Dipodascus albidus forma minor.

By Richard P. Korf
(Department of Plant Pathology, Cornell University, Ithaca, New York, U.S.A.)

The genus *Dipodascus* Lagh. has been of particular interest to students of the *Ascomycetes* since it was first described over sixty years ago. The genus has been treated extensively in textbooks and in mycology courses as an example of a primitive (or a simpliefied) Ascomycete, representing a possible connecting link in the phylogenetic derivation of *Ascomycetes* from *Phycomycetes*. In some treatments the genus is the type of a separate family, *Dipodascaceae*, or even of a separate order, *Dipodascales*. Some workers have placed the genus in the family *Ascoideaceae* along with the genus *Ascoidea* Bref., which it resembles in lacking an ascocarp and in possessing asci with a very large number of ascospores.

Only two species appear to have been described in the genus. The type species, *Dipodascus albidus* Lagerheim (1892), was originally isolated from the slime flux of a tropical species of *Puya* (*Bromeliaceae*) in Ecuador. Its life history was worked out in pure culture, but unfortunately these cultures were soon lost. The species was rediscovered by Juel (1902), who isolated it from the slime flux of a species of *Betula* (*Corylaceae*) in Sweden. Subcultures of Juel's isolate were sent to various laboratories, and it was soon represented in nearly all mycological laboratories in the world. Further details of the life cycle and cytology of this organism were provided by Juel (1902, 1921) and by Dangeard (1907). About twenty-five years ago, however, all known subcultures of Juel's isolate had apparently died out or been lost, despite its worldwide dispersal. To my knowledge, it has been collected again only once, by Martin (1937), who collected it upon the surface of an undetermined, fallen branch in Columbia. On this occasion there was no indication of a slime flux being present, and the fungus was not recognized until the specimen had been dried, so that no cultures could be made.

A second species of the genus was described more recently as *Dipodascus uninucleatus* Biggs (1937), isolated from a dead pupa of *Drosophila melanogaster*. Cultures of her fungus are now available in many laboratories. It differs from *Dipodascus albidus* in being

more yeast-like in culture, producing a much more limited mycelium, and in lacking oidia. Most significant, however, is its nuclear condition, as each cell is uninucleate. Following the fusion of uninucleate gametangia, the two gametangial nuclei fuse and then undergo many successive divisions (the first two of which are presumably meiotic) as the developing ascus elongates. As in *D. albidus,* the asci are eventually filled with a very large and indefinite number of ascospores. The discovery of this species, with a life history much more like that of a typical Ascomycete, has placed in doubt the advisability of considering *D. albidus* to be a unique, connecting link with the *Phycomycetes.* The fusion of multinucleate gametangia in *D. albidus* had been proposed as homologous to the fusion of the multinucleate gametangia of higher *Phycomycetes* (*Zygomycetes*), and the ascus of *Dipodascus* as the homologue of the germ sporangium of a Zygomycete undergoing "germination" immediately instead of following a period of rest.

On May 28, 1956, Professor D. S. Welch of this Department called to my attention a peculiar fungus which had appeared in one of a series of petri dish cultures that he had prepared on May 21. I was immediately struck with the resemblance of his fungus to the genus *Dipodascus,* and in particular to *D. albidus,* and undertook to isolate and purify the material. In many respects it is very similar to *D. albidus,* but it also displays constant differences from the original description, from subsequent descriptions, and from slides of Juel's isolate which have been at my disposal. While the fungus may eventually prove to be a third species of the genus, I shall content myself for the moment in describing it as a form of *D. albidus,* to which it is certainly closely allied. Dr. D. P. Rogers, New York Botanical Garden, has kindly provided the validating Latin diagnosis.

Dipodascus albidus Lagh. forma **minor** Korf, f. nov. A typo differt in ascis minoribus (50—80 ⇌ 6—7 μ) et sporis numero a 16 ad fere 32 tantum. E radice *Pini resinosae* cultus. Typus: Dept. Plant Pathology, Cornell Univ. CUP 43905.

D. albidus f. *minor* was noted in a petri dish growing from one of five chips of wood from the roots of *Pinus resinosa.* The chips had been planted upon nutrient agar in an attempt to isolate *Fomes annosus.* Professor Welch had first washed the roots, which had been collected in Chemung County, New York, in tap water to free them of soil, and had then dipped the roots in 95 percent alcohol and flamed them. The outer bark was removed carefully, and chips of the woody root tissue were cut out and placed on the agar. Seventeen days after planting the chips, *D. albidus* f. *minor* was found growing from four of the five chips. The fifth chip supported only a colony

of a budding, ascosporic yeast with hat-shaped ascospores. While it is likely that all of the chips in this plate were taken from the same root, the fact that *Dipodascus* grew from four of the chips is highly suggestive. It may well have been established within the root, rather than representing merely a surface contaminant. It should be recalled that in two of the three known collections of *D. albidus* f. *albidus*, that fungus was associated with slime flux, and could conceivably have been growing within the woody tissue originally. It is interesting, at least, to speculate upon the possible rôle of these fungi in nature.

D. albidus f. *minor* produces an abundant mycelium consisting of multinucleate cells, as does the type form, and like that form it also produces abundant oidia (arthrospores). Both characters are in sharp contrast to the condition in *D. uninucleatus*. The oidia of *D. albidus* f. *minor* are uninucleate, as can be demonstrated by staining with trypan blue according to the method of Hoffmeister (1953). The gametangia which are produced are smaller than those in *D. albidus* f. *albidus*, and the asci are very much smaller, containing many fewer ascospores. I have regularly found apparently mature asci with as few as 16 spores, and in no case have I been able to count more than 32 spores. Most asci seem to have 22 to 24 spores on the basis of my preliminary observations. Earlier workers have reported aberrant asci with only a few spores in the type form as well, and apparently these are not uncommon on starvation media. Although I have tried numerous media, I have been unable to induce *D. albidus* f. *minor* to produce asci with hundreds of ascospores as in *D. albidus* f. *albidus* and in *D. uninucleatus*. The asci of *D. albidus* f. *minor* do not show much tendency to become tapered toward the apex, but are approximately cylindrical with a rounded apex. The ascospores almost completely fill the small ascus, whereas in *D. albidus* f. *albidus* the lower half of the ascus is highly vacuolate and usually devoid of ascospores.

In a preliminary study, twenty-four well-separated colonies from dilution plates of ascospores and oidia were isolated and grown separately in test tubes on agar. All isolates produced asci. This is presumptive evidence for believing that *D. albidus* f. *minor* is homothallic, as are *D. albidus* f. *albidus* and *D. uninucleatus*. Transfers of the new form are being deposited with the American Type Culture Collection and with the Centraalbureau voor Schimmelcultures, Baarn. It is to be hoped that in these days of improved culture methods, of lyophilization, etc., the new form of *D. albidus* will not be lost as was the type form. Cytological and morphogenetic studies of the new form are in progress in this laboratory. Upon completion of these studies, transfers will be sent to interested investigators and teachers upon request.

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