The general concepts of imbibition and germination assume only passive water uptake to occur during imbibition, and biosynthetic activity to be restricted to the period of germination. In contrast to these concepts, we have evidence for protein and RNA synthesis during imbibition: proteins extracted from spores imbibed in a medium containing a mixture of ^{14}C-amino acids show significant rates of incorporation; electrophoretic separation of labelled protein demonstrates radioactivity for all detectable proteins; all fractions of RNA of imbibed spores are labelled after incubation either with ^{3}H-adenosine or ^{3}H-uridine.

There are no obvious differences between the *in vitro* translation products of poly(A)$^{+}$RNA isolated from dry or imbibed spores and the *in vivo* proteins. Stored poly(A)$^{+}$RNA translatable in a cell-free system therefore seems to have no evident significance for early processes of germination.

Induction of germination with gibberellic acid or light leads to an increase of the rates of translation and transcription. The pattern of *in vivo* labelled proteins does not change during the first 72 hours after induction of germination. At this time, an additional band of protein (approximately 20,500 d) becomes detectable. The same result was found for the pattern of *in vitro* translation products. However, the 20,500 d protein becomes visible after only 48 hours. The appearance of this protein is the only evident qualitative difference between dry, imbibed or induced spores in the pattern of proteins. Since this protein appears when more than 50% of spores are in mitosis or already have separated the rhizoid initial, we feel that it cannot be regarded as a likely candidate for a molecular signal or indicator of early events of germination.

Spore germination of two tree-ferns

G. M. Felippe, L. M. Esteves, W. M. Ferreira and **Therezinha S. Melhem**

Departamento de Fisiologia Vegetal, cp 6109, Universidade Estadual de Campinas, 13100 Campinas, Brazil

In Southern Brazil, the tree-ferns are amongst several species in danger of extinction. Also, in Brazil, only classical taxonomic studies have been carried out on tree-ferns. Thus, it was decided to initiate a germination study of two members of the Cyatheaceae—*Trichipteris corcovadensis* and *Cyathea delgadii*. The spores were collected from plants occurring in the Sao Paulo Botanic Gardens. In the case of *Trichipteris corcovadensis*, spores of 5 different specimens were collected (11066 A,B,C,D,E). The spores were germinated in Knop's solution with the modification given by Dyer (1979). The criterion of germination was the emergence of the rhizoid. The external morphology of the spores was studied under the optical microscope (after acetolysis) and under the scanning microscope.

Cyathea delgadii: the spores were 100% positively photoblastic. The viability decreased rapidly and the germination was very low after 2 years' storage at 4°C. Germination was better under the lowest light intensities used and was not affected by photoperiod. The range of constant temperatures in which germination occurred was from 15 to 30°C. The duration of the light induction period was at least 1 h (red light). Germination was promoted by both red and blue light and their actions were reversed by far red.

Trichipteris corcovadensis: only the spores of specimen 11066-B germinated and the percentage germination was low. It occurred at constant temperatures of 20, 25 and 30°C but only in light. The germination was not promoted by growth-regulators. Under all conditions tested, there was no germination of specimen 11066-A. An attempt was made to relate spore morphology to the lack of germination. The spores could be separated into three types: two extreme forms, I and II, and intermediates. Specimen B produced form I only. Specimen A, collected in 1980 and 1981, also produced only form I but did not germinate. The other specimens produced forms I and II and intermediate forms. Equatorial diameter was larger in specimen B than in the other specimens (except specimen A-1981). There is a perine on the surface of spores of specimen B, and a less well-developed one on spores of specimen D. Are the specimens studied natural hybrids? Or is it a problem of spore maturity?

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Dyer, A. F. 1979. The culture of fern gametophytes for experimental investigation. In *The Experimental Biology of Ferns*, ed. Dyer, A. F., pp. 253–305. London: Academic Press.

Lipid metabolism in germinating fern spores

Armin R. Gemmrich

Universität Ulm, Abt. Allgemeine Botanik, D-7900 Ulm, F.R.G.

Most fern spores contain oil droplets as storage material consisting of triglycerides rich in unsaturated fatty acids. The amount of triglycerides is low in green spores and is 40–80% in non-green spores (Gemmrich 1979). The mobilisation of these lipid reserves is induced by imbibing the spore, independent of the induction of germination. In *Anemia* spores, the amount of triglycerides decreases to about two-thirds within 3 weeks of imbibition; concomitantly the activity of lipase increases threefold as compared to the dry spore activity. Besides lipid mobilisation, lipid synthesis is highly active in the imbibed spore. The products are storage lipids as well as polar membrane lipids. It is suggested that the enzymes involved in the synthesis of storage lipids are remnants of the synthetic activities during sporogenesis. They are inactivated when the spore dehydrates and regain their activity upon rehydration (Gemmrich 1979). In contrast to what is generally assumed, the present results indicate that during the imbibition phase, hydrolytic and synthetic processes are active. They are not, however, able to trigger the germination process.

Lipid synthesis is enhanced in the spore after induction of germination. The products, phospho- and glycolipids, are typical of vegetative tissues. In contrast to the imbibed spore prior to induction, storage lipids are not formed. During germination, the lipid reserves are completely degraded and converted into carbohydrates. The decrease in lipid content coincides with an increase of the activities of lipase and isocitrate lyase, the latter being a marker of the glyoxylate cycle. When the reserves have been depleted, these enzyme activities disappear. Concomitant with the lipid degradation, both the number and the volume of microbodies within the spore cell increase. These microbodies, which function as glyoxysomes, disappear when the