Preslia, Praha, 64:207-210, 1992

Variation in *Oxyria digyna*

***Oxyria digyna* a její proměnlivost**

Jindřich Chrtek [1] and Michaela Šourková [2]

[1]*Botanical Department of the National Museum, 252 43 Průhonice, Czechoslovakia,* [2]*Department of Botany, Charles University, Benátská 2, 128 01 Praha 2, Czechoslovakia*

Chrtek J. et Šourková M. (1992): Variation in *Oxyria digyna*.- Preslia, Praha, 64:207-210.

Keywords: *Polygonaceae, Oxyria digyna, O. caucasica*, morphology, chorology

A detailed analysis of the herbarium material of *Oxyria digyna* (L.) Hill deposited in PR and PRC showed that this species could be divided into two different species: *O. digyna* (L.) Hill s. str. and *O. caucasica* Chrtek et Šourková spec. nova. The new species has anthers 0.9-1.3 (-1.5) mm long and fruits (4.5-) 5.0-6.5 mm wide. For the present time *O. caucasica* is known from the Caucasus, Elburz Mts., mountains of northern Iraq and probably from the Tian Shan. The species shows only a little variation. On the other hand, *O. digyna* s. str. is widespread and accordingly, a greater morphological variation was found in this species. Different chromosome numbers were found: 2n = 42 in *O. caucasica* and 2n = 14 in *O. digyna* s. str.

The genus *Oxyria* Hill differs from related genera of the *Polygonaceae* mainly by its dimerous flowers and two-winged achenes. In herbaria, *Oxyria* is confused mainly with some *Rumex* species (mostly with *R. scutatus* L.); fruits in *Rumex* are, however, trigonous, non-winged and covered with three appressed, enlarged internal tepals.

The genus *Oxyria* is generally believed to include only one species. In addition to *O. digyna*, however, some authors distinguish another species, *O. sinensis* Hemsl. (identical with *O. mairei* Lévl. and possibly also with *O. elatior* R. Br.). The distribution pattern of both species was given by Meusel et al. (1965:129). In the Northern Hemisphere, *O. digyna* is distributed continuously in the Arctic, Subarctic and Boreal zones and disjunctively in the higlands of Europe, Asia and North America. *O. sinensis* grows in the Chinese provinces of Yunnan and Sichuan. Surprisingly, except of Tolmačev (1966:141-143) nobody has been concerned with the diversification of *O. digyna*. He accepts as separate species not only the Himalayan *O. sinensis* and *O. mairei* but also *O. elatior*, which, in his opinion, extends to the southern Siberia (Sayany Mts.). In northern Siberia, only *O. digyna* occurs.

Records of chromosome numbers reported for *Oxyria* are numerous: 2n = 14 (a great number of data), 2n = 28 (only one record) and 2n = 42 (several records) have been found (i.e. Fedorov 1969:579, Májovský, Murín et al. 1987:105). Even such differerences have not stimulated further studies which is even more surprising if we consider that the chromosome variation in *Oxyria* was discovered as early as in 1929 (Edman 1929). Unfortunately, his counts were made on material of an unknown origin obtained from botanical gardens.

We were therefore concerned with the question whether the material of *O. digyna* within the limits of its vast distribution area is homogeneous or not. We have studied herbarium materials preserved in the Department of Botany of Charles University in Prague (PRC) and in the Botanical Department of the National Museum in Průhonice (PR). Attention was paid to the following morphological characters: plant height, width

of leaf blades, length of external tepals, length and width of internal tepals, length of anthers, size of pollen grains, length and width of fruits (including the wings), and shape and size of seeds. The character of habitats has also been taken into consideration. Our assumption that the material is not quite homogeneous was confirmed.

The most significant differences were found in fruits, anthers and pollen grains. Other characters such as width of blades and size of tepals were of no or only little use for taxonomic evaluation. Plant height varied greatly in relation to the altitude. Plants from highland habitats were extremely small whereas those from lower altitudes (and moist habitats) were tall. In herbaria, the tall plants are mostly labelled as *O. elatior* R. Br. irrespective of their geographical origin. The taller plants are characteristic of *O. sinensis* and *O. elatior* described from Yunnan (China) and Kumaon (India). At present, the relationship between these two species is not clear.

Having evaluated the results we concluded that the material of *O. digyna* (except of *O. sinensis* and *O. elatior*) can be divided into two groups: (1) The first one with wide distribution area is characterized by smaller fruits, shorter anthers, and smaller pollen grains. It occurs in whole Europe, in North America and in a part of Asia. (2) The other group has larger fruits, longer anthers and larger pollen grains. Its distribution seems to be limited to Asia including the Caucasus.

Having assessed the morphological characters and having taken into consideration distribution areas and other differences between both groups within *O. digyna*, we conclude that the description of a new species is justified.

Oxyria Hill, Veg. Syst. 10:24, 1765

Perennial glaucous herb. Stems erect, (3-)10-40 cm tall, roundish, striate, leafless, terminating in a simple or slightly branched inflorescences. Leaves almost all basal, long-petiolate, undivided, entire, with radiating nerves, reniform to orbicularly cordate, green to glaucous. Ochreae membranous. Flowers small, in clusters of 2 or 3, on slender pedicels jointed about the middle, thickened toward the top. Clusters in lax, raceme-like inflorescences. Perianth-segments in 2 whorls of 2, outer perianth--segments spreading or deflexed, inner appressed, obovate, erect, not tuberculate, slightly enlarged but not longer than fruit. Stamens 6, shorter than perianth, anthers purplish. Ovary superior, unilocular, ovate, compressed with 2 edges. Styles 2, very short. Stigmas fringed. Fruit flat, orbicular, with scarious, ± undulated wings. Seeds compressed, ± brown.

The genus includes about 4 species.

Oxyria digyna (L.) Hill, Hort. Kew., p. 158, 1768 s. str.

Syn.: *Rumex digynus* L., Sp. Pl., p. 337, 1753; *O. reniformis* Hook. Fl. Scot., p. 111, 1821.

Plants (3-) 7-18 (-25) cm tall, inner perianth-segments 1.4-2.1 (-2.5) mm long and 0.7-1.2 (-1.6) mm wide, outer ones 1.2-1.5 (-1.7) mm long, anthers (0.3-) 0.4-0.8 (-1.1) mm long, pollen grains 21-25 µm, fruits (2.3-) 3.0-4.0 (-4.8) mm wide, seeds 1.7-2.0 mm long.

O. digyna s. str. has a very extensive distribution area of an Arcto-Alpine character, which is partly continuous, partly disjunctive. It includes the whole Europe, part of Asia (e.g. the Altai Mts. and probably northern Siberia) and North America.

Throughout this vast distribution area, differences in the length of anthers were observed. Shorter anthers, (0.3-) 0.4-0.7 (-0.8) mm long, are present in plants from the Pyrenees, Alps, western, northern, and southern Carpathians, Balkans (from Herzegovina to Bulgaria), Altai Mts. and North America (mountains of the USA). We had at our disposal especially plentiful material from the West Carpathians, Alps and Balkans in which we also searched for differences in the length of anthers between plants growing on limestones and those on granites; however, no apparent differences were found. Somewhat larger anthers, (0.4-) 0.6-0.9 (-1.1) mm long, were present in most plants from northern Europe (Fennoscandia, Spitzbergen, Iceland) and northern regions of America (Labrador, Greenland). The limits of the distribution area of *O. digyna* s. str. in Siberia and in some Asian mountain ranges remain unclear. For the more precise delimination of the distribution area, ample herbarium material has to be studied.

***Oxyria caucasica* Chrtek et Šourková spec. nova**

Plantae (7-) 11-20 cm altae, tepala interna 1.8-2.3 (-2.4) mm longa et 1.0-1.8 mm lata, tepala externa 1.0-1.6 (-2.0) mm longa, antherae 0.9-1.3 (-1.5) mm longae, pollina (25-) 27-28 (-28.5) µm in diam., fructus 4.5-5.6 mm longi et (4.5-) 5.0-6.5 mm lati, semina 2.2-2.7 mm longa.

Holotypus: Caucasus - Těberda, in alluvione glareosa ripae sin. fl. Těberda prope ostium rivi Ulu-Chatipara (ca 5 km) situ merid. a ponte in opp. Těberda, ca 1.350 m s. m., 17.7. 1977, leg. M. Šourková et M. Mestenhauserová. Holotypus in herb. PRC asservatur.

Specimina visa

Russia - Caucasia. Angustium fluminis Baksan, ad moraenam sub glacie V. Azau, ad pedem montis Elbrus, ca 2.300 m s. m., glarea eruptiva basica, 14.7. 1975, leg. Holý, PR. - Declivia obsita in substrato gneissiaceo inter Kafe Ai (sub monte Čeget) et lacum Donguz - Orunkel, ca 2.700 m s. m. in loco scaturiginis inter glaream gneissiaceam, 16.7.1975, leg. Holý, PR. - Territorium fluxus superioris fl. Baksan ca 25 km ab opp. Tyrny-Auz, Elbrus: in pratis alpinis vallis Šchelda, 2.7.1974, leg. Kopecká et Loukota, PRC. - Armenia (P. Smirnow, Pl. Armeniae Ross., a. 1929) In vicinitate lacus Tokla, Toklinskij chr., G. Tigal-Dara, zona alpina, 3.000 m s. m., 27.8.1973, leg. P. Smirnov, PR. - (Herbarium Instituti Academiae Scientiarium Armeniae.) In declivi meridionali montis Alačiz, in vicinate Sev-Lič, ca 3.300 m s. m., 18.8.1947, leg. Denisova, PR.

Iran. Persia borealis, m. Elburz, Laristan, in fauce Junesar, 2.600-2.700 m s. m., 13.7.1902, leg. J. et A. Bornmüller, PR.

Iraq. Distr. Rowanduz, in valle Hassar-i-Sakran, 7.6.1961, leg. Hadač et Faisal Abd' el Kader, PR.

Probaliter etiam *O. caucasica*: Kirgizia - Tian-Shan, montes Chatkalski khrebet, mons Chimgan, 1.900-2.600 m s. m., 17.7.1979, leg. Vašák, PR.

O. caucasica is distributed mainly in the Caucasus, Elburz (N Iran), mountains of N Iraq and probably in the Tian Shan. Presumably, the chromosome number of 2n = 42 (Sokolovskaja et Strelkova 1967 sec. Fedorov 1969:579) found in plants from the mountains of the central ridge of the Caucasus, refers to these plants. From the Caucasus, we saw only plants with long anthers.

Grossgejm (1949:583), who reported only on *O. elatior* from the whole territory of the Caucasus, also assumed deviating character of Caucasian plants (Grossgejm 1930:44 mentioned *O. digyna* as the only Caucasian species of this genus). The name *O. elatior*, being used frequently for European plants as well, does not apply to the Caucasian plants. *O. elatior* was described from the Himalayas (cf. Wallich 1832:64-65) and regarding its conspicuously tall growth it is probably very closely related to *O. sinensis* Hemsl. Little is known about the taxonomy of the Himalayan species. Hara et al. (1982:175) recognized *O. digyna* from Nepal but a future study of the ample material will certainly yield many surprising changes.

Souhrn

Oxyria digyna (L.) Hill je považována do dnešní doby za jednotný, široce rozšířený druh. Pouze někteří autoři oddělovali jihozápadočínské rostliny (Sečuán, Yunnan) do samostatného druhu *O. sinensis* Hemsl. (= *O. mairei* Lévl.) nebo především rostliny kavkazské do druhu *O. elatior* R. Br. popsaného však z indického Kumaonu. Stupeň homogenity *O. digyna* jsme chtěli prověřit na dostupném herbářovém materiálu (PR, PRC). Zkoumali jsme následující znaky: výška rostlin, šířka listové čepele, délka vnějších okvětních lístků, délka a šířka vnitřních okvětních lístků, délka prašníků, velikost pylových zrn, délka a šířka plodů, tvar a velikost semen; dále jsme věnovali i značnou pozornost rozšíření. Zhodnocením těchto znaků jsme dospěli k závěru, že *O. digyna* se rozpadá (kromě *O. sinensis* a *O. elatior*) ve dva druhy, a to *O. digyna* (L.) Hill s. str. a *O. caucasica* Chrtek et Šourková. Nový druh se od *O. digyna* s. str. odlišuje nejen morfologicky [především delšími prašníky - 0,9-1,3 (-1,5) mm, většími pylovými zrny - (25-) 27-28 (-28,5) µm v průměru a obzvláště širšími plody - (4,5-) 5,0-6,5 mm], ale i rozšířením: *O. caucasica* roste na Kavkaze, v Iránu (Elburz) a v severní horské části Iráku. K tomuto druhu budou patřit s největší pravděpodobností i rostliny z pohoří Ťian-Šan v Kirgizii. Naproti tomu *O. digyna* s. str. je rozšířena v Evropě, Asii a Severní Americe (± souvisle v arktické a subarktické zóně, disjunktivně v jižnějších územích ve vysokohorských polohách). Otázkou zůstává jižní hranice tohoto druhu na Sibiři. Zatímco z oblasti Altaje jsme revidovali typické rostliny *O. digyna*, literární údaje z centrální Sibiře by svědčily spíše o výskytu jiného druhu. Zatímco *O. caucasica* je ± jednotná, *O. digyna* s. str. vykazuje určitou proměnlivost. Tak např. délka prašníků u většiny rostlin z Fennoskandie, Špicberků, Islandu, Grónska a Labradoru je poněkud větší než u rostlin z Pyrenejí, Alp, Karpat a balkánsko-dinarských pohoří, Altaje a hor Spojených států. Tyto rostliny by si zasloužily další studium.

Pro široký druh *O. digyna* jsou převážně uváděny chromozómové počty 2n = 14 (více počtů z různých částí areálu), řídčeji 2n = 42 (z Asie, včetně Kavkazu), zcela výjimečně 2n = 28. K druhu *O. digyna* s. str. se s určitostí vztahují 2n = 14, k *O. caucasica* 2n = 42. Tento počet je uváděn např. z Kavkazu, odkud jsme viděli jen *O. caucasica* a nikoliv *O. digyna* s. str.

References

Edman G. (1929): Zur Entwicklungsgeschichte der Gattung *Oxyria* Hill, nebst zytologischen, embryologischen und systematischen Bemerkungen über einige andere Polygonaceen.- Acta Horti Bergiani, Stockholm, 9:165-291.

Fedorov A. A. [red.] (1969): Chromosomnye čisla cvetkovych rastenij. - Leningrad.

Grossgejm A. A. (1930): Flora Kavkaza. Vol. 2. - Moskva et Leningrad.

Grossgejm A. A. (1949): Opredelitel rastenij Kavkaza. - Moskva.

Hara A., Chater A. O. et Wiliams L. H. J. (1982): An enumeration of the flowering plants of Nepal. Vol. 3. - London.

Májovský J., Murín A. et al. (1987): Karyotaxonomický prehľad flóry Slovenska. - Bratislava.

Meusel H., Jäger E. et Weinert E. (1965): Vergleichende Chorologie der zentraleuropäischen Flora. - Jena.

Tolmačev A. I. (1966): Arktičeskaja flora. Vol. 5. - Moskva et Leningrad.

Wallich N. (1832): Plantae asiaticae rariores, or descriptions and figures of a selected number of unpublished East Indian plants. Vol. 3. - London.

Received 21 November 1991
Accepted 6 June 1992