

**To the systematics of blue butterflies of the genus *Glaucopsyche* SCUDDER, 1872
in the Tian-Shan mountains**

(Lepidoptera, Lycaenidae)

by

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Summary: It is stated that the Tian-Shanian territory inhabits three species of the genus *Glaucopsyche* SCUDDER, 1872, and their diagnostic features are given. Lectotypes of *Lycaena alexis laetifica* PÜNGELER, 1898 and *Lycaena cyllarus aeruginosa* STAUDINGER, 1881, and the neotype of *Papilio alexis* PODA, 1761 are designated. Details of the distribution of the latter, the genus' species in the territory of Tian-Shan are clarified; *G. laetifica* (PÜNGELER, 1898) is for the first time recorded from North-Eastern Kazakhstan.

Резюме: В настоящем сообщении показано, что на территории Тянь-Шаня обитает три вида рода *Glaucopsyche* SCUDDER, 1872, и выделяются их диагностические признаки. Обозначаются лектотипы *Lycaena alexis laetifica* PÜNGELER, 1898 и *Lycaena cyllarus aeruginosa* STAUDINGER, 1881, неотип *Papilio alexis* PODA, 1761. Уточняются детали распространения видов рода на территории Тянь-Шаня, *G. laetifica* (PÜNGELER, 1898) впервые приводится для Северо-Восточного Казахстана.

Some groups of Middle Asiatic blues have extremely difficult systematics. Mostly these groups are in the huge and morphologically unstable young genera *Plebeius* KLUK, 1780 and *Polyommatus* LATREILLE, 1804 (habitus depends on host plants, biotopes, elevation etc.), but some problems are dotted inside of small and actually well-known genera. In the present paper I judge some questions of systematics in the genus *Glaucopsyche* SCUDDER, 1872.

Three opinions to this genus in Tian-Shan exist in the modern literature: 1. this area is inhabited by 3 independent species which are *G. alexis* (PODA), *G. aeruginosa* (STGR.) and *G. laetifica* (PÜNGELER) (KORB & BOLSHAKOV, 2011); 2. the area is inhabited by only 2 species [*G. alexis* (PODA), *G. laetifica* (PÜNGELER)], and the taxon *aeruginosa* (STGR.) is the subspecies of *G. alexis* (PODA) (HESSELBARTH et al., 1995); 3. the area is inhabited by 2 species [*G. alexis* (PODA), *G. laetifica* (PÜNGELER)], and the taxon *aeruginosa* (STGR.) is only an infrasubspecific form of *G. alexis* (PODA) (TUZOV et al., 2000).

The syntypes of *Lycaena alexis laetifica* PÜNGELER, 1898 and *Lycaena cyllarus aeruginosa* STAUDINGER, 1881 are preserved in the Museum für Naturkunde (Berlin), the type material of *Papilio alexis* PODA, 1761 is lost. For the stability and the indication of diagnostic features it is absolutely necessary to designate lectotypes and a neotype of all of them.

***Lycaena alexis laetifica* PÜNGELER, 1898:** 57. Type locality by the original description: "Ili flumen" and by the original labeling: "Asia centr., Ili [river]". Syntype material: 2 ♂♂, 1 ♀ (NEKRUTENKO, 2000: 270). In the type series there is a ♂ designated clearly by PÜNGELER as "Type", but it was never published by him. This ♂ specimen is selected here as the lectotype - original and additional labeling see col. pl. 1: 3.

The genitalia of the lectotype ♂ specimen see figs. 1, 6c, 7c.

***Lycaena cyllarus aeruginosa* STAUDINGER, 1881** (Stettiner Ent. Z. 42: 285-286). Type locality by the original description: "...vom Ala Tau". Syntypes: 2 ♂♂, 1 ♀ (NEKRUTENKO, 2000: 201). The syntype series consists of two species, which easily can be separated by the ♂ genitalia (figs. 2-7) and by the habitus (col. pl. 1: 4-21); actually the two specimens, 1 ♂, 1 ♀, from Saissan environs belong to *G. alexis* (PODA), and 1 ♂ from Ala Tau (Dzhungarsky Alatau Mts. in Kazakhstan) belongs to *L. c. aeruginosa* STGR. (col. pl. 1: 7-9); it is important to note that this specimen was first listed in the original description: "Das einzige vom Ala Tau eingesandte ♂.." (STAUDINGER, 1881: 285). So we know exactly which specimen Dr. O. STAUDINGER used for describing *L. c. aeruginosa*; this ♂ is here designated as lectotype (col. pl. 1: 7, 8), - original and additional labeling see col. pl. 1: 9.

The genitalia of the lectotype ♂ see figs. 2, 6d, 7a.

The type locality for this taxon, accordingly to the Art. 76.2 of ICZN is: "Lepsa" by the lectotype designation.

***Papilio alexis* PODA, 1761:** 77. Type locality by the original description: Graz environs [Austria]. The type material is lost (HESSELBARTH et al., 1995: 568). A neotype ♂ is here designated and figured with all labels (col. pl. 1: 5-7)

The genitalia of the lectotype ♂ see figs. 4, 6b, 7b.

The type locality for this taxon accordingly to the Art. 76.3 of ICZN is: "Austria, Kumberg environs near Graz" by the neotype designation. The neotype ♂ is deposited in the Zoological Museum of the Moscow University.

These 3 species have good and constant differences:

Feature / Species	alexis	aeruginosa	laetifica
Male wings upperside	Marginal border bright, wider than in other two species; it is especially visible in hindwing	Marginal border not bright, at least 2 times narrower than in alexis; it is especially visible in hindwing	Marginal border bright but very thin, it is especially visible in hindwing

Feature / Species	alexis	aeruginosa	laetifica
Male wings underside	Bluish or greenish suffusion in hindwing always covers surface completely; black spots in hindwing can be present	Bluish or greenish suffusion in hindwing never covers surface completely; black spots in hindwing never present	Bluish or greenish suffusion in hindwing never covers surface completely; black spots in hindwing never present
Forewing form in male	Outer margin and anal margin are almost a right angle	Outer margin and anal margin are always obtuse angle	Outer margin and anal margin are almost a right angle
Aedoeagus	Length is less than valva; width is always 2 times more than width of valva; form is conical with one cog on apex	Length is less than valva; width is always 2 times less than width of valve; form is bottle-formish with two cogs on apex	Length is almost equal to valva; width is always 2 times more than width of valve; form is straight with two cogs on apex
Vesica	Having two long and narrow cornuti	Having two short and wide cornuti	Having one cornutus with big cogs
Uncus/gnathos connection	As it is shown in figs. 6a, b	As it is shown in figs. 6d, e	As it is shown in figs. 6c, f

The available material of *Glaucopsyche* from Tian-Shan was revised. There are the following conclusions regarding the distribution of the genus in this territory (fig. 8):

Glaucopsyche laetifica (PÜNGELER, 1898) is distributed locally in the Ili and Charyn river valleys, also two populations are found in the northern coastline of the Balkhash Lake; a new locality for this species is Semipalatinsk Nuclear Test Site (20.V.2010, Kazakhstan, Pavlodar Prov., Semipalatinsk Nuklear Test Site, NW coast of the lake Karosar, 51°7'28"N 77°34'E, leg. P. EGOROV) (col. pl. 1: 16; fig. 6f), this is the northern limit of distribution for this species.

Glaucopsyche alexis (PODA, 1761) is distributed locally in the lowlands and midlands of the northern gorges of Dzhungar Alatau Mts., Terskey Ala-Too Mts., Transili Alatau Mts., in the southern slopes of Kungey Ala-Too Mts., some parts of Inner Tian-Shan (Naryntoo Mts., Moldo-Too Mts.) and Ferghana valley (plain parts and lowlands in foothills of Ferghansky Mts.). In Kyrgyz Mts. it is known only from the Chon-Kuurchak valley near Bishkek.

Glaucopsyche aeruginosa (STAUDINGER, 1881) is distributed locally in the midlands and highlands of Dzhungaria (Dzhungarsky Alatau Mts. and Boro-Khoro Mts.), Kungey Ala-Too Mts., Transili Alatau Mts., Kyrgyz Mts., and in West Tian-Shan (Chatkalsky Mts., Syrdaryinsky Karatau Mts., Talassky Mts., Pskemsky Mts.). From the Middle Asiatic region also *G. a. tshatkala* KORB, 1997 **comb. et stat. nov.** (described as *Albulina tshatkala*; type locality: Uzbekistan, Chatkal Mts., Kumbel range, Beldersaj valley) is known. The holotype of *G. a. tshatkala* KORB, 1997 **comb. et stat. nov.** differs from the lectotype of *G. aeruginosa* (STGR.) and all other specimens of this species from North and Inner Tian-Shan (col. pl. 1: 7-12, 14, 15, 17) by the intensity and size of the greenish suffusion of the hindwing underside.

The distribution of *G. aeruginosa* (STGR.): the nominotypical subspecies flies in Dzhungaria and North Tian-Shan, and *G. a. tshatkala* KORB **comb. et stat. nov.** in West Tian-Shan.

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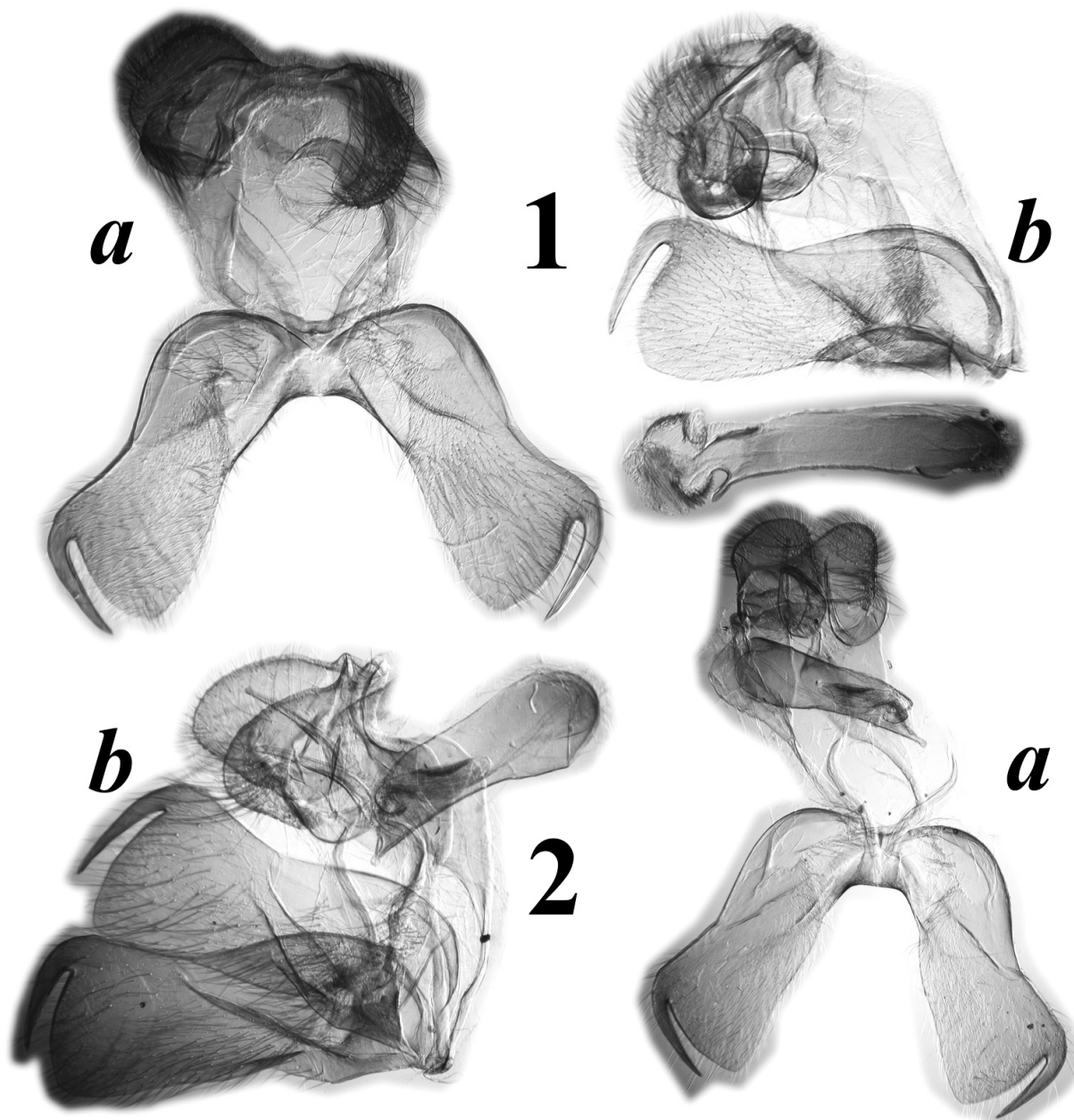
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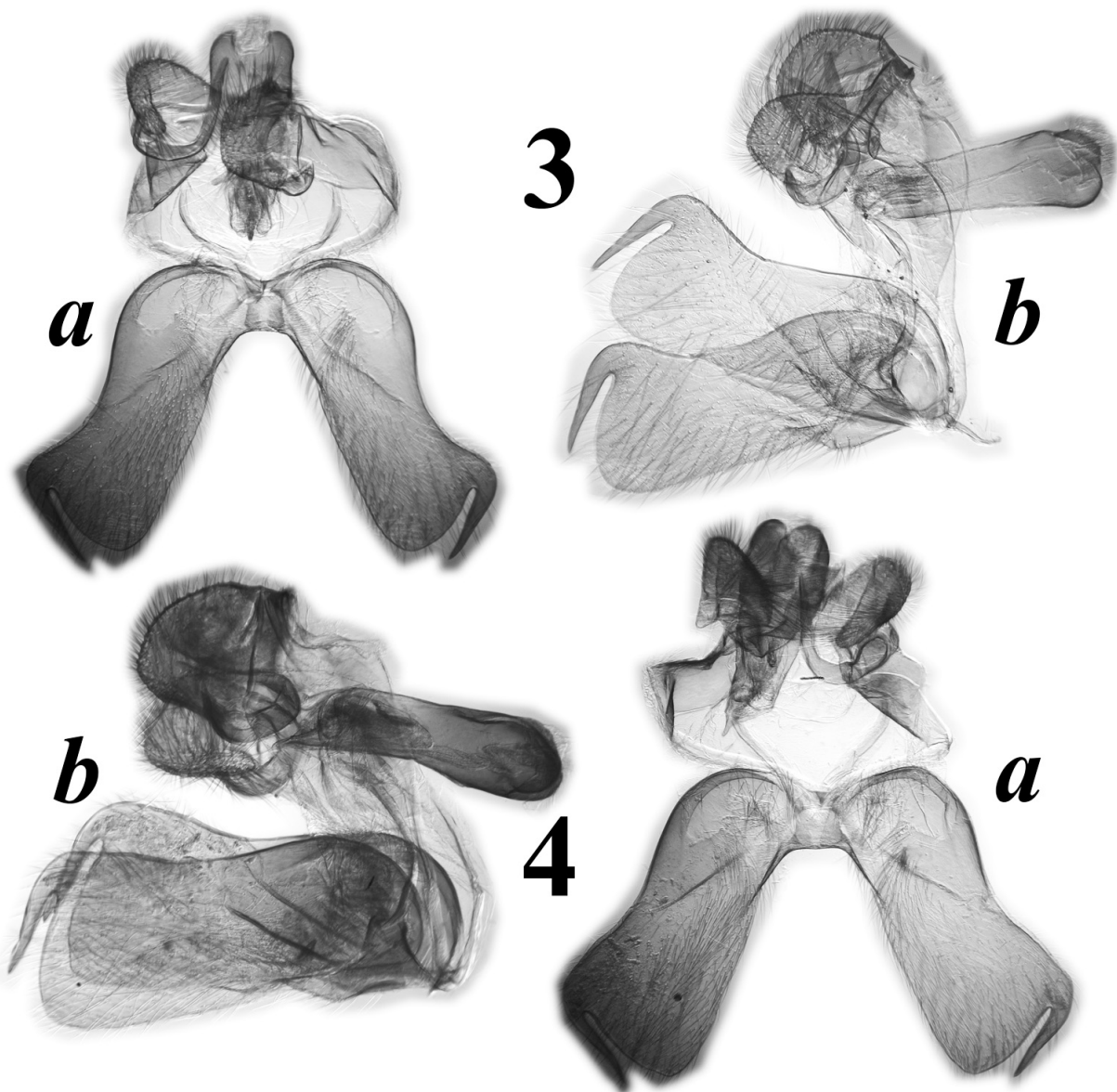
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Figs. 1, 2: ♂ genitalia of *Glaucopyche* species (a - frontal view, b - lateral view). (1) *Glaucopyche laetifica* (PÜNGELER, 1898), lectotype; (2) *Glaucopyche aeruginosa* (STAUDINGER, 1881), lectotype.



Figs. 3, 4: ♂ genitalia of *Glaucopsyche alexis* (PODA, 1761) (a - frontal view, b - lateral view). (3) , 12.VI.2006, Kyrghyzstan, Kyrghyz Mts., Tee-Ashuu Pass, 1600 m, leg. S. K.KORB; (4) neotype.

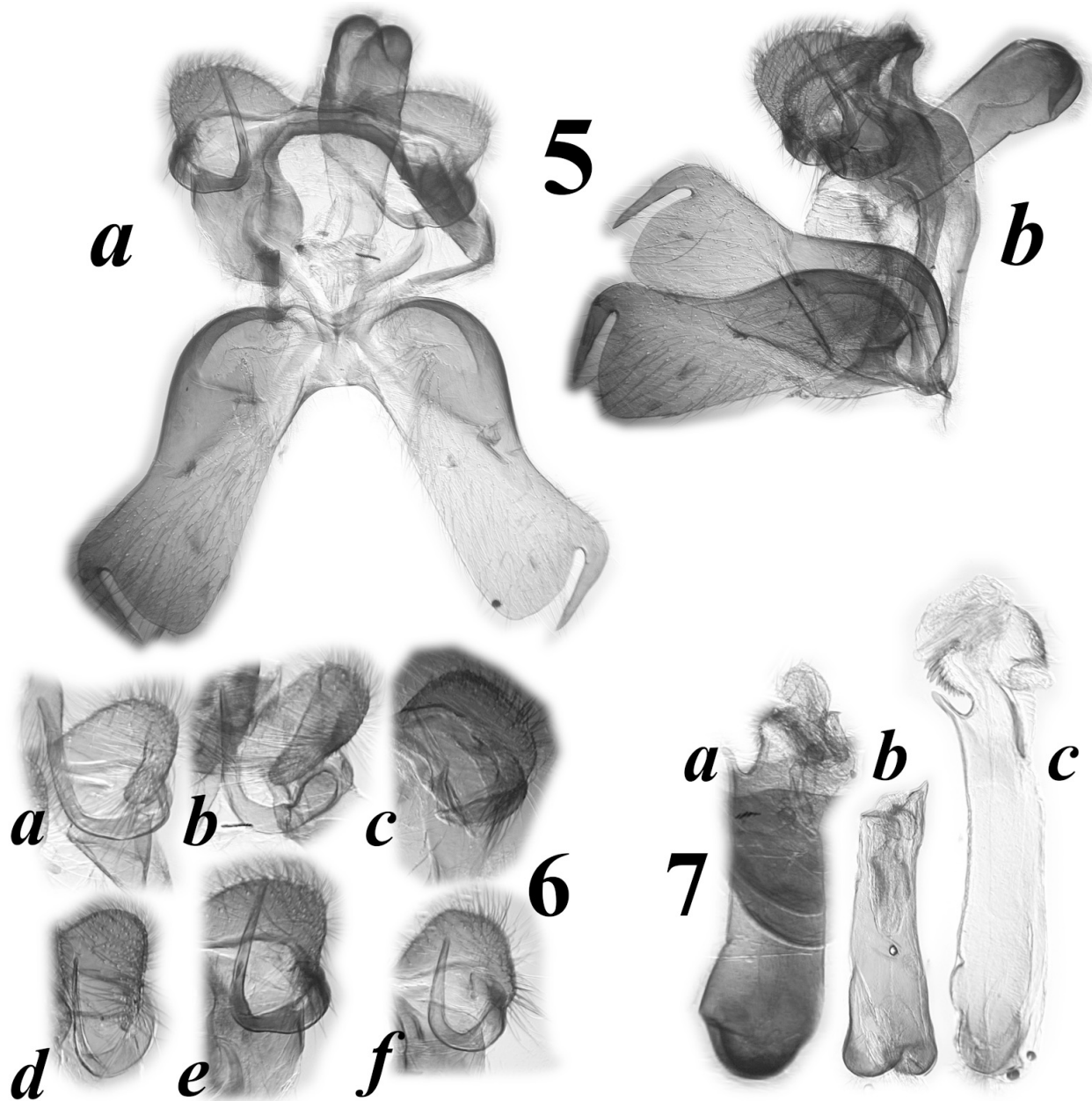


Fig. 5: *Glaucopsyche aeruginosa* (STAUDINGER, 1881), 22.-25.VI.2009, Kyrghyzstan, Suusamyр valley, Sary-Kaiky mountains, 2400 m, leg. S. K.KORB (a - frontal view, b - lateral view).

Fig. 6: Uncus and gnatos connection: (a, b) *Glaucopsyche alexis* (PODA, 1761), a: ♂ specimen from the type series of *Glaucopsyche aeruginosa* (STAUDINGER, 1881), b: neotype; (c, f) *Glaucopsyche laetifica* (PÜNGELER, 1898), c: lectotype, f: 20.V.2010, Kazakhstan, Pavlodar Prov., Semipalatinsk Nuklear Test Site, NW coast of the lake Karosar, 51°7'28"N 77°34'E, leg. P. EGOROV; (d, e) *Glaucopsyche aeruginosa* (STAUDINGER, 1881), d: lectotype, e: 22.-25.VI.2009, Kyrghyzstan, Suusamyр valley, near Suusamyр settlement, 2500 m, leg. S. K.KORB.

Fig. 7: Aedeagi: (a) *Glaucopsyche aeruginosa* (STAUDINGER, 1881), lectotype; (b) *Glaucopsyche alexis* (PODA, 1761), neotype; (c) *Glaucopsyche laetifica* (PÜNGELER, 1898), lectotype.

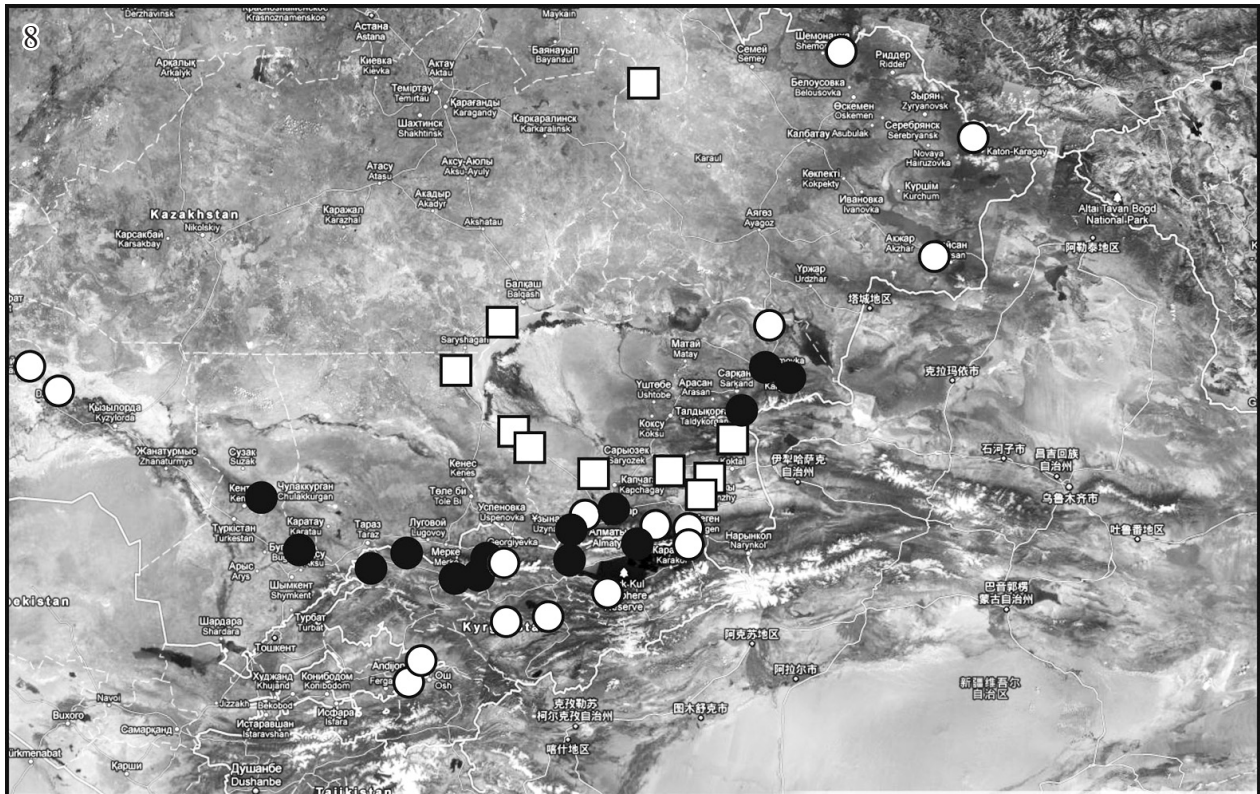


Fig. 8: Distribution map of *Glaucopsyche* spp. in Tian-Shan mountains and adjacent areas. White circles: *Glaucopsyche alexis* (PODA, 1761); black dots: *Glaucopsyche aeruginosa* (STAUDINGER, 1881); white squares: *Glaucopsyche laetifica* (PÜNGELER, 1898).
 Fig. 9: Biotope of *Glaucopsyche laetifica* (PÜNGELER, 1898): 20.V.2010, Kazakhstan, Pavlodar Prov., Semipalatinsk Nuclear Test Site, NW coast of the lake Karosar, 51°7'28"N 77°34'E (photo by S. Titov).
 Fig. 10: Biotope of *Glaucopsyche aeruginosa* (STAUDINGER, 1881): 25.VI.2009, Kyrgyzstan, Suusamyr valley, West Karakol river near Suusamyr settlement, 2300 m, 42°10'56.90" N, 74° 3'13.62" E (photo by the author).
 Fig. 11: Biotope of *Glaucopsyche alexis* (PODA, 1761): 27.VI.2009, Kyrgyzstan, Bishkek environs, near Koy-Tash, 1300 m, 42°42'9.16" N, 74°39'10.95" E (photo by the author).
 Fig. 12: Biotope of *Glaucopsyche alexis* (PODA, 1761) and *G. aeruginosa* (STAUDINGER, 1881): 18.VII.2009, Kyrgyzstan, Ala-Archa National Park, 1900 m, 42°36'9.49" N, 74°28'51.28" E (photo by the author).

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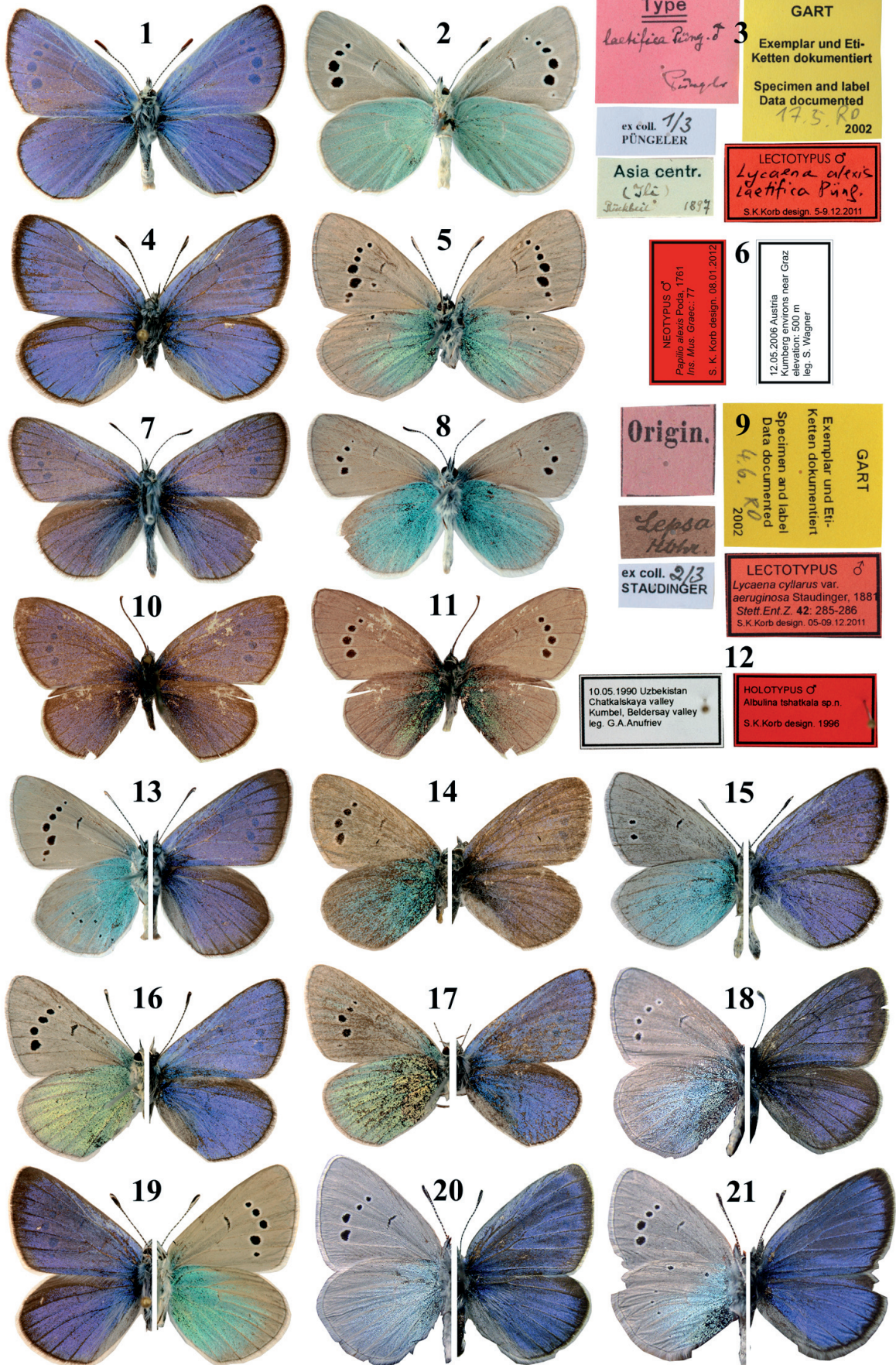
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12



Colour plate I



Figs. 1-3: *Glaucopsyche laetifica* (PÜNGELER, 1898), lectotype ♂; figs. 4-6: *G. alexis* (PODA, 1761), neotype ♂; figs. 7-9: *G. aeruginosa* (STAUDINGER, 1881), lectotype ♂; figs. 10-12: *G. aeruginosa tshatkala* (KORB, 1997), holotype ♂; fig. 13: *G. alexis* (PODA, 1761), ♂ from the syntype series of *Lycæna cyllarus aeruginosa* STAUDINGER, 1881; fig. 14: *G. a. tshatkala* (KORB, 1997), ♂, 22-25.VI.2009, Kyrgyzstan, Suusamyр valley, Sary-Kaiky mountains (right shore of West Karakol river), 2250 m (leg. S. K. KORB); fig. 15: *G. a. aeruginosa* (STGR.), ♂, 22.-25.VI.2009, Kyrgyzstan, Suusamyр valley, near Suusamyр settlement, 2500 m, leg. S. K. KORB; fig. 16: *G. laetifica* (PÜNG.), 20.V.2010, Kazakhstan, Pavlodar Prov., Semipalatinsk Nuklear Test Site, NW coast of the lake Karosar, 51°7'28"N 77°34'E, leg. P. EGOROV; fig. 17: *G. a. aeruginosa* (STGR.), 1.V.2010, Kazakhstan, Transili Alatau Mts., 140 km E Almaty, Chingelsu valley, leg. P. EGOROV; figs. 18-21: *G. alexis* (PODA), (18) 1.VII.1999, Kyrgyzstan, Moldo-Too Mts., E from Kara-Goo Pass, 1560 m, leg. G. A. ANUFRIEV; (19) 3.V.2011, Kazakhstan, Transili Alatau Mts., Koram, 800 m, leg. S. K. KORB; (20) 24.VI.1999, Kyrgyzstan, eastern part of Ferghana valley, 20 km W of Kochkor-Ata, 570 m, leg. G. A. ANUFRIEV; (21) 14.-16.VI.2004, Kyrgyzstan, Kyrgyz Mts., Chon-Kuurchak valley, 1700 m, leg. S. K. KORB.

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