

Book Review

J.M. Anderson and H.M. Anderson. *Palaeoflora of Southern Africa. Molteno Formation (Triassic). Volume 2. Gymnosperms (excluding Dicroidium)* A.A. Balkema. Rotterdam, 1986

This impressive, 567 pp book which includes 331 plates and 1107 text figures, is the second of a projected 6 volumes in a series of monographs on the Molteno Formation (Upper Triassic, Carnian), which is probably the most representative Gondwanaland flora of this age. Judging by the first two volumes, the whole series promises to rival the Yorkshire flora by T.M. Harris, the present standard work on palaeoflora. While the British monographer had the advantage of a much longer collecting history and many famous predecessors, the South African team explored, over a period of 20 years beginning in 1967, excellent collecting sites and made a collection of 17000 catalogued slabs. They have also profited from general progress in palaeontological methodology and techniques. While the older generation seldom spoke of their taxonomic philosophy, the Andersons have chosen to be explicit on this and other matters, including the evolutionary perspectives of foraminiferal and the ammonite records. Their palaeodeme approach is admittedly similar to N.F. Hughes' biorecords. The palaeodeme is defined as a collection of specimens showing a unimodal distribution of variation, derived from a single fossil assemblage from a discrete lithological unit (I have purposely omitted "representing a single breeding population" as this is no more than wishful thinking at the moment). There are obvious problems with unimodality. These are briefly admitted in differences mentioned between immature and mature leaves of e.g., *Ginkgo biloba*. In this species, however, leaves are somewhat different on male and female trees as well as on long shoots and spur shoots. Should these be split into several palaeodemes?

A palaeodeme is further defined as a basic

taxonomic unit, while a species, to all practical purposes, is no more than the most representative ("reference") palaeodeme. The authors state that the morphological limits of a species coincide with those of the reference palaeodeme. However, the reference palaeodeme is not definitive and can be replaced at any time by a more typical or better preserved palaeodeme. This procedure should replace traditional taxonomy based on miscellaneous specimens.

With good material, the palaeodeme approach has obvious merits. Primarily, as a tool in variation studies, while a succession of palaeodemes can give us some idea of speciation processes. However, as a taxonomic philosophy, it poses serious problems. "Traditional" taxonomy accepts types in a nomenclatorial sense only. One specimen or a set of conspecific specimens are neither more typical morphologically than another nor define species limits. Traditional taxonomists argue about species for several hundred years. For most of them, however, "species" is a mental concept deduced from what was observed on individual or deme levels but not identified with a selected individual or deme. It is in a sense prophetic, open to the inclusion of still undiscovered individuals or demes not surpassing certain limits set by the mental concept. Attempts to reduce species to a sum of individuals have been made since Diogenes' time. However, a reductionist species only accounts for individuals or demes actually observed at a single moment. It is not prophetic and must be abandoned when new discoveries are made. This is just what is proposed by Hughes and the Andersons. There is no way of stabilizing nomenclature, nor is a stable nomenclature acceptable as a good thing. It should also be mentioned in passing that J.S.L. Gilmour, the founder of deme terminology, did not consider it to be taxonomic.

According to the above concept of palaeodemes, these (rather than species) are seen as basic units of a fossil flora. All the palaeodemes from a

lithological unit constitute an *assemblage*, while a *palaeoflora* is the sum of all assemblages from a single formation and *palaeoempire* is a coherent biotic alliance of supracontinental extent and considerable duration (overlapping with the “geoflora” of Chaney).

The Molteno flora was further analysed from the viewpoint of its phytogeographical position in the Gondwanian palaeoempire, assemblage content (altogether 75 assemblages are recognized), and “prominence” which is a compound value index calculated as a sum of diversity, ubiquity, frequency and abundance for each genus. The completeness of the fossil record is estimated by comparing observed species numbers (122 for Molteno) with the expected total number (215) obtained by fitting a zero-truncated inverse Gaussian–Poisson distribution (Sichel distribution) to the species per assemblage counts. This material is presented in a tabulated form obviously not intended for easy reading.

The current state of classification art is assessed by comparing traditional “pre-cladistic” supra-generic classification systems by Stewart, 1983 and Meyen, 1984 with two recent cladistic schemes by Crane, 1985 and Doyle Donoghue, 1986. The authors follow Meyen whose classification they find more consistent with their Gondwana Triassic records, especially in placing ginkgoaleans close to peltasperms among seed ferns. A minor problem here is that while a peltasperm, or rather a corytosperm, derivation of ginkgoaleans has been suggested by several authors, “seed fern” remains a loose concept which can be better dispensed with

or restricted to the lyginopterid — medullosan grade.

In a short evolutionary chapter, different evolutionary models are compared to and tested against the Molteno results with a brief digression on palaeoanthropology. Neither gradualistic nor punctuational models received full support. Both are regarded as oversimplifications of the fossil record — a conclusion to which I willingly subscribe.

A special chapter is devoted to cuticles — their sampling, terminology and intra-iterpalaeodeme variation.

Taxonomic revision of 23 leaf genera (4 new) with 92 species (40 new) gives 470 pages of condensed, but amply documented, nomenclature, diagnostic features, ranges, phytosociological inferences, comparisons and brief comments on associated reproductive organs. The iconography includes 3320 figures and 1107 drawings. Most taxonomic decisions seem fairly reasonable except probably “*Ginkgo*”, for which I would like more evidence especially of reproductive structures. I would also have preferred it if the comparisons were less Gondwana-oriented. Incidentally, the Siberian genus *Heilungia* Prynada could have been mentioned in connection with *Jeanjacquesia*, the detached pinnules being named after a pitifully isolated philosopher.

This beautifully executed, thought-provoking volume should attract not only palaeobotanists but also a wide range of biologists engaged in classification and evolutionary studies.

V.A. KRASSILOV (Vladivostok)