



# History of the secondary range formation and new findings of *Collomia linearis* Nutt. (Polemoniaceae) in Russia

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## ABSTRACT

This paper reports on the discovery of a new alien species for the flora of the Amur Region, *Collomia linearis* Nutt. (Polemoniaceae), and provides information about the species' location and the composition of the community in which it is found. Based on herbarium and literature data, the article examines the species' geographical distribution in Russia.

**Keywords:** pathway of invasion, dissemination, alien species, Trans-Siberian Railway, Russian Far East

## РЕЗЮМЕ

**Котенко О.В., Виноградова Ю.К. История формирования вторичного ареала и новые находки *Collomia linearis* Nutt. (Polemoniaceae) в России.** В статье сообщается о находке нового чужеродного вида для флоры Амурской области: *Collomia linearis* Nutt. (Polemoniaceae). Приведены сведения о местонахождении вида, составе сообщества с его участием. По гербарным и литературным данным рассмотрено географическое распространение вида по территории России.

**Ключевые слова:** вектор инвазии, распространение, чужеродный вид, Транссибирская железнодорожная магистраль, российский Дальний Восток

Railways are a way for plants to enter new territories (Faulkner et al. 2020). Species use railways to overcome geographical barriers and enter new (for them) regions, which is confirmed by new plant discoveries in various regions of our country (Borisova et al. 2017, Leostrin et al. 2018, Tokhtar et al. 2021, Motorykina 2023, Murtazaliev 2024).

The Trans-Siberian Railway (TSR) passes through the Amur Region in a submeridional direction, which creates conditions for the invasion of new alien species in this region (Voroshilov et al. 1966, Aistova 2004, Tokhtar et al. 2021, Seregin 2025). Some of them, such as, for example, *Plantago indica* L., have so far only been recorded in this region on railway embankments; however, most of these plant species have begun to colonize other anthropogenic habitats, such as roadsides, fields, and lawns.

*Collomia linearis* Nutt. (Polemoniaceae) is a North-American species. In its natural geographic range (Canada and the United States), it is found on riverbanks, in forests, on meadows, and along roadsides. *Collomia linearis* is characterized by ecological plasticity (Wilken 1978). In the Illustrated Flora (Hegi 1927), this species is not listed as occurring in Europe, and in a later book (Tutin 1972), it is listed for Europe as occurring only in Fennoscandia. Currently, it is registered not only in Europe (Norway, Sweden, Finland, Estonia, the Netherlands, the United Kingdom, Germany, Switzerland, Portugal, Spain, and Italy), but also in Argentina, Australia and Japan (Fig. 1) (GBIF 2025a).

This annual plant was introduced to Russia in the second half of the 19th century. The herbarium of Moscow State University contains two herbarium specimens from Bertol-

di's (1865) collection in culture "in Taurien" (MW0622787, MW0622788, Seregin 2025). Subsequently, this species began to actively expand its secondary distribution area in Russia, primarily through transportation routes.

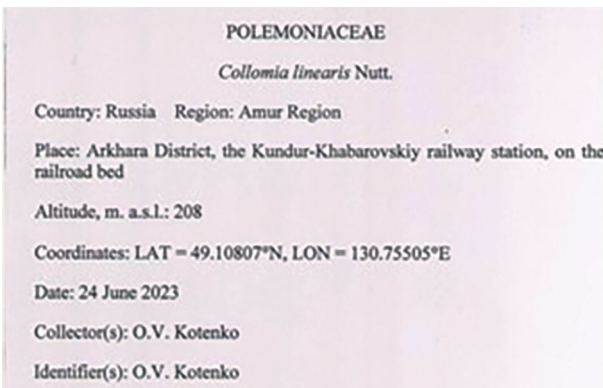
The purpose of this work was to report the discovery of a new alien species, *C. linearis*, in the Amur Region, and to analyze herbarium and literature data on the distribution of this species.

The study was conducted during geobotanical study and is based on relevés taken along the railroad. The species nomenclature is according to POWO (2025). In characterizing the geographical distribution of this species, we studied data from herbaria (LE, MHA, MW, SVER, KUZ, NSK, and VLA) and literature data (Ivanova & Tuganaev 1969, Ovyosnov & Shilova 1975, Abramov 1989, Papchenkov & Dimitriev 1989, Melnikova 1993, Tarasova 1994, Teryokhina 1995, Vasyukov 2004, Borisova & Golubeva 2006, Martynenko & Gruzdev 2008, Silaeva et al. 2010, Leostrin et al. 2018), as well as data from the iNaturalist platform (2025).

*Collomia linearis* was found on June 24, 2023, during fieldwork at the Kundur-Khabarovsk railway station, which is located on the Trans-Siberian Railway in the Amur Region. The full information about this habitat of this species is as follows: "Amur Region, Arkhar District, Kundur-Khabarovsk railway station, on the railway track, 49.10807°N 130.75505°E, 24 VI 2023, O.V. Kotenko", ABGI, specimen code 179212 (Kislov et al. 2017, e-Herbarium 2025) (Fig. 2). The species occurs between the railway track and the passenger-freight railway. The vegetation community is not developed; the herb layer with a total cover of 30 % consists of



**Figure 1** The secondary range of *Collomia linearis* Nutt. in Russia (GBIF 2025b). Periods of secondary range formation: green dots – period 1942–1962; blue dots – period 1963–1983; yellow dots – period 1984–2004; red dots – period 2005–2025. The blue line: Trans-Siberian railroad



**Figure 2** The label of the herbarium specimen of *Collomia linearis*

isolated groups of depressed plants that have been affected by herbicides. The moss-lichen layer is not developed.

Fifteen specimens were recorded, with a height of 9–23 cm, of which 11 specimens were in the flowering phase, three were in the fruiting phase, and one was in the vegetative phase. This alien species has not been previously recorded in the Amur Region (Starchenko 2008, Aistova 2009). The specimens of *C. linearis* found were growing on the railway track along with other plants (Table 1).

The species diversity of this plant community and the abundance of these species are low (1 to 5); the substrate is plant-free, probably due to its recent replacement. In addition to *C. linearis*, six other alien species were found here: *Acalypha australis*, *Amaranthus albus*, *Crepis tectorum*, *Plantago indica*, *Senecio vulgaris* and *Trifolium campestre*. Thus, after the reconstruction of the railway track, the pioneer plants that have settled on it are both native and alien species.

**Table 1.** Species composition of the plant community with *Collomia linearis* Nutt.

Species	Cover, %	Average height, cm
<i>Collomia linearis</i> Nutt.	< 1	16
<i>Amaranthus albus</i> L.	5	20
<i>Galeopsis bifida</i> Boenn.	4	18
<i>Acalypha australis</i> L.	3	9
<i>Geranium sibiricum</i> L.	3	15
<i>Trifolium campestre</i> Schreb.	3	10
<i>Crepis tectorum</i> L.	2	30
<i>Potentilla supina</i> L.	2	30
<i>Agrimonia striata</i> Michx.	1	10
<i>Epilobium palustre</i> L.	1	30
<i>Geum aleppicum</i> Jacq.	1	15
<i>Plantago indica</i> L.	1	10
<i>Pulsatilla dahurica</i> (Fisch. ex DC.) Spreng.	1	10
<i>Senecio vulgaris</i> L.	<1	20

The spontaneous population of *C. linearis* in the Russian Federation was first recorded in 1942 in the Bashkir Nature Reserve (Kotov & Karnaukh 1945). Currently, the secondary distribution area of this species covers 34 regions of the Russian Federation: 21 in the European part of Russia, four in the Urals, seven in Siberia, and two in the Far East. According to herbarium and literary data, the distribution of this species was as follows: Chelyabinsk Region (1959, SVER0653576), Udmurtian Republic (1961, LE). Republic of Tatarstan (1967: Ivanova & Tuganaev 1969), Kurgan Region (1969, SVER0678783), Sverdlovsk Region (1970, SVER0653436), Perm Territory (Ovyosnov & Shilova 1975), Orenburg Region (1977, SVER0653581), Tver Region (1978, MW0476312, Seregin 2025), Primorye Territory (1979, VLA), Chuvash Republic (1980: Papchenkov & Dimitriev 1989), Republic of Mari El (1980: Abramov 1989), Krasnoyarsk Territory (1981: Tupitsina 1984), Ulyanovsk Region (1984, MW0476336, Seregin 2025), Republic of Mordovia (1985: Silaeva et al. 2010), Saratov Region (1987, MW0476332, Seregin 2025), Moscow (1990, MHA0066812, Seregin 2025), Ivanovo Region (1991: Borisova & Golubeva 2006), Khabarovsk Territory (Melnikova 1993), Tula Region (1994, MW0476323, Seregin 2025), Kirov Region (1989: Tarasova 1994), Altai Territory (Teryokhina 1995), Penza Region (1998: Vasyukov 2004), Leningrad Region (Tzvelev 2000), Kemerovo Region (2000, KUZ013871, Seregin 2025), Yaroslavl Region (2001, MW0476330, Seregin 2025), Vladimir Region (2002, MW0476327, Seregin 2025), Irkutsk Region (2005, NSK0123765), Komi Republic (Martynenko & Gruzdev 2008), Nizhny Novgorod Region (Mininzon 2010), Republic of Buryatia (2010, NSK0005807), Samara Region (2012, MW0476338, Seregin 2025), Kostroma Region (2017: Leostrin et al. 2018), Tyumen Region (Glazunov et al. 2017).

This species has been naturalized in the Udmurtian Republic (Baranova et al. 2016), the Orenburg Region (Abramova et al. 2017), and the Republic of Bashkortostan (Abramova et al. 2021). The unintentional introduction of *C. linearis* to the Amur Region is likely related to the active modernization of the TSR infrastructure (Yakusheva 2022).

Given the invasive spread of this species and its ability to reproduce through seeds, it is possible that this species may be introduced to the Jewish Autonomous Region in the future, where it has not been recorded to date (Rubtsova 2017).

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