NOTES.

ON THE 'PROLIFEROUS' FORM OF THE SCAPE OF *PLANTAGO LANCEOLATA*.—In Masters' 'Teratology' there will be found a description, at pp. 108 et seq., of various forms of abnormal scapes in the genus *Plantago*. They are put into five groups, after Schlechtendal (Bot. Zeit., 1857, p. 873). Two of these groups are: the 'roseate' form of *Plantago media*—the garden rose-plantain; and the 'proliferous' of *Plantago lanceolata*. The other three need not concern us, but the suggestion is made that all five are built on the same plan, that is, of growth-increase in the various parts *already existing* in the spike. Masters, describing the 'proliferous' form of spike, says it consists of 'several spikes, some sessile, others stalked and pendent, the whole intermixed with leaves and disposed in a rose-like manner'.

FIG. 1. First specimen of vegetative abnormality on the scape of *Plantago lanceolata*.

The 'proliferous' form is rather rare, but the writer has to record the finding of two specimens in two different localities near Dublin in one afternoon, viz. by the towpath of the Royal Canal at the Liffey Junction Station and near the top of Knockmaroon Hill.

First of all, as to the general features of the abnormalities. Fig. 1, A, is a representation of the first specimen. The large ribbed flower scape (a) is shown. It was surmounted by a plant—much more rosette-like than the parent—which consisted of seven well-developed leaves. Only six are drawn. The leaves were fairly large,

varying in length from $3\frac{1}{2}$ to 6 inches. There were also borne two small secondary flower scapes with good spikes which are also shown. The details of the apical growth were not followed, but the white hairs which clothe the leaf bases of the typical plant were well developed here. One point was clear, however, and is shown in Fig. 1, B. It represents the flower scape with the vegetative portion removed, and shows that its point of attachment (*b*) was lateral. The part (*a*) above this was withered and dry, as if some part previously growing above it had died.

The second specimen showed more. It was obviously younger—only five leaves being developed, and these being small. The rosette was somewhat asymmetrical. Fig. 2 shows this, and further that it was asymmetrical because it was carried as a lateral outgrowth from the lower end of a normal spike of which the withering head is still seen projecting on the left, being pushed aside by the developing rosette. The lower part of the spike—hidden in the figure—was still visible. Fig. 1 is but an older stage of this, in which the spike has withered and

the vegetative growth has become practically symmetrical—its lateral origin being still indicated, as in Fig. 1, B.

FIG. 2. Second specimen of abnormality on *Plantago lanceolata* (also diagrammatic).

The abnormality is apparently to be interpreted as the adventitious development of a vegetative bud in place of a flower-bud in the spike, comparable with similar developments in the flower heads of other plants, such as in the case of the *Pelargonium zonale* mentioned by H. de Vries (Jahrb. f. wiss. Bot., Bd. xxii).

The remarks it is wished to make are these. In the first place it is quite a different phenomenon from the development seen in *Plantago media* var. *bracteata*. This is a well-known constant garden variety of which there is a very good example in the Botanical Gardens here. In this form the bracts subtending the flowers of the spike grow vegetatively. They may only undergo this development

along part of the spike or throughout its whole length.

Passing on now to the second point, which relates to the anatomical construction of normal and abnormal scapes derived from specimen A. A transverse section of the normal scape shows a ribbed structure with development of sclerenchyma towards the periphery, and especially at the ribs. Within the sclerotic zone are complete vascular bundles of moderate dimensions, and in addition isolated strands of phloem are present.

The abnormal scape had a larger section, due at any rate in part to the increased dimensions of the cortical parenchyma. In addition to this, however, the

vascular bundles are larger than in the normal specimen, whilst the isolated phloem strands are replaced by small, complete vascular bundles. A final point of difference consists in the more complete development of the sclerenchyma zone in the abnormal specimen. It was better differentiated (more highly sclerized), and also consisted of more numerous cell-layers. The relative increase of this 'mechanical' tissue was greater than that of the 'vascular' elements.

These modifications the writer attributes to the joint requirements of a flower scape which has to sustain and carry water to an extensive vegetative development, such as that represented in Fig. 1—requirements which are both transpiratory and mechanical.

Some time ago, as a consequence of grafting buds on petioles of *Pelargonium zonale*, the writer found that when the buds grew into large plants the petioles developed secondary thickening, interfascicular cambium, periderm, and an indefinite extension of life (Proc. Roy. Dubl. Soc., vol. xiv, no. 33, 1915). In the paper cited he gave reasons for the contention that the secondary thickening in the grafted petioles was not entirely due to the stimulus of increased transpiration requirement (as claimed for similar phenomena by Winkler in Jahrb. f. wiss. Bot., Bd. xlv, 1907), but also largely as a response to some mechanical stimulus from the obviously increased stresses to which the petiole was subjected. This contention seems to be borne out by the circumstances described for the case of *Plantago lanceolata*.

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