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## A Tertiary Ginkgo from Patagonia

EDWARD W. BERRY

With the discovery to which this note is devoted the Ginkgo has now been recorded from all of the continental areas. Its most extensive range appears to have been attained in the middle Mesozoic. Tertiary species have heretofore been unknown outside the Northern Hemisphere, where they have survived in western Europe as late as the Pliocene and in Asia and North America as late as the Miocene. The latest Arctic occurrences I regard as older Tertiary.

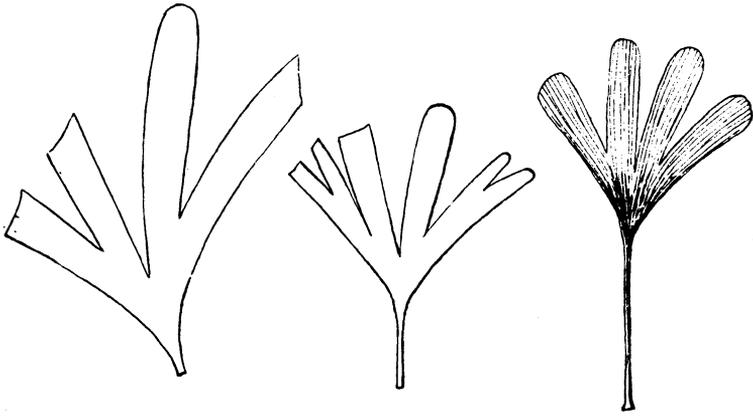
In a collection of fossil plants from northern Patagonia which reached me last spring are a considerable number of leaves of a new species of Ginkgo. This material comes from Rio Pichileufu about 30 miles east of Lago Nahuel Huapi in Rio Negro Territory, the locality being about  $41^{\circ} 10'$  south latitude and  $70^{\circ} 52'$  west longitude. The matrix is a fine grained andestic tuff and the preservation is excellent.

This species may be named **Ginkgo patagonica** and described as follows: Leaves variable in size, long petiolate, fan shaped with a cuneate base, divided by a sharp median sinus which extends  $\frac{3}{4}$ s to  $\frac{4}{5}$ s of the distance to the base into 2 primary segments. Each of these is invariably divided by a sharp but less deep sinus into 2 equal round-tipped segments. In about half the specimens this represents the maximum dissection. In the remainder the outer segments are bisected to a greater or less degree. The leaf substance is fairly coriaceous and the veins are largely immersed. The veins are stout and the venation is typical of the genus, except the outer marginals are not so prominently differentiated as is usual in the existing *Ginkgo biloba*.

The petiole is stout and striated, slightly expanded at the base and measures 4 centimeters in length in the only complete specimen, in which the lamina is 5 centimeters long and about the same in maximum width. The cuticles are preserved in most of the specimens but had been allowed to dry and slack for several years before coming into my hands, and hence it has been impossible to make sufficiently good cuticular preparations for photographing. The cell outlines are quadrangular more often

than polygonal; the walls are wavy and rather heavily cuticularised.

Although Ginkgo has not heretofore been recorded from South America, the allied Mesozoic genus *Baiera* has on several occasions, as by Kurtz from the Rhaetic of Mendoza and by Halle from the Lower Cretaceous of the Lago San Martin region. As has been frequently pointed out, and as Halle remarks in discussing the latter, the distinction between the leaves of *Baiera* and those of *Ginkgo* is very vague and a considerable number of forms have been described which could be referred



Sketch of three specimens traced from photographs.  $\times \frac{2}{3}$ .

to either. In general *Baiera* has a shorter petiole, a narrower base and a more dissected lamina and is unknown in post Mesozoic time. On the other hand the leaves of the existing *Ginkgo biloba* in what has been called localized situations, such as in proximity to fruits, on shoots from the trunk or old branches, etc., are frequently as dissected as the present Patagonian species, or a number of Mesozoic forms that have been referred to *Baiera*. I know of no consistent features that can be applied to these intermediate forms, but since the present species comes from the latter half of the Tertiary I feel sure that it should be referred to *Ginkgo* rather than to *Baiera*, although it is just to remark that there would be little difficulty in deriving it from the Lower Cretaceous form from South America which Halle calls *Baiera cf. australis* M'Coy.<sup>1</sup>

This South American Ginkgo is associated with an abundant arborescent flora which is chiefly dicotyledonous, but which contains several ferns, an abundant cycad belonging to the genus *Zamia*, and conifers representing the genera *Araucaria*, *Fitzroya*, *Libocedrus* and *Podocarpus*. There are also a few fruits and seeds, cyprinodont fish scales and insect remains; the latter chiefly beetle elytra.

The picture presented by this flora is in striking contrast to the present day conditions in this region, which is now a wind-blown treeless pampa with an annual precipitation of less than 20 centimeters. The ecological picture of the Miocene conditions has not yet been fully worked out since the identification of some of the elements, especially among the dicotyledons, is unusually difficult.

One is tempted to say something of the ancestry of the Ginkgo but this fascinating subject has been discussed repeatedly in recent years. One thing the present discovery emphasizes is the paucity of our knowledge of Cretaceous and Tertiary floras in South America and that this is due, not so much to their lack, as it is to the pitifully small amount of geological exploration.

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<sup>1</sup> Halle, T. G. Kgl. Svenska Vetens-Akad. Handl. Bd. 51, No. 3, p. 37, pl. 4, figs. 23-30; pl. 5, figs. 1-4, 5 (?), 6 (?), 1913.