

All air written
Dear to purpose
or not to right
Gode

Dr Wries

Amsterdam, Kerklaan 9
Aug. 10/79.

Mr J. J. van der Pijl
Science
Ch. D. A. II

Dear Sir.

During the last days I have been making the experiments on tendrils, you had the kindness to point out to me in your letter of Nov. 10. 75. I am much pleased, that I have at last found the occasion of making these experiments; you know that it was chiefly with regard to them, that I have worked out in 1876 my plasmolytic method in my Paper: *Untersuchungen über die Zellstreckung* 1877. This method has now proved to be of great use to me.

Among the seeds of *Echinocystis lobata* only one germinated and gave a small plant; the seed of *Lycopers lobata*, that Prof. Trautv. sent me at the same time; germinated very well, so I have made most of my experiments with the tendrils of this species.

I my how I want to grow for looking



The question was to decide, whether the rapid curvations of the tendrils are caused by growth, or by a change of the turgor of the cells. So I put the tendrils, as soon as they had curled clearly round the thin (2 mm) sticks in a solution of NaClO_2 , where the turgor was annulled in a very short time. Tendrils that had made $\frac{1}{4}$ - $\frac{1}{2}$ curvations in $\frac{1}{2}$ hour, quite lost them in the salt solution, and showed thereby that your suggestion was right, and that no appreciable growth had occurred on the upper side. Tendrils, that had curled once or twice round the sticks, did not quite lose their curvations, but lost them the more, the less they had curved themselves. So it was also with the tendrils of other plants.

You see, that the stimulus occasioned a change of the turgor of the cells, and that the growth is increased only in a secondary manner.

It seems, that by all curvations of growing plants, the turgor of the convex side is increased first, and that the increasing of the growth is only an effect of the increasing of turgor. For they all lose their curvations more or less in

the salt solution. So it is with the epinastical curvations of tendrils and of petioles, with the revolving and climbing movement of climbing plants; with the geotropical and heliotropical curvations of young stems, and with the geotropical curvations of the knots of grasses.

If you cut-off tendrils, that have just curled themselves round a stick, or made some free curvations after not finding a stick, and you put them in a solution of salts of 20% , you will easily see, that the number of the curvations becomes smaller.

I am yet extending my investigations on this point.

I have also experienced on the contraction of roots, you were so kind as to show much interest in, during my visit to you, last year.

You can not only see the wrinkles in the bark of the roots, but very often even the oldest, central vessels of the wood are wrinkled by being contracted. The active cause of the contraction lies in the parenchymatous cells of the wood and the bark, the woody elements are only an impediment to the contraction. For this reason the roots of herbaceous plants have so much parenchyma, and so few fibres and vessels.

The parenchyma contracts by absorbing water.

If part of a young root is put into water, it becomes shorter and thicker; you may see the cells doing the same if very thin pieces of the pith are put into water under the microscope. Cells and parts of tissue contract in a few minutes, the whole roots in some hours. The contraction is generally about 5%. If a root swells, it becomes flat and longer; so it is when it is killed, or when the turgor is annulled by strong solutions of salts. The contraction is caused by an increasing of the turgor.

This temporary increase of the turgor must affect the growth of the cells, they must become thicker and shorter by growing.

As soon as my observations will be published I will send them to you, but I fear it will last long.

With many thanks for the great interest of interest in my experiments, you so often showed me; I remain, dear Sir, with much respect

Yours faithfully
J. Hugo de Vries.