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THE AMERICAN REPRESENTATIVES OF PYROLA ROTUNDIFOLIA.

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It has long seemed strange that the handsome plants passing as *Pyrola rotundifolia* should occupy in Europe and America geographic areas of such different character. The European plant is a species of northern and mountainous districts, extending from latitude 73° in Greenland,[1] latitude 67° in Lapland,[2] and Iceland and the Faroe Islands across much of Europe and western Asia to latitude 45°, and very rarely southward in the Pyrenees, Apennines, and other mountains.[3] An extreme Arctic representative of the plant, *P. grandiflora*, Radius (*P. groenlandica* and *P. pumila*, Hornem., *P. rotundifolia*, var. *pumila*, Hornem.) occurs in Greenland and the Arctic regions of America, extending south in Labrador to Hopedale (latitude 55° 40′). In Europe the range of *P. rotundifolia* closely approximates that of *P. minor*; and a third species, *P. media*, Swartz, unites to such an extent the characters of *P. rotundifolia* and *P. minor* that European botanists often find difficulty in distinguishing it.[4]

The large white-flowered plant which in America has long passed as true *Pyrola rotundifolia* occurs in open dry or sandy woods, rarely in swamps, from the Baie des Chaleurs, Quebec (latitude 48° 10′) west to South Dakota and south beyond latitude 35° into Georgia. Its range in America is thus much more southern than that of *P.*

[1] Lange, Consp. Fl. Groen. 85 (1880).

[2] N. J. Andersson, Pl. Vasc. Quickjock Lap. Lulensis, 27 (1845).

[3] See Nyman, Consp. Fl. Eur. 492 (1879).

[4] "P. MEDIA, Swartz. . . . Perhaps a mere variety of *P. minor*, and sometimes passing almost into *P. rotundifolia*."— Bentham, Brit. Fl., ed. 4, 300 (1878).

minor (the European associate of *P. rotundifolia*), a species occurring in arctic and subarctic America, extending southward in cold fir and spruce forests and deep swamps to Cape Breton, the higher mountains of northern New England, the Great Lakes, and the Rocky Mountains. At no point, except possibly the extreme northern limit of *P. rotundifolia* and the extreme southeastern limit of *P. minor* (where each species is rare and local) do their ranges coincide; and nowhere in America, so far as known, has there ever been found any transition between the two species, such as is represented in Europe by *P. media*.

Superficially the three plants, the European *Pyrola rotundifolia*, the Arctic *P. grandiflora*, and the so-called *P. rotundifolia* of temperate America, present little to indicate that they may not be phases of one broadly distributed species; and as such they have been treated by many authors, who, at the same time, have included with them *P. asarifolia*, Michx. and *P. bracteata*, Hook., both species of well defined characters and geographic range. In general, the plant of temperate North America is taller and has larger leaves, while the Arctic *P. grandiflora* is lower and with smaller leaves than *P. rotundifolia* of Europe.[1] In general, too, *P. grandiflora* of the Arctic regions and the plant of the eastern United States and Canada have much larger flowers with thicker petals than the European species, but in plants from northern Scandinavia the corolla is as large as in average American specimens.[2]

A comparison of the stamens brings out certain points which indicate, even more than the geographic range and the variation in size and texture of the petals and the size of the leaves, that the three plants are probably best treated as distinct species, or at least as well developed geographic subspecies. In the large-flowered plant of the eastern United States and Canada the filaments are shorter

[1] Measurement of 50 American herbarium-specimens shows a range in height from 9 to 36 (average 25) cm.; of 28 European plants a range from 15 to 30 (average 20) cm.; of 25 Arctic plants a range from 5 to 16 (average 10) cm. The leaves of the American plants show a range in the length of blade from 2 to 6.8 (average 4.4) cm.; of the European from 1.9 to 4.6 (average 3.3) cm.; of the Arctic from 1 to 3 (average 2) cm.

[2] Petals of 20 herbarium specimens of the plant of temperate America vary in length from 6.5 to 10.5 (average 8.4) mm.; of 20 European specimens they vary from 5.5 to 8 (average 6.5) mm.; of 20 Arctic American plants from 7.5 to 11 (average 8.7) mm.

while the anthers are distinctly longer than in the small-flowered European plant. In the largest-flowered member of the group, *P. grandiflora* of the Arctic regions, on the other hand, both the filaments and the anthers are shorter than in either the small-flowered European *P. rotundifolia*, or the large-flowered plant of temperate North America.[1]

In *Pyrola rotundifolia* of Europe and the Arctic *P. grandiflora* the anthers are muticous or rarely mucronulate at base. In the so-called *P. rotundifolia* of eastern America, as in *P. asarifolia* and *P. bracteata*, the base of the anther is distinctly mucronate. In the specimens at hand this character is very apparent, but, for the most part, current descriptions of *P. rotundifolia*, based upon both European and American material and generally including *P. asarifolia*, *P. bracteata*, *P. grandiflora*, etc., are similar to that in the Synoptical Flora: "the mucro at base either short and distinct or obsolete."[2]

At least one monographer of the group, however, Dr. Alefeld, basing his description solely upon Old World material,[3] says in his extended diagnosis: "antherae . . . . muticae."[4] In this connection, furthermore, it is interesting to note, as our present knowledge of plant-distribution might lead us to expect, that the material examined from Japan, Manchuria, and Korea has not only the large leaves and flowers but the large prominently mucronate anthers of the American plant. This fact was emphasized in 1872 by the discriminating Maximowicz who, in his "Diagnoses plantarum novarum Japoniae et Mandshuriae," commented on the monograph of Alefeld and stated that in the Japanese and American material the anthers were all mucronulate at base, though in Europe, where they are said to be muticous, mucronulate anthers often occur.[5]

[1] The stamens of the American plant show a range in length from 4.75 to 7 (average 6) mm., the anthers from 2.75 to 3.6 (average 3.2) mm.; of the European plant from 5 to 7.75 (average 6.27) mm., the anthers from 2 to 3 (average 2.5) mm.; of the Arctic plant from 4 to 5.5 (average 5) mm., the anthers from 1.7 to 2.3 (average 2) mm. [2] Gray, Syn. Fl. ii. pt. 1, 47 (1878).

"[3] Da ich in allen Herbarien nur europäische oder asiatische, niemals amerikanische Examplare sah, so kann ich auch die von anderen Autoren angegebenen Standorte dieser Art für Amerika nicht anführen."— Alefeld, Linnaea, xxviii. 64 (1856). [4] Alefeld, Linnaea, xxviii. 63 (1856).

[5] "Signa, quibus denuo tentavit dignoscere *P. asarifoliam* et *P. rotundifoliam* monographus Alefeld, sunt: calycis laciniae in priore breviores, antherae basi mucronulatae et stylus corollam aequans. In meis speciminibus numerosis e *Japonia* calycis laciniae occurrunt saepe lanceolatae, quales a monographo *P.*

Among the European specimens examined by the writer only two show the mucronulate base of the anther referred to by Maximowicz, but in these the mucro is much shorter than in anthers of the American plant and in their other characters the specimens are clearly referable to the European type. The mucronate base of the anther, then, although not an invariable character, is worthy at least of secondary consideration in distinguishing from the European and the Arctic species the plant of Eastern America and Asia.

In the European *Pyrola rotundifolia* the anther-cells are slightly constricted above, forming very short nearly straight necks or tubes through which open the pores. In the Arctic *P. grandiflora* these necks are essentially wanting; but in the plant of temperate America, Japan, etc., the necks are continued as prominent curved processes.

In the form of its style the Arctic *Pyrola grandiflora*, furthermore, presents a character which seems to separate it very clearly from the European *P. rotundifolia* and its larger American and East Asian representative. In the two latter plants the style is terminated by a distinct ring above which are the five protruding stigmatic lobes. In *P. grandiflora* this ring is nearly if not quite obsolete.

From these comparisons it seems that the plants of Northern Europe, of the Arctic regions of Greenland and America, and of eastern temperate North America and northeastern Asia are well defined members of the subgenus *Thelaia*. The two former are clearly referable to *Pyrola rotundifolia*, L., and *P. grandiflora*, Radius. The plant of eastern America and Eastern Asia has, however, been very generally accepted as identical with the Old World *P. rotundifolia*. Only one author, so far as known, has previously maintained for the plant specific validity.[1] Robert Sweet, in 1830, gave the plant an

rotundifoliae tribuuntur, stylus corollam aequans vel superans, antherae vero omnes basi mucronulatae. Ita inveni etiam in americanis, nempe calycis lacinias variabiles, antheras vero mucronulatas. At in europaeis, ubi antherae muticae postulantur, in permultis (scandinavicis, germanicis, galiicis) etiam mucronulatas video."—Maximowicz, Bull. Acad. Imp. Sci. St. Pét. xviii. 623 (1872).

[1] *Pyrola rotundifolia*, as published by Linnaeus in the Species Plantarum (396), included the American as well as the European plant; and among other citations was that of "Pyrola noveboracensis. *Cold. noveb.* 99." Colden's *P. noveboracensis*, published in Act. Soc. Upsal. 1743, p. 122, no. 99, was probably the large American plant, but I am unable to find that it has been taken up by any post-Linnean author as a species distinct from *P. rotundifolia*. Treated by Linnaeus and all subsequent authors as a pure synonym of *P. rotundifolia*, the pre-Linnean name, *P. noveboracensis*, can hardly be given nomenclatorial precedence over the post-Linnean *P. americana*, Sweet.

appropriate name, though, unfortunately, he failed to point out the characters upon which he based his conclusion. Sweet's Hortus Britannicus was, as its secondary title explains, "a catalogue of plants, indigenous, or cultivated in the gardens of Great Britain." The species under each genus were numbered separately, then were indicated the color, English name, geographic source, hardiness, duration, etc. The American plant, the ninth in Sweet's list of Pyrolas, was thus entered:

"9. americàna. (*wh.*) American. N. America. . . . . H. 2.
rotundifòlia Ph. *non* Eng. bot."[1]

The reference to *Pyrola rotundifolia* of Pursh, not of the English Botany, alone defines Sweet's species, for there can be no doubt that Pursh's plant, "in dry stony or sandy woods: Canada to Carolina,"[2] was the common large-flowered plant of eastern America, which, treated as a valid species, should bear the name *P. americana*, Sweet.

Briefly, the conclusions reached in this study are, that *Pyrola rotundifolia*, *P. grandiflora*, and *P. americana*, are distinct though closely related species, each occupying a well defined geographic area and maintaining with essential constancy certain characters notably in the size of the petals, and the size, proportions, and forms of the anthers and filaments.

The leading characters of the plants are:

PYROLA ROTUNDIFOLIA, L. Sp. 396 (1753), as to European plant — including var. *arenaria*, Koch. Syn. 478 (1837). *Thelaia rotundifolia*, Alefeld, Linnaea, xxviii. 60 (1856). Plant varying in height from 15 to 30 (average 20) cm.: leaf-blade from 1.9 to 4.6 (average 3.3) cm.: petals comparatively thin, white or slightly purple-tinged, 5.5 to 8 (average 6.5) mm. long: stamens 5 to 7.75 (average 6.27) mm. long; the anthers 2 to 3 (average 2.5) mm. long, muticous or rarely mucronulate at base, the cells narrowed above to short straightish necks: style with a distinct ring or collar below the 5 protruding lobes of the stigma.— Greenland, Iceland, and Lapland, across northern and central Europe and western Asia and locally southward in the mountains.

P. AMERICANA, Sweet, Hort. Brit., ed. 2, 341 (1830). *P. rotundifolia*, Am. auth., mostly. Plant 9 to 36 (average 25) cm. high: leaf-blade 2 to 6.8 (average 4.4) cm. long: petals thick, cream-white, rarely pink-tinged, 6.5 to 10.5 (average 8.4) mm. long: stamens 4.75 to 7 (average 6) mm. long; anthers 2.75 to 3.6 (average 3.2) mm.

[1] Sweet, Hort. Brit., ed. 2, 341 (1830).
[2] Pursh, Fl. 299 (1814).

long, mucronate at base, the cells constricted above to prominent arched necks: style similar to that of *P. rotundifolia*.— Baie des Chaleurs, Quebec to South Dakota and Georgia; Japan, Korea, Manchuria.

P. GRANDIFLORA, Radius, Diss. Pyrol. 27, t. 3, fig. 2 (1821). *P. rotundifolia*, var. *pumila*, Hornem. dansk. oecon. Plantel., ed. 3, 463 (1821). *P. groenlandica*, Hornem. Fl. Dan. xi. t. 1817 (1825). *P. pumila*, Hornem. ex Cham. & Schl. Linnaea, i. 514 (1826). *P. rotundifolia*, var. *grandiflora*, DC. Prodr. vii. 773 (1839). *Thelaia grandiflora*, Alefeld, Linnaea, xxviii. 68 (1856). Plant 5 to 16 (average 10) cm. high: leaf-blade 1 to 3 (average 2) cm. long: petals thick, white to crimson, 7.5 to 11 (average 8.7) mm. long: stamens 4 to 5.5 (average 5) mm. long; the anthers 1.7 to 2.3 (average 2) mm. long, muticous at base, the cells barely constricted above: style without annulate tips.—Greenland and Arctic America, south to Hopedale, Labrador.

GRAY HERBARIUM.

NOTES ON THE FLORA OF BERKSHIRE COUNTY, MASSACHUSETTS.

RALPH HOFFMANN.

THE following records from Berkshire County, Massachusetts, may be of interest. They refer to plants which either have not hitherto been recorded from Massachusetts, or are known from very few stations in the state. These plants fall into more or less well-defined groups. In the cold sphagnum bogs and on the higher mountains occur northern plants which either reach or approach their southern limit for New England in Berkshire County. The western and southern river valleys, on the other hand, extend into New York or Connecticut, and on their well-drained slopes occur plants which for the most part have been prevented by the unbroken Hoosac Plateau from extending their range into central Massachusetts. Two or three plants are adventive but at least one is well-established.

Specimens of all the plants here recorded have been placed in the Herbarium of the New England Botanical Club. They have all been collected by me except in three instances where the plants were gathered by Mr. M. L. Fernald. I have to thank Mr. Fernald for his