Dicroidium compression floras from southern Victoria Land

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Dicroidium is a form genus of pteridosperm foliage found on all of the continents and islands of the Southern Hemisphere, indicating that the plants which bore *Dicroidium* foliage were widely distributed throughout Gondwanaland during the Triassic. *Dicroidium* was first collected in Antarctica from Triassic exposures on Mount Fleming and Mount Shapeless, southern Victoria Land (Gunn and Warren 1962; Plumstead 1962, pp. 1–154). Approximately 15 different species have been identified from the central Transantarctic Mountains, Victoria Land, and East Antarctica (Townrow 1967; Rigby and Schopf 1969, pp. 91–106; Boucher, Taylor, and Taylor 1993, pp. 39–46; Webb and Fielding 1993). Impression and compression specimens are abundant in the fossil record, yet little is known about the spatial and temporal range of species within this genus. To improve understanding of the role of *Dicroidium* in Triassic biostratigraphy and paleoenvironmental reconstructions, specimens have been collected and identified from several localities and stratigraphic levels in Antarctica. This article describes specimens from two sites in southern Victoria Land.

We collected plant compressions and impressions from Feather Bay and Roscolyn Tor, Allan Hills, during three different field seasons (1989–1990, 1992–1993, and 1993–1994) (76°42'S 159°42'E) (Taylor et al. 1990). At each site, *Dicroidium* species were identified from several levels within the Lashly Formation, which is Middle to Late Triassic in age (Kyle and Schopf 1982, pp. 649–659). The Lashly Formation has been divided into four members (members A–D), each up to 90+ meters (m) thick. At its greatest exposure, however, the Lashly Formation may extend up to 520+ m (Barrett et al. 1971; Barrett 1991, pp. 120–152). Sedimentological evidence within the Lashly Formation of the Allan Hills indicates a fluvial depositional setting, including both braided and meandering low-

Figure 1. Dicroidium odontopteroides from level 1, Lashly Formation, Feather Bay (×1.25).

Figure 2. Specimens of Dicroidium dutoitii from level 2, Lashly Formation, Feather Bay (×1.5).

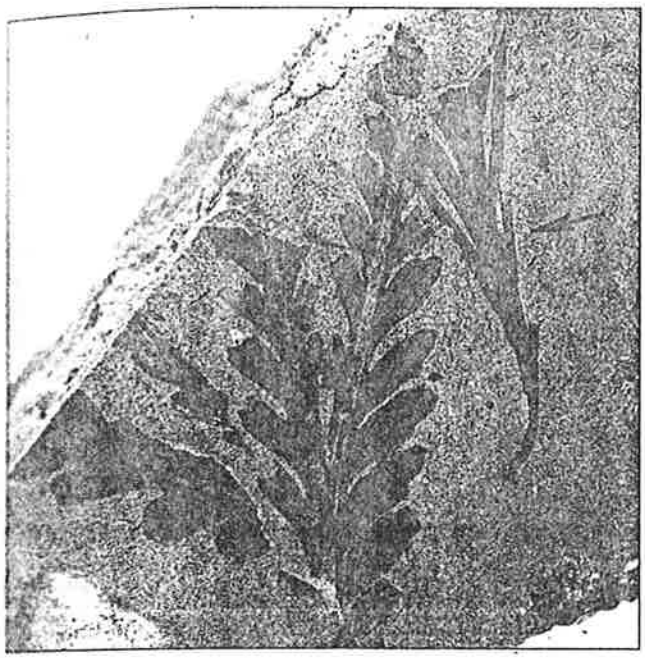

Figure 3. *Dicroidium trilobita* and *D. elongata* (arrow) from level 4, Lashly Formation, Feather Bay (×1.7).

sinuosity stream environments (Ballance 1977; Gabites 1985; Isbell et al. 1990).

At Feather Bay, we identified four levels within member C (Late Triassic) that are less than 1 m thick (levels 1–4). The levels are approximately 1 to several meters apart. The plant fossils occur in light-to-medium gray mudstone and siltstone. When cuticle is present, it is poorly preserved. Floral assemblages at each level vary in species diversity and plant types. All levels, except level 3, are dominated by *Dicroidium* foliage. These levels are also characterized by the presence of corystosperm reproductive organs. In level 1 (the oldest level), the dominant foliage is *Dicroidium odontopteroides* (figure 1). The flora also includes *D. dutoitii*, dispersed seeds, and corystosperm reproductive structures, including *Pteruchus* and cupules.

Higher in the section at level 2, *Dicroidium dutoitii* (figure 2) is dominant, with *D. odontopteroides* also present. The assemblage also includes corystosperm reproductive organs, sphenophytes, stem compressions, and conifer cones and foliage. A distinct change in the flora occurs at level 3, which is dominated by conifer cones and foliage, osmundaceous ferns, sphenophytes, and various seeds. *Dicroidium dutoitii* is a rare occurrence at this level.

In level 4, several species of *Dicroidium* are present including *D. elongata* (=*Xylopteris elongata*), *D. trilobita* (=*Johnstonia trilobita*), *D. odontopteroides*, and *D. spinifolium* (figure 3). Also present are corystosperm reproductive structures and seeds, osmundaceous ferns, and conifer foliage.

At Roscolyn Tor, we identified four plant levels corresponding to those stratigraphic sequences found in Feather Bay. In the northern section of Roscolyn Tor, level 2 contains *Dicroidium odontopteroides*, *D. dutoitii*, and *D. stelznerianum*. Also present are corystosperm reproductive organs, seeds, osmundaceous fern foliage, sphenophyte stems and foliage, stem compressions, and a rare appearance of conifer foliage. Upper member C in south Roscolyn Tor is a dark gray shale and *Dicroidium* foliage is abundant, including *D. lancifolium* and *D. odontopteroides*.

Changes in floral assemblages and *Dicroidium* species at these localities during the Late Triassic may reflect several factors, including changes in the fluvial environment due to flooding, successional changes in the region, seasonality and/or climate changes. The preservation of both vegetative and reproductive remains at most levels increases the probability of establishing a relationship between organs of the same plant, thus providing evidence for plant reconstructions. As more localities and specimens are studied, further stratigraphic correlations and data will be available to evaluate Triassic plants and the paleoecosystem dynamics of high-latitude environments during a globally warm period.

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References

Ballance, P.F. 1977. The Beacon Supergroup in the Allan Hills, central Victoria Land, Antarctica. *New Zealand Journal of Geology and Geophysics*, 20(6), 1003–1016.

Barrett, P.J. 1991. The Devonian to Jurassic Beacon Supergroup of the Transantarctic Mountains and correlatives in other parts of Antarctica. In R.J. Tingley (Ed.), *The geology of Antarctica* (Oxford Monographs on Geology and Geophysics, 17). New York: Clarendon Press.

Barrett, P.J., B.P. Kohn, R.A. Askin, and J.G. McPherson. 1971. Preliminary report on Beacon Supergroup studies between the Hatherton and Mackay Glaciers, Antarctica. *New Zealand Journal of Geology and Geophysics*, 14(3), 605–614.

Boucher, L.D., E.L. Taylor, and T.N. Taylor. 1993. *Dicroidium* from the Triassic of Antarctica. In S.G. Lucas and M. Morales (Eds.), *The nonmarine Triassic* (Bulletin No. 3). Albuquerque: New Mexico Museum of Natural History and Science.

Gabites, H.I. 1985. Triassic paleoecology of the Lashly Formation, Transantarctic Mountains, Antarctica. (Unpublished Masters of Science thesis, Victoria University of Wellington.)

Gunn, B.M., and G. Warren. 1962. *Geology of Victoria Land between the Mawson and Mulock Glaciers, Antarctica* (New Zealand Geological Survey Bulletin 71).

Isbell, J.L., T.N. Taylor, E.L. Taylor, N.R. Cúneo, and B. Meyer-Berthaud. 1990. Depositional setting of Permian and Triassic fossil plants in the Allan Hills, southern Victoria Land. *Antarctic Journal of the U.S.*, 25(5), 22.

Kyle, R.A., and J.M. Schopf. 1982. Permian and Triassic palynostratigraphy of the Victoria Group, Transantarctic Mountains. In C. Craddock (Ed.), *Antarctic geoscience*. Madison: University of Wisconsin Press.

Plumstead, E.P. 1962. Fossil floras of Antarctica. In *Trans-Antarctic Expedition, 1955–1958*, (Scientific Report 9, Geology). London: Trans-Antarctic Expedition Committee.

Rigby, J.F., and J.M. Schopf. 1969. Stratigraphic implications of antarctic paleobotanical studies. In A.J. Amos (Ed.), *Gondwana stratigraphy (IUGS Symposium 1967), Earth Sciences* (Vol. 2). Paris: UNESCO.

Taylor, E.L., T.N. Taylor, B. Meyer-Berthaud, J.L. Isbell, and N.R. Cúneo. 1990. A Late Triassic flora from the Allan Hills, southern Victoria Land. *Antarctic Journal of the U.S.*, 25(5), 20–21.

Townrow, J.A. 1967. Fossil plants from Allan and Carapace Nunataks, and from the Upper Mill and Shackleton Glaciers, Antarctica. *New Zealand Journal of Geology and Geophysics*, 10(2), 456–473.

Webb, J.A., and C.R. Fielding. 1993. Revised stratigraphical nomenclature for the Permo-Triassic Flagstone Bench Formation, northern Prince Charles Mountains, East Antarctica. *Antarctic Science*, 5(4), 409–410.