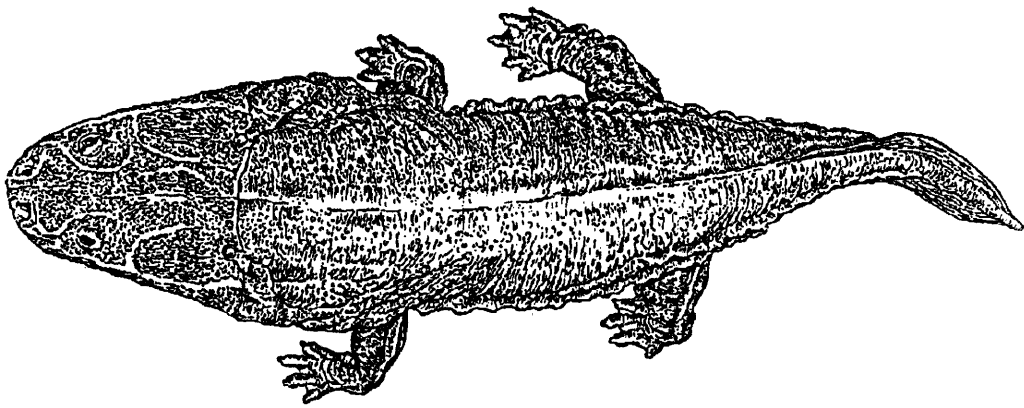


PALEONTOLOGY



A CATALOG OF UPPER TRIASSIC PLANT MEGAFOSSILS OF THE WESTERN
UNITED STATES THROUGH 1988

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Abstract-A catalog of the Upper Triassic genera and species of plant megafossils that have been described from the western United States through 1988 is presented together with a list of the pertinent references. The fossils, which were first reported nearly 140 years ago, occur at many localities west of the Mississippi River in the United States. They are particularly abundant in the Chinle Formation and Dockum Group in Utah, Arizona, New Mexico and Texas; a few additional fossils are found in the Dolores Formation in Colorado, the Popo Agie Formation in Wyoming, the Gold Range Formation in Nevada and in the Eagle Mills Formation and Arkansas. As the catalog, shows the Upper Triassic flora of the western United States includes about 70 well characterized species based on megafossils. The fossils represent nearly all major plant groups and include several of uncertain classification. The ferns and cycadophytes are especially well represented in terms of both numbers and diversity, and the conifers also are rather common. On the other hand, the ginkgophytes and lycopods are very scarce. It is evident from these fossils that a large diverse land-flora was present in the western United States during Late Triassic time.

INTRODUCTION

This catalog contains an alphabetically arranged list of all of the genera and species of plant megafossils that have been described or reported from the Upper Triassic rocks in the western United States from 1850 through 1988. Cited references are listed in the bibliography. A systematic list of all the valid taxa in the flora is provided at the end of the bibliography.

Nearly all of the fossils listed here were obtained from the Chinle Formation in Utah, Arizona and New Mexico. Much smaller numbers were collected from the Popo Agie Formation in Wyoming, the Dolores Formation in Colorado, the Dockum Group in New Mexico and Texas and the Gold Range Formation in Nevada. Although petrified wood commonly occurs in the Upper Triassic formations of the southwestern United States most of the plant fossils described from these units are impressions and compressions of leaves and reproductive structures. Abundant palynomorphs also occur in these same units, but they are not indexed here, although the principal references are included in the bibliography.

ACKNOWLEDGMENTS

This catalog is an outgrowth of the research which I have been conducting since the late 1960's. Much of my recent research has been supported by grants from the Earth Sciences Section, National Science Foundation. The latest of them was Grant EAR82-18054. This support is acknowledged with grateful thanks. Also, I am indebted to the many geologists who have informed me about the occurrence of plant fossils at various localities in the western United States and have assisted me with my research in various ways.

HISTORICAL BACKGROUND

Humans have known of the plant fossils which occur in the Upper Triassic strata in the western United States for thousands of years, as artifacts made from typical Upper Triassic petrified wood have been found in many ancient Indian ruins in the Southwest (Ash, 1970a). However, their presence apparently was not noted in print until a report of the explorations of Lt. J. H. Simpson of the U.S. Army in northeastern Arizona was published in 1850. In that report, he (Simpson, 1850) described the occurrence of petrified wood in the basal part of the Chinle Formation in the vicinity of Canyon de Chelly. During the following decade, petrified wood was observed at a number of additional localities in the Chinle Formation in the Southwest by members of other U.S. Army Exploring Expeditions, but none of it was described by a paleobotanist until 1858 when H.R. Goepfert reported on some specimens collected from what is now Petrified Forest National Park in eastern Arizona. He concluded (Goepfert, in Mollhausen, 1858), on the basis of his microscopic studies, that the wood had the structure of the living conifer Araucaria.

In 1859, members of the Ives Expedition made a small collection of poorly preserved leaves from the lower part of the Chinle Formation in northern New Mexico. The collection was turned over to J. S. Newberry to study just before the American Civil War, but it was not described until many years later (Newberry, 1876). As summarized elsewhere (Ash, 1970a, 1972b), only a few additional Upper Triassic plant fossils were described from the western United States until 1941 when L. H. Daugherty of San Jose State College published a comprehensive study of those that occur in the Chinle Formation in Arizona and New Mexico and in the Dockum Group in West Texas. In that report, which was the turning point in the study of Upper Triassic plant fossils of the western United States, Daugherty described a total of 34 species based on megafossils, principally leaves, including several that have been described earlier and four new species of palynomorphs. Since 1941, many additional plant megafossils and palynomorphs have been described from the Upper Triassic rocks in the western United States, especially from the

Chinle Formation and the Dockum Group, and several of the older taxa have been redescribed as summarized below.

STRATIGRAPHIC BACKGROUND

Chinle Formation

The Chinle Formation is widely exposed in northern Arizona and southern Utah, and is much less widely exposed in northwestern New Mexico, southwestern Colorado and southeastern Nevada. Throughout this region it rests unconformably on older strata. The formation consists of a variety of clastic sedimentary rocks. At the base is a thin persistent bed of conglomerate that often includes small amounts of sandstone and shale. It is overlain by a thick sequence of mainly greenish and brownish mudrock which grades upward into reddish mudrock. Numerous, thin, discontinuous beds of sandstone also occur throughout this part of the Chinle. The uppermost part of the formation consists of reddish sandstone and pinkish-purple silty limestone. The Chinle has a maximum thickness of about 550 m in northwestern New Mexico and apparently correlates with the late Carnian and early Norian Stages of the Upper Triassic (Ash et al., 1986).

Plant fossils are quite abundant in the Chinle Formation at many places, particularly in the lower part. Although this flora has been studied for many years, new localities with new forms are found nearly every field season. There seems to be a general change in the flora from the bottom to the top of the formation, and three floral zones have been recognized in it (Ash, 1988). In the basal beds the flora is fairly large and is dominated by conifers and cycadophytes. Higher up the flora is quite large and varied and is dominated by ferns, cycadophytes and several unclassified gymnosperms. The known flora in the upper beds of the Chinle is very small, consisting of only a few identifiable forms.

The plant fossils in the lower part of the Chinle are often well preserved with the cuticle or epidermis intact, but the fossils usually are somewhat fragmentary. In contrast, those in the highest beds are merely impressions but at two localities entire plants are preserved. The principal references for the plant megafossils in the Chinle are Daugherty (1941), Ash (1970a, 1972a, 1972e, 1975a, 1978b, 1980, 1986a, 1987c), Gould (1971), Knowlton (1888) and Litwin (1984). Numerous palynomorphs also have been described from these strata since the pioneering work of Daugherty (e.g., Dunay and Traverse, 1971, Gottesfeld, 1972, Stone, 1978, Litwin, 1984, 1986).

Dockum Group

The Dockum Group is exposed principally in the panhandle of Texas and adjacent areas in eastern New Mexico. It consists mainly of variegated and red claystone and mudstone

and a small amount of somber colored sandstone and conglomerate. The unit is subdivided into several formations which are discontinuous and generally cannot be traced any great distance. The Dockum has a maximum thickness of about 650 m, but most exposures usually show only 100 m or less. It appears to correlate with the late Carnian and early Norian Stages.

Identifiable plant megafossils, particularly leaves, are not common in the Dockum but do occur throughout the Group and at many localities. Petrified wood occurs in the Dockum but it is not as abundant or well preserved as in the Chinle Formation to the west. The fossil leaves in the formation are usually well preserved. The flora is not as large as the flora in the Chinle but does contain several of the same species, and it is evident that the floras are closely related. The principal references on the plant megafossils in the flora are Daugherty (1941) and Ash (1970c, 1972c, 1975a, 1976a, 1980). Dockum palynomorphs are described in Dunay and Fisher (1979) and Fisher and Traverse (1971).

Dolores Formation

The Dolores Formation is exposed principally in the walls of deep canyons in southwestern Colorado. It ranges up to about 320 m in thickness and consists principally of reddish-brown siltstone and fine-grained sandstone. The formation is generally thought to be approximately equivalent to the upper part of the Chinle Formation of the Colorado Plateau region (Stewart et al., 1972) and probably correlates with the Carnian and Norian stages also. Plant megafossils which have been reported from the Dolores are casts or impressions. The principal references for the Dolores Formation are Holt (1947), Brown (1956), Tidwell et al. (1977) and Ash (1980, 1987c).

Popo Agie Formation

The Popo Agie Formation occurs in west-central Wyoming where it is about 30 m thick. The formation consists mainly of reddish to purplish claystone and other siltstone and sandstone. Several localities in the Popo Agie have yielded poorly preserved impressions of a few typical Upper Triassic leaves and stems. The principal references for this flora are Berry (1924) and Ash (1980).

Gold Range Formation

The Gold Range Formation of southwestern Nevada consists of a sequence of argillite, limestone, volcanic flows, tuff and breccia. It has a thickness of about 900 m according to Ponsler (1977). A few impressions of typical Upper Triassic leaves have been obtained from the unit (Ash in Ponsler, 1977).

Eagle Mills Formation

The Eagle Mills Formation is known only in the subsurface in east Texas and adjacent areas in Arkansas and adjoining states. The unit consists of a sequence of nonmarine redbeds, gray and white siltstone and diabase. It ranges up to about 2600 m in thickness and rests unconformably on Paleozoic strata (Scott et al., 1961). A few impressions of a typical Upper Triassic leaf have been described from the unit in Arkansas by Dorf (in Scott et al., 1961), and Moy and Traverse (1986) have described a small Upper Triassic palynoflora from the formation in east Texas.

COMPOSITION OF THE FLORA

Presently about 70 well characterized species based on plant megafossils are known from the continental Upper Triassic rocks of the western United States. Most of the species are represented by compressions; only a few are based on impressions, petrifications or pithcasts. Nearly all of these plant megafossils occur in the lower part of the Chinle Formation or in the Dockum Group, but a few are known from the upper part of the Chinle and Dolores formations (Ash, 1980, 1987c).

Non-vascular plants are represented in the flora by small, discrete, ovoid bodies ranging from 2 to 50 mm in diameter that are found in some of the wood in the Chinle Formation. Daugherty (1941) compared these fossils with similar bodies which are formed in the wood of certain living conifers by a heart-rot fungi and assigned them to Polyporites.

In spite of their rather delicate nature, the lycopods are represented in the flora by several megafossils including the compressed leafy shoot of an extinct species of Selaginella and the petrified stems of a small lycopod called Chinlea. The horsetails are mainly represented by pithcasts of a large species of Neocalamites and Equisetites. They occur at many localities in the Upper Triassic of the western United States. At one locality the fossil attains a maximum diameter of nearly 30 cm and a length of at least 6 m (Holt, 1947). This division is also represented by the compressed stems and cones of a small Equisetites and the compressed stems and leaves of a species of the rare horsetail Schizoneura.

Fern and fern-like foliage is rather common in the Upper Triassic flora of the western United States. Some fragmentary tree-fern stems also occur in these same strata. The foliage represents a variety of ferns, including two (Phlebopteris and Clathropteris) which have palmate fronds and are probably closely related to certain living tropical ferns. Others, such as Cynepteris and Wingatea have a pinnate type of frond. The tree fern is assigned to the

genus Itopsidema. It has a rather small stem that is about 10 cm in diameter and was probably several meters long. At the present time, nothing is known of its foliage. Unclassified fern foliage in these rocks is locally abundant and is referred to two species of Cladophlebis.

Not surprisingly the cycadophytes are well represented in the flora with the cycadeoids being the most common. This order is represented by both leaves and cones. The leaves include pinnate forms, such as Zamites, Otozamites, and Pterophyllum and the entire leaves Nilssoniopteris. An unusual pinnate leaf, Eoginkgoites, in which wedge-shaped pinnae are grouped at the top of the petiole is also assigned to the Bennettitales because it has typical cycadeoid cuticle (Ash, 1977). The only cycadeoidean cone known in these strata is referred to Williamsonia. This fossil, which looks very much like a daisy, is very similar to some of the cones that occur in the Upper Jurassic of England (Ash, 1968). The cycads are poorly represented in these rocks. Only two stems (Lysoxylon and Charmorgia) and one fragmentary leaf in these strata can be referred to this order at this time (Gould, 1971; Ash, 1985).

The ginkgoes (s.l.) are represented in the flora by a few specimens of two types of leaves. One of them (Baiera) has been described by Daugherty (1941), while the other remains undescribed (Ash, 1967).

Three taxa have been assigned to the cordaites, a group which was very abundant during the late Paleozoic. They include the wood Dadoxylon, leafy shoots and isolated leaves referred to Pelourdea, and some seeds called Samaropsis (Daugherty, 1941, Ash, 1987c).

The conifers appear to be the most abundant and varied plant group in the Upper Triassic of the western United States. Leafy shoots of Pagiophyllum and Brachyphyllum are the most abundant of these fossils. A number of cones are associated with this foliage at a number of localities in the Chinle Formation and the Dockum Group. Unfortunately, none of them have been described, and their classification is uncertain at this time. Several of the types of petrified wood found in these strata are assigned to this division. They include Araucarioxylon arizonicum which is so abundant that it is a characteristic fossil in the Chinle Formation. A much rarer form is the wood called Woodworthia (Daugherty, 1941).

A number of plant megafossils which cannot be assigned to any known division at this time occur in the Upper Triassic strata of the western United States. They include Marcouia, a delicate filmy type of leaf which could well be a fern. However, no sporangia have been found on the many specimens of this fossil that have been examined. One specimen does show a small oval hole on the lamina which might represent a seed. If so, then Marcouia is probably a pteridosperm. Another is the putative angiosperm Sanmiguelia. Although some (e.g., Read and Hickey, 1972) have disagreed with its assignment to the angiosperms, no one has

clearly established its relationships. It is evident that additional material referable to these interesting fossils, which show certain key features such a cuticle or reproductive organs, are necessary before they can be classified with any assurance. One type of gymnosperm wood (Schilderia) is referred to the Gnetales by some authors (e.g., Daugherty, 1941) because it has broad rays similar to those in the stems of certain living members of the order. Two other taxa in the flora (Dechellyia and Dinophyton) have also been identified with the Gnetales by some authors (see Crane, 1988; Krassilov and Ash, 1988), but for the present these all are unclassified in this report.

COMMENTS

The Upper Triassic flora of the western United States is large and diverse and includes representatives of nearly all major groups of vascular plants, the principal exception being the angiosperms. However, it should be noted here that the flora does include one form, Sanmiguelia, which has been tentatively assigned to the angiosperms by Cornet (1986). The flora contains elements of both the antecedent floras and those that followed as well as many elements which seemingly are not closely related to either of those floras. Permian elements in the flora includes large horsetails, Neocalamites and Equisetites, the supposed cordaitaleans, Pelourdea, Samaropsis and Dadoxylon, and possibly some of the conifers such as Brachyphyllum and Pagiophyllum. Younger elements include the cycadeoids, which are very close to those which occur in the Jurassic and Cretaceous. These include Williamsonia, Zamites, Nilssoniopteris and the cycad stem Charmorgia. Forms which appear to be endemic to the Upper Triassic of the western United States include some of the ferns such as Cynepteris and Wingatea and the possible Gnetalean taxa Dinophyton and Dechellyia. Sanmiguelia might also fall into this category.

CATALOG

This catalog, in general, follows the style of the catalog part of LaMotte's (1944) "Supplement to Catalogue of Mesozoic and Cenozoic Plants of North America." All references cited are included in the bibliography that follows the catalog. Data for each generic citation are arranged in the following order: the generic name, author, date of publication, page reference and the name and author of the type species.

For each primary citation, data are arranged as follows: the generic and specific name, author, date of publication, page reference, and the plate or text-figure references. Then follow formation and locality data for the type specimen of the species and other specimens described or reported by the author. Next, in chronological order, are listed citations of the species by later authors together with the year of publication, page, plate and text-figure references, and formation and locality information. Brief annotations concerning the fossil are enclosed in parentheses at the end of the primary citation. Beneath each primary citation are listed, in chronological order, synonyms of the species, together with the author, year of publication, page, plate and text-figure references, and formation and locality data.

APACHEA Daugherty, 1941, p. 55-56. Type species: Apachea arizonica Daugherty.

Apachea arizonica Daugherty, 1941, p. 55-56, p. 9, fig. 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Sterile foliage, Dipteridaceae. May be a poorly preserved specimen of Clathropteris walkeri.)

ARAUCARIORHIZA Daugherty, 1963, p. 805. Type species: Araucariorhiza joae Daugherty.

Araucariorhiza joae Daugherty, 1963, p. 805, figs. 1-8, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (May be the roots of Araucarioxylon arizonicum, conifers.)

Araucarioxylon arizonicum Knowlton 1888, p. 3-4, pl. 1, Swaine and Hegewald, 1882, p. 1-3. Knowlton, 1890, p. 614, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. and near Fort Wingate, New Mexico. Knowlton (in Fontaine and Knowlton, 1890), p. 281, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. Lee, 1907, p. 367, Shinarump Mbr. of the Chinle Fm. near Cedar City, Utah. Reagan, 1925, p. 122-123, figs. 5-7, Chinle Fm. in northeastern Arizona. Walker, 1938, p. 137-141, pls. 1-4, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. Daugherty,

- 1941, p. 86-87, pl. 31, figs. 1-3, Chinle Fm. near Las Vegas, Nev., Leeds, Cedar City, and Zion Canyon, Utah, Marble Canyon, Tuba City, Cameron, St. Johns, Houck, and Petrified Forest National Park, Ariz., near Fort Wingate, Abiquiu, and Coyote, New Mexico, Dockum Gp. near Tucumcari, New Mexico and Alanreed, Texas. Gregory, 1950, p. 72, Chinle Fm. near Zion National Park, Utah. Scott, 1961, p. B130-B132, Chinle Fm. Colorado Plateau. Ash, 1972c, p. 126-127, Dockum Gp. of eastern New Mexico and the panhandle of Texas. Ash, 1974a, p. 48, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park. Ash, 1974b, p. 181, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. Sigleo, 1978a, b, 1979, Petrified forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. Ash, 1980, p. 163, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz., Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico, and Trujillo Fm. of the Dockum Group in the panhandle of Texas. Ash, 1987c, 99, figs. 3i-j, Siltstone Mbr. of the Chinle Fm., Big Indian Wash area, Utah. (Wood, conifers.)
- Araucarites monilifer Ward, 1905, p. 34-35, pl. 3, Chinle Fm. near Cameron, Ariz.
- Araucarioxylon mollhausianum (Goepfert) Knowlton, 1890, p. 617, Chinle Fm. in Petrified Forest National Park, Ariz. Nomen nudum. (Wood, conifers.)
- Araucarites mollhausianus Goepfert, 1858a, p. 492, 1858b, p. 831, Chinle Fm. in Petrified Forest National Park, Ariz. Nomen nudum, see Ash, 1970a, p. D6.
- Araucarioxylon sp. Ash, 1980, p. 158, Temple Mountain and Shinarump Mbrs. of the Chinle Fm., in southeastern Utah, and near Thoreau, New Mexico. (Wood, conifers.)
- Araucarioxylon sp. Platen, 1908, p. 108, Chinle Fm. in Petrified Forest National Park, Ariz.
- Araucarites chiquito Ward, 1900a, p. 322, Chinle Fm. near Cameron, Ariz. Nomen nudum. The fossil is lost. (Cone, ?conifers.)
- Araucarites mollhausianus Goepfert, 1858a, b = Araucarioxylon mollhausianum (Goepfert) Knowlton.
- Araucarites monilifer Ward, 1905 = Araucarioxylon arizonicum (Knowlton).
- Araucarites shinarumpensis Ward, 1905, p. 30, pls. 1-2, Chinle Fm. near Tanners Crossing, Ariz. (Leafy shoot, conifers.)
- AXELRODIA Cornet, 1986, 252-253. Type species: Axelrodia burgeri Cornet.
- Axelrodia burgeri Cornet, 1986, p. 253, pl. 5, fig. f, pl. 6, figs. a-c, g-l, pl. 7, figs. c-e, j-k, pl. 8, figs. b-c, Trujillo Fm. of the Dockum Gp. near Canyon, Texas.

- (Possible seed-bearing organ of Sanmiguelia, classification uncertain.)
- Baiera arizonica Daugherty, 1941, p. 85-86, pl. 18, fig. 4, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Leaf, ginkgoes.)
- Brachyphyllum hegewaldia Ash, 1973, 49-52, figs. 2-3, pl. 1, figs. 1, 6, 7, pl. 2, figs. 1-2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Leafy shoot, conifers.)
- Brachyphyllum sp. A. Ash, 1972a, p. 27 fig. 3, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
- Brachyphyllum munsteri Schenk. Brown, 1956 = Pagiophyllum sp. Ash, 1987c.
- Brachyphyllum sp. Newberry, 1876, pl. 4, fig. 4, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. Brown (in Stewart, et al), 1972, p. 85, Temple Mountain Mbr. of the Chinle Fm. in the San Rafael Swell, Utah. Ash, 1975b, p. 146, fig. 4e, Shinarump Mbr. of the Chinle Fm. Capitol Reef National Park, Utah. (Leafy shoot, conifers.)
- Brachyphyllum sp. A. Ash, 1972a = Brachyphyllum hegewaldia Ash.
- Branch of a conifer. Newberry, 1876, pl. 4, fig. 3, pl. 5, fig. 4, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico (Leafy shoot, conifers.)
- Calamites sp. Sidwell and Warn, 1953, p. 984, Santa Rosa Fm. of the Dockum Gp. near Glorieta Mesa, New Mexico. (Pith cast, horsetails)
- Carpolithus chinleana Daugherty, 1941, p. 79. Ash, 1972a, p. 39, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Seed of uncertain classification.)
- Cephalotaxopsis sp. Brown (in Stewart, et al), 1972, p. 86, Chinle Fm. in Red Rock Valley, Ariz.
- CHARMORGIA Ash, 1985a, p. 28. Type species: Charmorgia dijolli Ash.
- Charmorgia dijolli Ash, 1985a, p. 29, figs. 2-3, pls. 1-4, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. and near Winslow, Ariz. (Stem, cycads.)
- Cheirolepis munsteri Braun. Fontaine, 1890 = Palissya diffusa (Emmons) Fontaine.
- CHINLEA Daugherty, 1941, p. 45. emend. Miller. 1968. Type species: Chinlea campii Daugherty.
- Chinlea campii Daugherty, 1941, p. 45, pl. 4, fig. 4, emend. Miller, 1968, p. 113, figs. 1-13, Petrified Forest Mbr. of the Chinle Fm. near St. Johns, Ariz. (Stem, lycopods.)
- Osmundites walkeri Daugherty, 1941, p. 50-52, pl. 5, fig. 1, Petrified Forest Mbr. of the Chinle Fm. in Petrified

- Forest National Park and the St. Johns area, Ariz., Chinle Fm. in Dinnebito Wash, Ariz.
- Chinlea sp. Miller, 1968, p. 113, fig. 14, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park and the St. Johns area, Ariz. (Stem, lycopods.)
Undetermined stem fragments. Daugherty, 1941, p. 100-101, pl. 19, fig. 2; pl. 20, figs. 1, 2, Petrified Forest Mbr. of the Chinle Fm. near St. Johns, Ariz.
- Cladophlebis daughertyi Ash, 1970a, p. D43, fig. 19, pl. 5, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. and Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. (Sterile fernlike foliage.)
- Cladophlebis n. sp. Ash, 1967a, p. 127, fig. 2B, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico.
- Cladophlebis microphylla auct. non Fontaine Daugherty, 1941, p. 46-47, pl. 4, fig. 3; pl. 5, fig. 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
- Cladophlebis cf. denticulata (Brongniart) Fontaine. Ash, 1970a = Cladophlebis yazzia Ash.
- Cladophlebis microphylla auct. non Fontaine. Daugherty, 1941 = Cladophlebis daughertyi Ash.
- Cladophlebis reticulata auct. non Fontaine. Daugherty, 1941 = ?Cladophlebis n. sp. Ash.
- Cladophlebis subfalcata Fontaine. Brown (in Stewart et al), 1972, p. 85, Monitor Butte Mbr. of the Chinle Fm. in White Canyon, Utah.
- Cladophlebis yazzia Ash, 1973, p. 46-48, fig. 1, pl. 1, figs. 2-5, 8-10. Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Sterile fernlike foliage.)
- Cladophlebis cf. denticulata (Brongniart) Fontaine. Ash, 1970a, table 1. Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
- Cladophlebis n. sp. Ash, 1967a = Cladophlebis daughertyi Ash.
- Cladophlebis sp. Ash, 1975b, p. 144, fig. 5b, Shinarump Mbr. of the Chinle Fm. in the White Canyon area, Utah. Brown (in Stewart et al., 1972), p. 85, Shinarump Mbr. of the Chinle Fm. near St. Johns and Cameron, Ariz. (Sterile fern-like foliage.)
- ?Cladophlebis n. sp. Ash, 1970a, p. D26, D46, Petrified Forest Mbr. of the Chinle Fm., in Petrified Forest National Park, Ariz. and possibly the Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. (Sterile fern-like foliage.)
- Cladophlebis reticulata auct. non Fontaine. Daugherty, 1941, p. 47-48, pl. 5, fig. 3, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
- Clathropteris walkeri Daugherty, 1941, p. 56-57, pl. 10, figs. 1-4, emend. Ash, 1970a, p. D41, fig. 18, pl. 4,

- figs. 2-7. Ash, 1967a, p. 126, fig. 2c, Litwin, 1984, p. 15-19, pl. 10-13, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz., Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. Ash, 1972c, p. 124, figs. 1D, 1E, 2H, Tecovas Mbr. of the Dockum Gp. near Amarillo, Texas. (Fertile and sterile foliage and spores, ferns.)
- ?Apache arizonica Daugherty, 1941, p. 55-56, p. 9, fig. 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
- Cone of a conifer. Newberry, 1876, pl. 5, fig. 5, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. (Cone, ?conifers.)
- Coniopteris plumosa Daugherty, 1941 = Wingatea plumosa (Daugherty) Ash.
- Ctenis neuropteroides Daugherty, 1941 = Marcouia neuropteroides (Daugherty) Ash.
- Ctenophyllum braunianum Goepfert. Brown (in Stewart et al., 1972), p. 85, Shinarump Mbr. of the Chinle Fm. near St. Johns, Ariz. and Deer Flat, Utah. (Leaf, cycads.)
- Ctenophyllum? sp. Fontaine and Knowlton, 1890, p. 283, Chinle Fm. in Arroyo del Cobre, New Mexico. (Leafy shoot, probably unidentifiable, see Ash, 1974.)
- Cycadites? sp. Fontaine and Knowlton, 1890, p. 283, Chinle Fm. in Arroyo del Cobre, New Mexico. (Leafy shoot, probably unidentifiable, see Ash, 1974.)
- CYNEPTERIS Ash, 1970a, p. D31. Type species: Cynepteris lasiophora Ash.
- Cynepteris lasiophora Ash, 1970a, p. D31-D38, figs. 15, 16, pls. 2, 3, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate area, New Mexico and in Petrified Forest National Park, Ariz. Ash, 1972c, p. 125, figs. 1F-1G, 2B, Tecovas Mbr. of the Dockum Gp. near Amarillo, Texas and Santa Rosa Sandstone of the Dockum Gp. near Santa Rosa, New Mexico. Ash, 1975b, p. 144, fig. 5A, Shinarump Mbr. of the Chinle Fm., in Capitol Reef National Park, Utah. Ash, 1978b, p. 25, fig. 3a, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. Ash, 1988, p. 21-22, pl. 1, fig. 4, Mudstone Mbr. of the Santa Rosa Fm. near Santa Rosa, New Mexico (Fertile and sterile fern foliage, ferns.)
- Lonchopteris virginiensis auct. non Fontaine. Daugherty, 1941, p. 49, pl. 5, figs. 4, 5, pl. 6, figs. 1, 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz., Chinle Fm. near Nazlini, Ariz. Brown (in Stewart, et al., 1972), p. 85, Shinarump Mbr. of the Chinle Fm. near Cameron, Ariz.
- Lonchopteris(?) sp. Daugherty, 1941, p. 50, pl. 4, figs. 2, Chinle Fm., near Nazlini, Ariz.
- Dadoxylon chaneyi Daugherty, 1941, p. 65-69, pl. 21-25, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Stem, cordaites.)

- DECHELLYIA Ash, 1972e, p. 607. Type species: Dechellia gormanii Ash.
- Dechellyia gormanii Ash, 1972e, p. 607-608, figs. 5, 6A-6C, pls. 115-118, Crane, 1988, p. 257-258, figs. 5.13C-G, Monitor Butte Mbr. of the Chinle Fm. in Canyon de Chelly, Ariz. and near Fort Wingate, New Mexico. (Leafy branch and winged seed-bearing structure, classification uncertain.)
Undetermined winged seed. Ash, 1967a, p. 130, fig. 3A, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico.
- DINOPHYTON Ash, 1970c, p. 650-651. Type species: Dinophyton spinosus Ash.
- Dinophyton spinosus Ash, 1970c, p. 651-657, figs. 2-6, pls. 122-124. Ash, 1972a, p. 39-40, fig. 2F, pl. 1, figs. 2-3, Ash, 1974a, p. 43, figs. 9E, 9F, Monitor Butte Mbr. of the Chinle Fm. near Thoreau and Fort Wingate, New Mexico and in the White Canyon area, Utah, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park and near the Gap, Ariz. Ash, 1972c, p. 127, figs. 2D, 2E, Tecovas Mbr. of the Dockum Gp. near Crosbyton, Texas, Santa Rosa Sandstone of the Dockum Gp. near Santa Rosa, New Mexico. Ash, 1975b, p. 147, figs. 3, 4i, 4k, Monitor Butte Mbr. of the Chinle Fm. in southeastern Utah. Ash, 1978b, p. 42, figs. 2F, 2G, 19, Ciniza Lake Beds of the Chinle Fm. near Fort Wingate, New Mexico. Krassilov, 1987, p. 239, pl. 3, Krassilov and Ash, 1988, p. 34-36, pls. 1-5, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. Ash, 1988, p. 23, pl. 1, figs. 3, 6-8, Mudstone Mbr. of the Santa Rosa Fm. near Santa Rosa, New Mexico. (Leafy shoot, samara, and pollen organ, classification uncertain.)
Gymnospermous shoots. Ash, 1967a, p. 128-130, figs. 3E, 3F, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico.
Foliage of an undescribed conifer, Ash, 1970, p. 37, fig. 2F.
- Eoginkgoites davidsonii Ash, 1977, p. 647-649, figs. 4-6, pl. 77-79, Shinarump Mbr. of the Chinle Fm. in southeastern Utah, and near Cameron and St. Johns, Ariz. (Leaf, cycadeoids.)
- Sphenozamites rogersianus Fontaine. Brown (in Smith, et al., 1963), p. 16 Shinarump Mbr. of the Chinle Fm. in Capitol Reef National Park, Utah. Brown (in Davidson, 1967), p. 30, Shinarump Mbr. of the Chinle Fm. in the Circle Cliffs area, Utah. Brown (in Stewart, et al., 1972), p. 85, Shinarump Mbr. of the Chinle Fm. near St. Johns, Ariz. and in southeastern Utah.
- Eoginkgoites sp. Ash, 1975b, p. 146, fig. 6, Shinarump Mbr. of the Chinle Fm. in southeastern Utah. Ash, 1980, p.

160. Popo Agie Fm. near Lander, Wyom. Ash, 1976b, p. 1330, Shinarump Mbr. of the Chinle Fm. in Utah and Ariz. Zamites? sp. Berry, 1924, p. 496, figs. 5,6. Popo Agie Fm. near Lander, Wyom.
- Equisetites bradyi Daugherty, 1941, p. 61-62, pl. 12, figs. 4, 5. Ash, 1972a, p. 29, Chinle Fm. in Dinnebito Wash, Ariz. (Stems and nodal diaphragms, horsetails.)
- Equisetites sp. Daugherty, 1941, p. 62, pl. 12, fig. 6. Ash, 1972a, p. 29, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. Brown (in Stewart, et al., 1972), p. 85, Shinarump Mbr. of the Chinle Fm. near St. Johns, Ariz. Ash, 1975b, p. 144, figs. 4a, 4b, Shinarump Mbr. of the Chinle Fm. in Capitol Reef National Park, Utah. Dubiel, 1987, p. 39, fig. 8, Monitor Butte Mbr. of the Chinle Fm. in Capitol Reef National Park, Utah. (Stem, horsetails.)
- Equisetites sp. A. Ash, 1978b, p. 25, figs. 2e, 2h, Ciniza Lake Beds and Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. (Stem and pith cast, horsetails.)
- Equisetum knowltoni Fontaine and Knowlton, 1890, p. 283, pls. 23-24. (Pith cast, horsetails. Probably collected from Permian strata. See Ash, 1972a, p. 29, 1974, p. 181.)
- Equisetum sp. Berry, 1924, p. 491-492, fig. 1 and Ash, 1980, p. 160, Popo Agie Fm. near Lander, Wyoming. Foliage of an undescribed conifer, Ash, 1970b = Dinophyton spinosus Ash.
- Ginkgophytic leaf, Ash, 1967a, p. 128, figs. 3C, 3D, Monitor Butte Mbr. of the Chinle Fm., near Fort Wingate, New Mexico. (Leaf, ginkgoes.)
- Gymnospermous shoots Ash, 1967a = Dinophyton spinosus Ash. Isoetites circularis (Emmons) Brown, 1948, p. 358, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (?Leafy stem, lycopods.)
- Lepacyclotes circularis Emmons. Daugherty, 1941, p. 81, pl. 15, figs. 1, 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
- ITOPSIDEMA Daugherty, 1960, p. 775. Type species: Itopsidema vancleavei Daugherty.
- Itopsidema vancleavei Daugherty, 1960, p. 775, figs. 1-13, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Stem, ferns.)
- Laccopteris smithii Daugherty, 1941 = Phlebopteris smithii (Daugherty) Arnold. emend. Ash, Litwin and Traverse, 1982.
- Lepacyclotes circularis Emmons. Daugherty, 1941 = Isoetites circularis (Emmons) Brown.
- Lonchopteris virginensis auct. non Fontaine. Daugherty, 1941 = Cynepteris lasiophora Ash.
- Lonchopteris? sp. Daugherty, 1941 = Cynepteris lasiophora Ash.

- Lycopodites? sp. Daugherty, 1941, p. 65, pl. 12, fig. 3, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Leaf, lycopods.)
- Lycostrobos chinleana Daugherty, 1941, p. 63, pl. 12, figs. 1, 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Cone, horsetails.)
- LYSSOXYLON Daugherty, 1941, p. 71-78. Type Species: Lyssoxylon grigsbyi Daugherty.
- Lyssoxylon grigsbyi Daugherty, 1941, p. 71-78, pl. 26-30 emend. Gould, 1971, p. 241-246, figs. 1-36, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. and ?Monitor Butte Mbr. of the Chinle Fm. near Coolidge, New Mexico. (Stem, cycads.)
- Macrotaeniopteris magnifolia (Rogers) Schimper. Scott, et al, 1961, p. 10, fig. 5, Eagle Mills Fm. in southwest Arkansas.
- Macrotaeniopteris magnifolia (Rogers) Schimper. Daugherty, 1941 = Nilssoniopteris ciniza Ash, 1978b.
- MARCOUIA Ash, 1972d, p. 424-429. Type species: Marcouia neuropteroides (Daugherty) Ash.
- Marcouia neuropteroides (Daugherty) Ash, 1972d, p. 424-429, figs. 1C-1E, pl. 80, figs. 1-10, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico and the Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Leaf, classification uncertain.)
- Ctenis neuropteroides Daugherty, 1941, p. 80, pl. 13, fig. 3, pl. 14, fig. 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
- Masculostrobos clathratus Ash, 1972e, p. 613-614, figs. 6D-6K, pl. 119, Monitor Butte Mbr. of the Chinle Fm. in Canyon de Chelly, Ariz. (Cone, probably the cone of Dechellyia, classification uncertain.)
- NEMECECKIGONE Cornet, 1986, p. 266. Type species: Nemececkigone fabaforma Cornet.
- Nemececkigone fabaforma Cornet, 1986, p. 266-267, p. 6, figs. d-f, pl. 7, figs. e-1, figs. 5b, 7b, Trujillo Fm. of the Dockum Gp. near Canyon, Texas. (Possible dispersed seeds of Sanmiguelia, classification uncertain.)
- Neocalamites virginiensis (Fontaine) Berry: Daugherty, 1941, p. 58-59, pl. 11, figs. 1-4, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park and the St. Johns area, Ariz. Ash, 1972a, p. 25. (Stem, isolated leaves and pith cast, horsetails.)
- Neocalamites sp. Ash, 1967a, p. 125-126, fig. 1, Ash, 1978b, p. 24, fig. 1, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. (Pith cast, horsetails.)
- Neocalamites sp. Ash, 1987c, p. 97-99, figs. 3a, b, Siltstone Mbr. of the Chinle Formation in the Big Indian Wash area, Utah.

- Neocalamites sp. Holt, 1947, p. 511-513, pls. 1-2, Chinle Fm. near Bedrock, Colo. (Pith cast, horsetails.)
- Neocalamites sp., Lucas, Hunt, and Kietzke, 1985, p. 8, figs. 1.15 - 1.16., upper shale mbr. of the Chinle Fm. in Bull Canyon, east central New Mexico. (Pith casts, horsetails.)
- New genus A. Ash, 1972a = Dechellyia Ash.
- Nilssoniopteris ciniza Ash, 1978b, p. 25-30, figs. 2C, 2D, 4-6, Ciniza Lake Beds of the Chinle Fm. near Fort Wingate, New Mexico. (Leaf, cycadeoids.)
- Macrotaeniopteris magnifolia (Rogers) Schimper. Daugherty, 1941, p. 82-83, pl. 16, figs. 3-4, Petrified Forest Mbr. of the Chinle Fm. in Dinnebito Wash, Ariz. Brown (in Stewart, et al., 1972), p. 85, Shinarump Mbr. of the Chinle Fm. near St. Johns, Ariz. and Elk Ridge, Utah.
- Nilssoniopteris n. sp. Ash, 1967a, p. 128, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico.
- Nilssoniopteris n. sp. Ash, 1972a, p. 37-38, fig. 3D, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico and in Dinnebito Wash, Ariz.
- Nilssoniopteris n. sp. Ash, 1967a = Nilssoniopteris ciniza Ash.
- Nilssoniopteris sp. A. Ash, 1972a = Nilssoniopteris ciniza Ash.
- Osmundities walkeri Daugherty, 1941 = Chinlea campii Daugherty emend. Miller.
- Otozamites macombii Newberry, 1876, p. 141-142, pl. 4, figs. 1-2, pl. 5, fig. 3, pl. 6, fig. 5. Ash, 1972a, p. 37, fig. 3C. Ash, 1974b, p. 181, figs. 3-1, 3-2, 3-3 (reproduction of Newberry's illustrations), Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. (Leaf, ?cycadeoids.)
- Otozamites powelli (Fontaine) Berry, 1927 = Zamites powellii Fontaine.
- Pachyphyllum? sp. Newberry, 1876 = Pagiophyllum simpsonii Ash.
- Pagiophyllum duttonia Ash, 1978b, p. 36, figs. 14a, 14c, 15, Ciniza Lake Beds of the Chinle Fm. near Fort Wingate, New Mexico. (Leafy shoot, conifers.)
- Pagiophyllum navajoensis Ash, 1978b, p. 38-40, figs. 14b, 16-18, Ciniza Lake Beds of the Chinle Fm. near Fort Wingate, New Mexico. (Leafy shoot, conifers.)
- Pagiophyllum sp. d. Ash, 1972a, p. 35, figs. 2e.
- Pagiophyllum newberryi Ward, 1900 = P. simpsonii Ash.
- Pagiophyllum readiana Ash, 1978b, p. 31-33, figs. 8-10, Ciniza Lake Beds of the Chinle Fm. near Fort Wingate, New Mexico. (Leafy shoot, conifers.)
- Pagiophyllum sp. b. Ash, 1972a, p. 35, fig. 2c, table 1.
- Pagiophyllum simpsonii Ash, 1970b, p. 949, figs. 3-4, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. Ash, 1974b, p. 181, fig. 4-

- 4, 4-5, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. (Leafy shoot, conifers).
Pagiophyllum newberryi Ward, 1900, p. 318, 427, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. Daugherty, 1941, p. 94-95, pl. 19, fig. 1, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
Pachyphyllum? sp. Newberry, 1876, pl. 5, figs. 4, 5, pl. 6, fig. 9, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico.
- Pagiophyllum zuniana Ash, 1978b, p. 33-35, figs. 11-13, Ciniza Lake Beds of the Chinle Fm. near Fort Wingate, New Mexico. (Leafy shoot, conifers.)
Pagiophyllum sp. C, Ash 1972a, p. 35, fig. 2d.
- Pagiophyllum sp. Ash, 1975b, p. 146, fig. 4d, Shinarump Mbr. of the Chinle Fm. in Capitol Reef National Park, Utah. (Leafy shoot, conifers.)
- Pagiophyllum sp. Ash, 1987c, p. 99, figs. 3e, f. (Leafy shoot, conifers.)
Brachyphyllum munsteri Schenk. Brown, 1956 = Pagiophyllum sp. Ash, 1987c, p. 206, pl. 33, figs. 1, 3, Dolores Fm. near Placerville, Colo.
- Pagiophyllum? sp. Newberry, 1876 = Pagiophyllum simpsonii Ash.
- Pagiophyllum sp. B. Ash, 1972a = Pagiophyllum readiana Ash.
Pagiophyllum sp. C. Ash, 1972a = Pagiophyllum zuniana Ash.
Pagiophyllum sp. D. Ash, 1972a = Pagiophyllum navajoensis Ash.
- Palissya braunii? Endlicher. Fontaine and Knowlton, 1890 = Palissya diffusa (Emmons) Fontaine.
Palissya diffusa (Emmons) Fontaine, 1883. Knowlton, 1919, p. 429.
Cheirolepis muensteri (Schenk) Schimper. Fontaine, 1890, p. 284.
- Palissya sphenolepis (F. Braun) Knowlton, 1919, p. 429.
Palissya braunii? Endlicher. Fontaine and Knowlton, 1890, p. 284, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico.
- Palissya sp. Fontaine and Knowlton, 1890, p. 383, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. Brown (in Smith, et al., 1963), p. 16, Shinarump Mbr. of the Chinle Fm. in Capitol Reef National Park. Brown (in Stewart., et al, 1972), p. 86, Monitor Butte Mbr. of the Chinle Fm. near Torrey, Utah. (Leafy shoot, conifers.)
- Pelourdea poleoensis (Daugherty) Arnold, emend. Ash, 1987a, p. 46, pls. 1-2, figs. 2, 4b, 5, Siltstone Member of the Chinle Fm. in the Big Indian Valley area, Utah. Arnold, 1964, p. 7, pl. 1, figs. 2-3, Dolores Fm. near Placerville, Colo. Ash, 1967a, p. 130, Ash, 1978b, p. 31, fig. 3d, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. Ash, 1972c, p. 126-127,

- Dockum, Gp. near Canyon, Texas. Ash, 1988, p. 22-23, pl. 1, fig. 5, Mudstone Mbr. of the Santa Rosa Fm. near Santa Rosa, New Mexico. (Leaf and leafy stem, ?cordaites.)
- Yuccites poleoensis Daugherty, 1941, p. 70-71, pl. 13, fig. 1, Poleo Sandstone Mbr. of the Chinle Fm. near Poleo Mesa, New Mexico. Brown (in Stewart, et al., 1972), p. 85, Shinarump Mbr. of the Chinle Fm. near St. Johns, Ariz.
- Phlebopteris smithii (Daugherty) Arnold 1947, p. 196-197, figs. 91-92, emend. Ash, Litwin and Traverse, 1982, p. 205-208, figs. 1-3, pls. 1-4, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. Ash, 1967a, p. 127, fig. 2D and Ash 1970a, table 1, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. Brown (in Stewart, et al., 1972), p. 85, Shinarump Mbr. of the Chinle Fm. near Cameron, Ariz. Ash, 1972c, p. 125, figs. 1A-1B, 2C, Tecovas Shale of the Dockum Gp. near Amarillo, Texas. Ash, 1975b, p. 144, fig. 4C, Monitor Butte Mbr. of the Chinle Fm. in southeastern Utah. Ash, 1978b, p. 25, fig. 2a, Ciniza Lake Beds of the Chinle Fm. near Fort Wingate, New Mexico. Litwin, 1984, p. 7-10, pl. 8, 9, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. and Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. (Fertile and sterile foliage and spores, ferns.)
- Laccopteris smithii Daugherty, 1941, p. 53-54, pl. 7; pl. 8, figs. 1-3; pl. 9, fig. 1, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz., Chinle Fm. in Dinnebito Wash, Ariz.
- Phlebopteris utensis Arnold, 1956, p. 119-120, pl. 16, Chinle Fm. near Hite, Utah. Ash, 1975b, p. 144, ?Shinarump Mbr. of the Chinle Fm. near Hite, Utah.
- Phlebopteris utensis Arnold, 1956 = P. smithii (Daugherty) Arnold emend. Ash, Litwin and Traverse.
- Phlebopteris utensis Arnold, Ash, 1975b = P. smithii (Daugherty) Arnold emend. Ash, Litwin and Traverse.
Pith cast, Ash, 1988, p. 23-24, Mudstone mbr. of the Santa Rosa Fm. near Santa Rosa, New Mexico. (Pith cast, ?gymnosperm.)
- Podozamites arizonicus Daugherty, 1941, p. 89, pl. 14, figs. 1, 3, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Leafy shoot, conifers.)
- Podozamites emmonsi Newberry. Brown (in Stewart et al., 1972), p. 86, Shinarump Mbr. of the Chinle Fm. on Monitor Butte, Utah. (Leafy shoot, ?conifers.)
- Podozamites lanceolatus (Lindley and Hutton) Braun. Brown (in Stewart, et al., 1972), p. 85, Temple Mountain and Shinarump Mbrs. of the Chinle Fm. in southeastern Utah. (Leafy shoot, conifers.)

- Podozamites? sp. Berry, 1924, p. 496-497, fig. 7, Popo Agie Fm. near Lander, Wyom. (Leafy shoot, conifers.)
- Protocupressinoxylon dockumense (Torrey) Krausel, 1949, p. 142, 149.
- Voltzioxylon dockumense Torrey, 1923, p. 64, pl. 8, figs. 1, 2, Dockum Gp. near Spur, Texas. (Stem, conifers.)
- Pterophyllum bakerii Berry, 1930 = Zamites powelli Fontaine (in Fontaine and Knowlton, 1890).
- Pterophyllum browni Berry, 1924, p. 492-494, fig. 2, Ash, 1980, p. 160, Popo Agie Fm. near Lander, Wyom. (Leaf, cycadeoid.)
- Pterophyllum sp. Berry, 1924, p. 494-495, fig. 3, Popo Agie Fm. near Lander, Wyom. (Leaf, cycadeoid.)
Round seeds, Ash, 1975b, p. 147, fig. 4d, Shinarump Mbr. of the Chinle Fm. in southeastern Utah. (Seed?, classification uncertain.)
- Samaropsis puerca Daugherty, 1941, p. 69-70. pl. 13, fig. 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Seed, ?cordaites).
- Samaropsis sp. Ash, 1988, p. 23, pl. 1, fig. 1, Mudstone Mbr. of the Santa Rosa Fm. near Santa Rosa, New Mexico. (Seed, cordaites.)
- SANMIGUELIA Brown, 1956, p. 206, emend. Tidwell and others, 1977, p. 146, Cornet, 1986, 234-236. Also see Read and Hickey, 1972, p. 134-135 and Crane, 1987, 778-779. Type species: Sanmiguelia lewisi Brown.
- Sanmiguelia lewisi Brown 1956, p. 206, pl. 32, figs. 1-2, pl. 33, fig. 2, emend. Tidwell and others, 1977, p. 146, fig. 4, pl. 1, figs. 1, 2, 4, pl. 2, figs. 2-6, pl. 3, fig. 4, Scott, Barghoorn and Leopold, 1960, p. 284-299, Becker, 1972, 181-185, pl. 37, fig. 1, pl. 38, figs. 3, 4, Ash, 1978c, p. 100, figs. 3c, d, Ash, 1987, p. 100, figs. 3c, d, 4b, Dolores Fm. near Placerville, Colo. Ash, 1972c, p. 127, fig. 2F, Ash 1976a, p. 801-802, fig 2, Ash, 1980, p. 164-165, fig. 5.3m, Cornet, 1986, p. 236, pl. 1, figs. a-h, pl. 2, figs. a-k, pl. 3, figs. g-i, pl. 4, fig. i, pl. 7, figs. m-n, pl. 8, figs. a, d-i, figs. 2-4. Trujillo Fm. of the Dockum Gp. near Canyon, Texas. Ash, 1982b, p. 752, fig. 2, Ash, 1987, p. 100, fig. 4b, Owl Rock Mbr. of the Chinle Fm. in Capitol Reef National Park, Utah. Ash, 1987, p. 100, figs. 3c, d, 4b, Rock Point Mbr. of the Wingate Ss., northeastern Arizona. (Leaf, leafy stem, uncertain classification.)
- SCHILDERIA Daugherty, 1934, p. 363-365. Type species: Schilderia adamanica.
- Schilderia adamanica Daugherty, 1934, p. 363-365, pl. 5, figs. 1-7, Daugherty, 1941, p. 95-97, pl. 33, figs. 1-2, 4-7, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Stem, ?Gnetales.)
- Schizoneura harrisii Ash, 1985b, p. 59-65, fig. 1, pl. 1, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate,

- New Mexico. (Leafy shoot, possible cone and spore, horsetails.)
- Selaginella anasazia Ash, 1972e, p. 601-603, fig. 4, pl. 114, Monitor Butte Mbr. of the Chinle Fm. in Canyon de Chelly, Ariz. (Leafy shoot, lycopods.)
- Sphenopteris arizonica Daugherty, 1941, p. 99, pl. 19, figs. 3, 4, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. (Sterile fernlike foliage)
- Sphenozamites rogersianus Fontaine. Brown (in Smith, et al., 1963), p. 16 = Eoginkgoites davidsonii Ash.
- Sphenozamites rogersianus Fontaine. Brown (in Davidson, 1967), p. 30 = Eoginkgoites davidsonii Ash.
- Sphenozamites rogersianus Fontaine. Brown (in Stewart, et al., 1972), p. 85 = Eoginkgoites davidsonii Ash.
- SYNANGISPADIXIS Cornet, 1986, p. 247. Type species: Synangispadixis tidwellii Cornet.
- Synangispadixis tidwellii Cornet, 1986, p. 248-251, pl. 3, figs. a-e, pl. 4, figs. a-h, pl. 5, figs. a-e, g, pl. 7, figs. a-b, fig. 8b. Trujillo Fm. of the Dockum Gp. near Canyon, Texas. (Possible pollen-bearing organ of Sanmiguelia, classification uncertain.)
- Todites fragilis Daugherty, 1941, p. 52-53, pl. 6, figs. 3, 5. emend. Ash, 1970a, p. D27-D31, figs. 13-14, pl. 1, Ash, 1967, p. 126, fig. 2A, Litwin, 1984, p. 1-2, pls. 1, 2, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz., Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. (Fertile and sterile foliage and spores, ferns.)
Undetermined cone. Ash, 1967a, p. 130, fig. 33, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico.
- Undetermined fertile frond. Daugherty, 1941, p. 99-100, pl. 16, figs. 4, Chinle Fm. near Nazlini, Ariz. (Probably a fragment of Wingatea plumosa.)
- Undetermined fruiting bodies. Daugherty, 1941, p. 100, pl. 16, figs. 1,2, Chinle Fm. in Dinnebito Wash, Ariz.
- Undetermined winged seed Ash, 1967a = Dechellyia gormanii Ash.
- Undetermined stem fragments. Daugherty, 1941 = Chinlea sp. Miller.
- VOLTZIOXYLON Torrey, 1923, p. 63. Type species: Voltzioxylon dockumense Torrey.
- Voltzioxylon dockumense Torrey, 1923 = Protocupressinoxylon dockumense (Torrey) Krausel.
- Williamsonia nizonii Ash, 1968, p. 115-118, figs. 1, 2, pl. 1, figs. 1-4, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. (Female cone, cyadeoids.)
Williamsonia n. sp. Ash, 1967a, p. 128, fig. 3H, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico.

- WINGATEA Ash, 1970a, p. D38. Type species: Wingatea plumosa (Daugherty) Ash.
- Wingatea plumosa (Daugherty) Ash, 1970a, p. D38-D39, fig. 17, pl. 1, fig. 4, Litwin, 1984, p. 5-7, pl. 3-7, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz. and Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. (Fertile and sterile foliage and spores, ferns.)
- Coniopteris plumosa Daugherty, 1941, p. 54-55, pl. 9, figs. 3-5, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
- WOODWORTHIA Jeffrey, 1910, p. 330. Type species: Woodworthia arizonica Jeffrey.
- Woodworthia arizonica Jeffrey, 1910, p. 330, pl. 31-32, Krausel, 1919, p. 247, Seward, 1919, p. 234, Krausel, 1920, p. 203, Torrey, 1923, p. 64, Daugherty, 1934, p. 365, Daugherty, 1941, p. 90-92, pl. 32, figs. 1-4, Vogellehner, 1965, p. 41, Vogellehner, 1967, Ash, 1972c, p. 127, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz., Chinle Fm. near Houck, Ariz., Dockum Group near Alanreed, Texas. (Stem, conifers.)
- Yuccites poleoensis Daugherty, 1941 = Pelourdea poleoensis (Daugherty) Arnold.
- Zamites occidentalis Newberry, 1876, p. 142-143, pl. 5, figs. 1-2, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico. (Leaf, cycadeoids.)
- Zamites powellii Fontaine (in Fontaine and Knowlton, 1890), p. 284, figs. 5-7, emend. Ash, 1975a, p. 145-148, figs. 3, 4, pls. 1-2, Agua Zarca Sandstone Mbr. of the Chinle Fm. in Arroyo del Cobre, New Mexico, Shinarump Mbr. of the Chinle Fm. near Elk Ridge, Utah, Temple Mountain Mbr. of the Chinle Fm. in the San Rafael Swell, Utah, Monitor Butte Mbr. of the Chinle Fm. in the San Rafael Swell, Circle Cliffs, White Canyon and Monitor Butte areas, Utah, Nazlini and St. Johns areas, Ariz., and in the Fort Wingate and Cottonwood Creek areas, New Mexico, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz., Tecovas Fm. of the Dockum Gp. in the Canadian River Valley, Palo Dura Canyon and Alanreed and Kalgary areas, Texas, ?Trujillo Fm. of the Dockum Gp. near Boys Ranch, Texas. Ash, 1972c, p. 127, figs. 1H, 2A, 2G, Tecovas Fm., Trujillo Sandstone, Santa Rosa Sandstone and Chinle Shale Mbrs. of the Dockum Gp. in west Texas and eastern New Mexico. Ash, 1975b, p. 146, figs. 4f, 4g, Temple Mountain, Shinarump and Monitor Butte Mbrs. of the Chinle Fm. in southeastern Utah. Ash (in Ponsler, 1977, p. 23), Gold Range Fm., southwestern Nevada. Ash, 1978b, p. 31, figs. 3b, 3c, 7, Ciniza Lake Beds and Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. Ash, 1988, p. 22,

- pl. 1, figs. 2, 9, Mudstone Mbr. of the Santa Rosa Fm. near Santa Rosa, New Mexico. (Leaf, cycadeoids.)
Otozamites powelli (Fontaine) Berry, 1927, p. 305-307, figs. 1-5, Shinarump Conglomerate in the Circle Cliffs area, Utah. Daugherty, 1941, p. 84-85, pl. 17, figs. 1-2, pl. 18, figs. 1-3, 5, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz., Monitor Butte Mbr. of the Chinle Fm. near St. Johns and Nazlini, Ariz., Dockum Gp. near Alanreed and Claredon, Texas. Ash, 1967a, p. 128, figs. 3G, Monitor Butte Mbr. of the Chinle Fm. near Fort Wingate, New Mexico. Ash, 1972a, p. 127, figs. 14, 2A, 2G, Tecovas Shale and Trujillo Sandstone of the Dockum Gp. in the panhandle of Texas, Santa Rosa Sandstone Mbr. and Chinle Shale Mbr. of the Dockum Gp. in eastern New Mexico. Ash, 1972a, p. 37, figs. 3a, 3b, Chinle Fm. in northern Arizona, southern Utah, northwestern New Mexico. Brown (in Stewart, et al., 1972), p. 85-86, Shinarump Mbr. of the Chinle Fm. near St. Johns, Ariz., Temple Mountain, Shinarump, and Monitor Butte Mbrs. of the Chinle Fm. in southern Utah. Ash, 1974a, p. 47, fig. 9A, Petrified Forest Mbr. of the Chinle Fm. in Petrified Forest National Park, Ariz.
Pterophyllum bakeri Berry, 1930, p. 459, figs. 1-2, Shinarump Mbr. of the Chinle Fm. in southeastern Utah. Brown (in Stewart, et al., 1972), p. 85, Moss Back Mbr. of the Chinle Fm. in Poison Spring Box Canyon, Utah.
Zamites sp. Berry, 1924, p. 495-496, fig. 4 and Ash, 1980, p. 160, Popo Agie Fm. near Lander, Wyo. (Leaf, cycadeoids.)
Zamites sp. Berry, 1924 = Eoginkgoites sp. Ash, 1975b.
Zamites n. sp. Ash, 1980, p. 158, fig. 5.2g, Shinarump Mbr. of the Chinle Fm. in southeastern Utah. (Leaf, cycadeoids.)

SYSTEMATIC LIST

Isoetes

Isoetites circularis

Lycopods

Chinlea campii; Lycostrobus chinleana; Chinlea sp.;
Selaginella anasazia

Horsetails

Equisetites bradyi; Neocalamites sp.; Equisetites spp.;
Schizoneura harrisii; Neocalamites virginienis

Ferns and Fernlike Foliage

Cladophlebis daughertyi; Itopsidema vancleavei;
C. subfalcata; Phlebopteris smithii; C. yazzia;
Sphenopteris arizonica; Cladophlebis sp.;
Todites fragilis; Clathropteris walkeri;
Wingatea plumosa; Cynepteris lasiophora

Cycads

Charmorgia dijolli; Lyssoxylon grigsbyi;
Ctenophyllum braunianum;

Cycadeoids

Eoginkgoites davidsonii; Pterophyllum sp.;
Eoginkgoites. sp.; Williamsonia nizhonii;
Nilssoniopteris ciniza; Zamites occidentalis;
Otozamites macombii; Z. powellii;
Pterophyllum brownii; Zamites spp.

Ginkgoes

Baiera arizonica; Ginkgophytic leaf

Cordaites

Dadoxylon chaneyi; Samaropsis puerca;
Pelourdea poleoensis; Samaropsis sp.

Conifers

Araucarioxylon joae; Pagiophyllum spp.;
Araucarioxylon arizonicum; Palissya diffusa;
Brachyphyllum hegewaldia; P. sphenolepis;
Brachyphyllum spp.; Palissya spp.;
Cephalotaxopsis sp.; Podozamites arizonicus;
Pagiophyllum duttonia; P. emmonsi;
P. navajoensis; P. lanceolatus;
P. readiana; Podozamites? sp.;
P. simpsonii; Protocupressinoxylon dockumense;
P. zuniana; Woodworthia arizonica

Position Uncertain

Axelrodia burgeri; Masculostrobus clathratus;
Carpolithus chinleana; Nemececkigone fabaforma;
Dechellyia gormanii; Sanmiguelia lewisi;
Dinophyton spinosus; Schilderia adamanica;
Macrotaeniopteris magnifolia; Synangispadixis tidwellii
Marcouia neuropteroides

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