MEETINGS OF THE BOTANICAL SOCIETY OF THE NETHERLANDS

MEETING OF THE SECTION FOR VEGETATION RESEARCH ON MARCH 23RD, 1968

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Some remarks on vegetation and vegetation-research in South-Africa

South-Africa has an enormous potential biological richness within its boundaries considering the geographical situation, the geological age and the great climatological differences. Superficially landscape and vegetation show a high degree of homogeneity which at a closer view may be divided into two types: On the one hand the actual homogeneity of extreme, arid and semi-arid regions of the western part of the central plateau and the more temperate, but badly impoverished areas, where the original forest and savannah are changed into treeless graslands and extensive (dwarf) shrub vegetations; erosion as a result of overgrazing and frequent fires and the rapid dispersion of exotic plant species are in many respects an alarming threat to vegetation and soil. On the other hand the seeming homogeneity of the very differentiated areas of of the SW. Cape and parts of Natal and Transvaal; the Cape Peninsula with its great floristic richness, the homogeneous physiognomy and the absence of dominants is the most striking example of this type: this vegetation shows the character of a continuum in optima forma as the resultant of a.o. the underground of old, acid Table Mountain Sandstone and the mainly climatological gradation of the environment. The mean difference in temperature of 10° between the cold water of the Atlantic Ocean on the western side and the warm water of the Indian Ocean on the eastern side of the Peninsula, meeting at Cape Point, provides possibly the most important ecological factor.

The "Veld-Types of South-Africa" (Acocks 1953) with the vegetation map were much appreciated for a basic orientation, as well as other publications and personal communications of the cooperators of the Botanical Research Institute of the Department of Agricultural Technical Services at Pretoria. Vegetation research in South-Africa is still in an early stage but it shows a promising development. The ecological approximation of natural vegetation in particular awaits further interest and analysis.

MEETING OF THE SECTION FOR PLANT MORPHOLOGY AND – ANATOMY ON MARCH 3oth, 1968

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Development of the micro- and macrogametophyte of Pinus silvestris L.
An electron microscopic investigation.

The wind conveys the mature pollen grain to the macrosporangium. The two micropilar arms catch one or more pollen grains and the pollination droplet, a guttation product of the nucellar tissue, transports it to the receptive surface of the nucellus. (McWilliam 1958; Sarvas 1962) At the tip of the nucellar tissue the pollen grains remain for several days ungerminated. The nucellus cells, situated at the tip of the nucellar tissue, contain many osmiophilic droplets: lipid granula. The nucellus cells situated closer to the bottom of the nucellar tissue have many starch grains.

Both the ungerminated and the germinated pollen grains produce enzymes, which affect the matrix of the cell wall of the nucellus cells. The cellulose layers of the cell wall turn aside, while sometimes the cellulose itself is also affected. The production of enzymes which are able to dissolve the matrix of the cell wall, principally pectinase and cellulase, was proved in vitro by PATON (1921) for *Pinus austriaca* and by STANLEY (1958) for *Pinus silvestris.*

As the pollen grain excretes cell wall affecting enzymes and drives them before itself, it can penetrate between the nucellus cells more easily. The pollen tube pushes the nucellus cells aside and grows into the nucellar tissue with a branching tube. The cells, pushed aside by the pollen tube, degenerate.

The cells near the pollen tube contain many lipid granula in their cytoplasm.

After some weeks the growth of the pollen tube stops and the pollen grain with its branched tube remains in this condition till the following spring. During germination the number of cell organelles does not increase, the cell has few organelles.

In winter there is a great decrease of starch; the number of lipid granula increases, a great deal mainly around the pollen tube. In spring the starch grains increase again and the number of lipid granula decreases.

Meanwhile the megaspore has been developing at the bottom of the nucellar tissue.

After meiosis the megaspore is visible as a great cell surrounded by a meristematic tissue. The megaspore possesses a large nucleus and many starch grains in the cytoplasm; it is surrounded by a thick wall.

During the first months of development the megaspore increases in volume and its cell wall is gradually dissolved. The cytoplasm is strongly stretched to thin threads, by which the megaspore acquires a very whimsical form.

Around the megaspore some cells are degenerating and thus the space around the megaspore increases. The megaspore produces enzymes which affect and expand the whole cell wall of the surrounding cells. Via the middle lamella the enzymes continually penetrate farther into the surrounding tissue; whereby, gradually the whole cell wall is affected, including the cellulose.

With the enlargement of the space by the degeneration of the surrounding cells the megaspore increases till the speed of degeneration gets greater. Then the now multinucleate megaspore arranges itself in a few places at the margin of the growing space and does not increase any more.

During the degeneration some cells with a strongly affected cell wall get into the space and do not degenerate any more. Of a few other cells the cell wall disappears as a whole and the content of the cell comes into the space where it is dissolved.

During the acceleration of degeneration the pattern of degeneration changes as well. The cells, now situated at the margin, at their walls hardly show any phenomena pointing to a strong attack of enzymes produced by the megaspore. Their cell organelles are strongly swollen and the nuclearmembrane disappears. This break-down process takes place in several cell layers at the same time, so the space grows rapidly, when the cells in the space have dissolved. In spring the multinucleate megaspore is situated locally at the margin of the great space, where there are also intact cells with strongly swollen cell walls.

At the formation of the macroprothallium wall, the megaspore takes its place in the center of the space. All material for the wall is produced by the multinuclear megaspore itself.

The intercellularly situated micro- and macrogametophyte show correspondences and differences in regard to each other. Both conform themselves very individually, so that any direct interaction as yet seems improbably.

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