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Juniperus nana.	Asplenium Adiantum-nigrum.
Taxus baccata.	Ruta-muraria.
Orchis latifolia.	Scolopendrium vulgare.
Habenaria viridis.	Cystopteris fragilis.
Tofieldia palustris.	Polystichum aculeatum.
Potamogeton natans.	Lastrea Oreopteris.
Carex paniculata.	Osmunda regalis.
glauc.	Equisetum palustre.
Deschampsia cæspitosa.	Chara fragilis.
Melica nutans.	

Heterophylly in New Zealand Veronicas. By ROBERT LINDSAY, Curator, Royal Botanic Garden. (Plates V. and VI.)

(Read 14th June 1888.)

The shrubby species of *Veronica*, which abound in New Zealand, are of great interest both from a botanical and from a horticultural point of view. A large number of species have proved to be thoroughly hardy, and well adapted for cultivation in our climate. Forming, as most of them do, small, compact, evergreen bushes, they are found to be invaluable for the decoration of rock-gardens or other situations where dwarf-growing shrubs are required. One of the first to recognise their value in this respect was the late Mr Isaac Anderson Henry, who from time to time exhibited these plants at our meetings, and from whose garden at Hay Lodge, Trinity, many of the species now in cultivation in this country can be traced. The late Mr Gorrie was also an assiduous collector of New Zealand plants, including *Veronicas*. But the feature I wish specially at present to notice is, that some of the species, viz., those which have been termed "Whip-cord" *Veronicas*, present remarkable instances of heterophylly. My attention was first directed to this occurrence in a rather peculiar manner. In the summer of 1881 Mr Henry exhibited a plant, under the name of *Veronica salicornioides*, at a meeting of the Scottish Horticultural Society, for which he was awarded a first-class certificate. An objection was afterwards raised on the ground that, as this plant was more like a Conifer than a *Veronica*, the certificate should have been withheld until the plant had been seen in flower. Mr Henry had no doubt that the plant was what he represented it to be; still, in the absence

of flowers, it was somewhat difficult to convince those who were inclined to be sceptical. Various means were therefore adopted to induce the plant to flower, but it remained obstinate. A plant which I received from Mr Henry was placed near the glass in a stove, with the view of trying to force it to flower. Very soon it began to alter in appearance, and ultimately it produced, not flowers, but leaves of a kind which showed that the plant was really a *Veronica*. The plant afterwards flowered, though sparingly, first at Easter Duddingston Lodge, in 1885, and in the following year at Hay Lodge (after Mr Henry's death), and also in the Garden here. This circumstance led me to experiment upon other allied species which we had under culture, with the remarkable result that, when treated in a similar manner, each species produced leaves quite distinct both from the normal type and from each other. Mr N. E. Brown of Kew, in an article which appeared in the *Gardener's Chronicle* in January last, has shown conclusively that the plant grown in gardens as *Veronica salicornioides* is not the true plant of that name, as it does not agree with the type-specimen in the Kew Herbarium, a portion of which plant he figures. Being under the impression that the so-called *V. salicornioides* is a very variable plant, Mr Brown has given it the name of *V. cupressoides* var. *variabilis*. For our present purpose, however, it will be more convenient to distinguish it by the better known though erroneous name. In cultivation, *V. salicornioides* of gardens forms a dense low-growing bush. Our largest plants have never exceeded 10 inches in height, and are at present from 2 to 3 feet in diameter, but appear as if they would become more widely spread. In the adult condition the leaves closely resemble those of a Cupressus, and are yellowish-green in colour. The whole plant, indeed, has a fine golden appearance, which it retains throughout the year, but this hue is rather more pronounced in spring. The flowers are white, with pink anthers. When a plant of this species is put into heat, or becomes weakened by any other means, the leaves then produced are entirely different from the normal form. They become expanded into flat blades, usually entire, but often lobed; a three-lobed leaf appears to be the limit which this species is capable of producing. I regard this as being a reversion to the juvenile condition of the plant. In the

illustrations on Plates V. and VI. (for photographs of which I am indebted to Mr Richardson), the two forms, marked Nos. 1 and 1a, are very well shown. *V. cupressoides* in cultivation is an erect growing shrub, attaining a height of from 3 to 4 feet, the diameter being about 1 foot. It has very dark green Cupressus-like leaves in the adult condition, these being arranged in opposite pairs, and so distant from each other as to show the stem. The flowers are dark violet coloured. When weakened, the majority of the leaves become pinnatifid, sometimes either lobed or entire. Illustrations 2 and 2a show the different forms very clearly.

Veronica lycopodioides is a most curious species. In the adult condition the branches are square, while the leaves are sharp pointed, closely set, and imbricated. A plant which has been grown here for nine years is only now beginning to develop adult foliage. The juvenile leaves are of two kinds; the majority are markedly pinnatifid, with acute lobes, while others are entire and subulate. The three forms of leaf are still all to be seen on the same plant, but the two last will in all probability eventually disappear. Cuttings taken from branches having adult leaves and rooted in heat develop, for the most part, pinnatifid leaves with acute lobes, a few being entire, as seen in illustration 3, while 3a shows a portion of the adult plant.

If we are correct in supposing that the form of leaf produced by all these weakened plants, or portions of plants, is a reversion to the juvenile condition, seedlings from those species ought to develop similar leaves. I have never seen seedlings of any of the above-named species, seeds of these interesting plants being difficult to procure. A short time ago, however, I was fortunate enough to receive from a friend in New Zealand good seeds of a nearly allied species, named *Veronica Armstrongii*, which have germinated. The young seedlings show flat pinnatifid leaves, closely resembling those mentioned as having been found on weakened plants of other species. There can be little doubt, therefore, that seedlings of these species would at first produce exactly similar leaves. Illustration 4 is taken from a seedling of *Veronica Armstrongii*, while 4a shows the adult condition of the same taken from a dried specimen. The manner in which these Veronicas shed their leaves is also interesting. The smaller branches are articulated with the stem, and fall

off bodily, leaving a well-marked scar, resembling some conifers in this respect as well as in general appearance.

It may reasonably be conjectured that the remote ancestors of the *Veronicas* mentioned originally had leaves of one form only, resembling more closely than they at present do the ordinary species of the genus, and that, through change of environment or some such cause, these leaves have become altered as we now find them. The heterophyllous condition might thus be explained as being a tendency to revert to the original type.

Observations on the Annual Increase in Girth of Trees in the Royal Botanic Garden, and at Craigiehall, near Edinburgh, from 1878 to 1887. Part I. By Dr CHRISTISON, Edinburgh.

(Read 12th July 1888.)

In March 1883 I communicated to the Royal Society of Edinburgh the results of five years' observations on the increase in girth of trees, begun in 1878 by Sir Robert Christison, and completed by myself in 1882. The same trees having been under observation for five additional years, I now present the results for the whole decennial period, 1878-87. In the later years of that period monthly as well as annual observations were taken; but, as the former were fully discussed in a paper read to this Society last summer, the present investigation is confined entirely to the annual observations.

In estimating the value of the results, two disturbing elements have frequently to be taken into account. One is, that a considerable number of the trees seem to have been selected at too great an age for the purposes in view; not that they were actually of great age, but because the thin sandy soil of the Botanic Garden seems incapable of supporting tree life in full vigour after a moderate age, in most cases. The other disturbing element is the occurrence, early in the decennial period, of three successive seasons of almost unprecedented severity, which left their impress on the girth increase, not only at the time, but in some species to the very end of the period, if not permanently. The general

Fig. 1

Fig. 1^a

Fig. 2

Fig. 2^a

HETEROPHYLLY IN NEW ZEALAND VERONICAS.

Fig. 3.

Fig. 4.

Fig. 3^a.

Fig. 4^a.