

LOCAL AND REGIONAL FOREST HETEROGENEITY AFTER THE CRETACEOUS–
PALEOGENE BOUNDARY IN THE DENVER BASIN, COLORADO, USA, AND
IMPLICATIONS FOR THE ORIGINS OF RAINFORESTS

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Local and regional forest heterogeneity after the Cretaceous–Paleogene Boundary in the Denver Basin, Colorado, USA, and implications for the origins of rainforests

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The recovery of forest ecosystems following the environmental perturbation of the Cretaceous–Paleogene (K-Pg) boundary event are not well understood. Here, I present megafloral data from three new early Paleocene (ca. 65.8 Ma) fossil leaf sites from the western margin of the Denver Basin, Colorado, USA, and compare that to existing megafloral data from other parts of the Basin approximately 80 km to the east. My data show four types of spatial heterogeneity: first, I see pronounced taxonomic differences within individually preserved forest floors (i.e. across ~50 m of lateral extent); second, I see comparable differences among successional forest floor horizons at the same geographic location; third, I see the most floral change among separate megafloral sites in the western portion of the Denver Basin, which I interpret as geographically proximal to the Laramide mountain front; fourth, and finally, I see notable differences between contemporaneous mountain proximal and mountain distal floras within the Denver Basin. These data indicate considerable spatial heterogeneity on local and regional scales immediately following the K-Pg boundary. In addition, results of my analyses indicate high rainfall (average mean annual precipitation (MAP) of approximately 230 cm) in mountain proximal floras in the Basin compared to those further east in the center of the Basin (MAP of approximately 155 cm). Finally, there are leaf morphological traits, including drip-tips, cordate bases and overall large leaf size, that are indicative of rainforests in the mountain proximal floras. Taken with the compositional change across the landscape and MAP estimates for the early Paleocene, these data suggest that the origin of the Castle Rock rainforest, which grew 2.2 million years after the K-Pg boundary in the Denver

Basin, could be the result of increased niche space due to local topography and intensified orographic rainfall.

Dedication

I would like to dedicate this thesis to my parents, Jane and Joe Crystal. It would not have been possible without their help and support. Thank you, Mom and Daddin, for encouraging me from a young age to look to the rocks around me to satisfy my curiosity, and for reburying the dinosaur toys in the sandbox every night when I was young. And thank you for the aptronym, as you always said someone with the last name Crystal is well-suited to become a geologist.

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I. Introduction

The Late Cretaceous forests in the North American Western Interior Basin were diverse and heterogeneous compared to early Paleocene forests, which were depauperate (i.e. low diversity) and homogenous (Johnson, 2002; Wilf and Johnson, 2004). The environmental devastation at the Cretaceous-Paleogene (K-Pg) boundary (e.g. Schulte et al., 2010) brought about taxonomic extinction (ca. 60% see Wilf and Johnson, 2004) and ecological reorganization in plant ecosystems (Wilf et al., 2003; Blonder et al., 2014). Conventional thinking argued that forest diversity did not recover until the Early Eocene, ~10 Ma after the K-Pg extinction. However, this paradigm shifted with the discovery in 1994 of the heterogeneous and high diversity early Paleocene Castle Rock rainforest (ca. 63.8 Ma; Kowalczyk et al., 2018) in the Denver Basin, Colorado (Johnson and Ellis, 2002, Ellis et al., 2003).

This unusual fossil flora is more diverse than any other flora from the early Paleocene (Johnson and Ellis, 2002). It also has larger leaf size than other early Paleocene floras and, consequently, higher leaf-estimated mean annual precipitation (MAP). Furthermore, and in addition to large leaf size, the leaves that occur in the Castle Rock flora exhibit distinct rainforest physiognomic characteristics including drip tips, elongated and elliptic shapes, and cordate bases (Ellis et al., 2003). Despite the occurrence of the Castle Rock rainforest just 2.2 Ma after the K-Pg boundary, the origin of this ecosystem remains unknown.

Studies of other Denver Basin floras recognized a distinct geographic floral gradient in the Denver Basin, and hypothesized that floras occurring near the proposed early Paleocene Laramide topographic or mountain front on the western side of the basin are more diverse than mountain distal floras on the eastern side (Johnson et al., 2003). However, the fossil sites analyzed in the eastern portion of the Denver Basin (i.e. the West Bijou Creek flora described by (Barclay et al.,

2003)) come from the earlier part of the Paleocene, the Puercan North American Land Mammal Age (NALMA), which spans the first million years of the Paleocene epoch (Eberle, 2003; Dahlberg et al., 2016), while the Castle Rock flora comes from later in the Paleocene, during the Torrejonian NALMA. Therefore, further exploration of the floral gradient in the Denver Basin requires the analysis of more mountain proximal fossil sites from the Puercan that are contemporaneous with the eastern floral associations and predate the Castle Rock rainforest. The leading hypothesis for this floral gradient and for the origin of the Castle Rock rainforest is that the close proximity to an early Paleocene topographic front resulted in a combination of intensified orographic rainfall and increased niche space due to an elevational gradient (Barclay et al., 2003; Johnson et al., 2003). Thus, investigation of earliest Paleocene mountain proximal floras that predate the Castle Rock rainforest has the potential to elucidate the origins of the Castle Rock rainforest and provide a greater understanding of early Paleocene floral dynamics and recovery following the extinction at the K-Pg boundary in the Denver Basin.

This study focuses on three previously unpublished, mountain-proximal fossil leaf sites in the Denver Basin from the earliest Paleocene (~65.8 Ma), that predate the Castle Rock flora (~63.8 Ma) by approximately 2 million years. They include two megafloras (leaves and other large plant remains) that represent distinct sites, and one site in Lakewood, CO that provides a rare opportunity to study four laterally continuous forest floor deposits, including *in situ* tree stumps. Statistical analysis of these floras, including comparison to contemporaneous published floras in the more eastern reaches of the Denver Basin, provide insight into the origin of the Castle Rock rainforest, and angiosperm-dominated rainforests in general.

II. Background

a. Biological Patterns at the Cretaceous-Paleogene Boundary

i. Extinction

The Cretaceous–Paleogene (K-Pg) boundary (66.021 ± 0.024 Ma, Clyde et al., (2016)) was a time of dramatic environmental, climatic, and ecological change (e.g. Schulte et al., 2010; MacLeod et al., 2018). The type section for the K-Pg boundary is in El Kef, Tunisia (Molina et al., 2006). It marks one of the five mass extinctions in Earth’s history (Sepkoski, 1996) and the disappearance of approximately 70% of Earth’s species including all of the non-avian dinosaurs, marine reptiles, ammonites and inocerimid clams (Robertson et al., 2013). There are two notable events that have long been debated as potential causes of the K-Pg mass extinction: a bolide impact off of Mexico’s Yucatán Peninsula (Alvarez et al., 1980; Ganapathy, 1980; Smit and Hertogen, 1980; Schulte et al., 2010; MacLeod et al., 2018) that created the Chicxulub crater (Hildebrand et al., 1991), and volcanism of the Deccan Traps on the Indian subcontinent (Li and Keller, 1998; Keller et al., 2008). Regardless of the cause, the K-Pg boundary is recognized in the rock record by a globally distributed layer of impact ejecta (Schulte et al., 2010), an anomalously high concentration of iridium compared to bulk-crust (Alvarez et al., 1980), presence of impact-generated shocked quartz (Bohor, 1990) and spherules (Montanari et al., 1984), and disappearance of Cretaceous pollen taxa including those of the *Wodehousia spinata* Assemblage Zone (Tschudy et al., 1984; Nichols and Johnson, 2008; Bercovici et al., 2012; Vajda and Bercovici, 2014).

The K-Pg boundary is best known for the extinction of the non-avian dinosaurs, but other groups were also affected by the events at the end of the Cretaceous. Most notably, land plants, which are the foundation of terrestrial ecosystems, suffered a mass extinction. At the K-Pg boundary, approximately 57% of megaflorea taxa disappeared (Wilf and Johnson, 2004). Similarly,

those organisms directly dependent on plants, including insects, also went extinct, with insects that showed both generalized and specialized feeding strategies suffering losses (Wilf et al., 2006).

The best records of the Cretaceous floras that perished at the boundary are known from the Western Interior of North America (Wolfe and Upchurch, 1987; Johnson, 2002; Johnson et al., 2003; Wilf et al., 2003; Nichols and Johnson, 2008). In general, these Cretaceous floras were rich, heterogeneous, and diverse (Johnson, 2002; Nichols, and Johnson, 2008). They were dominated by angiosperms, but had minor components of ferns and fern allies, cycads, ginkgoes, and conifers (Johnson, 2002). Johnson (2002) recognized five megafloral associations in the Cretaceous floras of the Williston Basin in North Dakota, three time-successive floras in the Maastrichtian, and two facies associated floras. Overall, these megafloral associations represent diverse woodland environments in sub-humid climates, with lobed leaves being particularly common (Johnson, 2002; Nichols and Johnson, 2008). Similar megafloral associations, grouped based on stratigraphic and geographic occurrence, have also been recognized in the Denver Basin fossil floras (Johnson et al., 2003). They recognized two successive Cretaceous floral associations that are diverse and heterogeneous, similar to those observed in the Cretaceous deposits elsewhere in the Western Interior (Johnson et al., 2003).

ii. Recovery

Following the boundary, early successional and disaster-adapted plants, particularly ferns, proliferated, as indicated by a ‘fern spore spike’ in earliest Paleocene rocks (Nichols and Johnson, 2008). Interpolation using median sediment accumulation rates and radiometric dates of ash layers from K-Pg boundary sections in the Denver Basin by Clyde et al. (2016), suggest that the peak of the fern spore spike occurred approximately 85 years after the boundary, and lasted about 1000

years. Following the fern spore spike, Paleocene floras, while still dominated by angiosperms, lacked characteristics of the Cretaceous megafloral associations. They were low diversity, dominated by taxa other than those that had dominated in the Cretaceous, and lacked the characteristic lobation of many Cretaceous leaf taxa (Johnson, 2002). In fact, it was long hypothesized that plant communities did not fully recover until approximately 10 million years after the K-Pg boundary, during the early Eocene (Johnson and Ellis, 2002; Ellis et al., 2003). Insect damage records indicate that while generalized insect damage recovered in the early Paleocene, specialized damage, did not recover until the late Paleocene (Labandeira et al., 2002; Wilf et al., 2006).

Johnson (2002), recognized one megafloral association in the Paleocene of the Williston Basin, known as the Fort Union I (FUI) flora. This low diversity flora has been recognized throughout the Western Interior (Nichols and Johnson, 2008) and corresponds with the Puercan NALMA. As for the Denver Basin, Johnson et al. (2003) recognized three Paleocene megafloral associations that suggest a geographic floral gradient. The floras in the eastern part of the basin exhibit low diversity typical of recovery flora and similar to the FUI. The floras on the western part of the basin, closer to the proposed topographic front, however, are more diverse, heterogeneous and suggest a higher MAP. The mountain proximal floral association is typified by the Castle Rock Rainforest (Ellis et al., 2003). These authors (Johnson and Ellis, 2002; Ellis et al., 2003; Johnson et al., 2003) put forth the hypothesis that higher topography and increased orographic precipitation played an important role in the development of this diverse, heterogeneous flora.

b. Rainforest Characteristics

Sub-tropical and tropical rainforests, both modern and ancient, are highly complex and varied ecosystems (Morley, 2000). Generally, modern tropical rainforests have high species diversity, high species richness, high spatial heterogeneity among plants, dominance by angiosperms, and different levels of vegetation including closed canopies (Morley, 2000; Johnson and Ellis, 2002; Ellis et al., 2003). Modern tropical or sub-tropical rainforests occur in warm (> 24 or $25\text{ }^{\circ}\text{C}$), wet ($> 200\text{ cm}$ of precipitation per year) equable climates (Morley, 2000). Other vegetation characteristics include straight tree trunks, and presence of woody vines with broad palmate leaves (Morley, 2000). Leaves in rainforests are typically large in size, coriaceous, have elongate and elliptic shapes, and possess entire margins and drip tips (Morley, 2000; Johnson and Ellis, 2002; Ellis et al., 2003). Leaves from vines typically have cordate or deeply emarginate bases. Typically, rain forests in the fossil record can be identified on the basis of these floral characteristics as well as features like high floral diversity, high richness, high spatial heterogeneity, and dominance of angiosperms (Morley, 2000). Supporting evidence for rainforests include lithological features that are consistent with environments in which precipitation exceeds evaporation, typically identified by the presence of lignites, peats, or coals (Morley, 2000).

While forests have existed in warm, wet climates throughout much of the Phanerozoic, modern tropical and sub-tropical rainforests have characteristics that are distinct from rainforests of other time periods. For example, they differ from the rainforests of Mississippian and Pennsylvanian, which were dominated by lycopsids, rather than angiosperms. Following the evolution of angiosperms in the Cretaceous (Morely, 2000), some studies suggest the occurrence of isolated floras possessing many of these modern tropical or sub-tropical rainforest characteristics (i.e., drip tips, smooth margins (Upchurch and Wolfe, 1987)), though others argue

that there are no Cretaceous floras with rainforest physiognomic characteristics (Johnson and Ellis, 2002). Thus, the origin of the first modern tropical rainforest is controversial. However, it is clear that following the evolution of angiosperms came the potential for the development of rainforests with characteristics resembling those of modern tropical or sub-tropical rainforests. It is also apparent that the extinction at the K-Pg boundary set the stage for the development and diversification of floras that eventually led to the tropical and subtropical rainforests of today (Morely, 2000).

c. Denver Basin Geologic Setting

The Denver Basin is an asymmetric structural basin located east of the Rocky Mountain Front Range in Colorado (Fig. 1). The basin contains Paleozoic through Cenozoic rocks, and Late Cretaceous through Eocene synorogenic sediments derived from the uplift of the Rocky Mountains during the Laramide Orogeny that contain abundant fossil plants (Johnson et al., 2003; Raynolds, 2002; Barclay et al., 2003). During this time, two distinct unconformity-bound pulses of synorogenic sedimentation have been recognized (Raynolds, 2002). The older sequence, called the D1 sequence, which is equivalent to the Denver Formation in the Denver Basin, was deposited during the Late Cretaceous and early Paleocene between approximately 68 and 64 Ma, and includes a high resolution geochronologic and paleontological record of the K-Pg Boundary (Barclay et al., 2003; Clyde et al. 2016). The D1 sequence contains a variety of lithologies ranging from coarse-grained alluvial fans to finer-grained fluvial and paludal deposits (Raynolds, 2002; Raynolds and Johnson, 2003). Within the sequence, the facies on the western margin of the basin, which are interpreted as being proximal to the early Paleocene mountain front, are characterized by coarse-grained, clastic fluvial facies. These facies grade towards the east from the Paleocene

mountain front towards the center of the basin into more fine-grained, paludal deposits (Raynolds, 2002; Raynolds and Johnson, 2003).

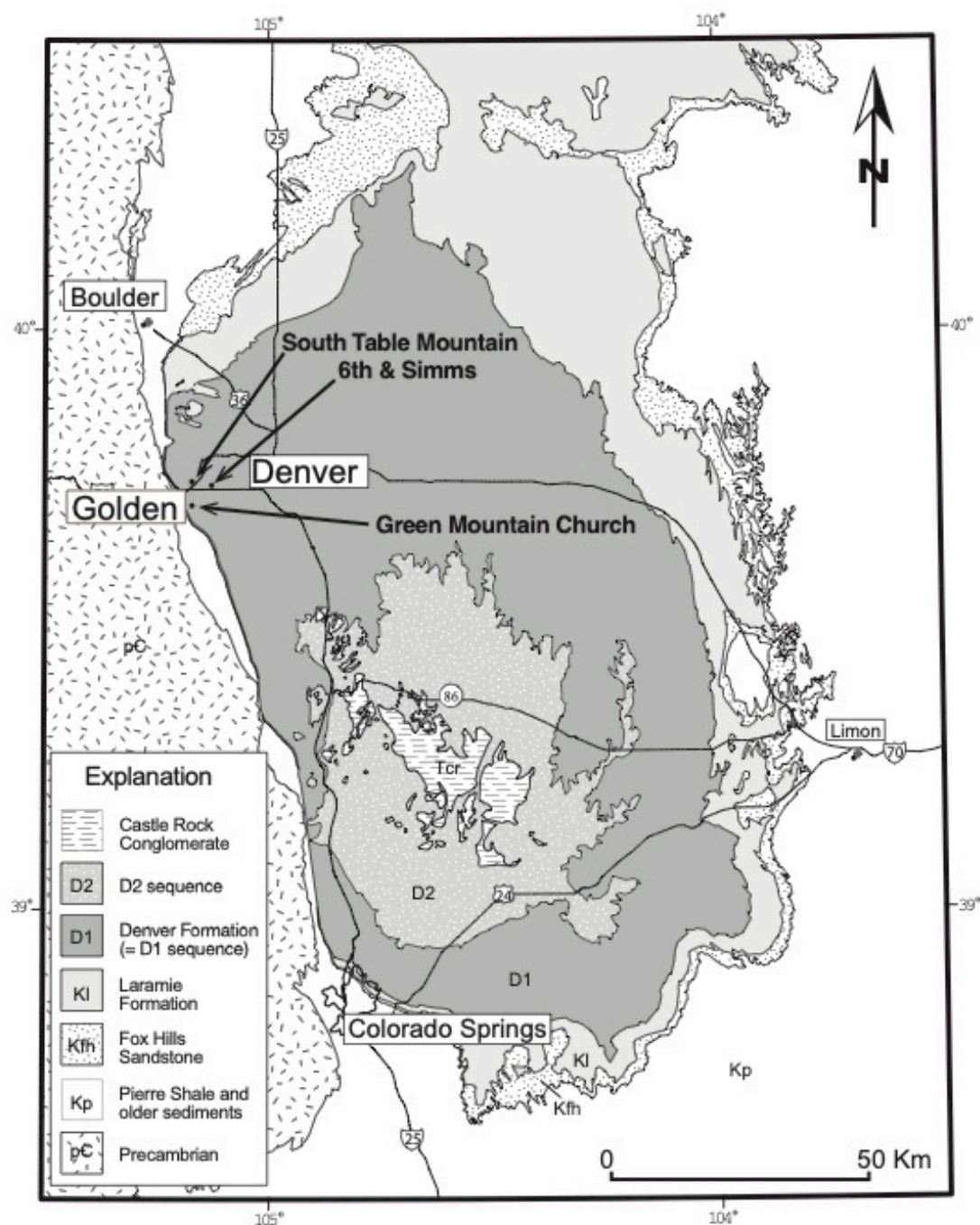


Figure 1: **Map of the Denver Basin.** Map of the Denver Basin showing the location of the three fossil sites analyzed in this study. Figure adapted from Eberle (2003) and Raynolds (2002).

The ages of rocks in the D1 sequence have been determined by mammalian biostratigraphy (Eberle, 2003; Dahlberg et al., 2016), magnetostratigraphy (Hicks et al., 2002; Clyde et al., 2016), palynostratigraphy (Nichols and Fleming, 2002), ^{40}Ar – ^{39}Ar radiometric dating (Obradovich, 2002), and U–Pb radiometric dating (Clyde et al., 2016). Fossils in the D1 sequence include abundant plants (Johnson et al., 2003) and frequent, though less abundant, vertebrates, including fishes, turtles, crocodilians, champsosaurs, dinosaurs, and mammals (Carpenter and Young, 2002; Eberle, 2003). Many of the mammalian fossils have been further identified and include multituberculates, marsupials, cimolestids, and ‘condylarths’ (Eberle, 2003; Dahlberg et al., 2016; Middleton et al., 2004). In particular, the strata from the earliest Paleocene in the Denver Basin preserves an excellent record of mammalian fossils from the Puercan.

In comparison to the D1 sequence, the D2 sequence, contains mostly coarse-grained, arkosic sediments that date to the latest Paleocene and early Eocene. It is separated from the D1 sequence by an approximately eight million-year unconformity (Raynolds, 2002). The D2 sequence also contains fossil plants and sparse vertebrate remains, however, it lacks the geochronologic control of the D1 sequence, and given its younger age, is outside the scope of this study.

III. Materials and Methods

a. Fossil Localities

Three previously undescribed fossil leaf sites were analyzed. For the purposes of this study, I use the term ‘site’ to indicate a general area from which fossils were collected (e.g., the 6th Ave & Simms Street site), and the term ‘locality’ to indicate a specific collection location within the site (e.g. DMNH loc. 3791). A site and a locality can be synonymous, as is the case at the Green

Mountain Church site, if there is only one locality collected at a site. I use the term ‘area’ to describe a larger geographic region in which fossil sites are located. For example, all of the fossil sites described in this study are in the same area along the western margin of the Denver Basin in the Rocky Mountain Front Range. Finally, the 6th & Simms site is exceptional in that it contains four continuous forest floor deposits, which I refer to as ‘horizons’. These horizons occur at a particular stratigraphic interval that is laterally continuous for 10 meters or more across multiple localities (Fig. 2).

The 6th & Simms (SS) megaflora site, located in the vicinity of 6th Avenue and Simms Street in Lakewood, Colorado, was discovered in 2009 during construction of a Denver Regional Transportation District (RTD) light rail line that now parallels 6th Avenue. Crews from the Denver Museum of Nature & Science (DMNS) censused six quarry localities (DMNH loc. 3791-3796 [the DMNS catalog and locality numbers use the designation DMNH for the Denver Museum of Natural History]) spanning a roughly 50-meter-long exposure that preserved four forest floor horizons (horizons A–D), some with *in-situ* tree stumps (Fig. 2). Forest floor horizons are identified by the presence of immature paleosol deposits (Fig. 2). The paleosols are mottled, have evidence of rooting and, in some cases, *in-situ* tree stumps. The fossil leaves occur in layers of mudstone that overlay the paleosol deposits, interpreted to be overbank deposits that covered the forest floor. The sedimentary contact between the paleosol and the overbank deposit is laterally traceable across the 50-meter-long exposure. Thus, the fossil floras in horizons A–D at this site are interpreted to be parautochthonous forest floor deposits (Miller, pers. comm. 2019). Over 1,600 leaves from this deposit were censused by personnel from the DMNS in 2009, 194 of which were collected as museum voucher specimens, and are now housed at the DMNS.

The South Table Mountain (STM) fossil plant site, located on the southeastern flank of STM in Golden, Colorado, was first studied in 1943 by Roland Brown (Brown, 1943, 1962). Crews

from the DMNS returned in the 1990s and 2000s and collected 422 fossil leaves from two quarry localities that occur a few meters apart in the same stratigraphic interval (DMNH locs. 412 and 413) at this site. These fossil localities are located near the top of a ridge on the southeastern flank of South Table Mountain (Fig. 3).

The Green Mountain Church (GMC) fossil plant site is located just east of the Green Mountain United Methodist Church in Lakewood, Colorado. Members of the Western Interior Paleontological Society collected 248 fossil plants from this locality (DMNH loc. 500) in the early 1990s, during the construction of a parking lot for the church and donated them to the DMNS in the early 2000s. As such, detailed stratigraphic information about this fossil site is unavailable.

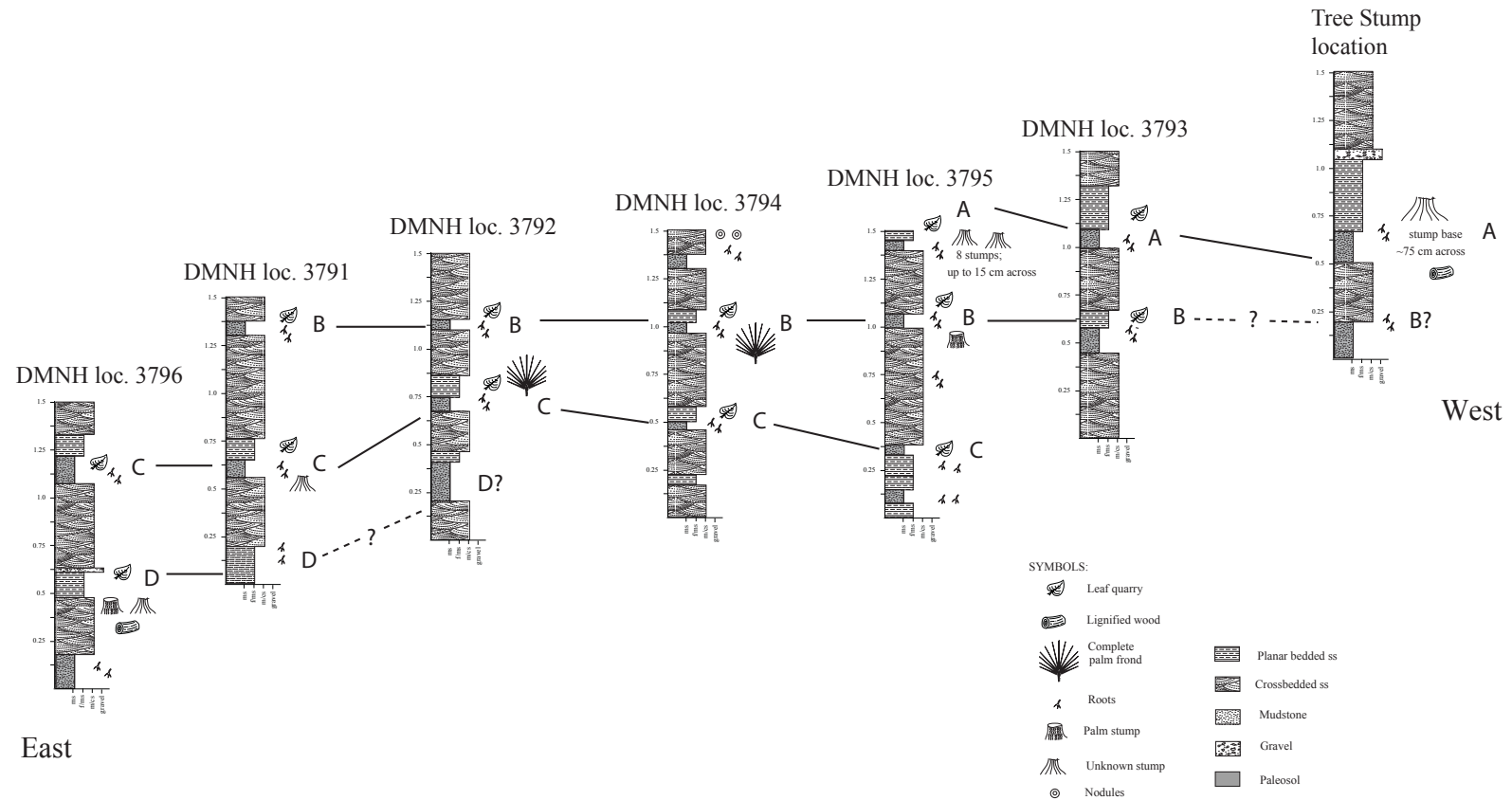


Figure 2: **6th & Simms Stratigraphy**. Stratigraphic columns of the six localities at the SS fossil site. Distance between DMNH loc. 3796 (far left) and the three stump location (far right) is approximately 50 m.

b. Ages of Sites

In order to address the question of Castle Rock rainforest origin, it is essential to know that the fossil sites I am analyzing are older than the Castle Rock rainforest. Stratigraphic and geochronologic data combined with sedimentation rates were used to date the three megaflorea sites. This was possible for the STM localities, which occur approximately 2.5 m stratigraphically below the fossil vertebrate locality (DMNH loc. 2387) that is correlative with the early Puercan (Pu1), and in magnetostratigraphic C29R (Hicks et al., 2002; Eberle, 2003). A recent study by Sprain et al. (2015) in northeastern Montana used high resolution $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology to determine the duration of C29R. Their results estimate C29R to be $345,000 \pm 38,000$ years long and suggests that the duration of the Pu1 interval zone in C29R was approximately $70,000 \pm 38,000$ years. Thus, it is likely that the fossil plant localities at STM occur less than 100,000 years after the K-Pg boundary. In addition, the STM localities occur approximately 10 m above a 5 m interval that palynological studies suggest contain the K-Pg boundary (Kauffman et al., 1990). For the GMC and SS localities, since there aren't any vertebrate fossils or magnetostratigraphic data, I relied on projecting the K-Pg Boundary elevation to the geographic position of my sites. This was possible because previous workers have used a combination of geologic mapping techniques; oil, gas and water well resistivity and rock core data; surface observations; key contacts (e.g. K-Pg Boundary locations); geochronologic data; and digital elevation models (DEMs) to create a three-dimensional (3-D) model (surface and subsurface) of the Denver Basin using Geographic Information Systems (GIS) (Dechesne et al., 2011). This model allows for the projection of stratigraphic horizons of interest, such as the K-Pg boundary interval, across map surface and through the subsurface. I used the location of the K-Pg boundary from this model and the average Paleocene sedimentation rate of 166 m/myr for the western portion of the basin developed by

Hicks et al. (2002) to estimate the ages of the GMC and SS localities. I propagated uncertainties associated with the age of the K-Pg boundary (66.021 ± 0.024 Ma) from Clyde et al. (2016), the vertical root mean square error associated with the DEMs used in the model (Dechesne et al., 2011) of 2.44 meters (Gesch et al., 2014), and the resolution error for Google Earth elevation estimates of 8.86 m from Wang et al. (2017) to determine the uncertainties associated with my age estimates. I estimated the age of SS to be 65.84 ± 0.13 Ma, the age of STM to be $65.96 +0.13/-0.06$ Ma (the asymmetrical uncertainty is because the site cannot be older than the K-Pg boundary at 66.021 ± 0.024 Ma), and the age of GMC to be $65.92 + 0.13/-0.1$ Ma. These sites all occur within the first 200,000 years of the Paleocene, during the Puercan. Given the large error associated with these age estimates, I cannot accurately determine the relative order of the three sites, but I can confidently say that they are from the earliest Paleocene and are older than the Castle Rock rainforest, which is most important for this research.

c. Paleobotanical Methods

Plant fossils were collected from the three sites using the bench quarry technique. This technique involves locating the fossil-bearing horizon and removing the overburden to produce a bench of the fossiliferous layer. The bench is swept clean of debris and the fossils are excavated from the bench (Barclay et al., 2003). Two collecting methods were used: selective collecting and census collecting (see Barclay et al., 2003; Wilf and Johnson, 2004). Selective collecting, also known as non-census collecting, involves the collection of only the best-preserved or most complete specimens as voucher specimens to accession into a museum collection. Census collecting, also known as quantitative collecting, involves counting every fossil found in the quarry

to produce an unbiased plant community data set. The SS site was collected using the census technique and the STM and GMC sites were collected selectively.

I then sorted fossil leaves into morphological categories that are meant to approximate biological species (Table 1). These categories, known as morphotypes, are based on leaf architectural characters described in Ellis et al. (2009). This method allows for floral physiognomic and paleoecological analyses of large quantities of fossil specimens without formal taxa identification. I also use the term morphotaxa interchangeably with morphotypes.

Each morphotype was assigned a number and a two-letter prefix, GA, which stands for Golden Area, because the fossil floras were collected near Golden, Colorado (Fig. 1). For each morphotype, the best specimen was designated as a holomorphotype (HM). The fossil HMs are figured and described according to the Manual of Leaf Architecture (Ellis et al., 2009) in Appendix A.

In addition, I collected leaf physiognomic character data, including leaf area and leaf margin type to determine MAP and mean annual temperature (MAT), respectively. I calculated MAT and MAT uncertainties using the following regressions where “E” is the percent of smooth margin species in a flora, n is the number of dicot taxa, and ϕ is an overdispersion factor estimated at 0.052 (Miller et al., 2006).

- | | |
|--|------------------------|
| (1) $\text{MAT} = 0.286E + 2.240$ | (Wilf, 1997) |
| (2) $\text{MAT} = 0.290E + 1.320$ | (Miller et al., 2006) |
| (3) $\text{MAT} = 0.2471E + 2.3305$ | (Kennedy et al., 2014) |
| (4) $\text{SE}(E_i)^2 = [1 + \phi(n_i - 1)E_i(1 - E_i)](E_i(1 - E_i)/n_i)$ | (Miller et al., 2006) |

These equations were selected because they are based on assemblages of leaves primarily from North America. Studies have shown that there is a bias in leaf-estimated MAT between regions on Earth (e.g. Kennedy et al., 2014; Kowalski, 2002). In particular, there is a significant

difference between the Northern and Southern hemispheres, with Southern hemisphere floras containing a larger percentage of entire margined leaves than Northern Hemisphere floras for the same MAT value (Kennedy et al., 2014). The regressions from Wilf, 1997, Miller et al., 2006, and Kennedy et al., 2014 are primarily based on Northern Hemisphere (and North American) floral assemblages.

I calculated MAP using regressions from Wilf et al. (1998), which is focused on North American floras because, like the MAT relationships, there is also a regional influence on MAP regression equations (Jacobs, 2002). The global regression of Peppe et al. (2018) was also included for comparison. MAP was calculated as follows, where $M\ln A$ is the mean natural log of leaf area and the standard error is given by equation 7 (Wilf et al., 1998).

$$(5) \quad \ln MAP = 0.548(M\ln A) + 0.786 \quad (\text{Wilf et al., 1998})$$

$$(6) \quad \ln MAP = 0.346(M\ln A) + 2.404 \quad (\text{Peppe et al., 2018})$$

$$(7) \quad SE = \sqrt{1/(n-2)[\Sigma(y - \bar{y})^2 - \{\Sigma(x - \bar{x})(y - \bar{y})\}^2 / \Sigma(x - \bar{x})^2]}$$

MAP and MAT calculations were made using Microsoft Excel 2016.

Rarefaction curves were generated using the free software PAleontological STatistics (PAST) (Hammer et al., 2001). Biodiversity metrics for richness, diversity and evenness at each site were also calculated. Species richness, represented by S , is simply the number of species at each site. Simpson's Diversity Index (1-D) and Shannon diversity index are used as measures of floral diversity. These two indices in particular were selected because they take relative abundance of taxa into consideration (Patzkowsky and Holland, 2007). The three biodiversity metrics are influenced by rare or abundant taxa differently. S is most influenced by rare taxa, Simpson's 1-D is most influenced by abundant taxa (Patzkowsky and Holland, 2007), and the Shannon index is an intermediate. Simpson's 1-D index is unaffected by sample size. Floral evenness is measured by Pielou's measure of species evenness (J). Whittaker's beta diversity (β_w) is used as a measure

of beta diversity because it can be used to interpret how the richness of an area (i.e. the Golden Area) is greater than the richness of any individual site (Anderson et al., 2011). Calculations of biodiversity metrics were done using Microsoft Excel and PAST.

Traditionally in ecological studies, communities are statistically compared using analysis of similarity (ANOSIM) or permutational multivariate analysis of variance (PERMANOVA). In order to conduct these analyses, I would need multiple censuses conducted at each site. However, due to limitations of my dataset, SS was the only site where I had access to multiple censuses, and I was therefore unable to perform ANOSIM or PERMANOVA analyses to compare my three fossil sites. Instead, I qualitatively compared floral communities among sites using two methods. First, site floral compositions were compared using nonmetric multidimensional scaling (NMDS) in R with the package ‘vegan’ (Oksanen et al., 2018; R Core Team, 2017). Bray-Curtis distances were used for the NMDS ordinations and to qualitatively assess dissimilarity among sites and SS horizons. Bray-Curtis distances (Table 2) are on a scale of 0 to 1; the greater the Bray-Curtis distance, the greater the dissimilarity. For the purpose of this study, I will consider any Bray-Curtis distances between sites greater than 0.5 to suggest that the sites are dissimilar. In the NMDS plot, the greater the distances between points representing each site, the greater the dissimilarity. Since SS is the only site that had multiple horizons to be compared, I calculated the centroid of all SS sites (labeled as ‘SS’ in Fig. 4), which represents the mean distance between all four SS horizons in multidimensional space. Then, I plotted an ellipse representing the 99% confidence interval around the centroid (I chose 99% CI to include all four horizons within the CI), and qualitatively compared the distance of other sites (labeled as GM, STM in Fig. 4) to the SS centroid. Thus, any sites that fall outside the 99% confidence ellipse of SS are more different from SS in general than any individual SS horizon is from any other SS horizon. I also compared sites using detrended correspondence analysis (DCA) in PAST as another means to assess similarity. DCA is another

ordination method typically used in ecological studies to compare differences in community compositions. Since ANOSIM and PERMANOVA cannot be done in this study, I use the DCA as another method to constrain similarity between sites and corroborate the NMDS analysis. Similar to NMDS, the greater the distances between the points representing sites, the more dissimilar the sites are.

IV. Results

a. Golden Area Flora

The flora from the three previously unpublished fossil sites – 6th & Simms, South Table Mountain, and Green Mountain Church – collectively referred to as the Golden Area flora, contains 2369 fossil leaves, grouped into 64 morphotypes (Table 1). Of those 64 morphotypes, 44 are angiosperm leaves, 10 are seeds/flowers/reproductive parts, five are ferns, one is a lycopod, one is a bryophyte, and one is a conifer (Table 3, Fig. 5). Of the 44 angiosperms, four are monocots and 40 are dicots. The seven most abundant taxa, each comprising 3% or greater of the Golden Area flora, contain characteristic early Paleocene plants including the dicots “*Rhamnus*” *goldiana* (GA39, 41% of all taxa), *Platanites marginata* (GA23, 22% full leaves and GA52, 3.7% leaflets), *Cornophyllum newberryi* (GA47, 6%), “*Zizyphus*” sp. (GA53, 5%); the monocot *Palmacities* sp. (GA17, 3.4%); and the fern *Allantodiopsis erosa* (GA12, 3%) (Fig. 5).

Golden Area (GA) Morphotype	Number of Specimens	Taxa ID
GA1	1	<i>Cyclocarya brownii</i>
GA2	16	Seed 1
GA3	12	Seed 2
GA4	16	Seed 3
GA5	1	Seed 4
GA6	1	Reproductive Axis 1
GA7	2	Bryophyte thallus
GA8	1	Fruit/Flower 1
GA9	1	Bark 1
GA10	1	<i>Selaginella</i> sp.
GA11	16	<i>Dryoteris</i> sp.
GA12	72	<i>Alantodiopsis erosa</i>
GA13	3	<i>Onoclea hesperia</i>
GA14	7	Fern 1
GA15	3	Fern 2
GA16	1	Conifer 1
GA17	80	<i>Palmacites</i> sp.
GA18	3	<i>Paleoreodoxites</i> sp.
GA19	1	<i>Sabalities</i> sp.
GA20	14	<i>Paleonelumbo macroloba</i>
GA21	11	" <i>Artocarpus</i> " <i>lessigiana</i>
GA22	1	Roots 1
GA23	527	<i>Platanites marginata</i>
GA24	9	Dicot 1
GA25	7	Dicot 2
GA26	1	Dicot 3
GA27	2	Dicot 4
GA28	49	Dicot 5
GA29	2	Dicot 6
GA30	2	Dicot 7
GA31	7	cf. " <i>Sassafrass</i> "
GA32	24	Dicot 8
GA33	1	Dicot 9
GA34	19	Dicot 10
GA35	1	Dicot 11

GA36	7	Dicot 12
GA37	2	Dicot 13
GA38	1	Dicot 14
GA39	978	<i>“Rhamnus” goldiana</i>
GA40	5	<i>Phenocites</i> sp.
GA41	1	Dicot 15
GA42	3	Dicot 16
GA43	1	Dicot 17
GA44	1	Dicot 18
GA45	1	Dicot 19
GA46	2	Dicot 20
GA47	147	<i>Cornophyllum newberryi</i>
GA48	3	Dicot 21
GA49	5	Dicot 22
GA50	1	Dicot 23
GA51	14	cf. <i>“Vitis” stantoni</i>
GA52	87	<i>Platanites marginata</i> leaflett
GA53	121	<i>“Zizyphus”</i> sp.
GA54	2	Dicot 24
GA55	5	Dicot 25
GA 56	2	Reproductive Axis 2
GA 57	1	Reproductive Axis 3
GA58	1	Reproductive Axis 4
GA59	2	Dicot 26
GA60	9	<i>“Ficus” planicostata</i>
GA61	1	Dicot 27
GA62	5	Dicot 28
GA63	1	Dicot 29
GA64	2	<i>“Populus” nebrascensis</i>

Table 1: **Table of Golden Area Morphotypes.** List of Golden Area (GA) morphotypes. See Appendix A for descriptions and images of each morphotype.

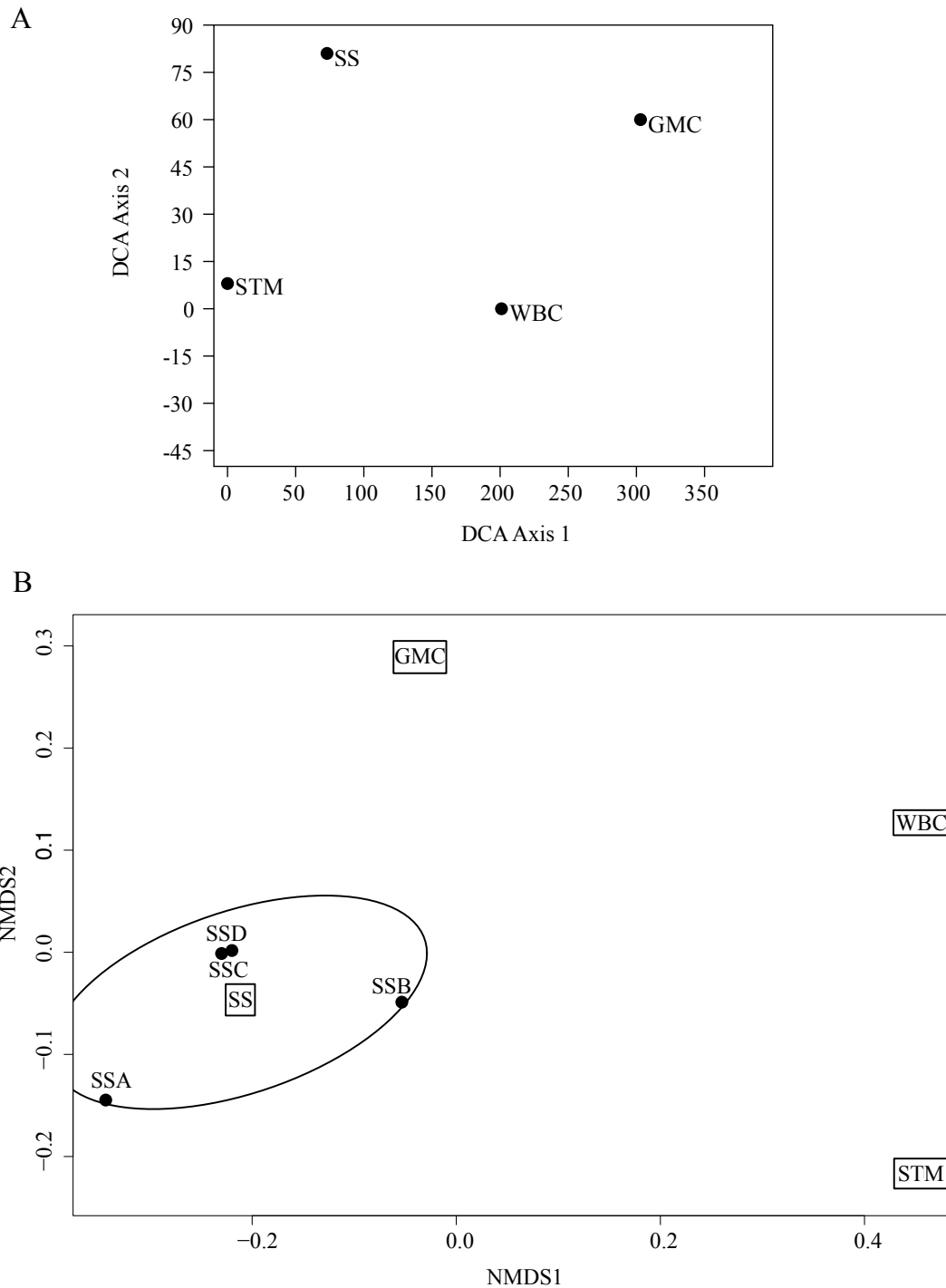


Figure 4: Statistical Comparisons. Comparisons of floral composition between Golden Area floras using presence/absence data. A) Detrended correspondence analysis (DCA). B) Nonmetric multidimensional scaling (NMDS). The three fossil sites from the Golden Area, as well as the West Bijou Creek flora (WBC) are plotting as distinct points in both A and B, suggesting that the sites are dissimilar.

	SSA	SSB	SSC	SSD	STM	GM	SS Overall
SSA							
SSB	0.55						
SSC	0.33	0.43					
SSD	0.53	0.48	0.30				
STM	0.82	0.74	0.76	0.76			0.69
GM	0.72	0.69	0.60	0.65	0.77		0.68
WBC	0.84	0.70	0.75	0.79	0.64	0.71	0.64

Table 2: **Table of Bray–Curtis Distances.** Bray–Curtis distances calculated in R using ‘vegan’ package (Oksanen et al., 2018) for presence/absence data. Bray–Curtis distances are on a scale from 0 to 1, with 1 being the most dissimilar and 0 being the most similar. All the Bray–Curtis distances between sites (i.e. excluding comparisons between SS horizons) reported here are > 0.5, suggesting that all are dissimilar. WBC is the West Bijou Creek flora.

b. 6th & Simms (SS)

The flora from this site is 65.84 ± 0.13 Ma. It has four continuous forest floor horizons comprising six localities (DMNH loc. 3791–3796). It contains 1,809 specimens grouped into 22 GA morphotypes, which includes 13 dicots, two monocots, two ferns, three seeds/reproductive parts, one root, and one bark. The taxa consist of characteristic early Paleocene plants including three dominant dicots “*Rhamnus*” *goldiana* (GA39, 49% of all taxa at this site), *Platanites marginata* (GA23, 28%), and “*Zizyphus*” sp. (GA53, 6.5%). Other notable occurrences include the dicots “*Ficus*” *planicostata* (GA60, 0.2%), “*Artocarpus*” *lessigiana* (GA21, 0.6%), cf. “*Vitis*” *stantoni* (GA51, 0.7%), and *Paleonelumbo macroloba* (GA20, <0.5%). Monocots consist of *Sabalites* sp. (GA19, 4.4%) and cf. *Paloreodoxites plicatus* (GA18, 0.1%); and ferns include *Allantodiopsis erosa* (GA12, 0.9%) and *Onoclea hesperia* (GA13, <0.5%). Leaf sizes indicate a

rainfall of 302 cm + 131.15cm/-91.5 cm (1 SE, equation from Wilf, 1998) or 274.8 cm +412.7 cm/-166.4 cm (1 SE, equation from Peppe et al, 2018) (Table 4, Fig. 6). The leaf margin analysis suggests a MAT of $25.12 \pm 5.12^{\circ}\text{C}$ (equation from Wilf, 1997), $24.52 \pm 5.12^{\circ}\text{C}$ (equation from Miller et al., 2006), or $22.1 \pm 5.12^{\circ}\text{C}$ (equation from Kennedy et al., 2014) (Table 4, Fig. 6). Rarefaction curves from the four forest floor horizons plus the SS site overall can be found in Fig. 7. My results show that while the four forest floor horizons are similar in richness (the 95% confidence intervals for horizons A, C, and D overlap one another), horizon B has the highest overall rarefied richness (Fig. 7). The “*Rhamnus*” *goldiana* specimens in this flora exhibit a leaf physiognomy similar to “*Rhamnus*” leaves from the Castle Rock site, including large leaf size, and presence of drip tips, cordate bases, and smooth margins.

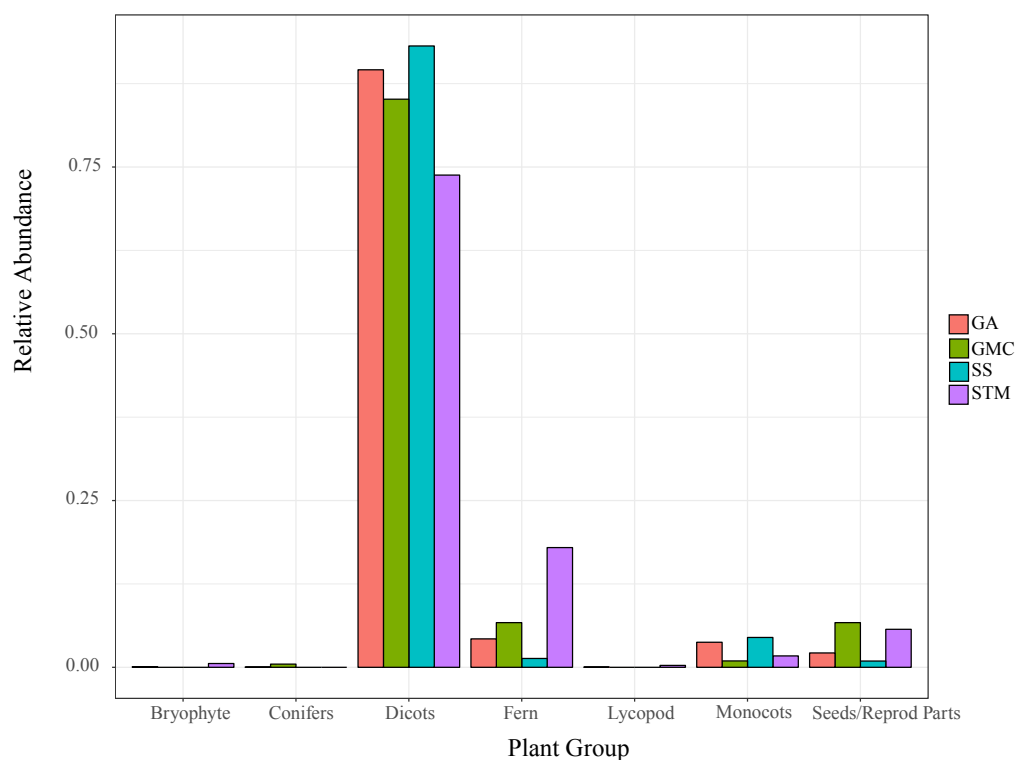
	6th & Simms	South Table Mountain	Green Mountain Church	Golden Area Overall	West Bijou Creek
Total Number of Specimens	1809	351	209	2369	1548
Number of Morphotypes	22	38	23	64	26
Number of Dicot Taxa	13	24	16	53	23
Number of Monocot Taxa	2	2	2	6	1
Number of Fern Taxa	2	5	2	9	2
Number of Conifer Taxa	0	0	1	1	0
Number of Lycopod Taxa	0	1	0	1	0
Number of Bryophyte Taxa	0	1	0	1	0
Number of Seeds/Reprod. Parts	3	5	4	12	n/a
Number of forest floor horizons	4	n/a	n/a	4	n/a

Table 3: **Table of Golden Area Floral Composition.** Floral composition of fossil sites.

Site	MAT Wilf, 1997	MAT Miller et al., 2006	MAT Kennedy et al., 2014	MAP Peppe et al., 2018	MAP Wilf, 1998
6th Ave and Simms St	25.12 ± 5.12 °C	24.52 ± 5.12 °C	22.1 ± 5.12 °C	274.84 +421.74/-166.4 cm	302 +131.15/-91.5 cm
SouthTable Mountain	17.16 ± 4.74 °C	16.45 ± 4.74 °C	15.22 ± 4.74 °C	214.15 +328.61/-129.7 cm	206.13 +89.32/-62.30 cm
Green Mountain	14.5 ± 5.46 °C	13.75 ± 5.46 °C	12.92 ± 5.46 °C	204.81 +314.28/ -124.0 cm	192.45 +83.40/-58.2 cm
West Bijou Creek	18.6 ± 2.6 °C	n/a	n/a	n/a	~155 cm
Castle Rock	21.8 ± 1.5°C	n/a	n/a	n/a	204 cm +142/-292 cm
Tropical Rainforest	> 25°				> 180 cm

Table 4: **Table of Mean Annual Temperature and Mean Annual Precipitation.** MAT and MAP estimates using the methods of the different authors including Wilf (1997), Miller et al. (2006), Kennedy et al. (2014), Peppe et al. (2018), and Wilf et al., (1998) and comparisons of Golden Area fossil sites to the Castle Rock site and modern tropical rainforests.

A



B

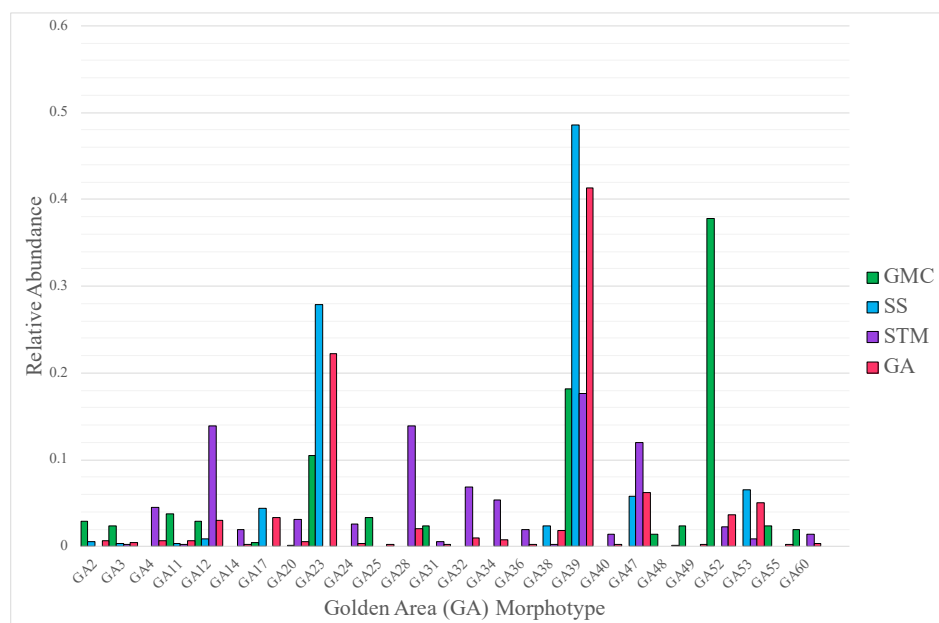


Figure 5: **Floral Composition.** Comparisons of plant type (A) and abundance of morphotypes (B) at all three fossil sites. In (B), only morphotypes with an abundance greater than 2% are displayed.

	6 th & Simms	South Table Mountain	Green Mountain Church	Golden Area Overall
Richness (S) (Count of taxa)	22	38	23	64
Simpson's D-1	0.6762	0.9019	0.805	0.7685
Shannon Information	1.519	2.733	2.208	2.148
Beta Diversity (β_w)	2.909	1.684	2.783	1
Evenness (Pielou's J)	0.4914	0.7513	0.7043	0.5185

Table 5: **Table of Golden Area Diversity Metrics.** Diversity metrics for all fossil sites.

c. South Table Mountain (STM)

The flora at STM (65.96 $\pm$ 0.13/-0.06 Ma) contains 422 specimens grouped into 38 GA morphotypes, including 26 angiosperms, five ferns, one lycopod, one bryophyte, and five seeds/reproductive parts (Table 3). The most abundant taxa are the dicots “*Rhamnus*” *goldiana* (GA39, 18% of all taxa at this site), *Cornophyllum newberryi* (GA47, 12%), *Paleonelumbo macroloba* (GA20, 3.1%), *Platanites marginata* leaflets (GA52, 2.3%), unidentified dicots (GA28, 14%; GA32, 6.8%; GA34, 5.4%), and the fern *Allantodiopsis erosa* (GA12, 14%). Also present are monocots *Phenocites* sp. and cf. *Paloreodoxites plicatus*, and other ferns *Onoclea hesperia*, and *Dryoteris* sp. Leaf sizes indicate a MAP of 206.1cm $\pm$ 89.3cm/-62.3 cm (1 SE, equation from Wilf, 1998), or 214.1 cm $\pm$ 328.6cm /-129.7 cm (1 SE, equation from Peppe et al, 2018) (Table 4, Fig. 6). The leaf margin analysis suggests a MAT of 17.16 $\pm$ 4.74 °C (equation from Wilf, 1997), 16.45 $\pm$ 4.74 °C (equation from Miller et al., 2006), or 15.22 $\pm$ 4.74 °C (equation from Kennedy et al., 2014) (Table 4, Fig. 6). Some leaves in this flora, like those in the SS flora, exhibit leaf

physiognomy similar to leaves from the Castle Rock site, including large leaf size, and presence of drip tips, cordate bases, and smooth margins.

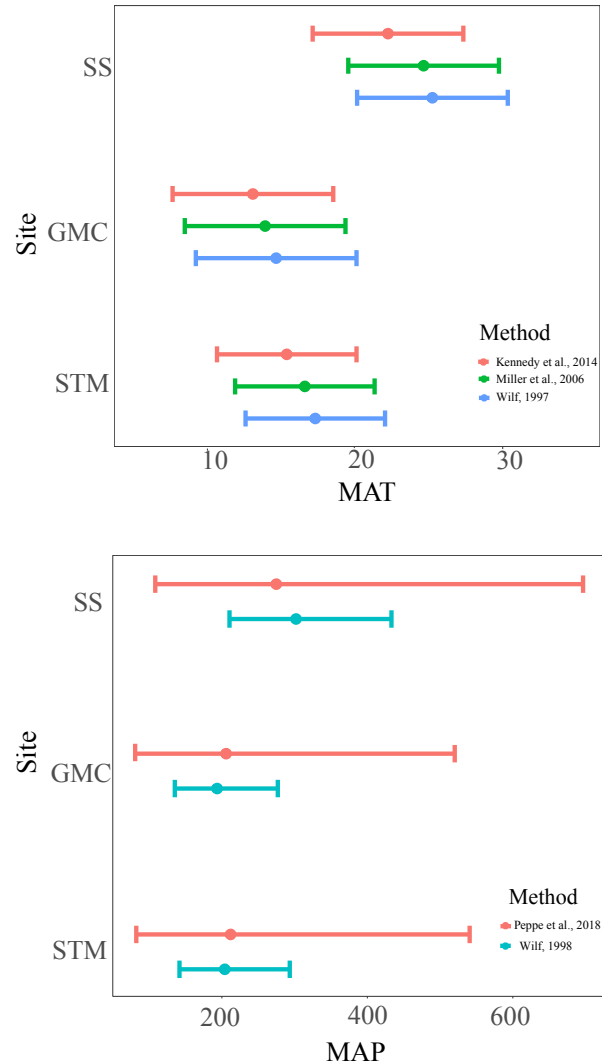


Figure 6: **MAT and MAP.** A) MAT estimates for all three fossil sites, using linear regressions from Wilf, 1997 (blue), Miller et al., 2006 (green), and Kennedy et al., 2014 (red). SS has the highest overall MAT estimate. The uncertainty ranges for MAT estimates at STM and GMC overlap, suggesting they are similar. B) MAP estimates for the three fossil sites using linear regressions from Wilf, 1998 (turquoise) and Peppe et al., 2018 (red). Uncertainty ranges for all three overlap, suggesting similar MAP at all sites.

d. Green Mountain Church (GMC)

The flora at GMC ($65.92 \pm 0.13/-0.1$ Ma) contains 248 specimens grouped into 23 GA morphotypes, including 16 angiosperms, two ferns, one conifer, and four seeds/reproductive parts (Table 3). The most abundant taxa include dicots *Platanites marginata* leaflet (GA52, 38%), “*Rhamnus*” *goldiana* (GA39, 18%), *Platanites marginata* (GA23, 11%) unidentified dicot (GA25, 3.3%), ferns *Allantodiopsis erosa* (GA12, 2.9%) and *Dryoteris* sp. (GA11, 3.8%). Also present are monocots *Sabalites* sp. and an unidentified palm, and other ferns including *Onoclea hesperia*. Leaf sizes indicate a MAP of $192.5 \text{ cm} +83.4 \text{ cm}/-58.2 \text{ cm}$ (1 SE, equation from Wilf, 1998), or $204.8 \text{ cm} +314.3 \text{ cm}/-124.0 \text{ cm}$ (1 SE, equation from Peppe et al, 2018) (Table 4, Fig. 6). The leaf margin analysis suggests a MAT of 14.5 ± 5.46 °C (equation from Wilf, 1997), 13.75 ± 5.46 °C (equation from Miller et al., 2006), or 12.92 ± 5.46 °C (equation from Kennedy et al., 2014) (Table 4, Fig. 6). When the two morphotypes of *Platanites marginata* (GA23 and GA 52) are considered together, they make up nearly 50% of the flora. Thus, this low diversity flora is dominated by one taxon. In addition, some leaves in this flora, like the other two, exhibit leaf physiognomy similar to leaves from the Castle Rock site including large leaf size, and presence of drip tips, cordate bases, and smooth margins.

e. Comparison

Of the 64 GA morphotypes, only five (7.9 %) occur at all three sites (“*Rhamnus*” *goldiana*, *Platanites marginata*, *Allantodiopsis erosa*, *Dryoteris* sp., and seeds 0.5 cm–2 cm in diameter range). Aside from the five taxa common to all three sites, SS and STM share only five additional taxa (10 total), SS and GMC share only three additional taxa (eight total), and GMC and STM only

share two additional taxa (seven total). Of the remaining 49 morphotypes, 10 of them are found only at SS, 13 are found only at GMC, and 26 are found only at STM. Of the three sites, SS has the lowest diversity, evenness, and richness; STM has the highest diversity, evenness, and richness, and GMC is intermediate in diversity, evenness, and richness (Table 5). Statistical comparisons using Bray–Curtis distances, DCA, and NMDS suggest that the three sites are different (see discussion below). SS has the highest average MAT estimate (23.91 ± 5.12 °C, Fig. 6A). The uncertainty ranges for the MAT estimates at STM and GMC overlap (15.0 ± 5.10 °C, Fig. 6A), suggesting they are essentially indistinguishable. The MAP ranges for all three sites also overlap (Fig. 6B). Average MAT of the Golden Area (all three sites) is 17.97 ± 5.11 °C, and average MAP is 230.40 cm $+228.08$ cm/ -105.35 cm.

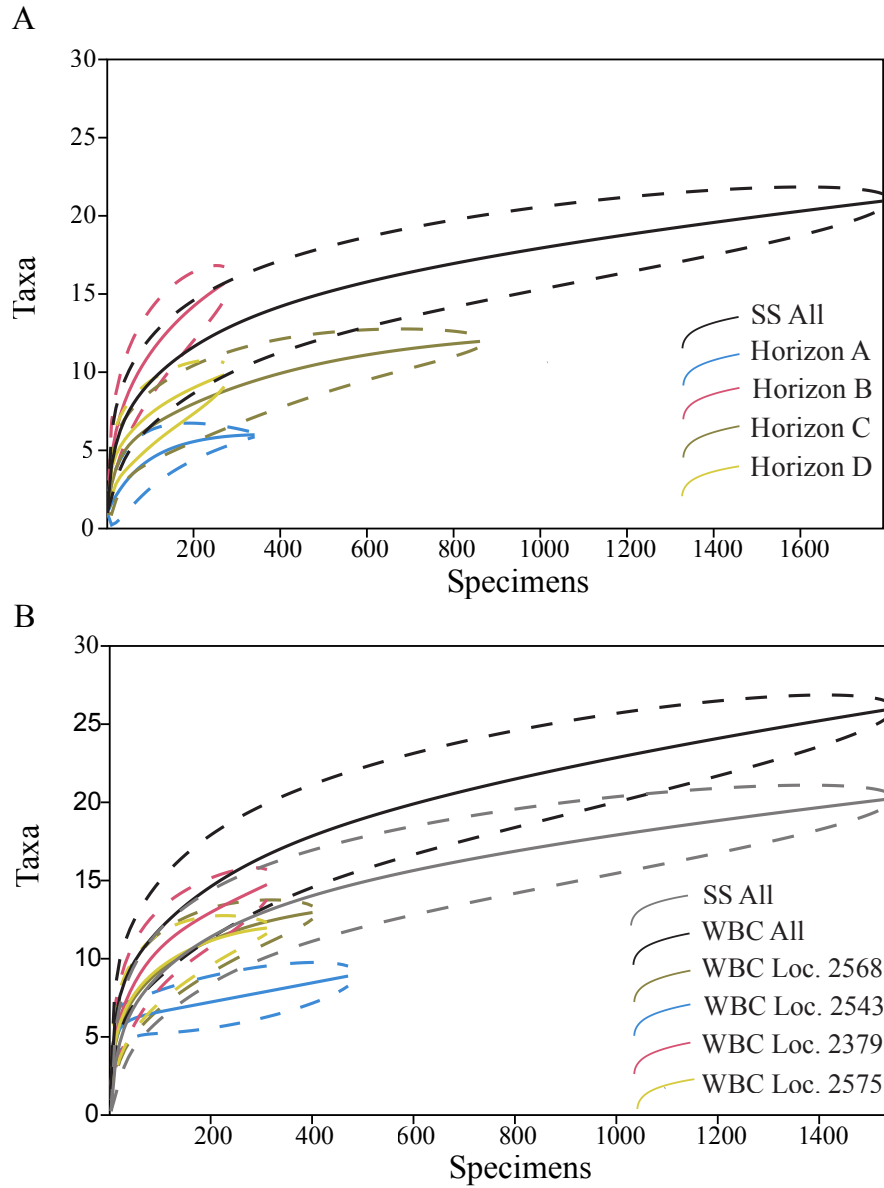


Figure 7: **Rarefaction.** Rarefaction curves of the census collected fossil floras. (A) 6th and Simms (SS) flora overall (black line) and individual forest floor horizons (A-D); and (B) West Bijou Creek flora (WBC) and 6th and Simms overall (gray line). 95% confidence intervals are indicated by dashed ellipses.

V. Discussion:

a. Comparison of the Golden Area floras

All sites in the Golden Area flora are dominated by dicots, which comprise greater than 60% of total fossils present at all three sites (Table 3, Fig. 5). All three fossil sites share “*Rhamnus*” *goldiana* (GA39) as either the most or second most abundant taxon, and *Platanites marginata* (GA23 and GA52) and *Allantodiopsis erosa* (GA12) ranked in the top ten most abundant taxa at all three sites. MAT and MAP estimates from all three sites suggest a relatively warm, wet climate, with MAP estimated to be approximately 200 cm or greater. However, the MAT estimate at SS gives a warmer MAT estimate (approximately 24 °C) than the other two sites (approximately 15 °C).

Qualitatively, plant community composition varies among the different sites. All of the sites appear to be distinct in both DCA (Fig. 4A) and NMDS (Fig. 4B) analyses. In general, Bray–Curtis distances are greater than 0.5 between sites, which suggests that all sites are more dissimilar than similar. In the NMDS plot in particular, STM and GMC plot outside the 99% confidence interval of the four SS horizons that comprise the SS site, suggesting these sites are different from the SS site overall. Thus, the Bray-Curtis distances (Table 2) suggest that the sites are statistically dissimilar in addition to being visually dissimilar in the NMDS plot. The Bray-Curtis distances among all of the SS horizons are approximately less than 0.5, which confirms that all of the horizons are more similar than dissimilar to each other, making them distinct from STM and GMC.

Comparing individual sites to the SS horizons suggests that STM is most similar to SS horizon B and least similar to SS horizon A; GMC is most similar to SS horizon C and least similar to SS horizon A. Of all the comparisons made for the Golden Area flora, SS horizon A and STM are the most dissimilar and SS horizon A and C are the most similar. Overall, these three lines of

evidence (qualitative comparisons of DCA, Bray–Curtis distances, and NMDS) together suggest that these three different sites represent distinct floras.

While the statistical analyses above suggest the forest floor horizons at SS are all compositionally similar to each other, these analyses do not provide any information about the spatial distribution of the morphotaxa throughout these horizons. A closer examination of the spatial distribution of morphotaxa at this site shows a high spatial heterogeneity in the dominance of taxa between quarries within the same forest floor horizon. As illustrated in Figure 8, the abundance of the dominant taxa within each forest floor horizon varies highly from east to west. For example, in forest floor horizon C, *Platanites marginata*, one of the two most abundant taxa at SS, makes up approximately 20 % of the leaves collected from the middle of the horizon (DMNH loc. 3794), but comprises 80% of the leaves collected at the locality approximately 10 meters to the west (DNMH loc. 3795) in the same horizon. Similar patterns exist within the other forest floor horizons and for other abundant taxa (Fig. 8). As illustrated in Figure 9, the floral composition itself is also very different among horizons. Horizon A is dominated by *Platanites marginata* (GA 23, >90% of taxa in that horizon), with only minor components of other morphotypes. In contrast, horizon C is dominated by “*Rhamnus*” *goldiana* (GA39, ~ 80% of taxa in that horizon), horizon B is dominated by both *Platanites marginata* (GA23, 43% of taxa in that horizon) and “*Rhamnus*” *goldiana* (GA39, 23% of taxa in that horizon), and horizon D is dominated by *Platanites marginata* (GA23, 40% of taxa in that horizon) and *Cornophyllum newberryi* (GA47, 36% of taxa in that horizon). These compositional differences among the horizons is noticeable even when comparing horizons at the same quarry locality. For examples, as illustrated in Figure 8, at DMNH loc. 3795, *Platanites marginata* has a high relative abundance in horizon B (80% of all taxa), and a much lower relative abundance in horizon C (11%). Overall,

this indicates that while diversity was markedly low, spatial heterogeneity in forests was high (Fig. 8, 9).

In contrast to the SS flora, the fossil flora at STM has high diversity and evenness. This may indicate that a higher diversity flora lived at STM than at SS. Lithologically, while some fossils are preserved in a fine-grained mudstone interpreted to be an overbank deposit, STM lacks evidence for the development of a paleosol, like those observed at SS. This suggests that the leaf fossils present at STM do not come from an *in-situ* fossil forest floor like SS. Instead, it is possible that these leaves may have been transported to some degree. Typically, transported assemblages of leaves are more diverse and homogeneous than *in-situ* forest floor assemblages (Ellis and Johnson, 2013). Thus, the high diversity and evenness of the floral composition at the STM site may suggest a higher degree of transport compared to the forest floors at SS. However, there are many factors that can contribute to how far leaves can be transported without significant degradation, including the size of the stream, the size of the drainage basin, the flow velocity, the flow turbulence, bedforms present, and natural obstacles (e.g. natural levees and dams) (Spicer, 1989). Overall, it seems as though the fossil leaf assemblage at STM does not represent an *in-situ* forest floor like SS, but that it also does not seem to represent an assemblage that has been transported across a very large distance, because the leaves are relatively intact. However, the precise distance to which the STM leaves have been transported is not able to be determined.

The SS forest floor horizons and GMC are more similar in their floral composition, in that they are both dominated primarily by a single taxon. This suggests that GMC may also be a forest floor deposit with similar composition to those at the SS site. However, the dominance of a single taxon may also be the result of a sampling bias due to selective collecting of specific fossil taxa at GMC. These fossil specimens were collected by others and donated to the DMNS. As a result, the specific methods of fossil collection and detailed lithology are unknown. Thus, while STM and

GMC contribute to the understanding of the overall Golden Area floral composition, the *in-situ* forest floor deposits and censused localities at the SS site provide greater insight into the early Paleocene ecosystem.

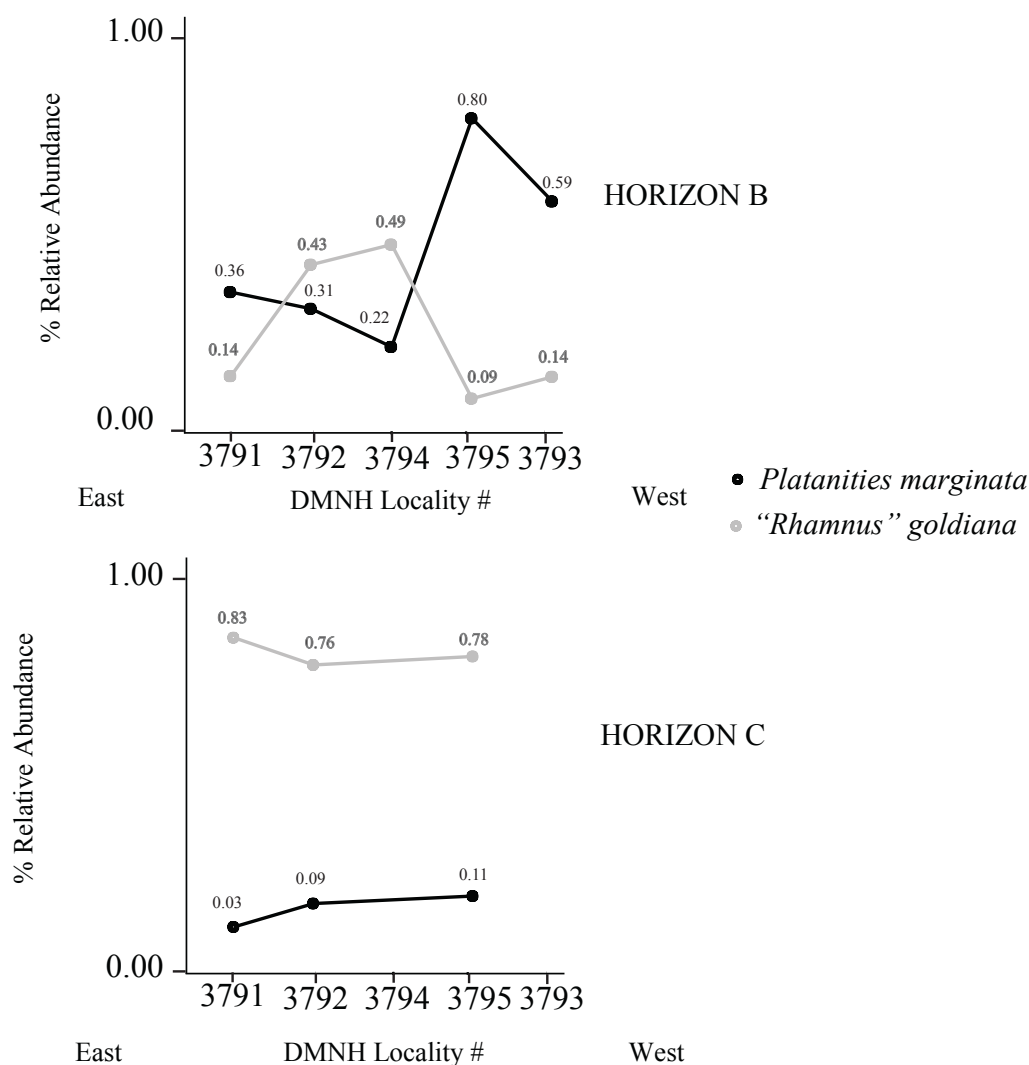


Figure 8: **Relative Abundance of Dominant Taxa in 6th & Simms Horizons.** Relative abundance of two taxa, *Rhamnus goldiana* (gray) and *Platanities marginata* (black) at each locality within forest floor horizons B and C. Illustrates heterogeneity of the forest floor horizons.

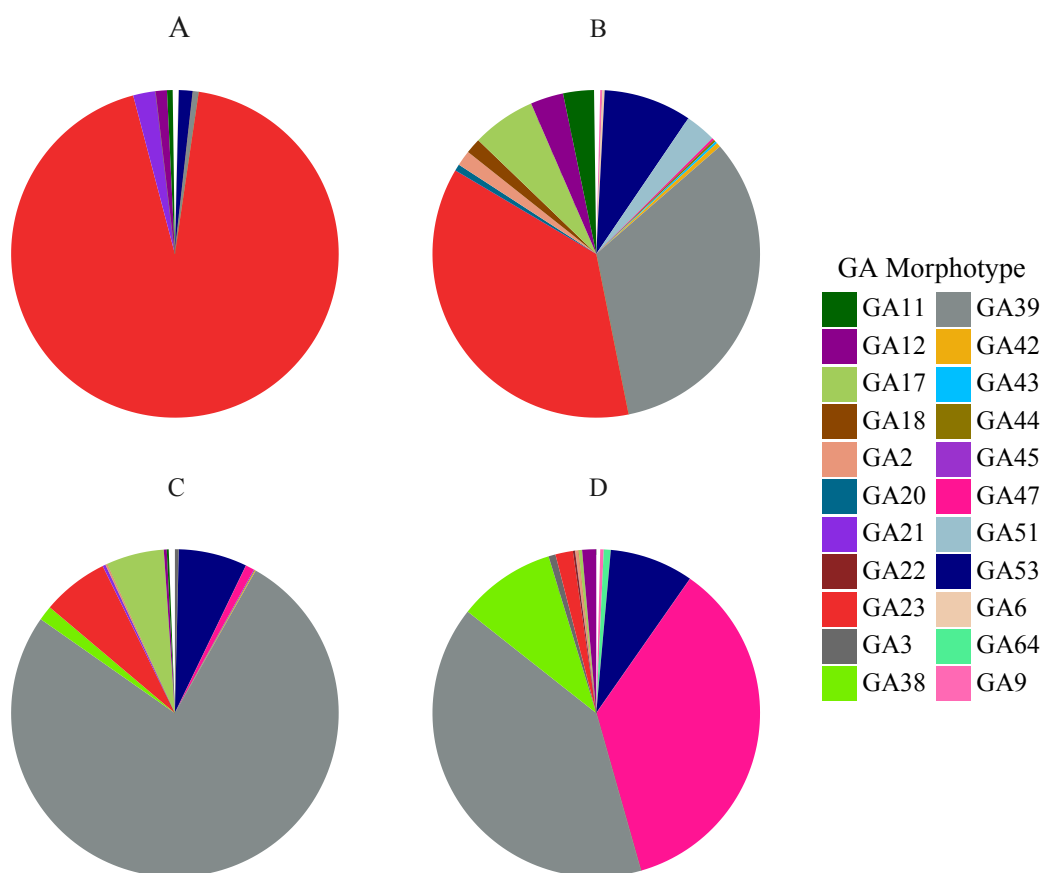


Figure 9: **Comparison of Floral Composition Among 6th & Simms Horizons.** Abundance of all morphotypes by horizon at the SS site. Each pie chart (A–D) represents a different forest floor horizon (A–D).

b. Comparisons of mountain proximal floras to distal floras in the Denver Basin

As described previously, initial studies of the Denver Basin fossil floras by Johnson et al. (2003), grouped them into megafloral associations based on their age and geographic occurrence (Johnson et al., 2003). For the Paleocene floras, the authors grouped them into three different associations: western (mountain proximal) floras, central floras, and eastern (mountain distal) floras. The Puercan-aged West Bijou Creek floras described by Barclay et al. (2003) were placed into the latter grouping, and the Torrejonian-aged Castle Rock rainforest was placed in the western (mountain proximal) grouping. The authors observed that, compared to the Castle Rock rainforest, the older West Bijou Creek floras were of much lower diversity and compositionally distinct from the younger Castle Rock flora (Barclay et al., 2003; Johnson et al., 2003). Rather than compare the Puercan West Bijou Creek flora to the younger Torrejonian Castle Rock flora, comparison of the West Bijou Creek flora to the coeval western Golden Area flora analyzed here provides a greater understanding of geographic variations and floral gradients in the Denver Basin during the first 200,000 years of the Paleocene.

The earliest Paleocene floras from the two areas within the Denver Basin, the Golden Area flora and West Bijou Creek flora, represent similar climate conditions. Both areas give relatively high MAT and MAP estimates (17.97 ± 5.11 °C and 230.40 cm $+228.08$ cm/ -105.35 cm for Golden Area, and 18.6 ± 2.6 °C and ~ 155 cm, respectively) indicating warm, wet, equable climates. In addition, the fossil vertebrate assemblages at both STM and West Bijou Creek, both of which include crocodilian vertebrae and osteoderms and gar fish scales, provide further evidence for warm, wet conditions (Barclay et al., 2003; Eberle, 2003). The floras from these two areas are dominated by dicot angiosperms ($>60\%$), and both have only minor components of monocots, ferns, and conifers. Floras in both areas are similarly dominated by just a few taxa. For the Golden

Area flora, these are “*Rhamnus*” *goldiana* (GA39) and *Platanites marginata* (GA23 and GA52). For the West Bijou Creek flora, these are *Cornophyllum newberryi* (BC10, BC for Bijou Creek) and cf. *Averrhoites affinis* (BC09) (Barclay et al., 2003). However, floral composition between the two areas appears to be different. Only two of the ten most abundant taxa are shared between the two areas, and of the identified taxa from both areas (19 for GA and 23 for BC), only eight are shared between the two. Comparisons of the censused sites in both areas (i.e. SS in the Golden Area and the combined four censused localities at Wet Bijou Creek) show that overall, SS has a higher rarefied richness than West Bijou Creek.

I also statistically compared the three Golden Area sites to the West Bijou Creek flora, using the Bray-Curtis distances, DCA, and NMDS to assess similarity. I used my data from the three Golden Area sites, and data from the four earliest Paleocene censused localities at West Bijou Creek (i.e. censused sites occurring in C29R) (Barclay et al., 2003) to determine if flora were similar or distinct communities. As illustrated in Figure 4, the West Bijou Creek flora appears distinct from the Golden Area flora, as suggested by the dissimilarity of the Golden Area sites to the West Bijou Creek site (point WBC, for West Bijou Creek). This is further illustrated by the Bray–Curtis distances (Table 2) between West Bijou Creek and the three Golden Area sites, all of which are greater than 0.5. This suggests that West Bijou Creek is dissimilar to the Golden Area sites, and, therefore, likely represents a distinct eastern–basin flora.

As mentioned above, the West Bijou Creek flora bears great similarity to the disaster-recovery flora of the northern Great Plains regions, the FUI flora (Johnson, 2002), specifically in its floral composition and low diversity (Barclay et al., 2003). The West Bijou Creek flora contains the seven most abundant morphotypes from the Ludlow Member of the Fort Union Fm, which all are in the top twelve most abundant morphotypes of West Bijou Creek (Barclay et al., 2003). While the Golden Area flora and the West Bijou Creek flora are similar in their low diversity, the Golden

Area flora is also quite similar to the Castle Rock flora in that it also possesses some rainforest characteristics such as large leaf size, presence of drip tips, cordate bases, and smooth margins.

c. Implications for high-diversity rainforest development

Previous studies of the fossil floras from the Paleocene in basins north of Colorado (i.e., Williston Basin; (Johnson, 2002)) and in the eastern regions of the Denver Basin (i.e. the West Bijou Creek flora; (Barclay et al., 2003)) have suggested that Paleocene floras were of low diversity and homogeneous (Ellis et al., 2003). However, analyses of fossil floras from mountain proximal deposits in the Denver and Raton Basins reveal higher-diversity, heterogeneous, rainforest-type assemblages (Wolfe and Upchurch, 1987; Ellis et al., 2003). One such deposit is the Castle Rock rainforest, known from the western margin of the Denver Basin near Castle Rock, Colorado. This atypical flora is more diverse than any other flora from this time, as well as more diverse than Late Cretaceous and early Eocene floras (Johnson and Ellis, 2002), and preserves mature forest floor layers, including *in-situ* tree stumps. It is hypothesized to have been preserved by a series of overbank flooding deposits that rapidly buried and preserved the forest floor (Ellis et al., 2003).

The Castle Rock flora is more similar to extant sub-tropical to tropical rainforests than it is to other Paleocene or Eocene floras (Johnson and Ellis, 2002). Similarities between the Castle Rock flora and today's rainforests include: dominance by angiosperms, high diversity, high spatial heterogeneity, large leaf size, dominance of smooth-margined leaves, and presence of drip tips (Johnson and Ellis, 2002). The Castle Rock rainforest lived approximately 2.2 million years after the K-Pg boundary, based on palynology, magnetostratigraphy and correlation with radiometrically dated ash layers, and is temporally correlative to the Torrejonian (Johnson and

Ellis, 2002). It is hypothesized that the high topography associated with the uplift of the Front Range led to increased orographic precipitation on the western margin of the basin that allowed for the development of the Castle Rock rainforest (Johnson and Ellis, 2002; Ellis et al., 2003; Johnson et al., 2003). Cretaceous floras do not display rainforest characteristics, suggesting that rainforests in the Denver Basin did not occur until the Paleocene (Johnson et al., 2003).

The new fossil flora at SS described here has several characteristics in common with the Castle Rock rainforest and with extant sub-tropical to tropical rainforests. These characteristics include: high MAP and MAT estimates, leaf physiognomy characteristics such as presence of drip tips and deeply-emarginate bases (which suggests the leaves may come from vines), dominance of angiosperms, and high spatial heterogeneity across the forest floor. As illustrated in Table 4, the MAT estimated from the flora is comparable to that of the Castle Rock rainforest and the MAP is higher by approximately 1 meter, which is in agreement with the hypothesis that the early Paleocene Front Range generated intense orographic rainfall. Many of the leaves from SS have well-developed drip tips (e.g. GA39, Appendix A), corroborating the high rainfall estimates. In addition, many of the morphotypes exhibit leaf bases that are deeply emarginate (see GA41 in Appendix A). These same morphotypes appear elsewhere in the Denver Basin, but in those floras, the leaves are smaller and they do not possess drip tips or deeply emarginate bases. Also, of the 16 identified taxa of the Castle Rock rainforest, four are shared with the Golden Area flora (dicots *Platanites marginata*, “*Artocarpus*” *lessigiana*, and cf. *Sassafras*, and the fern *Allantodiopsis erosa*).

The SS flora also displays a high spatial heterogeneity across short distances (i.e. <50 m) with respect to dominant taxa, which is similar to the Castle Rock rainforest flora and many modern rainforest settings (Fig. 10). Two patterns are apparent. First, the dominant taxa differ between successive forest floor horizons. In other words, the dominant taxonomic composition

overturns as the forest floor is flooded, dies and then regrows (Fig. 9). Second, the relative abundance of dominant taxa also changes spatially within continuous forest floor horizons (illustrated for the two most common taxa "*Rhamnus*" *goldiana* and *Platanites marginata* in Figure 8). Spatial heterogeneity across laterally continuous intervals such as this suggests an uneven distribution of plant types across a landscape. This is a common feature of modern tropical and sub-tropical rainforests (Morely, 2000), and has been observed for the Castle Rock rainforest as well (Ellis et al., 2003). In previous studies (e.g. Ellis et al., 2003), spatial heterogeneity has been visually assessed using area plots that illustrate the distribution and change in relative abundance of morphotypes across a landscape. Figure 10 shows these area plots for SS horizon B (Fig. 10A), the Castle Rock rainforest (Fig. 10B), a modern heterogeneous, *in-situ* rainforest from Noah's Creek, Australia (Fig. 10C), and a transported sample of Noah's Creek leaves creating a more homogenous leaf assemblage (Fig. 10D). In comparing the four area plots in Figure 10, the changes in relative abundances of morphotypes across the forest floor horizon B at SS (Fig. 10A) is more similar to the distribution of morphotypes and modern species shown in the *in-situ* Noah's Creek rainforest (Fig. 10C) and the Castle Rock rainforest (Fig. 10B). The abundances of morphotypes at the different localities across horizon B at SS are much more variable than the abundances of morphotypes and species at the quarry localities in the homogeneous Noah's Creek assemblage (Fig. 10D). Thus, this provides evidence that the forest floors at SS display spatial heterogeneity, similar to that of the Castle Rock rainforest and to modern tropical rainforests. Additionally, Bray–Curtis distances among localities within the same horizon (horizon B) at SS range from 0.19 to 0.57. Bray–Curtis distances among localities at Castle Rock range from 0.48 to 0.75. The higher range in Bray–Curtis distances for Castle Rock is likely due to the higher diversity at this site (i.e. there is a greater potential for heterogeneity in the spatial distribution of 108 morphotypes at Castle Rock, compared to the 22 morphotypes at SS), but the overlap in the range

of the Bray–Curtis distances between the two sites suggests some level of similar heterogeneity among localities at both sites. Bray–Curtis distances for modern leaf litter from a modern rainforest in Manu, Peru range from 0.35 to 0.85 (Johnson and Ellis, 2002). Again, the overlap in the range of Bray–Curtis distances between SS horizon B and the modern rainforest in Manu suggests similar spatial heterogeneity at both sites.

Overall, the data for SS presented here shows that while diversity is low, there is heterogeneity among trees on the forest floor at a small scale. Because the SS site possesses many characteristics typical of rainforests aside from high species diversity, I hypothesize that the high diversity in mountain proximal floras like the Castle Rock flora appeared later in the Denver Basin. Thus, it would seem as though the earliest Paleocene rainforests (i.e. SS) developed characteristics like high spatial heterogeneity and drip tips first, and only after a couple of million years did high species diversity occur (i.e. the Castle Rock rainforest).

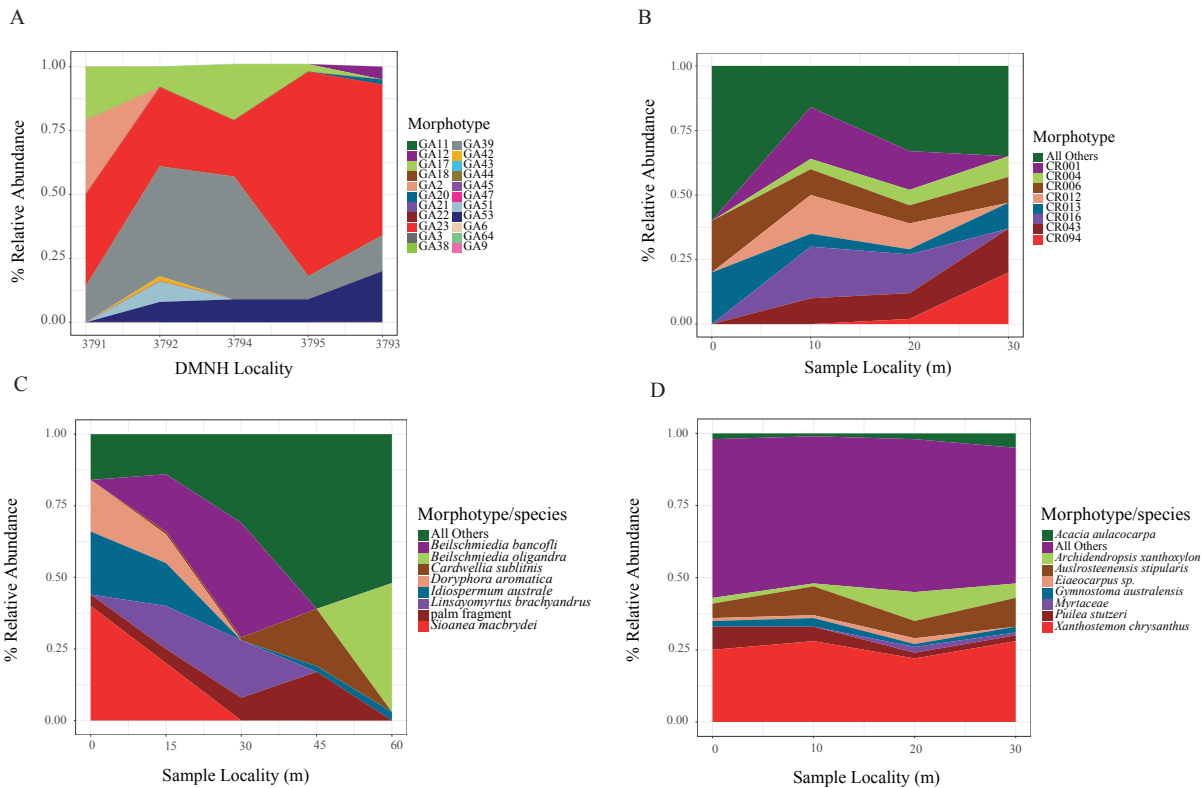


Figure 10: Comparison of Spatial Heterogeneity. A) Relative abundance of all morphotypes at each locality within forest floor horizon B at 6th & Simms. B) Relative abundance of the eight most abundant morphotypes at four quarry localities spanning a 30 meter portion of the Castle Rock exposure. Data from Ellis et al. (2003). C) Relative abundance of the eight most abundant species from four collection localities across a 62 m portion of a tropical forest floor in Noah's Creek, Queensland, Australia. Data from Ellis et al. (2003). D) Relative abundance of the eight most abundant species from four collection localities within a river containing leaves that originated in the Noah's Creek forest. This data is included for the purposes of comparing a heterogeneous leaf assemblage (B, C) to a homogeneous assemblage. Data from Ellis et al. (2003). This comparison suggests that the forest floor horizon B at SS (A) is more similar to the heterogeneous assemblages at Castle Rock and Noah's Creek (B, C) than to the homogeneous assemblage at Noah's Creek (D).

	Loc. 3791	Loc. 3792	Loc. 3794	Loc. 3795
Loc. 3792	0.47			
Loc. 3794	0.43	0.19		
Loc. 3795	0.52	0.49	0.57	
Loc. 3793	0.5	0.47	0.55	0.23

Table 6: **Bray–Curtis Distances for SS Horizon B Localities.** Bray–Curtis distances calculated in R using ‘vegan’ package (Oksanen et al., 2018) for presence/absence data for all four localities of horizon B at SS. Bray–Curtis distances are on a scale from 0 to 1, with 1 being the most dissimilar and 0 being the most similar.

	CR Quarry Z	CR Quarry A	CR Quarry B
CR Quarry A	0.7		
CR Quarry B	0.75	0.48	
CR Quarry C	0.73	0.65	0.52

Table 7: **Bray–Curtis Distances for Castle Rock Quarry Localities.** Bray–Curtis distances calculated in R using ‘vegan’ package (Oksanen et al., 2018) for presence/absence data for all four localities of horizon B at SS. Bray–Curtis distances are on a scale from 0 to 1, with 1 being the most dissimilar and 0 being the most similar.

d. Implications for K-Pg boundary recovery and early Paleocene temperature

Through their analyses of Paleocene floras in the Denver Basin, including the Castle Rock rainforest and the West Bijou Creek flora, Johnson et al. (2003) proposed the hypothesis that the Rocky Mountain front provided “pockets of landscape” that sheltered vegetation from the effects at the K-Pg boundary, resulting in upland refugia in the western margin of the Denver Basin. It seems plausible that the increased orographic rainfall caused by the high topography allowed for the development of these microenvironments where plants could thrive. In addition, the leaves at the Castle Rock site were thick, coriaceous leaves that likely had low nutritional value, which made them unappealing for herbivorous insects (Wilf et al., 2006). This, coupled with the hypothesis that there was low herbivore pressure due to the loss of herbivores in the K-Pg extinction, is likely a contributing factor to the success of the flora at Castle Rock (Wilf et al., 2006).

Evidence supporting the mountain front refugia hypothesis that Johnson et al. (2003) provided comes from the Castle Rock rainforest, and from other early Paleocene sites within the Denver Basin, including the Scotty’s Palm site. This site is similar to Castle Rock, in that it has a relatively high species diversity (79 morphotypes) and suggests a high MAP (179 cm/yr) (Johnson et al., 2003), and yet it is estimated to have lived during the early Paleocene, similar in age to the Golden Area flora. Because the Scotty’s Palm site represents a such a diverse vibrant flora in the early Paleocene, Johnson et al. (2003) hypothesize that the taxa at this site originate from survivors of the extinction, rather than immigrants to the area (Johnson et al., 2003). The new Golden Area floras described here show similar characteristics to the Scotty’s Palm site (the Golden Area flora overall has 64 morphotypes (STM alone has 38 morphotypes) and an average MAP of 230 cm/yr), and, as such, is consistent with this hypothesis put forth by Johnson et al. (2003). However, in

order to test this hypothesis and determine where the Golden Area taxa are derived from, detailed phylogenetic studies of Late Cretaceous and early Paleocene floras of the Denver Basin would need to be conducted.

The MAT and MAP estimates provided here suggest that the climate of the first 200,000 years of the Paleocene in the Denver Basin was warm and wet, which is congruent with the Puercan vertebrate fauna that contains crocodilians, turtles, champsosaurs, and gars (Barclay et al., 2003; Eberle, 2003). These estimates are similar to those from the Castle Rock rainforest, MAT of $21.8 \pm 1.5^{\circ}\text{C}$ and MAP of $204 \text{ cm} +142/-292 \text{ cm}$ (Table 4). It is these warm and wet conditions that likely allowed for the Castled Rock rainforest to develop and flourish. The MAT and MAP estimates from the Golden Area flora, approximately two million years before the Castle Rock rainforest, suggest that the high temperature and precipitation that allowed for the Castle Rock rainforest to develop and thrive had already been achieved by $65.84 \pm 0.21 \text{ Ma}$, just 200 ka after the K-Pg boundary.

VI. Conclusion

In this study, I present analyses of three new earliest Paleocene fossil floras (SS, STM and GMC) referred to here as the Golden Area flora from the Denver Basin. My comparison of these sites shows a few shared dominant taxa but, more interestingly, I found significant heterogeneity in taxonomic composition among the sites. First, at the SS site, there is spatial heterogeneity from east to west across *in-situ* forest floor horizons (approximately 50 meters long). The relative abundance of the dominant morphotaxa in each horizon varies by up to 60% across this 50-meter distance. There is also heterogeneity at the same quarry locality among forest floor horizons, and each horizon has notably different floral compositions. In addition, the three sites of the Golden

Area flora (SS, STM, and GMC) are markedly dissimilar in their flora composition. There are only five taxa common to all three sites, and statistical analyses of the floral communities, including NMDS, DCA, and qualitative comparisons of Bray–Curtis distances, suggest that each site represents its own distinct flora community. Finally, though similar in their low diversity, the Golden Area flora is compositionally distinct from its contemporaneous counterpart in the eastern portion of the Denver Basin, the West Bijou Creek flora. Only eight taxa are shared between the two areas, and statistical comparisons of the plant communities from the two areas suggest dissimilarity.

The new mountain-proximal fossil flora at the SS site in particular provides insight into the origin of the Castle Rock rainforest in the Denver Basin. Like the Castle Rock flora, the SS site exhibits similar characteristics to modern sub-tropical to tropical rainforests, including dominance of angiosperms, rainforest leaf physiognomy, high MAT and MAP, and high spatial heterogeneity. This site further supports the hypothesis that proximity to the topographic front and associated increased orographic rainfall is linked to rainforest evolution. It suggests that floral communities in close proximity to the mountain front, while low diversity, were thriving communities with many rainforest characteristics just 200,000 years after the K-Pg boundary. The low diversity of the site would suggest that the high diversity of rainforests in the Denver Basin appeared two million years later.

There is a great deal of work that can be done in the future to improve our understanding of the Golden Area flora. First, since ANOSIM and PERMANOVA analyses to compare communities can only be done with multiple censuses from each site, returning to STM and census collect in the future would allow for these analyses to be conducted. Though the statistical comparisons conducted here provide evidence for dissimilarity, ANOSIM or PERMANOVA would provide a more robust, statistically significant comparison. Renewed collecting is no longer

possible at GMC because the fossil locality has been paved over, but future exploration and prospecting of the Green Mountain area may lead to the discovery of other coeval fossil sites that can be census collected. In addition, the discovery of other mountain proximal fossil sites in both the Denver Basin and the Raton Basin could further corroborate the hypothesis of rainforest origins. In addition, there is a great deal more work to be done to determine if the upland environments in the Denver Basin were indeed refugia. The vibrant mountain-proximal floras, including the Golden Area, might be derived from survivors that persisted due to refugia, as suggested by Johnson et al., 2003, but in order to test this hypothesis, extensive phylogenetic studies examining the relationships between Late Cretaceous and early Paleocene Denver Basin floras should be conducted.

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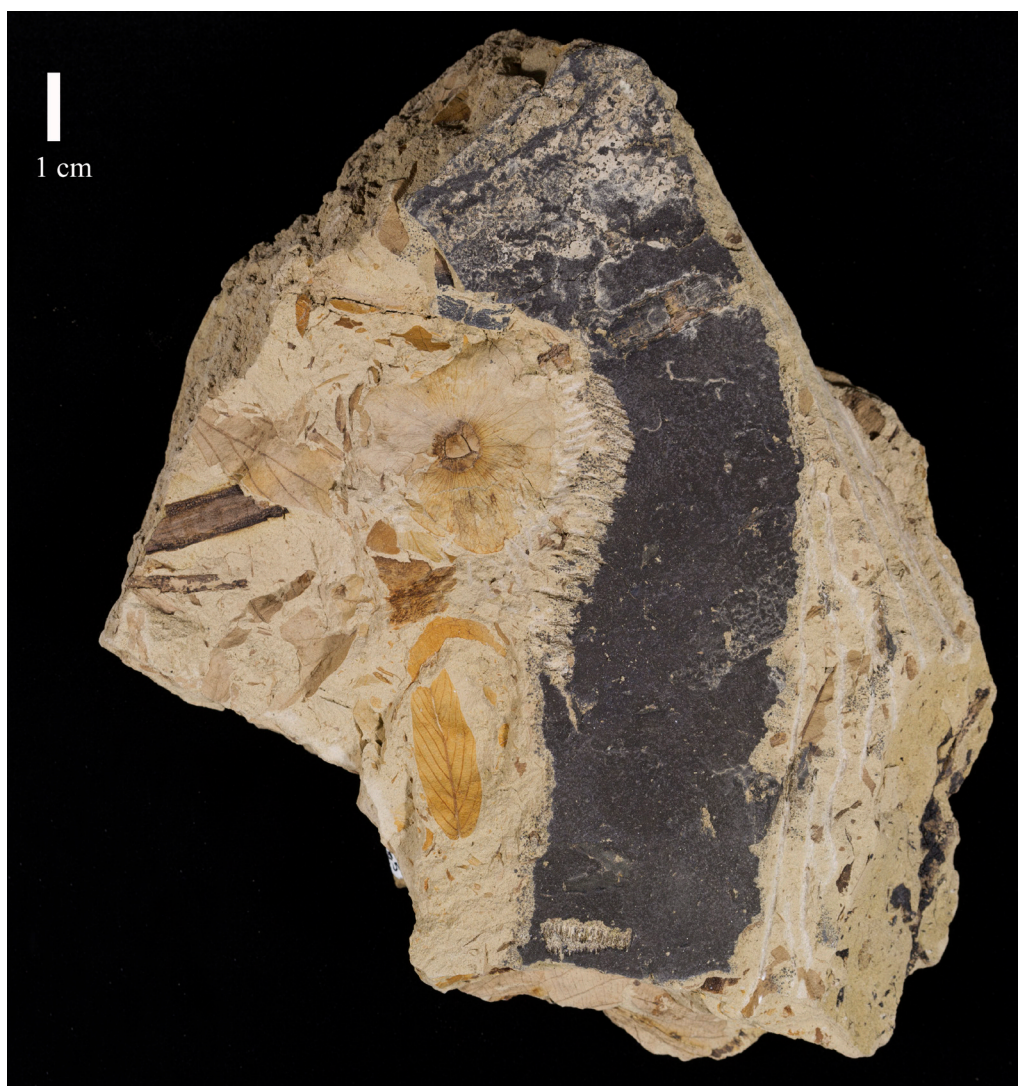
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Appendices

Appendix A: Golden Area Morphotype Descriptions

<i>GAI</i>			Family: Juglandaceae	Genus and Species:	<i>Cyclocarya brownii</i>		
<u>Section I. Leaf Characters</u>			score	description	<u>Section II. Venation</u>		
Leaf Attachment	1	99	n/a		1° Primary Vein Framework	23	99 n/a
Leaf Arrangement	2	99	n/a		Naked Basal Veins	24	99 n/a
Leaf Organization	3	99	n/a		Number of Basal Veins	25	n/a
Leaflet Organization	4	99	n/a		Agrophic Veins	26	99 n/a
Leaflet Attachment	5	99	n/a		2° Major 2o vein framework	27	99 n/a
Petiole Features	6	99	n/a		Interior secondaries	28	99 n/a
Features of the Blade:					Minor secondary course	29	99 n/a
Position of Blade Attachment	7	99	n/a		Perimarginal veins	30	99 n/a
Laminar size	8	99	n/a		Major secondary spacing	31	99 n/a
Laminar L:W ratio	9	n/a			Variation of secondary angle	32	99 n/a
Laminar Shape	10	99	n/a		Major secondary attachment	33	99 n/a
Medial Symmetry	11	99	n/a		Inter- proximal course	34.1	99 n/a
Base Symmetry	12	99	n/a		2° intersecondary length	34.2	99 n/a
Base Symmetry	12	.	-		distal course	34.3	99 n/a
Lobation	13	99	n/a		vein frequency	34.4	99 n/a
Margin Type	14	99	n/a		3° Intercostal tertiary vein fabric	35	99 n/a
Special Margin Features	15	99	n/a		Angle of percurrent tertiaries	35.1.2	99 n/a
Apex Angle	16	99	n/a		vein angle variability	36	99 n/a
Apex Shape	17	99	n/a		Epimedial tertiaries	37	99 n/a
Apex Shape	17	.	-		admedial course	37.2.1	99 n/a
Base Angle	18	99	n/a		exmedial course	37.2.2	99 n/a
Base shape	19	99	n/a		Exterior tertiary course	38	99 n/a
Base shape	19	.	-		4° Quaternary Vein Fabric	39	99 n/a
Terminal Apex Features	20	99	n/a		5° Quinternary Vein Fabric	40	99 n/a
Surface Texture	21	99	n/a		Areolation	41	99 n/a
Surficial Glands	22	99	n/a		FEV branching	42.1	99 n/a
					FEV termination	42.2	99 n/a
					Marginal Ultimate venation	43	99 n/a
<u>Section III. Teeth</u>				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46	n/a					
sinus shape	47	99	n/a				
tooth shapes	48	n/a					
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				
Winged seed with a small nutlet in the center. Veins within circular wings anastomose and bifurcate. The nutlet in the center is approximately 0.5 cm in diameter, and the seed overall is approximately 2 cm in diameter.							



GA1 HM

DNMH spec. # 16605

DMNH loc. # 412

G42

Family:

Genus and Species:

Section I. Leaf Characters			score	description	
Leaf Attachment	1	99	n/a		
Leaf Arrangement	2	99	n/a		
Leaf Organization	3	99	n/a		
Leaflet Organization	4	99	n/a		
Leaflet Attachment	5	99	n/a		
Petiole Features	6	99	n/a		
Features of the Blade:					
Position of Blade Attachment	7	99	n/a		
Laminar size	8	99	n/a		
Laminar L:W ratio	9	99	n/a		
Laminar Shape	10	99	n/a		
Medial Symmetry	11	99	n/a		
Base Symmetry	12	99	n/a		
Base Symmetry	12	.	-		
Lobation	13	99	n/a		
Margin Type	14	99	n/a		
Special Margin Features	15	99	n/a		
Apex Angle	16	99	n/a		
Apex Shape	17	99	n/a		
Apex Shape	17	.	-		
Base Angle	18	99	n/a		
Base shape	19	99	n/a		
Base shape	19	.	-		
Terminal Apex Features	20	99	n/a		
Surface Texture	21	99	n/a		
Surficial Glands	22	99	n/a		
Section III. Teeth			score	description	
Tooth spacing	44	99	n/a		
Number of orders of teeth	45	99	n/a		
Teeth / cm	46	99	n/a		
sinus shape	47	99	n/a		
tooth shapes	48	99	n/a		
tooth shapes	48	99	n/a		
tooth shapes	48	99	n/a		
principal vein	49	99	n/a		
principal vein termination	50	99	n/a		
course of accessory vein	51	99	n/a		
features of the tooth apex	52	99	n/a		
Section II. Venation			char.	score	description
1°	Primary Vein Framework	23	99	n/a	
	Naked Basal Veins	24	99	n/a	
	Number of Basal Veins	25	99	n/a	
	Agrophic Veins	26	99	n/a	
2°	Major 2o vein framework	27	99	n/a	
	Interior secondaries	28	99	n/a	
	Minor secondary course	29	99	n/a	
	Perimarginal veins	30	99	n/a	
	Major secondary spacing	31	99	n/a	
	Variation of secondary angle	32	99	n/a	
	Major secondary attachment	33	99	n/a	
Inter-	proximal course	34.1	99	n/a	
2°	intersecondary length	34.2	99	n/a	
	distal course	34.3	99	n/a	
	vein frequency	34.4	99	n/a	
3°	Intercostal tertiary vein fabric	35	99	n/a	
	Angle of percurrent tertiaries	35.1.2	99	n/a	
	vein angle variability	36	99	n/a	
	Epimedial tertiaries	37	99	n/a	
	admedial course	37.2.1	99	n/a	
	exmedial course	37.2.2	99	n/a	
	Exterior tertiary course	38	99	n/a	
4°	Quaternary Vein Fabric	39	99	n/a	
5°	Quinternary Vein Fabric	40	99	n/a	
	Areolation	41	99	n/a	
	FEV branching	42.1	99	n/a	
	FEV termination	42.2	99	n/a	
	Marginal Ultimate venation	43	99	n/a	
Text Description:					
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry - , Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape - , Base Angle n/a, Base shape n/a, Base shape - , Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.					
Round seed with a diameter greater than 2 cm.					



GA2 HM

DNMH spec. # 48374

DMNH loc. # 500

G43

Family:

Genus and Species:

Section I. Leaf Characters				score	description
Leaf Attachment	1	99	n/a		
Leaf Arrangement	2	99	n/a		
Leaf Organization	3	99	n/a		
Leaflet Organization	4	99	n/a		
Leaflet Attachment	5	99	n/a		
Petiole Features	6	99	n/a		
Features of the Blade:					
Position of Blade Attachment	7	99	n/a		
Laminar size	8	99	n/a		
Laminar L:W ratio	9		n/a		
Laminar Shape	10	99	n/a		
Medial Symmetry	11	99	n/a		
Base Symmetry	12	99	n/a		
Base Symmetry	12	.	-		
Lobation	13	99	n/a		
Margin Type	14	99	n/a		
Special Margin Features	15	99	n/a		
Apex Angle	16	99	n/a		
Apex Shape	17	99	n/a		
Apex Shape	17	.	-		
Base Angle	18	99	n/a		
Base shape	19	99	n/a		
Base shape	19	.	-		
Terminal Apex Features	20	99	n/a		
Surface Texture	21	99	n/a		
Surficial Glands	22	99	n/a		
Section III. Teeth					
Tooth spacing	44	99	n/a		
Number of orders of teeth	45	99	n/a		
Teeth / cm	46		n/a		
sinus shape	47	99	n/a		
tooth shapes	48		n/a		
tooth shapes	48				
tooth shapes	48				
principal vein	49	99	n/a		
principal vein termination	50	99	n/a		
course of accessory vein	51	99	n/a		
features of the tooth apex	52	99	n/a		
Section II. Venation					
Primary Vein Framework	23	99	n/a		
Naked Basal Veins	24	99	n/a		
Number of Basal Veins	25		n/a		
Agrophic Veins	26	99	n/a		
Major 2o vein framework	27	99	n/a		
Interior secondaries	28	99	n/a		
Minor secondary course	29	99	n/a		
Perimarginal veins	30	99	n/a		
Major secondary spacing	31	99	n/a		
Variation of secondary angle	32	99	n/a		
Major secondary attachment	33	99	n/a		
proximal course	34.1	99	n/a		
intersecondary length	34.2	99	n/a		
distal course	34.3	99	n/a		
vein frequency	34.4	99	n/a		
Intercostal tertiary vein fabric	35	99	n/a		
Angle of percurrent tertiaries	35.1.2	99	n/a		
vein angle variability	36	99	n/a		
Epimedial tertiaries	37	99	n/a		
admedial course	37.2.1	99	n/a		
exmedial course	37.2.2	99	n/a		
Exterior tertiary course	38	99	n/a		
Quaternary Vein Fabric	39	99	n/a		
Quinternary Vein Fabric	40	99	n/a		
Areolation	41	99	n/a		
FEV branching	42.1	99	n/a		
FEV termination	42.2	99	n/a		
Marginal Ultimate venation	43	99	n/a		
Text Description:					
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.					
Round seed that is 0.5 cm –2 cm in diameter.					



GA3 HM

DNMH spec. # 46873

DMNH loc. # 412

G44

Family:

Genus and Species:

<u>Section I. Leaf Characters</u>			score	description	
Leaf Attachment	1	99	n/a		
Leaf Arrangement	2	99	n/a		
Leaf Organization	3	99	n/a		
Leaflet Organization	4	99	n/a		
Leaflet Attachment	5	99	n/a		
Petiole Features	6	99	n/a		
Features of the Blade:					
Position of Blade Attachment	7	99	n/a		
Laminar size	8	99	n/a		
Laminar L:W ratio	9		n/a		
Laminar Shape	10	99	n/a		
Medial Symmetry	11	99	n/a		
Base Symmetry	12	99	n/a		
Base Symmetry	12	.	-		
Lobation	13	99	n/a		
Margin Type	14	99	n/a		
Special Margin Features	15	99	n/a		
Apex Angle	16	99	n/a		
Apex Shape	17	99	n/a		
Apex Shape	17	.	-		
Base Angle	18	99	n/a		
Base shape	19	99	n/a		
Base shape	19	.	-		
Terminal Apex Features	20	99	n/a		
Surface Texture	21	99	n/a		
Surficial Glands	22	99	n/a		
<u>Section III. Teeth</u>			score	description	
Tooth spacing	44	99	n/a		
Number of orders of teeth	45	99	n/a		
Teeth / cm	46		n/a		
sinus shape	47	99	n/a		
tooth shapes	48		n/a		
tooth shapes	48				
tooth shapes	48				
tooth shapes	48				
principal vein	49	99	n/a		
principal vein termination	50	99	n/a		
course of accessory vein	51	99	n/a		
features of the tooth apex	52	99	n/a		
<u>Section II. Venation</u>			char.	score	description
1°	Primary Vein Framework	23	99	n/a	
	Naked Basal Veins	24	99	n/a	
	Number of Basal Veins	25		n/a	
	Agrophic Veins	26	99	n/a	
2°	Major 2o vein framework	27	99	n/a	
	Interior secondaries	28	99	n/a	
	Minor secondary course	29	99	n/a	
	Perimarginal veins	30	99	n/a	
	Major secondary spacing	31	99	n/a	
	Variation of secondary angle	32	99	n/a	
	Major secondary attachment	33	99	n/a	
Inter-2°	proximal course	34.1	99	n/a	
	intersecondary length	34.2	99	n/a	
	distal course	34.3	99	n/a	
	vein frequency	34.4	99	n/a	
3°	Intercostal tertiary vein fabric	35	99	n/a	
	Angle of percurrent tertiaries	35.1.2	99	n/a	
	vein angle variability	36	99	n/a	
	Epimedial tertiaries	37	99	n/a	
	admedial course	37.2.1	99	n/a	
	exmedial course	37.2.2	99	n/a	
	Exterior tertiary course	38	99	n/a	
4°	Quaternary Vein Fabric	39	99	n/a	
5°	Quinternary Vein Fabric	40	99	n/a	
	Areolation	41	99	n/a	
	FEV branching	42.1	99	n/a	
	FEV termination	42.2	99	n/a	
	Marginal Ultimate venation	43	99	n/a	
Text Description:					
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L: W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.					
Oblong seed that is less than 0.5 cm in diameter.					



GA4 HM

DNMH spec. # 23769

DMNH loc. # 412

G45

Family:

Genus and Species:

Section I. Leaf Characters			score	description
Leaf Attachment	1	99	n/a	
Leaf Arrangement	2	99	n/a	
Leaf Organization	3	99	n/a	
Leaflet Organization	4	99	n/a	
Leaflet Attachment	5	99	n/a	
Petiole Features	6	99	n/a	
Features of the Blade:				
Position of Blade Attachment	7	99	n/a	
Laminar size	8	99	n/a	
Laminar L:W ratio	9		n/a	
Laminar Shape	10	99	n/a	
Medial Symmetry	11	99	n/a	
Base Symmetry	12	99	n/a	
Base Symmetry	12	.	-	
Lobation	13	99	n/a	
Margin Type	14	99	n/a	
Special Margin Features	15	99	n/a	
Apex Angle	16	99	n/a	
Apex Shape	17	99	n/a	
Apex Shape	17	.	-	
Base Angle	18	99	n/a	
Base shape	19	99	n/a	
Base shape	19	.	-	
Terminal Apex Features	20	99	n/a	
Surface Texture	21	99	n/a	
Surficial Glands	22	99	n/a	
Section III. Teeth				
Tooth spacing	44	99	n/a	
Number of orders of teeth	45	99	n/a	
Teeth / cm	46		n/a	
sinus shape	47	99	n/a	
tooth shapes	48		n/a	
tooth shapes	48			
tooth shapes	48			
principal vein	49	99	n/a	
principal vein termination	50	99	n/a	
course of accessory vein	51	99	n/a	
features of the tooth apex	52	99	n/a	
Section II. Venation				
1°	Primary Vein Framework	23	99	n/a
	Naked Basal Veins	24	99	n/a
	Number of Basal Veins	25		n/a
	Agrophic Veins	26	99	n/a
2°	Major 2o vein framework	27	99	n/a
	Interior secondaries	28	99	n/a
	Minor secondary course	29	99	n/a
	Perimarginal veins	30	99	n/a
	Major secondary spacing	31	99	n/a
	Variation of secondary angle	32	99	n/a
	Major secondary attachment	33	99	n/a
Inter-2°	proximal course	34.1	99	n/a
	intersecondary length	34.2	99	n/a
	distal course	34.3	99	n/a
	vein frequency	34.4	99	n/a
3°	Intercostal tertiary vein fabric	35	99	n/a
	Angle of percurrent tertiaries	35.1.2	99	n/a
	vein angle variability	36	99	n/a
	Epimedial tertiaries	37	99	n/a
	admedial course	37.2.1	99	n/a
	exmedial course	37.2.2	99	n/a
	Exterior tertiary course	38	99	n/a
4°	Quaternary Vein Fabric	39	99	n/a
5°	Quinternary Vein Fabric	40	99	n/a
	Areolation	41	99	n/a
	FEV branching	42.1	99	n/a
	FEV termination	42.2	99	n/a
	Marginal Ultimate venation	43	99	n/a
Text Description:				
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.				
Round seed that is less than 0.5 cm in diameter.				



GA5 HM

DNMH spec. # 48376

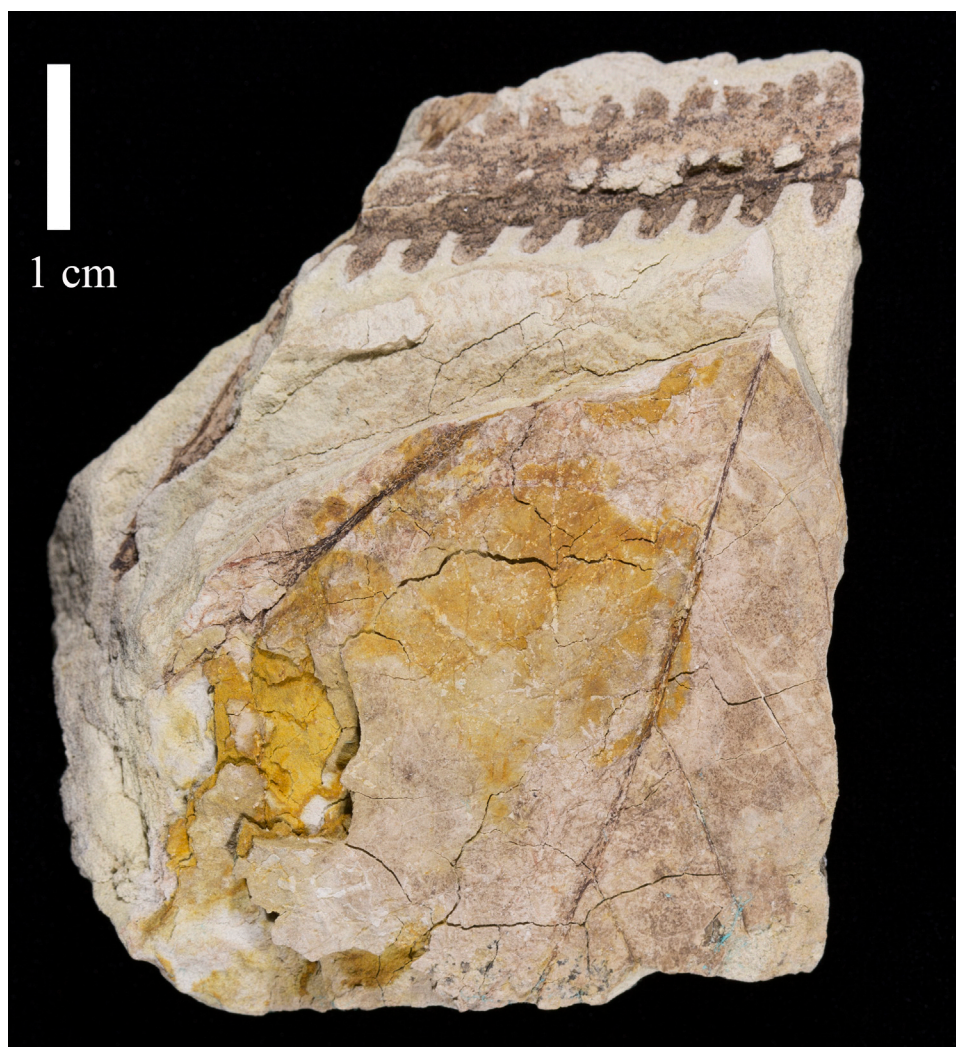
DMNH loc. # 500

G46

Family:

Genus and Species:

Section I. Leaf Characters			Section II. Venation		
	score	description	char.	score	description
Leaf Attachment	1	99 n/a	1° Primary Vein Framework	23	99 n/a
Leaf Arrangement	2	99 n/a	Naked Basal Veins	24	99 n/a
Leaf Organization	3	99 n/a	Number of Basal Veins	25	99 n/a
Leaflet Organization	4	99 n/a	Agrophic Veins	26	99 n/a
Leaflet Attachment	5	99 n/a	2° Major 2o vein framework	27	99 n/a
Petiole Features	6	99 n/a	Interior secondaries	28	99 n/a
Features of the Blade:			Minor secondary course	29	99 n/a
Position of Blade Attachment	7	99 n/a	Perimarginal veins	30	99 n/a
Laminar size	8	99 n/a	Major secondary spacing	31	99 n/a
Laminar L:W ratio	9	99 n/a	Variation of secondary angle	32	99 n/a
Laminar Shape	10	99 n/a	Major secondary attachment	33	99 n/a
Medial Symmetry	11	99 n/a	Inter- proximal course	34.1	99 n/a
Base Symmetry	12	99 n/a	2° intersecondary length	34.2	99 n/a
Base Symmetry	12	-	distal course	34.3	99 n/a
Lobation	13	99 n/a	vein frequency	34.4	99 n/a
Margin Type	14	99 n/a	3° Intercostal tertiary vein fabric	35	99 n/a
Special Margin Features	15	99 n/a	Angle of percurrent tertiaries	35.1.2	99 n/a
Apex Angle	16	99 n/a	vein angle variability	36	99 n/a
Apex Shape	17	99 n/a	Epimedial tertiaries	37	99 n/a
Apex Shape	17	-	admedial course	37.2.1	99 n/a
Base Angle	18	99 n/a	exmedial course	37.2.2	99 n/a
Base shape	19	99 n/a	Exterior tertiary course	38	99 n/a
Base shape	19	-	4° Quaternary Vein Fabric	39	99 n/a
Terminal Apex Features	20	99 n/a	5° Quinternary Vein Fabric	40	99 n/a
Surface Texture	21	99 n/a	Areolation	41	99 n/a
Surficial Glands	22	99 n/a	FEV branching	42.1	99 n/a
			FEV termination	42.2	99 n/a
			Marginal Ultimate venation	43	99 n/a
Section III. Teeth			Text Description:		
Tooth spacing	44	99 n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth /cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.		
Number of orders of teeth	45	99 n/a			
Teeth / cm	46	99 n/a			
sinus shape	47	99 n/a			
tooth shapes	48	99 n/a			
tooth shapes	48	99 n/a			
tooth shapes	48	99 n/a			
tooth shapes	48	99 n/a			
principal vein	49	99 n/a			
principal vein termination	50	99 n/a			
course of accessory vein	51	99 n/a			
features of the tooth apex	52	99 n/a			
Reproductive axis					



GA6 HM

DNMH spec. # 45893

DMNH loc. # 3793

GA7

Family:

Genus and Species:

Section I. Leaf Characters				score	description	
Leaf Attachment	1	99	n/a			
Leaf Arrangement	2	99	n/a			
Leaf Organization	3	99	n/a			
Leaflet Organization	4	99	n/a			
Leaflet Attachment	5	99	n/a			
Petiole Features	6	99	n/a			
Features of the Blade:						
Position of Blade Attachment	7	99	n/a			
Laminar size	8	99	n/a			
Laminar L:W ratio	9		n/a			
Laminar Shape	10	99	n/a			
Medial Symmetry	11	99	n/a			
Base Symmetry	12	99	n/a			
Base Symmetry	12	.	-			
Lobation	13	99	n/a			
Margin Type	14	99	n/a			
Special Margin Features	15	99	n/a			
Apex Angle	16	99	n/a			
Apex Shape	17	99	n/a			
Apex Shape	17	.	-			
Base Angle	18	99	n/a			
Base shape	19	99	n/a			
Base shape	19	.	-			
Terminal Apex Features	20	99	n/a			
Surface Texture	21	99	n/a			
Surficial Glands	22	99	n/a			
Section III. Teeth						
Tooth spacing	44	99	n/a			
Number of orders of teeth	45	99	n/a			
Teeth / cm	46		n/a			
sinus shape	47	99	n/a			
tooth shapes	48		n/a			
tooth shapes	48					
tooth shapes	48					
tooth shapes	48					
principal vein	49	99	n/a			
principal vein termination	50	99	n/a			
course of accessory vein	51	99	n/a			
features of the tooth apex	52	99	n/a			
Section II. Venation				char.	score	description
1°	Primary Vein Framework	23	99	n/a		
	Naked Basal Veins	24	99	n/a		
	Number of Basal Veins	25		n/a		
	Agrophic Veins	26	99	n/a		
2°	Major 2o vein framework	27	99	n/a		
	Interior secondaries	28	99	n/a		
	Minor secondary course	29	99	n/a		
	Perimarginal veins	30	99	n/a		
	Major secondary spacing	31	99	n/a		
	Variation of secondary angle	32	99	n/a		
	Major secondary attachment	33	99	n/a		
Inter-2°	proximal course	34.1	99	n/a		
	intersecondary length	34.2	99	n/a		
	distal course	34.3	99	n/a		
	vein frequency	34.4	99	n/a		
3°	Intercostal tertiary vein fabric	35	99	n/a		
	Angle of percurrent tertiaries	35.1.2	99	n/a		
	vein angle variability	36	99	n/a		
	Epimedial tertiaries	37	99	n/a		
	admedial course	37.2.1	99	n/a		
	exmedial course	37.2.2	99	n/a		
	Exterior tertiary course	38	99	n/a		
4°	Quaternary Vein Fabric	39	99	n/a		
5°	Quinternary Vein Fabric	40	99	n/a		
	Areolation	41	99	n/a		
	FEV branching	42.1	99	n/a		
	FEV termination	42.2	99	n/a		
	Marginal Ultimate venation	43	99	n/a		
Text Description:						
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.						
Bryophyte thallus. Approximately 1 cm in length, 0.5 cm in width. Veintation is not visible.						



GA7 HM

DNMH spec. # 24124

DMNH loc. # 412

G48

Family:

Genus and Species:

<u>Section I. Leaf Characters</u>			<u>Section II. Venation</u>		
	score	description	char.	score	description
Leaf Attachment	1	99 n/a	1° Primary Vein Framework	23	99 n/a
Leaf Arrangement	2	99 n/a	Naked Basal Veins	24	99 n/a
Leaf Organization	3	99 n/a	Number of Basal Veins	25	99 n/a
Leaflet Organization	4	99 n/a	Agrophich Veins	26	99 n/a
Leaflet Attachment	5	99 n/a	2° Major 2o vein framework	27	99 n/a
Petiole Features	6	99 n/a	Interior secondaries	28	99 n/a
Features of the Blade:			Minor secondary course	29	99 n/a
Position of Blade Attachment	7	99 n/a	Perimarginal veins	30	99 n/a
Laminar size	8	99 n/a	Major secondary spacing	31	99 n/a
Laminar L:W ratio	9	99 n/a	Variation of secondary angle	32	99 n/a
Laminar Shape	10	99 n/a	Major secondary attachment	33	99 n/a
Medial Symmetry	11	99 n/a	Inter- proximal course	34.1	99 n/a
Base Symmetry	12	99 n/a	2° intersecondary length	34.2	99 n/a
Base Symmetry	12	-	distal course	34.3	99 n/a
Lobation	13	99 n/a	vein frequency	34.4	99 n/a
Margin Type	14	99 n/a	3° Intercostal tertiary vein fabric	35	99 n/a
Special Margin Features	15	99 n/a	Angle of percurrent tertiaries	35.1.2	99 n/a
Apex Angle	16	99 n/a	vein angle variability	36	99 n/a
Apex Shape	17	99 n/a	Epimedial tertiaries	37	99 n/a
Apex Shape	17	-	admedial course	37.2.1	99 n/a
Base Angle	18	99 n/a	exmedial course	37.2.2	99 n/a
Base shape	19	99 n/a	Exterior tertiary course	38	99 n/a
Base shape	19	-	4° Quaternary Vein Fabric	39	99 n/a
Terminal Apex Features	20	99 n/a	5° Quinternary Vein Fabric	40	99 n/a
Surface Texture	21	99 n/a	Areolation	41	99 n/a
Surficial Glands	22	99 n/a	FEV branching	42.1	99 n/a
			FEV termination	42.2	99 n/a
			Marginal Ultimate venation	43	99 n/a
<u>Section III. Teeth</u>			Text Description:		
Tooth spacing	44	99 n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophich Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.		
Number of orders of teeth	45	99 n/a			
Teeth / cm	46	99 n/a			
sinus shape	47	99 n/a			
tooth shapes	48	99 n/a			
tooth shapes	48				
tooth shapes	48				
tooth shapes	48				
principal vein	49	99 n/a			
principal vein termination	50	99 n/a			
course of accessory vein	51	99 n/a			
features of the tooth apex	52	99 n/a			
Fruiting body.					



GA8 HM

DNMH spec. # 46872

DMNH loc. # 412

G49

Family:

Genus and Species:

Section I. Leaf Characters				score	description	
Leaf Attachment	1	99	n/a			
Leaf Arrangement	2	99	n/a			
Leaf Organization	3	99	n/a			
Leaflet Organization	4	99	n/a			
Leaflet Attachment	5	99	n/a			
Petiole Features	6	99	n/a			
Features of the Blade:						
Position of Blade Attachment	7	99	n/a			
Laminar size	8	99	n/a			
Laminar L:W ratio	9		n/a			
Laminar Shape	10	99	n/a			
Medial Symmetry	11	99	n/a			
Base Symmetry	12	99	n/a			
Base Symmetry	12	.	-			
Lobation	13	99	n/a			
Margin Type	14	99	n/a			
Special Margin Features	15	99	n/a			
Apex Angle	16	99	n/a			
Apex Shape	17	99	n/a			
Apex Shape	17	.	-			
Base Angle	18	99	n/a			
Base shape	19	99	n/a			
Base shape	19	.	-			
Terminal Apex Features	20	99	n/a			
Surface Texture	21	99	n/a			
Surficial Glands	22	99	n/a			
Section II. Venation				char.	score	description
1°	Primary Vein Framework	23	99	n/a		
	Naked Basal Veins	24	99	n/a		
	Number of Basal Veins	25		n/a		
	Agrophic Veins	26	99	n/a		
2°	Major 2o vein framework	27	99	n/a		
	Interior secondaries	28	99	n/a		
	Minor secondary course	29	99	n/a		
	Perimarginal veins	30	99	n/a		
	Major secondary spacing	31	99	n/a		
	Variation of secondary angle	32	99	n/a		
	Major secondary attachment	33	99	n/a		
Inter-2°	proximal course	34.1	99	n/a		
	intersecondary length	34.2	99	n/a		
	distal course	34.3	99	n/a		
	vein frequency	34.4	99	n/a		
3°	Intercostal tertiary vein fabric	35	99	n/a		
	Angle of percurrent tertiaries	35.1.2	99	n/a		
	vein angle variability	36	99	n/a		
	Epimedial tertiaries	37	99	n/a		
	admedial course	37.2.1	99	n/a		
	exmedial course	37.2.2	99	n/a		
	Exterior tertiary course	38	99	n/a		
4°	Quaternary Vein Fabric	39	99	n/a		
5°	Quinternary Vein Fabric	40	99	n/a		
	Areolation	41	99	n/a		
	FEV branching	42.1	99	n/a		
	FEV termination	42.2	99	n/a		
	Marginal Ultimate venation	43	99	n/a		
Section III. Teeth						
Tooth spacing	44	99	n/a			
Number of orders of teeth	45	99	n/a			
Teeth / cm	46		n/a			
sinus shape	47	99	n/a			
tooth shapes	48		n/a			
tooth shapes	48					
tooth shapes	48					
tooth shapes	48					
principal vein	49	99	n/a			
principal vein termination	50	99	n/a			
course of accessory vein	51	99	n/a			
features of the tooth apex	52	99	n/a			
Text Description:						
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.						
Bark.						



GA9 HM

DNMH spec. # 46476

DMNH loc. # 3795

GA10			Family: Selaginellaceae		Genus and Species: Selaginella sp.								
Section I. Leaf Characters			score	description		Section II. Venation			char.	score	description		
Leaf Attachment	1	99	n/a	1°	Primary Vein Framework	23	99	n/a	2°	Major 2o vein framework	27	99	n/a
Leaf Arrangement	2	99	n/a		Naked Basal Veins	24	99	n/a		Interior secondaries	28	99	n/a
Leaf Organization	3	99	n/a		Number of Basal Veins	25		n/a		Minor secondary course	29	99	n/a
Leaflet Organization	4	99	n/a		Agrophic Veins	26	99	n/a		Perimarginal veins	30	99	n/a
Leaflet Attachment	5	99	n/a		Major secondary spacing	31	99	n/a		Variation of secondary angle	32	99	n/a
Petiole Features	6	99	n/a		Major secondary attachment	33	99	n/a		Major secondary attachment	33	99	n/a
Features of the Blade:				Inter-2°	proximal course	34.1	99	n/a	3°	Intercostal tertiary vein fabric	35	99	n/a
Position of Blade Attachment	7	99	n/a		intersecondary length	34.2	99	n/a		Angle of percurrent tertiaries	35.1.2	99	n/a
Laminar size	8	99	n/a		distal course	34.3	99	n/a		vein angle variability	36	99	n/a
Laminar L:W ratio	9		n/a		vein frequency	34.4	99	n/a		Epimedial tertiaries	37	99	n/a
Laminar Shape	10	99	n/a		Intercostal tertiary vein fabric	35	99	n/a		admedial course	37.2.1	99	n/a
Medial Symmetry	11	99	n/a		Angle of percurrent tertiaries	35.1.2	99	n/a		exmedial course	37.2.2	99	n/a
Base Symmetry	12	99	n/a		vein angle variability	36	99	n/a		Exterior tertiary course	38	99	n/a
Base Symmetry	12	.	-		Epimedial tertiaries	37	99	n/a		Quaternary Vein Fabric	39	99	n/a
Lobation	13	99	n/a		admedial course	37.2.1	99	n/a		Quinternary Vein Fabric	40	99	n/a
Margin Type	14	99	n/a		exmedial course	37.2.2	99	n/a		Areolation	41	99	n/a
Special Margin Features	15	99	n/a		Exterior tertiary course	38	99	n/a		FEV branching	42.1	99	n/a
Apex Angle	16	99	n/a	4°	Quaternary Vein Fabric	39	99	n/a	FEV termination	42.2	99	n/a	
Apex Shape	17	99	n/a		5°	Quinternary Vein Fabric	40	99	n/a	Marginal Ultimate venation	43	99	n/a
Apex Shape	17	.	-			Areolation	41	99	n/a				
Base Angle	18	99	n/a			FEV branching	42.1	99	n/a				
Base shape	19	99	n/a	FEV termination		42.2	99	n/a					
Base shape	19	.	-										
Terminal Apex Features	20	99	n/a										
Surface Texture	21	99	n/a										
Surficial Glands	22	99	n/a										
Section III. Teeth				Text Description:									
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.									
Number of orders of teeth	45	99	n/a										
Teeth / cm	46		n/a										
sinus shape	47	99	n/a										
tooth shapes	48		n/a										
tooth shapes	48												
tooth shapes	48												
tooth shapes	48												
principal vein	49	99	n/a										
principal vein termination	50	99	n/a										
course of accessory vein	51	99	n/a										
features of the tooth apex	52	99	n/a										
Branching microphylls approximately 1 cm in length. Central midvein and secondary veins are present.													



GA10 HM

DNMH spec. # 42899

DMNH loc. # 412

GAIL		Family: Dryopteridaceae		Genus and Species: Dryopteris sp.		
Section I. Leaf Characters		score	description			
Leaf Attachment	1	99	n/a			
Leaf Arrangement	2	99	n/a			
Leaf Organization	3	99	n/a			
Leaflet Organization	4	99	n/a			
Leaflet Attachment	5	99	n/a			
Petiole Features	6	99	n/a			
Features of the Blade:						
Position of Blade Attachment	7	99	n/a			
Laminar size	8	99	n/a			
Laminar L:W ratio	9		n/a			
Laminar Shape	10	99	n/a			
Medial Symmetry	11	99	n/a			
Base Symmetry	12	99	n/a			
Base Symmetry	12	.	-			
Lobation	13	99	n/a			
Margin Type	14	99	n/a			
Special Margin Features	15	99	n/a			
Apex Angle	16	99	n/a			
Apex Shape	17	99	n/a			
Apex Shape	17	.	-			
Base Angle	18	99	n/a			
Base shape	19	99	n/a			
Base shape	19	.	-			
Terminal Apex Features	20	99	n/a			
Surface Texture	21	99	n/a			
Surficial Glands	22	99	n/a			
Section II. Venation		char.	score	description		
1°	Primary Vein Framework	23	99	n/a		
	Naked Basal Veins	24	99	n/a		
	Number of Basal Veins	25		n/a		
	Agrophich Veins	26	99	n/a		
2°	Major 2o vein framework	27	99	n/a		
	Interior secondaries	28	99	n/a		
	Minor secondary course	29	99	n/a		
	Perimarginal veins	30	99	n/a		
	Major secondary spacing	31	99	n/a		
	Variation of secondary angle	32	99	n/a		
	Major secondary attachment	33	99	n/a		
Inter-2°	proximal course	34.1	99	n/a		
	intersecondary length	34.2	99	n/a		
	distal course	34.3	99	n/a		
	vein frequency	34.4	99	n/a		
3°	Intercostal tertiary vein fabric	35	99	n/a		
	Angle of percurrent tertiaries	35.1.2	99	n/a		
	vein angle variability	36	99	n/a		
	Epimedial tertiaries	37	99	n/a		
	admedial course	37.2.1	99	n/a		
	exmedial course	37.2.2	99	n/a		
	Exterior tertiary course	38	99	n/a		
4°	Quaternary Vein Fabric	39	99	n/a		
	5°	Quinternary Vein Fabric	40	99	n/a	
		Areolation	41	99	n/a	
		FEV branching	42.1	99	n/a	
FEV termination		42.2	99	n/a		
	Marginal Ultimate venation	43	99	n/a		
Section III. Teeth		Text Description:				
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophich Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.		
Number of orders of teeth	45	99	n/a			
Teeth / cm	46		n/a			
sinus shape	47	99	n/a			
tooth shapes	48		n/a			
tooth shapes	48					
tooth shapes	48					
tooth shapes	48					
principal vein	49	99	n/a			
principal vein termination	50	99	n/a			
course of accessory vein	51	99	n/a			
features of the tooth apex	52	99	n/a			
FronD organization is pinnate-pinnatifid to bipinnate-pinnatifid; rachis gracile and deflected slightly at the origin of the pinnae. Pinnae are pinnate, oblong in shape, alternate, and vary in size from approximately 1 cm to 0.2 cm. Pinnules are alternate and oblong; approximately 0.3 cm in length and less than 0.1 cm in width. Midveins						



GA11 HM

DNMH spec. # 23782

DMNH loc. # 412

GA12		Family: Dryopteridaceae		Genus and Species: Allantodiopsis erosa				
Section I. Leaf Characters		score	description	Section II. Venation				
Leaf Attachment	1	99	n/a	1°	Primary Vein Framework	23	99	n/a
Leaf Arrangement	2	99	n/a		Naked Basal Veins	24	99	n/a
Leaf Organization	3	99	n/a		Number of Basal Veins	25		n/a
Leaflet Organization	4	99	n/a		Agrophich Veins	26	99	n/a
Leaflet Attachment	5	99	n/a	2°	Major 2o vein framework	27	99	n/a
Petiole Features	6	99	n/a		Interior secondaries	28	99	n/a
Features of the Blade:					Minor secondary course	29	99	n/a
Position of Blade Attachment	7	99	n/a		Perimarginal veins	30	99	n/a
Laminar size	8	99	n/a		Major secondary spacing	31	99	n/a
Laminar L:W ratio	9		n/a		Variation of secondary angle	32	99	n/a
Laminar Shape	10	99	n/a		Major secondary attachment	33	99	n/a
Medial Symmetry	11	99	n/a	Inter-2°	proximal course	34.1	99	n/a
Base Symmetry	12	99	n/a		intersecondary length	34.2	99	n/a
Base Symmetry	12	.	-		distal course	34.3	99	n/a
Lobation	13	99	n/a		vein frequency	34.4	99	n/a
Margin Type	14	99	n/a	3°	Intercostal tertiary vein fabric	35	99	n/a
Special Margin Features	15	99	n/a		Angle of percurrent tertiaries	35.1.2	99	n/a
Apex Angle	16	99	n/a		vein angle variability	36	99	n/a
Apex Shape	17	99	n/a		Epimedial tertiaries	37	99	n/a
Apex Shape	17	.	-		admedial course	37.2.1	99	n/a
Base Angle	18	99	n/a		exmedial course	37.2.2	99	n/a
Base shape	19	99	n/a		Exterior tertiary course	38	99	n/a
Base shape	19	.	-	4°	Quaternary Vein Fabric	39	99	n/a
Terminal Apex Features	20	99	n/a	5°	Quinternary Vein Fabric	40	99	n/a
Surface Texture	21	99	n/a		Areolation	41	99	n/a
Surficial Glands	22	99	n/a		FEV branching	42.1	99	n/a
					FEV termination	42.2	99	n/a
					Marginal Ultimate venation	43	99	n/a
Section III. Teeth				Text Description:				
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry - , Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape - , Base Angle n/a, Base shape n/a, Base shape - , Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophich Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.				
Number of orders of teeth	45	99	n/a					
Teeth / cm	46		n/a					
sinus shape	47	99	n/a					
tooth shapes	48		n/a					
tooth shapes	48							
tooth shapes	48							
tooth shapes	48							
principal vein	49	99	n/a					
principal vein termination	50	99	n/a					
course of accessory vein	51	99	n/a					
features of the tooth apex	52	99	n/a					
Frond organization is unknown; rachis is not present. Pinna is pinnatifid and oblong and approximately 4 cm –5 cm in length. Secondary veins bifurcate and terminate at the margin.								



GA12 HM

DNMH spec. # 46488

DMNH loc. # 3791

GAI3

Family: Dryopteridaceae

Genus and Species:

Onoclea hesperia

Section I. Leaf Characters				Section II. Venation			
	score		description		char.	score	description
Leaf Attachment	1	99	n/a	1°	Primary Vein Framework	23	99 n/a
Leaf Arrangement	2	99	n/a		Naked Basal Veins	24	99 n/a
Leaf Organization	3	99	n/a		Number of Basal Veins	25	n/a
Leaflet Organization	4	99	n/a		Agrophic Veins	26	99 n/a
Leaflet Attachment	5	99	n/a	2°	Major 2o vein framework	27	99 n/a
Petiole Features	6	99	n/a		Interior secondaries	28	99 n/a
Features of the Blade:					Minor secondary course	29	99 n/a
Position of Blade Attachment	7	99	n/a		Perimarginal veins	30	99 n/a
Laminar size	8	99	n/a		Major secondary spacing	31	99 n/a
Laminar L:W ratio	9		n/a		Variation of secondary angle	32	99 n/a
Laminar Shape	10	99	n/a		Major secondary attachment	33	99 n/a
Medial Symmetry	11	99	n/a	Inter-2°	proximal course	34.1	99 n/a
Base Symmetry	12	99	n/a		intersecondary length	34.2	99 n/a
Base Symmetry	12	.	-		distal course	34.3	99 n/a
Lobation	13	99	n/a		vein frequency	34.4	99 n/a
Margin Type	14	99	n/a	3°	Intercostal tertiary vein fabric	35	99 n/a
Special Margin Features	15	99	n/a		Angle of percurrent tertiaries	35.1.2	99 n/a
Apex Angle	16	99	n/a		vein angle variability	36	99 n/a
Apex Shape	17	99	n/a		Epimedial tertiaries	37	99 n/a
Apex Shape	17	.	-		admedial course	37.2.1	99 n/a
Base Angle	18	99	n/a		exmedial course	37.2.2	99 n/a
Base shape	19	99	n/a		Exterior tertiary course	38	99 n/a
Base shape	19	.	-	4°	Quaternary Vein Fabric	39	99 n/a
Terminal Apex Features	20	99	n/a	5°	Quinternary Vein Fabric	40	99 n/a
Surface Texture	21	99	n/a		Areolation	41	99 n/a
Surficial Glands	22	99	n/a		FEV branching	42.1	99 n/a
					FEV termination	42.2	99 n/a
					Marginal Ultimate venation	43	99 n/a
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				

FronD organization bipinnatifid to bipinnate-pinnatifid; rachis stout. Pinnae are pinnate and oblong; alternate. Pinnules are oblong to ovate, approximately 1 cm in length and 0.8 cm in width; opposite. Midvein is not present. Secondary veins are reticulate.

Froned organization bipinnatifid to bipinnate-pinnatifid; rachis stout. Pinnae are pinnate and oblong; alternate. Pinnules are oblong to ovate, apprximately 1 cm in length and 0.8 cm in width; opposite. Midvein is not present. Secondary veins are reticulate.



GA13 HM

DNMH spec. # 23780

DMNH loc. # 412

GA14			Family:	Genus and Species:		
Section I. Leaf Characters			score	description		
Leaf Attachment	1	99	n/a			
Leaf Arrangement	2	99	n/a			
Leaf Organization	3	99	n/a			
Leaflet Organization	4	99	n/a			
Leaflet Attachment	5	99	n/a			
Petiole Features	6	99	n/a			
Features of the Blade:						
Position of Blade Attachment	7	99	n/a			
Laminar size	8	99	n/a			
Laminar L:W ratio	9		n/a			
Laminar Shape	10	99	n/a			
Medial Symmetry	11	99	n/a			
Base Symmetry	12	99	n/a			
Base Symmetry	12	.	-			
Lobation	13	99	n/a			
Margin Type	14	99	n/a			
Special Margin Features	15	99	n/a			
Apex Angle	16	99	n/a			
Apex Shape	17	99	n/a			
Apex Shape	17	.	-			
Base Angle	18	99	n/a			
Base shape	19	99	n/a			
Base shape	19	.	-			
Terminal Apex Features	20	99	n/a			
Surface Texture	21	99	n/a			
Surficial Glands	22	99	n/a			
Section II. Venation				char.	score	description
1°				Primary Vein Framework	23	99 n/a
				Naked Basal Veins	24	99 n/a
				Number of Basal Veins	25	n/a
				Agrophic Veins	26	99 n/a
2°				Major 2o vein framework	27	99 n/a
				Interior secondaries	28	99 n/a
				Minor secondary course	29	99 n/a
				Perimarginal veins	30	99 n/a
				Major secondary spacing	31	99 n/a
				Variation of secondary angle	32	99 n/a
				Major secondary attachment	33	99 n/a
Inter-2°				proximal course	34.1	99 n/a
				intersecondary length	34.2	99 n/a
				distal course	34.3	99 n/a
				vein frequency	34.4	99 n/a
3°				Intercostal tertiary vein fabric	35	99 n/a
				Angle of percurrent tertiaries	35.1.2	99 n/a
				vein angle variability	36	99 n/a
				Epimedial tertiaries	37	99 n/a
				admedial course	37.2.1	99 n/a
				exmedial course	37.2.2	99 n/a
				Exterior tertiary course	38	99 n/a
4°				Quaternary Vein Fabric	39	99 n/a
5°				Quinternary Vein Fabric	40	99 n/a
				Areolation	41	99 n/a
				FEV branching	42.1	99 n/a
				FEV termination	42.2	99 n/a
				Marginal Ultimate venation	43	99 n/a
Section III. Teeth				Text Description:		
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.		
Number of orders of teeth	45	99	n/a			
Teeth / cm	46		n/a			
sinus shape	47	99	n/a			
tooth shapes	48		n/a			
tooth shapes	48					
tooth shapes	48					
tooth shapes	48					
principal vein	49	99	n/a			
principal vein termination	50	99	n/a			
course of accessory vein	51	99	n/a			
features of the tooth apex	52	99	n/a			
Frond organization pinnatifid to pinnate; rachis stout. Pinnae are simple, linear, approximately 2 cm in length and 0.5 cm in width; alternate. Secondary veins terminate at the margins.						



GA14 HM

DNMH spec. # 42890

DMNH loc. # 413

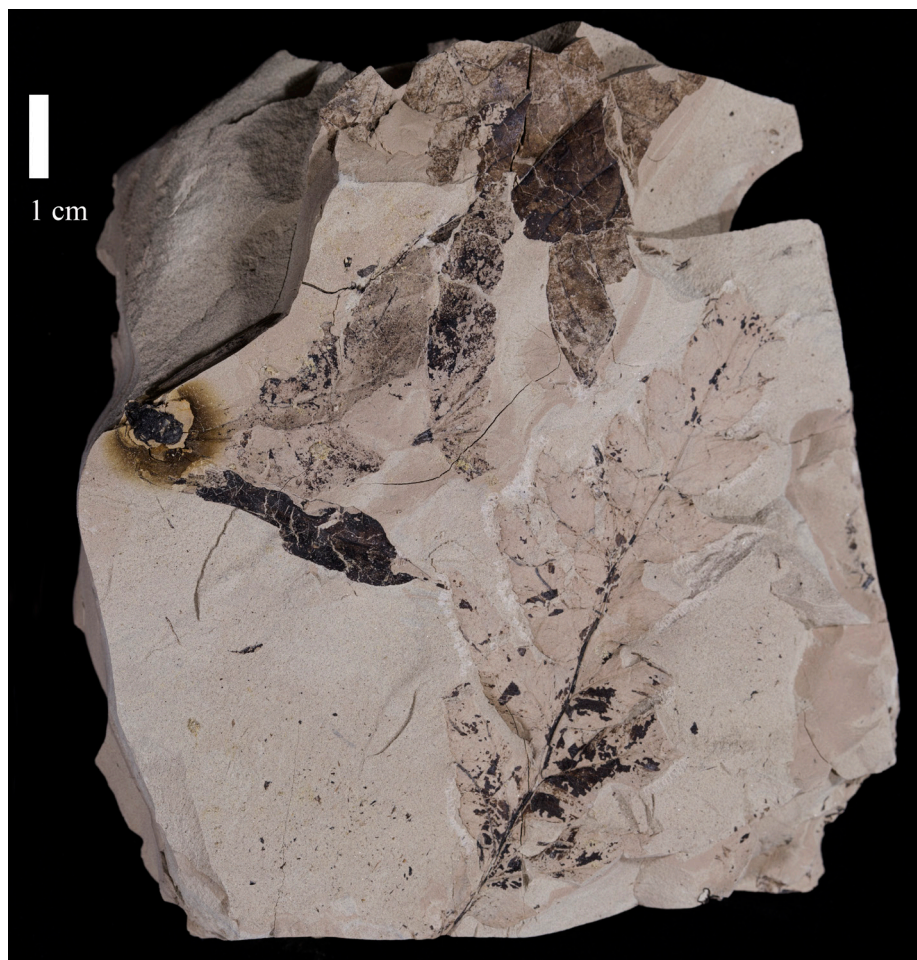
GA15

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
	score	description		char.	score	description	
Leaf Attachment	1	99	n/a	1 st	23	99	Primary Vein Framework
Leaf Arrangement	2	99	n/a		24	99	Naked Basal Veins
Leaf Organization	3	99	n/a		25		Number of Basal Veins
Leaflet Organization	4	99	n/a		26	99	Agrophic Veins
Leaflet Attachment	5	99	n/a	2 nd	27	99	Major 2o vein framework
Petiole Features	6	99	n/a		28	99	Interior secondaries
Features of the Blade:					29	99	Minor secondary course
Position of Blade Attachment	7	99	n/a		30	99	Perimarginal veins
Laminar size	8	99	n/a		31	99	Major secondary spacing
Laminar L:W ratio	9		n/a		32	99	Variation of secondary angle
Laminar Shape	10	99	n/a		33	99	Major secondary attachment
Medial Symmetry	11	99	n/a	Inter-2 nd	34.1	99	proximal course
Base Symmetry	12	99	n/a		34.2	99	intersecondary length
Base Symmetry	12	.	-		34.3	99	distal course
Lobation	13	99	n/a		34.4	99	vein frequency
Margin Type	14	99	n/a	3 rd	35	99	Intercostal tertiary vein fabric
Special Margin Features	15	99	n/a		35.1.2	99	Angle of percurrent tertiaries
Apex Angle	16	99	n/a		36	99	vein angle variability
Apex Shape	17	99	n/a		37	99	Epimedial tertiaries
Apex Shape	17	.	-		37.2.1	99	admedial course
Base Angle	18	99	n/a		37.2.2	99	exmedial course
Base shape	19	99	n/a		38	99	Exterior tertiary course
Base shape	19	.	-	4 th	39	99	Quaternary Vein Fabric
Terminal Apex Features	20	99	n/a	5 th	40	99	Quinternary Vein Fabric
Surface Texture	21	99	n/a		41	99	Areolation
Surficial Glands	22	99	n/a		42.1	99	FEV branching
					42.2	99	FEV termination
					43	99	Marginal Ultimate venation
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				

Frond organization pinnate to pinnate-pinnatifid; rachis gracile. Pinnae are simple to pinnate, ovate, range in length from approximately 1.5 cm to 0.5 cm and are 0.5 cm in width; alternate. Secondary veins terminate at the margins.



GA15 HM

DNMH spec. # 48361

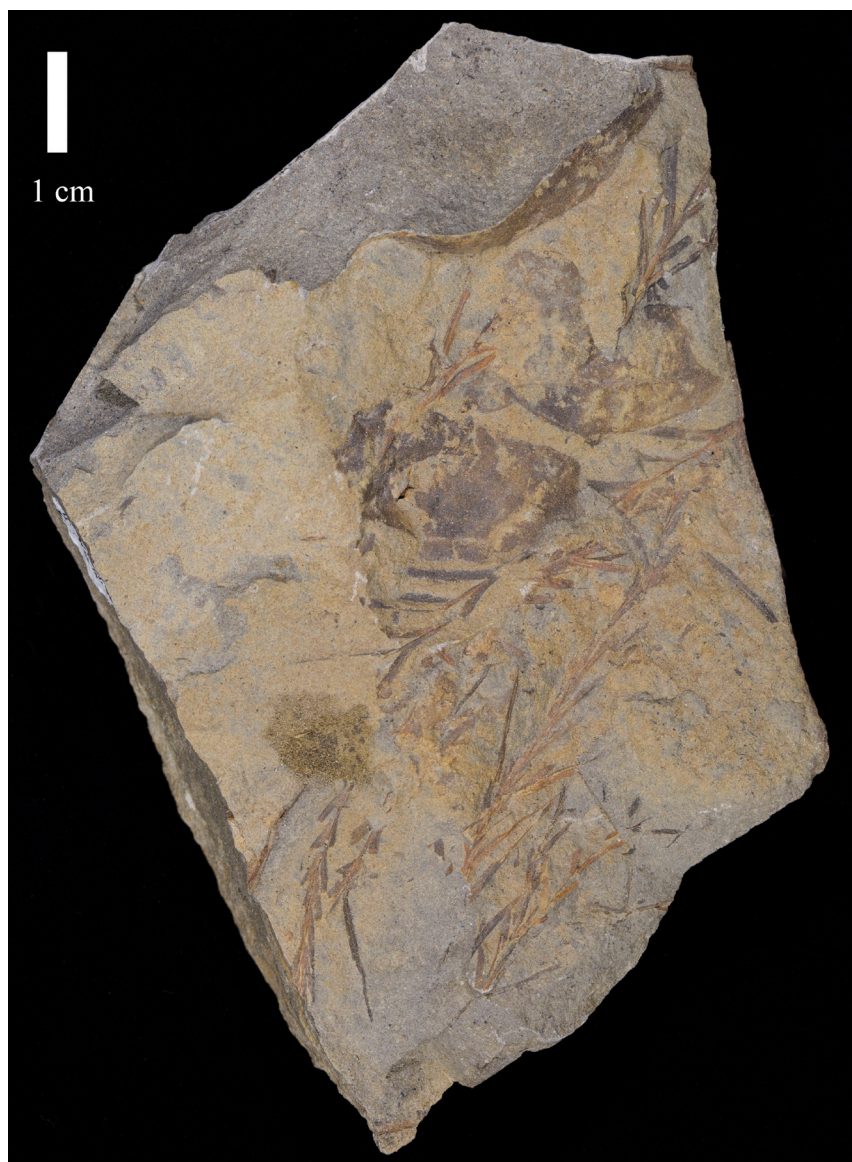
DMNH loc. # 500

GA16

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
		score	description		char.	score	description
Leaf Attachment	1	99	n/a	1°	Primary Vein Framework	23	99 n/a
Leaf Arrangement	2	99	n/a		Naked Basal Veins	24	99 n/a
Leaf Organization	3	99	n/a		Number of Basal Veins	25	n/a
Leaflet Organization	4	99	n/a		Agrophic Veins	26	99 n/a
Leaflet Attachment	5	99	n/a	2°	Major 2o vein framework	27	99 n/a
Petiole Features	6	99	n/a		Interior secondaries	28	99 n/a
Features of the Blade:					Minor secondary course	29	99 n/a
Position of Blade Attachment	7	99	n/a		Perimarginal veins	30	99 n/a
Laminar size	8	99	n/a		Major secondary spacing	31	99 n/a
Laminar L:W ratio	9		n/a		Variation of secondary angle	32	99 n/a
Laminar Shape	10	99	n/a		Major secondary attachment	33	99 n/a
Medial Symmetry	11	99	n/a	Inter-2°	proximal course	34.1	99 n/a
Base Symmetry	12	99	n/a		intersecondary length	34.2	99 n/a
Base Symmetry	12	.	-		distal course	34.3	99 n/a
Lobation	13	99	n/a		vein frequency	34.4	99 n/a
Margin Type	14	99	n/a	3°	Intercostal tertiary vein fabric	35	99 n/a
Special Margin Features	15	99	n/a		Angle of percurrent tertiaries	35.1.2	99 n/a
Apex Angle	16	99	n/a		vein angle variability	36	99 n/a
Apex Shape	17	99	n/a		Epimedial tertiaries	37	99 n/a
Apex Shape	17	.	-		admedial course	37.2.1	99 n/a
Base Angle	18	99	n/a		exmedial course	37.2.2	99 n/a
Base shape	19	99	n/a		Exterior tertiary course	38	99 n/a
Base shape	19	.	-	4°	Quaternary Vein Fabric	39	99 n/a
Terminal Apex Features	20	99	n/a	5°	Quinternary Vein Fabric	40	99 n/a
					Areolation	41	99 n/a
Surface Texture	21	99	n/a		FEV branching	42.1	99 n/a
Surficial Glands	22	99	n/a		FEV termination	42.2	99 n/a
					Marginal Ultimate venation	43	99 n/a
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				
Conifer needles ranging in lenght from approximately 1 cm to 0.2 cm.							



GA16 HM

DNMH spec. # 48364

DMNH loc. # 500

GAI7

Family:

Genus and Species:

<u>Section I. Leaf Characters</u>				<u>Section II. Venation</u>				
		score	description		char.	score	description	
	Leaf Attachment	1	99 n/a	1°	Primary Vein Framework	23	99 n/a	
	Leaf Arrangement	2	99 n/a		Naked Basal Veins	24	99 n/a	
	Leaf Organization	3	99 n/a		Number of Basal Veins	25	99 n/a	
	Leaflet Organization	4	99 n/a		Agrophich Veins	26	99 n/a	
	Leaflet Attachment	5	99 n/a	2°	Major 2o vein framework	27	99 n/a	
	Petiole Features	6	99 n/a		Interior secondaries	28	99 n/a	
Features of the Blade:			Minor secondary course		29	99 n/a		
			Perimarginal veins		30	99 n/a		
			Major secondary spacing	31	99 n/a			
			Variation of secondary angle	32	99 n/a			
Position of Blade Attachment	Laminar size	8	99 n/a		Major secondary attachment	33	99 n/a	
	Laminar L:W ratio	9	99 n/a		Inter-2°	proximal course	34.1	99 n/a
	Laminar Shape	10	99 n/a			intersecondary length	34.2	99 n/a
	Medial Symmetry	11	99 n/a			distal course	34.3	99 n/a
	Base Symmetry	12	99 n/a	3°		vein frequency	34.4	99 n/a
	Base Symmetry	12	-		Intercostal tertiary vein fabric	35	99 n/a	
	Lobation	13	99 n/a		Angle of percurrent tertiaries	35.1.2	99 n/a	
	Margin Type	14	99 n/a		vein angle variability	36	99 n/a	
	Special Margin Features	Apex Angle	16	99 n/a	Epimedial tertiaries	37	99 n/a	
		Apex Shape	17	99 n/a	admedial course	37.2.1	99 n/a	
		Apex Shape	17	-	exmedial course	37.2.2	99 n/a	
		Base Angle	18	99 n/a	4°	Exterior tertiary course	38	99 n/a
Base shape		19	99 n/a	Quaternary Vein Fabric		39	99 n/a	
Base shape		19	-	5°		Quinternary Vein Fabric	40	99 n/a
Terminal Apex Features	20	99 n/a	Areolation			41	99 n/a	
Surface Texture	21	99 n/a	FEV branching		42.1	99 n/a		
	Surficial Glands	22	99 n/a		FEV termination	42.2	99 n/a	
				Marginal Ultimate venation	43	99 n/a		
<u>Section III. Teeth</u>				<u>Text Description:</u>				
Tooth spacing	44	99 n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophich Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.					
	Number of orders of teeth	45						99 n/a
	Teeth / cm	46						99 n/a
	sinus shape	47						99 n/a
	tooth shapes	48						99 n/a
	tooth shapes	48						
	tooth shapes	48						
	tooth shapes	48						
	principal vein	49						99 n/a
	principal vein termination	50						99 n/a
	course of accessory vein	51						99 n/a
	features of the tooth apex	52						99 n/a
Leaflet of pinnate palm leaf with parallel veins.								

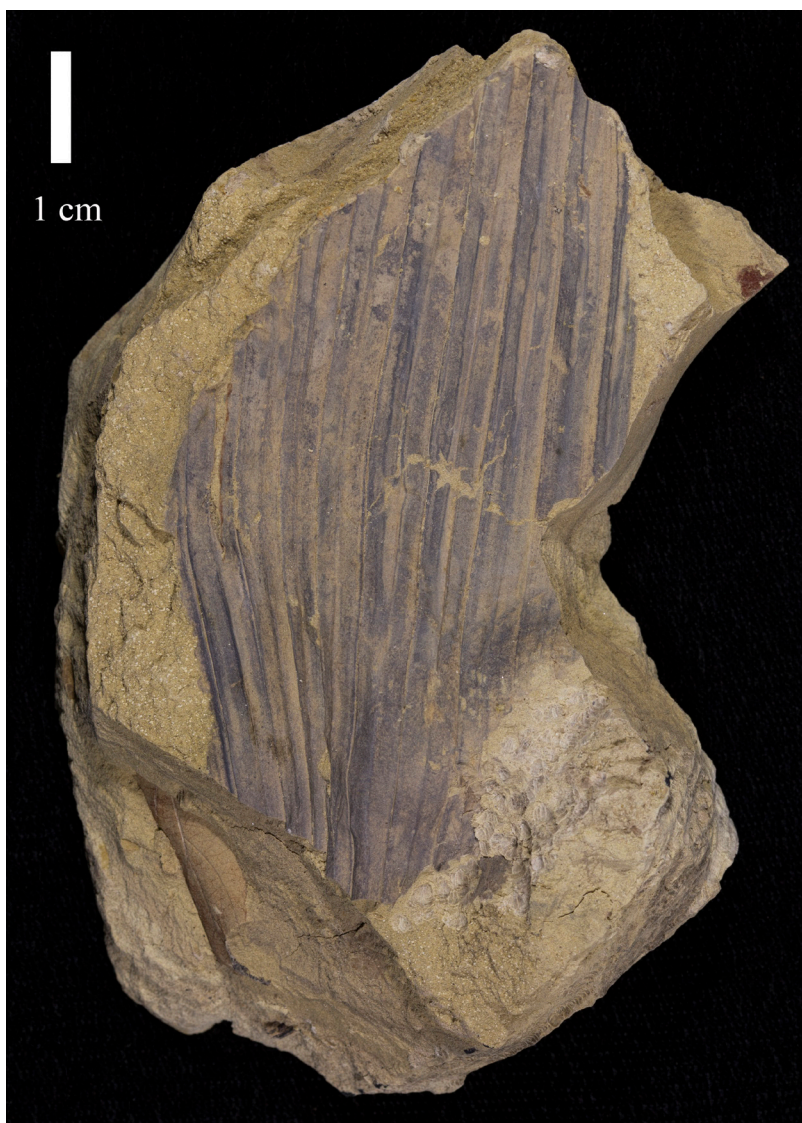


GA17 HM

DNMH spec. # 46475

DMNH loc. # 3791

<i>GA18</i>			Family:	Genus and Species:	<i>Paleoreodoxites</i>		
<i>Section I. Leaf Characters</i>			score	description	<i>Section II. Venation</i>		
					char.	score	description
Leaf Attachment	1	99	n/a	1*	Primary Vein Framework	23	99 n/a
Leaf Arrangement	2	99	n/a		Naked Basal Veins	24	99 n/a
Leaf Organization	3	99	n/a		Number of Basal Veins	25	99 n/a
Leaflet Organization	4	99	n/a		Agrophic Veins	26	99 n/a
Leaflet Attachment	5	99	n/a	2*	Major 2o vein framework	27	99 n/a
Petiole Features	6	99	n/a		Interior secondaries	28	99 n/a
					Minor secondary course	29	99 n/a
					Perimarginal veins	30	99 n/a
Features of the Blade:					Major secondary spacing	31	99 n/a
Position of Blade Attachment	7	99	n/a		Variation of secondary angle	32	99 n/a
Laminar size	8	99	n/a		Major secondary attachment	33	99 n/a
Laminar L:W ratio	9	99	n/a	Inter-2*	proximal course	34.1	99 n/a
Laminar Shape	10	99	n/a		intersecondary length	34.2	99 n/a
Medial Symmetry	11	99	n/a		distal course	34.3	99 n/a
Base Symmetry	12	99	n/a		vein frequency	34.4	99 n/a
Base Symmetry	12	.	-	3	Intercostal tertiary vein fabric	35	99 n/a
Lobation	13	99	n/a		Angle of percurrent tertiaries	35.1.2	99 n/a
Margin Type	14	99	n/a		vein angle variability	36	99 n/a
Special Margin Features	15	99	n/a		Epimedial tertiaries	37	99 n/a
Apex Angle	16	99	n/a	4*	admedial course	37.2.1	99 n/a
Apex Shape	17	99	n/a		exmedial course	37.2.2	99 n/a
Apex Shape	17	.	-		Exterior tertiary course	38	99 n/a
Base Angle	18	99	n/a		Quaternary Vein Fabric	39	99 n/a
Base shape	19	99	n/a	5*	Quinternary Vein Fabric	40	99 n/a
Base shape	19	.	-		Areolation	41	99 n/a
Terminal Apex Features	20	99	n/a		FEV branching	42.1	99 n/a
					FEV termination	42.2	99 n/a
Surface Texture	21	99	n/a		Marginal Ultimate venation	43	99 n/a
Surficial Glands	22	99	n/a				
<i>Section III. Teeth</i>				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46	99	n/a				
sinus shape	47	99	n/a				
tooth shapes	48	99	n/a				
tooth shapes	48	99	n/a				
tooth shapes	48	99	n/a				
tooth shapes	48	99	n/a				
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				
Partial leaflet of palm leaf with parallel veins.							



GA18 HM

DNMH spec. # 46481

DMNH loc. # 3791

GAI9

Family: Arecaceae

Genus and Species:

Sabalites sp.

<u>Section I. Leaf Characters</u>			score	description	
Leaf Attachment	1	99	n/a		
Leaf Arrangement	2	99	n/a		
Leaf Organization	3	99	n/a		
Leaflet Organization	4	99	n/a		
Leaflet Attachment	5	99	n/a		
Petiole Features	6	99	n/a		
Features of the Blade:					
Position of Blade Attachment	7	99	n/a		
Laminar size	8	99	n/a		
Laminar L:W ratio	9		n/a		
Laminar Shape	10	99	n/a		
Medial Symmetry	11	99	n/a		
Base Symmetry	12	99	n/a		
Base Symmetry	12	.	-		
Lobation	13	99	n/a		
Margin Type	14	99	n/a		
Special Margin Features	15	99	n/a		
Apex Angle	16	99	n/a		
Apex Shape	17	99	n/a		
Apex Shape	17	.	-		
Base Angle	18	99	n/a		
Base shape	19	99	n/a		
Base shape	19	.	-		
Terminal Apex Features	20	99	n/a		
Surface Texture	21	99	n/a		
Surficial Glands	22	99	n/a		
<u>Section III. Teeth</u>					
Tooth spacing	44	99	n/a		
Number of orders of teeth	45	99	n/a		
Teeth / cm	46		n/a		
sinus shape	47	99	n/a		
tooth shapes	48		n/a		
tooth shapes	48				
tooth shapes	48				
tooth shapes	48				
principal vein	49	99	n/a		
principal vein termination	50	99	n/a		
course of accessory vein	51	99	n/a		
features of the tooth apex	52	99	n/a		
<u>Section II. Venation</u>				char.	score
1°	Primary Vein Framework	23	99	n/a	
	Naked Basal Veins	24	99	n/a	
	Number of Basal Veins	25		n/a	
	Agrophic Veins	26	99	n/a	
2°	Major 2o vein framework	27	99	n/a	
	Interior secondaries	28	99	n/a	
	Minor secondary course	29	99	n/a	
	Perimarginal veins	30	99	n/a	
	Major secondary spacing	31	99	n/a	
	Variation of secondary angle	32	99	n/a	
	Major secondary attachment	33	99	n/a	
Inter-2°	proximal course	34.1	99	n/a	
	intersecondary length	34.2	99	n/a	
	distal course	34.3	99	n/a	
	vein frequency	34.4	99	n/a	
3°	Intercostal tertiary vein fabric	35	99	n/a	
	Angle of percurrent tertiaries	35.1.2	99	n/a	
	vein angle variability	36	99	n/a	
	Epimedial tertiaries	37	99	n/a	
	admedial course	37.2.1	99	n/a	
	exmedial course	37.2.2	99	n/a	
	Exterior tertiary course	38	99	n/a	
4°	Quaternary Vein Fabric	39	99	n/a	
5°	Quinternary Vein Fabric	40	99	n/a	
	Areolation	41	99	n/a	
	FEV branching	42.1	99	n/a	
	FEV termination	42.2	99	n/a	
	Marginal Ultimate venation	43	99	n/a	
Text Description:					
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a					
Costapalmate leaf.					



GA19 HM

DNMH spec. # 48369

DMNH loc. # 500

GA20		Family: Nelumbonaceae		Genus and Species:		Paleonelumbo macroloba								
Section I. Leaf Characters				score	description		Section II. Venation				char.	score	description	
Leaf Attachment	1	88	not visible					1°	Primary Vein Framework	23	23.2	palmate		
Leaf Arrangement	2	88	not visible						Naked Basal Veins	24	99	n/a		
Leaf Organization	3	3.1	simple						Number of Basal Veins	25	12	3		
Leaflet Organization	4	88	not visible						Agrophic Veins	26	99	n/a		
Leaflet Attachment	5	99	n/a					2°	Major 2o vein framework	27	88	not visible		
Petiole Features	6	88	not visible						Interior secondaries	28	28.1	absent		
Features of the Blade:									Minor secondary course	29	88	not visible		
Position of Blade Attachment	7	7.2	peltate central						Perimarginal veins	30	88	not visible		
Laminar size	8	8.5	mesophyll						Major secondary spacing	31	88	not visible		
Laminar L:W ratio	9								Variation of secondary angle	32	88	not visible		
Laminar Shape	10	88	not visible						Major secondary attachment	33	33.4	deflected		
Medial Symmetry	11	88	not visible					Inter-	proximal course	34.1	88	not visible		
Base Symmetry	12	88	not visible					2°	intersecondary length	34.2	88	not visible		
Base Symmetry	12	.	-						distal course	34.3	88	not visible		
Lobation	13	13.1	unlobed						vein frequency	34.4	88	not visible		
Margin Type	14	88	#N/A					3°	Intercostal tertiary vein fabric	35	35.2.2	regular reticulate		
Special Margin Features	15	88	not visible						Angle of percurrent tertiaries	35.1.2	99	n/a		
Apex Angle	16	99	n/a						vein angle variability	36	99	n/a		
Apex Shape	17	99	n/a						Epimedial tertiaries	37	37.1.1.2	alternate percurrent		
Apex Shape	17	.	-						admedial course	37.2.1	37.2.1.3	perpendicular to midvein		
Base Angle	18	18.4	circular						exmedial course	37.2.2	37.2.2.1	parallel to intercostal tertiary		
Base shape	19	99	n/a						Exterior tertiary course	38	88	not visible		
Base shape	19	.	-					4°	Quaternary Vein Fabric	39	39.1.2	alternate percurrent		
Terminal Apex Features	20	99	n/a					5°	Quinternary Vein Fabric	40	88	not visible		
Surface Texture	21	88	not visible						Areolation	41	41.2.3	good development		
Surficial Glands	22	88	not visible						FEV branching	42.1	42.1.1	absent		
									FEV termination	42.2	99	n/a		
									Marginal Ultimate venation	43	88	not visible		
Section III. Teeth								Text Description:						
Tooth spacing	44	88	not visible					Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization simple, Leaflet Attachment n/a, Leaflet Organization not visible, Petiole Features not visible, Position of Blade Attachment peltate central, Laminar size mesophyll, Laminar L:W ratio, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Special Margin Features not visible, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle circular, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework palmate, Naked Basal Veins n/a, Number of Basal Veins 3, Agrophic Veins n/a, Major 2o vein framework not visible, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins not visible, Major secondary spacing not visible, Variation of secondary angle not visible, Major secondary attachment deflected, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric regular reticulate, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries alternate percurrent, admedial course perpendicular to midvein, exmedial course parallel to intercostal tertiary, Exterior tertiary course not visible, Quaternary Vein Fabric alternate percurrent, Quinternary Vein Fabric not visible, Areolation good development, FEV branching absent, FEV termination n/a, Marginal Ultimate venation not visible, Tooth spacing not visible, Number of orders of teeth not visible, Teeth / cm not visible, sinus shape not visible, tooth shapes not visible, tooth shapes not visible, tooth shapes, tooth shapes, principal vein not visible, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.						
Number of orders of teeth	45	88	not visible											
Teeth / cm	46		not visible											
sinus shape	47	88	not visible											
tooth shapes	48		not visible											
tooth shapes	48		not visible											
tooth shapes	48		not visible											
principal vein	49	88	not visible											
principal vein termination	50	88	not visible											
course of accessory vein	51	88	not visible											
features of the tooth apex	52	88	not visible											



GA20 HM

DNMH spec. # 46477

DMNH loc. # 3793

GA21

Family: Moraceae?

Genus and Species:

“Artocarpus” lessigiana

Section I. Leaf Characters			score	description		
Leaf Attachment	1	88	not visible			
Leaf Arrangement	2	88	not visible			
Leaf Organization	3	88	not visible			
Leaflet Organization	4	88	not visible			
Leaflet Attachment	5	99	n/a			
Petiole Features	6	88	not visible			
Features of the Blade:						
Position of Blade Attachment	7	88	not visible			
Laminar size	8	8.5	mesophyll			
Laminar L:W ratio	9		not visible			
Laminar Shape	10	99	n/a			
Medial Symmetry	11	88	not visible			
Base Symmetry	12	88	not visible			
Base Symmetry	12	.	-			
Lobation	13	13.2.1	palmetely lobed			
Margin Type	14	88	#N/A			
Special Margin Features	15	88	not visible			
Apex Angle	16	88	not visible			
Apex Shape	17	88	not visible			
Apex Shape	17	.	-			
Base Angle	18	88	not visible			
Base shape	19	88	not visible			
Base shape	19	.	-			
Terminal Apex Features	20	88	not visible			
Surface Texture	21	88	not visible			
Surficial Glands	22	88	not visible			
Section III. Teeth			score	description		
Tooth spacing	44	88	not visible			
Number of orders of teeth	45	88	not visible			
Teeth / cm	46		not visible			
sinus shape	47	88	not visible			
tooth shapes	48		not visible			
tooth shapes	48		not visible			
tooth shapes	48		not visible			
tooth shapes	48		not visible			
principal vein	49	88	not visible			
principal vein termination	50	88	not visible			
course of accessory vein	51	88	not visible			
features of the tooth apex	52	88	not visible			
Section II. Venation			char.	score	description	
1°	Primary Vein Framework	23	23.2	palmete		
	Naked Basal Veins	24	88	not visible		
	Number of Basal Veins	25		not visible		
	Agrophic Veins	26	88	not visible		
2°	Major 2o vein framework	27	88	not visible		
	Interior secondaries	28	88	not visible		
	Minor secondary course	29	88	not visible		
	Perimarginal veins	30	88	not visible		
	Major secondary spacing	31	88	not visible		
	Variation of secondary angle	32	88	not visible		
	Major secondary attachment	33	33.4	deflected		
	proximal course	34.1	88	not visible		
Inter - 2°	intersecondary length	34.2	88	not visible		
	distal course	34.3	88	not visible		
	vein frequency	34.4	88	not visible		
3°	Intercostal tertiary vein fabric	35	88	not visible		
	Angle of percurrent tertiaries	35.1.2	88	not visible		
	vein angle variability	36	99	n/a		
	Epimedial tertiaries	37	88	not visible		
	admedial course	37.2.1	88	not visible		
	exmedial course	37.2.2	88	not visible		
	Exterior tertiary course	38	88	not visible		
4°	Quaternary Vein Fabric	39	88	not visible		
5°	Quinternary Vein Fabric	40	88	not visible		
	Areolation	41	88	not visible		
	FEV branching	42.1	88	not visible		
	FEV termination	42.2	88	not visible		
	Marginal Ultimate venation	43	88	not visible		
Text Description:						
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment n/a, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape n/a, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry -, Lobation palmetely lobed, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework palmate, Naked Basal Veins not visible, Number of Basal Veins not visible, Agrophic Veins not visible, Major 2o vein framework not visible, Interior secondaries not visible, Minor secondary course not visible, Perimarginal veins not visible, Major secondary spacing not visible, Variation of secondary angle not visible, Major secondary attachment deflected, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability n/a, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing not visible, Number of orders of teeth not visible, Teeth / cm not visible, sinus shape not visible, tooth shapes not visible, tooth shapes not visible, tooth shapes, tooth shapes, principal vein not visible, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.						



GA21 HM

DNMH spec. # 46483

DMNH loc. # 3791

<i>GA22</i>				Family:	Genus and Species:
<i>Section I. Leaf Characters</i>				score	description
	Leaf Attachment	1	99	n/a	
	Leaf Arrangement	2	99	n/a	
	Leaf Organization	3	99	n/a	
	Leaflet Organization	4	99	n/a	
	Leaflet Attachment	5	99	n/a	
	Petiole Features	6	99	n/a	
Features of the Blade:					
	Position of Blade Attachment	7	99	n/a	
	Laminar size	8	99	n/a	
	Laminar L:W ratio	9		n/a	
	Laminar Shape	10	99	n/a	
	Medial Symmetry	11	99	n/a	
	Base Symmetry	12	99	n/a	
	Base Symmetry	12	.	-	
	Lobation	13	99	n/a	
	Margin Type	14	99	n/a	
	Special Margin Features	15	99	n/a	
	Apex Angle	16	99	n/a	
	Apex Shape	17	99	n/a	
	Apex Shape	17	.	-	
	Base Angle	18	99	n/a	
	Base shape	19	99	n/a	
	Base shape	19	.	-	
	Terminal Apex Features	20	99	n/a	
	Surface Texture	21	99	n/a	
	Surficial Glands	22	99	n/a	
<i>Section II. Venation</i>				char.	score
1°	Primary Vein Framework	23	99	n/a	
	Naked Basal Veins	24	99	n/a	
	Number of Basal Veins	25		n/a	
	Agrophich Veins	26	99	n/a	
2°	Major 2o vein framework	27	99	n/a	
	Interior secondaries	28	99	n/a	
	Minor secondary course	29	99	n/a	
	Perimarginal veins	30	99	n/a	
	Major secondary spacing	31	99	n/a	
	Variation of secondary angle	32	99	n/a	
	Major secondary attachment	33	99	n/a	
Inter-2°	proximal course	34.1	99	n/a	
	intersecondary length	34.2	99	n/a	
	distal course	34.3	99	n/a	
	vein frequency	34.4	99	n/a	
3°	Intercostal tertiary vein fabric	35	99	n/a	
	Angle of percurrent tertiaries	35.1.2	99	n/a	
	vein angle variability	36	99	n/a	
	Epimedial tertiaries	37	99	n/a	
	admedial course	37.2.1	99	n/a	
	exmedial course	37.2.2	99	n/a	
	Exterior tertiary course	38	99	n/a	
4°	Quaternary Vein Fabric	39	99	n/a	
5°	Quinternary Vein Fabric	40	99	n/a	
	Areolation	41	99	n/a	
	FEV branching	42.1	99	n/a	
	FEV termination	42.2	99	n/a	
	Marginal Ultimate venation	43	99	n/a	
<i>Section III. Teeth</i>				score	description
	Tooth spacing	44	99	n/a	
	Number of orders of teeth	45	99	n/a	
	Teeth / cm	46		n/a	
	sinus shape	47	99	n/a	
	tooth shapes	48		n/a	
	tooth shapes	48		n/a	
	tooth shapes	48		n/a	
	tooth shapes	48		n/a	
	principal vein	49	99	n/a	
	principal vein termination	50	99	n/a	
	course of accessory vein	51	99	n/a	
	features of the tooth apex	52	99	n/a	
Text Description:					
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophich Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.					
Roots.					

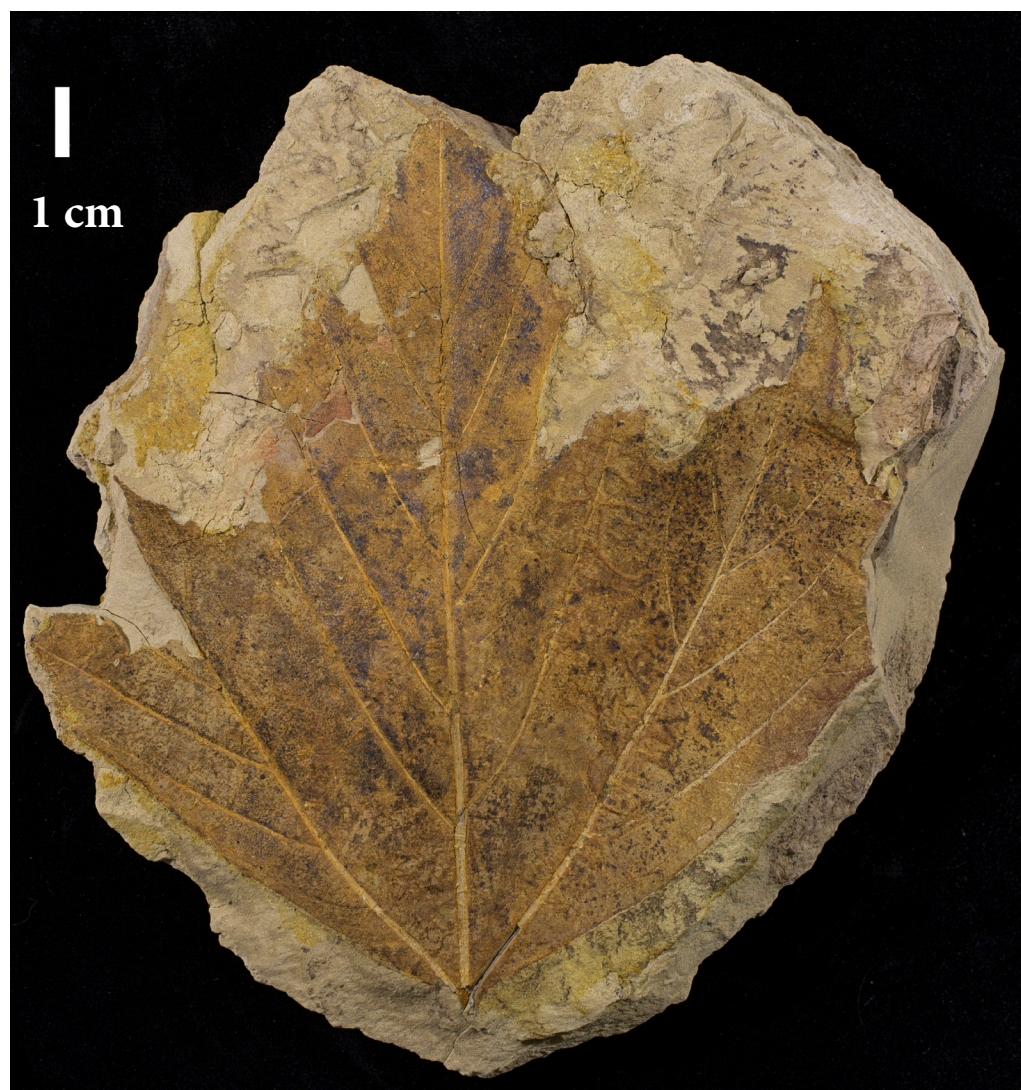


GA22 HM

DNMH spec. # 46777

DMNH loc. # 3796

GA23		Family: Platanaceae		Genus and Species:		Platanites marginata	
Section I. Leaf Characters				score	description		
Leaf Attachment	1	88	not visible				
Leaf Arrangement	2	88	not visible				
Leaf Organization	3	3.2	compound				
Leaflet Organization	4	99	n/a				
Leaflet Attachment	5	88	not visible				
Petiole Features	6	88	not visible				
Features of the Blade:							
Position of Blade Attachment	7	7.1	marginal				
Laminar size	8	8.5	mesophyll				
Laminar L:W ratio	9	88	not visible				
Laminar Shape	10	10.3	ovate				
Medial Symmetry	11	11.1	symmetrical				
Base Symmetry	12	12.1	symmetrical				
Base Symmetry	12	.	-				
Lobation	13	13.2.1	palmately lobed				
Margin Type	14	14.2.2	serrate				
Special Margin Features	15	88	not visible				
Apex Angle	16	16.1	acute				
Apex Shape	17	17.1	straight				
Apex Shape	17	.	-				
Base Angle	18	18.2	obtuse				
Base shape	19	19.1.3	convex				
Base shape	19	.	-				
Terminal Apex Features	20	0	absent				
Surface Texture	21	88	not visible				
Surficial Glands	22	88	not visible				
Section II. Venation				char.	score	description	
1°	Primary Vein Framework	23	23.2.2	palinactinodromous			
	Naked Basal Veins	24	24.1	absent			
	Number of Basal Veins	25		3			
	Agrophric Veins	26	26.2.2	compound			
2°	Major 2o vein framework	27	27.1.1	craspedodromous			
	Interior secondaries	28	28.2	present			
	Minor secondary course	29	29.3	semicraspedodromous			
	Perimarginal veins	30	0	absent			
	Major secondary spacing	31	31.2	irregular			
	Variation of secondary angle	32	32.1	uniform			
	Major secondary attachment	33	33.4	deflected			
Inter-2°	proximal course	34.1	34.1.1	parallel to major secondaries			
	intersecondary length	34.2	34.2.1	<50% of subjacent secondary			
	distal course	34.3	34.3.2	parallel to subjacent major secondary			
	vein frequency	34.4	34.1.1	parallel to major secondaries			
3°	intercostal tertiary vein fabric	35	35.1.1.1.4	chevroned opposite percurrent			
	Angle of percurrent tertiaries	35.1.2	35.1.2.2	obtuse			
	vein angle variability	36	36.3	increasing exmedially			
	Epimedial tertiaries	37	37.1.1.1	opposite percurrent			
	admedial course	37.2.1	37.2.1.2	parallel to intercostal tertiary			
	exmedial course	37.2.2	37.2.2.2	basiflexed			
	Exterior tertiary course	38	88	not visible			
4°	Quaternary Vein Fabric	39	88	not visible			
5°	Quinternary Vein Fabric	40	88	not visible			
	Areolation	41	88	not visible			
	FEV branching	42.1	88	not visible			
	FEV termination	42.2	88	not visible			
	Marginal Ultimate venation	43	88	not visible			
Section III. Teeth				Text Description:			
Tooth spacing	44	88	not visible	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization compound, Leaflet Organization n/a, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size mesophyll, Laminar L:W ratio 1, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation palmately lobed, Margin Type serrate, Special Margin Features not visible, Apex Angle acute, Apex Shape straight, Apex Shape -, Base Angle obtuse, Base shape convex, Base shape -, Terminal Apex Features absent, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework palinactinodromous, Naked Basal Veins absent, Number of Basal Veins 3, Agrophric Veins compound, Major 2o vein framework craspedodromous, Interior secondaries present, Minor secondary course semicraspedodromous, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle uniform, Major secondary attachment deflected, proximal course parallel to major secondaries, intersecondary length <50% of subjacent secondary, distal course parallel to subjacent major secondary, vein frequency parallel to major secondaries, Intercostal tertiary vein fabric chevroned opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability increasing exmedially, Epimedial tertiaries opposite percurrent, admedial course parallel to intercostal tertiary, exmedial course basiflexed, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing not visible, Number of orders of teeth one, Teeth / cm not visible, sinus shape rounded, tooth shapes cv/cc, tooth shapes, tooth shapes, tooth shapes, principal vein present, principal vein termination on proximal flank of tooth, course of accessory vein not visible, features of the tooth apex not visible,			
Number of orders of teeth	45	45.1	one				
Teeth / cm	46		not visible				
sinus shape	47	47.2	rounded				
tooth shapes	48		cv/cc				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	49.1	present on proximal flank of tooth				
principal vein termination	50	50.2.4					
course of accessory vein	51	88	not visible				
features of the tooth apex	52	88	not visible				



GA23 HM

DNMH spec. # 46480

DMNH loc. # 3793

GA24

Family:

Genus and Species:

Section I. Leaf Characters			score	description
Leaf Attachment	1	88	not visible	
Leaf Arrangement	2	88	not visible	
Leaf Organization	3	88	not visible	
Leaflet Organization	4	88	not visible	
Leaflet Attachment	5	88	not visible	
Petiole Features	6	88	not visible	
Features of the Blade:				
Position of Blade Attachment	7	7.1	marginal	
Laminar size	8	8.5	mesophyll	
Laminar L:W ratio	9	5:3		
Laminar Shape	10	10.4	oblong	
Medial Symmetry	11	11.1	symmetrical	
Base Symmetry	12	12.1	symmetrical	
Base Symmetry	12	.	-	
Lobation	13	13.1	unlobed	
Margin Type	14	14.2.2	serrate	
Special Margin Features	15	99	n/a	
Apex Angle	16	88	not visible	
Apex Shape	17	88	not visible	
Apex Shape	17	.	-	
Base Angle	18	18.2	obtuse	
Base shape	19	19.1.4	concavo-convex	
Base shape	19	.	-	
Terminal Apex Features	20	88	not visible	
Surface Texture	21	88	not visible	
Surficial Glands	22	88	not visible	

Section II. Venation		char.	score	description
1°	Primary Vein Framework	23	23.1	pinnate
	Naked Basal Veins	24	0	absent
	Number of Basal Veins	25	3	
	Agrophic Veins	26	26.2.1	simple
2°	Major 2o vein framework	27	27.1.2	semicraspedodromous
	Interior secondaries	28	28.1	absent
	Minor secondary course	29	29.3	semicraspedodromous
	Perimarginal veins	30	0	absent
	Major secondary spacing	31	31.3	decreasing proximally
	Variation of secondary angle	32	32.1	uniform
	Major secondary attachment	33	33.2	basally decurrent
	proximal course	34.1	88	not visible
Inter-2°	intersecondary length	34.2	88	not visible
	distal course	34.3	88	not visible
3°	vein frequency	34.4	88	not visible
	Intercostal tertiary vein fabric	35	35.1.1.1.3	sinuous opposite percurrent
	Angle of percurrent tertiaries	35.1.2	35.1.2.3	perpendicular
	vein angle variability	36	36.2	consistent
	Epimedial tertiaries	37	88	not visible
	admedial course	37.2.1	88	not visible
	exmedial course	37.2.2	88	not visible
	Exterior tertiary course	38	38.3	terminating at the margin
4°	Quaternary Vein Fabric	39	88	not visible
5°	Quinternary Vein Fabric	40	88	not visible
	Areolation	41	88	not visible
	FEV branching	42.1	88	not visible
	FEV termination	42.2	88	not visible
	Marginal Ultimate venation	43	88	not visible

Section III. Teeth			
Tooth spacing	44	44.2	irregular
Number of orders of teeth	45	45.1	one
Teeth / cm	46	2	
sinus shape	47	47.2	rounded
tooth shapes	48		st/st
tooth shapes	48		st/cv
tooth shapes	48		cv/cv
tooth shapes	48		
principal vein	49	49.1	present
principal vein termination	50	88	not visible
course of accessory vein	51	88	not visible
features of the tooth apex	52	88	not visible

Text Description:	
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size mesophyll, Laminar L:W ratio 5:3, Laminar Shape oblong, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features n/a, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle obtuse, Base shape concavo-convex, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 3, Agrophic Veins simple, Major 2o vein framework semicraspedodromous, Interior secondaries absent, Minor secondary course semicraspedodromous, Perimarginal veins absent, Major secondary spacing decreasing proximally, Variation of secondary angle uniform, Major secondary attachment basally decurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric sinuous opposite percurrent, Angle of percurrent tertiaries perpendicular, vein angle variability consistent, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course terminating at the margin, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one, Teeth / cm 2, sinus shape rounded, tooth shapes st/st, tooth shapes st/cv, tooth shapes cv/cv, tooth shapes, principal vein present, principal vein termination not visible, course of accessory vein not visible,	



GA24 HM

DNMH spec. # 23765

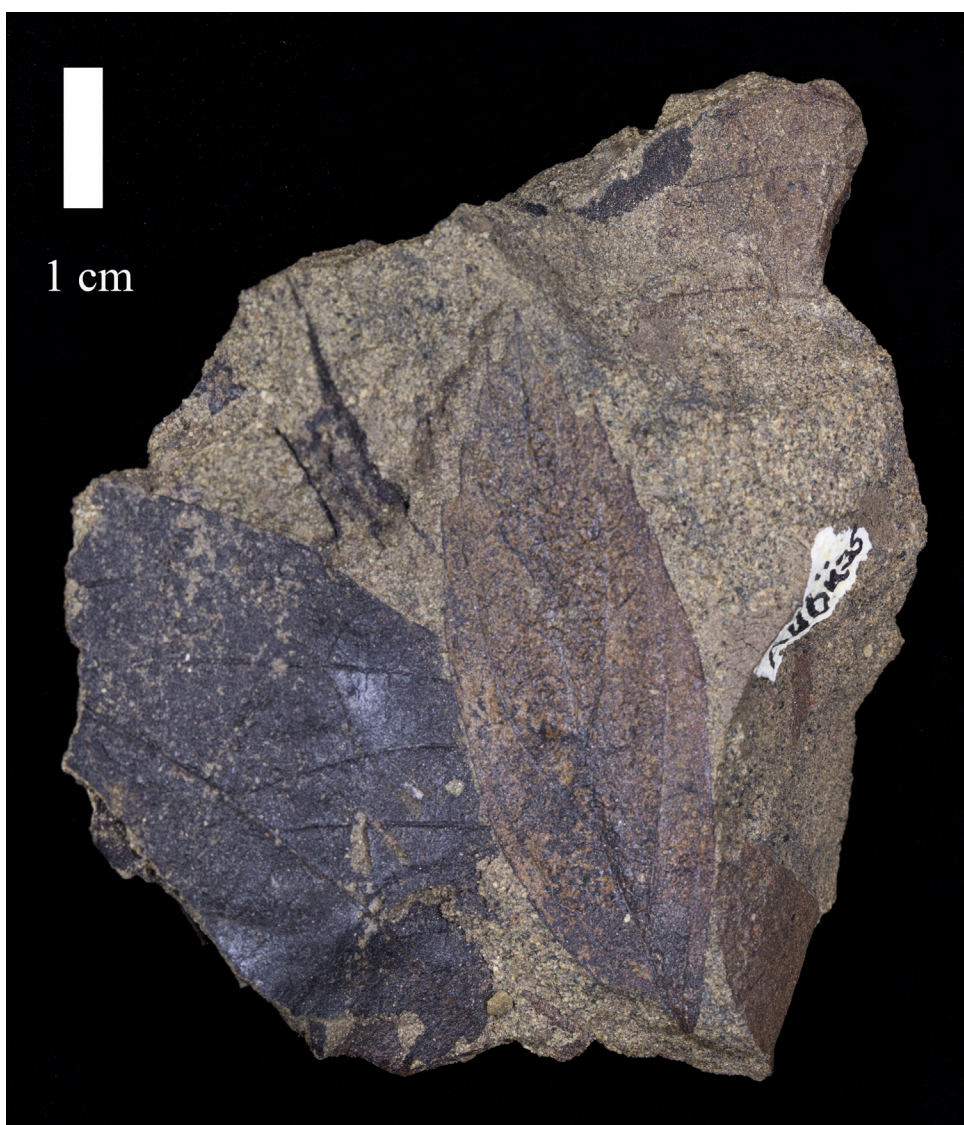
DMNH loc. # 412

G425

Family:

Genus and Species:

Section I. Leaf Characters			score	description	
Leaf Attachment	1	88		not visible	
Leaf Arrangement	2	88		not visible	
Leaf Organization	3	88		not visible	
Leaflet Organization	4	88		not visible	
Leaflet Attachment	5	88		not visible	
Petiole Features	6	88		not visible	
Features of the Blade:					
Position of Blade Attachment	7	7.1		marginal	
Laminar size	8	8.3		microphyll	
Laminar L:W ratio	9		5:2		
Laminar Shape	10	10.3		ovate	
Medial Symmetry	11	11.1		symmetrical	
				basal insertion	
Base Symmetry	12	12.2.3		asymmetrical	
Base Symmetry	12	.		-	
Lobation	13	13.1		unlobed	
Margin Type	14	14.2.2		serrate	
Special Margin Features	15	88		not visible	
Apex Angle	16	16.1		acute	
Apex Shape	17	17.1		straight	
Apex Shape	17	.		-	
Base Angle	18	18.1		acute	
Base shape	19	19.1.1		straight	
Base shape	19	.		-	
Terminal Apex Features	20	88		not visible	
Surface Texture	21	88		not visible	
Surficial Glands	22	88		not visible	
Section II. Venation			char.	score	description
1 ^o	Primary Vein Framework	23	23.1		pinnate
	Naked Basal Veins	24	24.1		absent
	Number of Basal Veins	25		1	
	Agrophic Veins	26	26.2.1		simple
2 ^o	Major 2o vein framework	27	27.1.2		semicraspedodromous
	Interior secondaries	28	28.1		absent
	Minor secondary course	29	88		not visible
	Perimarginal veins	30	0		absent
	Major secondary spacing	31	31.1		regular
	Variation of secondary angle	32	32.1		uniform
	Major secondary attachment	33	88		not visible
Inter-2 ^o	proximal course	34.1	88		not visible
	intersecondary length	34.2	88		not visible
	distal course	34.3	88		not visible
	vein frequency	34.4	88		not visible
3 ^o	Intercostal tertiary vein fabric	35	88		not visible
	Angle of percurrent tertiaries	35.1.2	88		not visible
	vein angle variability	36	88		not visible
	Epimedial tertiaries	37	88		not visible
	admedial course	37.2.1	88		not visible
	exmedial course	37.2.2	88		not visible
	Exterior tertiary course	38	88		not visible
4 ^o	Quaternary Vein Fabric	39	88		not visible
5 ^o	Quinternary Vein Fabric	40	88		not visible
	Areolation	41	88		not visible
	FEV branching	42.1	88		not visible
	FEV termination	42.2	88		not visible
	Marginal Ultimate venation	43	88		not visible
Section III. Teeth					
Tooth spacing	44	44.2		irregular	
Number of orders of teeth	45	45.1		one	
Teeth / cm	46		2		
sinus shape	47	47.2		rounded	
tooth shapes	48		cc/st		
tooth shapes	48		st/st		
tooth shapes	48		cc/cv		
tooth shapes	48				
principal vein	49	49.1		present	
principal vein termination	50	50.2.1		at apex of tooth	
course of accessory vein	51	88		not visible	
features of the tooth apex	52	88		not visible	
Text Description:					
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size microphyll, Laminar L:W ratio 5:2, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry basal insertion asymmetrical, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle acute, Apex Shape straight, Apex Shape -, Base Angle acute, Base shape straight, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins simple, Major 2o vein framework semicraspedodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary attachment not visible, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one, Teeth / cm 2, sinus shape rounded, tooth shapes cc/st, tooth shapes st/st, tooth shapes cc/cv, tooth shapes, principal vein present, principal vein termination at apex of tooth, course of accessory					



GA25 HM

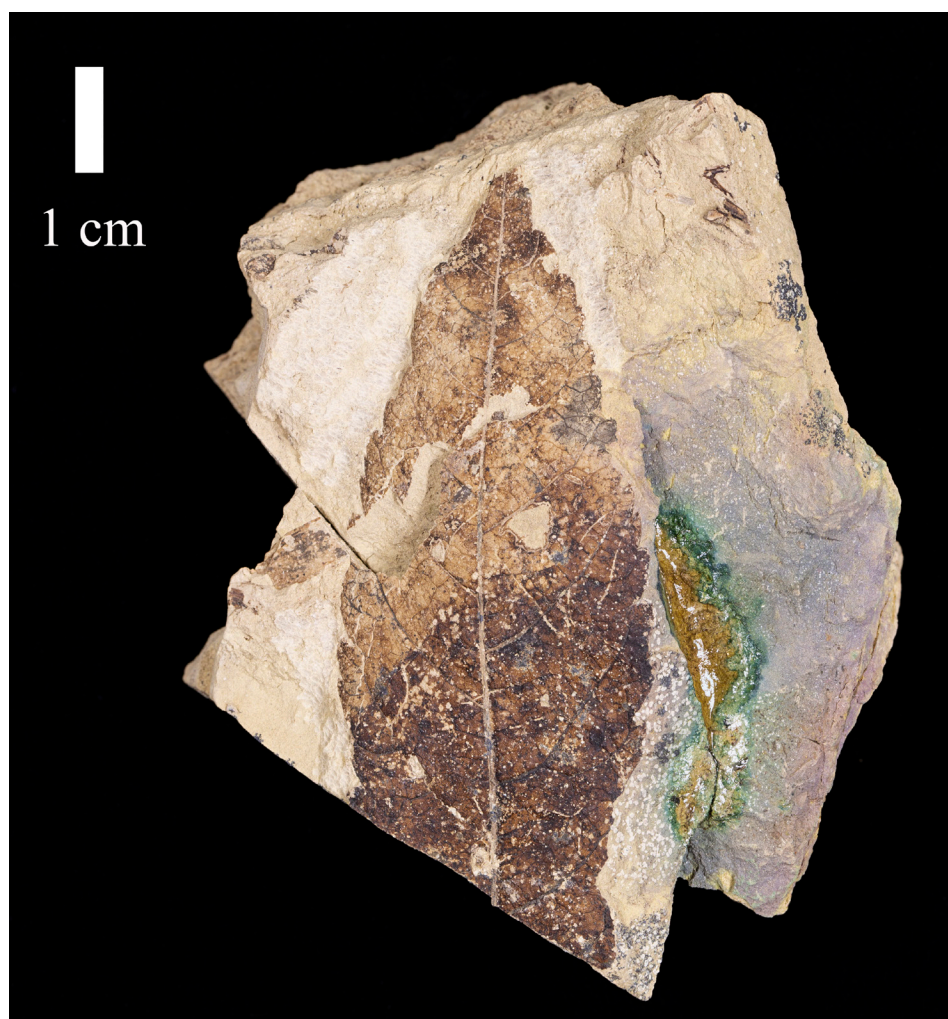
DNMH spec. #
DMNH loc. # 500

G426

Family:

Genus and Species:

Section I. Leaf Characters			score	description	
Leaf Attachment	1	88		not visible	
Leaf Arrangement	2	88		not visible	
Leaf Organization	3	88		not visible	
Leaflet Organization	4	88		not visible	
Leaflet Attachment	5	88		not visible	
Petiole Features	6	88		not visible	
Features of the Blade:					
Position of Blade Attachment	7	88		not visible	
Laminar size	8	8.3		microphyll	
Laminar L:W ratio	9		2:1		
Laminar Shape	10	10.3		ovate	
Medial Symmetry	11	11.1		symmetrical	
Base Symmetry	12	88		not visible	
Base Symmetry	12	.	-		
Lobation	13	13.1		unlobed	
Margin Type	14	14.2.2		serrate	
Special Margin Features	15	88		not visible	
Apex Angle	16	16.1		acute	
Apex Shape	17	17.1		straight	
Apex Shape	17	.	-		
Base Angle	18	88		not visible	
Base shape	19	88		not visible	
Base shape	19	.	-		
Terminal Apex Features	20	88		not visible	
Surface Texture	21	88		not visible	
Surficial Glands	22	88		not visible	
Section III. Teeth					
Tooth spacing	44	44.2		irregular	
Number of orders of teeth	45	45.1		one	
Teeth / cm	46		3		
sinus shape	47	47.1		angular	
tooth shapes	48		st/st		
tooth shapes	48		st/cv		
tooth shapes	48		cv/cv		
tooth shapes	48		rt/rt		
principal vein	49	49.1		present	
principal vein termination	50	50.2.1		at apex of tooth	
course of accessory vein	51	51.1.1		looped	
features of the tooth apex	52	88		not visible	
Section II. Venation					
1°	Primary Vein Framework	23	23.1		pinnate
	Naked Basal Veins	24	88		not visible
	Number of Basal Veins	25		1	
	Agrophic Veins	26	26.2.1		simple
2°	Major 2o vein framework	27	27.1.2		semicraspedodromous
	Interior secondaries	28	28.1		absent
	Minor secondary course	29	29.3		semicraspedodromous
	Perimarginal veins	30	0		absent
	Major secondary spacing	31	31.2		irregular
	Variation of secondary angle	32	32.1		uniform
	Major secondary attachment	33	33.3		excurrent
Inter-	proximal course	34.1.2	0		absent
2°	intersecondary length	34.2	34.2.2		>50% of subjacent secondary
	distal course	34.3	88		not visible
	vein frequency	34.4	34.4.2		~ 1 per intercostal area
3°	Intercostal tertiary vein fabric	35	35.1.1.1.3		sinuous opposite percurrent
	Angle of percurrent tertiaries	35.1.2	35.1.2.2		obtuse
	vein angle variability	36	36.2		consistent
	Epimedial tertiaries	37	88		not visible
	admedial course	37.2.1	88		not visible
	exmedial course	37.2.2	88		not visible
	Exterior tertiary course	38	38.3		terminating at the margin
4°	Quaternary Vein Fabric	39	39.2.1		regular reticulate
5°	Quinternary Vein Fabric	40	40.1.2		irregular reticulate
	Areolation	41	41.2.2		moderate development
	FEV branching	42.1	88		not visible
	FEV termination	42.2	88		not visible
	Marginal Ultimate venation	43	88		not visible
Text Description:					
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size microphyll, Laminar L:W ratio 2:1, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle acute, Apex Shape straight, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins not visible, Number of Basal Veins 1, Agrophic Veins simple, Major 2o vein framework semicraspedodromous, Interior secondaries absent, Minor secondary course semicraspedodromous, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle uniform, Major secondary attachment excurrent, proximal course absent, intersecondary length >50% of subjacent secondary, distal course not visible, vein frequency ~ 1 per intercostal area, Intercostal tertiary vein fabric sinuous opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability consistent, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course terminating at the margin, Quaternary Vein Fabric regular reticulate, Quinternary Vein Fabric irregular reticulate, Areolation moderate development, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one, Teeth / cm 3, sinus shape angular, tooth shapes st/st, tooth shapes st/cv, tooth shapes cv/cv, tooth shapes rt/rt, principal vein present, principal vein termination at apex of tooth, course of accessory vein looped, features of the tooth apex not visible.					



GA26 HM

DNMH spec. # 23778

DMNH loc. # 412

GA27

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
	score	description		char.	score	description	
Leaf Attachment	1	88	not visible	1°	23	23.1	pinnate
Leaf Arrangement	2	88	not visible		24	88	not visible
Leaf Organization	3	88	not visible		25		1
Leaflet Organization	4	88	not visible		26	26.2.2	compound festooned
Leaflet Attachment	5	88	not visible	2°	27	27.1.3	semicraspedodromous
Petiole Features	6	88	not visible		28	88	not visible
Features of the Blade:					29	29.1	craspedodromous
Position of Blade Attachment	7	88	not visible		30	0	absent
Laminar size	8	8.4	notophyll		31	88	not visible
Laminar L:W ratio	9		not visible		32	88	not visible
Laminar Shape	10	88	not visible		33	33.3	excurrent
Medial Symmetry	11	88	not visible	Inter-	34.1	88	not visible
Base Symmetry	12	88	not visible	2°	34.2	88	not visible
Base Symmetry	12	.	-		34.3	88	not visible
Lobation	13	13.1	unlobed		34.4	88	not visible
Margin Type	14	14.2.2	serrate	3°	35	35.1.1.1.3	sinuous opposite percurrent
Special Margin Features	15	88	not visible		35.1.2	35.1.2.2	obtuse
Apex Angle	16	88	not visible		36	88	not visible
Apex Shape	17	88	not visible		37	88	not visible
Apex Shape	17	.	-		37.2.1	37.2.1.3	perpendicular to midvein
Base Angle	18	88	not visible		37.2.2	37.2.2.2	basiflexed
Base shape	19	88	not visible		38	38.2	looped
Base shape	19	.	-	4°	39	39.1.1	opposite percurrent
Terminal Apex Features	20	88	not visible	5°	40	88	not visible
Surface Texture	21	88	not visible		41	88	not visible
Surficial Glands	22	88	not visible		42.1	88	not visible
					42.2	88	not visible
					43	88	not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins not visible, Number of Basal Veins 1, Agrophic Veins compound, Major 2o vein framework festooned semicraspedodromous, Interior secondaries not visible, Minor secondary course craspedodromous, Perimarginal veins absent, Major secondary spacing not visible, Variation of secondary angle not visible, Major secondary attachment excurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric sinuous opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability not visible, Epimedial tertiaries not visible, admedial course perpendicular to midvein, exmedial course basiflexed, Exterior tertiary course looped, Quaternary Vein Fabric opposite percurrent, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one, Teeth / cm 3, sinus shape angular, tooth shapes cc/cv, tooth shapes st/cv, tooth shapes st/st, tooth shapes, principal vein present, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.			
Number of orders of teeth	45	45.1	one				
Teeth / cm	46		3				
sinus shape	47	47.1	angular				
tooth shapes	48		cc/cv				
tooth shapes	48		st/cv				
tooth shapes	48		st/st				
tooth shapes	48						
principal vein	49	49.1	present				
principal vein termination	50	88	not visible				
course of accessory vein	51	88	not visible				
features of the tooth apex	52	88	not visible				



GA27 HM

DNMH spec. # 23777

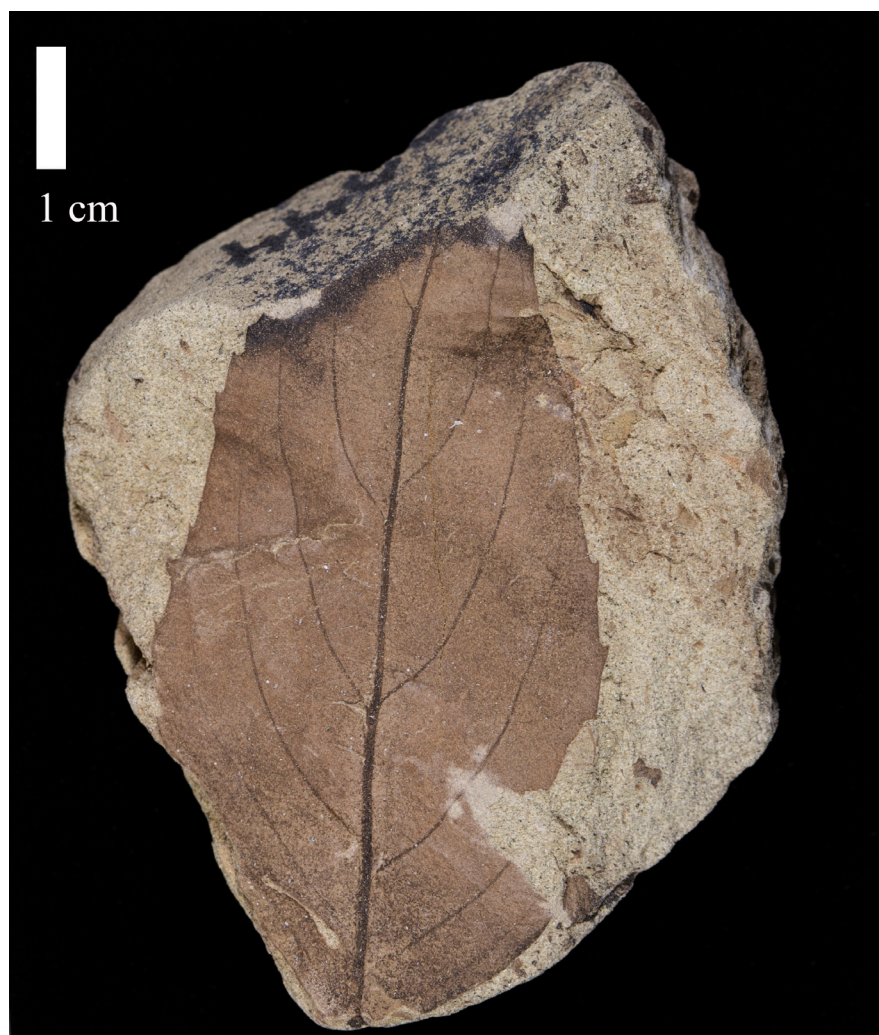
DMNH loc. # 412

G428

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
		score	description		char.	score	description
Leaf Attachment	1	88	not visible	1"	Primary Vein Framework	23	23.1 pinnate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	0 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	1
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.2.1 simple
Leaflet Attachment	5	88	not visible	2"	Major 2o vein framework	27	27.1.2 semicraspedodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1 absent
					Minor secondary course	29	29.1 craspedodromous
Features of the Blade:					Perimarginal veins	30	0 absent
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	31.3 decreasing proximally smoothly decreasing
					Variation of secondary angle	32	32.4 proximally
Laminar size	8	8.4	notophyll		Major secondary attachment	33	33.4 deflected
Laminar L:W ratio	9		2:1	Inter-	proximal course	34.1	88 not visible
Laminar Shape	10	10.4	oblong	2"	intersecondary length	34.2	88 not visible
Medial Symmetry	11	11.1	symmetrical		distal course	34.3	88 not visible
Base Symmetry	12	12.1	symmetrical		vein frequency	34.4	88 not visible
Base Symmetry	12	.	-	3"	Intercostal tertiary vein fabric	35	88 not visible
Lobation	13	13.1	unlobed		Angle of percurrent tertiaries	35.1.2	88 not visible
Margin Type	14	14.2.2	serrate		vein angle variability	36	88 not visible
Special Margin Features	15	88	not visible		Epimedial tertiaries	37	88 not visible
Apex Angle	16	88	not visible		admedial course	37.2.1	88 not visible
Apex Shape	17	88	not visible		exmedial course	37.2.2	88 not visible
Apex Shape	17	.	-		Exterior tertiary course	38	88 not visible
Base Angle	18	18.2	obtuse	4"	Quaternary Vein Fabric	39	88 not visible
Base shape	19	88	not visible	5"	Quinternary Vein Fabric	40	88 not visible
Base shape	19	.	-		Areolation	41	88 not visible
Terminal Apex Features	20	88	not visible		FEV branching	42.1	88 not visible
					FEV termination	42.2	88 not visible
Surface Texture	21	88	not visible		Marginal Ultimate venation	43	88 not visible
Surficial Glands	22	88	not visible				
Section III. Teeth				Text Description:			
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio 2:1, Laminar Shape oblong, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle obtuse, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins simple, Major 2o vein framework semicraspedodromous, Interior secondaries absent, Minor secondary course craspedodromous, Perimarginal veins absent, Major secondary spacing decreasing proximally, Variation of secondary angle smoothly decreasing proximally, Major secondary attachment deflected, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one, Teeth / cm 3, sinus shape rounded, tooth shapes st/st, tooth shapes cc/st, tooth shapes, tooth shapes, principal vein not visible, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.			
Number of orders of teeth	45	45.1	one				
Teeth / cm	46		3				
sinus shape	47	47.2	rounded				
tooth shapes	48		st/st				
tooth shapes	48		cc/st				
tooth shapes	48						
tooth shapes	48						
principal vein	49	88	not visible				
principal vein termination	50	88	not visible				
course of accessory vein	51	88	not visible				
features of the tooth apex	52	88	not visible				



GA28 HM

DNMH spec. # 23766

DMNH loc. # 412

GA29

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
	score	description		char.	score	description	
Leaf Attachment	1	88	not visible	1°	23	23.1	pinnate
Leaf Arrangement	2	88	not visible		24	0	absent
Leaf Organization	3	88	not visible		25	1	
Leaflet Organization	4	88	not visible		26	26.2.1	simple
Leaflet Attachment	5	88	not visible	2°	27	27.1.2	semicraspedodromous
Petiole Features	6	88	not visible		28	28.1	absent
Features of the Blade:					29	29.3	semicraspedodromous
Position of Blade Attachment	7	88	not visible		30	0	absent
Laminar size	8	8.3	microphyll		31	31.1	regular
Laminar L:W ratio	9	6:2.5			32	32.1	uniform
Laminar Shape	10	10.4	oblong		33	33.3	excurrent
Medial Symmetry	11	11.1	symmetrical	Inter-	34.1	34.1.2	perpendicular to midvein
Base Symmetry	12	88	not visible	2°	34.2	34.2.1	<50% of subadjacent second
Base Symmetry	12	-			34.3	99	n/a
Lobation	13	13.1	unlobed		34.4	34.4.3	>1 per intercostal area
Margin Type	14	14.2.2	serrate	3°	35	88	not visible
Special Margin Features	15	88	not visible		35.1.2	88	not visible
Apex Angle	16	88	not visible		36	88	not visible
Apex Shape	17	88	not visible		37	88	not visible
Apex Shape	17	-			37.2.1	88	not visible
Base Angle	18	88	not visible		37.2.2	88	not visible
Base shape	19	88	not visible		38	88	not visible
Base shape	19	-		4°	39	88	not visible
Terminal Apex Features	20	88	not visible	5°	40	88	not visible
					41	88	not visible
					42.1	88	not visible
Surface Texture	21	88	not visible		42.2	88	not visible
Surficial Glands	22	88	not visible		43	88	not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size microphyll, Laminar L:W ratio 6:2.5, Laminar Shape oblong, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins simple, Major 2o vein framework semicraspedodromous, Interior secondaries absent, Minor secondary course semicraspedodromous, Perimarginal veins absent, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary attachment excurrent proximal course perpendicular to midvein, intersecondary length <50% of subadjacent secondary, distal course n/a, vein frequency >1 per intercostal area, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiary not visible, vein angle variability not visible, Epimedial tertiary not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one, Teeth / cm 1.5, sinus shape rounded, tooth shapes cv/cv, tooth shapes st/st, tooth shapes st/cv, tooth shapes , principal vein present, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.			
Number of orders of teeth	45	45.1	one				
Teeth / cm	46	1.5					
sinus shape	47	47.2	rounded				
tooth shapes	48	cv/cv					
tooth shapes	48	st/st					
tooth shapes	48	st/cv					
tooth shapes	48						
principal vein	49	49.1	present				
principal vein termination	50	88	not visible				
course of accessory vein	51	88	not visible				
features of the tooth apex	52	88	not visible				



GA29 HM

DNMH spec. # 23773

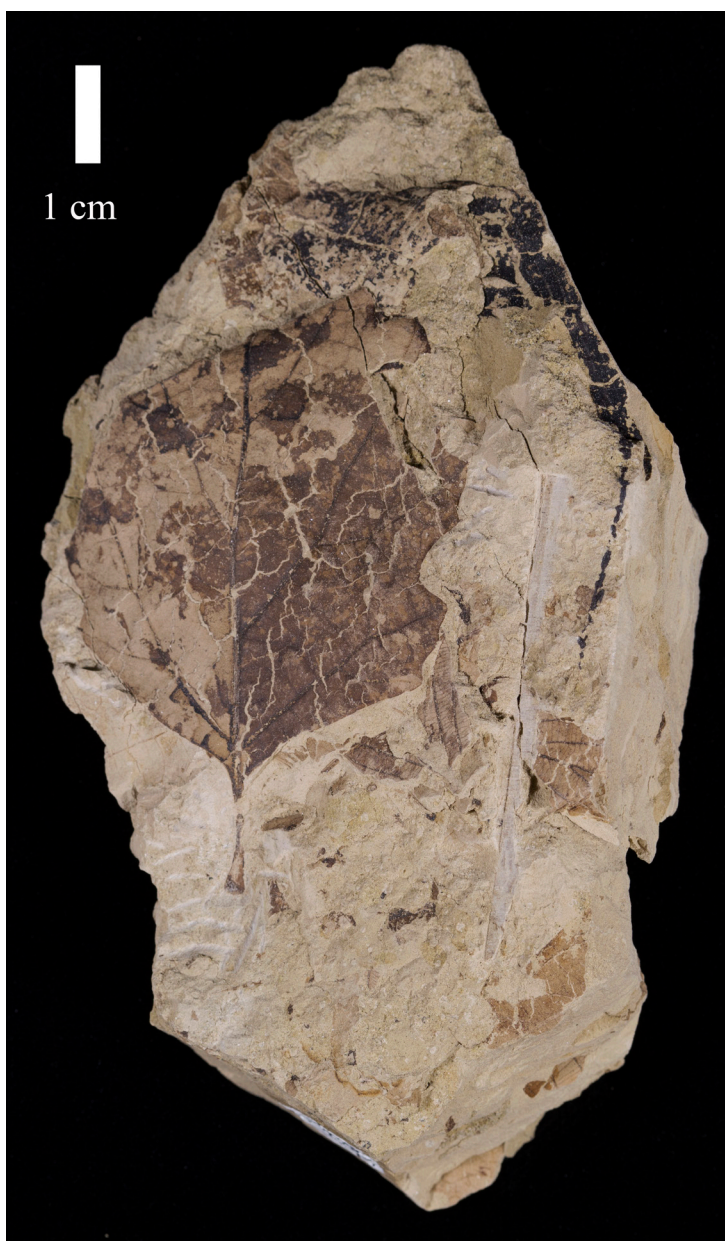
DMNH loc. # 412

GA30

Family:

Genus and Species:

<i>Section I. Leaf Characters</i>				<i>Section II. Venation</i>			
	score	description			char.	score	description
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.2 palmate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	0 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	3
Leaflet Organization	4	88	not visible		Agrophric Veins	26	26.2.2 compound
Leaflet Attachment	5	88	not visible	2°	Major 2o vein framework	27	27.1.1 craspedodromous
Petiole Features	6	88	not visible		Interior secondaries	28	88 not visible
					Minor secondary course	29	29.1 craspedodromous
					Perimarginal veins	30	0 absent
					Major secondary spacing	31	31.1 regular
					Variation of secondary angle	32	32.1 uniform
Features of the Blade:					Major secondary attachment	33	33.3 excurrent
Position of Blade Attachment	7	7.1	marginal	Inter-2°	proximal course	34.1	88 not visible
Laminar size	8	8.4	notophyll		intersecondary length	34.2	88 not visible
Laminar L:W ratio	9	5:4			distal course	34.3	88 not visible
Laminar Shape	10	10.3	ovate		vein frequency	34.4	88 not visible
Medial Symmetry	11	11.1	symmetrical	3°	Intercostal tertiary vein fabric	35	88 not visible
Base Symmetry	12	12.1	symmetrical		Angle of percurrent tertiaries	35.1.2	88 not visible
Base Symmetry	12	.	-		vein angle variability	36	88 not visible
Lobation	13	13.1	unlobed		Epimedial tertiaries	37	88 not visible
Margin Type	14	14.2.2	serrate	4°	admedial course	37.2.1	88 not visible
Special Margin Features	15	88	not visible		exmedial course	37.2.2	88 not visible
Apex Angle	16	88	not visible		Exterior tertiary course	38	88 not visible
Apex Shape	17	88	not visible		Quaternary Vein Fabric	39	88 not visible
Apex Shape	17	.	-	5°	Quinternary Vein Fabric	40	88 not visible
Base Angle	18	18.2	obtuse		Areolation	41	88 not visible
Base shape	19	19.1.4	concavo-convex		FEV branching	42.1	88 not visible
Base shape	19	.	-		FEV termination	42.2	88 not visible
Terminal Apex Features	20	88	not visible		Marginal Ultimate venation	43	88 not visible
Surface Texture	21	88	not visible				
Surficial Glands	22	88	not visible				
<i>Section III. Teeth</i>				Text Description:			
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio 5:4, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry - , Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape - , Base Angle obtuse, Base shape concavo-convex, Base shape - , Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework palmate, Naked Basal Veins absent, Number of Basal Veins 3, Agrophric Veins compound, Major 2o vein framework craspedodromous, Interior secondaries not visible, Minor secondary course craspedodromous, Perimarginal veins absent, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary attachment excurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth two , Teeth / cm 4, sinus shape rounded, tooth shapes st/st, tooth shapes st/cv, tooth shapes cv/cv, tooth shapes , principal vein present, principal vein termination at apex of tooth, course of accessory vein not visible, features of the tooth apex not visible.			
Number of orders of teeth	45	45.2	two				
Teeth / cm	46	4					
sinus shape	47	47.2	rounded				
tooth shapes	48		st/st				
tooth shapes	48		st/cv				
tooth shapes	48		cv/cv				
tooth shapes	48						
principal vein	49	49.1	present				
principal vein termination	50	50.2.1	at apex of tooth				
course of accessory vein	51	88	not visible				
features of the tooth apex	52	88	not visible				



GA30 HM

DNMH spec. # 23774

DMNH loc. # 412

G431		Family: Lauraceae?		Genus and Species:		cf. "Sassafras"	
Section I. Leaf Characters				Section II. Venation			
	score	description			char.	score	description
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.1 pinnate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	88 not visible
Leaf Organization	3	88	not visible		Number of Basal Veins	25	1
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.2.2 compound
Leaflet Attachment	5	88	not visible	2°	Major 2o vein framework	27	27.1.1 craspedodromous
Petiole Features	6	88	not visible		Interior secondaries	28	0 absent
Features of the Blade:					Minor secondary course	29	29.3 semicraspedodromous
Position of Blade Attachment	7	88	not visible		Perimarginal veins	30	0 absent
Laminar size	8	8.5	mesophyll		Major secondary spacing	31	31.1 regular
Laminar L:W ratio	9		not visible		Variation of secondary angle	32	32.1 uniform
Laminar Shape	10	10.3	ovate		Major secondary attachment	33	33.3 excurrent
Medial Symmetry	11	11.1	symmetrical	Inter-2°	proximal course	34.1	34.1.1 parallel to major secondari
Base Symmetry	12	88	not visible		intersecondary length	34.2	34.2.1 <50% of subjacent secondari
Base Symmetry	12	-	-		distal course	34.3	88 not visible
Lobation	13	13.2.2	pinnately lobed		vein frequency	34.4	34.4.1 < 1 per intercostal area
Margin Type	14	14.2.2	serrate	3°	Intercostal tertiary vein fabric	35	35.1.1.1.4 chevroned opposite percurre
Special Margin Features	15	88	not visible		Angle of percurrent tertiaries	35.1.2	35.1.2.1 acute
Apex Angle	16	16.1	acute		vein angle variability	36	88 not visible
Apex Shape	17	17.3	acuminate		Epimedial tertiaries	37	37.1.1.1 opposite percurrent
Apex Shape	17	-	-		admedial course	37.2.1	37.2.1.3 perpendicular to midvein
Base Angle	18	88	not visible		exmedial course	37.2.2	37.2.2.2 basiflexed
Base shape	19	88	not visible		Exterior tertiary course	38	38.3 terminating at the margin
Base shape	19	-	-	4°	Quaternary Vein Fabric	39	88 not visible
Terminal Apex Features	20	88	not visible	5°	Quinary Vein Fabric	40	88 not visible
					Areolation	41	88 not visible
Surface Texture	21	88	not visible		FEV branching	42.1	88 not visible
Surficial Glands	22	88	not visible		FEV termination	42.2	88 not visible
					Marginal Ultimate venation	43	88 not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	44.1	regular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry -, Lobation pinnately lobed, Margin Type serrate, Special Margin Features not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins not visible, Number of Basal Veins 1, Agrophic Veins compound, Major 2o vein framework craspedodromous, Interior secondaries absent, Minor secondary course semicraspedodromous, Perimarginal veins absent, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary attachment excurrent, proximal course parallel to major secondaries, intersecondary length <50% of subjacent secondary, distal course not visible, vein frequency < 1 per intercostal area, Intercostal tertiary vein fabric chevroned opposite percurrent, Angle of percurrent tertiaries acute, vein angle variability not visible, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course basiflexed, Exterior tertiary course terminating at the margin, Quaternary Vein Fabric not visible, Quinary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing regular, Number of orders of teeth one -, Teeth / cm 1, sinus shape rounded, tooth shapes st/st, tooth shapes st/cv, tooth shapes cc/cv, tooth shapes , principal vein present, principal vein termination at apex of tooth, course of accessory vein absent, features of the tooth apex not visible.			
Number of orders of teeth	45	45.1	one				
Teeth / cm	46		1				
sinus shape	47	47.2	rounded				
tooth shapes	48		st/st				
tooth shapes	48		st/cv				
tooth shapes	48		cc/cv				
tooth shapes	48						
principal vein	49	49.1	present				
principal vein termination	50	50.2.1	at apex of tooth				
course of accessory vein	51	0	absent				
features of the tooth apex	52	88	not visible				



GA31 HM

DNMH spec. # 48356

DMNH loc. # 500

G432

Family:

Genus and Species:

Section I. Leaf Characters				score	description
Leaf Attachment	1	88			not visible
Leaf Arrangement	2	88			not visible
Leaf Organization	3	88			not visible
Leaflet Organization	4	88			not visible
Leaflet Attachment	5	88			not visible
Petiole Features	6	88			not visible
Features of the Blade:					
Position of Blade Attachment	7	7.1			marginal
Laminar size	8	8.4			notophyll
Laminar L:W ratio	9		3:1		
Laminar Shape	10	10.1			elliptic
Medial Symmetry	11	11.1			symmetrical
Base Symmetry	12	12.1			symmetrical
Base Symmetry	12	.			-
Lobation	13	13.1			unlobed
Margin Type	14	14.2.2			serrate
Special Margin Features	15	88			not visible
Apex Angle	16	16.1			acute
Apex Shape	17	17.3			acuminate
Apex Shape	17	.			-
Base Angle	18	18.1			acute
Base shape	19	19.1.1			straight
Base shape	19	.			-
Terminal Apex Features	20	0			absent
Surface Texture	21	88			not visible
Surficial Glands	22	88			not visible

Section II. Venation				char.	score	description
1°	Primary Vein Framework	23	23.1			pinnate
	Naked Basal Veins	24	24.1			absent
	Number of Basal Veins	25			1	
	Agrophic Veins	26	26.1			absent
2°	Major 2o vein framework	27	27.1.1			craspedodromous
	Interior secondaries	28	28.1			absent
	Minor secondary course	29	88			not visible
	Perimarginal veins	30	0			absent
	Major secondary spacing	31	31.1			regular
	Variation of secondary angle	32	32.1			uniform
	Major secondary attachment	33	33.3			excurrent
Inter-2°	proximal course	34.1	88			not visible
	intersecondary length	34.2	88			not visible
	distal course	34.3	88			not visible
	vein frequency	34.4	88			not visible
3°	Intercostal tertiary vein fabric	35	88			not visible
	Angle of percurrent tertiaries	35.1.2	88			not visible
	vein angle variability	36	88			not visible
	Epimedial tertiaries	37	88			not visible
	admedial course	37.2.1	88			not visible
	exmedial course	37.2.2	88			not visible
	Exterior tertiary course	38	88			not visible
4°	Quaternary Vein Fabric	39	88			not visible
5°	Quinternary Vein Fabric	40	88			not visible
	Areolation	41	88			not visible
	FEV branching	42.1	88			not visible
	FEV termination	42.2	88			not visible
	Marginal Ultimate venation	43	88			not visible

Section III. Teeth			
Tooth spacing	44	44.2	irregular
Number of orders of teeth	45	45.1	one
Teeth / cm	46		2
sinus shape	47	47.1	angular
tooth shapes	48		st/st
tooth shapes	48		
tooth shapes	48		
tooth shapes	48		
principal vein	49	88	not visible
principal vein termination	50	88	not visible
course of accessory vein	51	88	not visible
features of the tooth apex	52	88	not visible

Text Description:	
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio 3:1, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape -, Base Angle acute, Base shape straight, Base shape -, Terminal Apex Features absent, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent, Major 2o vein framework craspedodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary attachment excurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one , Teeth / cm 2, sinus shape angular, tooth shapes st/st, tooth shapes , tooth shapes , tooth shapes , principal vein not visible, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.	



GA32 HM

DNMH spec. # 23770

DMNH loc. # 412

G433

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
		score	description		char.	score	description
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.1 pinnate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	1
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.1 absent
Leaflet Attachment	5	88	not visible	2°	Major 2o vein framework	27	27.1.1 craspedodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1 absent
					Minor secondary course	29	29.1 craspedodromous
					Perimarginal veins	30	0 absent abruptly increasing
Features of the Blade:					Major secondary spacing	31	31.5 proximally
Position of Blade Attachment	7	88	not visible		Variation of secondary angle	32	32.2 inconsistent
Laminar size	8	8.4	notophyll		Major secondary attachment	33	88 not visible
Laminar L:W ratio	9		not visible	Inter-2°	proximal course	34.1	88 not visible
Laminar Shape	10	10.3	ovate		intersecondary length	34.2	88 not visible
Medial Symmetry	11	11.1	symmetrical		distal course	34.3	88 not visible
Base Symmetry	12	88	not visible		vein frequency	34.4	88 not visible
Base Symmetry	12	.	-	3°	Intercostal tertiary vein fabric	35	88 not visible
Lobation	13	13.1	unlobed		Angle of percurrent tertiaries	35.1.2	88 not visible
Margin Type	14	14.2.2	serrate		vein angle variability	36	88 not visible
Special Margin Features	15	88	not visible		Epimedial tertiaries	37	88 not visible
Apex Angle	16	88	not visible	4°	admedial course	37.2.1	88 not visible
Apex Shape	17	88	not visible		exmedial course	37.2.2	88 not visible
Apex Shape	17	.	-		Exterior tertiary course	38	88 not visible
Base Angle	18	88	not visible		Quaternary Vein Fabric	39	88 not visible
Base shape	19	88	not visible	5°	Quinternary Vein Fabric	40	88 not visible
Base shape	19	.	-		Areolation	41	88 not visible
Terminal Apex Features	20	88	not visible		FEV branching	42.1	88 not visible
					FEV termination	42.2	88 not visible
Surface Texture	21	88	not visible		Marginal Ultimate venation	43	88 not visible
Surficial Glands	22	88	not visible				
Section III. Teeth				Text Description:			
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent, Major 2o vein framework craspedodromous, Interior secondaries absent, Minor secondary course craspedodromous, Perimarginal veins absent, Major secondary spacing abruptly increasing proximally, Variation of secondary angle inconsistent, Major secondary attachment not visible, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one, Teeth / cm 1, sinus shape angular, tooth shapes st/st, tooth shapes , tooth shapes , principal vein present, principal vein termination at apex of tooth, course of accessory vein looped, features of the tooth apex not visible.			
Number of orders of teeth	45	45.1	one				
Teeth / cm	46		1				
sinus shape	47	47.1	angular				
tooth shapes	48		st/st				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	49.1	present				
principal vein termination	50	50.2.1	at apex of tooth				
course of accessory vein	51	51.1.1	looped				
features of the tooth apex	52	88	not visible				



GA33 HM

DNMH spec. # 23772

DMNH loc. # 412

GA34

Family:

Genus and Species:

<u>Section I. Leaf Characters</u>				<u>Section II. Venation</u>			
		score	description		char.	score	description
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.1 pinnate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	1
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.2.2 compound festooned
Leaflet Attachment	5	88	not visible	2°	Major 2o vein framework	27	27.3.2 brochidodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1 absent
					Minor secondary course	29	29.2 simple brochidodromous
					Perimarginal veins	30	0 absent abruptly increasing proximally
Features of the Blade:					Major secondary spacing	31	31.5 inconsistent
Position of Blade Attachment	7	7.1	marginal		Variation of secondary angle	32	32.2 deflected
Laminar size	8	8.4	notophyll		Major secondary attachment	33	33.4 absent
Laminar L:W ratio	9	7:4		Inter-2°	Intersecondary proximal course	34.1	0 absent
Laminar Shape	10	10.4	oblong		intersecondary length	34.2	99 n/a
Medial Symmetry	11	11.1	symmetrical		distal course	34.3	99 n/a
Base Symmetry	12	12.1	symmetrical		vein frequency	34.4	99 n/a
Base Symmetry	12	.	-				convex opposite
Lobation	13	13.1	unlobed	3°	Intercostal tertiary vein fabric	35	35.1.1.1.2 percurrent
Margin Type	14	14.1	entire		Angle of percurrent tertiaries	35.1.2	35.1.2.2 obtuse
Special Margin Features	15	88	not visible		vein angle variability	36	36.2 consistent
Apex Angle	16	88	not visible		Epimedial tertiaries	37	37.1.1.1 opposite percurrent
Apex Shape	17	88	not visible		admedial course	37.2.1	37.2.1.3 perpendicular to midvein
Apex Shape	17	.	-		exmedial course	37.2.2	37.2.2.2 basiflexed
Base Angle	18	18.3	reflex		Exterior tertiary course	38	38.2 looped
Base shape	19	19.2.1	cordate	4°	Quaternary Vein Fabric	39	39.1.1 opposite percurrent
Base shape	19	.	-	5°	Quinternary Vein Fabric	40	88 not visible
Terminal Apex Features	20	88	not visible		Areolation	41	88 not visible
					FEV branching	42.1	88 not visible
					FEV termination	42.2	88 not visible
Surface Texture	21	88	not visible		Marginal Ultimate venation	43	88 not visible
Surficial Glands	22	88	not visible				
<u>Section III. Teeth</u>				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio 7:4, Laminar Shape oblong, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry - , Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape - , Base Angle reflex, Base shape cordate, Base shape - , Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins compound, Major 2o vein framework festooned brochidodromous, Interior secondaries absent, Minor secondary course simple brochidodromous, Perimarginal veins absent, Major secondary spacing abruptly increasing proximally, Variation of secondary angle inconsistent, Major secondary attachment deflected, Intersecondary proximal course absent, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric convex opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability consistent, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course basiflexed , Exterior tertiary course looped, Quaternary Vein Fabric opposite percurrent, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm 5, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46	99	5				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				



GA34 HM

DNMH spec. # 24088

DMNH loc. # 412

G435

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
		score	description		char.	score	description
Leaf Attachment	1	88	not visible	1*	Primary Vein Framework	23	23.1 pinnate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	1
Leaflet Organization	4	88	not visible		Agrophich Veins	26	26.1 absent
Leaflet Attachment	5	88	not visible	2*	Major 2o vein framework	27	27.3.1 simple brochidodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1 absent
					Minor secondary course	29	88 not visible
					Perimarginal veins	30	30.1 marginal secondary
Features of the Blade:							
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	31.3 decreasing proximally
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	32.1 uniform
Laminar L:W ratio	9		not visible		Major secondary attachment	33	33.3 excurrent
Laminar Shape	10	88	not visible	Inter- 2*	Intersecondary proximal course	34.1	88 not visible
Medial Symmetry	11	88	not visible		intersecondary length	34.2	88 not visible
Base Symmetry	12	88	not visible		distal course	34.3	88 not visible
Base Symmetry	12	.	-		vein frequency	34.4	88 not visible
Lobation	13	13.1	unlobed	3*	Intercostal tertiary vein fabric	35	88 not visible
Margin Type	14	14.1	entire		Angle of percurrent tertiaries	35.1.2	88 not visible
Special Margin Features	15	88	not visible		vein angle variability	36	88 not visible
Apex Angle	16	88	not visible		Epimedial tertiaries	37	88 not visible
Apex Shape	17	88	not visible		admedial course	37.2.1	88 not visible
Apex Shape	17	.	-		exmedial course	37.2.2	88 not visible
Base Angle	18	18.1	acute		Exterior tertiary course	38	88 not visible
Base shape	19	19.1.4	concavo-convex	4* 5*	Quaternary Vein Fabric	39	88 not visible
Base shape	19	.	-		Quinternary Vein Fabric	40	88 not visible
Terminal Apex Features	20	88	not visible		Areolation	41	88 not visible
					FEV branching	42.1	88 not visible
Surface Texture	21	88	not visible		FEV termination	42.2	88 not visible
Surficial Glands	22	88	not visible		Marginal Ultimate venation	43	88 not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry - , Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape - , Base Angle acute, Base shape concavo-convex, Base shape - , Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophich Veins absent, Major 2o vein framework simple brochidodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins marginal secondary, Major secondary spacing decreasing proximally, Variation of secondary angle uniform, Major secondary attachment excurrent, Intersecondary proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				



GA35 HM

DNMH spec. # 23775

DMNH loc. # 412

GA36

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
	score	description		char.	score	description	
Leaf Attachment	1	88	not visible	1°	23	23.1	pinnate
Leaf Arrangement	2	88	not visible		24	24.1	absent
Leaf Organization	3	88	not visible		25		1
Leaflet Organization	4	88	not visible		26	26.1	absent
Leaflet Attachment	5	88	not visible		27	27.3.1	simple brochidodromous
Petiole Features	6	88	not visible	2°	28	28.1	absent
Features of the Blade:					29	88	not visible
Position of Blade Attachment	7	88	not visible		30	88	not visible
Laminar size	8	8.4	notophyll		31	31.3	decreasing proximally
Laminar L:W ratio	9		7:4		32	32.1	uniform
Laminar Shape	10	10.1	elliptic		33	33.4	deflected
Medial Symmetry	11	11.1	symmetrical	Inter-2°	34.1	88	not visible
Base Symmetry	12	88	not visible		34.2	88	not visible
Base Symmetry	12	.	-		34.3	88	not visible
Lobation	13	13.1	unlobed		34.4	88	not visible
Margin Type	14	14.1	entire	3°	35	88	not visible
Special Margin Features	15	88	not visible		35.1.2	88	not visible
Apex Angle	16	88	not visible		36	88	not visible
Apex Shape	17	88	not visible		37	88	not visible
Apex Shape	17	.	-		37.2.1	88	not visible
Base Angle	18	88	not visible		37.2.2	88	not visible
Base shape	19	88	not visible		38	88	not visible
Base shape	19	.	-	4°	39	88	not visible
Terminal Apex Features	20	88	not visible	5°	40	88	not visible
					41	88	not visible
					42.1	88	not visible
Surface Texture	21	88	not visible		42.2	88	not visible
Surficial Glands	22	88	not visible		43	88	not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size notophyll, Laminar L:W ratio 7:4, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent, Major 2o vein framework simple brochidodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins not visible, Major secondary spacing decreasing proximally, Variation of secondary angle uniform, Major secondary attachment deflected, Intersecondary proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercoastal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/z, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/z				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				



GA36 HM

DNMH spec. # 24171

DMNH loc. # 412

G437

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
		score	description		char.	score	description
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.1 pinnate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	1
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.1 absent
Leaflet Attachment	5	88	not visible	2°	Major 2o vein framework	27	27.3.1 simple brochidodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1 absent
Features of the Blade:					Minor secondary course	29	29.2 simple brochidodromous
Position of Blade Attachment	7	7.1	marginal		Perimarginal veins	30	0 absent
Laminar size	8	8.4	notophyll		Major secondary spacing	31	31.3 decreasing proximally smoothly decreasing
Laminar L:W ratio	9		2:1		Variation of secondary angle	32	32.4 proximally
Laminar Shape	10	10.1	elliptic		Major secondary attachment	33	33.4 deflected
Medial Symmetry	11	11.1	symmetrical	Inter-2°	Intersecondary proximal course	34.1	34.1.1 parallel to major secondaries >50% of subjacent
Base Symmetry	12	12.1	symmetrical		intersecondary length	34.2	34.2.2 secondary
Base Symmetry	12	.	-		distal course	34.3	88 not visible
Lobation	13	13.1	unlobed		vein frequency	34.4	88 not visible
Margin Type	14	14.1	entire	3°	Intercostal tertiary vein fabric	35	88 not visible
Special Margin Features	15	88	not visible		Angle of percurrent tertiaries	35.1.2	88 not visible
Apex Angle	16	88	not visible		vein angle variability	36	88 not visible
Apex Shape	17	88	not visible		Epimedial tertiaries	37	88 not visible
Apex Shape	17	.	-		admedial course	37.2.1	88 not visible
Base Angle	18	18.2	obtuse		exmedial course	37.2.2	88 not visible
Base shape	19	19.1.1	straight		Exterior tertiary course	38	88 not visible
Base shape	19	.	-	4°	Quaternary Vein Fabric	39	88 not visible
Terminal Apex Features	20	88	not visible	5°	Quinternary Vein Fabric	40	88 not visible
Surface Texture	21	88	not visible		Areolation	41	88 not visible
Surficial Glands	22	88	not visible		FEV branching	42.1	88 not visible
					FEV termination	42.2	88 not visible
					Marginal Ultimate venation	43	88 not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio 2:1, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle obtuse, Base shape straight, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent, Major 2o vein framework simple brochidodromous, Interior secondaries absent, Minor secondary course simple brochidodromous, Perimarginal veins absent, Major secondary spacing decreasing proximally, Variation of secondary angle smoothly decreasing proximally, Major secondary attachment deflected, Intersecondary proximal course parallel to major secondaries, intersecondary length >50% of subjacent secondary, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				



GA37 HM

DNMH spec. # 23776

DMNH loc. # 412

G438

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
		score	description		char.	score	description
Leaf Attachment	1	88	not visible	1 ^o	Primary Vein Framework	23	23.1 pinnate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	0 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	1
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.1 absent
Leaflet Attachment	5	88	not visible	2 ^o	Major 2o vein framework	27	27.3.1 simple brochidodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1 absent
					Minor secondary course	29	88 not visible
Features of the Blade:					Perimarginal veins	30	30.3 fimbrial vein
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	31.3 decreasing proximally
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	32.1 uniform
Laminar L:W ratio	9		not visible		Major secondary attachment	33	33.2 basally decurrent
Laminar Shape	10	10.1	elliptic	Inter-	Intersecondary proximal course	34.1	0 absent
Medial Symmetry	11	88	not visible	2 ^o	intersecondary length	34.2	99 n/a
Base Symmetry	12	12.2	asymmetrical		distal course	34.3	99 n/a
Base Symmetry	12	.	-		vein frequency	34.4	99 n/a
Lobation	13	13.1	unlobed	3 ^o	Intercostal tertiary vein fabric	35	35.1.1.1.3 sinuous opposite percurrent
Margin Type	14	14.1	entire		Angle of percurrent tertiaries	35.1.2	35.1.2.1 acute
Special Margin Features	15	88	not visible		vein angle variability	36	88 not visible
Apex Angle	16	88	not visible		Epimedial tertiaries	37	88 not visible
Apex Shape	17	88	not visible		admedial course	37.2.1	37.2.1.3 perpendicular to midvein
Apex Shape	17	.	-		exmedial course	37.2.2	37.2.2.2 basiflexed
Base Angle	18	18.1	acute		Exterior tertiary course	38	38.3 terminating at the margin
Base shape	19	19.1.1	straight	4 ^o	Quaternary Vein Fabric	39	88 not visible
Base shape	19	.	-	5 ^o	Quinternary Vein Fabric	40	88 not visible
Terminal Apex Features	20	88	not visible		Areolation	41	88 not visible
					FEV branching	42.1	88 not visible
Surface Texture	21	88	not visible		FEV termination	42.2	88 not visible
Surficial Glands	22	88	not visible		Marginal Ultimate venation	43	88 not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape elliptic, Medial Symmetry not visible, Base Symmetry asymmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle acute, Base shape straight, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent, Major 2o vein framework simple brochidodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins fimbrial vein, Major secondary spacing decreasing proximally, Variation of secondary angle uniform, Major secondary attachment basally decurrent, Intersecondary proximal course absent, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric sinuous opposite percurrent, Angle of percurrent tertiaries acute, vein angle variability not visible, Epimedial tertiaries not visible, admedial course perpendicular to midvein, exmedial course basiflexed, Exterior tertiary course terminating at the margin, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				



GA38 HM

DNMH spec. # 23776

DMNH loc. # 412

G439

Family: Rhamnaceae?

Genus and Species:

“Rhamnus” goldiana

Section I. Leaf Characters				Section II. Venation					
		score	description		char.	score	description		
	Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.1	pinnate
	Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1	absent
	Leaf Organization	3	88	not visible		Number of Basal Veins	25		1
	Leaflet Organization	4	88	not visible		Agrophobic Veins	26	26.2.2	compound eucamptodromous becoming
	Leaflet Attachment	5	88	not visible	2°	Major 2o vein framework	27	27.2.1.3	brochidodromous distally
	Petiole Features	6	88	not visible		Interior secondaries	28	28.1	absent
	Features of the Blade:			Minor secondary course		29	29.2	simple brochidodromous	
	Position of Blade Attachment	7	7.1	marginal		Perimarginal veins	30	30.1	marginal secondary
	Laminar size	8	8.6	macrophyll		Major secondary spacing	31	31.1	regular
	Laminar L:W ratio	9		2:1		Variation of secondary angle	32	32.1	uniform
	Laminar Shape	10	10.3	ovate		Major secondary attachment	33	33.2	basally decurrent
	Medial Symmetry	11	11.1	symmetrical	Inter- 2°	Intersecondary proximal course	34.1	0	absent
	Base Symmetry	12	12.1	symmetrical		intersecondary length	34.2	99	n/a
	Base Symmetry	12	.	-		distal course	34.3	99	n/a
	Lobation	13	13.1	unlobed		vein frequency	34.4	99	n/a
	Margin Type	14	14.1	entire	3°	Intercostal tertiary vein fabric	35	35.1.1.1.1	straight opposite percurrent
	Special Margin Features	15	88	not visible		Angle of percurrent tertiaries	35.1.2	35.1.2.2	obtuse
	Apex Angle	16	16.1	acute		vein angle variability	36	36.3	increasing exmedially
	Apex Shape	17	17.3	acuminate		Epimedial tertiaries	37	37.1.1.1	opposite percurrent
	Apex Shape	17	.	-		admedial course	37.2.1	37.2.1.3	perpendicular to midvein
	Base Angle	18	18.2	obtuse		exmedial course	37.2.2	37.2.2.2	basiflexed
	Base shape	19	88	not visible	Exterior tertiary course	38	38.2	looped	
	Base shape	19	.	-	4°	Quaternary Vein Fabric	39	88	not visible
	Terminal Apex Features	20	88	not visible		5°	Quinternary Vein Fabric	40	88
	Surface Texture	21	88	not visible	Areolation		41	88	not visible
	Surficial Glands	22	88	not visible	FEV branching		42.1	88	not visible
					FEV termination		42.2	88	not visible
					Marginal Ultimate venation		43	88	not visible
Section III. Teeth				Text Description:					
	Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size macrophyll, Laminar L:W ratio 2:1, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape -, Base Angle obtuse, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophobic Veins compound, Major 2o vein framework eucamptodromous becoming brochidodromous distally, Interior secondaries absent, Minor secondary course simple brochidodromous, Perimarginal veins marginal secondary, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary attachment basally decurrent, Intersecondary proximal course absent, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric straight opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability increasing exmedially, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course basiflexed, Exterior tertiary course looped, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes -, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course				
	Number of orders of teeth	45	99	n/a					
	Teeth / cm	46		n/a					
	sinus shape	47	99	n/a					
	tooth shapes	48		n/a					
	tooth shapes	48							
	tooth shapes	48							
	tooth shapes	48							
	principal vein	49	99	n/a					
	principal vein termination	50	99	n/a					
	course of accessory vein	51	99	n/a					
	features of the tooth apex	52	99	n/a					

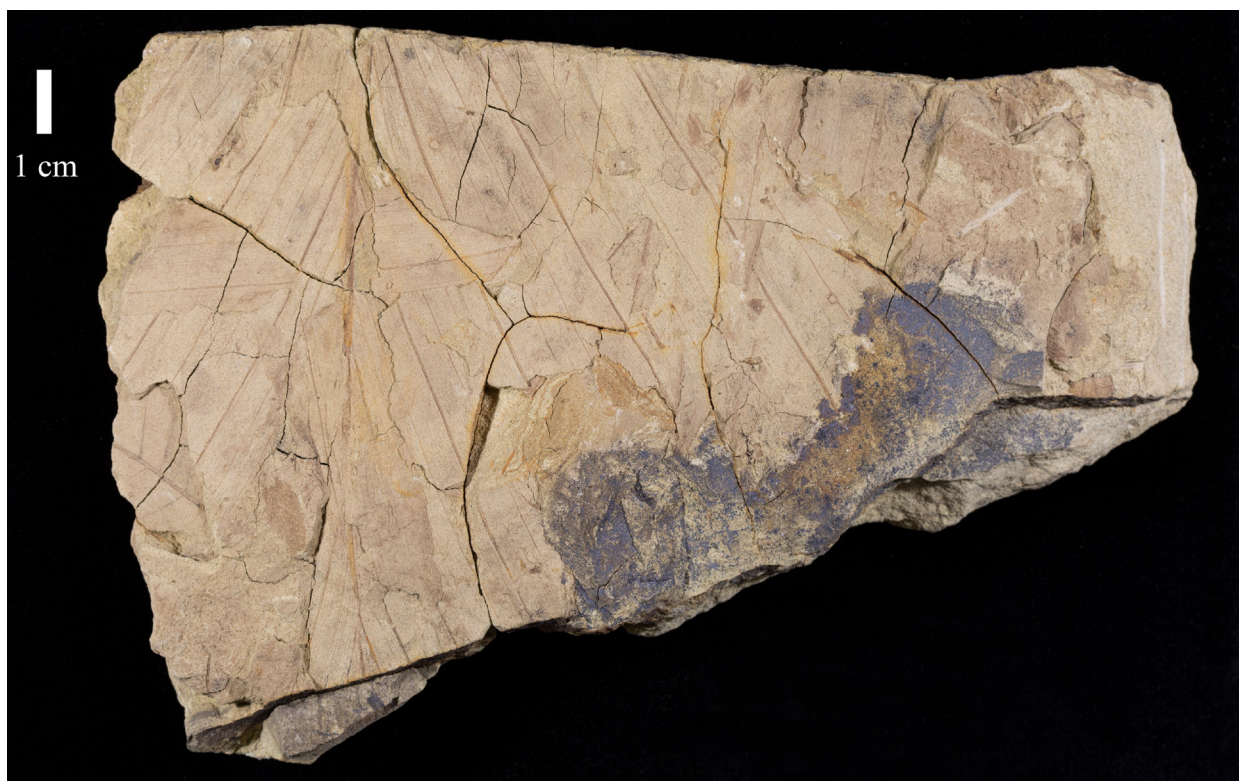


GA39 HM

DNMH spec. # 45892

DMNH loc. # 3791

GA40		Family: Arecaceae		Genus and Species:		Phenocites sp.	
Section I. Leaf Characters		score		description			
Leaf Attachment	1	99	n/a				
Leaf Arrangement	2	99	n/a				
Leaf Organization	3	99	n/a				
Leaflet Organization	4	99	n/a				
Leaflet Attachment	5	99	n/a				
Petiole Features	6	99	n/a				
Features of the Blade:							
Position of Blade Attachment	7	99	n/a				
Laminar size	8	99	n/a				
Laminar L:W ratio	9		n/a				
Laminar Shape	10	99	n/a				
Medial Symmetry	11	99	n/a				
Base Symmetry	12	99	n/a				
Base Symmetry	12	.	-				
Lobation	13	99	n/a				
Margin Type	14	99	n/a				
Special Margin Features	15	99	n/a				
Apex Angle	16	99	n/a				
Apex Shape	17	99	n/a				
Apex Shape	17	.	-				
Base Angle	18	99	n/a				
Base shape	19	99	n/a				
Base shape	19	.	-				
Terminal Apex Features	20	99	n/a				
Surface Texture	21	99	n/a				
Surficial Glands	22	99	n/a				
Section II. Venation				char.		score	
1°				Primary Vein Framework	23	99	n/a
				Naked Basal Veins	24	99	n/a
				Number of Basal Veins	25		n/a
				Agrophic Veins	26	99	n/a
2°				Major 2o vein framework	27	99	n/a
				Interior secondaries	28	99	n/a
				Minor secondary course	29	99	n/a
				Perimarginal veins	30	99	n/a
				Major secondary spacing	31	99	n/a
				Variation of secondary angle	32	99	n/a
				Major secondary attachment	33	99	n/a
Inter-2°				proximal course	34.1	99	n/a
				intersecondary length	34.2	99	n/a
				distal course	34.3	99	n/a
				vein frequency	34.4	99	n/a
3°				Intercostal tertiary vein fabric	35	99	n/a
				Angle of percurrent tertiaries	35.1.2	99	n/a
				vein angle variability	36	99	n/a
				Epimedial tertiaries	37	99	n/a
				admedial course	37.2.1	99	n/a
				exmedial course	37.2.2	99	n/a
				Exterior tertiary course	38	99	n/a
4°				Quaternary Vein Fabric	39	99	n/a
5°				Quinternary Vein Fabric	40	99	n/a
				Areolation	41	99	n/a
				FEV branching	42.1	99	n/a
				FEV termination	42.2	99	n/a
				Marginal Ultimate venation	43	99	n/a
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				
Leaflets of pinnate palm leaf with midvein and parallel secondary veins.							



GA40 HM

DNMH spec. # 46874

DMNH loc. # 412

GA41

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
	score	description		char.	score	description	
Leaf Attachment	1	88	not visible	1°	23	23.1	pinnate
Leaf Arrangement	2	88	not visible		24	24.1	absent
Leaf Organization	3	88	not visible		25		1
Leaflet Organization	4	88	not visible		26	26.2.2	compound
Leaflet Attachment	5	88	not visible	2°	27	27.3.1	simple brochidodromous
Petiole Features	6	88	not visible		28	28.1	absent
Features of the Blade:					29	29.2	simple brochidodromous
Position of Blade Attachment	7	7.1	marginal		30	0	absent
Laminar size	8	8.4	notophyll		31	31.2	irregular
Laminar L:W ratio	9		not visible		32	32.2	inconsistent
Laminar Shape	10	10.3	ovate		33	33.3	excurrent
Medial Symmetry	11	11.1	symmetrical	Inter-2°	34.1	34.1.1	parallel to major secondaries
Base Symmetry	12	12.1	symmetrical		34.2	34.2.1	<50% of subjacent secondary
Base Symmetry	12	.	-		34.3	34.3.1	reticulating
					34.4	34.4.1	< 1 per intercostal area
Lobation	13	13.1	unlobed	3°	35	35.1.1.1.2	convex opposite percurrent
Margin Type	14	14.1	entire		35.1.2	35.1.2.2	obtuse
Special Margin Features	15	88	not visible		36	36.3.1	basally concentric
Apex Angle	16	88	not visible		37	37.1.1.1	opposite percurrent
Apex Shape	17	88	not visible		37.2.1	37.2.1.3	perpendicular to midvein
Apex Shape	17	.	-		37.2.2	37.2.2.2	basiflexed
Base Angle	18	18.3	reflex		38	38.2	looped
Base shape	19	19.2.1	cordate	4°	39	39.2.2	irregular reticulate
Base shape	19	.	-	5°	40	88	not visible
Terminal Apex Features	20	88	not visible		41	88	not visible
Surface Texture	21	88	not visible		42.1	88	not visible
Surficial Glands	22	88	not visible		42.2	88	not visible
					43	88	not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry - , Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape - , Base Angle reflex, Base shape cordate, Base shape - , Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins compound, Major 2o vein framework simple brochidodromous, Interior secondaries absent, Minor secondary course simple brochidodromous, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle inconsistent, Major secondary attachment excurrent, Intersecondary proximal course parallel to major secondaries, intersecondary length <50% of subjacent secondary, distal course reticulating, vein frequency < 1 per intercostal area, Intercostal tertiary vein fabric convex opposite percurrent, Angle of percurrent tertiary obtuse, vein angle variability basally concentric, Epimedial tertiary opposite percurrent, admedial course perpendicular to midvein, exmedial course basiflexed , Exterior tertiary course looped, Quaternary Vein Fabric irregular reticulate, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				



GA41 HM

DNMH spec. # 23768

DMNH loc. # 412

GA42

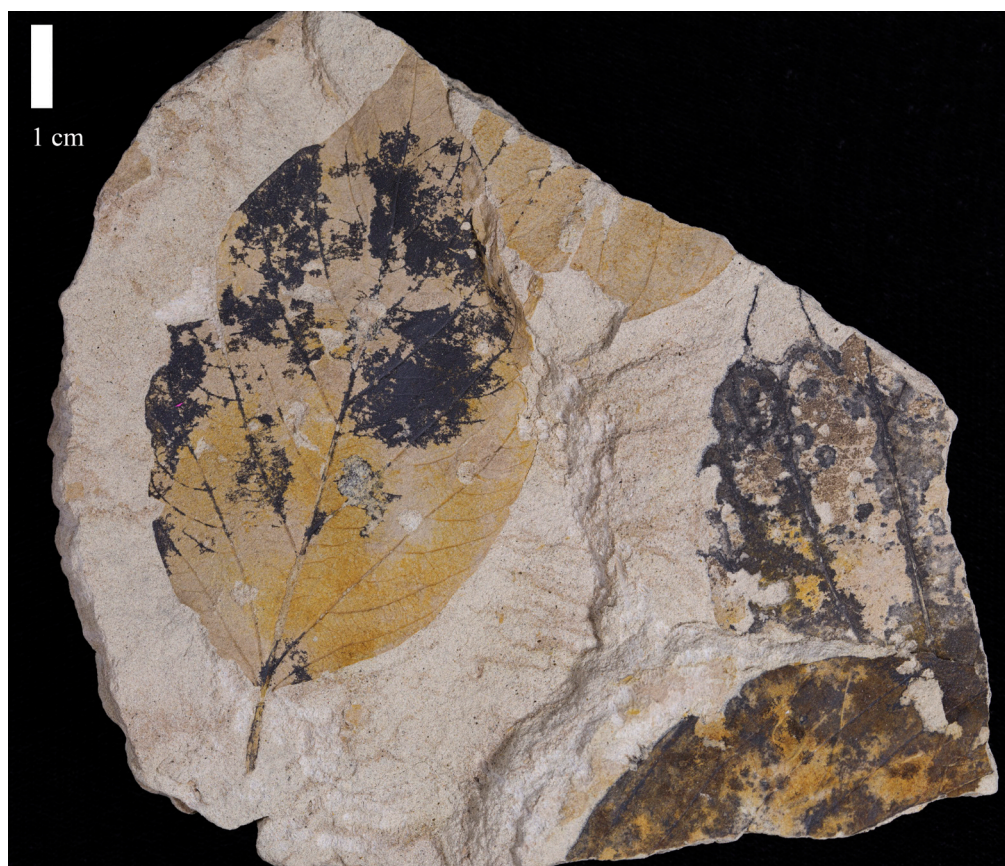
Family:

Genus and Species:

Section I. Leaf Characters				score	description	
Leaf Attachment	1	88	not visible			
Leaf Arrangement	2	88	not visible			
Leaf Organization	3	88	not visible			
Leaflet Organization	4	88	not visible			
Leaflet Attachment	5	88	not visible			
Petiole Features	6	88	not visible			
Features of the Blade:						
Position of Blade Attachment	7	7.1	marginal			
Laminar size	8	8.4	notophyll			
Laminar L:W ratio	9		4:3			
Laminar Shape	10	10.1	elliptic			
Medial Symmetry	11	11.1	symmetrical			
Base Symmetry	12	12.1	symmetrical			
Base Symmetry	12	.	-			
Lobation	13	13.1	unlobed			
Margin Type	14	14.1	entire			
Special Margin Features	15	88	not visible			
Apex Angle	16	16.1	acute			
Apex Shape	17	17.3	acuminate			
Apex Shape	17	.	-			
Base Angle	18	18.2	obtuse			
Base shape	19	19.1.3.1	rounded			
Base shape	19	.	-			
Terminal Apex Features	20	88	not visible			
Surface Texture	21	88	not visible			
Surficial Glands	22	88	not visible			

Section II. Venation		char.	score	description	
1*	Primary Vein Framework	23	23.1	pinnate	
	Naked Basal Veins	24	24.1	absent	
	Number of Basal Veins	25		5	
	Agrophich Veins	26	26.2.2	compound	
2*	Major 2o vein framework	27	27.3.1	simple brochidodromous	
	Interior secondaries	28	28.1	absent	
	Minor secondary course	29	29.2	simple brochidodromous	
	Perimarginal veins	30	0	absent	
	Major secondary spacing	31	31.2	irregular	
	Variation of secondary angle	32	32.6	one pair acute basal secondaries	
	Major secondary attachment	33	33.3	excurrent	
Inter-2*	Intersecondary proximal course	34.1	0	absent	
	intersecondary length	34.2	99	n/a	
	distal course	34.3	99	n/a	
	vein frequency	34.4	99	n/a	
3*	Intercostal tertiary vein fabric	35	35.1.1.1.2	convex opposite percurrent	
	Angle of percurrent tertiaries	35.1.2	35.1.2.1	acute	
	vein angle variability	36	36.2	consistent	
	Epimedial tertiaries	37	37.1.4	mixed	
	admedial course	37.2.1	37.2.1.1	parallel to subjacent secondary	
	exmedial course	37.2.2	37.2.2.1	parallel to intercostal tertiary	
	Exterior tertiary course	38	38.2	looped	
4*	Quaternary Vein Fabric	39	88	not visible	
5*	Quinternary Vein Fabric	40	88	not visible	
	Areolation	41	88	not visible	
	FEV branching	42.1	88	not visible	
	FEV termination	42.2	88	not visible	
	Marginal Ultimate venation	43	88	not visible	

Section III. Teeth				Text Description:		
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio 4:3, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape -, Base Angle obtuse, Base shape rounded, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 5, Agrophich Veins compound, Major 2o vein framework simple brochidodromous, Interior secondaries absent, Minor secondary course simple brochidodromous, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle one pair acute basal secondaries, Major secondary attachment excurrent, Intersecondary proximal course absent, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric convex opposite percurrent, Angle of percurrent tertiaries acute, vein angle variability consistent, Epimedial tertiaries mixed, admedial course parallel to subjacent secondary, exmedial course parallel to intercostal tertiary, Exterior tertiary course looped, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.		
Number of orders of teeth	45	99	n/a			
Teeth / cm	46		n/a			
sinus shape	47	99	n/a			
tooth shapes	48		n/a			
tooth shapes	48					
tooth shapes	48					
tooth shapes	48					
principal vein	49	99	n/a			
principal vein termination	50	99	n/a			
course of accessory vein	51	99	n/a			
features of the tooth apex	52	99	n/a			



GA42 HM

DNMH spec. # 46478

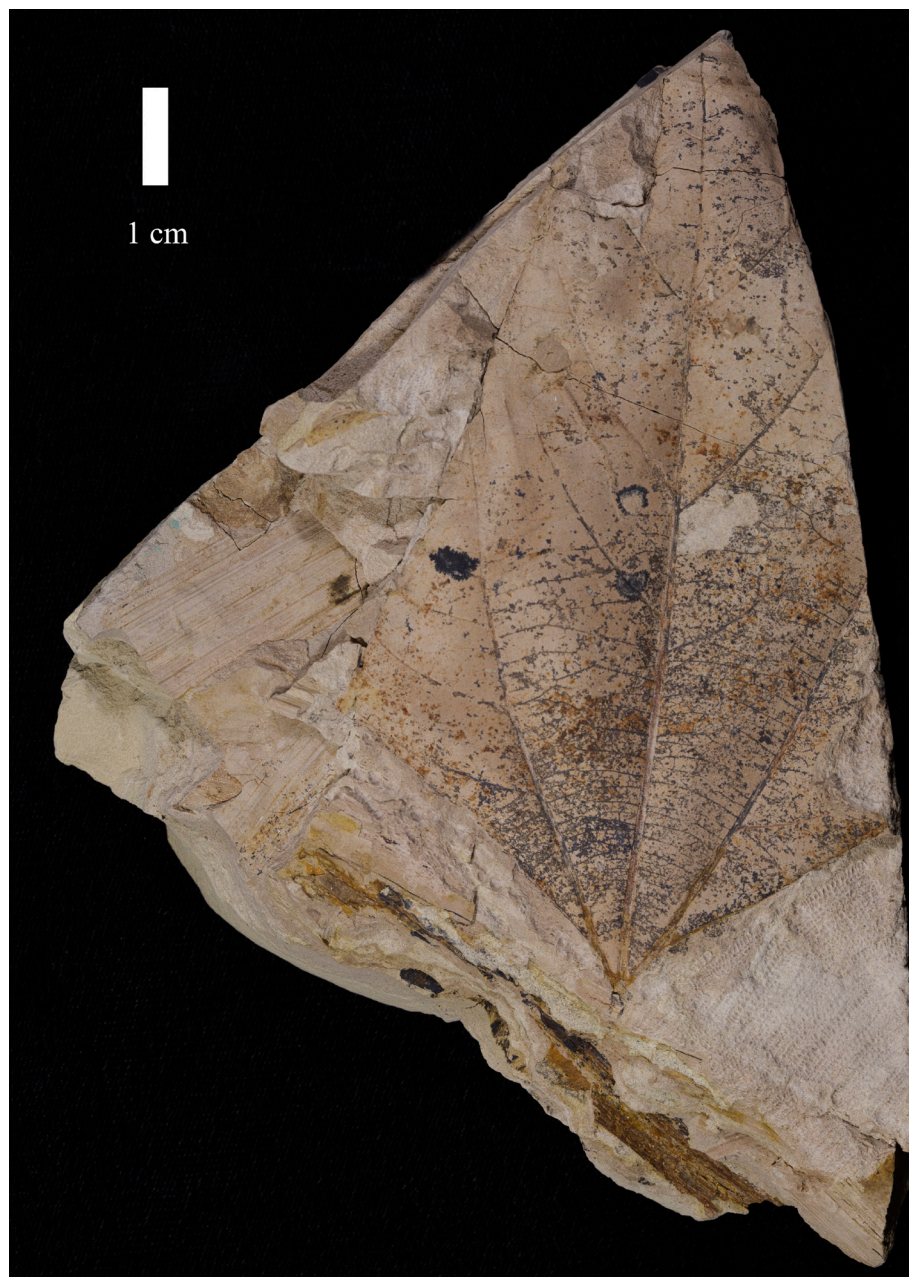
DMNH loc. # 3791

G443

Family:

Genus and Species:

Section I. Leaf Characters			score	description	Section II. Venation			char.	score	description
Leaf Attachment	1	88	not visible		1° Primary Vein Framework	23	23.2.3.1	basal acrodromous		
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.2	present		
Leaf Organization	3	88	not visible		Number of Basal Veins	25		5		
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.2.2	compound		
Leaflet Attachment	5	88	not visible		2° Major 2o vein framework	27	88	not visible		
Petiole Features	6	88	not visible		Interior secondaries	28	28.1	absent		
Features of the Blade:					Minor secondary course	29	88	not visible		
Position of Blade Attachment	7	7.1	marginal		Perimarginal veins	30	88	not visible		
Laminar size	8	8.5	mesophyll		Major secondary spacing	31	88	not visible		
Laminar L:W ratio	9		not visible		Variation of secondary angle	32	32.6	one pair acute basal secondaries		
Laminar Shape	10	88	not visible		Major secondary attachment	33	33.3	excurrent		
Medial Symmetry	11	88	not visible		Inter- Intersecondary proximal course	34.1	34.1.1	parallel to major secondaries		
Base Symmetry	12	12.1	symmetrical		2° intersecondary length	34.2	34.2.2	>50% of subjacent secondary		
Base Symmetry	12	.	-		distal course	34.3	34.3.2	parallel to subjacent major secondary		
Lobation	13	13.1	unlobed		vein frequency	34.4	34.4.1	< 1 per intercostal area		
Margin Type	14	14.1	entire		3° Intercostal tertiary vein fabric	35	35.1.1.1.2	convex opposite percurrent		
Special Margin Features	15	88	not visible		Angle of percurrent tertiaries	35.1.2	35.1.2.2	obtuse		
Apex Angle	16	88	not visible		vein angle variability	36	36.2	consistent		
Apex Shape	17	88	not visible		Epimedial tertiaries	37	37.1.1.1	opposite percurrent		
Apex Shape	17	.	-		admedial course	37.2.1	37.2.1.3	perpendicular to midvein		
Base Angle	18	18.2	obtuse		exmedial course	37.2.2	37.2.1.2	parallel to intercostal tertiary		
Base shape	19	19.1.3	convex		Exterior tertiary course	38	88	not visible		
Base shape	19	.	-		4° Quaternary Vein Fabric	39	39.1.3	mixed percurrent		
Terminal Apex Features	20	88	not visible		5° Quinternary Vein Fabric	40	88	not visible		
Surface Texture	21	88	not visible		Areolation	41	88	not visible		
Surficial Glands	22	88	not visible		FEV branching	42.1	88	not visible		
					FEV termination	42.2	88	not visible		
					Marginal Ultimate venation	43	88	not visible		
Section III. Teeth					Text Description:					
Tooth spacing	44	99	n/a		Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle obtuse, Base shape convex, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins present, Number of Basal Veins 5, Agrophic Veins compound, Major 2o vein framework not visible, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins not visible, Major secondary spacing not visible, Variation of secondary angle one pair acute basal secondaries, Major secondary attachment excurrent, Intersecondary proximal course parallel to major secondaries, intersecondary length >50% of subjacent secondary, distal course parallel to subjacent major secondary, vein frequency < 1 per intercostal area, Intercostal tertiary vein fabric convex opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability consistent, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course parallel to intercostal tertiary, Exterior tertiary course not visible, Quaternary Vein Fabric mixed percurrent, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of					
Number of orders of teeth	45	99	n/a							
Teeth / cm	46		n/a							
sinus shape	47	99	n/a							
tooth shapes	48		n/a							
tooth shapes	48									
tooth shapes	48									
tooth shapes	48									
principal vein	49	99	n/a							
principal vein termination	50	99	n/a							
course of accessory vein	51	99	n/a							
features of the tooth apex	52	99	n/a							



GA43 HM

DNMH spec. # 46482

DMNH loc. # 3792

G444

Family:

Genus and Species:

Section I. Leaf Characters			score	description	
Leaf Attachment	1	88	not visible		
Leaf Arrangement	2	88	not visible		
Leaf Organization	3	88	not visible		
Leaflet Organization	4	88	not visible		
Leaflet Attachment	5	88	not visible		
Petiole Features	6	88	not visible		
Features of the Blade:					
Position of Blade Attachment	7	88	not visible		
Laminar size	8	8.5	mesophyll		
Laminar L:W ratio	9		not visible		
Laminar Shape	10	88	not visible		
Medial Symmetry	11	88	not visible		
Base Symmetry	12	88	not visible		
Base Symmetry	12	.	-		
Lobation	13	13.1	unlobed		
Margin Type	14	14.1	entire		
Special Margin Features	15	88	not visible		
Apex Angle	16	88	not visible		
Apex Shape	17	88	not visible		
Apex Shape	17	.	-		
Base Angle	18	88	not visible		
Base shape	19	88	not visible		
Base shape	19	.	-		
Terminal Apex Features	20	88	not visible		
Surface Texture	21	88	not visible		
Surficial Glands	22	88	not visible		
Section II. Venation					
Primary Vein Framework	23	23.2	palmate		
Naked Basal Veins	24	24.1	absent		
Number of Basal Veins	25		5		
Agrophic Veins	26	26.2.2	compound		
Major 2o vein framework	27	27.3.1	simple brochidodromous		
Interior secondaries	28	28.1	absent		
Minor secondary course	29	29.2	simple brochidodromous		
Perimarginal veins	30	30.1	marginal secondary		
Major secondary spacing	31	88	not visible		
Variation of secondary angle	32	88	not visible		
Major secondary attachment	33	33.3	excurrent		
Intersecondary proximal course	34.1	88	not visible		
intersecondary length	34.2	88	not visible		
distal course	34.3	88	not visible		
vein frequency	34.4	88	not visible		
Intercostal tertiary vein fabric	35	35.1.1.1.1	straight opposite percurrent		
Angle of percurrent tertiaries	35.1.2	35.1.2.1	acute		
vein angle variability	36	88	not visible		
Epimedial tertiaries	37	37.1.1.1	opposite percurrent		
admedial course	37.2.1	37.2.1.3	perpendicular to midvein		
exmedial course	37.2.2	37.2.2.2	basiflexed		
Exterior tertiary course	38	38.2	looped		
Quaternary Vein Fabric	39	39.1.2	alternate percurrent		
Quinternary Vein Fabric	40	40.1.2	irregular reticulate		
Arculation	41	41.2.2	moderate development		
FEV branching	42.1	88	not visible		
FEV termination	42.2	88	not visible		
Marginal Ultimate venation	43	88	not visible		
Section III. Teeth					
Tooth spacing	44	99	n/a		
Number of orders of teeth	45	99	n/a		
Teeth / cm	46		n/a		
sinus shape	47	99	n/a		
tooth shapes	48		n/a		
tooth shapes	48		n/a		
tooth shapes	48		n/a		
tooth shapes	48		n/a		
principal vein	49	99	n/a		
principal vein termination	50	99	n/a		
course of accessory vein	51	99	n/a		
features of the tooth apex	52	99	n/a		
Text Description:					
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 5, Agrophic Veins compound, Major 2o vein framework simple brochidodromous, Interior secondaries absent, Minor secondary course simple brochidodromous, Perimarginal veins marginal secondary, Major secondary spacing not visible, Variation of secondary angle not visible, Major secondary attachment excurrent, Intersecondary proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric straight opposite percurrent, Angle of percurrent tertiaries acute, vein angle variability not visible, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course basiflexed, Exterior tertiary course looped, Quaternary Vein Fabric alternate percurrent, Quinternary Vein Fabric irregular reticulate, Arculation moderate development, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth					



GA44 HM

DNMH spec. # 45890

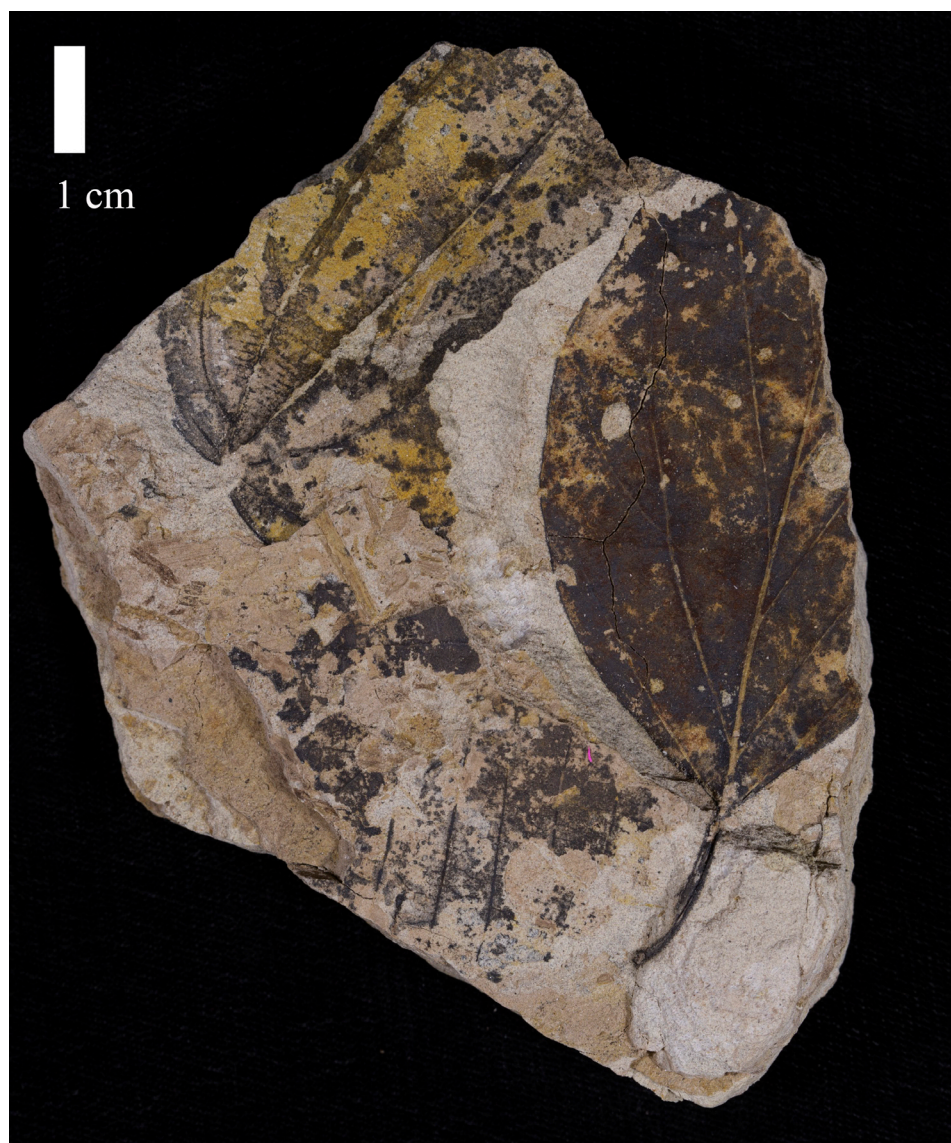
DMNH loc. # 3793

GA45

Family:

Genus and Species:

Section I. Leaf Characters				score	description	
	Leaf Attachment	1	88	not visible		
	Leaf Arrangement	2	88	not visible		
	Leaf Organization	3	88	not visible		
	Leaflet Organization	4	88	not visible		
	Leaflet Attachment	5	88	not visible		
	Petiole Features	6	88	not visible		
Features of the Blade:						
	Position of Blade Attachment	7	7.1	marginal		
	Laminar size	8	8.4	notophyll		
	Laminar L:W ratio	9		not visible		
	Laminar Shape	10	88	not visible		
	Medial Symmetry	11	88	not visible		
	Base Symmetry	12	88	not visible		
	Base Symmetry	12	.	-		
	Lobation	13	13.1	unlobed		
	Margin Type	14	14.1	entire		
	Special Margin Features	15	88	not visible		
	Apex Angle	16	88	not visible		
	Apex Shape	17	88	not visible		
	Apex Shape	17	.	-		
	Base Angle	18	18.2	obtuse		
	Base shape	19	19.1.1	straight		
	Base shape	19	.	-		
	Terminal Apex Features	20	88	not visible		
	Surface Texture	21	88	not visible		
	Surficial Glands	22	88	not visible		
Section II. Venation				char.	score	description
1°	Primary Vein Framework	23	23.1	pinnate		
	Naked Basal Veins	24	24.1	absent		
	Number of Basal Veins	25		1		
	Agrophic Veins	26	26.1	absent		
2°	Major 2o vein framework	27	27.2.1	eucamptodromous		
	Interior secondaries	28	28.1	absent		
	Minor secondary course	29	88	not visible		
	Perimarginal veins	30	30.1	marginal secondary		
	Major secondary spacing	31	31.2	irregular		
	Variation of secondary angle	32	32.2	inconsistent		
	Major secondary attachment	33	33.4	deflected		
	Inter-2°	Intersecondary proximal course	34.1	88	not visible	
intersecondary length		34.2	88	not visible		
distal course		34.3	88	not visible		
vein frequency		34.4	88	not visible		
3°	Intercostal tertiary vein fabric	35	88	not visible		
	Angle of percurrent tertiaries	35.1.2	88	not visible		
	vein angle variability	36	88	not visible		
	Epimedial tertiaries	37	88	not visible		
	admedial course	37.2.1	88	not visible		
	exmedial course	37.2.2	88	not visible		
	Exterior tertiary course	38	88	not visible		
	4°	Quaternary Vein Fabric	39	88	not visible	
5°	Quinternary Vein Fabric	40	88	not visible		
	Areolation	41	88	not visible		
	FEV branching	42.1	88	not visible		
	FEV termination	42.2	88	not visible		
	Marginal Ultimate venation	43	88	not visible		
Section III. Teeth				Text Description:		
	Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle obtuse, Base shape straight, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent, Major 2o vein framework eucamptodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins marginal secondary, Major secondary spacing irregular, Variation of secondary angle inconsistent, Major secondary attachment deflected, Intersecondary proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.	
	Number of orders of teeth	45	99	n/a		
	Teeth / cm	46		n/a		
	sinus shape	47	99	n/a		
	tooth shapes	48		n/a		
	tooth shapes	48				
	tooth shapes	48				
	tooth shapes	48				
	principal vein	49	99	n/a		
	principal vein termination	50	99	n/a		
	course of accessory vein	51	99	n/a		
	features of the tooth apex	52	99	n/a		



GA45 HM

DNMH spec. # 45485

DMNH loc. # 3791

GA46

Family:

Genus and Species:

Section I. Leaf Characters				score	description	
	Leaf Attachment	1	88	not visible		
	Leaf Arrangement	2	88	not visible		
	Leaf Organization	3	88	not visible		
	Leaflet Organization	4	88	not visible		
	Leaflet Attachment	5	88	not visible		
	Petiole Features	6	88	not visible		
Features of the Blade:						
	Position of Blade Attachment	7	7.1	marginal		
	Laminar size	8	8.4	notophyll		
	Laminar L:W ratio	9		1.5:1		
	Laminar Shape	10	10.1	elliptic		
	Medial Symmetry	11	11.1	symmetrical		
	Base Symmetry	12	88	not visible		
	Base Symmetry	12	.	-		
	Lobation	13	13.1	unlobed		
	Margin Type	14	14.1	entire		
	Special Margin Features	15	88	not visible		
	Apex Angle	16	16.1	acute		
	Apex Shape	17	17.3	acuminate		
	Apex Shape	17	.	-		
	Base Angle	18	18.1	acute		
	Base shape	19	88	not visible		
	Base shape	19	.	-		
	Terminal Apex Features	20	88	not visible		
	Surface Texture	21	88	not visible		
	Surficial Glands	22	88	not visible		

Section II. Venation		char.	score	description		
1 ^o	Primary Vein Framework	23	23.1	pinnate		
	Naked Basal Veins	24	24.1	absent		
	Number of Basal Veins	25		1		
	Agrophic Veins	26	26.1	absent		
2 ^o	Major 2o vein framework	27	27.2.1	eucamptodromous		
	Interior secondaries	28	28.1	absent		
	Minor secondary course	29	88	not visible		
	Perimarginal veins	30	0	absent		
	Major secondary spacing	31	31.3	decreasing proximally		
	Variation of secondary angle	32	32.1	uniform		
	Major secondary attachment	33	33.1	decurent		
	Inter-2 ^o	Intersecondary proximal course	34.1	88	not visible	
		intersecondary length	34.2	88	not visible	
	3 ^o	distal course	34.3	88	not visible	
vein frequency		34.4	88	not visible		
Intercostal tertiary vein fabric		35	88	not visible		
Angle of percurrent tertiaries		35.1.2	88	not visible		
vein angle variability		36	88	not visible		
Epimedial tertiaries		37	88	not visible		
admedial course		37.2.1	88	not visible		
exmedial course		37.2.2	88	not visible		
Exterior tertiary course		38	88	not visible		
4 ^o		Quaternary Vein Fabric	39	88	not visible	
	5 ^o	Quinternary Vein Fabric	40	88	not visible	
Areolation		41	88	not visible		
FEV branching		42.1	88	not visible		
FEV termination		42.2	88	not visible		
Marginal Ultimate venation		43	88	not visible		

Section III. Teeth			
Tooth spacing	44	99	n/a
Number of orders of teeth	45	99	n/a
Teeth / cm	46		n/a
sinus shape	47	99	n/a
tooth shapes	48		n/a
tooth shapes	48		
tooth shapes	48		
tooth shapes	48		
principal vein	49	99	n/a
principal vein termination	50	99	n/a
course of accessory vein	51	99	n/a
features of the tooth apex	52	99	n/a

Text Description:	
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio 1.5:1, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape -, Base Angle acute, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent, Major 2o vein framework eucamptodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing decreasing proximally, Variation of secondary angle uniform, Major secondary attachment decurent, Intersecondary proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.	



GA46 HM

DNMH spec. # 46846

DMNH loc. # 412

GA47		Family:		Genus and Species:		Cornophyllum newberryi									
Section I. Leaf Characters				score	description		Section II. Venation				char.	score	description		
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.1	pinnate	2°	Major 2o vein framework	27	88	not visible		
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.2	present		Interior secondaries	28	28.1	absent		
Leaf Organization	3	88	not visible		Number of Basal Veins	25		1		Minor secondary course	29	88	not visible		
Leaflet Organization	4	88	not visible		Agrophich Veins	26	26.1	absent		Perimarginal veins	30	0	absent		
Leaflet Attachment	5	88	not visible							Major secondary spacing	31	31.2	irregular		
Petiole Features	6	88	not visible							Variation of secondary angle	32	32.4	smoothly decreasing proximally		
Features of the Blade:										Major secondary attachment	33	33.3	excurrent		
Position of Blade Attachment	7	7.1	marginal							Intersecondary proximal course	34.1	88	not visible		
Laminar size	8	8.4	notophyll							intersecondary length	34.2	88	not visible		
Laminar L:W ratio	9		not visible							distal course	34.3	88	not visible		
Laminar Shape	10	88	not visible	Inter-2°				vein frequency	34.4	88	not visible				
Medial Symmetry	11	11.1	symmetrical												
Base Symmetry	12	12.1	symmetrical		3°	Intercostal tertiary vein fabric	35	35.1.1.1.1	straight opposite percurrent						
Base Symmetry	12	.	-			Angle of percurrent tertiaries	35.1.2	35.1.2.1	acute						
Lobation	13	13.1	unlobed			vein angle variability	36	36.2	consistent						
Margin Type	14	14.1	entire			Epimedial tertiaries	37	88	not visible						
Special Margin Features	15	88	not visible			admedial course	37.2.1	88	not visible						
Apex Angle	16	88	not visible			exmedial course	37.2.2	88	not visible						
Apex Shape	17	88	not visible			Exterior tertiary course	38	88	not visible						
Apex Shape	17	.	-			4°	Quaternary Vein Fabric	39	88	not visible					
Base Angle	18	18.2	obtuse	5°			Quinternary Vein Fabric	40	88	not visible					
Base shape	19	19.1.3	convex				Areolation	41	88	not visible					
Base shape	19	.	-		FEV branching		42.1	88	not visible						
Terminal Apex Features	20	88	not visible		FEV termination		42.2	88	not visible						
					Marginal Ultimate venation		43	88	not visible						
Surface Texture	21	88	not visible												
Surficial Glands	22	88	not visible												
Section III. Teeth					Text Description:										
Tooth spacing	44	99	n/a		Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle obtuse, Base shape convex, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins present, Number of Basal Veins 1, Agrophich Veins absent, Major 2o vein framework not visible, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle smoothly decreasing proximally, Major secondary attachment excurrent, Intersecondary proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric straight opposite percurrent, Angle of percurrent tertiaries acute, vein angle variability consistent, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.										
Number of orders of teeth	45	99	n/a												
Teeth / cm	46		n/a												
sinus shape	47	99	n/a												
tooth shapes	48		n/a												
tooth shapes	48														
tooth shapes	48														
tooth shapes	48														
principal vein	49	99	n/a												
principal vein termination	50	99	n/a												
course of accessory vein	51	99	n/a												
features of the tooth apex	52	99	n/a												



GA47 HM

DNMH spec. # 45891

DMNH loc. # 3793

G448

Family:

Genus and Species:

<u>Section I. Leaf Characters</u>			score	description	
Leaf Attachment	1	88		not visible	
Leaf Arrangement	2	88		not visible	
Leaf Organization	3	88		not visible	
Leaflet Organization	4	88		not visible	
Leaflet Attachment	5	88		not visible	
Petiole Features	6	88		not visible	
Features of the Blade:					
Position of Blade Attachment	7	7.1		marginal	
Laminar size	8	8.3		microphyll	
Laminar L:W ratio	9		5:2		
Laminar Shape	10	10.1		elliptic	
Medial Symmetry	11	11.1		symmetrical	
Base Symmetry	12	12.1		symmetrical	
Base Symmetry	12	.		-	
Lobation	13	13.1		unlobed	
Margin Type	14	14.1		entire	
Special Margin Features	15	88		not visible	
Apex Angle	16	16.1		acute	
Apex Shape	17	17.3		acuminate	
Apex Shape	17	.		-	
Base Angle	18	18.1		acute	
Base shape	19	19.1.3.1		rounded	
Base shape	19	.		-	
Terminal Apex Features	20	88		not visible	
Surface Texture	21	88		not visible	
Surficial Glands	22	88		not visible	
<u>Section III. Teeth</u>					
Tooth spacing	44	99		n/a	
Number of orders of teeth	45	99		n/a	
Teeth / cm	46			n/a	
sinus shape	47	99		n/a	
tooth shapes	48			n/a	
tooth shapes	48				
tooth shapes	48				
principal vein	49	99		n/a	
principal vein termination	50	99		n/a	
course of accessory vein	51	99		n/a	
features of the tooth apex	52	99		n/a	
<u>Section II. Venation</u>					
Primary Vein Framework		23	23.1		pinnate
Naked Basal Veins		24	24.1		absent
Number of Basal Veins		25		1	
Agrophic Veins		26	26.1		absent
Major 2o vein framework		27	27.2.1		eucamptodromous
Interior secondaries		28	28.1		absent
Minor secondary course		29	88		not visible
Perimarginal veins		30	0		absent
Major secondary spacing		31	31.1		regular
Variation of secondary angle		32	32.1		uniform
Major secondary attachment		33	33.3		excurrent
Inter-2o	Intersecondary proximal course	34.1	88		not visible
	intersecondary length	34.2	88		not visible
	distal course	34.3	88		not visible
	vein frequency	34.4	88		not visible
3o	Intercostal tertiary vein fabric	35	35.1.1.1.3		sinuous opposite percurrent
	Angle of percurrent tertiaries	35.1.2	35.1.2.2		obtuse
vein angle variability		36	88		not visible
Epimedial tertiaries		37	88		not visible
admedial course		37.2.1	88		not visible
exmedial course		37.2.2	88		not visible
Exterior tertiary course		38	88		not visible
4o	Quaternary Vein Fabric	39	88		not visible
	Quinternary Vein Fabric	40	88		not visible
5o	Areolation	41	88		not visible
	FEV branching	42.1	88		not visible
	FEV termination	42.2	88		not visible
	Marginal Ultimate venation	43	88		not visible
Text Description:					
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size microphyll, Laminar L:W ratio 5:2, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape -, Base Angle acute, Base shape rounded, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent, Major 2o vein framework eucamptodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary attachment excurrent, Intersecondary proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric sinuous opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.					



GA48 HM

DNMH spec. # 48375

DMNH loc. # 500

G449

Family:

Genus and Species:

<u>Section I. Leaf Characters</u>			score	description	
Leaf Attachment	1	88		not visible	
Leaf Arrangement	2	88		not visible	
Leaf Organization	3	88		not visible	
Leaflet Organization	4	88		not visible	
Leaflet Attachment	5	88		not visible	
Petiole Features	6	88		not visible	
Features of the Blade:					
Position of Blade Attachment	7	88		not visible	
Laminar size	8	8.5		mesophyll	
Laminar L:W ratio	9		10:7		
Laminar Shape	10	10.3		ovate	
Medial Symmetry	11	11.1		symmetrical	
Base Symmetry	12	88		not visible	
Base Symmetry	12	.	-		
Lobation	13	13.1		unlobed	
Margin Type	14	14.2.2		serrate	
Special Margin Features	15	88		not visible	
Apex Angle	16	88		not visible	
Apex Shape	17	88		not visible	
Apex Shape	17	.	-		
Base Angle	18	88		not visible	
Base shape	19	88		not visible	
Base shape	19	.	-		
Terminal Apex Features	20	88		not visible	
Surface Texture	21	88		not visible	
Surficial Glands	22	88		not visible	
<u>Section III. Teeth</u>					
Tooth spacing	44	44.2		irregular	
Number of orders of teeth	45	45.2		two	
Teeth / cm	46		1		
sinus shape	47	47.2		rounded	
tooth shapes	48			st/st	
tooth shapes	48			cv/cv	
tooth shapes	48				
principal vein	49	88		not visible	
principal vein termination	50	88		not visible	
course of accessory vein	51	88		not visible	
features of the tooth apex	52	88		not visible	
<u>Section II. Venation</u>					
1°	Primary Vein Framework	23	23.2		palmate
	Naked Basal Veins	24	24.1		absent
	Number of Basal Veins	25		3	
	Agrophic Veins	26	26.2.2		compound
2°	Major 2o vein framework	27	27.1.2		semicraspedodromous
	Interior secondaries	28	88		not visible
	Minor secondary course	29	88		not visible
	Perimarginal veins	30	0		absent
	Major secondary spacing	31	88		not visible
	Variation of secondary angle	32	88		not visible
	Major secondary attachment	33	33.3		excurrent
Inter-	Intersecondary proximal course	34.1	88		not visible
2°	intersecondary length	34.2	88		not visible
	distal course	34.3	88		not visible
	vein frequency	34.4	88		not visible
3°	Intercostal tertiary vein fabric	35	88		not visible
	Angle of percurrent tertiaries	35.1.2	88		not visible
	vein angle variability	36	88		not visible
	Epimedial tertiaries	37	88		not visible
	admedial course	37.2.1	88		not visible
	exmedial course	37.2.2	88		not visible
	Exterior tertiary course	38	88		not visible
4°	Quaternary Vein Fabric	39	88		not visible
5°	Quinternary Vein Fabric	40	88		not visible
	Areolation	41	88		not visible
	FEV branching	42.1	88		not visible
	FEV termination	42.2	88		not visible
	Marginal Ultimate venation	43	88		not visible
Text Description:					
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size mesophyll, Laminar L:W ratio 10:7, Laminar Shape ovate, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry - , Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape - , Base Angle not visible, Base shape not visible, Base shape - , Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 3, Agrophic Veins compound, Major 2o vein framework semicraspedodromous, Interior secondaries not visible, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing not visible, Variation of secondary angle not visible, Major secondary attachment excurrent, Intersecondary proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth two , Teeth / cm 1, sinus shape rounded, tooth shapes st/st, tooth shapes cv/cv, tooth shapes , tooth shapes , principal vein not visible, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.					



GA49 HM

DNMH spec. # 48358

DMNH loc. # 500

GASO				Family:				Genus and Species:								
Section I. Leaf Characters				score	description			Section II. Venation				char.	score	description		
Leaf Attachment	1	88	not visible		1°	Primary Vein Framework	23	23.2.3.1	basal acrodromous							
Leaf Arrangement	2	88	not visible			Naked Basal Veins	24	24.2	present							
Leaf Organization	3	88	not visible			Number of Basal Veins	25		5							
Leaflet Organization	4	88	not visible			Agrophic Veins	26	26.2.2	compound							
Leaflet Attachment	5	88	not visible		2°	Major 2o vein framework	27	27.1.2	semicraspedodromous							
Petiole Features	6	0	absent			Interior secondaries	28	28.1	absent							
						Minor secondary course	29	29.3	semicraspedodromous							
						Perimarginal veins	30	0	absent							
						Major secondary spacing	31	88	not visible							
						Variation of secondary angle	32	88	not visible							
						Major secondary attachment	33	33.3	excurrent							
						Inter-2°	proximal course	34.1	88	not visible						
							intersecondary length	34.2	88	not visible						
							distal course	34.3	88	not visible						
							vein frequency	34.4	88	not visible						
						3°	Intercostal tertiary vein fabric	35	88	not visible						
							Angle of percurrent tertiaries	35.1.2	88	not visible						
							vein angle variability	36	88	not visible						
							Epimedial tertiaries	37	88	not visible						
							admedial course	37.2.1	88	not visible						
							exmedial course	37.2.2	88	not visible						
							Exterior tertiary course	38	88	not visible						
						4°	Quaternary V'ain Fabric	39	88	not visible						
						5°	Quinternary Vein Fabric	40	88	not visible						
							Areolation	41	88	not visible						
							FEV branching	42.1	88	not visible						
							FEV termination	42.2	88	not visible						
							Marginal Ultimate venation	43	88	not visible						
Section III. Teeth					Text Description:											
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features absent, Position of Blade Attachment marginal, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape oblong, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape -, Terminal Apex Features not visible, Surface Texture not visible, Surfilial Glands not visible, Primary Vein Framework basal acrodromous, Naked Basal Veins present, Number of Basal Veins 5, Agrophic Veins compound, Major 2o vein framework semicraspedodromous, Interior secondaries absent, Minor secondary course semicraspedodromous, Perimarginal veins absent, Major secondary spacing not visible, Variation of secondary angle not visible, Major secondary attachment excurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary V'ain Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one , Teeth / cm 1, sinus shape rounded, tooth shapes st/st, tooth shapes cv/cv, tooth shapes , tooth shapes , principal vein present, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.												
Number of orders of teeth	45	45.1	one													
Teeth / cm	46		1													
sinus shape	47	47.2	rounded													
tooth shapes	48		st/st													
tooth shapes	48		cv/cv													
tooth shapes	48															
tooth shapes	48															
principal vein	49	49.1	present													
principal vein termination	50	88	not visible													
course of accessory vein	51	88	not visible													
features of the tooth apex	52	88	not visible													

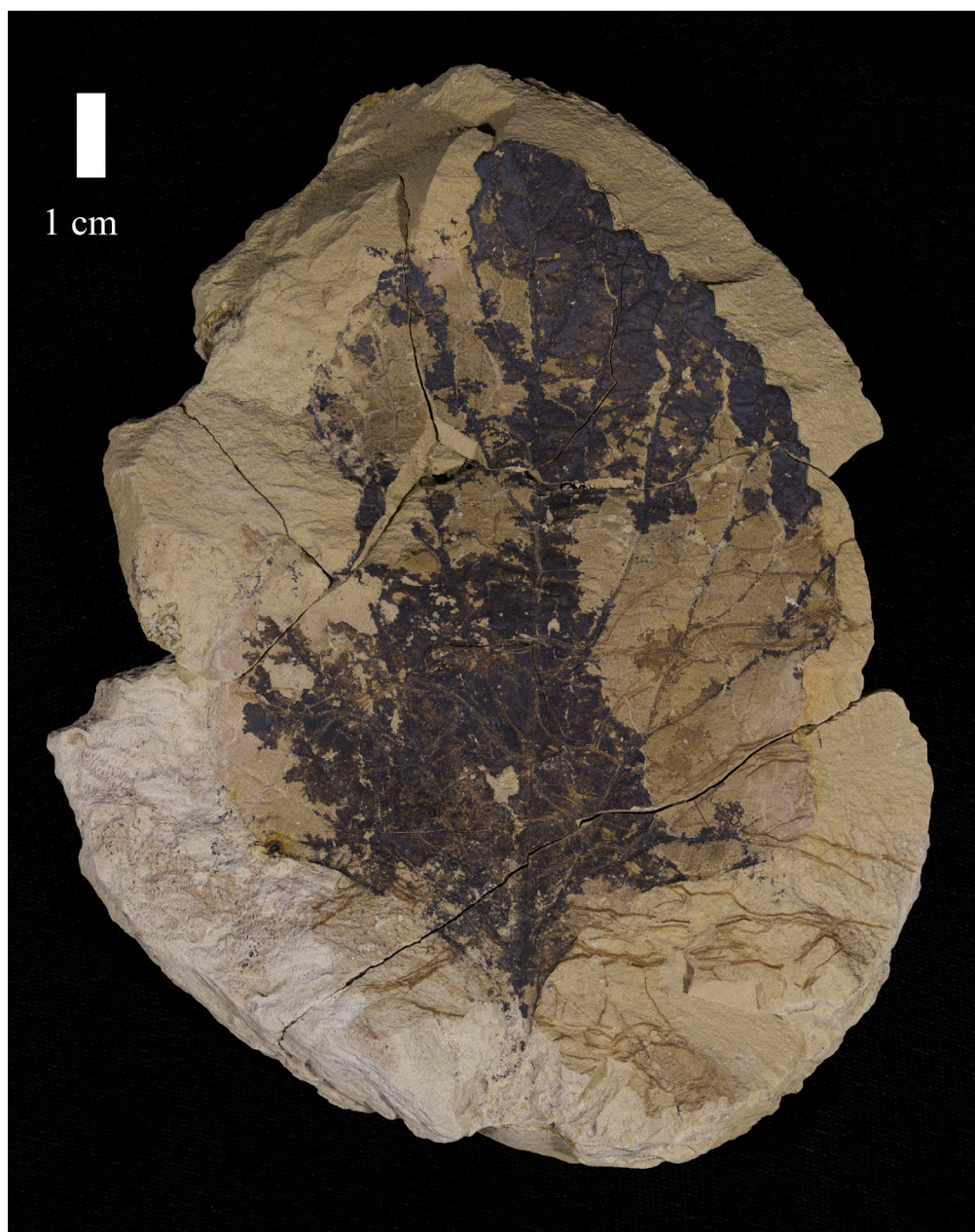


GA50 HM

DNMH spec. # 48354

DMNH loc. # 500

<u>G451</u>			Family: Vitaceae?		Genus and Species:		cf. " <i>Vitis</i> " stantonii				
<u>Section I. Leaf Characters</u>			score		description						
	Leaf Attachment	1	88	not visible							
	Leaf Arrangement	2	88	not visible							
	Leaf Organization	3	88	not visible							
	Leaflet Organization	4	88	not visible							
	Leaflet Attachment	5	88	not visible							
	Petiole Features	6	88	not visible							
Features of the Blade:											
	Position of Blade Attachment	7	7.1	marginal							
	Laminar size	8	8.5	mesophyll							
	Laminar L:W ratio	9		5:3							
	Laminar Shape	10	10.3	ovate							
	Medial Symmetry	11	11.1	symmetrical							
	Base Symmetry	12	12.1	symmetrical							
	Base Symmetry	12	.	-							
	Lobation	13	13.1	unlobed							
	Margin Type	14	14.2.2	serrate							
	Special Margin Features	15	88	not visible							
	Apex Angle	16	16.1	acute							
	Apex Shape	17	17.2	convex							
	Apex Shape	17	.	-							
	Base Angle	18	18.1	acute							
	Base shape	19	19.1.4	concavo-convex							
	Base shape	19	.	-							
	Terminal Apex Features	20	0	absent							
	Surface Texture	21	88	not visible							
	Surficial Glands	22	88	not visible							
<u>Section II. Venation</u>						char.		score		description	
1°	Primary Vein Framework	23	23.2.1.2	suprabasal actinodromous							
	Naked Basal Veins	24	24.1	absent							
	Number of Basal Veins	25		3							
	Agrophric Veins	26	26.2.1	simple							
2°	Major 2o vein framework	27	27.1.1	craspedodromous							
	Interior secondaries	28	28.1	absent							
	Minor secondary course	29	29.1	craspedodromous							
	Perimarginal veins	30	0	absent							
Inter-2°	Major secondary spacing	31	31.3	decreasing proximally							
	Variation of secondary angle	32	32.1	uniform							
	Major secondary attachment	33	33.3	excurrent							
	proximal course	34.1	88	not visible							
3°	intersecondary length	34.2	88	not visible							
	distal course	34.3	88	not visible							
	vein frequency	34.4	88	not visible							
	Intercostal tertiary vein fabric	35	88	not visible							
4°	Angle of percurrent tertiaries	35.1.2	88	not visible							
	vein angle variability	36	88	not visible							
	Epimedial tertiaries	37	88	not visible							
	admedial course	37.2.1	88	not visible							
5°	exmedial course	37.2.2	88	not visible							
	Exterior tertiary course	38	88	not visible							
	Quaternary Vein Fabric	39	88	not visible							
	Quinternary Vein Fabric	40	88	not visible							
	Areolation	41	88	not visible							
	FEV branching	42.1	88	not visible							
	FEV termination	42.2	88	not visible							
	Marginal Ultimate venation	43	88	not visible							
<u>Section III. Teeth</u>						Text Description:					
	Tooth spacing	44	44.1	regular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole						
	Number of orders of teeth	45	45.1	one	Features not visible, Position of Blade Attachment marginal, Laminar size						
	Teeth / cm	46		2	mesophyll, Laminar L:W ratio 5:3, Laminar Shape ovate, Medial Symmetry						
	sinus shape	47	47.2	rounded	symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed,						
	tooth shapes	48		cv/cv	Margin Type serrate, Special Margin Features not visible, Apex Angle acute,						
	tooth shapes	48		st/cv	Apex Shape convex, Apex Shape -, Base Angle acute, Base shape concavo-						
	tooth shapes	48		st/st	convex, Base shape -, Terminal Apex Features absent, Surface Texture not						
	tooth shapes	48			visible, Surficial Glands not visible, Primary Vein Framework suprabasal						
	principal vein	49	49.1	present	actinodromous, Naked Basal Veins absent, Number of Basal Veins 3, Agrophric						
	principal vein termination	50	50.2.1	at apex of tooth	Veins simple, Major 2o vein framework craspedodromous, Interior secondaries						
	course of accessory vein	51	88	not visible	absent, Minor secondary course craspedodromous, Perimarginal veins absent,						
	features of the tooth apex	52	88	not visible	Major secondary spacing decreasing proximally, Variation of secondary angle						
						uniform, Major secondary attachment excurrent, proximal course not visible,					
						intersecondary length not visible, distal course not visible, vein frequency not					
						visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries					
						not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial					
						course not visible, exmedial course not visible, Exterior tertiary course not visible,					
						Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible,					
						Areolation not visible, FEV branching not visible, FEV termination not visible,					
						Marginal Ultimate venation not visible, Tooth spacing regular, Number of orders					
						of teeth one, Teeth / cm 2, sinus shape rounded, tooth shapes cv/cv, tooth shapes					
						st/cv, tooth shapes st/st, tooth shapes, principal vein present, principal vein					

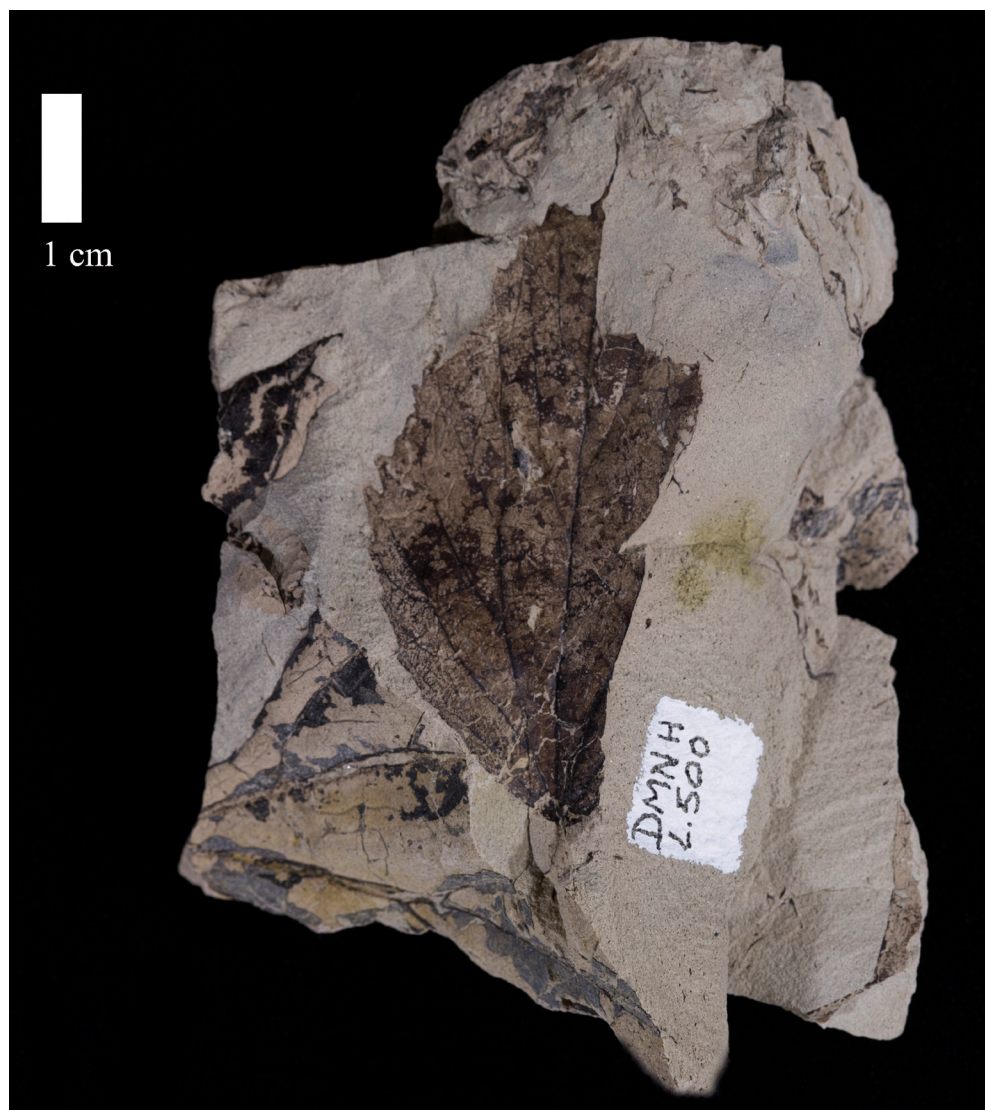


GA51 HM

DNMH spec. # 46479

DMNH loc. # 3792

G452			Family: Platanaceae			Genus and Species:			Platanites marginata		
Section I. Leaf Characters				score	description						
Leaf Attachment	1	88	not visible								
Leaf Arrangement	2	88	not visible								
Leaf Organization	3	88	not visible								
Leaflet Organization	4	88	not visible								
Leaflet Attachment	5	88	not visible								
Petiole Features	6	88	not visible								
Features of the Blade:											
Position of Blade Attachment	7	88	not visible								
Laminar size	8	8.3	microphyll								
Laminar L:W ratio	9		not visible								
Laminar Shape	10	10.1	elliptic								
Medial Symmetry	11	88	not visible								
Base Symmetry	12	12.1	symmetrical								
Base Symmetry	12	.	-								
Lobation	13	13.1	unlobed								
Margin Type	14	14.2.2	serrate								
Special Margin Features	15	88	not visible								
Apex Angle	16	88	not visible								
Apex Shape	17	88	not visible								
Apex Shape	17	.	-								
Base Angle	18	18.1	acute								
Base shape	19	19.1.3.1	rounded								
Base shape	19	.	-								
Terminal Apex Features	20	88	not visible								
Surface Texture	21	88	not visible								
Surficial Glands	22	88	not visible								
Section III. Teeth											
Tooth spacing	44	44.1	regular								
Number of orders of teeth	45	45.1	one								
Teeth / cm	46		3								
sinus shape	47	47.2	rounded								
tooth shapes	48		st/st								
tooth shapes	48		st/cv								
tooth shapes	48		cv/st								
tooth shapes	48										
principal vein	49	49.1	present								
principal vein termination	50	50.2.1	at apex of tooth								
course of accessory vein	51	88	not visible								
features of the tooth apex	52	88	not visible								
Section II. Venation							char.	score	description		
1°	Primary Vein Framework	23	23.2.1.1	basal actinodromous							
	Naked Basal Veins	24	24.1	absent							
	Number of Basal Veins	25		3							
	Agrophic Veins	26	26.2.2	compound							
2°	Major 2o vein framework	27	27.1.1	craspedodromous							
	Interior secondaries	28	28.1	absent							
	Minor secondary course	29	29.1	craspedodromous							
	Perimarginal veins	30	0	absent							
Inter-2°	Major secondary spacing	31	31.2	irregular							
	Variation of secondary angle	32	32.1	uniform							
	Major secondary attachment	33	33.3	excurrent							
	proximal course	34.1	88	not visible							
3°	intersecondary length	34.2	88	not visible							
	distal course	34.3	88	not visible							
	vein frequency	34.4	88	not visible							
	Intercostal tertiary vein fabric	35	35.1.1.3	mixed percurrent							
4°	Angle of percurrent tertiaries	35.1.2	35.1.2.2	obtuse							
	vein angle variability	36	88	not visible							
	Epimedial tertiaries	37	37.1.1.1	opposite percurrent							
	admedial course	37.2.1	37.2.1.3	perpendicular to midvein							
5°	exmedial course	37.2.2	37.2.2.2	basiflexed							
	Exterior tertiary course	38	88	not visible							
	Quaternary Vein Fabric	39	88	not visible							
	Quinternary Vein Fabric	40	88	not visible							
Inter-2°	Arcolation	41	88	not visible							
	FEV branching	42.1	88	not visible							
	FEV termination	42.2	88	not visible							
	Marginal Ultimate venation	43	88	not visible							
Text Description:											
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size microphyll, Laminar L:W ratio not visible, Laminar Shape elliptic, Medial Symmetry not visible, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle acute, Base shape rounded, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework basal actinodromous, Naked Basal Veins absent, Number of Basal Veins 3, Agrophic Veins compound, Major 2o vein framework craspedodromous, Interior secondaries absent, Minor secondary course craspedodromous, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle uniform, Major secondary attachment excurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric mixed percurrent, Angle of percurrent tertiaries obtuse, vein angle variability not visible, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course basiflexed, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Arcolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing regular, Number of orders of teeth one, Teeth / cm 3, sinus shape rounded, tooth shapes st/st, tooth shapes st/cv, tooth shapes cv/st, tooth shapes, principal vein present, principal vein termination at apex of tooth, course of accessory											



GA52 HM

DNMH spec. # 48373

DMNH loc. # 500

G453

Family: Rhamnaceae?

Genus and Species:

"Zizyphus" sp.

Section I. Leaf Characters				Section II. Venation					
		score	description		char.	score	description		
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.2 palmate		
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1 absent		
Leaf Organization	3	88	not visible		Number of Basal Veins	25	5		
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.2.1 simple		
Leaflet Attachment	5	88	not visible	2°	Major 2o vein framework	27	27.2.1 eucamptodromous		
Petiole Features	6	88	not visible		Interior secondaries	28	28.1 absent		
Features of the Blade:					Minor secondary course	29	29.1 craspedodromous		
Position of Blade Attachment	7	88	not visible		Perimarginal veins	30	30.3 fimbrial vein		
Laminar size	8	8.4	notophyll		Major secondary spacing	31	31.2 irregular		
Laminar L:W ratio	9		not visible		Variation of secondary angle	32	32.1 uniform		
Laminar Shape	10	10.1	elliptic		Major secondary attachment	33	33.3 excurrent		
Medial Symmetry	11	11.1	symmetrical		Inter-2°	proximal course	34.1	88 not visible	
Base Symmetry	12	12.1	symmetrical			intersecondary length	34.2	88 not visible	
Base Symmetry	12	.	-			distal course	34.3	88 not visible	
Lobation	13	13.1	unlobed	vein frequency		34.4	88 not visible		
Margin Type	14	14.1	entire	3°	Intercostal tertiary vein fabric	35	35.1.1.1.1 straight opposite percurrent		
Special Margin Features	15	88	not visible		Angle of percurrent tertiaries	35.1.2	35.1.2.2 obtuse		
Apex Angle	16	88	not visible		vein angle variability	36	88 not visible		
Apex Shape	17	88	not visible		Epimedial tertiaries	37	37.1.1.1 opposite percurrent		
Apex Shape	17	.	-		admedial course	37.2.1	37.2.1.3 perpendicular to midvein		
Base Angle	18	18.2	obtuse		exmedial course	37.2.2	37.2.2.1 parallel to intercostal tertiary		
Base shape	19	19.1.3.1	rounded		Exterior tertiary course	38	88 not visible		
Base shape	19	.	-		4°	Quaternary Vein Fabric	39	88 not visible	
Terminal Apex Features	20	88	not visible			5°	Quinternary Vein Fabric	40	88 not visible
Surface Texture	21	88	not visible				Areolation	41	88 not visible
Surficial Glands	22	88	not visible	FEV branching			42.1	88 not visible	
				FEV termination	42.2		88 not visible		
				Marginal Ultimate venation	43	88 not visible			
Section III. Teeth				Text Description:					
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle obtuse, Base shape rounded, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework palmate, Naked Basal Veins absent, Number of Basal Veins 5, Agrophic Veins simple, Major 2o vein framework eucamptodromous, Interior secondaries absent, Minor secondary course craspedodromous, Perimarginal veins fimbrial vein, Major secondary spacing irregular, Variation of secondary angle uniform, Major secondary attachment excurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric straight opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability not visible, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course parallel to intercostal tertiary, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.					
Number of orders of teeth	45	99	n/a						
Teeth / cm	46		n/a						
sinus shape	47	99	n/a						
tooth shapes	48		n/a						
tooth shapes	48								
tooth shapes	48								
tooth shapes	48								
principal vein	49	99	n/a						
principal vein termination	50	99	n/a						
course of accessory vein	51	99	n/a						
features of the tooth apex	52	99	n/a						



GA53 HM

DNMH spec. # 46478

DMNH loc. # 3791

G454

Family:

Genus and Species:

<u>Section I. Leaf Characters</u>				<u>Section II. Venation</u>				
	score	description			char.	score	description	
Leaf Attachment	1	88	not visible	1*	Primary Vein Framework	23	23.2 palmate	
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1 absent	
Leaf Organization	3	88	not visible		Number of Basal Veins	25	3	
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.2.2 compound	
Leaflet Attachment	5	88	not visible		Major 2o vein framework	27	27.1.1 craspedodromous	
Petiole Features	6	88	not visible	2*	Interior secondaries	28	28.2 present	
Features of the Blade:					Minor secondary course	29	29.3 semicraspedodromous	
Position of Blade Attachment	7	88	not visible		Perimarginal veins	30	0 absent	
Laminar size	8	8.4	notophyll		Major secondary spacing	31	31.2 irregular	
Laminar L:W ratio	9		not visible		Variation of secondary angle	32	32.2 inconsistent	
Laminar Shape	10	10.1	elliptic	Major secondary attachment	33	33.1 decurrent		
Medial Symmetry	11	11.1	symmetrical	Inter-2*	proximal course	34.1	0 absent	
Base Symmetry	12	12.1	symmetrical		intersecondary length	34.2	99 n/a	
Base Symmetry	12	-	-		distal course	34.3	99 n/a	
Lobation	13	13.2.1	palmately lobed		vein frequency	34.4	99 n/a	
Margin Type	14	14.1	entire		3*	Intercostal tertiary vein fabric	35	35.1.1.1.1 straight opposite percurrent
Special Margin Features	15	88	not visible	Angle of percurrent tertiaries		35.1.2	35.1.2.2 obtuse	
Apex Angle	16	88	not visible	vein angle variability		36	88 not visible	
Apex Shape	17	88	not visible	Epimedial tertiaries		37	37.1.1.1 opposite percurrent	
Apex Shape	17	-	-	admedial course		37.2.1	37.2.1.3 perpendicular to midvein	
Base Angle	18	88	not visible	exmedial course	37.2.2	37.2.2.1 parallel to intercostal tertiary		
Base shape	19	88	not visible	4*	Exterior tertiary course	38	88 not visible	
Base shape	19	-	-		Quaternary Vein Fabric	39	88 not visible	
Terminal Apex Features	20	88	not visible		5*	Quinternary Vein Fabric	40	88 not visible
Surface Texture	21	88	not visible			Areolation	41	88 not visible
Surficial Glands	22	88	not visible			FEV branching	42.1	88 not visible
				FEV termination		42.2	88 not visible	
				Marginal Ultimate venation		43	88 not visible	
<u>Section III. Teeth</u>				Text Description:				
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size notophyll, Laminar L:W ratio not visible, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation palmately lobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework palmate, Naked Basal Veins absent, Number of Basal Veins 3, Agrophic Veins compound, Major 2o vein framework craspedodromous, Interior secondaries present, Minor secondary course semicraspedodromous, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle inconsistent, Major secondary attachment decurrent, proximal course absent, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric straight opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability not visible, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course parallel to intercostal tertiary, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.				
Number of orders of teeth	45	99	n/a					
Teeth / cm	46		n/a					
sinus shape	47	99	n/a					
tooth shapes	48		n/a					
tooth shapes	48							
tooth shapes	48							
tooth shapes	48							
principal vein	49	99	n/a					
principal vein termination	50	99	n/a					
course of accessory vein	51	99	n/a					
features of the tooth apex	52	99	n/a					



GA54 HM

DNMH spec. # 23767

DMNH loc. # 412

G455

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
		score	description		char.	score	description
Leaf Attachment	1	88	not visible	1*	Primary Vein Framework	23	23.2.1.1 basal actinodromous
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	3
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.2.1 simple
Leaflet Attachment	5	88	not visible	2*	Major 2o vein framework	27	27.2.1 eucamptodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1 absent
					Minor secondary course	29	88 not visible
Features of the Blade:					Perimarginal veins	30	0 absent
Position of Blade Attachment	7	88	not visible		Major secondary spacing	31	31.2 irregular
Laminar size	8	8.5	mesophyll		Variation of secondary angle	32	88 not visible
Laminar L:W ratio	9		not visible		Major secondary attachment	33	33.3 excurrent
Laminar Shape	10	88	not visible	Inter-2*	proximal course	34.1	88 not visible
Medial Symmetry	11	11.1	symmetrical		intersecondary length	34.2	88 not visible
Base Symmetry	12	12.1	symmetrical		distal course	34.3	88 not visible
Base Symmetry	12	.	-		vein frequency	34.4	88 not visible
Lobation	13	13.1	unlobed	3*	Intercostal tertiary vein fabric	35	35.1.1.1.1 straight opposite percurrent
Margin Type	14	14.1	entire		Angle of percurrent tertiaries	35.1.2	35.1.2.2 obtuse
Special Margin Features	15	88	not visible		vein angle variability	36	88 not visible
Apex Angle	16	88	not visible		Epimedial tertiaries	37	88 not visible
Apex Shape	17	88	not visible		admedial course	37.2.1	88 not visible
Apex Shape	17	.	-		exmedial course	37.2.2	88 not visible
Base Angle	18	18.1	acute		Exterior tertiary course	38	88 not visible
Base shape	19	19.1.4	concavo-convex	4*	Quaternary Vein Fabric	39	88 not visible
Base shape	19	.	-	5*	Quinternary Vein Fabric	40	88 not visible
Terminal Apex Features	20	88	not visible		Areolation	41	88 not visible
					FEV branching	42.1	88 not visible
Surface Texture	21	88	not visible		FEV termination	42.2	88 not visible
Surficial Glands	22	88	not visible		Marginal Ultimate venation	43	88 not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle acute, Base shape concavo-convex, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework basal actinodromous, Naked Basal Veins absent, Number of Basal Veins 3, Agrophic Veins simple, Major 2o vein framework eucamptodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle not visible, Major secondary attachment excurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric straight opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				



GA55 HM

DNMH spec. # 48360

DMNH loc. # 500

GA56				Family:				Genus and Species:										
Section I. Leaf Characters				score	description			Section II. Venation				char.	score	description				
Leaf Attachment				1	99	n/a			1°				Primary Vein Framework	23	99	n/a		
Leaf Arrangement				2	99	n/a							Naked Basal Veins	24	99	n/a		
Leaf Organization				3	99	n/a							Number of Basal Veins	25		n/a		
Leaflet Organization				4	99	n/a							Agrophic Veins	26	99	n/a		
Leaflet Attachment				5	99	n/a			2°				Major 2o vein framework	27	99	n/a		
Petiole Features				6	99	n/a							Interior secondaries	28	99	n/a		
													Minor secondary course	29	99	n/a		
Features of the Blade:													Perimarginal veins	30	99	n/a		
Position of Blade Attachment				7	99	n/a							Major secondary spacing	31	99	n/a		
Laminar size				8	99	n/a							Variation of secondary angle	32	99	n/a		
Laminar L:W ratio				9		n/a							Major secondary attachment	33	99	n/a		
Laminar Shape				10	99	n/a							Inter-2°	proximal course	34.1	99	n/a	
Medial Symmetry				11	99	n/a								intersecondary length	34.2	99	n/a	
Base Symmetry				12	99	n/a								distal course	34.3	99	n/a	
Base Symmetry				12	.	-								vein frequency	34.4	99	n/a	
Lobation				13	99	n/a			3°				Intercostal tertiary vein fabric	35	99	n/a		
Margin Type				14	99	n/a							Angle of percurrent tertiaries	35.1.2	99	n/a		
Special Margin Features				15	99	n/a							vein angle variability	36	99	n/a		
Apex Angle				16	99	n/a							Epimedial tertiaries	37	99	n/a		
Apex Shape				17	99	n/a							admedial course	37.2.1	99	n/a		
Apex Shape				17	.	-							exmedial course	37.2.2	99	n/a		
Base Angle				18	99	n/a							Exterior tertiary course	38	99	n/a		
Base shape				19	99	n/a			4°				Quaternary Vein Fabric	39	99	n/a		
Base shape				19	.	-			5°				Quinternary Vein Fabric	40	99	n/a		
Terminal Apex Features				20	99	n/a							Areolation	41	99	n/a		
													FEV branching	42.1	99	n/a		
Surface Texture				21	99	n/a							FEV termination	42.2	99	n/a		
Surficial Glands				22	99	n/a							Marginal Ultimate venation	43	99	n/a		
Section III. Teeth									Text Description:									
Tooth spacing				44	99	n/a			Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry - , Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape - , Base Angle n/a, Base shape n/a, Base shape - , Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.									
Number of orders of teeth				45	99	n/a												
Teeth / cm				46		n/a												
sinus shape				47	99	n/a												
tooth shapes				48		n/a												
tooth shapes				48														
tooth shapes				48														
tooth shapes				48														
principal vein				49	99	n/a												
principal vein termination				50	99	n/a												
course of accessory vein				51	99	n/a												
features of the tooth apex				52	99	n/a												
Reproductive axis.																		



GA56 HM

DNMH spec. # 48368

DMNH loc. # 500

G457

Family:

Genus and Species:

<u>Section I. Leaf Characters</u>				<u>Section II. Venation</u>			
		score	description		char.	score	description
Leaf Attachment	1	99	n/a	1°	Primary Vein Framework	23	99 n/a
Leaf Arrangement	2	99	n/a		Naked Basal Veins	24	99 n/a
Leaf Organization	3	99	n/a		Number of Basal Veins	25	n/a
Leaflet Organization	4	99	n/a		Agrophic Veins	26	99 n/a
Leaflet Attachment	5	99	n/a	2°	Major 2o vein framework	27	99 n/a
Petiole Features	6	99	n/a		Interior secondaries	28	99 n/a
					Minor secondary course	29	99 n/a
					Perimarginal veins	30	99 n/a
Features of the Blade:							
Position of Blade Attachment	7	99	n/a		Major secondary spacing	31	99 n/a
Laminar size	8	99	n/a		Variation of secondary angle	32	99 n/a
Laminar L:W ratio	9		n/a		Major secondary attachment	33	99 n/a
Laminar Shape	10	99	n/a	Inter- 2°	proximal course	34.1	99 n/a
Medial Symmetry	11	99	n/a		intersecondary length	34.2	99 n/a
Base Symmetry	12	99	n/a		distal course	34.3	99 n/a
Base Symmetry	12	.	-		vein frequency	34.4	99 n/a
Lobation	13	99	n/a	3°	Intercostal tertiary vein fabric	35	99 n/a
Margin Type	14	99	n/a		Angle of percurrent tertiaries	35.1.2	99 n/a
Special Margin Features	15	99	n/a		vein angle variability	36	99 n/a
Apex Angle	16	99	n/a		Epimedial tertiaries	37	99 n/a
Apex Shape	17	99	n/a		admedial course	37.2.1	99 n/a
Apex Shape	17	.	-		exmedial course	37.2.2	99 n/a
Base Angle	18	99	n/a		Exterior tertiary course	38	99 n/a
Base shape	19	99	n/a	4° 5°	Quaternary Vein Fabric	39	99 n/a
Base shape	19	.	-		Quinternary Vein Fabric	40	99 n/a
Terminal Apex Features	20	99	n/a		Areolation	41	99 n/a
					FEV branching	42.1	99 n/a
Surface Texture	21	99	n/a		FEV termination	42.2	99 n/a
Surficial Glands	22	99	n/a		Marginal Ultimate venation	43	99 n/a
<u>Section III. Teeth</u>				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth /cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				
Reproductive axis.							



GA57 HM

DNMH spec. # 23771

DMNH loc. # 412

G458

Family:

Genus and Species:

Section I. Leaf Characters			score	description		
Leaf Attachment	1	88		not visible		
Leaf Arrangement	2	88		not visible		
Leaf Organization	3	88		not visible		
Leaflet Organization	4	88		not visible		
Leaflet Attachment	5	88		not visible		
Petiole Features	6	88		not visible		
Features of the Blade:						
Position of Blade Attachment	7	88		not visible		
Laminar size	8	88		not visible		
Laminar L:W ratio	9			not visible		
Laminar Shape	10	88		not visible		
Medial Symmetry	11	88		not visible		
Base Symmetry	12	88		not visible		
Base Symmetry	12	.	-			
Lobation	13	88		not visible		
Margin Type	14	14.1		entire		
Special Margin Features	15	88		not visible		
Apex Angle	16	88		not visible		
Apex Shape	17	88		not visible		
Apex Shape	17	.	-			
Base Angle	18	88		not visible		
Base shape	19	88		not visible		
Base shape	19	.	-			
Terminal Apex Features	20	88		not visible		
Surface Texture	21	88		not visible		
Surficial Glands	22	88		not visible		
Section II. Venation						
1°			Primary Vein Framework	23	88	not visible
			Naked Basal Veins	24	88	not visible
			Number of Basal Veins	25		not visible
			Agrophobic Veins	26	88	not visible
2°			Major 2o vein framework	27	27.3.1	simple brochidodromous
			Interior secondaries	28	88	not visible
			Minor secondary course	29	29.2	simple brochidodromous
			Perimarginal veins	30	88	not visible
			Major secondary spacing	31	88	not visible
			Variation of secondary angle	32	88	not visible
			Major secondary attachment	33	88	not visible
Inter-2°			proximal course	34.1	88	not visible
			intersecondary length	34.2	88	not visible
			distal course	34.3	88	not visible
			vein frequency	34.4	88	not visible
3°			Intercostal tertiary vein fabric	35	35.1.1.2	alternate percurrent
			Angle of percurrent tertiaries	35.1.2	88	not visible
			vein angle variability	36	88	not visible
			Epimedial tertiaries	37	88	not visible
			admedial course	37.2.1	88	not visible
			exmedial course	37.2.2	88	not visible
			Exterior tertiary course	38	38.2	looped
4°			Quaternary Vein Fabric	39	39.1.3	mixed percurrent
5°			Quinternary Vein Fabric	40	40.1.2	irregular reticulate
			Areolation	41	41.2.2	moderate development
			FEV branching	42.1	88	not visible
			FEV termination	42.2	88	not visible
			Marginal Ultimate venation	43	88	not visible
Section III. Teeth						
Tooth spacing	44	99		n/a		
Number of orders of teeth	45	99		n/a		
Teeth / cm	46			n/a		
sinus shape	47	99		n/a		
tooth shapes	48			n/a		
tooth shapes	48					
tooth shapes	48					
tooth shapes	48					
principal vein	49	99		n/a		
principal vein termination	50	99		n/a		
course of accessory vein	51	99		n/a		
features of the tooth apex	52	99		n/a		
Text Description:						
Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size not visible, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry - , Lobation not visible, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape - , Base Angle not visible, Base shape not visible, Base shape - , Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework not visible, Naked Basal Veins not visible, Number of Basal Veins not visible, Agrophobic Veins not visible, Major 2o vein framework simple brochidodromous, Interior secondaries not visible, Minor secondary course simple brochidodromous, Perimarginal veins not visible, Major secondary spacing not visible, Variation of secondary angle not visible, Major secondary attachment not visible, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric alternate percurrent, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course looped, Quaternary Vein Fabric mixed percurrent, Quinternary Vein Fabric irregular reticulate, Areolation moderate development, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth shapes , principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.						



GA58 HM

DNMH spec. # 48362

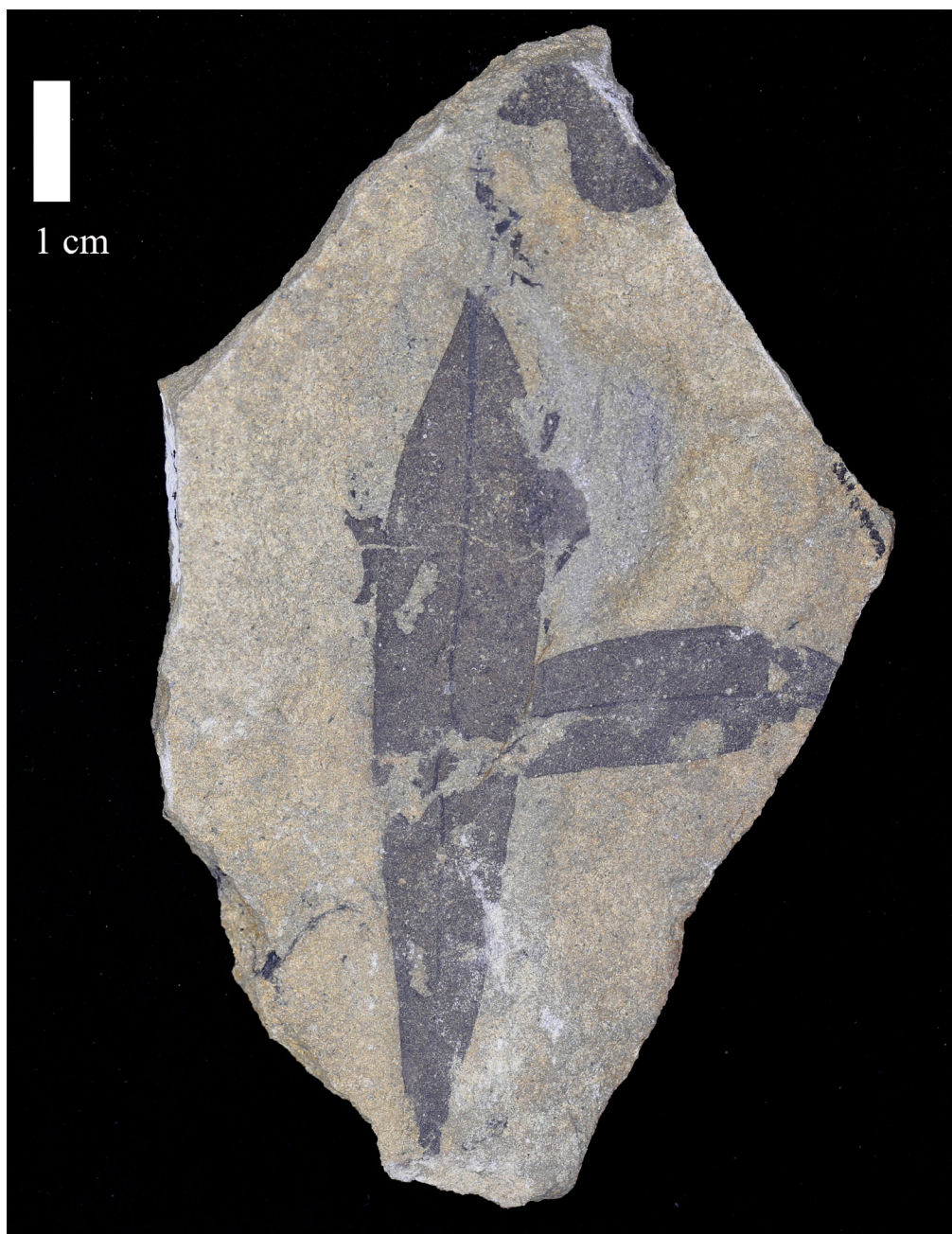
DMNH loc. # 500

GA59

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
		score	description		char.	score	description
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.1 pinnate
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1 absent
Leaf Organization	3	88	not visible		Number of Basal Veins	25	1
Leaflet Organization	4	88	not visible		Agrophie Veins	26	88 not visible
Leaflet Attachment	5	88	not visible	2°	Major 2o vein framework	27	88 not visible
Petiole Features	6	88	not visible		Interior secondaries	28	88 not visible
Features of the Blade:					Minor secondary course	29	88 not visible
Position of Blade Attachment	7	88	not visible		Perimarginal veins	30	0 absent
Laminar size	8	8.4	notophyll		Major secondary spacing	31	31.2 irregular
Laminar L:W ratio	9		6:1.5		Variation of secondary angle	32	88 not visible
Laminar Shape	10	10.2	obovate		Major secondary attachment	33	88 not visible
Medial Symmetry	11	11.1	symmetrical	Inter-2°	proximal course	34.1	88 not visible
Base Symmetry	12	88	not visible		intersecondary length	34.2	88 not visible
Base Symmetry	12	.	-		distal course	34.3	88 not visible
Lobation	13	13.1	unlobed		vein frequency	34.4	88 not visible
Margin Type	14	14.1	entire	3°	Intercostal tertiary vein fabric	35	88 not visible
Special Margin Features	15	88	not visible		Angle of percurrent tertiaries	35.1.2	88 not visible
Apex Angle	16	16.1	acute		vein angle variability	36	88 not visible
Apex Shape	17	17.3	acuminate		Epimedial tertiaries	37	88 not visible
Apex Shape	17	.	-		admedial course	37.2.1	88 not visible
Base Angle	18	18.1	acute		exmedial course	37.2.2	88 not visible
Base shape	19	88	not visible		Exterior tertiary course	38	88 not visible
Base shape	19	.	-	4°	Quaternary Vein Fabric	39	88 not visible
Terminal Apex Features	20	88	not visible	5°	Quinternary Vein Fabric	40	88 not visible
Surface Texture	21	88	not visible		Areolation	41	88 not visible
Surficial Glands	22	88	not visible		FEV branching	42.1	88 not visible
					FEV termination	42.2	88 not visible
					Marginal Ultimate venation	43	88 not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size notophyll, Laminar L:W ratio 6:1.5, Laminar Shape obovate, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape -, Base Angle acute, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophie Veins not visible, Major 2o vein framework not visible, Interior secondaries not visible, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle not visible, Major secondary attachment not visible, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.			
Number of orders of teeth	45	99	n/a				
Teeth / cm	46		n/a				
sinus shape	47	99	n/a				
tooth shapes	48		n/a				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	99	n/a				
principal vein termination	50	99	n/a				
course of accessory vein	51	99	n/a				
features of the tooth apex	52	99	n/a				



GA59 HM

DNMH spec. # 48372

DMNH loc. # 500

GA60				Family: Moraceae				Genus and Species: "Ficus" planicostata			
Section I. Leaf Characters				score	description		Section II. Venation				
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.2.1.1	basal actinodromous			
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1	absent			
Leaf Organization	3	88	not visible		Number of Basal Veins	25		3			
Leaflet Organization	4	88	not visible		Agrophich Veins	26	26.2.1	simple			
Leaflet Attachment	5	88	not visible		Major 2o vein framework	27	88	not visible			
Petiole Features	6	88	not visible	Inter-2°	Interior secondaries	28	28.1	absent			
Features of the Blade:					Minor secondary course	29	29.1	craspedodromous			
Position of Blade Attachment	7	7.1	marginal		Perimarginal veins	30	0	absent			
Laminar size	8	8.5	mesophyll		Major secondary spacing	31	31.2	irregular			
Laminar L:W ratio	9		not visible		Variation of secondary angle	32	88	not visible			
Laminar Shape	10	88	not visible		Major secondary attachment	33	33.1	decurrent			
Medial Symmetry	11	88	not visible		proximal course	34.1	88	not visible			
Base Symmetry	12	88	not visible		intersecondary length	34.2	88	not visible			
Base Symmetry	12	-	-		distal course	34.3	88	not visible			
Lobation	13	13.1	unlobed		vein frequency	34.4	88	not visible			
Margin Type	14	14.1	entire	3°	Intercostal tertiary vein fabric	35	35.1.1.1.1	straight opposite percurrent			
Special Margin Features	15	88	not visible		Angle of percurrent tertiaries	35.1.2	35.1.2.2	obtuse			
Apex Angle	16	88	not visible		vein angle variability	36	36.2	consistent			
Apex Shape	17	88	not visible		Epimedial tertiaries	37	37.1.1.1	opposite percurrent			
Apex Shape	17	-	-		admedial course	37.2.1	37.2.1.3	perpendicular to midvein			
Base Angle	18	18.2	obtuse	exmedial course	37.2.2	37.2.2.2	basiflexed				
Base shape	19	19.1.4	concavo-convex	Exterior tertiary course	38	88	not visible				
Base shape	19	-	-	Quaternary Vein Fabric	39	88	not visible				
Terminal Apex Features	20	88	not visible	5°	Quinternary Vein Fabric	40	88	not visible			
Surface Texture	21	88	not visible		Arcolation	41	88	not visible			
Surficial Glands	22	88	not visible		FEV branching	42.1	88	not visible			
					FEV termination	42.2	88	not visible			
					Marginal Ultimate venation	43	88	not visible			
Section III. Teeth				Text Description:							
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle obtuse, Base shape concavo-convex, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework basal actinodromous, Naked Basal Veins absent, Number of Basal Veins 3, Agrophich Veins simple, Major 2o vein framework not visible, Interior secondaries absent, Minor secondary course craspedodromous, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle not visible, Major secondary attachment decurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric straight opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability consistent, Epimedial tertiaries opposite percurrent, admedial course perpendicular to midvein, exmedial course basiflexed, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Arcolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.							
Number of orders of teeth	45	99	n/a								
Teeth / cm	46		n/a								
sinus shape	47	99	n/a								
tooth shapes	48		n/a								
tooth shapes	48										
tooth shapes	48										
tooth shapes	48										
principal vein	49	99	n/a								
principal vein termination	50	99	n/a								
course of accessory vein	51	99	n/a								
features of the tooth apex	52	99	n/a								

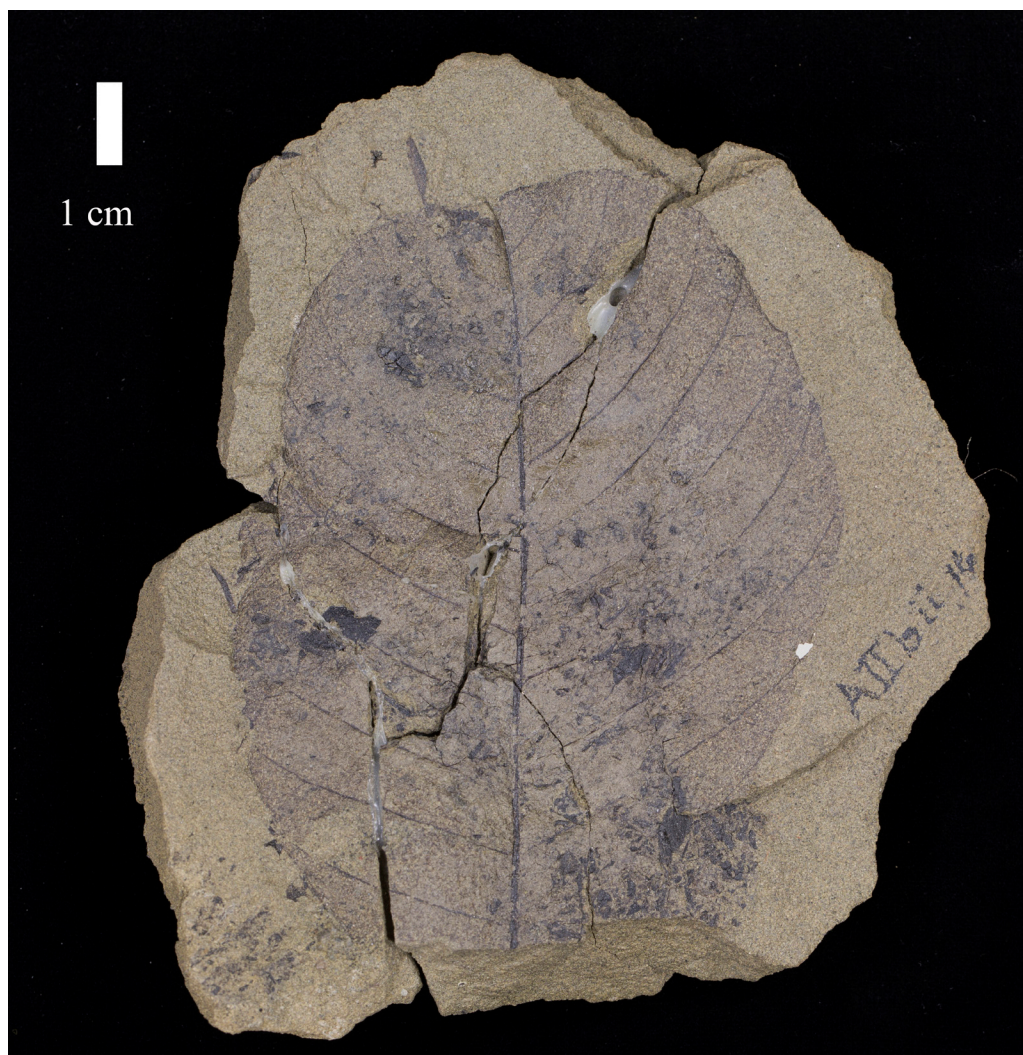


GA60 HM

DNMH spec. # 48363

DMNH loc. # 500

GA61		Family: Juglandaceae			Genus and Species:					
Section I. Leaf Characters				score	description					
Leaf Attachment	1	88	not visible		1°	Primary Vein Framework	23	23.1	pinnate	
Leaf Arrangement	2	88	not visible			Naked Basal Veins	24	24.1	absent	
Leaf Organization	3	88	not visible			Number of Basal Veins	25		1	
Leaflet Organization	4	88	not visible			Agrophic Veins	26	88	not visible	
Leaflet Attachment	5	88	not visible			2°	Major 2o vein framework	27	27.1.1	craspedodromous
Petiole Features	6	88	not visible				Interior secondaries	28	28.1	absent
							Minor secondary course	29	88	not visible
							Perimarginal veins	30	0	absent
							Major secondary spacing	31	31.1	regular
						Variation of secondary angle	32	32.1	uniform	
					Major secondary attachment	33	33.1	decurrent		
Features of the Blade:					Inter-2°	proximal course	34.1	88	not visible	
Position of Blade Attachment	7	88	not visible			intersecondary length	34.2	88	not visible	
Laminar size	8	8.5	mesophyll			distal course	34.3	88	not visible	
Laminar L:W ratio	9		not visible			vein frequency	34.4	88	not visible	
Laminar Shape	10	88	not visible			3°	Intercostal tertiary vein fabric	35	88	not visible
Medial Symmetry	11	11.1	symmetrical		Angle of percurrent tertiaries		35.1.2	88	not visible	
Base Symmetry	12	88	not visible		vein angle variability		36	88	not visible	
Base Symmetry	12	.	-		Epimedial tertiaries		37	88	not visible	
Lobation	13	13.1	unlobed		admedial course		37.2.1	88	not visible	
Margin Type	14	14.2	serrate		exmedial course		37.2.2	88	not visible	
Special Margin Features	15	88	not visible		Exterior tertiary course		38	88	not visible	
Apex Angle	16	88	not visible		4°		Quaternary Vein Fabric	39	88	not visible
Apex Shape	17	88	not visible				5°	Quinternary Vein Fabric	40	88
Apex Shape	17	.	-		Areolation			41	88	not visible
Base Angle	18	88	not visible		FEV branching	42.1		88	not visible	
Base shape	19	88	not visible		FEV termination	42.2		88	not visible	
Base shape	19	.	-		Marginal Ultimate venation	43		88	not visible	
Terminal Apex Features	20	88	not visible							
Surface Texture	21	88	not visible							
Surficial Glands	22	88	not visible							
Section III. Teeth					Text Description:					
Tooth spacing	44	44.1	regular		Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry symmetrical, Base Symmetry not visible, Base Symmetry -, Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins not visible, Major 2o vein framework craspedodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary attachment decurrent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing regular, Number of orders of teeth one , Teeth / cm 1, sinus shape rounded, tooth shapes st/cv, tooth shapes st/st, tooth shapes , tooth shapes , principal vein present, principal vein termination at apex of tooth, course of accessory vein not visible, features of the tooth apex not visible.					
Number of orders of teeth	45	45.1	one							
Teeth / cm	46		1							
sinus shape	47	47.2	rounded							
tooth shapes	48		st/cv							
tooth shapes	48		st/st							
tooth shapes	48									
tooth shapes	48									
principal vein	49	49.1	present							
principal vein termination	50	50.2.1	at apex of tooth							
course of accessory vein	51	88	not visible							
features of the tooth apex	52	88	not visible							



GA61 HM

DNMH spec. # 48357

DMNH loc. # 500

G462

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
	score	description		char.	score	description	
Leaf Attachment	1	88	not visible	1°	23	23.1	pinnate
Leaf Arrangement	2	88	not visible		24	24.1	absent
Leaf Organization	3	88	not visible		25		1
Leaflet Organization	4	88	not visible		26	26.2.1	simple
Leaflet Attachment	5	88	not visible	2°	27	27.1.2	semicraspedodromous
Petiole Features	6	88	not visible		28	28.1	absent
Features of the Blade:					29	88	not visible
Position of Blade Attachment	7	7.1	marginal		30	0	absent
Laminar size	8	8.5	mesophyll		31	31.2	irregular
Laminar L:W ratio	9		not visible		32	32.1	uniform
Laminar Shape	10	10.1	elliptic		33	33.3	excurent
Medial Symmetry	11	11.1	symmetrical	Inter-	34.1	88	not visible
Base Symmetry	12	12.1	symmetrical	2°	34.2	88	not visible
Base Symmetry	12	.	-		34.3	88	not visible
Lobation	13	13.1	unlobed		34.4	88	not visible
Margin Type	14	14.1	serrate	3°	35	35.1.1.1.1	straight opposite percurrent
Special Margin Features	15	88	not visible		35.1.2	35.1.2.2	obtuse
Apex Angle	16	88	not visible		36	88	not visible
Apex Shape	17	88	not visible		37	88	not visible
Apex Shape	17	.	-		37.2.1	88	not visible
Base Angle	18	18.1	acute		37.2.2	88	not visible
Base shape	19	19.1.1	straight		38	88	not visible
Base shape	19	.	-	4°	39	88	not visible
Terminal Apex Features	20	88	not visible	5°	40	88	not visible
					41	88	not visible
					42.1	88	not visible
Surface Texture	21	88	not visible		42.2	88	not visible
Surficial Glands	22	88	not visible		43	88	not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment marginal, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape elliptic, Medial Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry - , Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape - , Base Angle acute, Base shape straight, Base shape - , Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins simple, Major 2o vein framework semicraspedodromous, Interior secondaries absent, Minor secondary course not visible, Perimarginal veins absent, Major secondary spacing irregular, Variation of secondary angle uniform, Major secondary attachment excurent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric straight opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle variability not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible, Quaternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one , Teeth / cm 1, sinus shape rounded, tooth shapes st/cv, tooth shapes , tooth shapes , principal vein present, principal vein termination at apex of tooth, course of accessory vein not visible, features of the tooth apex not visible.			
Number of orders of teeth	45	45.1	one				
Teeth / cm	46		1				
sinus shape	47	47.2	rounded				
tooth shapes	48		st/cv				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	49.1	present				
principal vein termination	50	50.2.1	at apex of tooth				
course of accessory vein	51	88	not visible				
features of the tooth apex	52	88	not visible				



GA62 HM

DNMH spec. # 48367

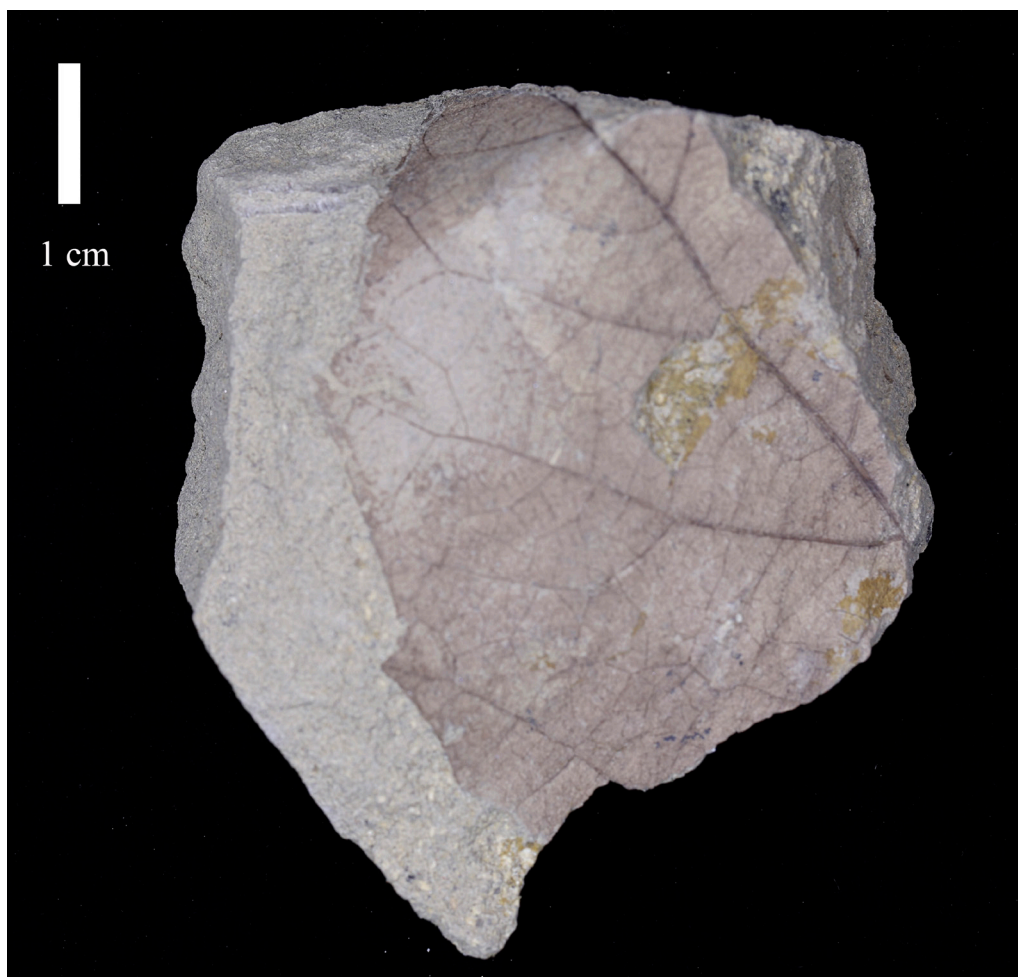
DMNH loc. # 500

GA63

Family:

Genus and Species:

Section I. Leaf Characters				Section II. Venation			
	score	description		char.	score	description	
Leaf Attachment	1	88	not visible	1°	23	88	not visible
Leaf Arrangement	2	88	not visible		24	88	not visible
Leaf Organization	3	88	not visible		25		not visible
Leaflet Organization	4	88	not visible		26	88	not visible
Leaflet Attachment	5	88	not visible	2°	27	27.3.1	simple brochidodromous
Petiole Features	6	88	not visible		28	88	not visible
Features of the Blade:					29	29.2	simple brochidodromous
Position of Blade Attachment	7	88	not visible		30	88	not visible
Laminar size	8	8.5	mesophyll		31	31.2	irregular
Laminar L:W ratio	9		not visible		32	88	not visible
Laminar Shape	10	88	not visible		33	33.3	excurent
Medial Symmetry	11	88	not visible	Inter-	34.1	88	not visible
Base Symmetry	12	88	not visible	2°	34.2	88	not visible
Base Symmetry	12	.	-		34.3	88	not visible
Lobation	13	13.1	unlobed		34.4	88	not visible
Margin Type	14	14.2	serrate	3°	35	35.1.1.2	alternate percurrent
Special Margin Features	15	88	not visible		35.1.2	88	not visible
Apex Angle	16	88	not visible		36	88	not visible
Apex Shape	17	88	not visible		37	37.1.1.3	mixed percurrent
Apex Shape	17	.	-		37.2.1	37.2.1.3	perpendicular to midvein
Base Angle	18	88	not visible		37.2.2	37.2.2.2	basiflexed
Base shape	19	88	not visible		38	38.2	looped
Base shape	19	.	-	4°	39	39.1.3	mixed percurrent
Terminal Apex Features	20	88	not visible	5°	40	88	not visible
Surface Texture	21	88	not visible		41	41.2.2	moderate development
Surficial Glands	22	88	not visible		42.1	42.1.3	mostly one branched
					42.2	42.2.1	simple
					43	88	not visible
Section III. Teeth				Text Description:			
Tooth spacing	44	44.1	regular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible, Position of Blade Attachment not visible, Laminar size mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible, Base Symmetry not visible, Base Symmetry - , Lobation unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not visible, Apex Shape - , Base Angle not visible, Base shape not visible, Base shape - , Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary Vein Framework not visible, Naked Basal Veins not visible, Number of Basal Veins not visible, Agrophic Veins not visible, Major 2o vein framework simple brochidodromous, Interior secondaries not visible, Minor secondary course simple brochidodromous, Perimarginal veins not visible, Major secondary spacing irregular, Variation of secondary angle not visible, Major secondary attachment excurent, proximal course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible, Intercoastal tertiary vein fabric alternate percurrent, Angle of percurrent tertiaries not visible, vein angle variability not visible, Epimedial tertiaries mixed percurrent, admedial course perpendicular to midvein, exmedial course basiflexed , Exterior tertiary course looped, Quaternary Vein Fabric mixed percurrent, Quintemary Vein Fabric not visible, Areolation moderate development, FEV branching mostly one branched, FEV termination simple, Marginal Ultimate venation not visible, Tooth spacing regular, Number of orders of teeth one , Teeth / cm 1, sinus shape rounded, tooth shapes st/st, tooth shapes , tooth shapes , tooth shapes , principal vein present, principal vein termination at apex of tooth, course of accessory vein looped, features of the tooth apex n/a.			
Number of orders of teeth	45	45.1	one				
Teeth / cm	46		1				
sinus shape	47	47.2	rounded				
tooth shapes	48		st/st				
tooth shapes	48						
tooth shapes	48						
tooth shapes	48						
principal vein	49	49.1	present				
principal vein termination	50	50.2.1	at apex of tooth				
course of accessory vein	51	51.1.1	looped				
features of the tooth apex	52	99	n/a				



GA63 HM

DNMH spec. # 42882

DMNH loc. # 413

GA64		Family: Salicaceae		Genus and Species: "Populus" nebrascensis	
Section I. Leaf Characters.		score	description		
Leaf Attachment	1	88	not visible		
Leaf Arrangement	2	88	not visible		
Leaf Organization	3	88	not visible		
Leaflet Organization	4	88	not visible		
Leaflet Attachment	5	88	not visible		
Petiole Features	6	88	not visible		
Features of the Blade:					
Position of Blade Attachment	7	88	not visible		
Laminar size	8	88	not visible		
Laminar L:W ratio	9		not visible		
Laminar Shape	10	88	not visible		
Medial Symmetry	11	88	not visible		
Base Symmetry	12	88	not visible		
Base Symmetry	12	.	-		
Lobation	13	88	not visible		
Margin Type	14	88	n/a		
Special Margin Features	15	88	not visible		
Apex Angle	16	88	not visible		
Apex Shape	17	88	not visible		
Apex Shape	17	.	-		
Base Angle	18	88	not visible		
Base shape	19	88	not visible		
Base shape	19	.	-		
Terminal Apex Features	20	88	not visible		
Surface Texture	21	88	not visible		
Surficial Glands	22	88	not visible		
Section III. Teeth.					
Tooth spacing	44	88	not visible		
Number of orders of teeth	45	88	not visible		
Teeth / cm	46		not visible		
sinus shape	47	88	not visible		
tooth shapes	48		not visible		
tooth shapes	48		not visible		
tooth shapes	48		not visible		
tooth shapes	48		not visible		
principal vein	49	88	not visible		
principal vein termination	50	88	not visible		
course of accessory vein	51	88	not visible		
features of the tooth apex	52	88	not visible		
Section II. Venation.					
char.	score	description			
1°	Primary Vein Framework	23	88	not visible	
	Naked Basal Veins	24	88	not visible	
	Number of Basal Veins	25		n/a	
	Agrophic Veins	26	88	not visible	
2°	Major 2o vein framework	27	88	not visible	
	Interior secondaries	28	88	not visible	
	Minor secondary course	29	88	not visible	
	Perimarginal veins	30	88	not visible	
	Major secondary spacing	31	88	not visible	
	Variation of secondary angle	32	88	not visible	
	Major secondary attachment	33	88	not visible	
Inter-	proximal course	34.1	88	not visible	
2°	intersecondary length	34.2	88	not visible	
	distal course	34.3	88	not visible	
	vein frequency	34.4	88	not visible	
3°	Intercostal tertiary vein fabric	35	88	not visible	
	Angle of percurrent tertiaries	35.1.2	88	not visible	
	vein angle variability	36	88	not visible	
	Epimedial tertiaries	37	88	not visible	
	admedial course	37.2.1	88	not visible	
	exmedial course	37.2.2	88	not visible	
	Exterior tertiary course	38	88	not visible	
4°	Quaternary Vein Fabric	39	88	not visible	
5°	Quinternary Vein Fabric	40	88	not visible	
	Areolation	41	88	not visible	
	FEV branching	42.1	88	not visible	
	FEV termination	42.2	88	not visible	
	Marginal Ultimate venation	43	88	not visible	
Text Description:					
Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a, Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a, Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a, Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major 2o vein framework n/a, Interior secondaries n/a, Minor secondary course n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of secondary angle n/a, Major secondary attachment n/a, proximal course n/a, intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a, Quinternary Vein Fabric n/a, Areolation n/a, FEV branching n/a, FEV termination n/a, Marginal Ultimate venation n/a, Tooth spacing n/a, Number of orders of teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.					

GA64 HM

Field Only

Not pictured

Appendix B: Golden Area Morphotype Data Tables

Golden Area (GA) Morphotype	SS	STM	GMC
GA1	0	1	0
GA2	10	0	6
GA3	6	1	5
GA4	0	16	0
GA5	0	0	1
GA6	1	0	0
GA7	0	2	0
GA8	0	1	0
GA9	1	0	0
GA10	0	1	0
GA11	7	1	8
GA12	17	49	6
GA13	0	3	0
GA14	0	7	0
GA15	0	3	0
GA16	0	0	1
GA17	79	0	1
GA18	2	1	0
GA19	0	0	1
GA20	3	11	0
GA21	11	0	0
GA22	1	0	0
GA23	505	0	22
GA24	0	9	0
GA25	0	0	7
GA26	0	1	0
GA27	0	2	0
GA28	0	49	0
GA29	0	2	0
GA30	0	2	0
GA31	0	2	5
GA32	0	24	0
GA33	0	1	0
GA34	0	19	0
GA35	0	1	0
GA36	0	7	0
GA37	0	2	0
GA38	43	1	0
GA39	878	62	38
GA40	0	5	0
GA41	0	1	0
GA42	3	0	0
GA43	1	0	0

GA44	1	0	0
GA45	1	0	0
GA46	0	2	0
GA47	105	42	0
GA48	0	0	3
GA49	0	0	5
GA50	0	0	1
GA51	14	0	0
GA52	0	8	79
GA53	118	3	0
GA54	0	2	0
GA55	0	0	5
GA 56	0	0	2
GA 57	0	1	0
GA58	0	0	1
GA59	0	0	2
GA60	0	5	4
GA61	0	0	1
GA62	0	0	5
GA63	0	1	
GA64	2	0	
Total	1809	351	209

Table A1: Number of Golden Area (GA) morphotypes by site.

Morphotype ID	Number of Specimens Per Horizon				Totals
	Horizon A	Horizon B	Horizon C	Horizon D	
GA2	0	7	2	1	10
GA3	0	0	4	2	6
GA6	0	1	0	0	1
GA9	0	1	0	0	1
GA11	2	3	2	0	7
GA12	4	6	3	4	17
GA17	0	19	59	1	79
GA18	0	2	0	0	2
GA20	0	3	0	0	3
GA21	8	0	3	0	11
GA23	337	125	38	5	505
GA39	2	69	691	116	878
GA38	0	0	15	28	43
GA42	0	2	1	0	3
GA43	0	1	0	0	1
GA44	0	1	0	0	1
GA45	0	0	1	0	1
GA47	0	1	0	104	105
GA51	0	14	0	0	14
GA53	5	34	55	24	118
GA64 (field only)	0	0	0	2	2
GA22	0	0	0	1	1
Totals	358	289	874	288	1809

Table A2: Number of Golden Area (GA) morphotypes by horizon at the SS site.