The conventional view sees all ginkgophytes as arborescent, by analogy with modern *Ginkgo biloba*:

![Diagram](image)

but there is in fact little evidence for arborescent ginkgophytes before the Tertiary. On the contrary, a number of indications seem to suggest the possibility that many early ginkgophytes were small shrubs:

![Diagram](image)

### 1. Competitive displacement

Note: Space limitations prevent the depiction of a ground cover of ferns, herbaceous lycopods, and bryophytes. Though it is difficult to find direct supporting evidence, it seems reasonable to assume that established, untested Mesozoic communities could have developed as many as three weakly stratified layers.

### 2. Sedimentological Context

Royer et al. (2003) have shown that Tertiary ginkgophytes are found predominantly in loose and proximal floodplain sediments.

### 3. Absence of wood

Scott et al. (1962) could verify no occurrences of clear ginkgo leaf wood earlier than the Jurassic. In marked contrast to the abundant remains of the order, fossil woods of the Ginkgoales are rare (Scott et al. 1962-1965). No other convincing candidates for Mesozoic ginkgophyte wood have been found, which is surprising given the amount of other well-preserved Mesozoic gymnosperm wood.

### 4. Atypical characters

*Ginkgo biloba* has polymorphic foliage, an early bolting growth phase, and poor shade tolerance. All these characteristics are unique or absent in all other Mesozoic gymnosperms wood.

**Data on leaf morphology in the Mesozoic of North America show a proportional increase of bifurcated, ginkgo-like leaves during the middle of the Jurassic. This ginkgo-like acme is correlated with a decreased proportion of the leaf forms associated with herbaceous or shrubby pteridophytes, and with no substantial change in the proportion of leaf forms associated with conifer gymnosperms.**

The increase in ginkgo-like foliage at the same time as fern-like forms decreased in relative abundance suggests replacement of some part of the forest understorey or early-successional habitats by early ginkgophyte shrubs. That is, early ginkgophytes may not have been competing for light or water in an established gymnosperm canopy. This suggests that most Mesozoic ginkgophytes were shrubs rather than large trees like the surviving *Ginkgo biloba*. Such a result explains the absence of Mesozoic ginkgophyte wood and supports the argument that has already been made from sedimentological data, that is, a much greater extent than do individuals of *Ginkgo biloba* now cultivated around the world, many ancestral ginkgophytes pursued early-successional strategies.

### Disturbance-Limited

- Canopy height up to 30 meters e.g. Araucarian conifers, Metasequoia

### Nutrient-Limited

- Canopy height up to 1 meter e.g. *Taxodiaceous conifer*, *Cycads, Bennettitans*

### Competition-Limited

- Canopy height up to 0.1 meters e.g. *Ferns, Equisetum*