

## EVIDENCE AGAINST AUTOGAMY IN *VACCINIUM ULIGINOSUM* L.

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Controlled selfs on four tetraploid ( $2n=48$ ) and 5 diploid ( $2n=24$ ) plants of *Vaccinium uliginosum* L. were unsuccessful. These negative data were supported by field observations from Halifax Co., N.S. where a single tetraploid clone interbreeds with *Vaccinium angustifolium* Aiton.

### INTRODUCTION

Both Warming (1908) and Hagerup (1933) reported that in Greenland *Vaccinium uliginosum* L. forma *microphylla* Lange was largely self-pollinating and by inference self-compatible. Apogamy was dismissed since stigmata were encrusted with pollen grains and pollen tubes were actively growing in the style. Hagerup (1933) averred that an outbreeding system would be selected against since insects were scarce in the Arctic. An observation challenged by Kevan (1972) who found ample insect activity in the high Canadian Arctic. Moreover Ballington (1975) and Vander Kloet (1976) have independently shown that interflower selfing is largely unsuccessful in experimental populations of several species of *Vaccinium* & *Cyanococcus* and in one of them, *V. angustifolium* Aiton is a complete failure (Vander Kloet 1976). The purpose of this paper is to show from experimental and field data that *V. uliginosum* does not self.

### MATERIALS and METHODS

In the autumn from 1973 until 1976, 20 small populations (2-15 plants) were started from seed taken from open pollinated berries collected at 17 sites scattered throughout eastern North America between 44°N and 75°N. Vouchers are in the E.C. Smith Herbarium, Acadia University at Wolfville, N.S.

Seedlings were kept in the greenhouse until perennating buds had formed; they were then transferred to a coldframe until the following April when they were returned to the greenhouse, which was kept insect free and at 20°C during the day and 10°C at night, and where they began to flower after 5 wk. Once blooming began, plants in flower were isolated and from each, 10 stigmata were excised at random and examined for the presence of pollen grains. In addition pollen was removed from several flowers, imbedded in a drop of 10% sucrose in a 0.7% agar solution, in order to follow pollen tube growth and thereby assess pollen viability. After the corolla of undisturbed flowers had dropped, the development of the calyx was observed. Finally one or two plants from each flowering population were selfed.

## RESULTS and DISCUSSION

Of the 70 plants under cultivation in 1976, 18 have flowered and of these 4 were tetraploid  $2n=48$ , the remainder diploid  $2n=24$  (Fig 1). Annually these 18 plants produced at least one flower and often more than 80, but regardless of flower density, none set seed and the last calyx usually dropped in mid-June, undeveloped. Twenty seven of the 30 stigmata excised at random from the corollas had no pollen encrusted in them; the remaining three stigmata contained 1, 4, and 7 grains

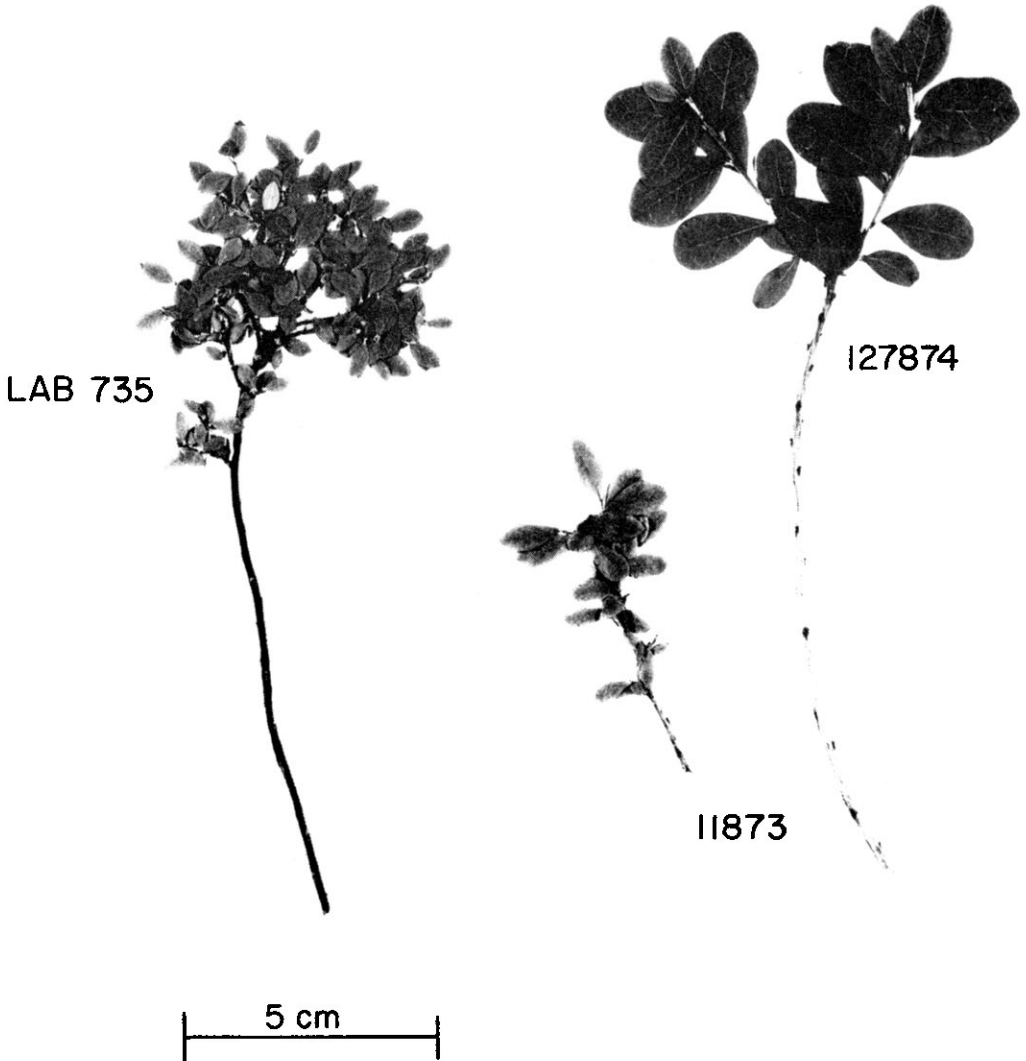


Fig 1. Comparison of progeny out of #11873 with a tetraploid plant from St. Anthony, Newfoundland 127874, and a diploid plant from West St. Modeste, Labrador 735.

respectively. Pollen collected from 7 plants had  $35 \pm 16\%$  germination; although pollen viability was not high, many of the tetrads had more than one pollen tube. Moreover selfing failed on the 9 plants attempted. In 1974, interplant crossing among homoploids was successful.

These negative experimental results discount autogamy and agree well with observational data on the species in Nova Scotia obtained from 1972 until the present. In October 1972, I discovered a single clone of V. uliginosum on the headlands of Portuguese Cove, Halifax Co., N.S. which was the first collection of this species on the Nova Scotia mainland. Repeated and lengthy searches of adjacent headlands in the following years yielded no additional colonies. This clone is well established, 5 m in diameter with a small tree of Picea glauca in the center of the clone. About 5 or 6 berries are produced on the entire clone although it has flowered quite abundantly each year (up to 35 flowers per shoot). The berries collected so far contained  $5 \pm 3$  seeds which germinated quite readily when fresh in 1973 and 1976 but not in 1975. In 1974 fruit was not collected.

The progeny produced from these few seeds does not resemble its female parent, nor any plant of V. uliginosum (Fig 2). The leaf blade is elliptic rather than ovate; the margin is obscurely serrate, each serration being tipped with a gland, as well as a few hairs (see Fig 2). All these characters suggest hybridization with V. angustifolium; it would, therefore, be an intersectional hybrid, a condition not entirely unknown in Vaccinium. Ritchie (1954, 1955) has shown that the European V. intermedium Ruthe is a hybrid produced by V. myrtillus L. and V. vitis-idaea L.

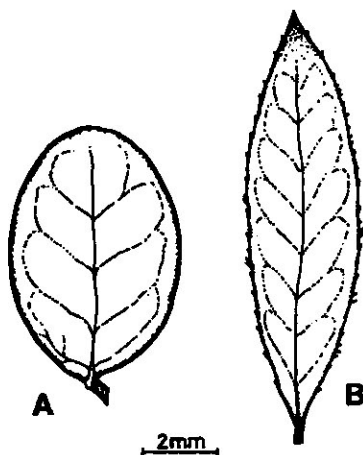


Fig 2. Comparison of leaf shape, venation pattern, and margin of the female parent 11873 (A) to one of its progeny (B).

Moreover, the potential for V. uliginosum to cross with V. angustifolium at Portuguese Cove is quite high; both are tetraploids and on 9 June 1977, both the single colony of V. uliginosum and V. angustifolium were in full bloom and being pollinated apparently indiscriminately by Bombus bimaculatus. Vaccinium vitis-idaea is also present on these headlands but was not yet in flower, and moreover is a diploid and therefore not likely to cross with this colony of V. uliginosum. Therefore, by elimination, V. angustifolium is the probable parent for these

experimental hybrids. Although I have yet to find the hybrid in the field, these field data do however support the experimental data and suggest that autogamy does not occur in V. uliginosum.

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