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## Notes on the taxonomy of the *Trigonotis radicans* group (*Boraginaceae*)

H. RIEDL

**Abstract:** *T. radicans* (TURCZ.) STEVEN on the one hand, and *Omphalodes sericea* MAXIM. with the synonyms *T. sericea* (MAXIM.) I.M. JOHNST., *T. coreana* NAKAI, *Omphalodes aquatica* BRAND, *T. sericea* OHWI and *T. nakaii* HARA on the other hand are two subspecies of one species in the present author's view. Their morphology and nomenclature are discussed on the basis of pertinent literature and collections in herb. W.

The oldest name in the whole group discussed here is *Myosotis radicans* TURCZANINOW (1840). It was transferred to *Eritrichium* by A. DE CANDOLLE (1846), who knew the taxon only from TURCZANINOW'S description. LEDEBOUR (1847-49) followed his interpretation. In 1851, STEVEN created the new genus *Trigonotis* and included *T. radicans* there.

Later authors, however, did not consider TURCZANINOW'S collection collected in "Davuria", in bogs of the river Argun anymore, but based their interpretation on collections of MAXIMOWICZ from the Amur more widely distributed in European herbaria, which did not agree with the type in several details, as has been pointed out by POPOV (1953). POPOV not only gave an extended description of the type collection but also identified MAXIMOWICZ' and other authors plants under the name of *T. radicans* as *T. coreana* NAKAI (1917).

In the meanwhile, MAXIMOWICZ (1872) had described a new species, *Omphalodes sericea*, collected by him in 1863 on the mountain range Kuncho-san, Kiushu, Japan. It was transferred to *Trigonotis* by I.M. JOHNSTON (1937). Strangely enough, one year earlier OHWI had used the same binomial for a collection of Faurie from Corea he considered as new. It seems to be the same taxon as that of MAXIMOWICZ. Later on OHWI (1953)

put it into synonymy of what he considered to be *T. radicans* together with *Omphalodes sericea* MAXIMOWICZ. In 1915, BRAND described *Omphalodes aquatica* from Corea as a species of doubtful affinity. OHWI (1953) and others took it for an additional synonym of *T. radicans*.

Since POPOV (1953) distinguished between the two species *T. radicans* and *T. coreana*, this practice was generally followed. The characters given for *T. radicans* varied a great deal, however. Obviously, POPOV had been the only author who had seen the type specimen, and his description should also be adopted. According to POPOV, the very delicate stems are more or less prostrate and rooting near the apex. The leaf blades are comparatively large, 4-7 cm long, subcordate at base, acute at apex and nearly entirely glabrous. The lobes of the fruiting calyx – flowers are lacking in the type – are 5 mm long. In *T. coreana*, on the other hand, stems are not prostrate, not rooting at apex, but producing filiform, rooting branches in the axils of the upper leaves at a later stage, leaf blades are appressed hairy, 1-3 cm long in the typical case, 4-6 cm long in a var. *grandis* described by POPOV, subcordate or rounded or cuneate at base, less distinctly acute at apex. Calyx lobes are 3-4 mm long, corollas 6-12 mm in diameter. This latter interpretation does not quite agree with the original diagnosis of NAKAI (1917). We can dismiss this author's characterization of *T. radicans*, according to which flowers should be axillary, while they are united to "racemes" in *T. coreana*. In *T. coreana*, the caespitose stems are ascendent in the beginning, rooting at last. The base of the leaf blades is acute or nearly truncate, the upper side denser, the lower side more loosely strigose. Calyx lobes are 2-3 mm long, the pedicels reflexed after flowering. The three specimens cited come from the island Cheju (Quelpaert) South of Corea collected by T. Nakai, Corea, Distr. Musang round Sadipen, leg. V. Komarov 1320 and from Russian Manchuria, southern Ussuri distr., round Nikolsk, leg. V. Komarov. In this case, the main difference between the Amur plant of TURCZANINOW and the plants mentioned by NAKAI lies in the hairs of the leaves, if the different size of the calyx is more closely related to the developmental state than to genetic factors, which is not yet clear.

In *T. sericea* (MAXIM.) I.M. JOHNSTON, the hairs on the leaves are dense and more silky on the stem-leaves and silky also on the pedicels. Otherwise I can find no difference from the description. The margin of the cup-shaped nutlets is said to be erect and about as high as half the nutlet. OHWI (1936)

described his *T. sericea* from a Korean plant collected by Faurie (n. 349). It is quite obviously the same as the Japanese collection of Maximowicz, but unfortunately a description of the nutlets is lacking.

Strangely enough, *Omphalodes aquatica* BRAND was described from the same collection of Faurie (n. 349) as OHWI's *T. serica*, but with very different characterization of the hairs. The slender, probably ascendent stems are glabrous or with a few hairs, the longer (17-52 mm) leaves are loosely short hairy. The corolla is up to 10 mm across in *T. sericea* OHWI, 12 mm in *O. aquatica*. Nutlets are not known in BRAND's species, which led to doubts about the generic affinities. Faurie's collection may be a mixture, but it seems more likely that the various plants are different in the same population depending on the amount of water present at the particular place where each is growing.

1941, HARA described a new species, *T. nakaii* in a paper that unfortunately is inaccessible to me. It was taken up, however, by OHWI (1953, 1965), who distinguished it from his *T. radicans* by the type of hairs: While *T. nakaii* should be appressed-strigose, the hairs should be spreading-strigose on lower part of stems, petioles and underside of leaves. *T. coreana* is not mentioned at all, but it is just this taxon that agrees with his description of *T. nakaii* in nearly every detail maybe apart from the calyx that is strongly accrescent after flower according to him. In Japan it is only found on Kyushu, the island where *Omphalodes sericea* MAXIM. had come from. It should also occur in Manchuria and Corea, according to KITAGAWA (1979), who followed his interpretation, furthermore along Amur and Ussuri, the area traditionally indicated for *T. coreana*.

Last of all, YAMAZAKI (1991) divided *T. radicans* into two varieties. In the type variety, he included *T. coreana* in the sense of POPOV, but not of NAKAI, and *T. sericea* OHWI, in var. *sericea* (MAXIM.) HARA all the other taxa described in the group. The two varieties are separated on the type of hairs exclusively.

In the case of *T. radicans*, there is not any reasonable choice but to follow POPOV (1953) and his description of the species. If a second species is acknowledged as done by him, the name *T. coreana* brings some problems. If *Omphalodes sericea* MAXIM. is assumed to be specifically identic with it – and it certainly cannot belong to *O. radicans* as supposed by OHWI –, "sericea" would be the oldest specific epitheton available. As, however,

OHWI's *T. sericea* was published as a new species and not a new combination, it is older than *T. sericea* (MAXIM) I.M. JOHNSTON and precludes the application of the latter. The next oldest name is *Omphalodes aquatica* BRAND, if it means the same taxon. In this case, a new combination would be necessary. If it is regarded as different, the valid name is *T. coreana* NAKAI.

Specimens of the whole group present at the Vienna Natural History Museum (herb. W) have been examined to solve at least some of the problems involved. They are cited by the numbers in the following enumeration.

#### Russia:

1. Amur. MAXIMOWICZ sub *Eritrichium radicans* A. DC.
2. Primorje, distr. Chasan, in vicin. pag. Tzukanovo, in valle fl. Tzukanovka, in locis humidis inter frutices, 28.5.1977. V. STARCZENKO & I. IVANOVA, Herb. Fl. SSSR 5844, sub *Trigonotis coreana* NAKAI

#### Manchuria:

3. Manshuria Rossica, prov. Austro-Ussuriensis, Fl. Tui-fun. Circa oppidum Nikolsk. 13.5.1896. V. KOMAROV, Fl. Manshuria 1320 sub *Trigonotis radicans* (DC.) GÜRKE
4. Mandschurei: Gegend von Harbin, Quelle bei Izu, 6.6.1926. JETTMAR.
5. Mandschuria orient.: Oho infra Ninguta. 25.5.1926. N. KOZLOW 14294 sub *Trigonotis radicans* (DC.) GÜRKE
6. Mandschuria orient: Tigrowe prope Schitouhodse. 3.6.1928 N. KOZLOW 73 sub *Trigonotis radicans* (DC.) GÜRKE

#### Corea:

7. Habitat in fontibus montium Kan-Ouen to. Julio 1907. FAURIE 331
8. Habitat in humidis silvarum secus rivulos Quelpaert. Maio 1907. FAURIE 1922

#### Japan:

9. Kundscho san. 1863. MAXIMOWICZ, Iter secundum. Isotype of *Omphalodes sericea* MAXIM.

The growth habit is extremely variable. There are single, erect stems from more or less creeping roots without basal rosettas in 1, with basal rosettas in

6 and 9, several stems from creeping roots without lower stem-leaves in 2, with lower stem-leaves in 4 and partly in 7, subcespitose growth in 3 and 8 and 1-2 stems with the dry remains of stems from previous years in 5. In 7, there are creeping (or floating?) elongate stems apart from the erect ones, similar tendencies are also found in 8. The plagiotropous stems are not rooting, however, maybe because they are still too young. Subfiliform lateral branches from the axils of stem leaves are only found in 6, but they are very young and certainly not rooting. The hairs of the stems are appressed in 2, 3, 4, 7 (very few) and 8, spreading in 1, 5, 6 and 9.

In general, the shape is ovate-oblong in the lower, ovate-lanceolate to oblong-lanceolate in the upper leaves. They are also usually sharply pointed, acute or acuminate, sometimes with a short mucro at apex, least so in 1 and 9. The base of the lowermost leaves is subcordate to horizontally cuneate only in 1, horizontally cuneate to broadly rounded especially in 4 and 9, but sometimes also in others. Most common are rounded bases abruptly tapering towards the petiole. The smallest leaves are found in 2, where the maximum length is 2 cm, many leaves are less than 1 cm without petiole. The average maximum is 3-3,5 cm, only in 9 it is 4,2 cm. The hairs are very loose on both sides in 7, dense in 3, 4 and 9, intermediate in the others. They are spreading only in 5, appressed in 2, 3, 4, 7, 8, 9, sometimes slightly spreading in 1 and 6. By far the longest pedicels were found in 1, where they also are slightly curved downwards already in flower. They are followed by 8, where they are only half as long and sometimes directed straight upwards. In all other specimens they reached 1 cm as a maximum. They were measured in flower or immediately afterwards, as none of the plants was fruiting. In all plants, the hairs on the pedicels were appressed or only very slightly spreading.

The calyx is usually densely hairy, least so in 1, 6 and 8. The hairs are appressed in 1, 2, 4, 6, 8, 9, slightly spreading especially near base in 3 and 5. The lobes are lanceolate and very acute in 2 and 8, ovate in 6, lanceolate-oblong to oblong, acute or nearly obtuse in the rest.

The flowers are (5)6-7 mm in diameter in 3, 4, 5, about 8 mm in 2 and 6, (10)11-12 mm in 1, 8 and 9.

From the length of the leaves, all specimens are outside the range of *Trigonotis radicans* s. str. which is glabrous moreover. In the long, slender, plagiotropous stems it agrees with 7 that was collected on the island Cheju,

however, the type locality of *T. coreana* NAKAI. Filiform, plagiotropous branches from the leaf axils that are typical for *T. coreana* according to POPOV (1953) are nearly always absent, present only in one collection from Manchuria.

Among the collections examined, correlations seem to be very rare morphologically as well as geographically. This leads to the conclusion that they should be regarded as conspecific. It would be necessary to examine whole populations in order to decide whether separation on a lower level such as that of variety is desirable. At present I am more inclined to assume that they are merely modifications due to environmental factors, mainly water. The remaining two taxa are regarded here as subspecies mainly for geographical reasons and as the specific rank does not seem appropriate. POPOV already mentioned, that *T. coreana* rather represents the southern race of *T. radicans* than a species of its own.

*Trigonotis radicans* (TURCZANINOV) STEVEN, Bull. Soc. Imp. Natur. Moscou XXIV: 603 (1851)

Syn.: *Myosotis radicans* TURCZANINOV, Bull. Soc. Imp. Natur. Moscou XIII: 258 (1840)

*Eritrichium radicans* (TURCZANINOV) A. DC., Prodrum X: 128 (1846)

Leaves 4-7 cm long, glabrous

a. ssp. *radicans*

Leaves 1-4 cm long, rarely longer, hairy

b. ssp. *sericea*

a. *T. radicans* ssp. *radicans*

Type: River Argun: TURCZANINOV. LE

b. *T. radicans* ssp. *sericea* (MAXIMOWICZ) H. RIEDL, comb. et stat. n.

Basionym: *Omphalodes sericea* MAXIMOWICZ, Bull. Acad. Sci. Pétersb. XVII: 453 (1872)

Syn.: *Omphalodes aquatica* BRAND, Fedde Repertorium spec. nov. XIII: 545 (1915)

*Omphalodes aquatica* var. *sinica* BRAND, l.c.

*Trigonotis coreana* NAKAI, Bot. Magazin Tokyo XXXI: 218 (1917)

*Omphalodes sericea* var. *koreana* BRAND in ENGLER, Pflanzenreich IV. 252: 105 (1921)

*Trigonotis sericea* OHWI, Journ. Japanese Botany XII: 328 (1936)

*Trigonotis sericea* (MAXIMOWICZ) I.M. JOHNSTON, Journ. Arnold Arbor. XVIII: 25 (1937)

*Trigonotis nakaii* HARA, Journ. Japanese Botany XVII: 635 (1941)

*T. radicans* var. *sericea* HARA, l.c.

Type: Japonia, insula Kiushu, in monte Kundscho-san. MAXIMOWICZ.  
LE, Isotype W.

### Zusammenfassung

Die als Arten beschriebenen Taxa *T. radicans* (TURCZ.) STEVEN, *T. sericea* (MAXIM.) I. M. JOHNST., *T. coreana* NAKAI, *Omphalodes aquatica* BRAND, *T. sericea* OHWI und *T. nakaii* HARA werden teils anhand der Literatur, teils anhand von Aufsammlungen besprochen. Der Mehrzahl davon kommt bestenfalls der Rang einer Varietät zu, sofern sie nicht überhaupt modifikativ durch Umwelteinflüsse entstanden sind. *T. nakaii* HARA ist sicher nur ein Synonym von *T. coreana* s. str. Nach dem derzeitigen Stand des Wissens erscheint es am günstigsten, innerhalb von *T. radicans* zwei Unterarten zu unterscheiden, deren Nomenklatur erörtert wird.

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Address of the author: Dr. Harald RIEDL,  
Vienna Natural History Museum, Department of Botany,  
Burgring 7, A-1014 Vienna, Austria.



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