THE WINTER CONDITION OF OUR VIOLETS

Thesis for the Degree of B. S.

Bertha Baker

1898

Senior Agricultural Thesis.

"The Winter Condition of Our Violets"

By Bertha Baker,
Class '98.

Michigan Agricultural College.

THESIS

The Winter Condition of Our Violets.

Many people have written about the violet, its cultivation and its value, but as yet, no comparison has been made of the rootstocks of the different species of our common violets.

In the spring or summer some of them bear flowers, each of which seems to spring from the surface of the ground, while others produce branches from a few inches to a foot or more in length. On these branches we have the flowers, each with its separate stalk. All are supplied with an abundance of green leaves throughout the growing season. After the plants have produced flowers and seeds, and even while producing these, in many cases the leaves are assimilating materials for the formation of starch and protoplasm; some of which is stored away in short rootstocks ready for the use of the plant on the approach of the following spring. Late in autumn, or winter, these leaves perish, and those which came from the rootstock have scars at the thickened base. The plants also perfect during the summer, rudimentary leaves and flower buds which are ready to grow and blossom as soon as the ground becomes warm in the spring.

It is the purpose of this thesis to illustrate, describe and compare the rootstocks of some of our violets as seen in the winter or early spring.

The plants were grown in the botanic garden, and were dug

up,washed and carefully examined. All the points of likeness as well as of difference were carefully noticed.

Violets are divided into two sections: Caulescent,those which manifestly have stems,and Acaulescent,those which appear to be stemless or nearly so.

A prominent botanist says,"a rootstock is a general name for any horizontal or oblique perennial stem which lies on the ground or is buried beneath its surface. It sends off fibrous roots of a slender sort whenever it rests on,or is covered by the soil,and usually produces from its apex some kind of aerial stem,either leafy or as a flower stalk,which rises into the air and light." They have well marked nodes and internodes,the former bearing leaves reduced to scales. The apex advances and at length rises into an ordinary stem,while the opposite and older part gradually dies away.

A bud forms in the axil of each scale-like leaf. Roots proceed from or near the nodes. The thickened rootstocks are gorged with the nourishing matter formed in the leaves and stored there for the use of the plant. These rootstocks answer the same purpose as do the thickened leaves of other plants,-as a sort of store-house where the plant may place the food accumulated in excess.

In the first specimen, Viola palmata,L.,or the common blue violet,the rootstock is very short,bringing the branches close together. The bases where the leaves have fallen off are very

thick. They are about 1-2 cm. and have a sort of three lobed appearance,as though they had been pinched. In Plate 1,the drawing shows these thickened bases and also the manner in which the new growth starts from the nodes. (a) shows the starch granules,which are very small and angular in appearance. (c),another view of the new growth; (d) the older portion of the rootstock. The rootstock is 13 mm.in diameter. The leaves of this specimen are roundish,cordate or reniform,however,there was a great variation. This is the most common of our violets,and grows in moist,or dryish,and especially sterile ground.

The rootstocks of Viola cucullata,Gray.,is very much lengthened so that the branches are not crowded so closely together as were those of the Viola palmata. They are arranged at intervals,two fifths of the circumference of the stalk,forming what is called the five ranked arrangement. The bases from which the leaves have fallen are very thick and fleshy. (See illustrations (b) and (c),Figure I). The new growth starts from these nodes. The roots come out near them or at their corners. This specimen is 12 mm. in diameter. The starch granules are small and very irregular in shape.

Viola Canadensis,L.,or the Canadian violet,was the third specimen examined. The rootstock was very long and slender, being about 7 mm. in diameter. In this respect it somewhat resembles the previous specimen,except it does not have as many scales. From the bases of the stems,and where the branches

have been broken off,the fibro-vascular bundles may be seen as in Fig. III,(c).

The bases of the leaves are so thickened as to form deep notches in the stock,as is shown in (b),Fig. III. The roots are very numerous,and very much divided. In this specimen was found an abundance of stach,in large granules,(a). Above the ground this specimen has long branching stems. The leaves are heart-shaped,pointed serrate. This plant grows in rich woods.

Viola Rostrata,Prush.,or the Long spurred violet. The rootstock creeps along under ground,branching and sending up new plants from these nodes. It is 4mm in diameter. The stocks are not fleshy and no not have as many scales as do the specimens previously mentioned. It has very long,fibrous roots. Above ground the plant sends up very tall branching,jointed stems. The starch was very scarce,only a few granules were found. These were sharply angular and rather irregular.

Viola sagittata,Ait.,the Arrow-leaved violet. In this the new growth forms a crown. The rootstock is two(?) cm high and 1.3 in diameter. The new branches are about 10.m. in length and 5 mm in diameter. The roots of this specimen were larger and more fleshy than those of any other specimen examined,except Solea concolor,which is not a true violet. The starch in this species was abundant. The granules are not as large as Viola Canadensis,and are irregular in shape. The leaves are smooth or hairy and vary in form from oblong heart-shaped,or halbred-shaped,to oblong lanceolate,or ovate.

Viola canina,L. This is the smallest specimen examined. The rootstock was very slender,measuring only 3 mm in diameter. It is short and has many branches. There are tiny leaves coming out at intervals along the stem. The leaves are heart-shaped,and are not pointed,except those which grow near the top of the plant. There was no starch found in this species,in which respect it resembles the Viola blanda. This species grows in damp or shady places.

Viola pubescens,Ait., The rootstock is long and tapering, measuring 5 mm at its greatest diameter. There are many scars where the branches have been. The roots are not numerous,being very few in number as compared with any other specimen. The new growth,branches from the nodes along the side of the stock. The leaves are very broadly heart-shaped,toothed and somewhat pointed. The starch was quite abundant,the granules resembling those of the Viola sagittata. This is the yellow violet which grows in the woods.

Viola pedata,L. The rootstock resembles that of the Viola sagittata in the manner in which the new growth starts from the stock. It has many scales like the sagittata. The stock is very woody and on examination of a transverse section,large cells were found which were mostly hexagonal in section,with very thin walls. The drawing,Fig. VIII,(b),shows these cells and their contents. The starch was very scarce,the granules being much smaller than any found in the previous specimens. The leaves differ from those of any other violet. They are three or five

divided or parted,linear or narrowly spatulate. This is what gives the variety the name of Birdfoot violet.

Solea concolor,Ging. This is called the green violet and differs from all the other violets examined. The rootstock is very long and twisted,having a somewhat gnarled appearance. The stock is hard and woody. The leaves differ entirely from any of the other violets. They are oblong,pointed at both ends, and are entire. They are of a light green color. The stems grow up to a height of 60 cm.or more. It has small inconspicuous flowers. There was no starch found. A transverse section was made and examined. The cells were very large and varying in shape. The section showed some hexagonal,pentagonal,and even square cells. This plant grows in damp places in the woods and is rather rare.

Viola blanda,Willd. The rootstock is slender,being 4 mm in diameter. It differs from all the rest in the large number of very long fibrous roots. These roots were 12 cm. in length. The leaves were very small and roundish heart-shaped in outline. A transverse section showed cells which were irregular and of vastly differing sizes and shapes. There were no starch cells. It is usually found in damp places and under tamarack trees.

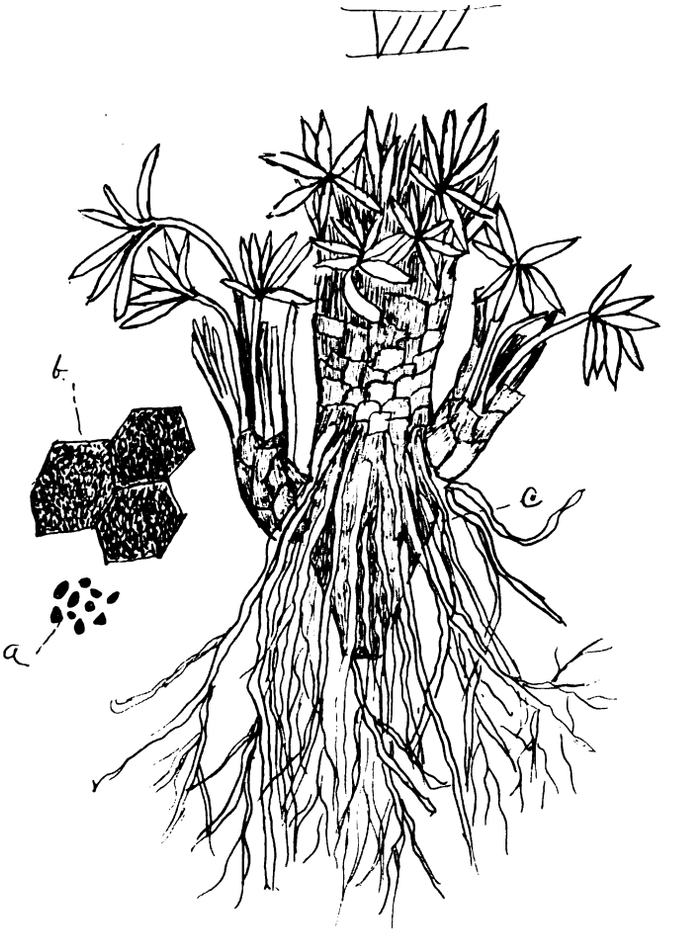
The principal differances found were the lack of starch in some specimens and the abundance in which it was found in others. There was also a great variation in the appearance,the sizes and shape of the rootstocks. Some were exceedingly short and thick while others were long and slender.


I
c
b
a
d
II
a
b
a
IV
III
b
c
a
b


V.
a
b


VI.


VII.
a


VIII.
b
c
a

IX

X