



Willem Hendrik Arisz

WILLEM HENDRIK ARISZ became a member of the Royal Botanical Society of the Netherlands in 1909. In 1912 he passed his "doctoraal" examination with honours. In those days his interest was directed mainly towards animal physiology. However, after a short stay at the Laboratory for Marine Biology in Naples and at the Botanical Laboratory of the University of Bonn, he chose a botanical subject, phototropism, for his doctorate, which he took in 1914, this also with honours. His professor and promotor was Prof. Dr. F. A. F. C. Went.

Research on the stimulation of plants in those days was strongly influenced by animal physiology. Arisz investigated a series of phenomena known as "tonus phenomena". His work was influenced by that of A. H. Blaauw who, in 1909, had found that a certain quantity of radiation energy is necessary for the occurrence of a perceivable curvature (irradiation time \times intensity).

By working with a wide range of both intensities and quantities of light, Arisz could demonstrate that the idea of a defined "threshold value", below which no curvatures develop must be rejected, and that the validity of the product rule is confined within certain limits, especially with regard to the negative phototropic curvatures.

Arisz also investigated the influence of irradiation from opposite sides. This caused successive curvatures in opposite directions, which is an indication of the independence of the induced processes. The problem arose, during these experiments, as to how far cells, cell-complexes and organs react independently or as a whole.

After the growth-hormone, auxin, had been isolated by F. W. Went in 1927, the conceptions: light-perception, stimulus conduction and light-growth-reaction acquired an entirely new significance.

In 1915 Arisz went to Java where he worked as a botanist at the Besuki Research Station at Djember and in 1920 he became director of this establishment. During his ten years at this research station he was initially occupied as a selectionist for tobacco. In the later years he worked on the physiology of the latex flow of *Hevea*.

He could show that two processes could be distinguished: a thinning of the latex during the flow and a thickening of the latex after cessation of the flow. The latter process drew his attention to the problem of the formation of rubber in the latex vessels and the significance of this system for the plant. He demonstrated that protein substances accumulated in the latex vessels, but that these were not released again after refooliation.

In June, 1926, Arisz was appointed professor at the University of Groningen as successor to Prof. Dr. Th. Weevers. Since that time, with the co-operation of many of his pupils, Prof. Arisz has concentrated his research work on the problem of the uptake of substances in, and their transport through, the plant.

His work on this subject linked up with that of Münch, Mason, Maskell and Phillis, Osterhout, Van den Honert and Steward and its main theme is the impossibility of explaining the uptake of substances in the plant as a physical diffusion process.

Initially the tentacles of *Drosera* were used, and through this it could be shown that the transport through the parenchymatic cells of the tentacles is dependent on metabolic processes.

However for the last 35 years Arisz has been working mainly with the leaves of *Vallisneria spiralis*.

One of the first results obtained from this material was that contrary to the theory held by Hugo de Vries, Arisz found that protoplasmic streaming was not the cause of the activated transport. Furthermore it was revealed what an important role is played by the plasmodesmata in the transport of substances from cell to cell.

The cytoplasm of adjacent cells form, as it were, one whole, a symplast. The uptake of substances in the symplast, passing the membrane, and the concentration of substances in the vacuole proved to be two separate activities, both influenced by the metabolism.

One of Arisz's more recent works concerns research on the polarity of the active transport. Since the beginning of his career, the physiological functioning of the vegetable organism as a unit has always been foremost with Arisz. In 1948 this theme was the subject of his address on the occasion of his retirement

as rector of the University. It was entitled: "Transport in the plant as the basis for unity of the organism".

His numerous publications on uptake and transport in plants all contribute to his theory, now known as the theory of the symplast, which has brought him international fame.

It is with great appreciation that his many pupils remember the time they worked under the guidance of his critical and stimulating mind.

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