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Dictyostelids in Pakistan II. Two Newly Found Species of *Dictyostelium*, *D. discoideum* Raper and *D. rosarium* Raper et Cavender

By

Hiromitsu HAGIWARA

Department of Botany, National Science Museum,
4–1–1 Amakubo, Tsukuba, Ibaraki 305, Japan

Abstract Two species of *Dictyostelium*, *D. discoideum* Raper and *D. rosarium* Raper et Cavender, were newly found in Pakistan. This is the first report of *D. rosarium* in Asia.

Concerning the dictyostelids of Pakistan, Hagiwara (1992) reported 9 species and 3 complexes of species. In the present paper, two more species are enumerated based on isolates from soils collected in northern Pakistan.

Dictyostelium discoideum Raper, J. Agr. Res. 50: 135 (1935). (Figs. 1, 2)

When cultured at 20°C on non-nutrient agar with *Eschericia coli*, sorocarps solitary, rarely branched; sorophores 0.3–3.8 mm in length, with capitate tips, sometimes with supporting cells, with supporters if prostrate, 6.5–39.5 μm in diam. at a level 100 μm above the bottom, 2.5–7(–10) μm in diam. at a level 50 μm below the top; basal disks well-developed, 25–160(–235) μm in diam.; sori pale yellow, 50–330(–350) μm in diam.; spores ellipsoid, usually 1.7–2.2 times longer than broad, smooth, mostly 5.4–8.0×2.9–3.9 (MD* 5.8–7.3×3.1–3.6) μm.

Isolates examined: V-32, 33, 34, 37 and 40, 1200 m alt., pine forests, Dadar, Mansehra, Sept. 1992; B-41, 1050 m alt., pine forest, Mt. Margala, Islamabad, Oct. 1992.

Distribution: Asia; China, India, Japan, Nepal. N. America; Canada, Mexico, U.S.A.

All the isolates examined had typical morphological features of *Dictyostelium discoideum*, viz., migrating pseudoplasmodia without sorophore formation, yellow sori, and well-developed basal disks (Fig. 2A). However, they were different from American isolates including the type culture NC-4 and Japanese ones in capitate sorophore tips (Figs. 1, 2B) and smaller basal disks.

Sorocarps are usually erect, but sometimes inclined and then their sorophore bases are supported by small cells or supporting cells (Fig. 2C). Sorocarps are

* Range of mean spore diameters of the isolates examined.

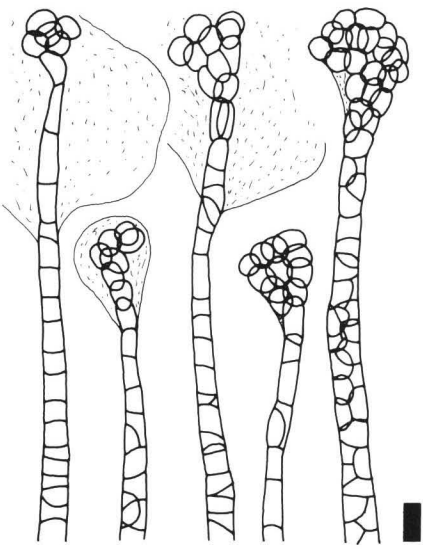

Fig. 1. *Dictyostelium discoideum.* Sorophore tips. Bar = 10 μm.

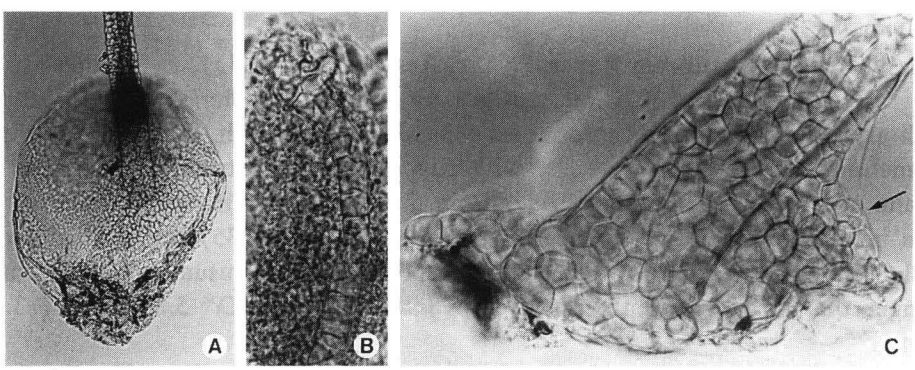

Fig. 2. *Dictyostelium discoideum.* A. Well-developed basal disk. ×12. B. Capitate sorophore tip. ×480. C. Sorophore base with supporting cells (arrow). ×480.

rarely prostrate and produced supporters at the point of sorophores standing up from the agar plates.

Dictyostelium rosarium Raper et Cavender, J. Elisha Mitchell Sci. Soc. 84: 31 (1968). (Figs. 3, 4)

When cultured at 20°C on non-nutrient agar with *Eschericia coli*, sorocarps usually gregarious, sometimes sparsely and irregularly branched, often prostrate; sorophores, 0.55–3.25(–5.05) mm in length, extending to 6.5 mm if prostrate, with

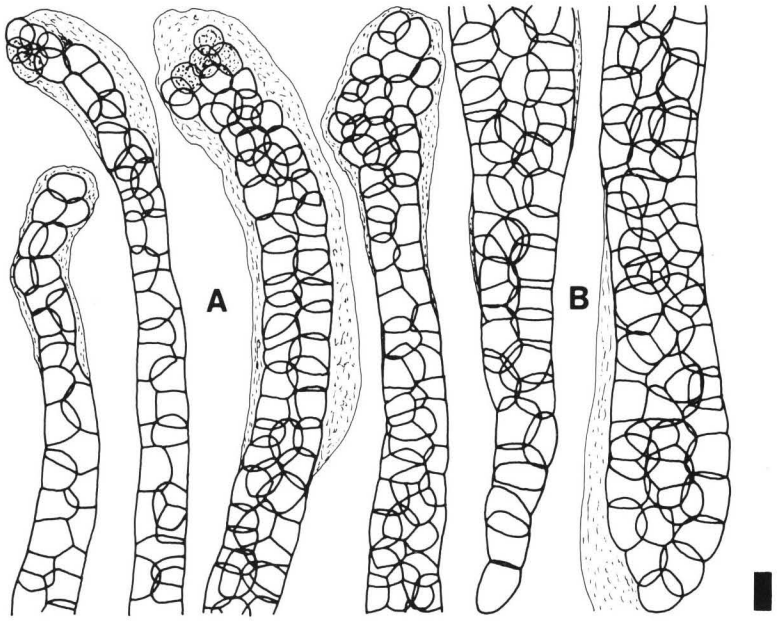

Fig. 3. *Dictyostelium rosarium*. A. Sorophore tips. B. Sorophore bases (prostrate in left and semierect in right). Bar = 10 μm.

3–11 lateral sori, with supporters if prostrate, with compound and obtuse tips, 8–30(–45) μm in diam. at thickest part above the bottom, 5.5–17(–21) μm in diam. at a level 50 μm below the top; sori white, 65–330(–350) μm in diam.; spores globose, mostly 4.6–6.4 (MD 5.0–5.9) μm in diam.; pseudoplasmodia with definite radiate streams, 0.5–11.5(–22) mm in diam., not migrating without sorophore formation, usually producing plural sorogens.

Isolates examined: M-45, 930 m alt., pine forest, near Alja, Azad Kashimir, Sept. 1991; C-45, 1940 m alt., maize field, Triku Roundu, Baltistan, Sept., 1992; B-9, along the road, Taxila, Rawalpindi, Oct. 1992; B-60, 750 m alt., along the road, Mt. Margala, Islamabad, Oct. 1992.

Distribution: N. America; U.S.A.

This is the first report of *Dictyostelium rosarium* in Asia. Pakistani isolates produce smaller sorocarps with less lateral sori in number than those of the original description for *Dictyostelium rosarium* (Raper and Cavender, 1968), but they presented typical characteristics, viz., lateral sessile sori along the sorophores and globose spores.

The isolates examined often developed large pseudoplasmodia (Fig. 4A), sometimes exceeding 20 mm in diam. In the large pseudoplasmodia, nodular aggregates were frequently produced in the process of inflow of myxamoebae into primary centers (Fig. 4B). Most of the nodules yielded single sorocarps and some of them reaggregated to other nodules. Sometimes the large pseudoplasmodia

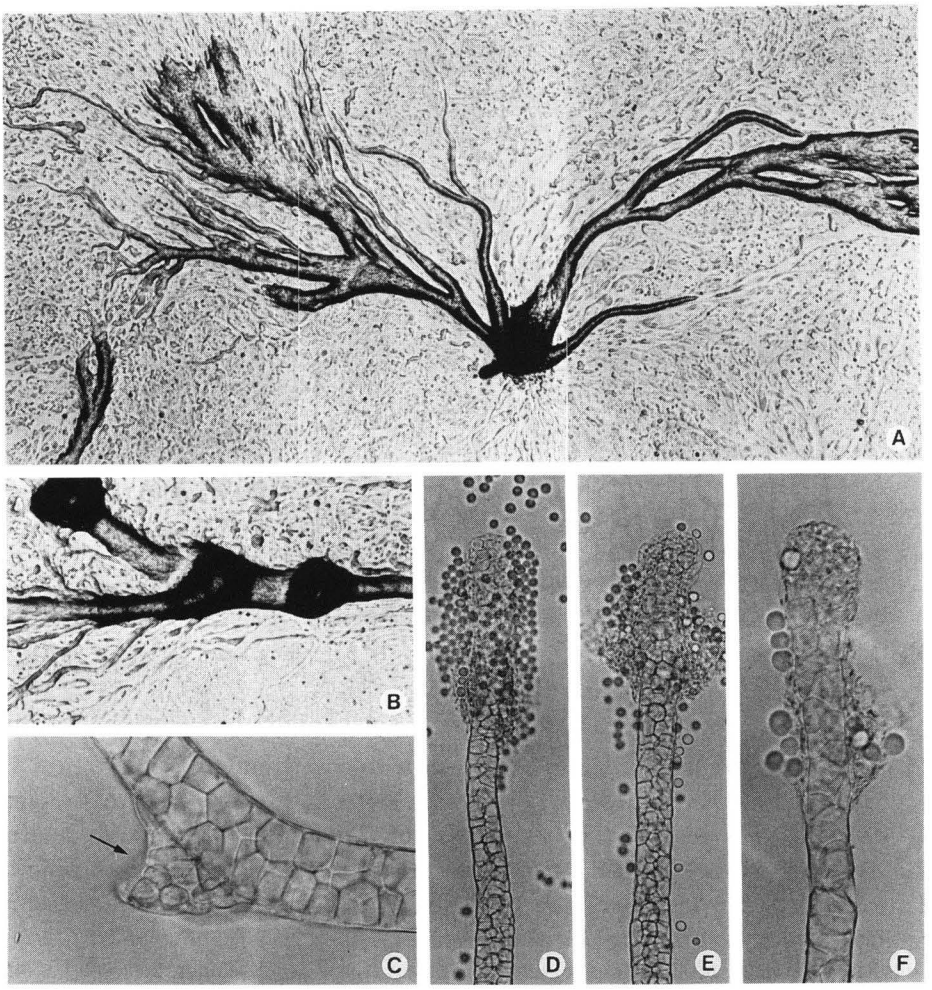

Fig. 4. *Dictyostelium rosarium.* A. Well-developed large pseudoplasmodium. ×12. B. Nodules produced in the process of aggregation. ×24. C. Supporter (arrow) produced under the prostrate sorophore. ×480. D–F. Sorophore tips. D, E, ×240. F, ×480.

yielded clustered sorocarps or branched ones, the latter not commonly becoming dichotomously branched.

Acknowledgments

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