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New insights into the actual taxonomical status of the Thuringian *Pinguicula gypsophila* WALLROTH (Lentibulariaceae)?

Description

Following the published, though often divergent characteristics presented by WALLROTH (1841) and VOCKE (1882) and supplied by own observations, I first describe the *Pinguicula gypsophila* sensu WALLROTH which has disappeared from nearly all modern German floras.

Pinguicula gypsophila WALLROTH in Linnaea **14**: 533. 1841

Low rosulate perennial herb; overwintering with winter buds; leaves bright green, never reddish. Flowers small, ~ 7–11 mm long (spur included; all parts of the flower about twice as small as in *P. vulgaris* s.l.), not widely open at the mouth, as a rule slightly transversely elliptical to rounded. Calyx bilabiate, bright green; upper lip deeply (nearly to the base) 3-lobed, lobes barely spreading, acute at the apex; lower lip 2-lobed to the middle, lobe segments acute, barely spreading. Corolla bilabiate, bright blue to pink, without white patches; upper lip 2-lobed, lobes narrow, with parallel margins, nearly as long as those of the lower lip; lower lip 3-lobed, lobes pilose at the base, narrow, with parallel not overlapping margins, rounded at the apex, rarely truncate. Stigma bilobed, the upper lobe lacerate, whitish as the incurved filaments of the anthers. Capsule inversely pear-shaped, small; seeds reticulate. Flowering during May and June, fruiting from July to August.

Type: Herb. WALLROTH – missing.

Distribution area: Germany, Thuringia, south of Harz mountains northwest of Nordhausen, near Woffleben, “Igelsumpf”; growing in rocks and vertical slopes on damp, oligotrophic (especially poor in nitrogen) Zechstein-gypsum soil (gravel) exposed to North and East. – Formerly (between 1820 and 1960) known from four stands in the Südharz mountain region: Stolberg (Kohnstein; locus classicus; RAUSCHERT, Journ. Excurs.^{*)}, **17**: 31.07.-1954; 19.08.1978; RAUSCHERT 1979: 49), Hage(n)berg (= Hocheberg; OSSWALD 1910: 30; WEIN 1912; SCHULZ 1913: 202; RAUSCHERT, Journ. Excurs.^{*)}, 31.07.1954, **17**: 18.08.-1978; RAUSCHERT 1979: 48, totally destroyed), Stempeda (Nordfuß des Alten Stolberg; PETRY 1910; RAUSCHERT, Journ. Excurs.^{*)}, **17**: 21.08.1974, 19.08.1978; RAUSCHERT 1979: 49) and Walkenried (HAMPE 1873, „Sachsä“; VOCKE & ANGELRODT 1886 „Sachsenberg“; RAUSCHERT 1979: 49, „Sachsenstein“ = Sachsenberg).

Specimens studied: Stempeda, Kohnstein: VOCKE 1870 – W, WU, 1876, – W, 1879 – JE, 1882 – LD, 1885 – M, 1893 – W; BÄCHTIEN 1874 – WU; ANGELRODT 1877 – WU; GUNKEL 1881 – JE; Quelle 1892 – JE; KAPPEL 1903 – M. Kohnstein, Nordhang, am Weg nach Hörningen, auf Gips: LIPPOLD 1965 – JE. Am Alten Stol(l)berg: OSSWALD 1889 – JE; comm. HAMPE, herb. SPORLEDER, o.J. – JE; RUDOLPH 1909 – JE. Walkenried: VOCKE 1890 – GOET. Sachsenstein: ANGELRODT 1876 – ZT, 1877 – WU.



Fig. 1: *Pinguicula gypsophila* sensu WALLROTH at the classical site "Kohnstein" near Nordhausen – Photograph: Dr. H. MANITZ, Jena.

Fig. 2: *Pinguicula gypsophila* sensu WALLROTH, cultivated specimen from the site "Igelsumpf" near Woffleben. – Cultivation and photograph: A. SCHMIDT, Jena.

Fig. 3: *Pinguicula gypsophila* at the new site Igelsumpf near Woffleben. – Photograph: Dr. H.-J. ZÜNDORF, Jena.

Discussion

To botanists the southern Harz (Südharz) mountain region (“Zechsteininformation am Südrand des Harzes” after DRUDE 1902: 517) especially on calcareous and gypsum grounds has been known as a refugial station of arctic-alpine plants (“Glazialrelikte”), i.e. such as *Salix hastata* L., *Rosa majalis* HERRM. em. MANSF., *Gypsophila repens* L., *Cardaminopsis petraea* (L.) HIITONEN, *Arabis alpina* L. (SCHULZ 1898: 29-59; 1902: 38/39; 1913: 84, Taf. II; DRUDE 1902: 517; RAUSCHERT, Journ. Excurs.^{*)}, 17: 18.08.1978; RAUSCHERT 1979; the latter planted bei K. REINHARDT, Ellrich, at the „Igelsumpf“).

The locality “Igelsumpf bei Woffleben”, a water-filled “Gipserdfall”, is not a natural site of *Pinguicula gypsophila*. Considering the existence of *Pinguicula gypsophila* at the classical sites near Stempeda to be in danger because of the shadowing trees, Dr. F. EBEL and Dr. S. RAUSCHERT from the Botanical Institute and Garden of the University of Halle-Wittenberg transferred seven rosettes to the Igelsumpf on 18.09.1979 to rescue the “taxon” from extinction. Here the plants are growing and proliferating well as F. EBEL, S. RAUSCHERT, H. SCHMIDT and O. BIRNBAUM, all from Halle, could observe during their visit on 19.06.1980. They added nine individuals of *Phyllitis scolopendrium* (L.) NEWMAN from its endangered site near Morungen.

Nowadays (own visit on 13.07.1997) a rich population of *Pinguicula gypsophila* has developed in the gypsum gravel. It grows on more or less shaded, water-dropped naked gypsum or detritus covered with algae, lichens or liverworts, isolated or in groups of 20 to 30 rosettes, often in trough-shaped deepenings, clefts or crevices of the rocks (Fig. 2). In the rubble we find it together with members of the *Parnassio-Seslerietum* community, such as *Parnassia palustris* L., *Galium boreale* L., *Sesleria varia* (JACQ.) WETTST., *Gymnocarpium robertianum* (HOFFM.) NEWMAN, *G. dryopteris* (L.) NEWMAN, *Cystopteris fragilis* (L.) BERNH., *Preissia quadrata* (SCOP.) NEES, *Solorina saccata* (L.) ACH., *Festuca glauca* HOST, *Gentianella germanica* (WILLD.) BÖRNER and the introduced *Arabis alpina* and *Phyllitis scolopendrium*. In the Erdfall pond lives *Oenanthe aquatica* (L.) POIR. (vgl. RAUSCHERT, Journ. Excurs.^{*)}, 18.08.1978).

All the other sites have disappeared (?!).

The taxon has been permanently disputed. Within *P. vulgaris* L. its populations are ecologically and morphologically totally isolated. Its extremely restricted distribution area is situated inmidst the so-called Central European glacial refugial region.

No modern German flora mentions the taxon. Only the “ROTHMALER” (1996: 413) reminds of the old traditional floristic line of a particular *Pinguicula*-taxon in the Harz mountains by naming the habitat “Gipsfelsen” (sub *Pinguicula vulgaris* L.) additionally to “Sickerrasen, Quell- und Flachmoore, Rieselfelder”.

In 1841 (pp. 533–534), WALLROTH had drawn the attention of botanists to a taxon, which he had detected at about 1830 and named *P. gypsophila*. It should be distinguished from the typical *P. vulgaris* L. by its flowers twice as small and light blue to pink (Fig. 1) and by its special habitat “auf quelligen Moosplätzen zwischen Gyps-felsenklüften ... hier und da ...” (“in watered mossy places between crevices on gypsum rocks ... here and there...”; Fig. 3). His statements were corroborated by VOCKE (1882: 92) who also separated the two taxa at the species level. He referred to the much later beginning of the flowering period

and the dwelling exclusively on gypsum rocks (“mindestens einen Monat späteren Blühbeginn” and “das alleinige Vorkommen auf Gipsfels oder wenigstens stark mit Gips versetzter Erde”). SCHULZ (1902) postulated, that *P. gypsophila* might have differentiated from the typical *Pinguicula vulgaris* under the specific conditions of the cold periods during the ice age. Later (SCHULZ 1913) he discussed an immigration from the eastern limestone Alps or the Dolomiti during the ice age, but he could not proof it.

Nobody has found *P. gypsophila* in the moist, boggy, sunny meadows which are or were situated directly in front of the steep rocks at Stempeda where the typical *P. vulgaris* was growing in shadowy places in rich populations (WALLROTH 1841, VOCKE 1882, SCHULZ 1913, DRUDE 1902, CASPER 1962, RAUSCHERT 1979). On the other hand, the seeds of the typical *P. vulgaris* growing in the moist meadows have not been transported by wind or birds onto the rocks. The ranges of the populations are sharply separated and no hybrids have ever been observed in nature perhaps due to the later (~ 2-4 weeks; VOCKE 1882: 92) flowering and fruiting of *P. gypsophila*. DRUDE (1902) put forward the hypothesis that *P. gypsophila* could be considered as the beginning of a species transformation (“Anlauf zur Artumbildung”).

OSSWALD (1912: 54) and WEIN (1912: 101) postulated that *P. gypsophila* would become very tall on some habitats and would not be differentiated from the typical *P. vulgaris* on species level. OSSWALD conceded WALLROTH's taxon the rank of a forma or varietas as other botanists did or had done [KOCH 1844: 665 sub β *minor*; GARCKE 1898, similar ranking; Peter 1901: 252 and DRUDE 1902: 203 sub *P. vulgaris* **gypsophila*; RAUSCHERT 1979: 49, “Gipsrasse” or “f. *gypsophila* (WALLR.)”].

WEIN (1912), following SCHINDLER (1907), denied the existence of any particular taxonomical character of the “gypsum race”. However his statements are not sufficiently founded. To a certain degree he misunderstood WALLROTH's differential calyx characters of *P. vulgaris* and *P. gypsophila* and overrated SCHINDLER's interpretation of the structure of the calyx as a taxonomically important feature to distinguish related *Pinguicula*-species.

RUSCHMANN (1914: 26) studying anatomy, water supply, nutrition, and assimilation of *P. vulgaris* and var. *gypsophila* concluded, that *P. gypsophila* would be nothing else than a local modification caused by the deficiency of nutritive substances, especially of nitrogen. Culture experiments with substrate exchange should have shown that the differences in relation to the size between *P. vulgaris* and its “variety” disappeared totally within a short time. But from the paper it becomes evident that the basis of these experiments had been only three (!) individuals of each taxon and the results were only valid for the characters after flowering. This is not a solid fundament for adequate conclusions.

When CASPER (1962, 1974) published his monographical work on *Pinguicula*, he followed RUSCHMANN (1914) overlooking the weak basis of whose “experiments”. Recently cultivated individuals in greenhouses do not change its habit, i.e. its constitution.

Conclusion

Now as ever the taxonomical status of *Pinguicula gypsophila* WALLROTH remains dubious. The successful transfer of some rosettes of the endangered *P. gypsophila*-population from Stempeda to Woffleben (Igelsumpf) in 1979 and their well development during the recent 20 years shows that *P. gypsophila* seems to be genetically and

phenotypically constant. It may deserve the rank of a variety of *P. vulgaris*. RAUSCHERT (1978) could be right speaking of a remarkable ecotype in shaded steep naked moist rocks (“bemerkenswertem Ökotyp (var. *minor* W.D.J. KOCH) an nackten, feucht-schattigen Felswänden”). His statement should be tested using modern molecular methods of DNA analyses. The “taxon” should not be omitted in recent phylogenetic, taxonomical and floristic studies in the wide-spread species *P. vulgaris* especially according to similar cases connected with nomina such as *P. bohemica* KRAJINA or *P. transsylvanica* SCHUR.

It is worth mentioning that *P. gypsophila* has never been detected on gypsum in the adjacent Kyffhäuser mountains (PETRY 1889: 34) probably due to the dryer climate.

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Summary

Pinguicula gypsophila was described in 1841 by WALLROTH from gypsum rocks of the Zechstein-formation of the Südharz mountains in Thuringia (Germany). Its great similarity to *P. vulgaris* motivated many botanists to reject the specific status of the “Gipsrasse” (gypsum race). Moreover, the four known classical stands have been destroyed to a great extent between ~1950 and 1970 by human (especially industrial) activities. The transfer of living rosettes in 1979 from Stempeda to the locality Igelsumpf (Woffleben near Nordhausen), to rescue the taxon from extinction, has been successful. Now, the taxonomically dubious “species” is apparently growing well in the new, protected place. With modern methods the hypothesis should be tested *P. gypsophila* to be a petrophilous ecotype (as var. *minor* W.D.J. KOCH ?). It should not be omitted from the recent studies of the new “Flora von Thüringen”.

Zusammenfassung

Pinguicula gypsophila wurde im Jahre 1841 durch WALLROTH von Gipsfelsen der Zechstein-Formation im Südharz (Thüringen, Deutschland) beschrieben. Ihre große Ähnlichkeit mit *Pinguicula vulgaris* veranlasste viele Botaniker, ihr den Artrang abzuspochen und sie höchstens als „Gipsrasse“ gelten zu lassen. Darüber hinaus wurden im Laufe von rund 20 Jahren die vier bekannten Standorte durch menschliche Eingriffe (Gipsabbau) zerstört. Die Umpflanzung einiger intakter Rosetten von Stempeda an einen relativ geschützten Standort, dem Erdfall Igelsumpf bei Woffleben unweit Nordhausen, im Jahre 1979 zur Bewahrung vor dem Aussterben war erfolgreich. Heute gedeiht die Population dort in relativ großer Individuenzahl. Mit modernen Methoden sollte die Hypothese überprüft werden, ob *P. gypsophila* nicht doch als petrophiler Ökotyp im Range einer Varietät (var. *minor* W.D.J. KOCH ?) gelten kann. Sie sollte bei der Vorbereitung der neuer Untersuchungen „Flora von Thüringen“ nicht übergangen werden.

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