

A remarkable find of *Duilius tenuis* Stål, 1858 (Homoptera: Cixiidae) in the eastern South Africa

Примечательная первая находка *Duilius tenuis* Stål, 1858 (Homoptera: Cixiidae) на востоке Южной Африки

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КЛЮЧЕВЫЕ СЛОВА: Hemiptera, Fulgoroidea, носатки, *Tamarix*, олигофагия, разрывы ареалов.

ABSTRACT. *Duilius tenuis* Stål, 1858 (Cixiidae), formerly known from Namibia and the Namibia–South Africa border as monophagous on indigenous *Tamarix usneoides*, has been recorded away from its known range in the easternmost Northern Cape on an invasive species of tamarisk.

РЕЗЮМЕ. *Duilius tenuis* Stål, 1858 (Cixiidae), ранее известный из Намибии и с границы Намибии с ЮАР как монофаг нативного *Tamarix usneoides*, найден вдали от его известного ареала, на самом востоке Северо-Капской провинции на заносном виде тamarиска.

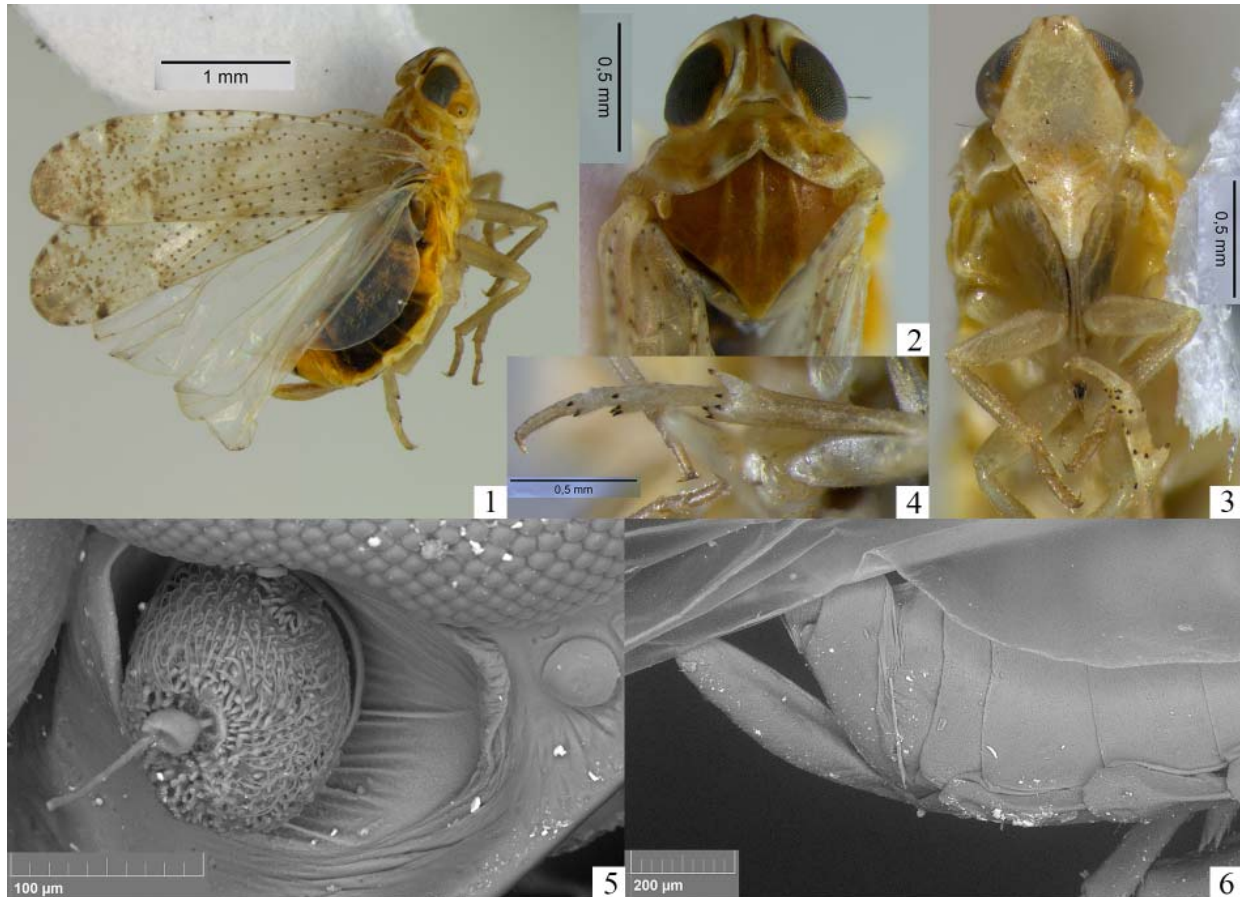
The author obtained several specimens of the cixiid *Duilius tenuis* Stål, 1858, collected near Hanover, Northern Cape (Figs 1–6). This planthopper was previously known from Namibia and the Namibia–South Africa border as a monophage on the only tamarisk species indigenous to Africa, *Tamarix usneoides*. Our colleague Michael Stiller (Agricultural Research Council, Pretoria) kindly informed us that he did not find *D. tenuis* in the National Collection of Insects and suggested that the species was not known in the Republic of South Africa. The new record is the first find of this species in eastern half of the Southern Africa, more than 500 km east of its known range, and, most notably, on an invasive tamarisk, almost certainly *T. ramosissima*, and outside the known range of the wild tamarisk *T. usneoides* [Foden, Potter, 2005]. Potential further finds could close this gap in the distribution of *D. tenuis*.

The genera *Tamarix* and *Duilius* Stål, 1858 have similar ranges: most of their species (*Tamarix* ~60 spp., *Duilius* ~25 spp.) inhabit the arid part of the Palearctic – Tethyan (Ancient Mediterranean) [Emeljanov, 1974], and one species is far removed from the main range, liv-

ing in southwestern Africa, in tamarisk — *T. usneoides*, in *Duilius* — *D. tenuis*. Almost all species of the genus *Duilius* are tamarisk oligophages [Emeljanov, 2015], including *D. tenuis* [Huang, Holzinger, 2010].

Tamarisks have significant ornamental value, as they bloom profusely and for a long time, and therefore were widely transported around the world, began to run wild, displacing representatives of the local flora, and in some places turned into noxious weeds, for example, in the USA [Marlin et al., 2017]. There are five invasive tamarisk species in South Africa, two of which (*T. ramosissima* = *pentandra*, *T. chinensis* = *juniperina*) are assessed as environmental weeds in need of biological control; these species form hybrids with *T. usneoides* in nature [Mayonde et al., 2015]. It remains unclear how these hybrids spread and whether anthropogenic dispersal of *T. usneoides* as an ornamental species took place.

The genus *Duilius* is represented by numerous species in the arid part of the Palearctic (Tethyan), including 7 species in North Africa (Canary Islands, Morocco, Algeria, Tunisia, Egypt, Sudan, Somalia), and only one species in South Africa, far from the main range of the genus [Dmitriev et al., 2022]. Surprisingly, the genus was first described from the South African exclave, namely, the Namib Desert (territory of modern Namibia) [Stål, 1858]. The first Tethyan representative of the genus *Duilius* in the present sense, discovered in Spain, was described only eight years later as a new genus and species, *Hemitropis bipunctata* Fieber, 1866 [Fieber, 1866]. Another eight years later, the genus was described a third time as *Haplacha* Lethierry, 1874 from Algeria [Lethierry, 1874]. It should be mentioned that the name *Haplacha* was also proposed by Fieber, but without a description, i.e. as *nomen nudum* [Metcalf, 1936]. The type species of the genus *Haplacha*, *D. seticulosus* (Lethierry, 1874) [Lethierry, 1874], was later



Figs 1–6. *Duilius tenuis*, female; bank of Seekoe River, 25 km NE of Hanover, Northern Cape, South Africa; on *Tamarix ?ramosissima*; September 2022: 1 — habitus; 2 — head and thorax, dorsal; 3 — anterior part of body, ventral; 4 — hind leg; 5 — antenna; 6 — terminal part of abdomen, lateral. 5–6 — SEM (BSE). Images: D.E. Shcherbakov.

Рис. 1–6. *Duilius tenuis*, самка; берег р. Секу, 25 км СВ Хановер, Северо-Капская провинция, ЮАР; на *Tamarix ?ramosissima*; сентябрь 2022: 1 — общий вид; 2 — голова и грудь сверху; 3 — передняя часть тела снизу; 4 — задняя нога; 5 — усик; 6 — вершина брюшка сбоку. 5–6 — СЭМ (BSE). Фото: Д.Е. Щербаков.

also found in Southern Europe (Spain, Sardinia, Sicily), Western and Middle Asia, Afghanistan, the Canary Islands, Morocco, Algeria, Tunisia, Egypt, Sudan, and Somalia [Nast, 1972; Dmitriev *et al.*, 2022]. The genus was described for the fourth time as *Duiliopsis* Bergevin, 1933 from southern Algeria [Bergevin, 1933].

Oshanin [1907] was the first to point out the synonymy of *Duilius* and *Hemitropis* Fieber, 1866 (and *Haplacha*), but apparently no one paid attention to this except Lallemand [1929]. The next attempt to synonymize made by Dlabola [1952] was also not accepted, the genus *Hemitropis* again resisted, and Dlabola [1960, 1961, 1965, 1968] abandoned this synonymy. Emeljanov [2007] confirmed the synonymy of *Duilius* and *Hemitropis*, and also reduced *Duiliopsis* to the subgenus of *Duilius*. The genus *Haplacha* left the scene without such sharp hesitation; its synonymy with *Hemitropis* was first pointed out by Puton [1899], followed by Oshanin [1907], Muir [1925], and others. An important subdivision of the genus *Hemitropis* was proposed by Dlabola [1985], who described the subgenus *Bitropis* Dlabola,

1985. The current division of the genus *Duilius* s.l. into subgenera was proposed by Emeljanov [2007]: *Duilius* Stål, 1855, s.str. (= *Hemitropis* Fieber, 1866; = *Haplacha* Lethierry, 1874) + *Duiliopsis* Bergevin, 1933 + *Bitropis* Dlabola, 1985.

In the subgenus *Bitropis*, the pygofer has a rudimentary wax area and lateral teeth (two) on the hind tibia. In the subgenus *Duilius* s.str., the wax area is absent, and the lateral teeth on the hind tibia are also absent. The subgenus *Duiliopsis* occupies an intermediate position: the wax area is absent, but one lateral tooth is retained.

As far as is known, all Cixiidae live in the soil at the larval stage, moving along cracks and crevices. The eggs of the few studied species with a well-developed ovipositor are laid in the soil and covered with waxy substance produced by the wax area on the pygofer. In *Duilius* females, the wax area on the pygofer is reduced or nearly so [Emeljanov, 2015], so they do not produce a waxy substance to cover the eggs; the place and pattern of oviposition are unknown, and larvae have never been observed.

Oviposition and larval life in the soil make it difficult or prevent the dispersal of Cixiidae with planting material transported by humans. In contrast, Cicadellidae oviposit in the stems and leaves of their host plants, and, for example, *Opsius stactogalus* Fieber, 1866 was brought with tamarisk to the New World and spread to both North and South America.

The fauna of specific phytophages of *Tamarix* is extremely rich and diverse, including various leafhoppers such as *Opsius* Fieber, 1866 (Opsini), *Megalopsius* Emeljanov, 1961 and *Tamaricades* Emeljanov, 1962 (Goniagnathini), as well as *Tamaricella* Zachvatkin, 1946 (Typhlocybinae) [Kovalev, 1995]. The fauna of true bugs is rich, including, in addition to phytophages, predators strictly tied to tamarisk bushes, such as *Aspilaspis* Stål, 1873 (Nabidae) [Kerzhner, 1981] and *Callistodema* Reuter, 1890 (Reduviidae) [Putshkov, Moulet, 2009].

In the subgenus *Bitropis* there are species that have switched to other plant families growing together with tamarisks (host change while maintaining oligophagy): *D. limonii* Emeljanov, 1964 is monophagous on *Limonium suffruticosum* (Plumbaginaceae), whereas *D. halimus* (Mitjaev, 1969) and *D. logvinenkoae* Emeljanov, 2007 have switched to succulent Chenopodiaceae (the last two species are apparently two independent switches). *D. tamaricis* (Puton et Lethierry, 1857) (subgenus *Duilius*) in addition to tamarisk has also been recorded on a species of another genus of Tamaricaceae, *Reaumuria*, a small (semi)shrub that differs from tamarisk in habit [Emeljanov, 2015]. *Duilius* was not recorded on the third genus of Tamaricaceae, *Myricaria*.

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