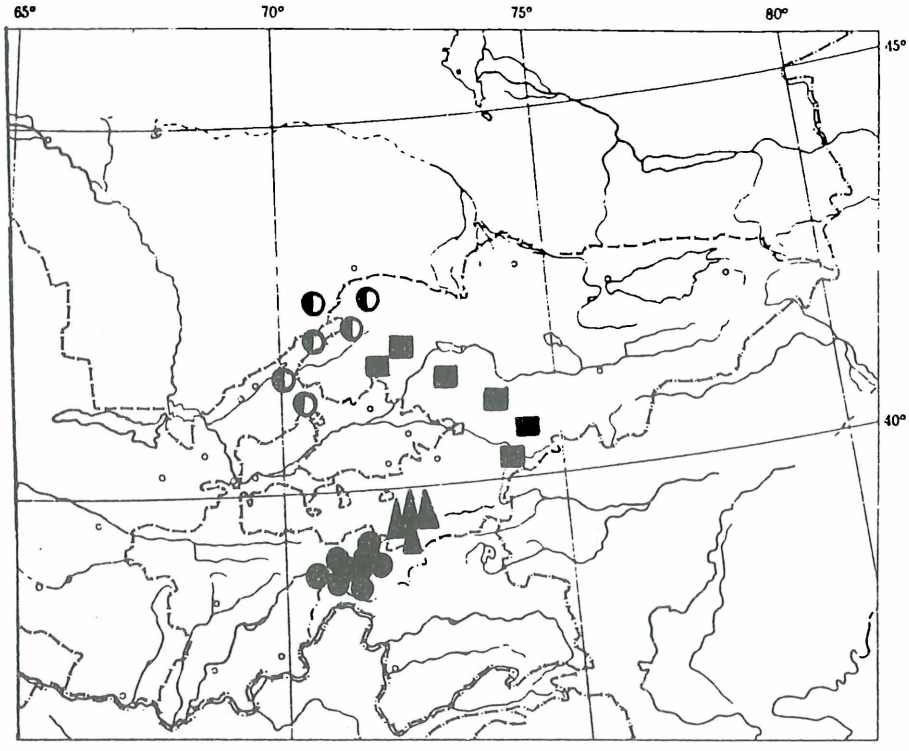

Map 2 (distribution of *M.kotshubeji* SHEL. and *M. ninae* SHEL.): ● - *M. kotshubeji kotshubeji* SHEL.; ▲ - *M. kotshubeji bundeli* subspec. nov.; ■ *M. kotshubeji kugarti* subspec. nov.; ◐ - *M. ninae* SHEL.

Biology: Unknown. Flies in one generation in June-July in the mountains up to 1500-2500 m on dry grassy slopes (LUKHTANOV & LUKHTANOV, 1994).

Material examined: 133 ♂♂ and 71 ♀♀ including the types of *M. ala* ssp. *ninae* SHELJUZHKO, 1935 (ZMKU) and f. *magnifica* SHELJUZHKO, 1935, ab. *oblongomaculata* SHELJUZHKO, 1935 and *elongatoconfluens* SHELJUZHKO, 1935 (ZMKU).

4. *Melitaea chitralensis* (MOORE, 1901)
(colour plate VII, figs. 22-25)

M. chitralensis MOORE, 1901, Lep. Indica **5**: 9, Pl. 380, fig. 1 (Chitral).
M. didyma chitralipluvia VERITY, 1929, Ent. Rec. **41**: 43 (Chitral).
M. chitralensis MOORE; HIGGINS, 1941, Trans. ent. Soc. Lond. **91** (7): 247, pl. 6, figs. 3, 9.

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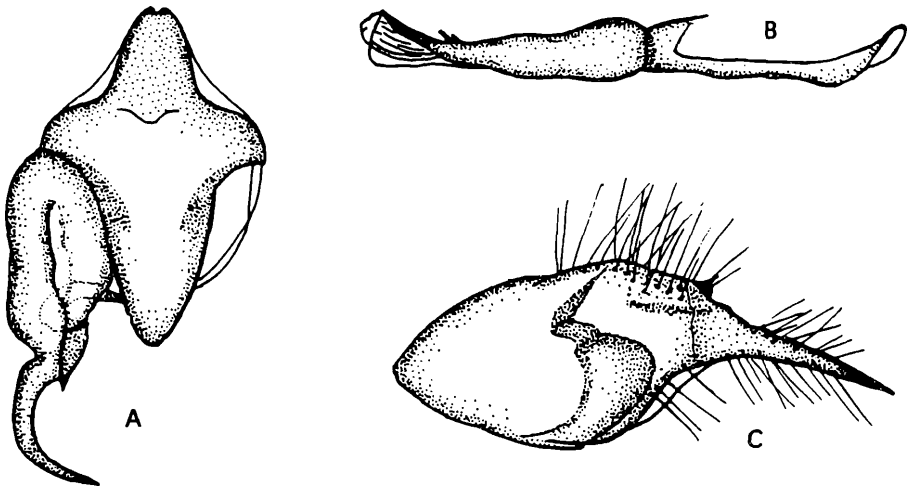

Fig. 7: male genitalia of *M. chitralensis* MOORE - Madaglasht. A - General view from the ventral side (the shape of ringwall); B - Aedeagus; C - Valva, lateral view from the outside.

M. chitralensis MOORE; HIGGINS, 1981, Bull. Brit. Mus. (Nat. Hist.) **43** (3): 166.

Type locality: Chitral (North Pakistan).

Male (colour plate VII, figs. 22, 23): 40-44 mm. UPS ground-colour deep red. Black marginal border wide (2 mm) on both wings, fused with internervural marginal black spots. UPF submarginal series complete and formed by black sharp lunules, connected with the black marginal border and outlined by black scales; postdiscal series absent or represented by one or two black spots near costa. Discal series of both wings regular, complete and formed by rather large black spots. UPH submarginal series represented by rounded lunules connected with the marginal border; wide black basal suffusion covers anal border and reaches discal spot near anal angle. UNH orange submarginal fascia wide and represented by separate quadrangular macules; postdiscal lunules or strokes forming proximal edge of this fascia in cellules between veins 3 and 5 outwardly concave.
Female (colour plate VII, figs. 24, 25): 44-47 mm. UPF ground-colour orange-red near the base and outer side of the wing, in the discal area - pale, as a rule; black pattern and black suffusion well developed. UPH ground-colour deep red, submarginal and discal series complete; black basal suffusion wide and often reaching submarginal lunules near anal angle. UNH orange submarginal fascia represented by separate rounded macules and indicated by black scales. Pale area between submarginal fascia and proximal black lunules well developed. Proximal black lunules in the cellules between veins 3 and 5 outwardly concave.

Male genitalia (fig. 7, A-C): Saccus more or less narrow and cylindrical, depression in its apical part is absent or weakly developed in the 3 ♂♂ examined. Ringwall produced distally into a

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large conical projection without a notch in the apical part. Valva oval, with a small spine on the dorsal surface in its distal part. Caudal process long. Large harpe without teeth. Aedeagus enlarged in the central part, with one or two spines on the dorsal surface near apex.
Female genitalia (fig. 13): Postvaginal plate oval (wider than antevaginal plate). It is sclerotized in the central part. Antevaginal plate strongly chitinized and not deeply divided into wide oval lobes. Antrum quadrangular; ductus narrow with a sclerotized fork-shaped area.

Distribution: northern Pakistan (Chitral).

Geographical variation and subspecies: Only the typical form is known from Chitral (Shishi-Kuh valley), which has rather constant characters. There are six specimens of *M. chitralensis* from Madaglasht (ex AVINOV's coll. ZISP), very similar externally to the photo of the holotype of *M. chitralensis* which is at our disposal.

Biology: Unknown. Flies most likely in one generation in June–July in the mountains up to 3000–3500 m.

Material examined: 3 ♂♂ and 3 ♀♀.

5. *Melitaea enarea* (FRUHSTORFER, 1916)

The name *enarea* was given by FRUHSTORFER (1916) to the specimen described by him from Garm. According to the description it differs from other forms of *M. didyma* by the well developed submargimal lunules on both wings. The specimen which was originally described by FRUHSTORFER was not illustrated. Except the original description of this butterfly (which is poor and short) this taxon is known only from the data given by HIGGINS (1941) (who did not see the type, as it is clear from the text) and from the description and photo of a topotype (♀) given by BRYK (1940) (which are similar to the description and illustration in HIGGINS). In the present work refering to the authority of the last two authors we attribute the name *enarea* to the butterfly described below.

Male: 35–43 mm. UPS ground-colour yellow-orange. Black marginal border often narrow on both wings and fused with internervural marginal black spots. UPF submarginal series complete and formed by black sharp lunules or strokes, often connected with the black marginal border; UPH submarginal series often absent. UPF postdiscal series represented by one or two black spots near costa. UPF discal series regular, complete and formed by black spots not fused near costa; UPH discal series sometimes absent. UPH black basal suffusion weakly developed, as a rule, and not covering discal spot near anal angle. UNH orange submarginal fascia narrow, represented by separate quadrangular macules often indicated by black scales; postdiscal lunules forming proximal edge of this fascia in the cellules between veins 3 and 5 outwardly concave. Pale area between orange submarginal fascia and black proximal lunules often developed.
Female: 37–45 mm. UPF ground-colour pale-yellow with admixture of pale-orange scales; black pattern well developed; grey suffusion may be present. UPH ground-colour yellow-orange;

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black basal suffusion more developed than in the male. UNH orange submarginal fascia represented by separate quadrangular macules indicated by black scales. Postdiscal lunules forming proximal edge of this fascia in the cellules between veins 3 and 5 outwardly concave. Pale area between orange submarginal fascia and proximal black lunules well developed.

Male genitalia (figs. 8, 9, A-C): Saccus narrow and conical with a depression in its apical part. Ringwall produced distally into a large conical projection with a notch in its apical part. Valva oval with a small spine on the dorsal surface in its distal part. Caudal process long. Large harpe without teeth. Aedeagus enlarged in the central part with a pointed projection on the ventral surface and a small spine on the dorsal surface near apex. The characters of the male genitalia are constant within the distribution area.
Female genitalia (fig. 14): Postvaginal plate oval (wider than antevaginal plate), sclerotized in the central part. Antevaginal plate strongly chitinized and deeply divided into comparatively narrow oval lopes. Antrum quadrangular; ductus narrow, with a sclerotized fork-shaped area.

Distribution (map 3): *M. enarea* is widely distributed in the mountains of Middle Asia. It extends to the south-western Pamirs in the South, in the West it occurs in the mountains near Samarkand, in the North it reaches the western Tian-Shan through Fergansky Mts.

Geographical variation and subspecies: The variation of *M. enarea* in size, shape of wings and wing pattern is great. The material examined gives us the confidence to speak about four subspecies of *M. enarea* within the territory of Middle Asia. Unfortunately the material from the northern part of this area and from Alaisky Mts. is very incomplete and we can not say anything about the subspecific status of these populations.

5a. *Melitaea enarea enarea* (FRUHSTORFER, 1916)
(colour plate VII, figs. 26-29)

M. didyma enarea FRUHSTORFER, 1916, Arch. Naturg. **82** (A)2: **11** (Garm).
M. didyma shugnana SHELJUZHKO, 1929, Mitt. Münch. Ent. Ges. **19**: 355, Taf. 27, Fig. 7-10 (Chorog).
M. didyma enarea FRUHSTORFER;BRYK, 1940, Folia Zoologica et Hydrobiologica **10** (2): 333, T. 1, Fig. 7; T. 5, Fig. 52 (Garm).
M. chitralensis enarea FRUHSTORFER; HIGGINS, 1941, Trans. ent. Soc. Lond. **106**: 248, pl. 6, fig. 2.
M. chitralensis enarea FRUHSTORFER; SHCHETKIN, 1981, Ent. Obozr. Tajikistana: 164-165 (Surkhob valley).
M. didyma enarea FRUHSTORFER; TUZOV, 1993, The synonymic list of butterflies from the ex-USSR: 47 (Darvaz, Alai?).
M. chitralensis shugnana SHELJUZHKO; TSHIKOLOVETS, 1997, Butterflies of Pamir: 118, pl. 28, figs. 7-8; pl. 29, figs. 7-8; pl. 43, fig. 4 - genitalia (Chorog).

Type locality: Garm, Peter the Great Mts.

Male (colour plate VII, figs. 26, 27): 40-42 mm. UPS submarginal series well developed, complete and formed by black sharp lunules connected with the black marginal border on both

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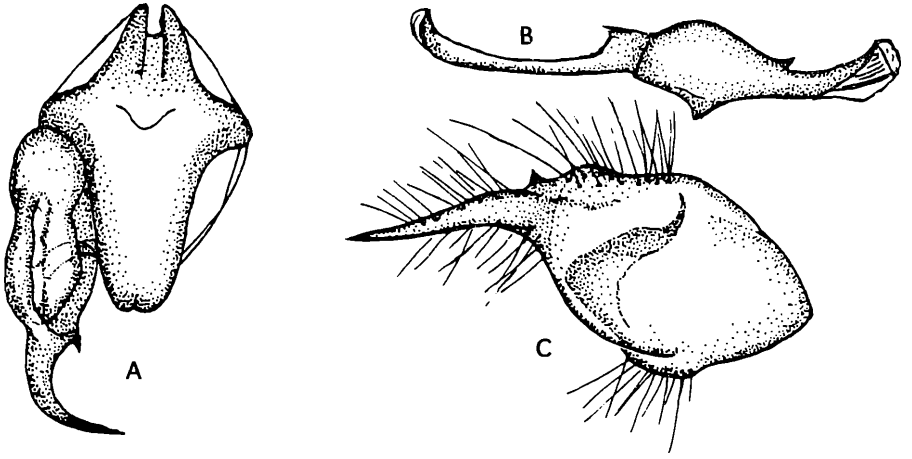

Fig. 8: male genitalia of *M. enarea enarea* FRUHST. Shugnansky Mts, Horog. A - General view from the ventral side (the shape of ringwall); B - Aedeagus; C - Valva, lateral view from the outside.

wings. UPS discal series on both wings formed by rather small black spots. The UPH black basal suffusion does not reach the discal spot near anal angle.
Female (colour plate 2, figs. 28, 29): 40-47 mm. UPF ground-colour pale-yellow; the black pattern and grey suffusion well developed. UPH ground-colour yellow-orange; discal and submarginal series often absent; black basal suffusion more developed than in the male. UNH orange submarginal fascia narrow and formed by rounded macules outlined by black scales.

Distribution: Garm, Komara-su river, Peter the Great Mts. (Ganishou, Obihingou, Dzhilandy, Darai-Nazarak, Kara-Shura river), Hazreti-Sho (Bomolo, Shuraabad), Darvazsky Mts. (Visharv, Karnak), Shugnansky Mts. (Chorog, Gunt river).

Taxonomic notes: Chorog is the type locality of *shugnana* described by SHELJUZHKO (1929). Later, HIGGINS (1941) synonymized it with *M. chitralensis enarea*. The material of *enarea* examined from Chorog and the type series of *shugnana* (in ZMKU) look like the typical form.
The subspecific status of *M. enarea* from Alaisky Mts. is unknown. At our disposal there is only 1 ♂ from Kysyl-Su river (ex AVINOV's coll., ZISP) and 1 ♀ from Tandyk (maybe Taldyk) pass (ZMMU). The female looks like the typical form. UPF submarginal series of the male complete and formed by sharp lunules connected with the marginal border; UPH submarginal series represented by lunules, not connected with the black marginal border. The true status of these specimens is unknown and should be clarified by examination of additional material.
HIGGINS (1941) recorded *M. enarea* for Sussamyr. There are 2 ♂♂ (ZMMU) from Kirgizsky Mts. (Issyk-Ata) at our disposal. One male is an aberrational specimen, the pattern of the other looks like *gromenkoi* subspec. nov. Both specimens are of small size (36 mm).

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Biology: Unknown. Flies in two generations (also in the western Pamirs): first - from end of April until May; second - in June-July in mountains up to 3000-3500 m. The habitat in the Pamirs is steppe, rocky gorges, semidesert in mountains up to 3900 m (TSHIKOLOVETS, 1997).

Material examined: 111 ♂♂ and 74 ♀♀ including the type of *M. didyma* ssp. *shugnana* SHELJUZHKO, 1929 (ZMKU).

5b. *Melitaea enarea ishkashima* (SHELJUZHKO, 1929)
(colour plate VII, fig. 30)

M. didyma ishkashima SHELJUZHKO, 1929, Mitt. Münch. ent. Ges. **19**: 359, T. 27, Fig. 13-14 (Kishlak Njut).
M. didyma ishkashima SHELJUZHKO; TSHIKOLOVETS, 1997, Butterflies of Pamir, pl. 28, fig. 13; pl. 29, fig. 13; pl. 38, fig. 8; pl. 39, fig. 8 (Ishkashim).

Type locality: Ishkasim, kishlak Njut (Ishkashimsky Mts., Njut).

Ishkashima was described by SHELJUZHKO (1929) on the base of 3 ♂♂ from Kishlak Njut (near Ishkashim). The type material examined (in ZMKU) shows that one of paratypes does not belong to *M. enarea*, being one of the forms of *M. didyma* from Pamirs. This specimen was figured in TSHIKOLOVETS (1997; pl. 28, fig. 14; pl. 18, fig. 14; pl. 43, fig. 3 - genitalia).
The material examined (including the type specimens) is very uniform. We consider it reasonable to retain the subspecific rank for the form *ishkashima*.

Male (colour plate VII, fig. 30): 35-38 mm. FW more or less short, HW comparatively wide. UPS submarginal series of both wings complete and formed by rounded black lunules connected with the black marginal border. UPF discal series formed by rather small black spots sometimes fused near costa. UPH discal series and black basal suffusion developed as in the typical form.
Female: 37-38 mm. FW and HW shape similar to that of the male. UPS and UNS pattern more or less similar to the typical form. UPF grey suffusion less developed than in the nominate subspecies.

Distribution: Ishkashimsky Mts. (Ishkashim, Nuchi-Lal, Njut).

Taxonomic notes: Distinguished from other subspecies by small size, shape of the FW and HW and UPS rounded submarginal lunules.

Biology: Unknown. The number of generations is also unknown. The material examined, including the type specimens, is dated by June. Flies in the mountains up to 2900-3000 m.

Material examined: 21 ♂♂ and 10 ♀♀ including the type of *M. didyma* ssp. *ishkashima* SHELJUZHKO, 1929 (ZMKU).

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5c. *Melitaea enarea permuta* (Higgins, 1941)
(colour plate VII, fig. 31)

M. chitralensis enarea mod. *permuta* Higgins, 1941, Trans. ent. Soc. Lond. **106**: 250, pl. 6, figs. 7, 8 (Hazreth-Sultan).
M. ala permuta Higgins; Tuzov, 1993, The synonymic list of butterflies from the ex-USSR: 48 (Gissar, S. Gissar).

Type locality: Samarkand.

The modification *permuta* was described by Higgins (1941) on the base of 6 ♂♂ and 6 ♀♀ from Samarkand (he believed the specimens to have come from Hazret-Sultan Mts.). The remaining specimen is labelled Aulie-Ata. Higgins (1941) considered *permuta* to be a desert modification.
Available specimens from the western localities are similar externally to the photo of the syntype of *M. enarea permuta* (the type series is in the BMNH) which is at our disposal.

Male (colour plate VII, fig. 31): 39-42 mm. UPF submarginal series complete and formed by black strokes and characteristic lunules which are not obvious; UPH submarginal series absent, as a rule. UPF discal series formed by black spots not fused near costa, UPH discal series absent or represented by two spots: near costa and anal border; black basal suffusion developed as in the typical form.
Female: 39-42 mm. Similar to the typical form. UPF grey suffusion less developed than in the nominate subspecies.

Distribution: Nuratau Mts. (Haiat), Kugitang Mts. (Hodzhepil), Gissarsky Mts. (Kondara, Kysyl-su river, Tonhoz-Daria river, Takob, Anzob pass, Obi-Garm), Zeravshansky Mts. (Aman-Kutan, Sazagan), Turkestansky Mts. (Samarkand), Karateginsky Mts. (Romit).

Taxonomic notes: Distinguished from other subspecies by UPF black submarginal strokes and partial reduction of UPH black pattern.
It is necessary to remark that there is no distinct boundary between ssp. *permuta* and the typical form. The examined material of *permuta* is not very uniform and intermediate forms and forms with typical characters occur in its area.
The remaining paratype of *permuta* is labelled "Aulie-Ata" We have only a single female of *M. enarea* from western Tian-Shan (Aksu-Dzhabagly). This specimen looks like a typical female of *permuta*.

Biology: Unknown. Flies in two generations: first - from the end of April until May, second - in June-July in mountains up to 800 m (Kugitang Mts.) to 2000 m (Gissarsky Mts.). The habitats in western Gissar (Kysyl-su river) are steppe-like slopes on median altitudes (1500 m).

Material examined: 52 ♂♂ and 41 ♀♀.

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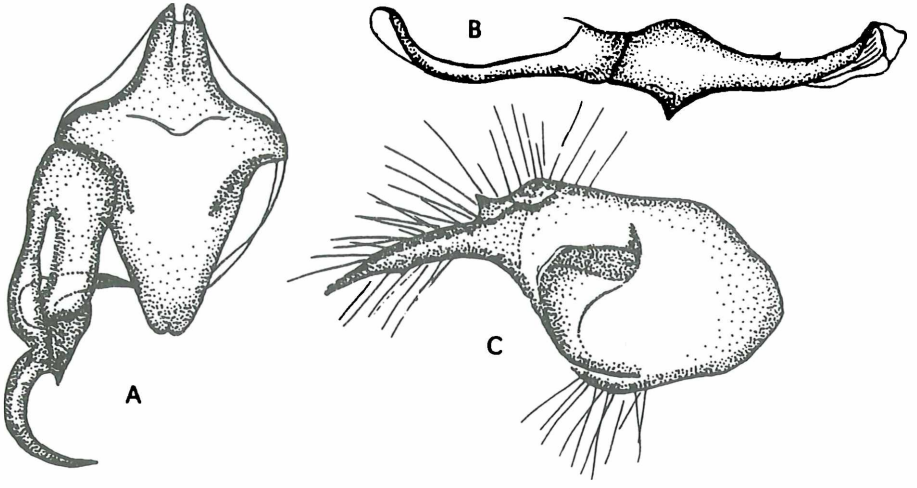

Fig. 9: male genitalia of *M. enarea gromenkoi* subspec. nov. 15 km N-W Dzhalal-Abad, Kara-Kianyr Mts. A General view from the ventral side (the shape of ringwall); B Aedeagus; C Valva, lateral view from the outside.

5d. *Melitaea enarea* ***gromenkoi*** **subspec. nov.**
(colour plate VII, figs. 32–34)

Material: Holotype ♂, Kirghizia, 15 km NW from Dzhalal-Abad, Kara-Kianyr Mts., 1200 m, 3.–5.V.1997, leg. V. Gromenko. Paratypes: 10 ♂♂, 10 ♀♀, with the same labels; 2 ♂♂, Kirghizia, Osh region, Karakuldja district, Terek-su village, 1600, 3.VII.1992, leg. M. Markchasev; 4 ♂♂, Kirghizia, Tash-Kumyr, 1200 m, 20.V.1997, leg. V. Gromenko; 1 ♀, Kirghizia, near Kara-Kul, Naryn river, 1100 m, 13.VI.1997, leg. I. Pljustch.

Description
Male (colour plate VII, figs. 32, 33): 41–43 mm. FW wide with more or less rounded apex. UPS ground-colour yellow-orange. UPF submarginal series complete and formed by black lunules outlined by black scales and often connected with the black marginal border; UPF postdiscal series represented by one or two rather big black spots near costa; discal series regular, complete and formed by black spots. UPH submarginal series well developed, formed by more or less sharp and large lunules, outlined by black scales and connected with wide marginal border; discal series complete, formed by rather small black spots; black basal suffusion developed as in the nominate subspecies or more. UNS pattern more rough than in other forms. UNH black spots and lunules strongly outlined by black scales; orange submarginal fascia wider than in the typical form, represented by separate quadrangular macules, indicated by black scales; postdiscal series forming the proximal edge of this fascia represented by black thick disconnected lunules; Pale area between orange fascia and proximal black lunules developed. The Series of males is very uniform.

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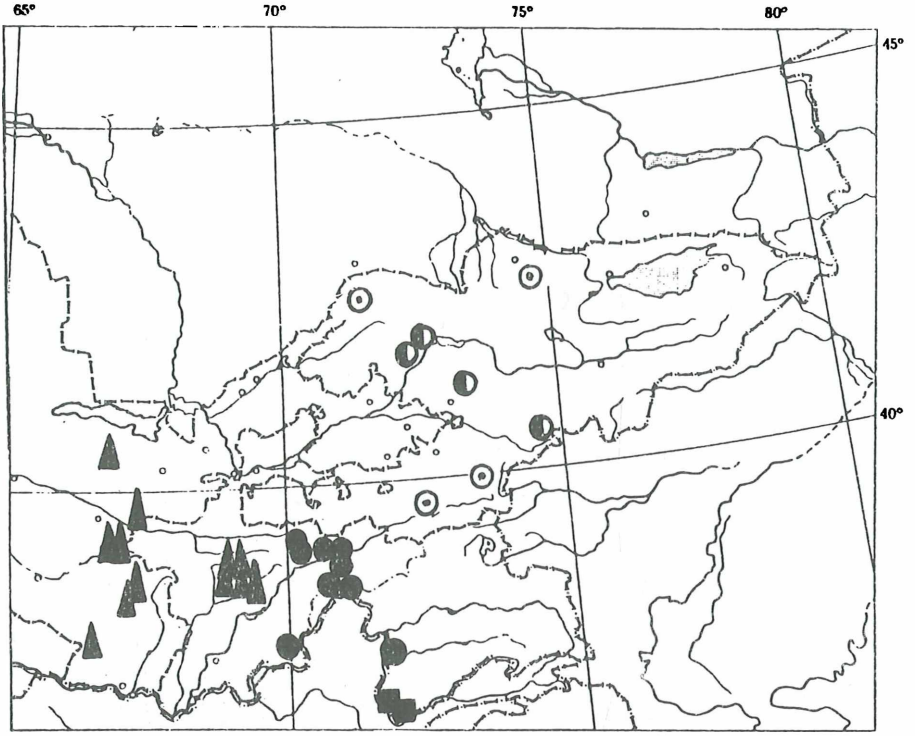

Map 3 (distribution of *M. enarea* FRUHST.): ● *M. enarea enarea* FRUHST.; ■ *M. enarea ishkashima* SHEL.; ▲ *M. enarea permuta* HIGG.; ◐ - *M. enarea gromenkoi* subspec. nov.; ⊙ *M. enarea* FRUHST. of unclear subspecific status.

Female (colour plate VII, fig. 34): 37-45 mm. Shape of wings like that of the male. UPF ground-colour yellow-orange (similar to the UPH ground-colour); black pattern well developed. UPH submarginal series regular, complete and formed by black sharp lunules outlined by black scales; discal series absent, as a rule; black basal suffusion often reaching submarginal lunules near anal angle. UNH pattern like that in the male.

Male (fig. 9, A-C) and female genitalia similar to those of the typical form.

Distribution: Fergansky Mts.

Taxonomic notes: Distinguished from other subspecies by FW shape, UPS and UNS well developed rough black pattern in both sexes and UPH well developed submarginal series of the female. Moreover, UPF ground-colour of the female more deep than in other forms of *enarea*.

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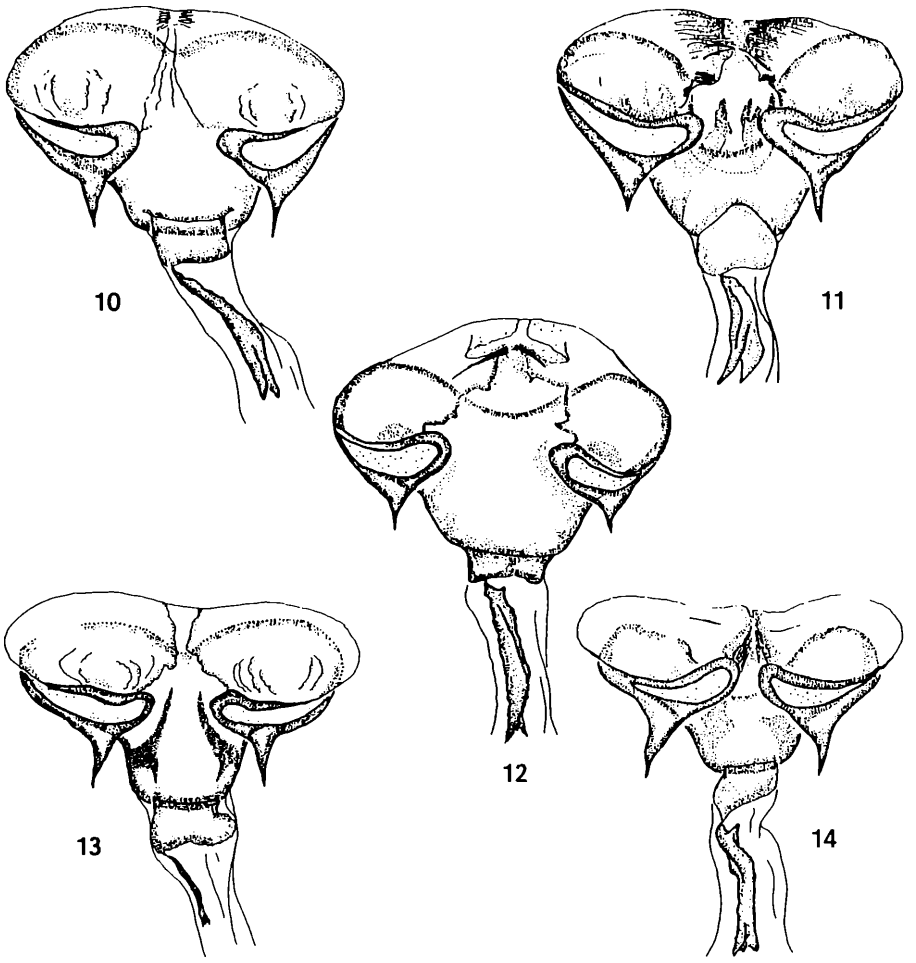

Figs. 10-14: female genitalia (dorsal view) without papillae anales and bursa copulatrix of:
Fig. 10: *M. ala* STGR. - Dzhungarsky Ala-Tau, Tekely.
Fig. 11: *M. kotshubeji* SHEL. - Peter the Great Mts., Ganishou.
Fig. 12: *M. ninae* SHEL. - western Tian-Shan, Chimgan.
Fig. 13: *M. chitralensis* MOORE Madaglasht.
Fig. 14: *M. enarea* FRUHST. Shugnansky Mts, Horog.

Biology: Unknown. Flies in two generations: first - from the end of April until May, second - in June-July up to 1000-1200 m. Near Dzhalal-Abad (Kara-Kianyr Mts.) it was taken on semi-desert slopes with ephemeral vegetation (fig. 15).

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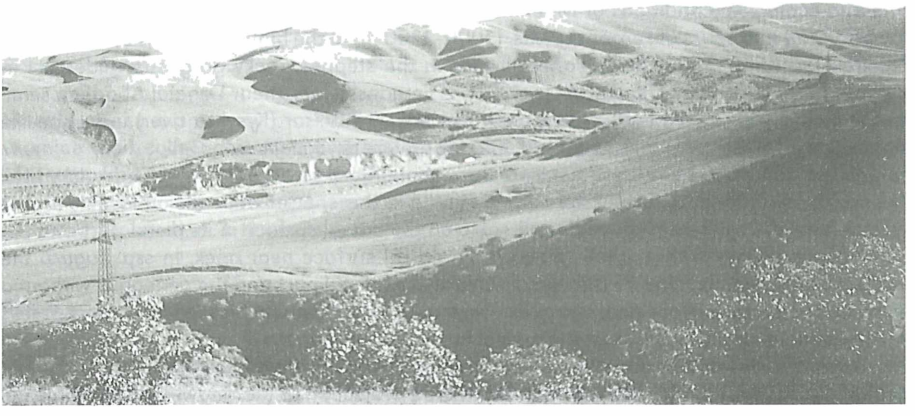

Fig. 15: Type locality of *M. enarea gromenkoi* subspec. nov. 15 km N-W from Dzalal-Abad, Kara-Kianyr Mts., 6.V.1997. VIKTOR A. GROMENKO fot.

Discussion

M. ala and *M. enarea* are the most widely distributed species in Central Asia. *M. ala* occurs practically in all mountains of Tian-Shan (including Talassky Ala-Tau Mts. in the west), Dzhungarsky Ala-Tau Mts., South Altai (LUKHTANOV & LUKHTANOV, 1994) and Saur Mts. in north-eastern Kazakhstan. The distribution area of *M. ala* is disintegrated into two comparatively isolated subspecies. However, intermediate forms exist between localities of the typical form and ssp. *bicolor* (sometimes in the Tyshkantau Mts., western part of Chinese Tian-Shan, Ketmen Mts. and Zailiisky Ala-Tau Mts.). Ssp. *bicolor* is the most widely distributed form of *M. ala* with a great variation which is probably determinated by its sensibility to climate.
The correct status of *M. ala* from the eastern part of Chinese Tian-Shan (Bogdo-Ola Mts.) and South Altai is unclear and should be clarified by examination of additional material.
Ecological conditions and habitats of *M. ala* are variable: in Altai it occurs only in dry stony desert foothills, while in more southern regions in mountains on dry meadows and steppe-like slopes (LUKHTANOV & LUKHTANOV, 1994).
M. enarea occurs throughout Gissaro-Darvaz, western Pamirs and Pamiro-Alai, and its distribution extends to the western Tian-Shan and Kirgizsky Mts. through Fergansky Mts. Its area is disintegrated into parts corresponding the distribution of separate subspecies. There is no distinct boundary between typical *enarea* and ssp. *permuta*. The material available suggests that these two forms sometimes fly together within the distribution of *permuta* but at different

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altitudes, as a rule. Moreover, there are rather many intermediate forms, especially in the central part of Gissarsky Mts. HIGGINS (1941) remarks that *enarea* is very sensitive to climate and it is probable that *permuta* is a desert modification. It is possible that *permuta* is rather a low-mountain ecological form than a geographical one. But we consider it reasonable to allot the subspecific status to this modification, because the majority of the examined material from western localities is distinguished from the typical form and rather tends towards *permuta*.
The true status of the specimens of *enarea* from Alaisky and Kirgizsky Mts. is unknown. Habitats and ecological conditions of *M. enarea* are extremely varied: from the foothills of Kugitang (800 m) and spurs of Fergansky Mts. (1000–1200 m) to the high mountains of Pamirs and Pamiro-Alai (2500–3500 m). In Pamirs it flies in the steppes, rocky gorges, semideserts in mountains up to 3900 m (TSHIKOLOVETS, 1997), in Fergansky Mts. (near Dzhalal-Abad) on semi-desert slopes with ephemeral vegetation, in the western Gissar (Kysyl-su river) in steppe-like slopes up to 1500 m. We believe that *M. enarea* prefers dry localities.
M. kotshubeji is of great interest. It occurs throughout Alaisky, Fergansky and Chatkalsky Mts. The variation in the structure of the male genitalia in this species depends on locality. In the typical form the valva is often without a spine on the dorsal surface in its distal part and the aedeagus is always with a small spine on the dorsal surface near apex. In ssp. *kugarti* the valva is always with a spine on the dorsal surface in its distal part and the aedeagus without a spine on the dorsal surface near the apex. The male genitalia of ssp. *bundeli* have more or less intermediate characters between the typical form and ssp. *kugarti*.
Ssp. *kugarti* is the most externally peculiar form of *M. kotshubeji*. But the structure of male genitalia (the shape of the aedeagus and the distal projection of the ringwall) and female genitalia (antevaginal plate with a depression in the base) shows its close relation to *kotshubeji*. Although we cannot exclude specific status of *kugarti*. The matter should be clarified by examination of additional material from the eastern part of Alaisky Mts. At the present stage of study we consider it reasonable to classify this form as a subspecies of *M. kotshubeji*.
M. ninae and *M. chitralensis* are probably the endemics of western Tian-Shan and Northern Pakistan (Chitral), respectively.
M. chitralensis, M. enarea, M. kotshubeji, on one hand, and *M. ninae* and *M. ala*, on the other hand, may be considered as the most related species. It is necessary to examine male genitalia, which have enough constant characteristic features (in spite of external ones) for the analysis of the relations of taxa within the complex in question. *M. enarea* differs well from *M. chitralensis* and *M. kotshubeji* by the structure of the aedeagus. the male genitalia of *M. chitralensis* combine the characteristic features of *M. enarea* (similar shape of distal projection of ringwall) and *M. kotshubeji* (similar structure of aedeagus). The male genitalia of *M. ninae* are intermediate between *M. ala* (similar structure of aedeagus) and *kugarti* (more or less similar shape of distal projection of ringwall). *M. ala* and *M. enarea* may be considered as the most distant species (great differences in the structure of aedeagus and the shape of distal projection of ringwall).
The available material allows to speak about distributional overlapping of related species in some localities: *M. ala* and *M. ninae* in Talassky Ala-Tau Mts. (Kara-Bura river) but at different altitudes, *M. enarea* and *M. kotshubeji* in Peter the Great Mts., Alaisky Mts. and Fergansky Mts. We do not exclude the overlapping of *M. chitralensis* and *M. enarea* in north-eastern Afghanistan (Hindu-Kush Mts.). SAKAI (1981) figured (Taf. 35, Fig. 27) the UPS of a specimen (named by him as *M didyma nadezhdae* SHELJUZHKO with a label: Wakhan, Issyk Valley) similar externally to typical *M. enarea*. It is very difficult to identify the specific status of this specimen

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by UPS photo, but occurrence of *M. enarea* in Vakhan Mts. is highly doubtful. It is possible that the distribution areas of *M. ala* and *M kotshubeji kugarti* are contiguous in the north-eastern part of the Chatkalsky Mts.
The complex in question is well isolated both by external features and the structure of the male genitalia. HIGGINS (1941) treated these species jointly in the *M. didyma*-group. In our opinion it is reasonable to regard the taxa in question as the *M. ala*-complex of the *M. didyma*-group in the genus *Melitaea*.

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Explanation of colour plate VI (p. 389):

Figs. 1, 2: *M. ala ala* STGR., ♂, Dzhungarsky Ala-Tau, Kok-Su river, 2000 m, 28.VI.1997, A. KLIMENKO.

Figs. 3, 4: *M. ala* STGR., ♀, Dzhungaria, Burchansarytau, Enbekshi, 1900 m, 28.VI.1995, S. CHURKIN.

Figs. 5, 6: *M. ala bicolor* SEITZ, ♂, Inner Tian-Shan, Dolon pass, 2500 m, 19.VII.1976, G. SAMODUROV.

Fig. 7: *M. ala bicolor*, ♀, Inner Tian-Shan, near Dolon pass, 2000 m, 18.VII.1998, K. KOLESNICHENKO.

Figs. 8, 9: *M. kotshubeji kotshubeji* SHEL., ♂, Peter the Great Mts., Ganishou, 2400 m, 23.VI. 1973, A. TSVETAEV.

Figs. 10, 11: *M. kotshubeji kotshubeji* SHEL., ♀, Peter the Great Mts., Ganishou, 2400 m, 23.VI. 1973, A. TSVETAEV.

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Figs. 12, 13: *M. kotshubeji bundeli* subspec. nov., paratype ♂, Zaalaisky Mts., Svis river, 3100 m, 30.VII.1953, A. BUNDEL.
Figs. 14, 15: *M. kotshubeji kugarti* subspec. nov., paratype ♂, Fergansky Mts., r. Kugart, 2000 m, 15.VI.1995, S. CHURKIN.
Figs. 16, 17: *M. kotshubeji kugarti* subspec. nov., paratype ♀, Fergansky Mts., r. Kugart, 2000 m, 15.VI.1995, S. CHURKIN.

1	2	3
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10	11	12
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16	17	

Explanation of colour plate VII (p. 391):

Figs. 18, 19: *M. ninae* SHEL., ♂, Uzbekistan, Chatkalsky Mts., Chimgan, 4.VII.1969, A. TSVETAEV.
Figs. 20, 21: *M. ninae* SHEL., ♀, Uzbekistan, Chatkalsky Mts., Chimgan, 4.VII.1969, A. TSVETAEV.
Figs. 22, 23: *M. chitralensis* MOORE, ♂, Madaglasht, 11000 ft., 27.VII.1910.
Figs. 24, 25: *M. chitralensis* MOORE, ♀, Madaglasht, 11000 ft., 27.VII.1910.
Figs. 26, 27: *M. enarea enarea* FRUHST., ♂, Peter the Great Mts., Ganishou, 2700 m, 13.VI.1971, V. MURZIN.
Figs. 28, 29: *M. enarea enarea* FRUHST., ♀, Peter the Great Mts., Ganishou, 2700 m, 13.VI.1971, V. MURZIN.
Fig. 30: *M. enarea ishkashima* SHEL., ♂, Ishkashim, kishlak Njut (Pamir oc.); coll. L. SHELJUSHKO.
Fig. 31: *M. enarea permuta* HIGG., ♂, Gissarsky Mts., Kondara, 11.V.1965, A. TSVETAEV.
Figs. 32, 33: *M. enarea gromenkoi* subspec. nov., holotype ♂, Kirghizia, 15 km NW from Dzhalal-Abad, Kara-Kianyr Mts, 1200 m, 5.V.1997, V. GROMENKO.
Fig. 34: *M. enarea gromenkoi* subspec. nov., paratype ♀, Kirghizia, 15 km NW from Dzhalal-Abad, Kara-Kianyr Mts, 1200 m, 5.V.1997, V. GROMENKO.

18	19	20
21	22	23
24	25	26
27	28	29
30	31	32
33	44	

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Colour plate VI

KOLESNICHENKO, K. A.: A review of the East-Palaearctic taxa of the *Melitaea didyma* (ESPER, 1779)-group. 1. The *M. ala* STAUDINGER, 1881-*M. chitralensis* MOORE, 1901-complex (Lepidoptera, Nymphalidae). - Atalanta **30** (1/4): 87-117

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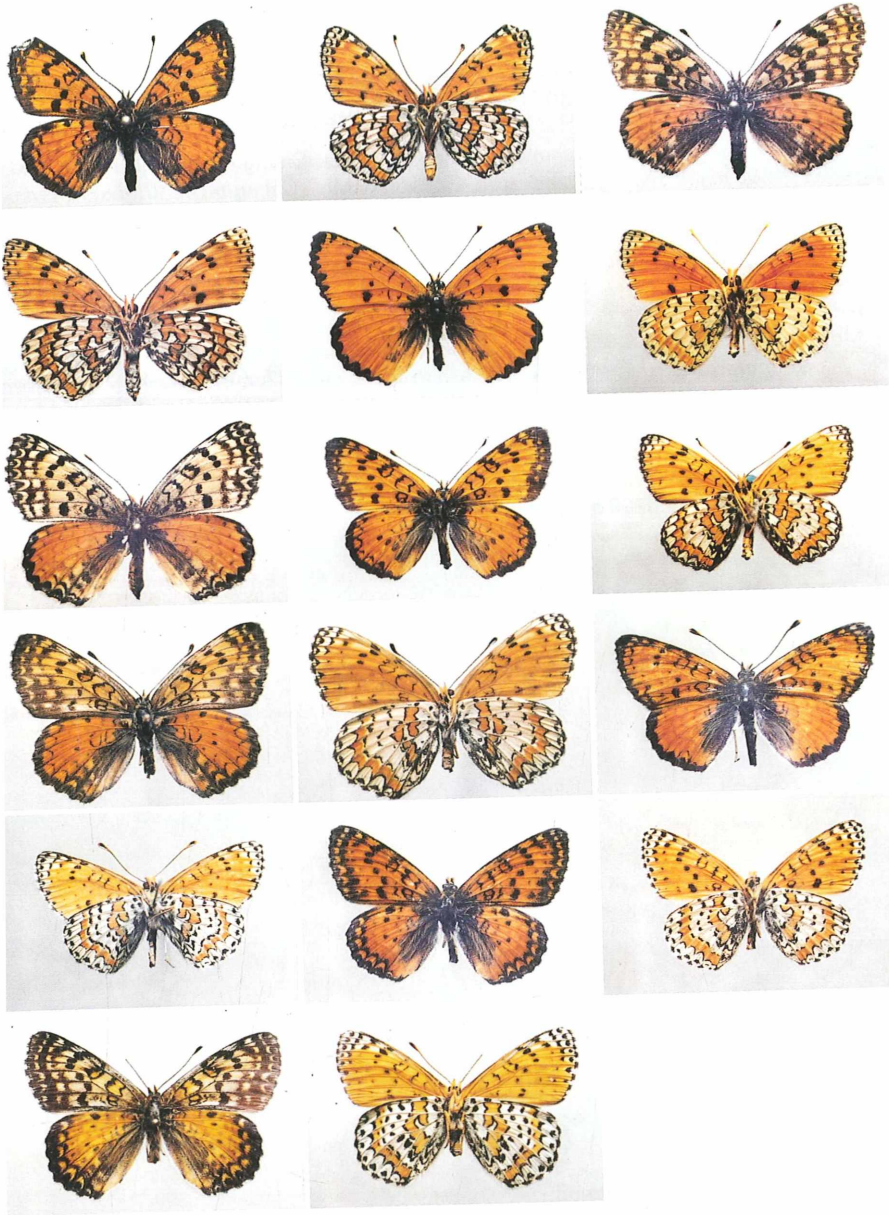
Colour plate VI



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Colour plate VII

KOLESNICHENKO, K. A.: A review of the East-Palaearctic taxa of the *Melitaea didyma* (ESPER, 1779)-group. 1. The *M. ala* STAUDINGER, 1881-*M. chitralensis* MOORE, 1901-complex (Lepidoptera, Nymphalidae). - Atalanta **30** (1/4): 87-117

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18	19	20
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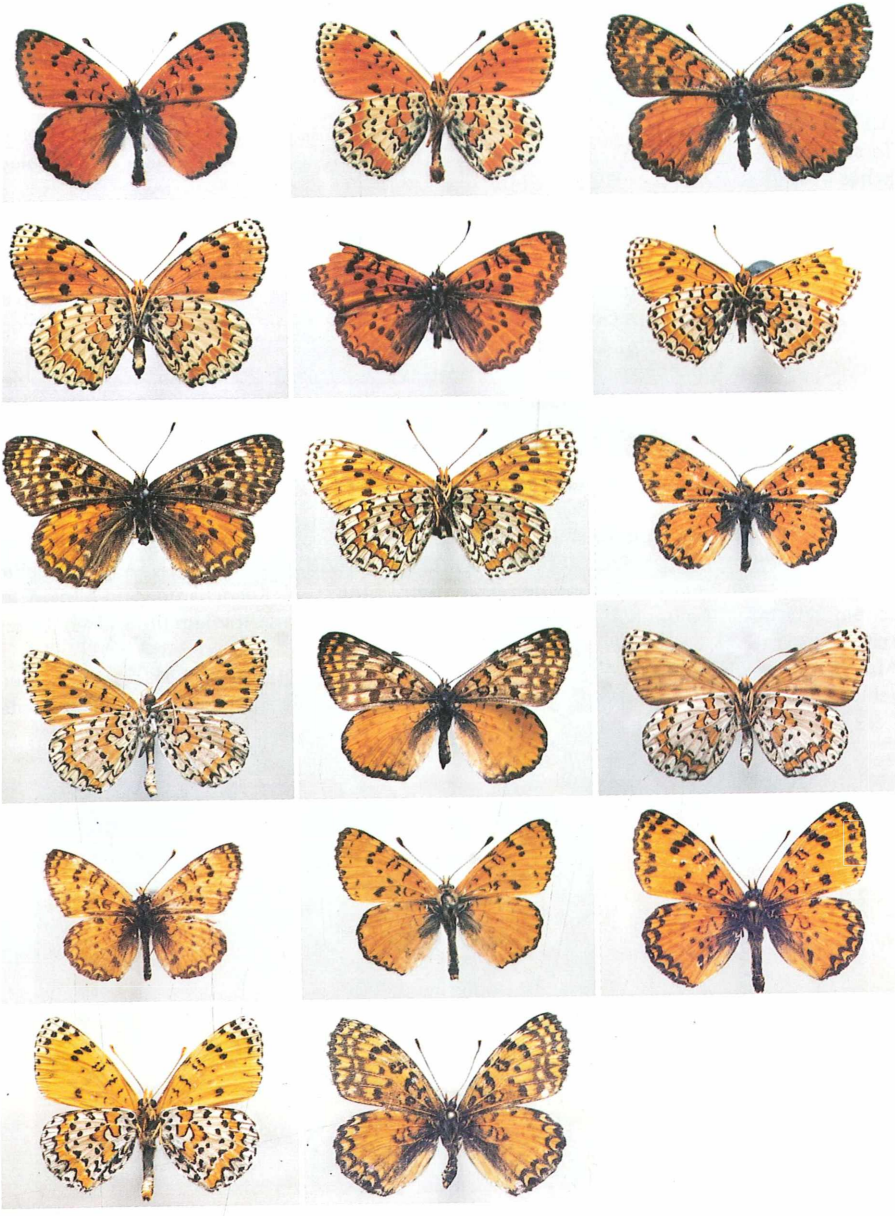
Colour plate VII



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