

THE CHROMOSOME NUMBER OF *SAXIFRAGA GASPENSIS* FERNALD

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ABSTRACT

The chromosome number of *Saxifraga gaspensis* Fern., a taxon frequently included in the circumpolar species *S. nivalis* L., or considered a variety, was determined on material from Mount Logan, Gaspé Peninsula, and found to be $2n = 40$. As the chromosome number of *S. nivalis* is $2n = 60$ (about 30 data from diverse countries), it seems that the plant described by Fernald in 1917 is specifically different. The authors suggest that *S. gaspensis* could be a stabilized relictual hybrid between *S. nivalis* and the closely related diploid species *S. tenuis* (Wahlenb.) H. Smith, $2n = 20$, or a polyploid originating from *S. tenuis*.

Key Words: *Saxifraga gaspensis*, *S. nivalis*, *S. tenuis*, chromosome number, distribution, endemism, Gaspé Peninsula, Québec, Canada

TAXONOMIC HISTORY

Saxifraga gaspensis was described by M. L. Fernald in 1917 from material collected in 1906 with J. F. Collins (600, GH) on calcareous slopes of Tabletop Mountain (Mount Jacques-Cartier) on the Gaspé Peninsula and first distributed in herbaria as *S. nivalis* L. The new species differed from the circumpolar arctic-alpine *S. nivalis* by its "rosette-leaves more narrowly cuneate-obovate and more gradually narrowed to a broad petiolar base," its less numerous flowered inflorescences which were spicate-racemose rather than spiciform to corymbiform, its shorter calyx lobes reflexed in fruit, its acute to subacute and narrower petals and its shorter capsules.

In the following decades, *S. gaspensis* was discovered in moist pockets and ravines on Mount Logan and Mount Blanc, west of the type locality, and it was also reported from northern Québec and Labrador (Rousseau, 1974). Although still retained as a distinct species by Fernald (1950) in the Gray's Manual, *S. gaspensis* is judged to be a synonym of *S. tenuis* or of *S. nivalis* var. *tenuis* Wahlenb. in more recent treatments (Scoggan, 1978; Kartesz, 1994). Hultén (1971), on the other hand, uses the name *S. gaspensis* on his maps but states that the species is doubtfully distinct from *S. nivalis* var. *tenuis*. Only Boivin (1966 and unpubl.) considered *S. gaspensis* [sub *S. nivalis* var. *gaspensis* (Fern.) Boivin] as a taxon differing from *S. nivalis* and *S. tenuis sensu stricto*.

However, in recent catalogs or documented lists of rare, endangered or vulnerable species in Canada or in Québec (Bouchard et al., 1983; Argus and Pryer, 1990; Lavoie, 1992), *S. nivalis* var. *gaspensis* is revived as, at least, a taxon in need of further research. For this reason and because of the urgent problem of determining if *S. gaspensis* must be included, or not, in the list of species to be legally protected, the present study was undertaken.

MATERIAL AND METHODS

Living material of *S. gaspensis* (some with seeds) was first collected in late August of 1993 in cold chimneys of Pease Basin on the eastern side of Mount Logan, for greenhouse culture. Additional specimens were also taken in June 1994 on schistose walls of Big Cascade, between Mounts Dodge and Griscom, east of the 1993 stations. For the cytological studies, fresh root tips were selected from potted plants and from seeds germinating on wet filter papers in Petri dishes. They were fixed in an acetic acid/absolute alcohol 1:3 mixture before coloration in aceto-carmin and squash in a drop of carmine. As a pre-treatment, before fixation, the potted plants or the Petri were kept in a refrigerator at 4°C for 4 to 7 hours.

RESULTS AND DISCUSSION

The chromosome number $2n = 40$ (Figure 1) was determined on one of the potted plants and two plantlets obtained from seeds collected in 1993 in Pease Basin. The same chromosome number ($2n = \text{ca. } 40$) was also observed on the 1994 material from Big Cascade. This chromosome number differs from the numerous counts reported for *S. nivalis* ($2n = 60$) and *S. tenuis* ($2n = 20$) on circumpolar material from Greenland, Iceland, Spitzberg, Norway, Siberia, Alaska, British Columbia, Northwest Territories, etc. with the exception of a report by Krause and Beamish (1973) who have found $n = 20$ on one specimen of this group from the Yukon territories (Lapie Lake). These authors do not attempt to attach any binomial to the cytotypes ($n = 20$, $n = 10$) they have found in the Yukon but describe them as belonging to a large *S. nivalis-tenuis* complex. Our chromosome data, however, were specifically determined from specimens which were suspected to

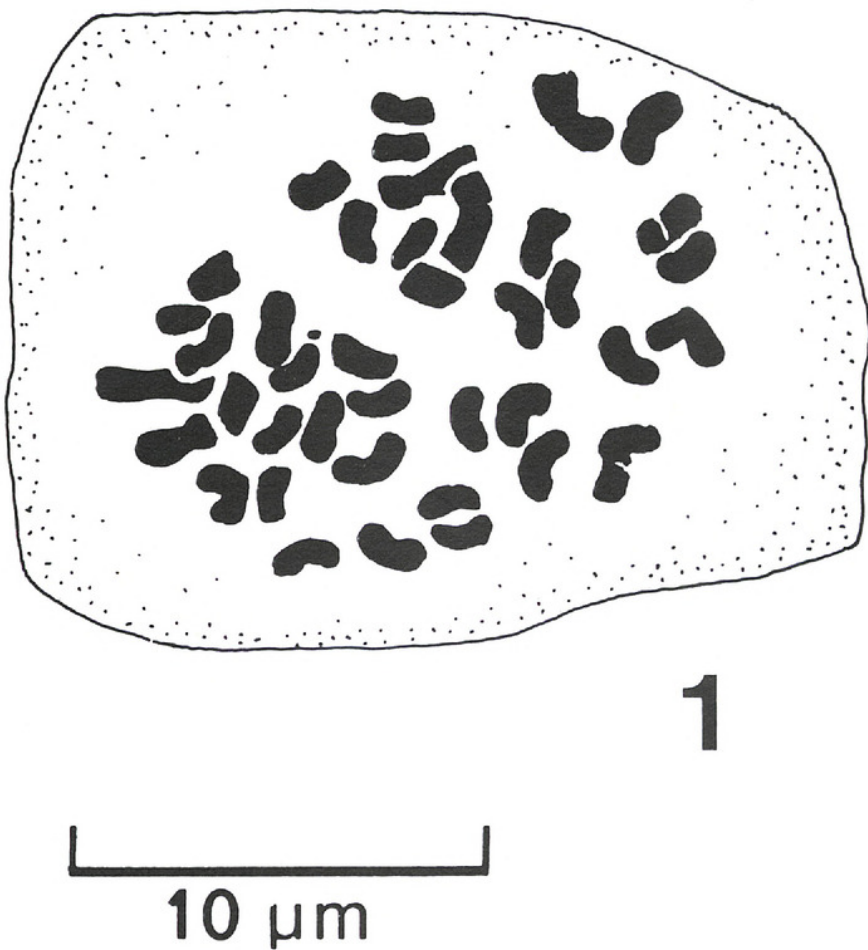


Figure 1. Somatic chromosomes of *Saxifraga gaspensis* Fern.; metaphase with $2n = 40$ chromosomes from a root-tip cell.

be *S. gaspensis*, so that we are inclined to consider this taxon as basically different from *S. nivalis* and *S. tenuis*.

The chromosome count ($n = 20$) of Krause and Beamish (1973) in the Yukon possibly belongs to a hybrid individual between *S. nivalis* ($2n = 60$) and *S. tenuis* ($2n = 20$), the two species growing together in this region where their differences "seem to break down and the plants appear to intergrade" as Krause and Beamish (1973) point out. The same situation may also prevail in northern Québec and Labrador where the mention of "*S. gaspensis*" refers perhaps to such hybrids.

It is quite possible that *S. gaspensis* shares the same hybrid origin but, as *S. tenuis* ($2n = 20$) is not reported for the Gaspé Peninsula and *S. nivalis sensu stricto* ($2n = 60$) possibly does not exist there either, we must suppose that *S. gaspensis* is a relictual stabilized hybrid able to reproduce and set viable seeds. This

event could have occurred when the Gaspé Peninsula climate and flora were different and comparable to the actual situation in the arctic. Another possibility is that *S. gaspensis* is a tetraploid offspring of *S. tenuis* but an ancient origin must also be advocated in this case.

The study of the meiosis in *S. gaspensis* could perhaps provide an answer to these questions but a cytological examination of different populations of *S. nivalis sensu lato* in the Gaspé Peninsula and in northern Québec may be necessary to understand the whole problem. It can already be recommended, however, that the taxa belonging to the *S. nivalis* complex in the Gaspé Peninsula be protected as an endangered local taxa.

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