Austroannularia gen. nov., an asymmetrical Permian sphenopsid leaf whorl from Gondwanaland

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Austroannularia gen. nov. is proposed for species of morphologically asymmetrical sphenopsid leaf whorls similar to those included in the Cathaysian genus Lobatannularia, but lacking the strongly bilobate character of the latter genus. The two species, A. subcircularis sp. nov. from eastern Australia and A. qubuensis from southern Tibet (Xizang) occur in Permian non-marine strata containing typical Gondwana species in the absence of Cathaysian species.

Key-words—Megafossils, Sphenopsida, Austroannularia, Lobatannularia, Permian (Australia).

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| अनुरूपता |

नोडानेसियन से एक असममित परम्परा ग्रीनिच स्फीनोप्लिड पर्मन-शक्ति और ओस्ट्रोएनन्तरिया नव प्रजाति

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आस्ट्रोएनन्तरिया हृदय में असममित स्फीनोप्लिड पर्मन-शक्ति की जातियों के लिए, जो कि कॅथायसीय प्रजाति लोबतान्तरिया प्रजाति के मध्य हैं तथा जिन्में विषमीयता तथा अनुरूपता है, के ओस्ट्रोएनन्तरिया नव प्रजाति प्रजाति की पाई है। कॅथायसीय जातियों की अनुरूपता में गोंडवाना नक्षत्रक की जातियों में एक परम्परा अनुरूपता है। पूरी ओस्ट्रोएनन्तरिया में ओस्ट्रोएनन्तरिया नव प्रजाति एवं दक्षिणी विभाग में ओस्ट्रोएनन्तरियास तथा दो जातियां पाई जाती हैं।

SYSTEMATIC DESCRIPTION

Order—Sphenophyllales incertae sedis

Austroannularia gen. nov.

Diagnosis—Annularia-like to Lobatannularia-like leaf whorls, asymmetrical, with shorter leaves on one side of the whorl giving the whorl a reniform outline; longer leaves tending also to be broader, fused for half their length or less, shorter leaves fused to a lesser extent if at all; leaves linear-obovate, with an acute apex, possible mucronate, leaf tips or apical regions tending to droop or be lax, sheath probably absent.

Type species—Austroannularia subcircularis sp. nov.

Origin of name—Austro, derived from Austrinus, Latin for “southern”. Annularia, a well known Late Palaeozoic sphenopsid genus, derived from annulus, Latin for “ring”.

Comparison—The genus Austroannularia may be distinguished from the genus Lobatannularia by the lack of strong bilobation of the leaf whorl. In Lobatannularia there are usually two diametrically opposite pronounced gaps in the whorl whereas Austroannularia has one or two regions where the leaves are shorter, but there is no break. Both genera are restricted to the Permian.

Austroannularia subcircularis sp. nov.

1916 Annularia stellata (?), Walkom, pp. 233-234, pl. 25.

Description—Leaf whorls almost circular, longest leaf about 1½ times longer than shortest leaf, longest leaf about 16 mm, broken leaves may be longer. There is no apparent foreshortening on the slab bearing the type specimen where whorls are spaced at slightly less than the length of the longest
Figure 1—Austroannularia subcircularis gen. et sp. nov. Holotype, Specimen no. F15/985/5, Queensland Museum. Natural size.

leaf. The leaves are lax, but this character may have been exaggerated during burial. The individual leaves vary in breadth in proportion to their length in approximately the ratio of five times as long as broad. This implies that the whorl has not been foreshortened during compression, but the asymmetry is a natural phenomenon. Longer leaves are fused for up to one third of their length, shorter leaves appear free. Shorter leaves are restricted to one side of the whorl, although on some whorls leaves may be slightly shorter on the opposite side of the whorl (Figure 1).

Holotype—F/15/985/5, housed by the Queensland Museum.

Locality—The only information available was given by Walkom (1916), no additional data are available—12.8 km from Dunedoo, New South Wales (approximately 260 km NW of Sydney). The horizon is unknown.

The colour and texture of the host rock, a pinkish mudstone, suggests it may be from the same or a similar horizon to that from which Holmes (1974, 1977) has described elements of the Glossopteris Flora from the Late Permian Illawarra Coal Measures near Dunedoo. Some Glossopteris leaves on the slab bearing the holotype are virtually indistinguishable from an unnamed species of Glossopteris from the Rangal Coal Measures, Middle Permian of Queensland, which is probably very slightly older than the Illawarra Coal Measures. The possibility exists that the holotype was found in the Illawarra Coal Measures.

Other Specimens—Two specimens from the Nychum Volcanics near Chillagoe, north Queensland, identified by White (1972) as Annularia belong in Austroannularia subcircularis. These specimens, F24325 and F24240, form part of the collections of the Bureau of Mineral Resources, Canberra.

Age—Bailey et al. (1982) give an age of 270 Ma for the Nychum Volcanics which is in the region of the Sakmarian-Artinskian boundary. If the holotype was collected from the Illawarra Coal Measures then the range of A. subcircularis may extend over the middle half or longer of Permian time. Early Permian(?)-Late Permian is the only reasonable age range.

Comparison—This species cannot belong in Annularia, as thought by Walkom (1916), and by White (1972), as it has an asymmetrical leaf whorl, whereas Annularia has leaves of uniform length throughout the whorl. Even when whorls lying across the bedding planes are compressed, they still retain bilateral symmetry both on the major and minor elliptical axes as demonstrated for Raniganjia by Pant and Nautiyal (1967). Although Austroannularia whorls are bilaterally symmetrical, this symmetry is only along a single plane corresponding to the minor axis.

Austroannularia qubuensis (Hsü 1976) comb. nov.

1976 Raniganjia qubuensis Hsü: 324, pl. 1, figs 4-7, text-fig. 1.


Diagnosis—See Hsü, 1976, p. 324.

Type Specimen—Specimen 4783a, Institute of Botany, Academia Sinica, Xiangshan, Beijing, figured by Hsü, 1976, pl. 1, fig. 4, is selected as lectotype.

Locality—From the Qubu Formation, at Dingjie, Horizon 3, fig. 1-12, p. 40, of Wang et al. 1984 in southern Tibet (Xizang). Wang et al. (1984), date this horizon as Early Permian, as does Li (1983). Li et al. (in press) have listed all identifiable species in the flora from Dingjie.

Comparison—The leaves of this species are much narrower than in A. subcircularis, being approximately ten times as long as broad, decidedly linear instead of linear-obovate, and with an acute apex. The leaf tips are more erect with no apparent drooping, a feature that separates A. qubuensis from Lobatanannularia as well as from A. subcircularis.

A POSSIBLE SOUTH AFRICAN SPECIES

Kovács-Endrődy (1986) identified some leaf whorls from the Late Permian Ecca Group of South
Africa in a new species, *Cyclopitys lanceolata*, comparing it with *C. nordenskioeldi* from central Siberia. She was probably unaware that this latter species has disappeared into synonymy, and is now included within *Annulina neuburgiana* (Radczenko) Neuburg 1964. This genus was suggested by Neuburg (1954) and later validated (Neuburg, 1964). *A. neuburgiana* also includes *Lobatannularia comiana* Zalessky & Chirkova 1938 as a synonym. The figured specimens of "*Cyclopitys lanceolata* are symmetrical whorls, but as leaves are fused basally they cannot be accommodated in either *Annulina*, or the Gondwana genus *Stellobeca*. Future investigations may show the need to expand the definition of *Australoannularia* to include specimens of "*C.* lanceolata". Her figured specimens demonstrate the South African species cannot be accommodated in either of the species of *Australoannularia* discussed in this paper.

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**REFERENCES**


