

i8 The coals of southern Pangea < Suess, Gondwana, *Glossopteris* >

The discovery of seed-bearing plants with the foliage of ferns threatened to disturb the mental balance of palaeobotanists.

—quoted, with approval, by Dukenfield Henry Scott (1854-1934), from a review of his four volume *Fossil Plants for Students of Botany and Geology* (1898-1919).¹

In 1858, Antonio Snider-Pellegrini in *The Creation and its Mysteries unveiled*² seized on the described similarities in plant fossils in the Carboniferous coal measures of Europe and North America to find in their present separation “continental drift” evidence for the Biblical Flood, which in Europe had wiped out all humanity save for Noah and his family but had not affected the Americas where the Indians are descended uninterrupted from Adam. Be that as it may, Eduard Suess in his synthesis of world paleogeography and structure: *Das Antlitz der Erde* (5 volumes, 1883-1901; translated as *The Face of the Earth*, 1904-1924 by William Johnson Sollas’ daughter Hertha),³ drew attention to a geologically well-studied part of peninsular India where a distinctive succession of rocks containing coals of economic importance had been identified. The fossil flora of these coals were distinctly different from those of the Carboniferous coals of Europe and North America. Reporting on these coal-bearing strata for the Geological Survey of India, H. B. Medicott in 1864 had referenced the type area of study as “Gondwanaland”⁴ (which, researched by S. Warren Carey, is a shortened version of the place-name for a despised aboriginal people called *Gowandawana* and meaning “bull’s balls people” from *gow* bovine, *anda* testicle, and *wana* belonging to).

The age of the coals of “Gondwanaland,” given that their fossil flora was unfamiliar, could not be directly known. However, the age of the Indian coal measures was found to be bracketed by minor marine incursions of Cretaceous age above them and of Early Permian age below them. In trying to make comparisons of their plant fossils with known European fossil flora, the closest comparisons were to a tongue shaped “fern” leaf that Adolphe Théodore Brongniart (1801-1876) had described in 1822.⁵ The descriptive name *Glossopteris* (Gk. *glosso*, tongue; *pterus*, fern) he used for this leaf (which, *mon Dieu*, he later discovered was a leaf of *Lepidodendron*), was reassigned in 1830 for the genus of “tongue-shaped, and with a conspicuous midrib and reticulate venation, leaf” typical of the Gondwanide coal flora.



Otto Feistmantel, in a *Record for the Survey*, formally described the “Gondwana flora” in 1876⁶ (the fossil specimens themselves are lost, or have become mixed into uncurated collections). The distinctive flora is commonly referred to as the “*Glossopteris* flora.” Although India is north of the equator, glossopterid plants of “Permian” age were discovered to be the flora of the coals in *all* the southern hemisphere continents and India (**Figure i8.1**). These continents, Africa, South America, the Australias (present Australia, New Guinea, New Zealand, and nearby islands), and Antarctica, together with India are collectively called *Gondwanaland* when their combined area was separate from Laurasia in the Jurassic, was the southern realm of Pangea in the Triassic, and was part of assembling Pangea during the Permian and Pennsylvanian, and the apocope *Gondwana* is used for the separate paleocontinent that this area was before the Pennsylvanian and since the mid-Cambrian.

How to formally classify the fernlike plants of Gondwanaland was not certain until **Edna Pauline Plumstead** (née **Janisch**)⁷ (1903-1989)⁸ in South Africa, beginning in 1952, described seed-bearing fruits attached to the leaves of different species of them.⁹ Her study of plant fossils collected by the 1955-58 American Trans-Antarctic Expeditions, beginning in 1965, extended correlations of the *Glossopteris* flora of India, South Africa, South America, and Australia, to Antarctica.¹⁰

The reproductive structures of the Glossopterids (**Figure i8.2**) establishes these to be seed ferns (Phylum, or Division, Gymnosperme). It is from this very diverse, extinct, group of cool-climate adapted plants that all later seed-bearing plants have evolved.¹¹

Glossopterid fertile organs attach, in different genera, to the plant's leaves or to its stem. Fossils of the fruiting bodies are rare, but the leaves without them are extremely common. Glossopterid leaf-form genera are tongue-shaped leaves, which have cross connections between lateral veins resulting in a mesh or net venation on the leaf lamina. Three leaf genera easily distinguished are: *Glossopteris* has a pronounced midridge, *Gangamopteris* has a median groove and no midrib, and *Palaeovittaria* has very little meshing of veins and no median groove. □

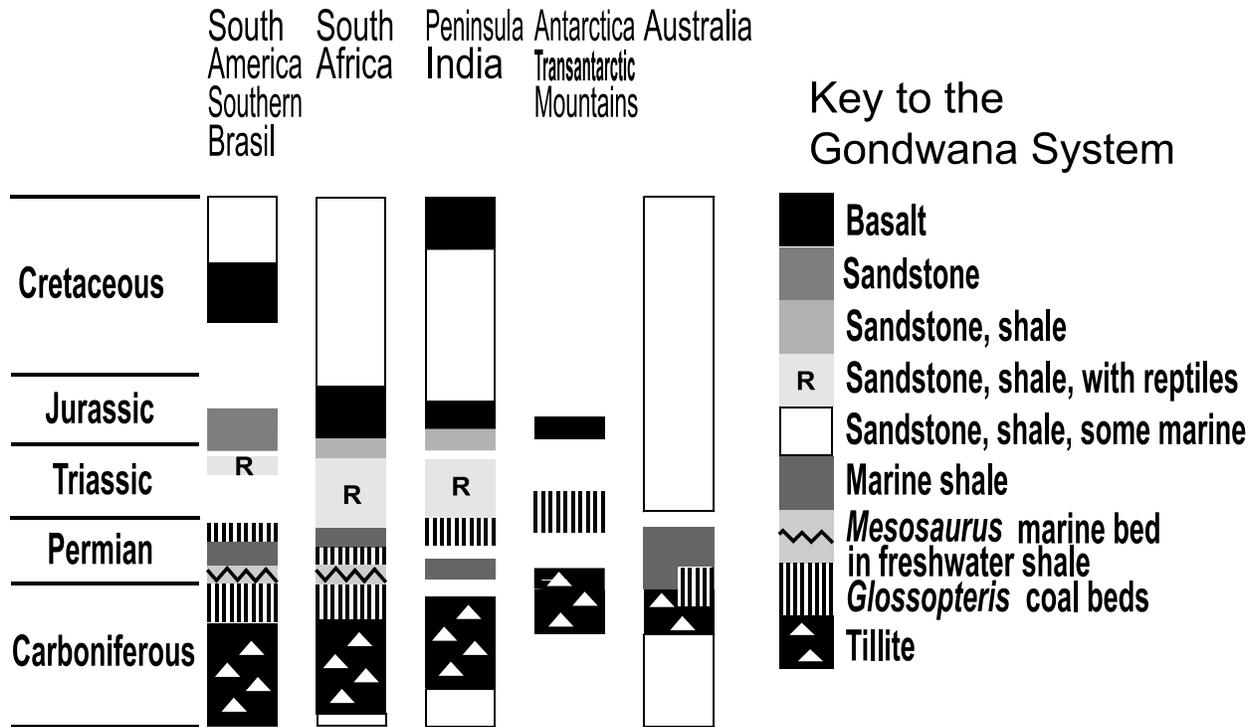


Figure i8.1¹² Representative geologic columns of the Gondwana System in now widely separated continents with deep oceans between.

The Mesozoic and late Paleozoic strata of the Gondwana System accumulated in Gondwanaland (when its area was the southern realm of Pangea and, earlier, of Pangea-to-be) and had begun to accumulate in the paleocontinent Gondwana.

The Gondwana System has its type area in India. Correlatives collectively go by that name in Australia but are called the *Santa Catarina System* in South America,¹³ the *Karoo System* in South Africa (see Topic i12), and the *Beacon Supergroup* in Antarctica.¹⁴

Figure i8.2 Line drawing of a Late Permian *Austroglossa walkornii* fructification, consisting of a small bunch of narrow-winged seeds, is attached by a short pedicel to the petiole of a *Glossopteris* leaf. This specimen is from Cooyal, New South Wales, Australia.⁵

