

## 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 in **comb. et stat. nov.** in West Tian-Shan.

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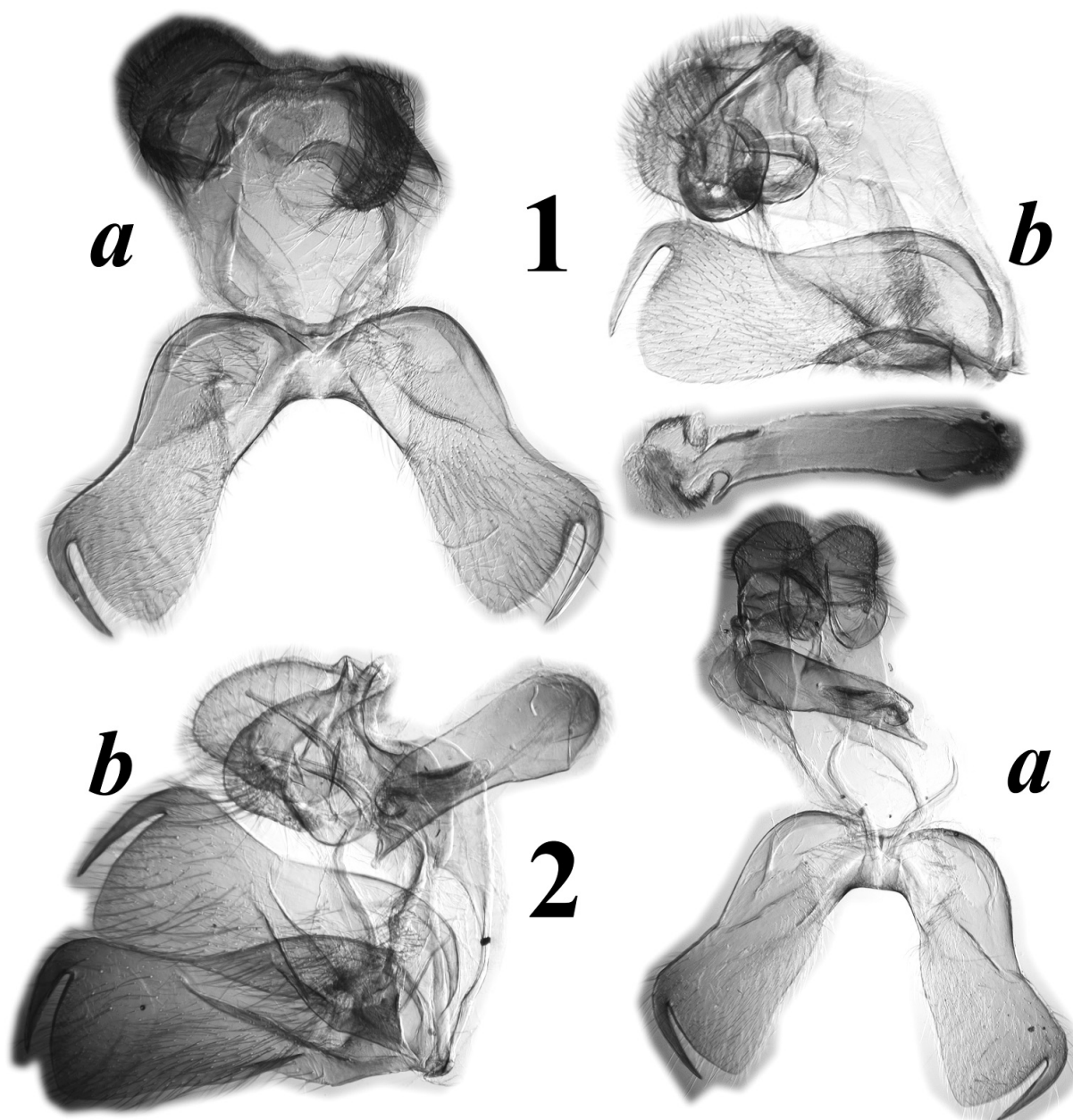
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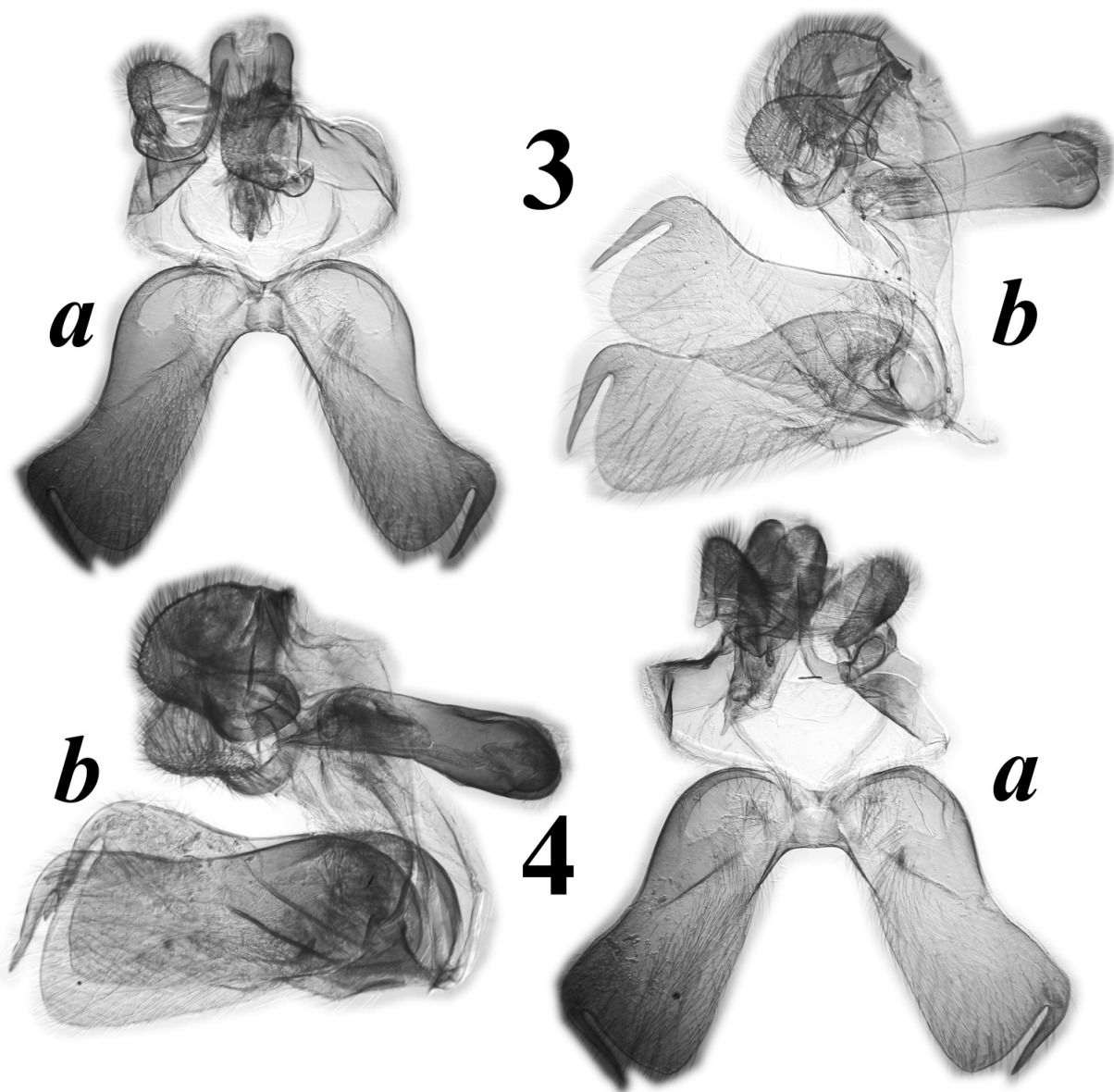
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Figs. 1, 2: ♂ genitalia of *Glaucopsyche* species (a - frontal view, b - lateral view). (1) *Glaucopsyche laetifica* (PÜNGELER, 1898), lectotype; (2) *Glaucopsyche aeruginosa* (STAUDINGER, 1881), lectotype.





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

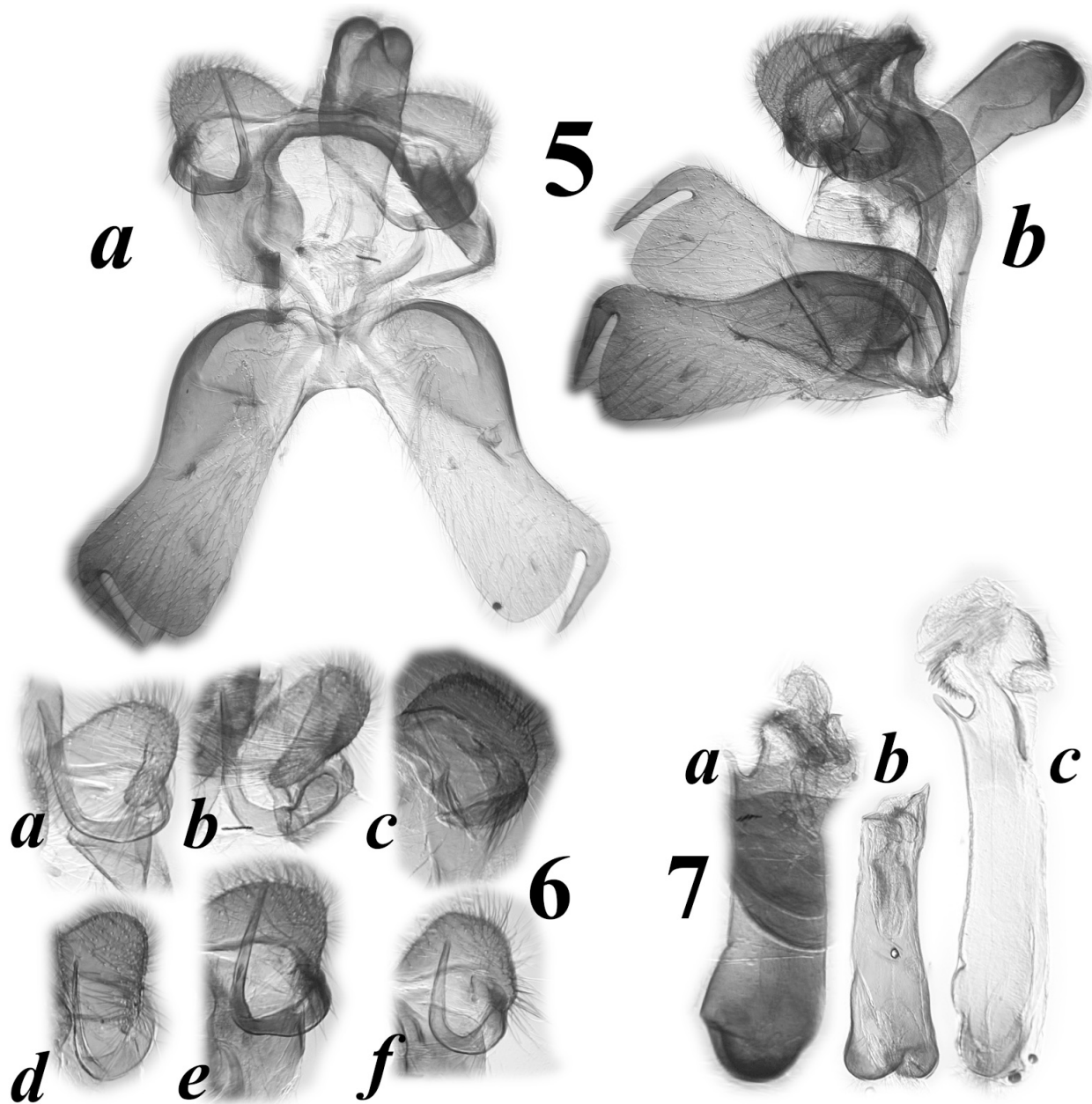


Fig. 5: *Glaucopsyche aeruginosa* (STAUDINGER, 1881), 22.-25.VI.2009, Kyrghyzstan, Suusamyr valley, Sary-Kaiky mountains, 2400 m, leg. S. K.KORB (a - frontal view, b - lateral view).

Fig. 6: Uncus and gnathos 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, Suusamyr valley, near Suusamyr settlement, 2500 m, leg. S. K.KORB.

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



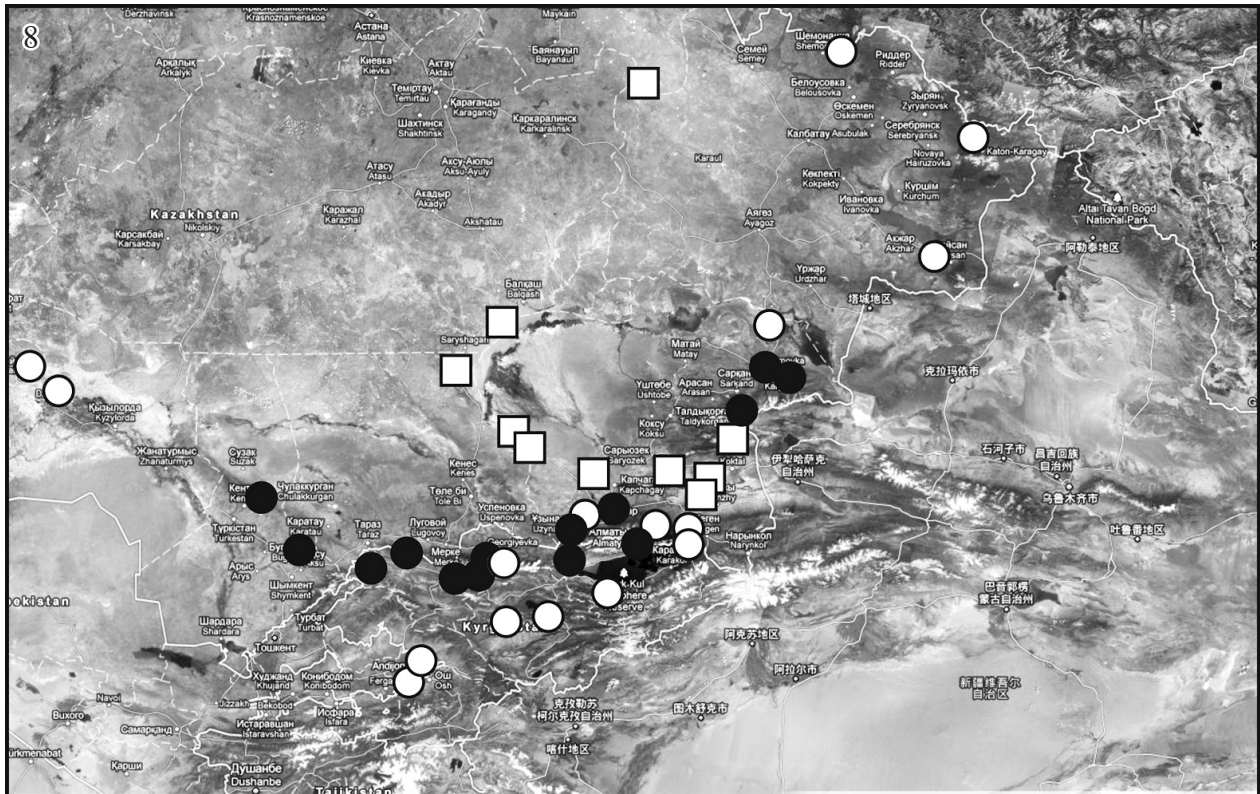


Fig. 8: Distribution map of *Glaucompsyche* spp. in Tian-Shan mountains and adjacent areas. White circles: *Glaucompsyche alexis* (PODA, 1761); black dots: *Glaucompsyche aeruginosa* (STAUDINGER, 1881); white squares: *Glaucompsyche laetifica* (PÜNGELER, 1898).

Fig. 9: Biotope of *Glaucompsyche 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 *Glaucompsyche 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 *Glaucompsyche 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 *Glaucompsyche 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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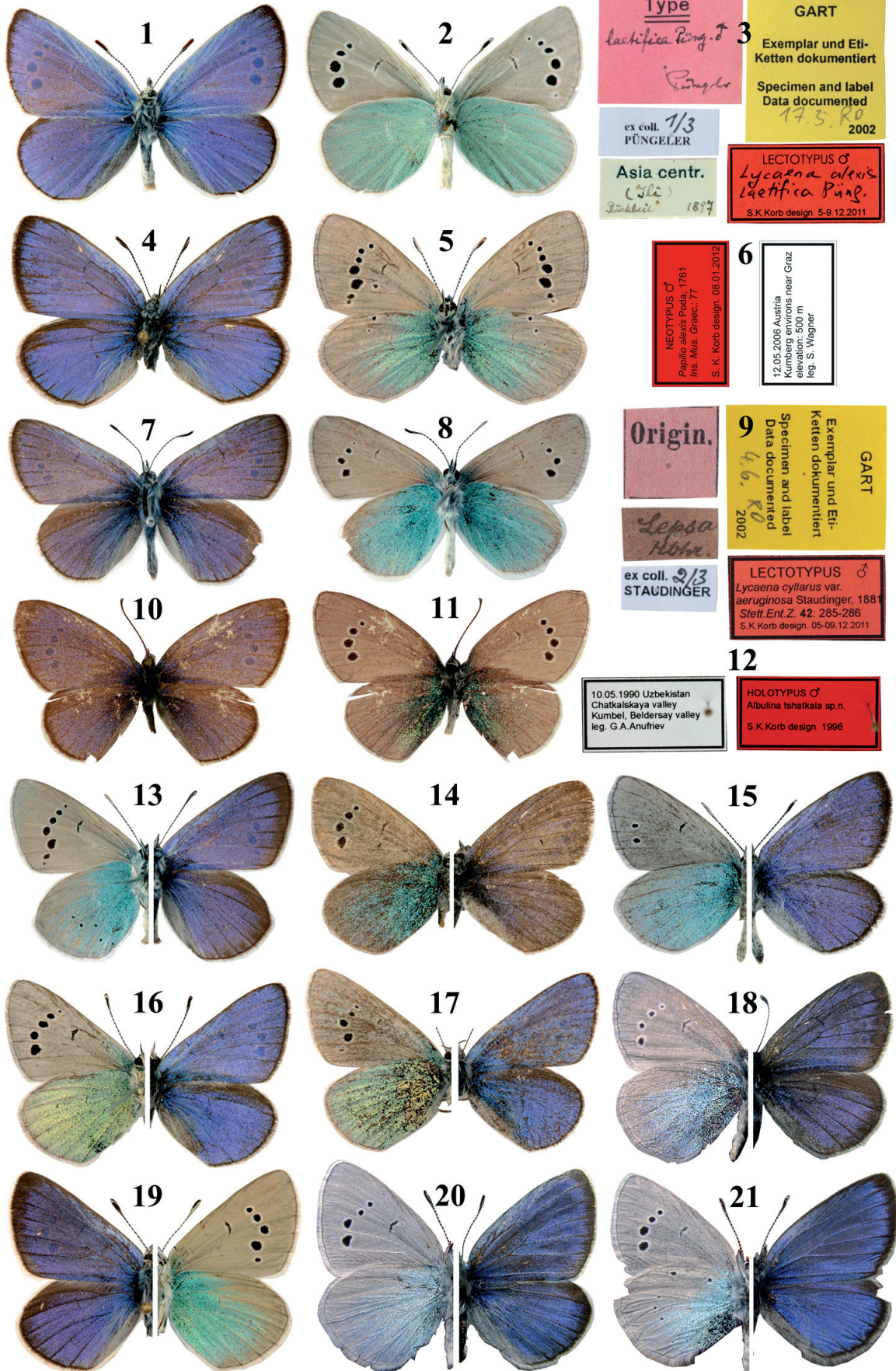


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# Colour plate I



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 *Lycaena cyllarus aeruginosa* STAUDINGER, 1881; fig. 14: *G. a. tshatkala* (KORB, 1997), ♂, 22-25.VI.2009, Kyrgyzstan, Suusamyr 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, Suusamyr valley, near Suusamyr settlement, 2500 m, leg. S. K. KORB; fig. 16: *G. laetifica* (PÜNG.), ♂, 20.V.2010, Kazakhstan, Pavlodar Prov., Semipalatinsk Nuclear 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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