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MEETINGS OF THE ROYAL BOTANICAL SOCIETY OF THE NETHERLANDS

MEETING OF THE SECTION FOR VEGETATION RESEARCH ON MARCH 19, 1982

H. F. VAN DOBBEN *(Rijksinstituut voor Natuurbeheer, Broekhuizerweg 2, 3956 NS, Leersum)*

Changes in the epiphytic vegetation (since 1900) of the surroundings of 's-Hertogenbosch

An attempt has been made to present a picture of the epiphytic lichen flora and vegetation in the surroundings of 's-Hertogenbosch, Noord-Brabant, The Netherlands at the beginning of this century, mainly based on herbarium material collected at that time by J. H. Wakker. To allow a comparison with the present situation, a field survey in the study area was made in 1974.

The area's epiphytic lichen flora showed a strong decline: of a total of 115 species collected by Wakker, only 46 species were found recently. As the Wakker samples usually contained more than one species, they could be treated as vegetation relevées. Thus some epiphytic lichen communities occurring in the area at the beginning of this century could be identified. Most of these communities have become now much impoverished or have disappeared entirly, especially those on acid substrates. Only one community (dominated by *Lecanora conizaeoides)* has strongly expanded. Considering the ecology of the species it was found that species with a narrow ecological amplitude, whose occurrence was limited to only one community, have usually disappeared. Species with a wider amplitude are still being found in the area, but their occurrence is often limited now to substrates with a high pH value.

Air pollution by SO_2 must be the main cause for the decline of the area's epiphytic lichens. It is thought that in this case SO_2 has a double effect, causing damage by (a) its toxicity and (b) acidification of the substrate. The influence of SO_2 is probably modified by other factors such as eutrophication and buffer capacity of the substrate.

A. A. MIDDELDORP *(Hugo de Vries-Laboratorium, Universiteit van Amsterdam, Sarphatistraat 221, 1018 BX Amsterdam)*

A palynological method to quantify net organic production in peat bog ecosystems

Peat bogs form a special object of study of our laboratory. The ultimate goal is understanding of the functioning of the ecosystem in time. The aim of this particular study is to construct a pollen concentration diagram of a peat section taken from the Engbertsdijksveen and to check if changes in the concentration diagram can be explained by changes in the rate of peat bog growth.

It was shown with the aid of six ^{14}C-datings that the average annual arboreal pollen influx over the period studied is approximately constant and of the order of 7000 pollen grains per year per cm^2. The main factor causing changes of arboreal pollen concentration in the peat is the growth rate. From its pollen concentration, therefore, the time lapse represented by each cm of the peat section can be calculated.

Macro remains, fungal spores and hyphae, and animal remains like mites too, were analysed for every cm peat. From this analysis it was concluded that different types of vegetation contributed to the peat formation. With the detailed time scale it is possible to quantify the net organic production for each type of vegetation. It was shown that despite the highest decomposition rate (as shown by high amounts of hyphae and a high degree of humification) a *Calluneto-Eriophoretum* leads to the highest rate of net organic production. Lowest net organic production corresponds to wet vegetation with *Scheuchzeria* and a vegetation dominated by *Erica* and *Molinia.*

It seems probable that the higher net primary production in a peat bog of a hummock vegetation (as found today), eventually, despite a high decomposition rate, leads to a higher peat production.

J. WIEGERS *(Hugo de Vries Laboratorium, Universiteit van Amsterdam, Sarphatistraat 221, 1018 BX Amsterdam)*

Developments in peatland forests in NW-Overijssel over a period of 10 to 15 years

After peat-digging in NW-Overijssel was abandoned, many small pools remained behind. In these a new vegetation succession started. The developing quivering bogs were initially often dominated by *Phragmites australis*, and developed into fen-woodland after reed-cutting had come to an end.

To analyse changes in species composition and structure of the vegetation of these woodlands during succession, relevées from the same plots made in 1964/'70 and 1979/'80 were used. The investigated woodlands are situated in the nature reserve "Weerribben". The relevées were made on 36 sites. The vegetation can be divided in two main types, one dominated by *Betula pubescens* in the tree layer, and the other with always *Alnus glutinosa* as a component of the tree layer. The *Betula*-type can be placed within the subassociation *betuletosum pubescentis* of the *Carici elongatae-Alnetum*, the *Alnus*-type within the subassociation *thelypteridetosum* of this association. Sites belonging to the former subassociation show lower values for pH and conductivity of the ground water and lower ground water levels than does the latter.

Changes in the vegetation of these woodlands over a period of 10 to 15 years turned out to be rather small. Species that find more optimal development in open vegetation declined and some species that are better adapted to woodland conditions increased. Analysis of changes in the structure of the vegetation showed an increasing separation of the tree layer from the shrub layer. A reduction of the herb layer and the moss layer was observable in many cases. Computation of mean ecological indicator values showed differences between the two types, the *Betula*-type being slightly drier and more acid. Mean nitrogen values for this type showed a decrease, thereby presenting an increasing difference with the *Alnus*-type.

G. J. R. ALLERSMA *(Vakgroep Plantenoecologie, Biologisch Centrum, postbus 14, 9750 AA Haren (Gn))*

The occurrence of Juncus acutiflorus, J. articulatus and J. acutiflorus × articulatus in hayfields along the river Drentsche Aa

P. KETNER, also on behalf of P. SCHMIDT, R. TJON LIM SANG and R. DE GRAAF *(Afdeling Vegetatiekunde en Plantenoecologie, De Dreyen 11, 6703 BC Wageningen)*

Antropogenic impacts on the ecosystem tropical rain forest in Surinam

M. C. GROENHART *(Vakgroep Vegetatiekunde, Hugo de Vries laboratorium, Sarphatistraat 221, 1018 BX Amsterdam)*

A gradient analysis in the nature reserve the Boschplaat on the isle Terschelling

MEETING OF THE SECTION FOR PLANT MORPHOLOGY AND -ANATOMY ON APRIL 23, 1982

A. M. C. EMONS *(Botanisch laboratorium, Katholieke Universiteit Nijmegen, Toernooiveld, 6525 ED Nijmegen)*

Cell wall texture and cortical microtubules in root hairs of Equisetum hyemale

It is widely accepted that microfibril orientation is determined by the direction of microtubules in the cortical cytoplasm subjacent to the cell wall (NEWCOMB 1980). The present study on root hairs of *Equisetum hyemale* (L.), common scouring rush, disputes the generality of this hypothesis.

To visualize the microfibrils, the cell wall matrix was extracted with hydrogenperoxide/glacialacetic acid. Subsequently, either, fractions of hairs showing the inner cell wall were shadowed with platinum/carbon, or, after flat embedding, thin sections were stained with potassium permanganate.

The secondary wall of young root hairs, which is being deposited against the random textured primary wall, has a helicoidal texture (EMONS 1982). A helicoidal wall is deposited in layers with a subsequently rotating fibril direction and is isotropic in polarized light.

Nevertheless, full-grown root hairs of *Equisetum hyemale* are positive birefringent. This indicates that a more or less axially oriented layer of microfibrils has been deposited against the helicoidal wall. From investigations of single-wall preparations under the polarizing microscope, the microfibrils in this last layer – which grows very thick – proved to be oriented according to a Z-helix with a pitch angle of c. 25 degrees. With the electron microscope this angle could be verified in shadow-cast preparations.

To visualize the microtubules, root hairs were fixed with glutaraldehyde/osmiumtetroxide and cross and tangential thin sections were stained with uranylacetate/leadcitrate.

In both young and full-grown root hairs cross sections showed transverse profiles of microtubules only. In tangential sections through the cortical cytoplasm the microtubules were always oriented predominantly parallel to the long axis of the hair.

Hence, the newly deposited microfibrils of the cell wall do not parallel the subjacent microtubules, neither in young, nor in full-grown hairs.

It is concluded that microtubule direction cannot determine microfibril orientation in root hairs of *Equisetum hyemale*.

EMONS, A. M. C. 1982: Microtubules do not control microfibril orientation in a helicoidal cell wall. *Protoplasma* (in press).

NEWCOMB, E. H. (1980): The general cell. In: *The biochemistry of plants* (P. K. STUMPF & E. E. Conn, eds.). Academic Press, New York, London, Toronto, San Francisco. 1, 1–54.

C. J. VENVERLOO *(Vakgroep Botanische Morfogenese, Botanisch Laboratorium, Nonnensteeg 3, 2311 VJ Leiden)*

Cell division in the epidermis of Nautilocalyx explants; phragmosome and preprophase-band.

Epidermis cells undergoing cytokinesis can be observed with Nomarski-optics in translucent explants of leaves of *Nautilocalyx lynchii (Gesneriaceae)*. Thin-sheet embedding of these explants makes it possible to obtain transmission electron micrographs of cells that have been previously examined and selected. In this way a sequential description of visible events could be combined with ultrastructural descriptions.

Two days after leaf explantation nuclei are seen moving to a central position in the cell and to be sustained there by a number of cytoplasmic strands, radiating in all directions. Mitosis generally takes place on the third day and is preceded by the formation of a thin continuous cytoplasmic sheet in the median periclinal plane. This sheet, the phragmosome, predicted accurately the site of the cell wall that is formed during cytokinesis.

In cells with a phragmosome there was always also a well developed band of cortical microtubules surrounding the cell (Venverloo, C. J. et al., Z. Pflanzenphysiol. *100*, 161–174, 1980). Phragmosome and band of microtubules were measured in four cells at several levels. The phragmosome was 2.0–8.9 μm thick near the cell wall. The band of microtubules measured 3.0–6.4 μm in cross section; it coincided for at least 2 μm with the phragmosome.

In earlier stages both, phragmosome and band of microtubules, seemed incomplete. Their formation will be studied further in cells surrounding local wounds.

J. KOSTER and C. J. VENVERLOO *(Vakgroep Botanische Morfogenese, Botanisch Laboratorium, Nonnensteeg 3, 2311 VJ Leiden)*

Shoot formation on leaf explants of *Nautilocalyx lynchii* (Gesneriaceae).

Explants of leaves of *Nautilocalyx lynchii*, taken from the abaxial side of the midrib, were studied for the formation of adventitious shoots. The explants consisted of an epidermal layer with glandular hairs and uniseriate hairs, and a few collenchyma layers. They were cultured on solid medium containing zeatine as phytohormone; on this medium only shoots were formed. The formation of shoots was studied by direct observation of the living explants. After a few days in culture, cell division occurs in all epidermal cells, but most frequently in cells around hairs; here meristems may be formed subsequently. These meristems, slightly or not raised above the explant, produce leaf primordia before a shoot apex can clearly be distinguished. Leaf primordia mostly originate in the division products of one original epidermal cell, sometimes of two cells. Basal cells of glandular hairs and the cells in contact with these cells or with uniseriate hairs are most often involved in the production of leaf primordia.

There are three ways of shoot formation: 1. Successive formation of two more or less opposite leaves; 2. Simultaneous formation of two opposite leaves; 3. After the first leaf, the second and third leaf are formed more or less simultaneously, perpendicular to the first. Entire shoots originate in the division products of 1–5 original epidermal cells. The region between the first leaf primorida, i.e. the meristematic area which will produce the new shoot apex, may be formed by the original cells which are involved in the production of the primordia or by one or two other cells. This means that the first leaf primordia and the shoot apex often have a different origin.

Sections through meristems and shoots in different stages of development showed, that the first leaf primordium and the shoot apex (in the sense of a tunica-corpus organization) originate more or less simultaneously.

E. S. PIERSON, A. A. M. VAN LAMMEREN and G. STARITSKY *(Landbouwhogeschool, Vakgroep Plantencytologie en -morfologie and Vakgroep Tropische Plantenteelt, Postbus 341, 6700 AH Wageningen)*

Embryoid development on in vitro cultured leaf discs of Coffea canephora

During an earlier meeting of the Society STARITSKY (1981) reported the rapid in vitro development of embryoids on punched leaf discs of *Coffea canephora*. Our further investigations confirmed these preliminary observations. In the present study the first embryoids were visible after 37 days of incubation and after 67 days 3% of the leaf discs bore embryoids.

Samples of the cultures have been observed by light and scanning electron microscopy. Callus development, visible already after one week of incubation, takes place only at the rim of the discs. One gets the impression that the callus tissue has been initiated from leaf mesophyll cells, mainly the spongy parenchyma.

Gradually a zonal differentiation takes place in the growing callus ridge. Small plasma-rich cells, close to the periphery of the callus mass, appear to be the precursors of globular embryoids. These embryoids have a typical pin's head appearence, the head only connected to the callus mass by a suspensor of a width of 1–2 cells. The small width of the suspensor might indicate that these embryoids are formed from one single cell.

In later stages of development secondary embryoids are produced on the surface of earlier formed embryoids. The meristematic regions of their origin are located in the epidermal and adjacent subepi-

dermal layer(s) of the "parent" embryoid. The multicellular origin of these adventitious embryoids may be recognised by the broad suspensor.

The present study forms part of a research project concentrated on the in vitro propagation of tropical woody crops.

A detailed publication about the investigations is in preparation.

STARITSKY, G. (1981): The development of Coffea canephora embryoids in vitro. *Acta Bot. Neerl.* **30**: 318.

P. BAAS *(Rijksherbarium, Postbus 9514, 2300 RA Leiden)*

Systematic, phylogenetic and ecological wood anatomy; history and perspectives

The three founders of plant anatomy in general, and of wood anatomy in particular are Grew, Malpighi and Van Leeuwenhoek. The latter's role has often been underrated, but many of his wood anatomical observations give much more accurate detail than Grew's and Malpighi's accounts. Leeuwenhoek's description of the vessel wall may even be considered to foreshadow modern concepts of cell wall ultrastructure (cf. BAAS 1982 a & b). Systematic, phylogenetic and ecological wood anatomy had their origin in the second half of the nineteenth century. The Baileyan trends of xylem evolution established in the early part of this century have been confirmed in subsequent studies. From a comparison with the comprehensive fossil pollen record, it can be deduced that angiosperm xylem specialisation had reached its present level at the beginning of Tertiary. Ecological trends may partly have governed the salient evolutionary trends, but can in some cases also have been responsible for reversions of some of the Baileyan trends. Rigid adaptionist interpretations of wood anatomical diversity can be criticised: in addition to adaptive ecological trends, functionless trends imposed by correlative restraints and 'patio ludens' (sensu VAN STEENIS 1981) have probably played an important role. Priorities for future research have been listed and should promote further integration of the various aspects of comparative wood anatomy. These are of equal significance in pure and applied research. A full account has been published elsewhere (BAAS 1982c).

BAAS, P. (1982a): Antoni van Leeuwenhoek and his observation of the woody cell wall. *IAWA Bull.* n.s. **3**: 3–6.

— (1982b): Leeuwenhoek's contributions to wood anatomy and his ideas on sap transport in plants. In L.C. PALM & H. A. M. SNELDERS (eds.): *Antoni van Leeuwenhoek 1632–1982. Studies commemorating the 350th anniversary of his birth.* Rodopi, Amsterdam (in press).

— (1982c): Systematic, phylogenetic and ecological wood anatomy – History and Perspectives. In P. BAAS (ed.): *New Perspectives of Wood Anatomy*, 23–58. Nijhoff/Junk, The Hague.

STEENIS, C. G. G. J. VAN (1981): *Rheophytes of the world. An account of the flood-resistant flowering plants and ferns and the theory of autonomous evolution.* Sijthoff & Noordhoff, Alphen aan den Rijn/Rockville, Maryland.

R. BREGTMAN *(Hugo de Vries-Laboratorium, Plantage Middenlaan 2a, 1018 DD Amsterdam)*

Opercula in Cactaceae