

## Notes on the Apical Gemmae of *Tortula abruptinervis*.

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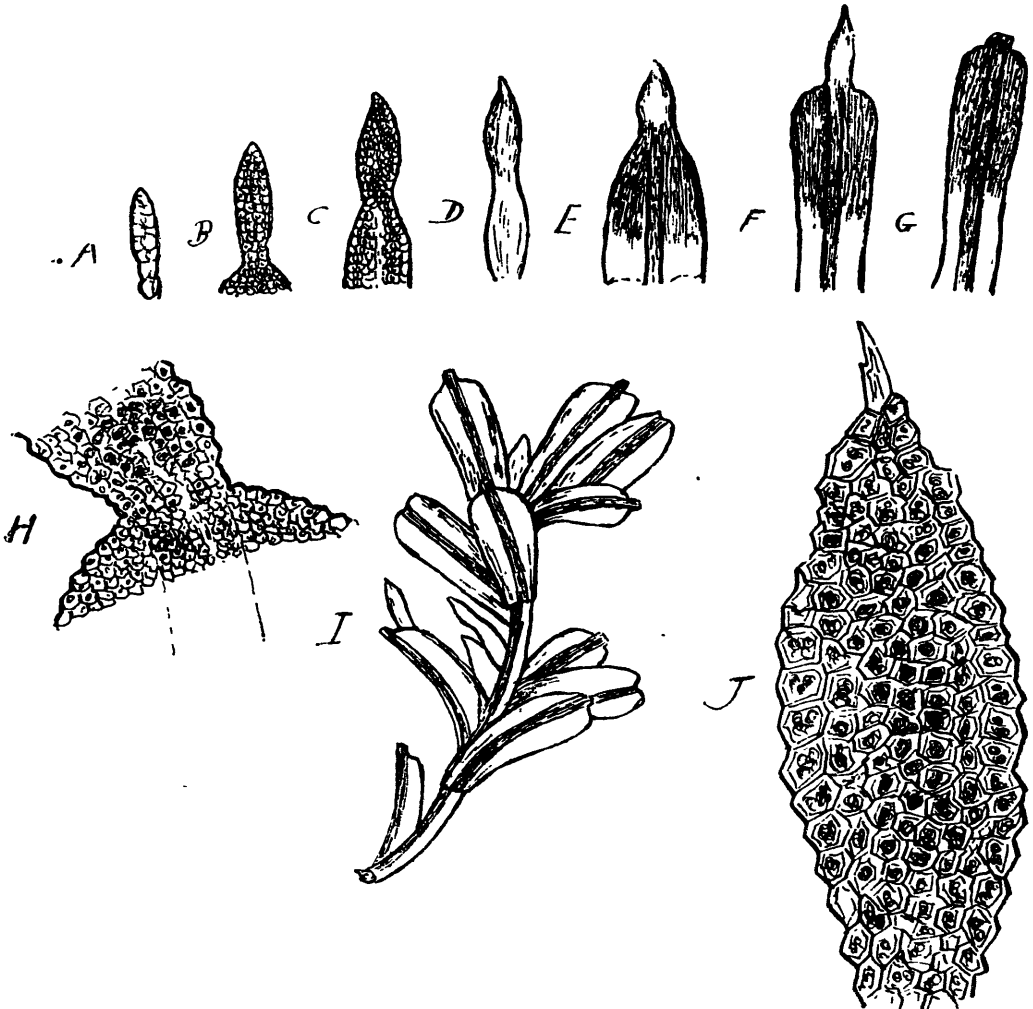
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*Tortula abruptinervis* Dixon was described by H. N. Dixon in Part III of his *Bulletin* on N.Z. mosses, from plants supplied by Mr. Gray, of Wairapapa. It is an exceedingly small plant and in the Turiroa district, Wairoa County, it grows on the bark of willow, ngaio, and cabbage trees intermixed, and almost hidden up with, other corticolous *Tortulae*. But plants gathered in bush further inland are decidedly taller.

The most interesting fact about this moss is that it bears gemmae on the ends of the leaves, and these break off, thereby causing the truncate appearance of the nerve which doubtless suggested the name. Concerning these the *Bulletin* says: "The gemmae are very noteworthy and exactly similar to those of *T. pagorum* (Milde) De Not, but much larger in proportion to the leaves." At this time, however, they were supposed to be axillary and the description runs thus: "Propagula numerosa, magna, in foliorum axillis sita." But investigation has shown that the gemmae are *apical*, and with reference to this Mr. Dixon writes later:—"It is possible or indeed probable that the axillary ones I observed were not in situ. They must fall off at a remarkably early stage in the development of the leaf, as they seem always to be lost on the terminal leaves except the very young and almost hidden ones; and from the nerve it would seem that every leaf must produce one. It is a very remarkable form of propagulum and it would be quite desirable that the development should be observed."

Ordinarily a leaf grows by subdivisions of cells, the apical cell ever pushing upward, a segment at the base constantly being divided off slantwise so as to form a more or less zigzag median line. But in this plant it is hard to say what happens. The smallest leaf I could discover consisted of a tiny gemma with cells very indistinct but not dense, very pale green and pulpy looking, contracted, however, into a neck consisting of just two rows of cells with two cells in each row. Then on the same plant were two more leaves slightly larger, widened out below the neck into what seemed a mass of nuclei the beginning of the leaf proper. Then one in which the gemma had considerably broadened out in the middle, with cells much denser and a darker green, and below the neck again, the leaf—seemingly growing downwards—the cells still indistinct but showing traces of a nerve. (See A, B, C, of drawings.) And so on.

From this it is clear that the gemma comes into existence first. Hence we have the phenomenon of a gemma producing a leaf instead of a leaf producing a gemma. Probably in no other moss known to science does such a thing occur.



A-G.—Leaves in various stages of Development.

A-C on larger scale.

H.—Showing Attachment of Gemma to Leaf.

I.—Portion of Stem showing young gemmiparous Leaves.

J.—Mature detached Gemma.

The gemma and the leaf proper continue to grow, independently, it would seem, but the relative rate of development seems to vary quite a lot in the different leaves. A very small leaf may bear quite a large gemma and *vice versa*. Sometimes a young leaf

is narrower than the gemma and then has the appearance of being merely the stalk, but the lamina broadens out and the nerve becomes more apparent. Again, a rounded gemma under the microscope looks very like a bird's head and neck, the hyaline point, which is afterwards to lengthen out into a shoot, representing the bill. A gemma of this shape usually lengthens out before it becomes finally detached.

Probably the gemma is matured before the leaf is fully grown as one finds leaves in all the later stages of development with only the broken nerve at the apex. Occasionally, as when growth has been rapid, as in mild damp weather, one sees a fully grown leaf with gemma intact. What causes them to break off? Perhaps rain-drops help and gradually wash them to the bases of the plants, that they may the more easily develop into protonemata. Sometimes it is a clean break from the edge of the lamina, but more usually the neck is left projecting from the apex. From appearances it would seem that the middle cells of this are modified into a continuation of the nerve tissue, so that in describing it one would say "nerve excurrent in a truncate mucro."

It may be noted that in Mr. Dixon's drawing in the *Bulletin* the plant is branched. The gemmae on the young leaves thus appearing laterally may give one the impression that they are axillary, especially if the young apical leaves are hidden at the time.

The fruit of this plant still remains unknown though archeogonia and antheridia have been found.