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REDISCOVERY OF *TEPHRITIS KOGARDTAUICA* (DIPTERA, TEPHRITIDAE)

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Rediscovery of *Tephritis kogardtauica* (Diptera, Tephritidae). **Korneyev, S. V., Karimpour, Y., Mohamadzade Namin, S.** — A species, previously known from a short description based on the holotype lost in the bombing of Hamburg before description, *T. kogardtauica* Hering, 1944, was collected recently in great numbers in the Middle East, from Iran to Kyrgyzstan; it is redescribed, and the neotype is designated. The flies were found to infest flower heads of *Inula stenocalathia* (Rech. f.) Soldano, *I. peacockiana* (Aitch. & Hemsl.) Korovin, and *I. grandis* Schrenk ex Fisch. & C. A. Mey.

Key words: Diptera, Tephritidae, *Tephritis*, neotype, host plants, *Inula*.

Повторное открытие *Tephritis kogardtauica* (Diptera, Tephritidae). Корнеев С. В., Каримпур Ю., Мохамадзаде-Намин С. — Вид, ранее известный только по короткому описанию, основанному на голотипе, утраченном во время бомбардировки Гамбурга в 1943 г., *T. kogardtauica* Hering, 1944, был собран в большом количестве на Среднем Востоке, от Ирана до Кыргызстана; приведено иллюстрированное переописание вида, обозначен неотип. Установлено, что мухи развиваются в соцветиях девясилов *Inula stenocalathia* (Rech. f.) Soldano, *I. peacockiana* (Aitch. & Hemsl.) Korovin, и *I. grandis* Schrenk ex Fisch. & C. A. Mey.

Ключевые слова: Diptera, Tephritidae, *Tephritis*, неотип, кормовые растения, *Inula*.

Introduction

The genus *Tephritis* Latreille, 1804 includes over 170 described species occurring mostly in the Holarctic and, to a lesser degree, in the Afrotropical, Oriental, and Australasian Regions (Norrbom et al., 1999). Flies of this genus inhabit most climatic zones and altitudes, from the dry and hot semidesert to circumpolar tundra and subnival belt in the mountains. Larvae of *Tephritis* species usually feed in flower heads of asteraceous plants of the tribes Anthemideae, Astreae, Cardueae, Cichorieae, Inuleae, and Senecioneae.

While revising the Western Palaearctic species of *Tephritis,* vast material of an unknown species from the Middle East was found by the first author, and later collected and reared in numbers in Iran by all of the authors of this paper. Detailed analysis of literature data showed that these specimens belong to an almost unknown species *Tephritis kogardtauica* Hering, 1944.

Erich Martin Hering described it based on a unique specimen, which he had examined and photographed and then returned to the Hamburg University Museum. It was subsequently destroyed by bombing in 1943, i. e., the holotype had been already destroyed at the moment of publication of the name. As no type material exists, we consider designation of the neotype in this revision important to stabilize the use of this name in the future.

Its type locality was given by Hering (1944) as "Togus Tjurae; Kogard Tau (Centralasien)". Later, Foote (1984) and then Norrbom et al. (1999) erroneously placed this locality into "China", but it is clearly the same as Kugart River in Kyrgyzstan, where Tancré, the collector of this species found it along with some butterflies (Rothschild, 1909). Numerous specimens exactly from the same locality collected by Theodosius G. Dobrzansky in 1925 have been examined by SVK in the collection of the Zoological Institute (Saint Petersburg); however, they were not available for the neotype designation when this manuscript was being prepared. We therefore designate as the neotype

and paraneotypes the specimens from Tashkumyr environs, the locality in Kyrghyzstan, Ferghana valley, nearest to Kugart.

In 2014 a large series of specimens possibly belonging to this species (fig. 1, *1*) was surprisingly found and reared from the host plant, *Inula stenocalathia* (fig. 3) by Younes Karimpour, Saeed Mohamadzade Namin, Severyn Korneyev and Valery Korneyev in Iran near Urmia (West Azerbaijan). Detailed study of those specimens shows that they are conspecific to specimens from other localities (fig. 2).

Detailed illustrated descriptions and the photos of the species in nature are given.

Material and methods

The material is deposited in collections of the I. I. Schmalhausen Institute of Zoology, National Academy of Science, Kiev, Ukraine (SIZK), Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZISP), Nationaal Natuurhistorische Museum, Leiden (RMNH), Natural History Museum, London (BMNH), and Saeed Mohamadzade Namin private collection (SMNC). The holotype of *T. kogardtauica* was originally deposited in the collection of Zoologische Museum der Universität Hamburg (ZMUH), which was destroyed in the World War II (B. Merz, pers. comm.). Wing slides or other parts of the holotype are absent in Hering's collection deposited in the Natural History Museum, London (D. Whitmore, personal communication) or in the collection of Museum für Naturkunde, Berlin (S. Korneyev, personal observation).

Terminology and abbreviations generally follow White et al. (1999); additional abbreviations are used: AL — aculeus length; CL — costal cell length; AL/CL — ratio of aculeus length to costal cell length; WL — wing length; BL — body length.

Tephritis kogardtauica Hering, 1944

Hering, 1944: 15; 1947: 9; Foote, 1984: 130; Norrbom et al., 1999: 217.

Material. Type. Holotype ♀: [**Kyrghyzstan**:] "Togus Tjurae; Kogard Tau (Centralasien), leg. R. Tancre (erhalten geblieben)" (ZMUH) (destroyed). **Neotype:** ♀, [**Kyrghyzstan**:] "Kara-Tyt 10.6 km from Tash-Kumyr, 41°26.3′ N 72°13.4′ E, h = 950–1100 m, 20–21.05.1994 (Korneyev) (SIZK). **Paraneotypes:** same label as for the holotype 11 ♂, 4 ♀ (SIZK).

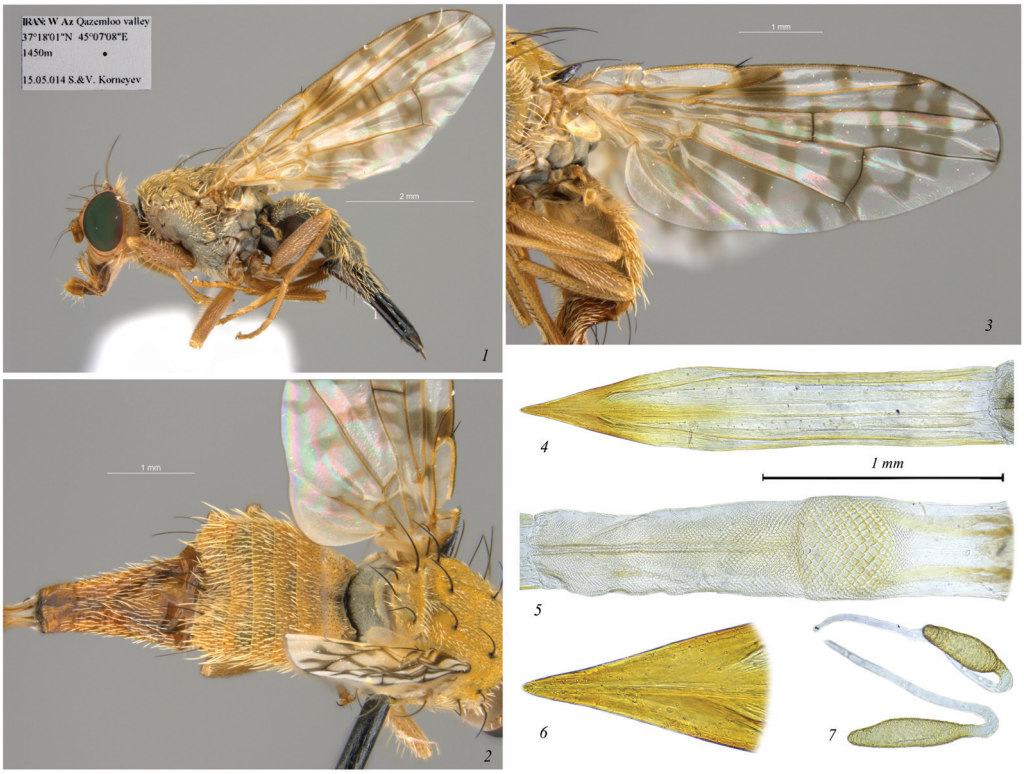

Fig. 1. *Tephritis kogardtaucia* (♀ from Iran): *1* — habitus; *2* — abdomen (dorsal view); *3* — wing; *4* — aculeus (ventral view); *5* — eversible membrane (ventral view); *6* — aculeus tip (ventral view); *7* — spermathecae.

Рис. 1. *Tephritis kogardtaucia* (♀ из Ирана): *1* — общий вид; *2* — брюшко (вид сверху); *3* — крыло; *4* — акулеус (вид снизу); *5* — выворачиваемая мембрана (вид снизу); *6* — вершина акулеуса (вид снизу); *7* — сперматеки.

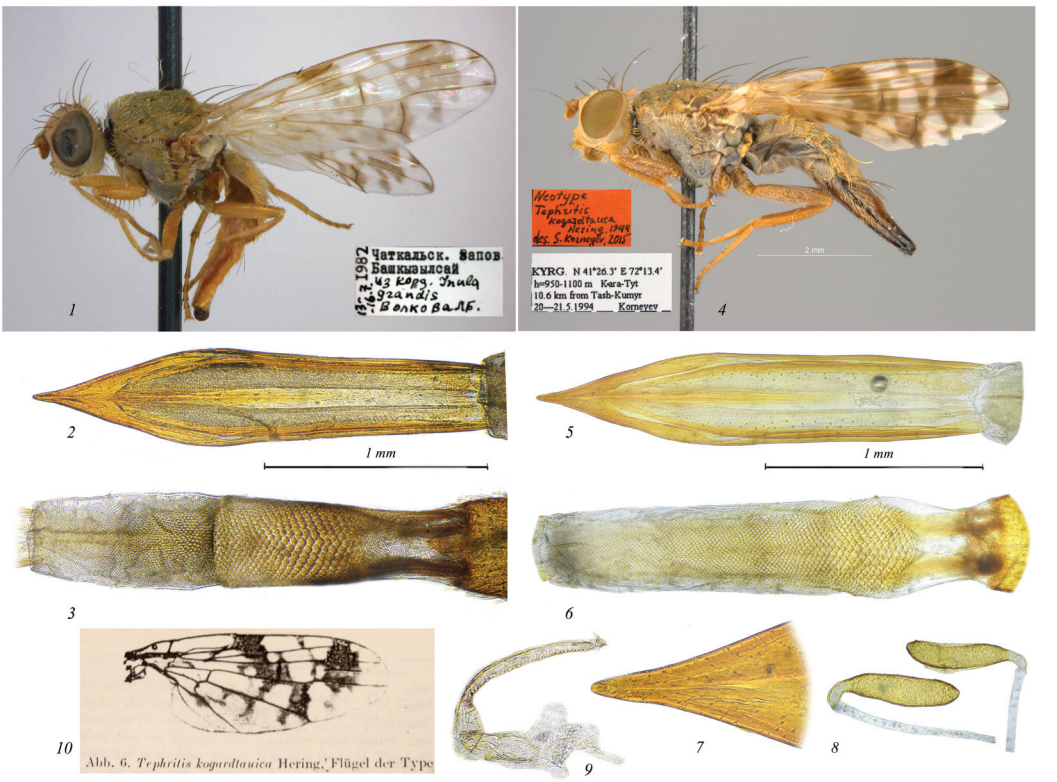

Fig. 2. *Tephritis kogardtaucia* from Uzbekistan (*1, 2, 3*), neotype ♀ (*4*) and paraneotypes (*5–9*) from Kyrgyzstan: *1, 4* — habitus; *2, 5* — aculeus, ventral view; *3, 6* — eversible membrane; *7* — aculeus tip, ventral view; *8* — spermathecae ; *9* — glans of phallus; *10* — original illustration of holotype.

Рис. 2. *Tephritis kogardtaucia* из Узбекистана (*1, 2, 3*), неотип ♀ (*4*) и паранеотипы (*5–9*) из Кыргызстана: *1, 4* — общий вид; *2, 5* — акулеус, вентральная сторона; *3, 6* — выворачиваемая мембрана, вентральная сторона; *7* — вершина акулеуса, вентральная сторона; *8* — сперматеки; *9* — гланс фаллюса; *10* — оригинальная иллюстрация голотипа.

Non-type material. Azerbaijan: Kjalvaz, Zuvand, 20.05.1936, 1 ♀ (Arnoldi) (ZISP). **Iran:** Western Azerbaijan Province: Qazemloo valley, 37°18.01′ N 45°07.08′ E, h = 1450 m, 15.05.2014, 79 ♂, 39 ♀ (S. & V. Korneyev, Y. Karimpour) (SIZK); idem, ex flower heads of *Inula stenocalathia*, coll. 19.06.2014, em. 27.06–12.07.2014, 35 ♂, 33 ♀ (S & V. Korneyev) (SIZK); idem, from flower heads of *I. stenocalathia*, coll. 19.06.2014, em. 29.06–15.07.2014, 90 ♂, 71 ♀ (Mohamadzade) (SMNC); Kurdistan Province, Marivan, Dezli Valley, 35°18.19′ N, 46°11.42′ E, 1900 m, ex flower heads of *Inula* sp., coll. 16.06.2014, em. 30.06–15.07.2014, 5 ♂, 3 ♀ (Mohamadzade & S. Korneyev) (SMNC). **Kazakhstan:** Kyrday pass, 13.07.1977, 5 ♂, 1 ♀; 5 km SW Alma-Aty, near Kargalinka vil., 5.05.1974, 1 ♂, 1specimen (sex unknown, abdomen lost); idem, 8.05.1974, 1 ♂, 6 specimens (sex unknown, abdomen lost) idem, 6 km SW, Alma-Aty, near. vil. Kargalinki, 13.05.1974, 2 ♂ (Ivannikov) (SIZK). **Kyrgyzstan:** Takyr-Ter mt., 20.07.1913, 1 ♂, 1 ♀ (Chernav[skiy]); Talas Ridge, 120 verst E from Aulie Aga, 1 ♂ (Reitter); Air-Tash pass, h = 2460, 18.07.1928, 4 ♀; Alai Ridge, h = 2600 m, Toku-Bay, 09.08.1928, 1 ♂; Ak-Bel River, 10.08.1928, 2 ♂ (Kuznetsov) (ZISP); Arslanbob, h = 2500, 20.08.1972, 1 ♂ (S. Parkhomenko); Boom valley, 29.08.1996, 1 ♂ (V. Korneyev) (SIZK); Kara-Archa village, SW Kyrghyz Alatau Mts., 35 km ESE Dzhambyl, 3.05.1994, 1 ♂, 1 ♀ (Korneyev) (SIZK); idem, Kara-Arthsa Tal 35 km ESE Dzhambyl, h = 1550 m, 3.05.1994, 3 ♂, 1 ♀ (Merz) (ZISP); Bishkek, Tshon-Aryk h = 1500 m, 5.06.1994, 5 ♂, 6 ♀, idem, h = 1200 m, 26.05.1994, 1 ♂, 2 ♀, idem, 29.06.1996 3 ♂, 1 ♀, idem, 20.06.1999 2 ♂, 7 ♀ (V. Korneyev) (SIZK); idem, Orto-Sai, 26.05.1994, 1 ♀ (Merz) (BMNH); Chatkal River valley, 15.3 km from Jangy-Bazar, 41°41.1′ N 70°39.7′ E, h = 1400–1700 m, 20–1.07.1998, 1 ♂, 2 ♀ (Kameneva & V. Korneyev) (SIZK); Ak-Terek, 15 km SW, Arslanbob, h = 1800 m, 13.08.1969 1 ♀ (Gorodkov) (SIZK); 11 km N Tas Kumyr, h = 900 m, 21.05.1994, 1 ♂ (Merz) (RMNH); Ferghana Ridge, Mikhaylovka, vic. of Kugart, 16.05.1925, 23 ♂, 32 ♀ (Th. Dobrzansky) (ZISP). **Uzbekistan:** Pacha-Ata, Namangan, Ferghana, 26.08.1928, 1 ♀ (Dzens-Litovskaya); Chatkal Nature Reserve, Bashkyzylsai, southern slope, *Inula grandis*, 16.06.1981, 1 ♀, idem, *I. grandis*, 10.07.1982, 1 ♂, 1 ♀, idem, *I. grandis*, 13–16.07.1982, 1 ♀, idem, 6.06.1982, *I. grandis* 1 ♂ (L. B. Volkova) (SIZK). **Tadjikistan:** Kondara pass, Varzob valley, h = 1100 m, 10.08.1937, 1 ♂ (Gussakovsky) (ZISP).

Diagnosis. *Tephritis kogardtauica* is a medium-sized (wing length 5.1–6.2 mm) species, mostly yellow colored with pale yellow wing pattern. *T. kogardtauica* can be easily distinguished from other Palaearctic species of *Tephritis* by the combination of pale yellow wing pattern and two separated spots on the apex of veins R_{4+5} and M, two hyaline spots in cell r_1, and the dark pattern in cell M not reaching posterior margin of the wing, oviscape widely white setulose and aculeus long and wide, evenly narrowed towards apex and narrowly rounded at apex, without steps or incisions. Thorax and abdomen are densely yellow-grey microtrichose, white setulose. The overwintered females differ by having black oviscape, whereas the fresh-reared flies of the summer generation have mostly brownish yellow oviscape. This species is associated with *Inula grandis* and *I. stenocalathia* (fig. 3).

Description. Head (fig. 1, *1*; 2, *1*, *4*). Yellow, except black ocellar triangle and occiput, length: height: width ratio 1 : 1.1 : 1.4. Frons as wide as long. Eye 1.4 times as high as long. First flagellomere of antenna 1.5 times as long as wide. Gena 0.5 times as high as length of first flagellomere. Ocellar, medial vertical, anterior orbital and frontal setae brown. Posterior orbital and lateral vertical white to yellowish white. Postocular and genal setulae mixed black and white, and setulae on distal part of palpus and on pedicel black.

Thorax (fig. 1, *1–2*; 2, *1*, *4*). Ground colour of scutum and scutellum brown to black, densely ochreous-grey microtrichose (golden-yellow in fresh specimens). Setulae white and acuminate; posterior notopleural seta whitish and lanceolate; posterior anepisternal and anepimeral setae brown. Apical scutellar seta 1/2 as long as basal scutellar seta.

Legs (fig. 1, *1*; 2, *1*; 2, *4*). Entirely yellow to brownish yellow. Fore femur with two posterodorsal rows of shorter white setae and one posteroventral row of long yellowish brown setae.

Wing (fig. 1, *3*) with reticulate pale brownish yellow pattern. Cells bc and c hyaline. Pterostigma brown, without hyaline spots. Cell r_1 posterior to pterostigma brownish yellow, two trapeziform hyaline spots distal to R_1 apex separated by narrow brown band; apex of cell r_1 entirely brownish yellow. Cell r_{2+3} hyaline at base, with dark area posterior to

Fig. 3. *Inula stenocalathia* (Rech. f.) Soldano, the host plant of *T. kogardtauica* (*1*), and a female of *T. kogardtauica* (*2*, 3) on its flower heads.

Рис. 3. *Inula stenocalathia* (Rech. f.) Soldano, кормовое растение *T. kogardtauica* (*1*); самка *T. kogardtauica* (*2*, 3) на его соцветиях.

pterostigma; three hyaline spots posterior to spots in r_1 separated by narrow yellow bands, medial one 2–3 times as wide as proximal and distal spots. Preapical brown area (posterior to cell r_1 apex) with 2–4 smaller hyaline spots. Apex hyaline with small triangular dark spot on R_{4+5} vein. Cell br hyaline in basal half and dark in apical half, usually with 2 small round hyaline spots. Crossvein r–m dark with 4 hyaline dots usually merged into narrow hyaline vertical lines. Cell r_{4+5} at the level of dm-cu with large hyaline spot, middle third of cell r_{4+5} brown; with 3–5 round hyaline spots, often merging, subapical hyaline spot in cell r_{4+5} subrectangular, apex with small triangular dark spot on R_{4+5} and M. Cell m with conspicuously reduced brownish yellow pattern usually not reaching its posterior margin. Cell dm with hyaline base, and two dark spots in apical part of cell divided by hyaline area. Cell cu in its medial part with 3 brownish or greyish bars separated by large hyaline spots posteriorly opened into entirely hyaline posterior half of cell cu, and 2 brownish areas at base and apex of it. Anal cell with one pale-yellow spot. Anal lobe is entirely hyaline.

Abdomen (fig. 1, *2*). Abdominal tergites yellow; densely microtrichose, white setulose and setose; male tergite 5 and female tergites 5 and 6 with dark brown to black marginal setae. Sternites brown, white setulose, moderately wide, male sternite 5 posteriorly incised. Female sternite 6 with anteromedial apodeme. Abdominal pleura matt grey or black.

Terminalia. Male. Epandrium and glans (fig. 2, *9*) similar to other *Tephritis* species.

Female. Oviscape longer than four posteriormost abdominal tergites combined but shorter than abdomen, widely white setulose ventrally and on anterolateral corners dorsally, black setulose and setose dorsomedially and posteriorly (fig. 1, *1–2*; 2, *1*, *4*). Overwintered specimens with black oviscape, but females of summer generation normally with brownish yellow oviscape (fig. 1, *1–2*). Eversible membrane with two pairs of taeniae 0.25 times as long as membrane itself; membrane with dentate scales, large and blunt (fig. 1, *5*; 2, *3*, *6*). Aculeus 4.5 times as long as wide, with evenly acute apex (fig. 1, *4*; 2, *2*, *5*). Two moderately long, papillose spermathecae 4 times as long as wide (fig. 1, *7*; 2, *8*).

Measurements. WL = 5.1–6.2 mm; CL =1.25 mm. AL = 2.1 mm; BL = 5.8–6.5 mm (n = 5) (♂), 7.2–7.9 mm (n = 5) (♀).

Host plants. The larvae feed in flower heads of *Inula grandis* Schrenk ex Fisch. & C. A. Mey (reared in Uzbekistan by L. Volkova and swept from this plant in Kyrgyzstan by V. Korneyev) and a plant, originally identified as *I. stenocalathia* (Rech. f.) Soldano (fig. 3), from which it was reared in West Azerbaijan (Iran) by S. Mohamadzade Namin, S. Korneyev, and V. Korneyev; the same plant has been identified later as *I. peacockiana* (Aitch. & Hemsl.) Korovin by Prof. V. Mozaffarian (Department of Botany, Research Inst. of Forests and Rangelands, Tehran). The differences between two latter nominal plant species is unclear, as well as their possible synonymy. *I. peacockiana* occurs from Iran through Turkmenistan to Kyrghyzstan.

Remarks. *Tephritis kogardtauica* is recorded here for the first time from Azerbaijan, Kazakhstan, Uzbekistan, Tajikistan, and Iran. In Uzbekistan and Kyrgyzstan it is associated with *Inula grandis* Schrenk ex Fisch. & C. A. Mey; another species infesting flower heads of that plant is *Goniurellia tridens* (Hendel, 1910) (SIZK collection data), whereas in Iran (and possibly in Azerbaijan) larvae of *Tephritis kogardtauica* infest flower heads of *Inula stenocalathia* (Rech.f.) Soldano, which is a superficially similar tall plant with big leaves, but with somewhat larger flower heads with longer semifloscules. *G. longicauda* Freidberg, 1980, another associated fruit fly species, infests this plant in Iran (S. Korneyev, Karimpour & Mohamadzade Namin, unpublished data), but the two mentioned species of *Goniurellia* have only minor differences (presence or absence of small hyaline dots on the wing pattern) (Freidberg, 1980).

No reliable differences between the specimens of *T. kogardtauica* reared from *I. grandis* in Kyrgyzstan and *I. stenocalathia* in Iran were found in body coloration, wing pattern and genital structures, and we consider them conspecific.

T. kogardtauica occurs in the lower and middle belt of mountains, from 900 to 2600 m a. s. l. on non-grazed grasslands, often on steep slopes filled mainly by *Serratula* spp. (Aster-

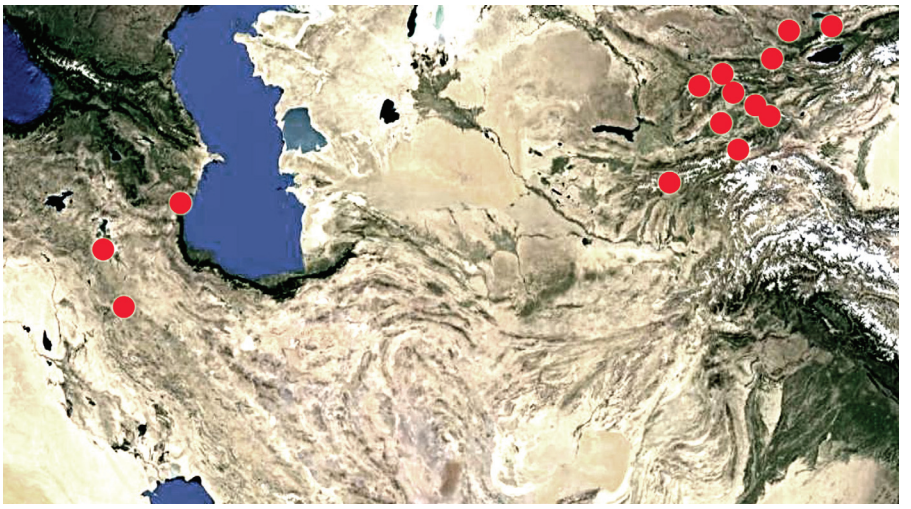

Fig. 4. Distribution of . *T. kogardtauica* in the Middle East.

Рис. 4. Распространение *T. kogardtauica* на Среднем Востоке.

aceae), and with *Inula* spp. plants as subdominants. The map (fig. 4) shows a disjunction between the localities in Azerbaijan and Western Iran, on one hand, and Western Ten-Shan, on the other hand. The areas in between, in Khorassan (Iran) and Kopetdagh (Turkmenistan) are still poorly examined, so T. *kogardtauica* is believed to occur in that area at least as a very local species.

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