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

by

VICTORIA FAYE CRYSTAL

B.A., Colorado College, 2014

A thesis submitted to the Faculty of the Graduate School of the University of Colorado in partial fulfillment of the requirement for the degree of Master of Science Department of Geological Sciences 2019 This thesis entitled: Local and regional forest heterogeneity after the Cretaceous–Paleogene Boundary in the Denver Basin, Colorado, USA, and implications for the origins of rainforests written by Victoria Faye Crystal has been approved for the Department of Geological Sciences

Dr. Jaelyn J. Eberle

Dr. Kathryn E. Snell

Dr. Ian M. Miller

Dr. Julio Sepúlveda

Dr. Tyler R. Lyson

Date_____

The final copy of this thesis has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the above mentioned discipline.

Crystal, Victoria Faye (M.S., Geological Sciences)

Local and regional forest heterogeneity after the Cretaceous–Paleogene Boundary in the Denver Basin, Colorado, USA, and implications for the origins of rainforests Thesis directed by Professor Jaelyn J. Eberle

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 impactgenerated 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 megaflora taxa disappeared (Wilf and Johnson, 2004). Similarly,

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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, gingkoes, 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 heterogenous, 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 °C), wet (> 200 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), ⁴⁰Ar–³⁹Ar 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.



below the base of this section

Figure 3: South Table Mountain Stratigraphy. Stratigraphic column of the ridge on the southeastern flank of STM, with the two localities at the STM fossil site indicated at approximately nine meters above the base of the ridge.

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 megaflora 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 magnetochron C29R (Hicks et al., 2002; Eberle, 2003). A recent study by Sprain et al. (2015) in northeastern Montana used high resolution ⁴⁰Ar/³⁹Ar 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 threedimensional (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) MAT = $0.286E + 2.240$	(Wilf, 1997)
(2) MAT = $0.290E + 1.320$	(Miller et al., 2006)
(3) MAT = 0.2471E + 2.3305	(Kennedy et al., 2014)
(4) $SE(E_i)^2 = [1 + \phi(n_i - 1)E_i(1 - E_i)](E_i(1 - E_i)/n_i)$	(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 MlnA is the mean natural log of leaf area and the standard error is given by equation 7 (Wilf et al., 1998).

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

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

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

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 (NMSD) 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)	Number of Specimens	Taxa ID	
Morphotype			
GA1	1	Cyclocarya brownii	
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	Selaginella sp.	
GA11	16	Dryoteris sp.	
GA12	72	Alantodiopsis erosa	
GA13	3	Onoclea hesperia	
GA14	7	Fern 1	
GA15	3	Fern 2	
GA16	1	Conifer 1	
GA17	80	Palmacites sp.	
GA18	3	Paleoreodoxites sp.	
GA19	1 Sabalities sp.		
GA20	14	Paleonelumbo macroloba	
GA21	11	"Artocarpus" lessigiana	
GA22	1	Roots 1	
GA23	527	Platanites marginata	
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. "Sassafrass"	
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	"Rhamnus" goldiana
GA40	5	Phenocites 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	Cornophyllum newberryi
GA48	3	Dicot 21
GA49	5	Dicot 22
GA50	1	Dicot 23
GA51	14	cf. "Vitis" stantoni
GA52	87	Platanites marginata leaflett
GA53	121	"Zizyphus" 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	"Ficus" planicostata
GA61	1	Dicot 27
GA62	5	Dicot 28
GA63	1	Dicot 29
GA64	2	"Populus" nebrascensis

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 ± 5.12 °C (equation from Wilf, 1997), 24.52 ± 5.12 °C (equation from Miller et al., 2006), or 22.1 ± 5.12 °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	$12.92\pm5.46~^\circ\mathrm{C}$	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	$21.8 \pm 1.5^{\circ}\mathrm{C}$	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.



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	Green	Golden Area
		Mountain	Mountain	Overall
			Church	
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 +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 +89.3cm/-62.3 cm (1 SE, equation from Wilf, 1998), or 214.1 cm +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 ± 4.74 °C (equation from Wilf, 1997), 16.45 \pm 4.74 °C (equation from Miller et al., 2006), or 15.22 ± 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 + 0.13/-0.1 Ma) contains 248 specimens grouped into 23 GA morphotypes, including16 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 cm +83.4 cm/-58.2 cm (1 SE, equation from Wilf, 1998), or 204.8 cm +314.3 cm/ -124.0 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 ($23.91 \pm 5.12 \text{ °C}$, Fig. 6A). The uncertainty ranges for the MAT estimates at STM and GMC overlap ($15.0 \pm 5.10 \text{ °C}$, 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 $17.97 \pm 5.11 \text{ °C}$, 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 newberryii (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 disasterrecovery 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 a 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 flora 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°C and MAP of 204 cm +142/-292 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 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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Appendices

Appendix A: Golden Area Morphotype Descriptions

<u>A1</u>	1	amily	: Jug	giandaceae		Genus and Species:		Cyclot	arya t	orownu
ction I. Leaf Characters		score		description	Se	ction 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 20 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-	proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a		2 °	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	
ction III. Teeth					Text D	escription:				
Tooth spacing	44	99	n/a		Leaf	Attachment n/a, Leaf Arrangeme	nt n/a, Le	af Orgar	nization	n/a, Leaflet
Number of orders of teeth	45	99	n/a		Orga	nization n/a, Leaflet Attachment	n/a, Petio	le Featu	res n/a, I	Position of B
Teeth / cm	46		n/a		Attac	hment n/a, Laminar size n/a, Lan	inar L:W	ration/	a, Lamii	har Shape n/
sinus shape	47	99	n/a		Medi	al Symmetry n/a, Base Symmetry	y n/a, Bas	a Symm	etry - , I	Apex Shap
tooth shapes	48		n/a		Anex	Shape - Base Angle n/a Base	shape n/a	Base sl	ane'	Terminal Ar
tooth shapes	48				Featu	ires n/a, Surface Texture n/a, Sur	ficial Gla	nds n/a,	Primary	Vein
tooth shapes	48				Fram	ework n/a, Naked Basal Veins n	/a, Numb	er of Bas	al Vein	s n/a, Agrop
tooth shapes	48				Vein	s n/a, Major 20 vein framework n	/a, Interio	rsecon	daries n/	a, Minor
principal vein	49	99	n/a		Varia	iuary course n/a, Perimarginal ve	ins n/a, M	ajor sec	ondary s	spacing n/a,
principal vein termination	50	99	n/a		cours	se n/a, intersecondary length n/a.	distal cou	ny auau rse n/a. v	vein frec	uencv n/a.
course of accessory vein	51	99	n/a		Inter	costal tertiary vein fabric n/a, Ang	gle of per	current t	ertiaries	n/a, vein an
faaturas of the tooth	52	00	n/a		varia	bility n/a, Epimedial tertiaries n/a	ı, admedia	al course	e n/a, exi	nedial cours
features of the tooth apex	52	99	n/a		n/a, F Fabri Ultin cm n/ shapo vein	Exterior tertiary course n/a, Quate c n/a, Areolation n/a, FEV brancl nate venation n/a, Tooth spacing (a, sinus shape n/a, tooth shapes n es, principal vein n/a, principal n/a n/a, features of the tooth apex n/a	rnary Vei ning n/a, I n/a, Num n/a, tooth ein termir	n Fabric EV tern ber of or shapes, nation n/	c n/a, Qu nination ders of tooth sh a, cours	internary Ve n/a, Margin teeth n/a, Te apes, tooth e of accessor

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GA1 HM

DNMH spec. # 16605 DMNH loc. # 412

<u> 18</u>		, anniny	•			Genus and Species.				
ction L. 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 20 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		Int	proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a		20	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	3512	99	n/a	
Spacial Margin Faaturas	15	00	n/a			vain angle variability	36	00	n/a	
Apor Apolo	16	00	n/a			Enimodial tartiariaa	27	00	n/a	
Apex Aligie	17	99	n/a			Epiniedial tertiaries	27.2.1	99	n/a	
Apex Shape	17	99	n/a			admediai course	37.2.1	99	n/a	
Apex Shape	1/		-			exmedial course	37.2.2	99	n/a	
Base Angle	18	99	n/a		40	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	
ction III. Teeth					Tex	Description:				
Tooth spacing	44	99	n/a		Le	af Attachment n/a, Leaf Arrangemen	nt n/a, Lea	af Orgar	ization	n/a,
Number of orders of teeth	45	99	n/a		Le	aflet Organization n/a, Leaflet Attac	hment n/a	a, Petiol	e Featu	res n/a,
Teeth / cm	46		n/a		Po	osition of Blade Attachment n/a, Lan	ninar size	n/a, Lan	ninar L:	Wratio
sinus shape	47	99	n/a		n/	a, Laminar Shape n/a, Medial Symm	etry n/a, I	Base Sy	mmetry	n/a, Base
tooth shapes	48		n/a		n/	a Apex Angle n/a Apex Shape n/a	Apex Sha	ne - B	ase And	ale n/a
tooth shapes	48				B	use shape n/a. Base shape Termin	al Apex F	eatures	n/a. Su	rface
tooth shapes	48				Te	exture n/a, Surficial Glands n/a, Prin	hary Vein	Framev	vork n/a	a, Naked
tooth shapes	48				Ba	asal Veins n/a, Number of Basal Vei	ins n/a, Ag	grophic	Veins r	1/a, Major
principal vein	49	99	n/a		20	vein framework n/a, Interior second	laries n/a,	Minor	seconda	ary course
principal resistancia di anti-	50	00			n/	a, Perimarginal veins n/a, Major sec	ondary sp	acing n/	a, Varia	ation of
principal vein termination	50	99	n/a		se	condary angle n/a, Major secondary	attachmen	itn/a, p	rox imal	l course n/a,
course of accessory vein	51	99	n/a		te	rtiary vein fabric n/a Angle of percu	rrent terti	aries n/s	i vein a	ingle
features of the tooth apex	52	99	n/a		va	riability n/a. Epimedial tertiaries n/a	. admedia	d course	n/a. ex	medial
					co	urse n/a, Exterior tertiary course n/a	, Quaterna	ary Veir	1 Fabric	n/a,
					Q	internary Vein Fabric n/a, Areolatic	on n/a, FE	Vbranc	hing n/	a, FEV
					te	rmination n/a, Marginal Ultimate ver	nation n/a	, Tooth	spacing	g n/a,
					N	umber of orders of teeth n/a, Teeth /	cm n/a, si	nus shaj	pe n/a, t	tooth
					sh	apes n/a, tooth shapes, tooth shapes	, tooth sh	apes, pi	nncipal	tures of the
					PI	incipal ven termination n/a, course t	or accesse	ny veill	a, 10a	a a co or ulc
					10	oth anex n/a				

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GA2 HM

DNMH spec. # 48374 DMNH loc. # 500

<u>1/1J</u>		anniy	•		Genus and Species:				
ction 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 20 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- proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a		2º 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		4º 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	
ction III. Teeth					Text Description:				
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangemen	t n/a, Lea	af Organ	izatio	n n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Attach	ment n/	a, Petiol	e Feat	ures n/a,
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Lami	nar size	n/a, Lan	ninar	L:W ratio
sinus shape	47	99	n/a		n/a, Laminar Shape n/a, Medial Symmetry - Lobation n/a Margin Tyt	try n/a, I	Base Syn	mmeti	ry n/a, Base Features
tooth shapes	48		n/a		n/a. Apex Angle n/a. Apex Shape n/a. A	nex Sha	ane - B	ase Ai	ngle n/a.
tooth shapes	48				Base shape n/a, Base shape -, Termina	l Apex F	eatures	n/a, S	urface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Prima	ary Vein	Framew	vork n	/a, Naked
tooth shapes	48				Basal Veins n/a, Number of Basal Vein	ıs n/a, A	grophic	Veins	n/a, Majoı
principal vein	49	99	n/a		20 vein framework n/a, Interior seconda	aries n/a.	, Minor s	second	lary course
principal vein termination	50	99	n/a		secondary angle n/a Major secondary a	ittachmer	ntn/a ni	a, vai rovim	al course n
course of accessory yoin	51	90	n/a		intersecondary length n/a, distal course	n/a, vein	frequer	ncy n/a	a, Intercost
	51	22	iva		tertiary vein fabric n/a, Angle of percur	rent terti	aries n/a	ı, vein	angle
features of the tooth apex	52	99	n/a		variability n/a, Epimedial tertiaries n/a,	admedia	al course	n/a, e	xmedial
					Course n/a, Exterior tertiary course n/a, Ouinternary Vein Fabric n/a, Arealatics	Quaterna	ary vein Vhrand	rabri	c n/a,
					termination n/a, Marginal Ultimate ven	ation n/a	. Tooth	spaciu	ra,r≞v ngn/a
					Number of orders of teeth n/a, Teeth / c	m n/a, si	inus shar	pe n/a	, tooth
					shapes n/a, tooth shapes, tooth shapes,	to oth sh	apes, pi	incip	al vein n/a,
					principal vein termination n/a, course of	faccesso	ory vein	n/a, fe	atures of th

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GA3 HM

DNMH spec. # 46873 DMNH loc. # 412

		anniy	•		Contro una Spoolos.
ction I. Leaf Characters		score		description	Section II. Venation char. score descrip
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 20 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- proximal course 34.1 99 n/a
Medial Symmetry	11	99	n/a		2° 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
ction III. Teeth					Text Description:
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Laminar size n/a, Laminar L: W ra
sinus shape	47	99	n/a		n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Symmetry
tooth shapes	48		n/a		n/a Apex Angle n/a Apex Shape n/a Apex Shape - Base Angle n/a
tooth shapes	48				Base shape n/a, Base shape -, Terminal Apex Features n/a. Surface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Nal
tooth shapes	48				Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, M
principal vein	49	99	n/a		20 ven tramework n/a, Interior secondaries n/a, Minor secondary co
principal vein termination	50	99	n/a		secondary angle n/a Major secondary attachment n/a provimal course
200000 of 200000000000000000000000000000	51	00			intersecondary length n/a, distal course n/a, vein frequency n/a. Inter
course of accessory vein	51	99	n/a		tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle
features of the tooth apex	52	99	n/a		variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedi
					course n/a, Exterior tertiary course n/a, Quaternary Vein Fabric n/a,
					termination n/a Marginal Ultimate venation n/a, FEV branching n/a, FE
					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
					principal vein termination n/a, course of accessory vein n/a, features
					tooth apex n/a.

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GA4 HM

DNMH spec. # 23769 DMNH loc. # 412

<u>GA5</u>	J	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 20 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			proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a		2°	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/9			Angle of percurrent tertiaries	3512	99	n/9	
Special Margin Features	15	99	n/9			vein angle variability	36	99	n/a	
Anex Angle	16	99	n/a			Enimedial tertiaries	37	99	n/a	
Apex Shape	17	99	n/a			admedial course	37.2.1	99	n/a	
A pex Shape	17	,,	ina			avmedial course	37 2 2	00	n/a	
Base Angle	18	. 00	- n/a			Exterior tertiary course	37.2.2	00	n/a	
Base shape	10	00	n/a		4°	Quaternary Vain Fabric	30	00	n/a	
Base shape	10	"	ii/a		5°	Quaternary Vein Fabric	40	00	n/a	
Base snape	19		-		3	Quinternary Vein Fabric	40	99	n/a	
Terminal Apex Features	20	99	n/a			EEV here a his a	41	99	n/a	
Stanford Transford	21	00				FEV branching	42.1	99	n/a	
Surface Texture	21	99 00	n/a			Manainal Ultimate manation	42.2	99	n/a	
Surriciar Giands	22	<u>,,,</u>	11/a			warginar Orumate venation	43	33	n/a	
ection III. Teeth					Text	Description:				
Tooth spacing	44	99	n/a		Le	af Attachment n/a, Leaf Arrangeme	nt n/a, Le	af Orgar	izatio	on n/a, Leaflet
Number of orders of teeth	45_	99	n/a		Or	ganization n/a, Leaflet Attachment	n/a, Petio	le Featur	es n/a	, Position of
Teeth / cm	46		n/a		BI	ade Attachment n/a, Laminar size n/	a, Lamin	ar L: Wr	atio n	/a, Laminar
sinus shape	47	99	n/a		Lo	bation n/a Margin Type n/a Species	al Margin	uy 11/a, r Feature	ase 5	Apex Angle n
tooth shapes	48		n/a		Ar	bex Shape n/a, Apex Shape - Base	Angle n/a	a. Base s	hape	n/a. Base shar
tooth shapes	48				-,	Terminal Apex Features n/a, Surfac	e Texture	n∕a, Su	rficial	Glands n/a,
tooth shapes	48				Pr	imary Vein Framework n/a, Naked I	Basal Vei	ns n/a, l	Numb	er of Basal
tooth shapes	48				Ve	ins n/a, Agrophic Veins n/a, Major	20 vein fi	ramewoi	kn/a,	Interior
principal vein	49	99	n/a		se	conduction of secondary courses of the conduction of secondary spacing n/a Variation of secondary courses and	rse n/a, Pe	erimargii	nal ve Mai	ins n/a, Major ar secondary
principal vein termination	50	99	n/a		att	achment n/a proximal course n/a ju	ntersecon	darv leno	$\frac{1}{2}$ th n/2	distal course
course of accessory yein	51	99	n/a		n/a	a, vein frequency n/a, Intercostal ter	tiary vein	fabric n	/a, An	gle of
	51		a		pe	rcurrent tertiaries n/a, vein angle va	riability n	/a, Epim	edial	tertiari es n/a,
features of the tooth apex	52	99	n/a		ad	medial course n/a, exmedial course	n/a, Exter arv Vein F	ior tertia	ary co	urse n/a, olation n/a
					FF	V branching n/a, FEV termination	n/a. Marø	inal Ulti	mate	venation n/a.
					To	oth spacing n/a, Number of orders of	of teeth n/	a, Teeth	/ cm 1	1/a, sinus shap
					n/a	a, tooth shapes n/a, tooth shapes , to	oth shape	s, tooth	shape	s, principal
					ve	in n/a, principal vein termination n/a	a, course	ofacces	sory v	eın n/a, featur
					of	the tooth apex n/a.				
Round seed that is less t	har	0.5 cm	in di	ameter						
	nail	0.5 011	mu	ameter.						



GA5 HM

DNMH spec. # 48376 DMNH loc. # 500

<u>46</u>	1	Family	:		Genus and Species:				
tion 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 20 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- proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a		2° 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 ^o 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	
tion III. Teeth					Text Description:				
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangeme	nt n/a, Le	af Organ	izatio	on n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Attac	chment n/	a, Petiol	e Feat	tures n/a,
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Lan	ninar size	n/a, Lan	ninar	L:W ratio
sinus shape	47	99	n/a		n/a, Laminar Shape n/a, Medial Symm	ietry n/a, l	Sase Syr	nmet	ry n/a, Bas
tooth shapes	48		n/a		n/a. Apex Angle n/a. Apex Shape n/a.	Apex Sha	ne - B	ase A	ngle n/a.
tooth shapes	48				Base shape n/a, Base shape -, Termin	al Apex I	eatures	n/a, S	urface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Prin	nary Vein	Framew	ork n	/a, Naked
tooth shapes	48				Basal Veins n/a, Number of Basal Ve	ins n/a, A	grophic	Veins	n/a, Majo
principal vein	49	99	n/a		20 vein iramework n/a, interior second n/a Perimarginal veins n/a Major sec	ondary en	acing n/	a Var	iation of
principal vein termination	50	99	n/a		secondary angle n/a, Major secondary	attachme	ntn/a, pi	rox im	al course r
course of accessory vein	51	99	n/a		intersecondary length n/a, distal cours	e n/a, veir	frequer	icy n/	a, Intercos
factures of the teeth ener	52	00	n/a		tertiary vein fabric n/a, Angle of percu	rrent terti	aries n/a	, vein	angle
reatures of the tooli apex	52	99	n/a		variability n/a, Epimedial tertiaries n/a	admedia	al course	n/a, e	ex medial
					Ouinternary Vein Fabric n/a Areolati	n n/a FF	V branc	hing	n/a FEV
					termination n/a, Marginal Ultimate ve	nation n/a	, Tooth	spaci	ng n/a,
					Number of orders of teeth n/a, Teeth /	cm n/a, s	inus shap	n∕a	, tooth
					shapes n/a, tooth shapes, tooth shapes	, tooth sh	apes, pr	incip	al vein n/a
					principal vem termination n/a, course	of accesso	ory vein	n/a, fé	eatures of t



GA6 HM

DNMH spec. # 45893 DMNH loc. # 3793

	- 1	unny	•		Genus una Species.
ection 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 ^e Major 20 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- proximal course 34.1 99 n/a
Medial Symmetry	11	99	n/a		2° 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
tion III. Teeth					Text Description:
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a,
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Laminar size n/a, Laminar L: W ratio
sinus shape	47	99	n/a		Symmetry - Lobation n/a Margin Type n/a Special Margin Features
tooth shapes	48		n/a		n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a,
tooth shapes	48				Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked
tooth shapes	48				Basal veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major
principal vein	49	99	n/a		n/a Perimarginal veins n/a Major secondary spacing n/a Variation of
principal vein termination	50	99	n/a		secondary angle n/a, Major secondary attachment n/a, proximal course n/a.
course of accessory vein	51	99	n/a		intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal
for the state of the total	50	00	u		tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle
reatures of the tooth apex	32	99	n/a		variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial
					Ouinternary Vein Fabric n/a, Areolation n/a, EEV branching n/a, EEV
					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



GA7 HM

DNMH spec. # 24124 DMNH loc. # 412

	-	J			1
tion I. Leaf Characters		score		description	Section II. Venation char. score description
Leaf Attachment	1	99	n/a		1º 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 20 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		proximal course 34.1 99 n/a
Medial Symmetry	11	99	n/a		nter- intersecondary length 34.2 99 n/a
Base Symmetry	12	99	n/a		distal course 34.3 99 n/a
Base Symmetry	12	,,	ina		vain fraquency 34.4 99 n/a
Labation	12	. 00	- n/a		3° Intercostal testiony van fabric 35 00 n/a
Looation Margin Type	14	27 00	n/a		Angle of percurrent tertiories 35.1.2 00 m/s
Spacial Margin Easturas	14	99	n/a		Angle of percurrent ternaries 55.1.2 99 II/a
Special Margin Features	15	99 00	n/a		Enimalial testissis 27 00 m/s
Apex Angle	10	99	n/a		epimediai tertiaries 37 99 h/a
Apex Shape	17	99	n/a		admedial course 37.2.1 99 h/a
Apex Snape	1/		-		exmedial course 37.2.2 99 h/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
ction III. Teeth					Text Description:
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a,
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Laminar size n/a, Laminar L: W ratio
sinus shape	47	99	n/a		n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base
tooth shapes	48		n/a		n/a Apex Angle n/a Apex Shape n/a Apex Shape - Base Angle n/a
tooth shapes	48				Base shape n/a. Base shape Terminal Apex Features n/a. Surface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked
tooth shapes	48				Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major
principal vein	49	99	n/a		20 vein framework n/a, Interior secondaries n/a, Minor secondary course
neinging lygin termination	50	00	m /o		n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of
principal veni termination	50	77	ıı/a		intersecondary length n/a, distal course n/a vein frequency n/a.
course of accessory vein	51	99	n/a		tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle
features of the tooth apex	52	99	n/a		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



GA8 HM

DNMH spec. # 46872 DMNH loc. # 412

<u>A9</u>]	Family	':			Genus and Species:				
ction I. Leaf Characters		score		description	Sect	ion 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 20 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-	proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a		20	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	
Anex 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 Anex Features	20	99	n/a			Areolation	40	99	n/a	
Terminar repex readines	20		ina			FEV branching	42.1	00	n/a	
Surface Texture	21	00	n /a			FEV termination	42.1	00	n/a	
Surface Texture	21	99	n/a			Manginal Ultimate variation	42.2	99	n/a	
Surreiar Giands	22	,,	1/a			Warginar Onimate Venation	45	,,	11/a	
ction III. Teeth					Text Des	cription:				
Tooth spacing	44	99	n/a		Leaf A	ttachment n/a, Leaf Arrangemen	nt n/a, Le	af Organ	izatio	on n/a,
Number of orders of teeth	45	99	n/a		Leaflet	Organization n/a, Leaflet Attac	hment n/	a, Petiol	e Feat	ures n/a,
Teeth / cm	46		n/a		Positio	on of Blade Attachment n/a, Lam	inar size	n/a, Lan	ninar	L:W ratio
sinus shape	47	99	n/a		n/a, La	minar Shape n/a, Medial Symm	etry n/a,	Base Syr	Inmeti	ry n/a, Base
tooth shapes	48		n/a		n/a An	ex Angle n/a Apex Shape n/a	Anex Sh	ane - B	ase Ai	nglen/a
tooth shapes	48				Base sl	hape n/a, Base shape -, Termin	al Apex 1	Features	n/a, S	urface
tooth shapes	48				Textur	e n/a, Surficial Glands n/a, Prin	nary Veir	n Framev	vork n	/a, Naked
tooth shapes	48				Basal V	/eins n/a, Number of Basal Vei	ns n/a, A	grophic	Veins	n/a, Major
principal vein	49	99	n/a		20 ven	n framework n/a, Interior second	laries n/a	, Minor s	second	lary course
principal vein termination	50	99	n/a		n/a, Pe	ary angle n/a Major secondary	attachme	ntn/a n	a, var	al course n/s
	51	00	n/-		interse	condary length n/a. distal course	e n/a, vei	1 frequer	1CV n/s	a. Intercosta
course of accessory vein	51	99	n/a		tertiary	vein fabric n/a, Angle of percu	rrent tert	iaries n/a	ı, vein	angle
features of the tooth apex	52	99	n/a		variabi	lity n/a, Epimedial tertiaries n/a	, admedi	al course	n/a, e	xmedial
					course	n/a, Exterior tertiary course n/a	, Quatern	ary Vein	Fabri	ic n/a,
					Quinte	mary vein Fabric n/a, Areolatic	m n/a, FE	v branc	ning r	va, FEV
					Numbe	er of orders of teeth n/a. Teeth /	cm n/a s	inus sha	spac⊓ ne n/a	. tooth
					shapes	n/a, tooth shapes, tooth shapes	, tooth sh	hapes, pi	rincip	al vein n/a,
							-	I		,
					princip	al vein termination n/a, course	of access	ory vein:	n/a, fe	eatures of the
					princip tooth a	oal vein termination n/a, course opex n/a.	of access	ory vein	n/a, fe	eatures of the
Bark					princip tooth a	pal vein termination n/a, course o ppex n/a.	of access	ory vein	n/a, fe	eatures of the



GA9 HM

DNMH spec. # 46476 DMNH loc. # 3795

<u>EA10</u>]	Family	: Sel	aginellaceae	Genus and Species:		Selagi	nella sp.
ction I. Leaf Characters		score		description	Section II. Venation	char.	score	descripti
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		2º Major 20 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		proximal course	34.1	99	n/a
Medial Symmetry	11	99	n/a		2º 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
L obation	13	99	n/a		3 ⁰ Intercostal tertiary vein fabric	35	99	n/a
Margin Type	14	00	n/a		- Angle of percurrent tertiories	3512	00	n/a
Special Margin Eastwar	15	00	n/a		Angle of percurrent tertaines	35.1.2	00	n/a
Special Margin Features	15	99	n/a		Enimodial tartiarias	30	99	n/a
Apex Angle	17	99	n/a		Epinedial teruaries	27.21	99	n/a
Apex Shape	17	99	n/a		admediai course	37.2.1	99	n/a
Apex Snape	1/		-		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
ction III. Teeth					Text Description:			
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangeme	nt n/a, Le	af Orgar	ization n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Atta	chment n/	a, Petiol	e Features n/a
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Lan	inar size	n/a, Lan	ninar L:Wrati
sinus shape	47	99	n/a		n/a, Laminar Shape n/a, Medial Symm	etry n/a, l	Base Sy	mmetry n/a, B
tooth shapes	48		n/a		n/a Apex Angle n/a Apex Shape n/a	Apex Sh:	ane - B	ase Angle n/a
tooth shapes	48				Base shape n/a, Base shape -, Termin	al Apex I	eatures	n/a, Surface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Prin	hary Veir	Framev	vork n/a, Nake
tooth shapes	48				Basal Veins n/a, Number of Basal Ve	ins n/a, A	grophic	Veins n/a, Ma
principal vein	49	99	n/a		20 vein framework n/a, Interior secon	laries n/a	, Minor	secondary cou
principal vein termination	50	99	n/a		n/a, Perimarginal Veins n/a, Major sec	ondary sp	acing n/	a, Variation of
principal veni termination	50		in a		intersecondary length n/a distal cours	anachine n/a veir	n frequer	cy n/a Interco
course of accessory vein	51	99	n/a		tertiary vein fabric n/a, Angle of percu	rrent terti	aries n/a	, vein angle
features of the tooth apex	52	99	n/a		variability n/a, Epimedial tertiaries n/a course n/a, Exterior tertiary course n/a Quinternary Vein Fabrie n/a, Areolati termination n/a, Marginal Ultimate ve Number of orders of teeth n/a, Teeth / shapes n/a, tooth shapes, tooth shapes principal vein termination n/a, course tracher are n/a	, admedia , Quatern on n/a, FE nation n/a cm n/a, s , to oth sh of access	al course ary Vein V branc , Tooth inus shaj apes, pr ory vein	n/a, exmedial h Fabric n/a, hing n/a, FEV spacing n/a, pe n/a, tooth rincipal vein n n/a, features o



GA10 HM

DNMH spec. # 42899 DMNH loc. # 412

<u>GA11</u>		Family	: Dr	yopteridad	eae	Genus and Species:		Dryoj	pteris 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
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 20 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		Ir	ter- proximal course	34.1	99	n/a
Medial Symmetry	11	99	n/a		2	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					Те	xt Description:			
Tooth spacing	44	99	n/a		I	eaf Attachment n/a Leaf Arrangeme	ntn/a Le	af Organ	uization n/a Leaflet
Number of orders of teeth	45	99	n/a		Ċ	Organization n/a. Leaflet Attachment	n/a. Petio	le Featu	es n/a. Position of
Teeth / cm	46		n/a		I	Blade Attachment n/a, Laminar size n/	a, Lamin	ar L:W1	atio n/a, Laminar
sinus shane	47	99	n/a		S	hape n/a, Medial Symmetry n/a, Base	Symmet	ry n/a, I	Base Symmetry -,
tooth shapes	48		n/a		I	obation n/a, Margin Type n/a, Specia	l Margin	Feature	s n/a, Apex Angle n/a,
tooth shapes	48		in a		F	Terminal Apex Features n/a Surfac	Angie n/a	i, Base s	nape n/a, Base snape
tooth shapes	48				I	rimary Vein Framework n/a, Naked H	Basal Vei	ns n/a.	Number of Basal Veins
tooth shapes	48				r	/a, Agrophic Veins n/a, Major 20 vei	n framewo	ork n/a,	Interior secondaries
principal vein	49	99	n/a		r	/a, Minor secondary course n/a, Perir	narginal v	eins n/a	, Major secondary
principal voin tormir-t	50	00	n/a		s	pacing n/a, Variation of secondary an	gle n/a, N	lajor se	condary attachment
principal veni termination	50	<u>,,,</u>	ıı/a		f	requency n/a. Intercostal tertiary vein	fabric n/s	a Angle	of percurrent tertiaries
course of accessory vein	51	99	n/a		r	/a, vein angle variability n/a, Epimed	ial tertiari	es n/a, a	idmedial course n/a,
features of the tooth apex	52	99	n/a		e () t c s t	xmedial course n/a, Exterior tertiary Juinternary Vein Fabric n/a, Areolatic ermination n/a, Marginal Ultimate ver forders of teeth n/a, Teeth / cm n/a, s hapes, tooth shapes, tooth shapes, tooth shapes, tooth soch accessory ver-	ourse n/a on n/a, FE nation n/a inus shap rincipal v sin n/a, fe	, Quater V branc , Tooth e n/a, to ein n/a, atures o	nary Vein Fabric n/a, hing n/a, FEV spacing n/a, Number oth shapes n/a, tooth principal vein f the tooth apex n/a.
Frond organization is of the pinnae. Pinnae cm. Pinnules are alter	pin are nate	nate-pin pinnate and ob	nnati , obl olong	fid to bipinna ong in shape, ;; approximat	te-p alte	hapes, tooth shapes, tooth shapes, permination n/a, course of accessory ve innatifid; rachis gracile and def rnate, and vary in size from app 3 cm in length and less than 0.	rincipal v cin n/a, fe lected sl rox ima 1 cm in	ein n/a, atures o ightly tely 1 c width	principal vein f the tooth apex n/a. at the origin cm to 0.2 . Midveins



GA11 HM

DNMH spec. # 23782 DMNH loc. # 412

n I. Leaf Characters		score		description		Section II Venation	char	score	descrir	ntion
Leaf Attachment	1	99	n/a	description	1°	Primary Vein Framework	23	99	n/a	puon
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 20 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 Shane	10	99	n/a			proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a		Inte 2º	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	34.5	99	n/a	
Lobation	13		n/a		3°	Intercostal tertiary vein fabric	35	99	n/a	
Margin Tuna	14	90	n/9		-	Angle of percurrent tertiories	3512	90	n/a	
Special Margin Features	15	99	n/a			vein angle variability	35.1.2	99	n/a	
Apex Apple	16	00	n/a			Enimadial tartiarias	37	00	n/a	
Apex Shape	17	99	n/a			admedial course	37.2.1	99	n/a	
Apex Shape	17	"	11/a			avmedial course	37.2.1	00	n/a	
Rose Angle	18		-			Exterior tertiory course	37.2.2	99	11/a 12/a	
Base Aligie	10	99	n/a		4°	Quatarnary Vain Fabria	20	99	n/a	
Base shape	19	99	n/a		4 5°	Quaternary Vein Fabric	39 40	99	n/a n/a	
Taminal Array Frattance	20		-		5	Quinternary veni Fabric	40	99	ii/a	
Terminal Apex reatures	20	99	n/a			Areolation FEV has a shire	41	99	n/a	
	21	00	,			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 Olumate venation	45	99	n/a	
n III. Teeth					Text	Description:				
Tooth spacing	44	99	n/a		Lea	f Attachment n/a, Leaf Arrangeme	nt n/a, Le	af Orgar	ization n/a,	
Number of orders of teeth	45	99	n/a		Lea	flet Organization n/a, Leaflet Attac	chment n/	a, Petiol	e Features n/a,	
Teeth / cm	46		n/a		Pos	sition of Blade Attachment n/a, Lan	iinar size	n/a, Lan	inar L: W ratio)
sinus shape	47	99	n/a		n/a Svr	, Laminar Snape n/a, Medial Symm	ietry n/a, i ine n/a S	Base Syl necial M	nmetry n/a, Bas	se
tooth shapes	48		n/a		n/a	Apex Angle n/a, Apex Shape n/a.	Apex Sh	ape B	ase Angle n/a.	
tooth shapes	48				Bas	se shape n/a, Base shape -, Termin	al Apex I	eatures	n/a, Surface	
tooth shapes	48				Tex	ture n/a, Surficial Glands n/a, Prin	nary Veir	Framev	ork n/a, Naked	ł
tooth shapes	48				Bas	al Veins n/a, Number of Basal Ve	ins n/a, A	grophic	Veins n/a, Majo	or
principal vein	49	99	n/a		20 n/a	Perimarginal veins n/a, Interior second	aries n/a	, Minor :	a Variation of	se
principal vein termination	50	99	n/a		sec	ondarv angle n/a, Major secondarv	attachme	ntn/a. p	roximal course i	n/a.
course of accessory yein	51	99	n/a		inte	ersecondary length n/a, distal course	e n/a, veir	1 frequer	icy n/a, Intercos	stal
factures of the test!	52	00			tert	iary vein fabric n/a, Angle of percu	rrent terti	aries n/a	, vein angle	
reatures of the toour apex	52	99	n/a		var	iability n/a, Epimedial tertiaries n/a	, admedia	al course	n/a, exmedial	
					Oui	internary Vein Fabric n/a Areolatio	, Quatern on n/a FF	V branc	hing n/a FEV	
					terr	nination n/a, Marginal Ultimate ve	nation n/a	, Tooth	spacing n/a,	
					Nui	mber of orders of teeth n/a, Teeth /	cm n/a, s	inus shaj	be n/a, tooth	
					sha	pes n/a, tooth shapes, tooth shapes	, tooth sh	apes, pi	incipal vein n/a	a,
					prii	th an av n/a	of access	ory vein	n/a, features of	the
					100	LII ADEX IVA.				



GA12 HM

DNMH spec. # 46488 DMNH loc. # 3791

				1 1 1		
tion I. Leaf Characters		score	,	description	<u>Section II. Venation</u> char. score	description
Leaf Attachment	1	99	n/a		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		Lateria accordance 27 99	n/a
Petiole Features	6	99	n/a		Miner secondary severe 28 99	n/a
					Perimensional secondary course 29 99	n/a
Features of the Blade:	-	00	,		Major secondary major 21 00	n/a
Position of Blade Attachment	/	99	n/a		Wajor secondary spacing 51 99	n/a
Laminar size	8	99	n/a		Variation of secondary angle 32 99	n/a
Laminar L:w ratio	9	00	n/a		Major secondary attachment 33 99	n/a
Laminar Shape	10	99	n/a		Inter- proximal course 34.1 99	n/a
Medial Symmetry	11	99	n/a		2º intersecondary length 34.2 99	n/a
Base Symmetry	12	99	n/a		distal course 34.3 99	n/a
Base Symmetry	12		-		vem frequency 34.4 99	n/a
Lobation	13	99	n/a		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		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
tion III. Teeth					Fext Description:	
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Orga	nization n/a, Lea
Number of orders of teeth	45	99	n/a		Organization n/a, Leaflet Attachment n/a, Petiole Featu	res n/a, Position
Teeth / cm	46		n/a		Blade Attachment n/a, Laminar size n/a, Laminar L:W	ation/a, Lamin
sinus shape	47	99	n/a		Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, I	sase Symmetry
tooth shapes	48		n/a		Apex Shape n/a Apex Shape - Base Angle n/a Base	shane n/a Base
tooth shapes	48				-, Terminal Apex Features n/a, Surface Texture n/a, Su	rficial Glands n/
tooth shapes	48				Primary Vein Framework n/a, Naked Basal Veins n/a,	Number of Basa
tooth shapes	48				Veins n/a, Agrophic Veins n/a, Major 20 vein framewo	rk n/a, Interior
principal vein	49	99	n/a		secondaries n/a, Minor secondary course n/a, Perimargi	nal veins n/a, M
principal vein termination	50	99	n/a		attachment n/a proximal course n/a intersecondary len	oth n/a distal cc
course of accessory yein	51	99	n/a		n/a, vein frequency n/a, Intercostal tertiary vein fabric r	/a, Angle of
	51	,,,	ii/a		percurrent tertiaries n/a, vein angle variability n/a, Epin	nedial tertiaries r
features of the tooth apex	52	99	n/a		admedial course n/a, exmedial course n/a, Exterior terti	ary course n/a,
					Quaternary Vein Fabric n/a, Quinternary Vein Fabric n EEV branching n/a EEV termination n/a Marginal Ult	a, Areolation n/
					Tooth spacing n/a, Number of orders of teeth n/a, Teeth	/cm n/a. sinus
					n/a, tooth shapes n/a, tooth shapes , tooth shapes , tooth	shapes , princip
					vein n/a, principal vein termination n/a, course of acces	sory vein n/a, fe
					of the tooth anex n/a	



GA13 HM

DNMH spec. # 23780 DMNH loc. # 412

ion I Leaf Characters		score		description	Section II Venation abor soore description
Leaf Attachment	1	90	n/a	description	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 20 vein framework 27 99 n/a
Petiole Features	6	99	n/a		Interior secondaries 28 99 n/a
Tenole Tenures	0	,,	11 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
I aminar size	8	99	n/a		Variation of secondary angle 32 99 n/a
Laminar I :W ratio	9	,,,	n/9		Major secondary attachment 33 99 n/a
Laminar L.w Tatto	10	00	n/a		major secondary attachment 55 99 ina
Madial Symmetry	10	99	n/a		Inter- proximar course 34.1 99 In/a
Base Symmetry	12	99	n/a		z ² intersecondary length 34.2 99 h/a
Base Symmetry	12	99	n/a		uistai course 34.5 99 il/a
Dasc Symmetry	12		-		3 Interportal tertiony yain fabric 25 00 m/a
Lobation Margin Tuna	13	99 00	n/a		Angle of percurrent tertiories 25.1.2 00 m/s
Margin Type	14	99	n/a		Angle of percurrent tertaries 35.1.2 99 h/a
Special Margin Features	15	99	n/a		Vein angle variability 36 99 h/a
Apex Angle	16	99	n/a		Epimedial tertiaries 3/ 99 n/a
Apex Shape	17	99	n/a		admedial course 37.2.1 99 n/a
Apex Shape	1/		-		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
tion III. Teeth					Text Description:
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a,
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Laminar size n/a, Laminar L: W ratio
sinus shape	47	99	n/a		n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base
tooth shapes	48		n/a		n/a Anex Angle n/a Anex Shape n/a Anex Shape - Base Angle n/a
tooth shapes	48				Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked
tooth shapes	48				Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major
principal vein	49	99	n/a		20 vein tramework n/a, Interior secondaries n/a, Minor secondary course
principal vein termination	50	99	n/a		n/a, remnarginal veins n/a, major secondary spacing n/a, variation of secondary angle n/a Major secondary attachment n/a proximal course n/a
course of accessory voir	51	00	n/o		intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal
Course of accessory vem	51	27 00	11/a		tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle
features of the tooth apex	52	99	n/a		variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial course n/a, Exterior tertiary course n/a, Quatemary Vein Fabrie n/a, Quinternary Vein Fabrie 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



GA14 HM

DNMH spec. # 42890 DMNH loc. # 413

<u>GA15</u>	F	amily	:			Genus and Species:				
Section I. Leaf Characters		score		description	Se	ction 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 20 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-	proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a		2°	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 D	escription:				
Tooth spacing	44	99	n/a		Leaf	Attachment n/a Leaf Arrangeme	ntn/a Ie	af Orgar	ization	n/a Leaflet
Number of orders of teeth	45	99	n/a		Orga	nization n/a, Leaflet Attachmentr	1/a, Petio	le Featur	es n/a, F	Position of
Teeth / cm	46		n/a		Blad	e Attachment n/a, Laminar size n/	a, Lamin	ar L:W r	atio n/a,	, Laminar Shapo
sinus shape	47	99	n/a		n/a, N	Aedial Symmetry n/a, Base Symm	netry n/a,	Base Sy	mmetry	-, Lobation
tooth shapes	48		n/a		n/a, M	Margin Type n/a, Special Margin	Features 1	1/a, Ape	x Angle	n/a, Apex
tooth shapes	48				Term	inal Apex Features n/a Surface 7	Fexture n/	a Surfi	vial Glar	e snape -, idsn/a Priman
tooth shapes	48				Vein	Framework n/a, Naked Basal Vei	ns n/a, N	lumber o	of Basal	Veins n/a,
tooth shapes	48				Agro	phic Veins n/a, Major 20 vein fra	mework 1	ı∕a, Intei	ior seco	ndaries n/a,
principal vein	49	99	n/a		Minc	r secondary course n/a, Perimarg	inal veins	n/a, Ma	jor seco	ndary spacing
principal vein termination	50	99	n/a		n/a, V	ariation of secondary angle n/a,	Major sec	ondary:	attachm	ent n/a,
course of accorrection	51	00	n/a		prox n/a I	ntercostal tertiary vein fabric p/a	Angle of	nercurr	uise n/a enttertie	, vem frequenc
course of accessory vein	51	77	n/a		angle	e variability n/a, Epimedial tertiari	ies n/a, ad	medial	course n	/a, exmedial
features of the tooth apex	52	99	n/a		cours Vein Marg n/a, 7	te n/a, Exterior tertiary course n/a Fabric n/a, Areolation n/a, FEV b inal Ultimate venation n/a, Toot četh / cm n/a, sinus shape n/a, to th shapes, principal vein n/a, prin	, Quatern ranching n spacing oth shape cipal veir	ary Veir n/a, FE' n/a, Nui s n/a, to termina	Fabric V termin nber of oth shap tion n/a	n/a, Quinternar nation n/a, orders of teeth es, tooth shape , course of



GA15 HM

DNMH spec. # 48361 DMNH loc. # 500

<u>110</u>	1	amily	:	Genus and Species:
ion 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 20 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- proximal course 34.1 99 n/a
Medial Symmetry	11	99	n/a	2º 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 ⁶ 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
				m m tot
ion III. Teeth				Text Description:
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,
Number of orders of teeth	45	99	n/a	Position of Blade Attachment n/a Laminar size n/a Laminar I W ratio
Teeth / cm	46		n/a	n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base
sinus shape	4/	99	n/a	Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features
tooth shapes	48		n/a	n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape - , Base Angle n/a,
tooth shapes	48			Base shape n/a, Base shape -, Terminal Apex Features n/a, Surface
tooth shapes	48			Basal Veins n/a Number of Basal Veins n/a Agronhic Veins n/a Major
tooth shapes	48	00	,	20 vein framework n/a, Interior secondaries n/a, Minor secondary course
principal vein	49	99	n/a	n/a, Perimarginal veins n/a, Major secondary spacing n/a, Variation of
principal vein termination	50	99	n/a	secondary angle n/a, Major secondary attachment n/a, proximal course n/a,
course of accessory vein	51	99	n/a	intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal
features of the tooth apex	52	99	n/a	tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle
				course n/a, Exterior tertiary course n/a, Ouaternary 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,
				tooth apex n/a
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GA16 HM

DNMH spec. # 48364 DMNH loc. # 500

1/	1	ranniy	•		Genus and Species.
ion 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 20 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- proximal course 34.1 99 n/a
Medial Symmetry	11	99	n/a		2° 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
ction III. Teeth					Text Description:
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a,
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Laminar size n/a, Laminar L: W ratio
sinus shape	47	99	n/a		n/a, Laminar Snape n/a, Mediai Symmetry n/a, Base Symmetry n/a, Base
tooth shapes	48		n/a		n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape - , Base Angle n/a,
tooth shapes	48				Base shape n/a, Base shape - , Terminal Apex Features n/a, Surface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked
tooth shapes	48				Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major
principal vein	49	99	n/a		20 Vein Iramework n/a, Interior secondaries n/a, Minor secondary course n/a Perimarginal veins n/a Major secondary spacing n/a Variation of
principal vein termination	50	99	n/a		secondary angle n/a. Major secondary attachment n/a, proximal course n/a
course of accessory vein	51	99	n/a		intersecondary length n/a, distal course n/a, vein frequency n/a, Intercostal
features of the tooth area	52	00	n/a		tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle
reatures of the tooli apex	52	99	n/a		variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial
					Ouinternary 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 vem termination n/a, course of accessory vein n/a, features of the
					tooth apex n/a.



GA17 HM

DNMH spec. # 46475 DMNH loc. # 3791

<u>**</u>		anniy	•		-	Series and Species.			
on I. Leaf Characters		score		description	Secti	on 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		29	Agrophic Veins	26	99	n/a
Leaflet Attachment	5	99	n/a		2	Major 20 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-	proximal course	34.1	99	n/a
Medial Symmetry	11	99	n/a		2 °	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
ion III. Teeth					Text Desc	ription:			
Tooth spacing	44	99	n/a		Leaf At	tachment n/a, Leaf Arrangemer	nt n/a, Le	af Orgar	nization n/a,
Number of orders of teeth	45	99	n/a		Leaflet	Organization n/a, Leaflet Attac	hment n/	a, Petiol	e Features n/a,
Teeth / cm	46		n/a		Positio	n of Blade Attachment n/a, Lam	inar size	n/a, Lan	ninar L: W ratio
sinus shape	47	99	n/a		n/a, Lar	try - Lobation n/a, Medial Symm	etry n/a, i	Base Sy:	Inmetry n/a, Base
tooth shapes	48		n/a		n/a. Ap	ex Angle n/a. Apex Shape n/a.	Apex Sha	ane - B	ase Angle n/a.
tooth shapes	48				Base sh	ape n/a, Base shape -, Termina	al Apex I	eatures	n/a, Surface
tooth shapes	48				Texture	n/a, Surficial Glands n/a, Prin	nary Vein	Framev	vork n/a, Naked
tooth shapes	48				Basal V	eins n/a, Number of Basal Vei	ns n/a, A	grophic	Veins n/a, Major
principal vein	49	99	n/a		20 Vein	inamework n/a, Interior second	aries n/a	, Minor	secondary course
principal vein termination	50	99	n/a		second	arv angle n/a. Major secondarv	attachme	ntn/a. n	roximal course n/a
course of accessory vain	51	90	n/a		intersed	condary length n/a, distal course	e n/a, veir	freque	ncy n/a, Intercostal
for the set of accessory Velli	52		11/a		tertiary	vein fabric n/a, Angle of percu	rrent terti	aries n/a	a, vein angle
Teatures of the tooth apex	52	99	n/a		variabi course Quinter termina Numbe shapes princip	lity n/a, Epimedial tertiaries n/a n/a, Exterior tertiary course n/a, nary Vein Fabric n/a, Areolatic tion n/a, Marginal Ultimate ver r of orders of teeth n/a, Teeth / n/a, tooth shapes, tooth shapes al vein termination n/a, course of	, admedia , Quatern on n/a, FE nation n/a cm n/a, s , tooth sh of accesso	al course ary Veir V branc , Tooth inus sha apes, p ory vein	e n/a, exmedial h Fabric n/a, hing n/a, FEV spacing n/a, pe n/a, tooth rincipal vein n/a, n/a, features of the



GA18 HM

DNMH spec. # 46481 DMNH loc. # 3791

	score		de contrations	T		-			
	beore		description		<u>Section II. Venation</u>	char.	score		description
1	99	n/a		1°	Primary Vein Framework	23	99	n/a	
2	99	n/a			Naked Basal Veins	24	99	n/a	
3	99	n/a			Number of Basal Veins	25		n/a	
4	99	n/a			Agrophic Veins	26	99	n/a	
5	99	n/a		2°	Major 20 vein framework	27	99	n/a	
6	99	n/a			Interior secondaries	28	99	n/a	
					Minor secondary course	29	99	n/a	
					Perimarginal veins	30	99	n/a	
7	99	n/a			Major secondary spacing	31	99	n/a	
8	99	n/a			Variation of secondary angle	32	99	n/a	
9		n/a			Major secondary attachment	33	99	n/a	
10	99	n/a		Int	er- proximal course	34.1	99	n/a	
11	99	n/a		2 °	intersecondary length	34.2	99	n/a	
12	99	n/a			distal course	34.3	99	n/a	
12		-			vein frequency	34.4	99	n/a	
13	99	n/a		3°	Intercostal tertiary vein fabric	35	99	n/a	
14	99	n/a			Angle of percurrent tertiaries	35.1.2	99	n/a	
15	99	n/a			vein angle variability	36	99	n/a	
16	99	n/a			Epimedial tertiaries	37	99	n/a	
17	99	n/a			admedial course	37.2.1	99	n/a	
17		-			exmedial course	37.2.2	99	n/a	
18	99	n/a			Exterior tertiary course	38	99	n/a	
19	99	n/a		4°	Quaternary Vein Fabric	39	99	n/a	
19		-		5°	Quinternary Vein Fabric	40	99	n/a	
20	99	n/a			Areolation	41	99	n/a	
					FEV branching	42.1	99	n/a	
21	99	n/a			FEV termination	42.2	99	n/a	
22	99	n/a			Marginal Ultimate venation	43	99	n/a	
				Tex	t Description:				
44	99	n/a		L	eaf Attachment n/a, Leaf Arrangemen	nt n/a, Le	af Organ	ization	n/a,
45	99	n/a		L	eaflet Organization n/a, Leaflet Attac	chment n/	a, Petiol	e Featur	es n/a,
46		n/a		P	osition of Blade Attachment n/a, Lam	iinar size	n/a, Lan	nnar L:	W ratio
47	99	n/a		S	mmetry - Lobation n/a Margin Ty	ietry fi/a, i ine n/a Si	Dase Syl	largin E	n/a, Dase
48		n/a		n	a, Apex Angle n/a, Apex Shape n/a.	Apex Sha	ape - , B	ase Ang	le n/a,
48				в	ase shape n/a, Base shape - , Termin	al Apex I	eatures	n/a, Sur	face
48				Т	exture n/a, Surficial Glands n/a, Prin	nary Vein	Framev	vork n/a	, Naked
48				B	asal Veins n/a, Number of Basal Vei	ins n/a, A	grophic Minor	Veins n	/a, Major
49	99	n/a		20	a Perimarginal veinsn/a Major second	ondary en	, withor :	seconda a Varia	ry course
50	99	n/a		se	condarv angle n/a, Major secondarv	attachme	nt n/a. p	roximal	course n/a
51	99	n/a		in	tersecondary length n/a, distal course	e n∕a, veir	1 frequer	ncy n/a,	Intercostal
51		11/a		te	rtiary vein fabric n/a, Angle of percu	rrent terti	aries n/a	, vein a	ngle
52	99	n/a		va	ariability n/a, Epimedial tertiaries n/a	, ad media	al course	n/a, exi	medial
				0	uinternary Vein Fabric n/a Arcolatic	, Quatern	V branc	rabric	n/a, FFV
				te	rmination n/a, Marginal Ultimate ver	nation n/a	, Tooth	spacing	n/a,
				N	umber of orders of teeth n/a, Teeth /	cm n/a, s	inus sha	pe n/a, t	ooth
				sł	apes n/a, tooth shapes, tooth shapes	, tooth sh	apes, pi	rincipal	vein n/a,
				p	rincipal vein termination n/a, course	of access	ory vein	n/a, feat	tures of the
				l te	oth anex n/a				
	1 2 3 4 5 6 7 8 9 10 11 12 12 13 14 15 16 17 17 18 19 20 21 22 24 45 46 47 48 48 48 48 48 48 48 5 5 5 5 5 5 5 5 5 5 5 5 5	1 99 2 99 3 99 4 99 5 99 6 99 7 99 8 99 9 1 10 99 11 99 12 . 13 99 14 99 15 99 16 99 17 . 18 99 19 . 20 99 21 99 22 99 44 99 45 99 46 . 47 99 48 . 49 99 50 99 51 99 52 99	1 99 n/a 2 99 n/a 3 99 n/a 4 99 n/a 5 99 n/a 6 99 n/a 7 99 n/a 8 99 n/a 10 99 n/a 11 99 n/a 12 . - 13 99 n/a 14 99 n/a 15 99 n/a 16 99 n/a 17 . - 18 99 n/a 19 . - 20 99 n/a 21 99 n/a 45 99 n/a 45 99 n/a 45 99 n/a 45 99 n/a 46 . n/a 47 99 n/a 48 . . 49 99 n/	1 99 n/a 2 99 n/a 3 99 n/a 4 99 n/a 5 99 n/a 6 99 n/a 6 99 n/a 7 99 n/a 8 99 n/a 10 99 n/a 11 99 n/a 12 .9 n/a 13 99 n/a 14 99 n/a 15 99 n/a 16 99 n/a 17 . - 18 99 n/a 19 . - 20 99 n/a 21 99 n/a 44 99 n/a 45 99 n/a 46	1 99 $n'a$ 1° 2 99 $n'a$ 1° 3 99 $n'a$ 2° 6 99 $n'a$ 2° 6 99 $n'a$ 2° 7 99 $n'a$ 2° 8 99 $n'a$ 1° 9 9 $n'a$ 1° 10 99 $n'a$ 1° 11 99 $n'a$ 1° 12 . - 3° 13 99 $n'a$ 2° 14 99 $n'a$ 3° 15 99 $n'a$ 1° 16 99 $n'a$ 1° 17 . - 3° 18 99 $n'a$ 4° 19 . - 5° 20 99 $n'a$ 1° 21 99 $n'a$ 1° 44 99 $n'a$ 1° 45 99 $n'a$ 1°	199 n/a 1°Primary Vein Framework299 n/a Naked Basal Veins399 n/a Number of Basal Veins599 n/a 2°699 n/a 1°799 n/a 1°899 n/a 1°9 n/a 1°1099 n/a 1°1199 n/a 1°129 n/a 1°1399 n/a 1°1499 n/a 1°1599 n/a 1°1699 n/a 1°172°1899 n/a 1°199 n/a 1°1699 n/a 1°172°1899 n/a 1°193°199 n/a 3°10-5°2099 n/a 1899 n/a 2199 n/a 2299 n/a 2399 n/a 2499 n/a 2599 n/a 2699 n/a 2799 n/a 28 n/a 29 n/a <tr< td=""><td>199n/a1°Primary Vein Framework23299n/aNaked Basal Veins24399n/aNumber of Basal Veins26599n/a2°Major 20 vein framework27699n/a2°Major secondary course299n/a2°Major secondary course299n/a1099n/a101099n/a1099n/a1199n/a1099n/a12101399n/a10991499n/a101599n/a101699n/a10171899n/a1019171899n/a101910171899n/a191011121314151617181910<td>199n'a1°Primary Vein Framework2399299n'aNaked Basal Veins2499499n'aAgrophic Veins25499n'aAgrophic Veins2699699n'aNumber of Basal Veins2899799n'aNumber of Basal Veins2899899n'aNumber of Basal Veins299999n'a190Najor secondary course299999n'a1901901199n'a1901901199n'a119011199n'a1119011199n'a1111901299n'a1111901399n'a111111499n'a3°11111599n'a1111111699n'a12111117221111195°Quinternary Vein Fabric301199n'a4"Quaternary Vein Fabric401920<t< td=""><td>199$n'a$1"Primary Vein Framework2399$n'a$299$n'a$Naked Basal Veins2499$n'a$499$n'a$Namber of Basal Veins2599$n'a$599$n'a$Agrophic Veins2699$n'a$699$n'a$Interior secondary course2899$n'a$799$n'a$Major secondary spacing3199$n'a$899$n'a$Major secondary spacing3199$n'a$9$n'a$Major secondary attachment3399$n'a$1199$n'a$Proximal course34.199$n'a$12Proximal course34.199$n'a$1399$n'a$Intercostal tertiary vein fabric3599$n'a$1499$n'a$Agle of percurrent tertiaries37.199$n'a$1599$n'a$Agle of percurrent tertiaries37.99$n'a$1699$n'a$Exterior tertiary course3899$n'a$17extendial course37.2.199$n'a$1899$n'a$Felv ternination4229$n'a$19Cuaternary Vein Fabric4099$n'a$19S'Quaternary Vein Fabric4099$n'a$1499$n'a$<</td></t<></td></td></tr<>	199 n/a 1°Primary Vein Framework23299 n/a Naked Basal Veins24399 n/a Number of Basal Veins26599 n/a 2°Major 20 vein framework27699 n/a 2°Major secondary course299 n/a 2°Major secondary course299 n/a 1099 n/a 101099 n/a 1099 n/a 1199 n/a 1099 n/a 12101399 n/a 10991499 n/a 101599 n/a 101699 n/a 10171899 n/a 1019171899 n/a 101910171899 n/a 191011121314151617181910 <td>199n'a1°Primary Vein Framework2399299n'aNaked Basal Veins2499499n'aAgrophic Veins25499n'aAgrophic Veins2699699n'aNumber of Basal Veins2899799n'aNumber of Basal Veins2899899n'aNumber of Basal Veins299999n'a190Najor secondary course299999n'a1901901199n'a1901901199n'a119011199n'a1119011199n'a1111901299n'a1111901399n'a111111499n'a3°11111599n'a1111111699n'a12111117221111195°Quinternary Vein Fabric301199n'a4"Quaternary Vein Fabric401920<t< td=""><td>199$n'a$1"Primary Vein Framework2399$n'a$299$n'a$Naked Basal Veins2499$n'a$499$n'a$Namber of Basal Veins2599$n'a$599$n'a$Agrophic Veins2699$n'a$699$n'a$Interior secondary course2899$n'a$799$n'a$Major secondary spacing3199$n'a$899$n'a$Major secondary spacing3199$n'a$9$n'a$Major secondary attachment3399$n'a$1199$n'a$Proximal course34.199$n'a$12Proximal course34.199$n'a$1399$n'a$Intercostal tertiary vein fabric3599$n'a$1499$n'a$Agle of percurrent tertiaries37.199$n'a$1599$n'a$Agle of percurrent tertiaries37.99$n'a$1699$n'a$Exterior tertiary course3899$n'a$17extendial course37.2.199$n'a$1899$n'a$Felv ternination4229$n'a$19Cuaternary Vein Fabric4099$n'a$19S'Quaternary Vein Fabric4099$n'a$1499$n'a$<</td></t<></td>	199n'a1°Primary Vein Framework2399299n'aNaked Basal Veins2499499n'aAgrophic Veins25499n'aAgrophic Veins2699699n'aNumber of Basal Veins2899799n'aNumber of Basal Veins2899899n'aNumber of Basal Veins299999n'a190Najor secondary course299999n'a1901901199n'a1901901199n'a119011199n'a1119011199n'a1111901299n'a1111901399n'a111111499n'a3°11111599n'a1111111699n'a12111117221111195°Quinternary Vein Fabric301199n'a4"Quaternary Vein Fabric401920 <t< td=""><td>199$n'a$1"Primary Vein Framework2399$n'a$299$n'a$Naked Basal Veins2499$n'a$499$n'a$Namber of Basal Veins2599$n'a$599$n'a$Agrophic Veins2699$n'a$699$n'a$Interior secondary course2899$n'a$799$n'a$Major secondary spacing3199$n'a$899$n'a$Major secondary spacing3199$n'a$9$n'a$Major secondary attachment3399$n'a$1199$n'a$Proximal course34.199$n'a$12Proximal course34.199$n'a$1399$n'a$Intercostal tertiary vein fabric3599$n'a$1499$n'a$Agle of percurrent tertiaries37.199$n'a$1599$n'a$Agle of percurrent tertiaries37.99$n'a$1699$n'a$Exterior tertiary course3899$n'a$17extendial course37.2.199$n'a$1899$n'a$Felv ternination4229$n'a$19Cuaternary Vein Fabric4099$n'a$19S'Quaternary Vein Fabric4099$n'a$1499$n'a$<</td></t<>	199 $n'a$ 1"Primary Vein Framework2399 $n'a$ 299 $n'a$ Naked Basal Veins2499 $n'a$ 499 $n'a$ Namber of Basal Veins2599 $n'a$ 599 $n'a$ Agrophic Veins2699 $n'a$ 699 $n'a$ Interior secondary course2899 $n'a$ 799 $n'a$ Major secondary spacing3199 $n'a$ 899 $n'a$ Major secondary spacing3199 $n'a$ 9 $n'a$ Major secondary attachment3399 $n'a$ 1199 $n'a$ Proximal course34.199 $n'a$ 12Proximal course34.199 $n'a$ 1399 $n'a$ Intercostal tertiary vein fabric3599 $n'a$ 1499 $n'a$ Agle of percurrent tertiaries37.199 $n'a$ 1599 $n'a$ Agle of percurrent tertiaries37.99 $n'a$ 1699 $n'a$ Exterior tertiary course3899 $n'a$ 17extendial course37.2.199 $n'a$ 1899 $n'a$ Felv ternination4229 $n'a$ 19Cuaternary Vein Fabric4099 $n'a$ 19S'Quaternary Vein Fabric4099 $n'a$ 1499 $n'a$ <



GA19 HM

DNMH spec. # 48369 DMNH loc. # 500

<u>GA20</u>		Family	: Nelumbonac	cea	e Genus and Species:		Paleon	elumbo 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 20 vein framework	27	88	not visible
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	88	not visible
Position of Blade Attachment	7	7.2	peltate central		Major secondary spacing	31	88	not visible
Laminar size	8	8.5	mesophyll		Variation of secondary angle	32	88	not visible
Laminar L:W ratio	9				Major secondary attachment	33	33.4	deflected
Laminar Shape	10	88	not visible		Inter- proximal course	34.1	88	not visible
Medial Symmetry	11	88	not visible		2° 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	35.2.2	regular reticulate
Margin Type	14	88	#N/A		Angle of percurrent tertiaries	35.1.2	99	n/a
Special Margin Features	15	88	not visible		vein angle variability	36	99	n/a
Apex Angle	16	99	n/a		Epimedial tertiaries	37	37.1.1.2	alternate percurrent
Apex Shape	17	99	n/a		admedial course	37.2.1	37.2.1.3	perpendicular to midvein
Apex Shape	17		-		exmedial course	37.2.2	37.2.2.1	parallel to intercostal tertiai
Base Angle	18	18.4	circular		Exterior tertiary course	38	88	not visible
Base shape	19	99	n/a	4	Quaternary Vein Fabric	39	39.1.2	alternate percurrent
Base shape	19		-	5	Quinternary Vein Fabric	40	88	not visible
Terminal Apex Features	20	99	n/a		Areolation	41	41.2.3	good development
					FEV branching	42.1	42.1.1	absent
Surface Texture	21	88	not visible		FEV termination	42.2	99	n/a
Surficial Glands	22	88	not visible		Marginal Ultimate venation	43	88	not visible
Section III. Teeth				Т	ext Description:			
Tooth spacing	44	88	not visible		Leaf Attachment not visible, Leaf Arrange	ment not v	isible, Lea	f Organization simple,
Number of orders of teeth	45	88	not visible		Leaflet Attachment n/a, Leaflet Organizati	on not visi	ble, Petiole	Features not visible,
Teeth / cm	46		not visible		ratio. Laminar Shape not visible. Medial S	ai, Lamina vmmetrv r	r size mes not visible.	Base Symmetry not
sinus shape	47	88	not visible		visible, Base Symmetry - , Lobation unlobe	ed, Specia	l Margin F	eatures not visible,
tooth shapes	48		not visible		Apex Angle n/a, Apex Shape n/a, Apex Sh	ape - , Ba	se Angle c	ircular, Base shape
tooth shapes	48		not visible		Glands not visible, Primary Vein Framewo	rk palmat	e, Naked I	Basal Veins n/a,
tooth shapes	48				Number of Basal Veins 3, Agrophic Veins	n/a, Majo	r 20 vein fi	ramework not visible,
tooth shapes	48				Interior secondaries absent, Minor seconda not visible. Major secondary spacing not vi	ry course	not visible	, Perimarginal veins
principal vein	49	88	not visible		visible, Major secondary attachment deflec	ted, proxi	nal course	not visible,
principal vein termination	50	88	not visible		intersecondary length not visible, distal cou	irse not vi	sible, vein	frequency not visible,
course of accessory yein	51	88	not visible		vein angle variability n/a Enimedial tertiar	ulate, Ang ies alterna	te of percura	irrent tertiaries n/a,
for the set of the to show the	52	00	not visible		perpendicular to midvein, exmedial course	parallel to	intercosta	l tertiary, Exterior
reatures of the toolir apex	52	00			tertiary course not visible, Quaternary Veir Vein Fabric not visible, Areolation good de termination n/a, Marginal Ultimate venation Number of orders of teeth not visible, Teet tooth shapes not visible, tooth shapes not vi principal vein not visible, principal vein ter vein not visible, features of the tooth apex not	n Fabric al evelopmen n not visib h / cm not sible, tootl mination r not visible	ternate per t, FEV bra le, Tooth s visible, sir h shapes, y not visible,	eurent, Quintemary neching absart, FEV pacing not visible, uus shape not visible, loodh shapes, course of accessory



GA20 HM

DNMH spec. # 46477 DMNH loc. # 3793

<u>GA21</u>		Family	Moraceae?	Genus and Species: "Artocarpus" lessigiana
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 88 not visible
Leaf Organization	3	88	not visible	Number of Basal Veins 25 not visible
Leaflet Organization	4	88	not visible	Agrophic Veins 26 88 not visible
Leaflet Attachment	5	99	n/a	2º Major 20 vein framework 27 88 not visible
Petiole Features	6	88	not visible	Interior secondaries 28 88 not visible
				Minor secondary course 29 88 not visible
Features of the Blade:				Perimarginal veins 30 88 not visible
Position of Blade Attachment	7	88	not visible	Major secondary spacing 31 88 not visible
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 33.4 deflected
Laminar Shape	10	99	n/a	Inter- proximal course 34.1 88 not visible
Medial Symmetry	11	88	not visible	2 ° 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	13.2.1	palmately lobed	Intercostal tertiary vein fabric 35 88 not visible
Margin Type	14	88	#N/A	Angle of percurrent tertiaries 35.1.2 88 not visible
Special Margin Features	15	88	not visible	vem angle variability $36 99 n/a$
Apex Angle	16	88	not visible	Epimedial tertiaries 3/ 88 not visible
Apex Snape	17	88	not visible	admedial course 37.2.1 88 not visible
Apex Snape	1/		-	Extension text is a second sec
Base Angle	18	88	not visible	4° Oustanary Vair Echnic 20 88 not visible
Base shape	19	00	not visible	5° Quaternary Vein Fabric 40 88 not visible
Terminal A pay Features	20		not visible	Areolation 41 88 not visible
Terminar Apex Teatures	20	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
ection III. Teeth				Text Description:
Tooth spacing	44	88	not visible	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not
Number of orders of teeth	45_	88	not visible	visible, Leaflet Organization not visible, Leaflet Attachment n/a, Petiole Features not visible Position of Blade Attachment not visible Laminar size mesonbull Laminar
Teeth / cm	46		not visible	L:W ratio not visible, Laminar Shape n/a, Medial Symmetry not visible, Base
sinus shape	47	88	not visible	Symmetry not visible, Base Symmetry -, Lobation palmately lobed, Special Margin
tooth shapes	48		not visible	Base Angle not visible, Base shape not visible, Base shape -, Terminal Apex
tooth shapes	48		not visible	Features not visible, Surface Texture not visible, Surficial Glands not visible, Primary
tooth shapes	48			Vein Framework palmate, Naked Basal Veins not visible, Number of Basal Veins not
tooth shapes	48			secondaries not visible, Minor secondary course not visible, Perimarginal veins not
principal vein	49	88	not visible	visible, Major secondary spacing not visible, Variation of secondary angle not visible,
principal vein termination	50	88	not visible	length not visible, distal course not visible, vein frequency not visible, Intercostal
course of accessory vein	51	88	not visible	tertiary vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle
features of the tooth apex	52	88	not visible	variability n/a, Epimedial tertiaries not visible, admedial course not visible, exmedial
				visible, Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible, FEV termination not visible, Marginal Ultimate venation on tvisible, Tooth spacing not visible, Number of orders of teeth not visible, Teeth / em not visible, sinus shape not visible, tooth shapes not visible, tooth shapes not visible, tooth shapes, tooth shapes, principal vein not visible, tooth approximation of visible, course of accessory vein not visible, features of the tooth apex not visible.



GA21 HM

DNMH spec. # 46483 DMNH loc. # 3791

A22		ramily	:		Genus and Species				
ction I. Leaf Characters		score		description	Section II. Venation	char.	score		description
Leaf Attachment	1	99	n/a		 Primary Vein Framewor 	k 23	99	n/a	
Leaf Arrangement	2	99	n/a		Naked Basal Veir	s 24	99	n/a	
Leaf Organization	3	99	n/a		Number of Basal Veir	s 25		n/a	
Leaflet Organization	4	99	n/a		Agrophic Veir	s 26	99	n/a	
Leaflet Attachment	5	99	n/a		2º Major 20 vein framewor	k 27	99	n/a	
Petiole Features	6	99	n/a		Interior secondarie	s 28	99	n/a	
					Minor secondary cours	e 29	99	n/a	
Features of the Blade:					Perimarginal veir	s 30	99	n/a	
Position of Blade Attachment	7	99	n/a		Major secondary spacin	g 31	99	n/a	
Laminar size	8	99	n/a		Variation of secondary angle	e 32	99	n/a	
Laminar L:W ratio	9		n/a		Major secondary attachmen	t 33	99	n/a	
Laminar Shape	10	99	n/a		Inter- proximal cours	e 34.1	99	n/a	
Medial Symmetry	11	99	n/a		2º intersecondary lengt	h 34.2	99	n/a	
Base Symmetry	12	99	n/a		distal cours	e 34.3	99	n/a	
Base Symmetry	12		-		vein frequenc	y 34.4	99	n/a	
Lobation	13	99	n/a		3° Intercostal tertiary vein fabri	c 35	99	n/a	
Margin Type	14	99	n/a		Angle of percurrent tertiarie	s 35.1.2	99	n/a	
Special Margin Features	15	99	n/a		vein angle variabilit	y 36	99	n/a	
Apex Angle	16	99	n/a		Epimedial tertiarie	s 37	99	n/a	
Apex Shape	17	99	n/a		admedial cours	e 37.2.1	99	n/a	
Apex Shape	17		-		exmedial cours	e 37.2.2	99	n/a	
Base Angle	18	99	n/a		Exterior tertiary cours	e 38	99	n/a	
Base shape	19	99	n/a		4 ^o Quaternary Vein Fabri	c 39	99	n/a	
Base shape	19		-		5° Quinternary Vein Fabri	c 40	99	n/a	
Terminal Apex Features	20	99	n/a		Areolatio	n 41	99	n/a	
					FEV branchin	g 42.1	99	n/a	
Surface Texture	21	99	n/a		FEV terminatio	n 42.2	99	n/a	
Surficial Glands	22	99	n/a		Marginal Ultimate venatio	n 43	99	n/a	
ction III. Teeth					Text Description:				
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangen	ient n/a, Le	af Orgar	izatio	on n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Att	achmentn	a, Petiol	e Feat	tures n/a,
Teeth / cm	46		n/a		Position of Blade Attachment n/a, L	iminar size	n/a, Lan	ninar	L:W ratio
sinus shape	47	99	n/a		Symmetry - Lobation n/a Margin	metry n/a, Type n/a S	Base Sy	mmet Iarain	Features
tooth shapes	48		n/a		n/a, Apex Angle n/a, Apex Shape n/	a. Apex Sh	ape - B	ase A	ngle n/a.
tooth shapes	48				Base shape n/a, Base shape -, Term	nal Apex	Features	n/a, S	urface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Pr	imary Vei1	n Framev	vork n	/a, Naked
tooth shapes	48				Basal Veins n/a, Number of Basal V	'eins n/a, A	grophic	Veins	n/a, Majo
principal vein	49	99	n/a		20 Vein framework n/a, Interior seco	ndaries n/a	, Minor	secon	ary course
principal vein termination	50	99	n/a		secondary angle n/a Major secondar	v attachme	ntn/a n	a, vai rovim	al course n
course of accessory usin	51	00	n/2		intersecondary length n/a, distal cou	se n/a, vei	n freque	ncy n/	a, Intercost
	51	<i>,,,</i>	ju a		tertiary vein fabric n/a, Angle of per	current tert	iaries n/a	ı, vein	angle
features of the tooth apex	52	99	n/a		variability n/a, Epimedial tertiaries r	/a, admedi	al course	n/a, e	xmedial
					Ouinternery Vain Fabria n/a Araola	a, Quaterr	ary ven Whrong	i Fabr	ic n/a,
					termination n/a. Marginal Ultimate	enation n/	. Tooth	space	ng n/a
					Number of orders of teeth n/a, Teeth	/ cm n/a, s	inus sha	pe n/a	, tooth
					shapes n/a, tooth shapes, tooth shap principal vein termination n/a, cours tooth apex n/a.	es , tooth si e of access	hapes, p ory vein	rincip n/a, fo	al vein n/a eatures of t
Roots									
ROOIS.									


GA22 HM

DNMH spec. # 46777 DMNH loc. # 3796

<u>GA23</u>	1	Family	: Platanaceae		Genus and Species:		Platan	ites marginata
Section I. Leaf Characters		score	description		Section II. Venation	char.	score	description
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.2.2	palinactinodromous
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.1	absent
Leaf Organization	3	3.2	compound		Number of Basal Veins	25		3
Leaflet Organization	4	99	n/a		Agrophic Veins	26	26.2.2	compound
Leaflet Attachment	5	88	not visible	2°	Major 20 vein framework	27	27.1.1	craspedodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.2	present
					Minor secondary course	29	29.3	semicraspedodromous
Features of the Blade:	_				Perimarginal veins	30	0	absent
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	31.2	irregular
Laminar size	8	8.5	mesophyll		Variation of secondary angle	32	32.1	uniform
Laminar L:W ratio	9	88	not visible	·····	Major secondary attachment	33	33.4	deflected
Laminar Shape	10	10.3	ovate	Inte	er- proximal course	34.1	34.1.1	parallel to major secondaries
Medial Symmetry	11	11.1	symmetrical	20	intersecondary length	34.2	34.2.1	<50% of subjacent secondary
Base Symmetry	12	12.1	symmetrical		distal course	34.3	34.3.2	secondary
Base Symmetry	12		-		vein frequency	34.4	34.1.1	parallel to major secondaries
Lobation	13	13.2.1	palmately lobed	3°	ntercostal tertiary vein fabric	35	35.1.1.1.4	chevroned opposite percurrent
Margin Type	14	14.2.2	serrate		Angle of percurrent tertiaries	35.1.2	35.1.2.2	obtuse
Special Margin Features	15	88	not visible		vein angle variability	36	36.3	increasing exmedially
Apex Angle	16	16.1	acute		Epimedial tertiaries	37	37.1.1.1	opposite percurrent
Apex Shape	17	17.1	straight		admedial course	37.2.1	37.2.1.2	parallel to intercostal tertiary
Apex Shape	17		-		exmedial course	37.2.2	37.2.2.2	basiflexed
Base Angle	18	18.2	obtuse		Exterior tertiary course	38	88	not visible
Base shape	19	19.1.3	convex	4 °	Quaternary Vein Fabric	39	88	not visible
Base shape	19		-	5°	Quinternary Vein Fabric	40	88	not visible
Terminal Apex Features	20	0	absent		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				Te	xt Description:			
Tooth spacing	44	88	not visible	L	eaf Attachment not visible, Lea	af Arran	gement not	visible, Leaf Organization
Number of orders of teeth	45	45.1	one	C E	ompound, Leaflet Organization	n n/a, Lea Plada At	flet Attacl	nment not visible, Petiole
Teeth / cm	46		not visible	n	nesophyll, Laminar L:W ratio 1	, Lamina	r Shape or	vate, Medial Symmetry
sinus shape	47	47.2	rounded	s	ymmetrical, Base Symmetry syi	mmetrica	ıl, Base Sy	mmetry -, Lobation
tooth shapes	48		cv/cc	p A	almately lobed, Margin Type se	errate, Sj ht Apex	Shape -	gin Features not visible, Apex Base Angle obtuse Base
tooth shapes	48			s	hape convex, Base shape -, Te	erminal A	Apex Featu	res absent, Surface Texture
tooth shapes	48			n	ot visible, Surficial Glands not	visible, F	rimary Ve	in Framework
tooth shapes	48			P A	grophic Veins compound. Mai	or 20 vei	in framew	ork craspedodromous. Interior
principal vein	49	49.1	present on proximal flank of	s P	econdaries present, Minor seco erimarginal veins absent, Majo	ndary co r second	urse semic ary spacin	raspedodromous, g irregular, Variation of
principal vein termination	50	50.2.4	tooth	S	econdary angle uniform, Major arallel to major secondaries in	seconda	ry attachn daw length	tent deflected, proximal course
course of accessory vein	51	88	not visible	P S	econdary, distal course parallel	to subja	cent major	secondary, vein frequency
features of the tooth apex	52	88	not visible	p e iii v A o c v f	arallel to major secondaries, In ercurrent, Angle of percurrent xmedially, Epimedial tertiaries ttercostal tertiary, exmedial co isible, Quaternary Vein Fabric treolation not visible, FEV bran farginal Ultimate venation not rders of teeth one , Teeth / cm v/cc, tooth shapes, tooth shape ein termination on proximal fla eatures of the tooth apex not vis	tercostal tertiaries opposite urse basi not visib ching no visible, T not visib s, tooth nk of too sible,	tertiary ve obtuse, ve percurren flexed, Ex le, Quinten tvisible, F ooth spaci ole, sinus sl shapes, pr tth, course	in fabric chevroned opposite in angle variability increasing t, admedia course parallel to terior tettiary course not "mary Vein Fabric not visible, ng not visible, Number of Pue rounded, tooth shapes incipal vein present, principal of accessory vein not visible,



GA23 HM

DNMH spec. # 46480 DMNH loc. # 3793

<u>GA24</u>	I	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	23.1	pinnate
Leaf Arrangement	2	88	not visible	Naked Basal Veins	24	0	absent
Leaf Organization	3	88	not visible	Number of Basal Veins	25		3
Leaflet Organization	4	88	not visible	Agrophic Veins	26	26.2.1	simple
Leaflet Attachment	5	88	not visible	2° Major 20 vein framework	27	27.1.2	semicraspedodromous
Petiole Features	6	88	not visible	Interior secondaries	28	28.1	absent
				Minor secondary course	29	29.3	semicraspedodromous
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
Laminar size	8	8.5	mesophyll	Variation of secondary angle	32	32.1	uniform
Laminar L:W ratio	9		5:3	Major secondary attachment	33	33.2	basally decurrent
Laminar Shape	10	10.4	oblong	proximal course	34.1	88	not visible
Medial Symmetry	11	11.1	symmetrical	2° 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	35.1.1.1.3	sinuous opposite percurrent
Margin Type	14	14.2.2	serrate	Angle of percurrent tertiaries	35.1.2	35.1.2.3	perpendicular
Special Margin Features	15	99	n/a	vein angle variability	36	36.2	consistent
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	18.2	obtuse	Exterior tertiary course	38	38.3	terminating at the margin
Base shape	19	1914	concavo-convex	4° Quaternary Vein Fabric	39	88	not visible
Base shape	19	19.1.1	-	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
				8			
Section III. Teeth				Text Description:			
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible. Leaf Arrange	ement not	visible. Le	af Organization not
Number of orders of teeth	45	45.1	one	visible, Leaflet Organization not visible, I	eaflet Att	achment n	ot visible, Petiole
Teeth / cm	46		2	Features not visible, Position of Blade At	tachment	marginal, I	aminar size mesophyll,
sinus shape	47	47.2	rounded	Laminar L:W ratio 5:3, Laminar Shape ob	ong, Med	ial Symmet	ry symmetrical, Base
tooth shapes	48		st/st	Special Margin Features n/a, Apex Angle	not visibl	e. Apex Sha	ape not visible. Apex
tooth shapes	48		st/cv	Shape -, Base Angle obtuse, Base shape	concavo-c	onvex, Bas	e shape -, Terminal
tooth shapes	48		cv/cv	Apex Features not visible, Surface Textur	e not visil	ole, Surficia	l Glands not visible,
tooth shapes	48			Primary Vein Framework pinnate, Naked	Basal Vei	ns absent,	Number of Basal Veins
principal vein	49	49.1	present	3, Agrophic Veins simple, Major 20 Vein secondaries absent. Minor secondary co	ramewori Irse semic	c semicrasp raspedodro	edodromous, Interior
principal vein termination	50	88	not visible	veins absent, Major secondary spacing d	ecreasing	proximally,	Variation of secondary
course of accessory voin	51	00	not visible	angle uniform, Major secondary attachm	ent basall	y decurren	t, proximal course not
course of accessory veni	51	00	not visible	visible, intersecondary length not visible	, distal cou	urse not vis	sible, vein frequency not
features of the tooth apex	52	88	not visible	visible, intercostal tertiary vein labric sin	angle var	iability con	rent, Angle of
				tertiaries not visible, admedial course no	t visible, e	exmedial co	ourse not visible,
				Exterior tertiary course terminating at the	ne margin,	Quaternar	y Vein Fabric not visible,
				Quinternary Vein Fabric not visible, Areo	lation not	visible, FE	V branching not visible,
				FEV termination not visible, Marginal Ul	Tooth /	ation not v	isible, looth spacing
				shapes st/st, tooth shapes st/cv, tooth sh	apes cv/c	. tooth sha	apes , principal vein
				present, principal vein termination not v	isible, cou	rse of acces	sory vein not visible,



GA24 HM

DNMH spec. # 23765 DMNH loc. # 412

<u>GA25</u>		Family	:	Genus and Species:	
Section I. Leaf Characters		score	description	Section II. Venation char. score descri	ption
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 26.2.1 simple	
Leaflet Attachment	5	88	not visible	2º Major 20 vein framework 27 27.1.2 semicraspedo	dromous
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	7.1	marginal	Major secondary spacing 31 31.1 regular	
Laminar size	8	8.3	microphyll	Variation of secondary angle 32 32.1 uniform	
Laminar L:W ratio	9		5:2	Major secondary attachment 33 88 not visible	
Laminar Shape	10	10.3	ovate	Inter- proximal course 34.1 88 not visible	
Medial Symmetry	11	11.1	symmetrical	2° intersecondary length 34.2 88 not visible	
			basal insertion		
Base Symmetry	12	12.2.3	asymmetrical	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	14.2.2	serrate	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	16.1	acute	Epimedial tertiaries 37 88 not visible	
Apex Shape	17	17.1	straight	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	19.1.1	straight	4° Ouaternary Vein Fabric 39 88 not visible	
Base shape	19		-	5° Ouinternary 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	
				6	
ection III. Teeth				Text Description:	
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf	
Number of orders of teeth	45	45.1	one	Organization not visible, Leaflet Organization not visible, Leaflet	
Teeth / cm	46		2	Attachment not visible, Petiole Features not visible, Position of Blade	
sinus shape	47	47.2	rounded	Attachment marginal, Laminar size microphyll, Laminar L: W ratio 5:2	basal
tooth shapes	48		cc/st	insertion asymmetrical. Base Symmetry - Lobation unlobed. Margin	Type
tooth shapes	48		st/st	serrate, Special Margin Features not visible, Apex Angle acute, Apex	Shape
tooth shapes	48		cc/cv	straight, Apex Shape -, Base Angle acute, Base shape straight, Base s	hape
tooth shapes	48			-, Terminal Apex Features not visible, Surface Texture not visible, Su	ficial
principal vein	49	49.1	present	Glands not visible, Primary Vein Framework pinnate, Naked Basal Ve	ins
principal vein termination	50	50.2.1	at apex of tooth	framework semicraspedodromous Interior secondaries absent Minor	111
course of concern vair	51	00	not visible	secondary course not visible. Perimarginal veins absent, Major second	arv
course of accessory veni	51	00	not visible	spacing regular, Variation of secondary angle uniform, Major seconda	ŗy
features of the tooth apex	52	88	not visible	attachment not visible, proximal course not visible, intersecondary len	gth
				not visible, distal course not visible, vein frequency not visible, Interco	stal
				angle variability not visible. Enimedial tertiaries not visible admedial	, vem
				not visible exmedial course not visible. Exterior tertiary course not vi	able
				Ouaternary Vein Fabric not visible. Ouinternary Vein Fabric not visible	e.
				Areolation not visible, FEV branching not visible, FEV termination not	t
				visible, Marginal Ultimate venation not visible, Tooth spacing irregula	r,
				Number of orders of teeth one, Teeth / cm 2, sinus shape rounded, to	oth
				shapes cc/st, tooth shapes st/st, tooth shapes cc/cv, tooth shapes, princ	ıpal
				vein present, principal vein termination at apex of tooth, course of acc	ssory



GA25 HM

DNMH spec. # DMNH loc. # 500

<u>GA26</u>]	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	23.1	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	26.2.1	simple
Leaflet Attachment	5	88	not visible	2º Major 20 vein framework	27	27.1.2	semicraspedodromous
Petiole Features	6	88	not visible	Interior secondaries	28	28.1	absent
				Minor secondary course	29	29.3	semicraspedodromous
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	8.3	microphyll	Variation of secondary angle	32	32.1	uniform
Laminar L:W ratio	9		2:1	Major secondary attachment	33	33.3	excurrent
Laminar Shape	10	10.3	ovate	Inter- proximal course	34.1.2	0	absent
Medial Symmetry	11	11.1	symmetrical	2º intersecondary length	34.2	34.2.2	>50% of subjacent secondar
Base Symmetry	12	88	not visible	distal course	34.3	88	not visible
Base Symmetry	12		-	vein frequency	34.4	34.4.2	~ 1 per intercostal area
Lobation	13	13.1	unlobed	3º Intercostal tertiary vein fabric	35	35.1.1.1.3	sinuous opposite percurrent
Margin Type	14	14.2.2	serrate	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	16.1	acute	Epimedial tertiaries	37	88	not visible
Apex Shape	17	17.1	straight	admedial course	37.2.1	88	not visible
Apex Shape	17		-	exmedial course	37.2.2	88	not visible
Base Angle	18	88	not visible	Exterior tertiary course	38	38.3	terminating at the margin
Base shape	19	88	not visible	4° Quaternary Vein Fabric	39	39.2.1	regular reticulate
Base shape	19		-	5° Quinternary Vein Fabric	40	40.1.2	irregular reticulate
Terminal Apex Features	20	88	not visible	Areolation	41	41.2.2	moderate development
				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	44.2	irregular	Leaf Attachment not visible, Lea	f Arrange	ment not vi	sible, Leaf Organization not
Number of orders of teeth	45	45.1	one	visible, Leaflet Organization no	visible, L	eaflet Attao	chment not visible, Petiole
Teeth / cm	46		3	Features not visible, Position of	Blade Atta	chment not ar Shape or	visible, Laminar size
sinus shape	47	47.1	angular	symmetrical, Base Symmetry no	t visible, B	ase Symme	try -, Lobation unlobed,
tooth shapes	48		st/st	Margin Type serrate, Special M	argin Featu	ures not visi	ble, Apex Angle acute,
tooth shapes	48		st/cv	Apex Shape straight, Apex Shap	e - , Base Apex Fea	Angle not	visible, Base shape not sible. Surface Texture not
tooth shapes	48		cv/cv	visible, Surficial Glands not visib	le, Primar	y Vein Fra	mework pinnate, Naked
tooth shapes	48		rt/rt	Basal Veins not visible, Number	of Basal	Veins 1, Ag	grophic Veins simple,
principal vein	49	49.1	present	Major 20 vein framework semic	raspedodro	omous, Inte	rior secondanes absent, parginal veins absent Major
principal vein termination	50	50.2.1	at apex of tooth	secondary spacing irregular, Va	iation of s	econdary a	ngle uniform, Major
	51	51.1.1	lasered	secondary attachment excurrent	proximal	course abso	ent, intersecondary length
course of accessory vein	51	31.1.1	looped	>50% of subjacent secondary, d intercostal area. Intercostal terti	stal cours	e not visible	s opposite percurrent Angle
reatures of the tool apex	52	00	notvisiole	of percurrent tertiaries obtuse, v tertiaries not visible, admedial c Exterior tertiary course termina reticulate, Quinternary Vein Fal development, FEV branching ne Ultimate venation not visible, Tc one, Teeth / cm 3, sinus shape: tooth shapes cv/cv, tooth shapes termination at apex of tooth, cou tooth apex not visible.	in angle v ourse not v ing at the : rric irregul t visible, F oth spacin ingular, to rt/rt, princ rse of acc	variability c visible, exm margin, Qu lar reticulata EV termina g irregular oth shapes ipal vein pi essory vein	onsistent, Épimedial edial course not visible, aternary Vein Fabric regular e, Areolation moderate ation not visible, Marginal Number of orders of teeth st/st, tooth shapes st/cv, resent, principal vein looped, features of the



GA26 HM

DNMH spec. # 23778 DMNH loc. # 412

<u>GA27</u>		Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	Sec	ction II. Venation	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 festooned
Leaflet Attachment	5	88	not visible	2°	Major 20 vein framework	27	27.1.3	semicraspedodromous
Petiole Features	6	88	not visible		Interior secondaries	28	88	not visible
					Minor secondary course	29	29.1	craspedodromous
Features of the Blade:					Perimarginal veins	30	0	absent
Position of Blade Attachment	7	88	not visible		Major secondary spacing	31	88	not visible
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	88	not visible
Laminar L:W ratio	9		not visiible		Major secondary attachment	33	33.3	excurrent
Laminar Shape	10	88	not visible	Inter-	proximal course	34.1	88	not visible
Medial Symmetry	11	88	not visible	2 °	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	35.1.1.1.3	sinuous opposite percurren
Margin Type	14	14.2.2	serrate		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	37.2.1.3	perpendicular to midvein
Apex Shape	17		-		exmedial course	37.2.2	37.2.2.2	basiflexed
Base Angle	18	88	not visible		Exterior tertiary course	38	38.2	looped
Base shape	19	88	not visible	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
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 I	Description:			
Tooth spacing	44	44.2	irregular	Leat	f Attachment not visible, Leaf Ar	rangemen	t not visible	, Leaf Organization not
Number of orders of teeth	45	45.1	one	visib	le, Leaflet Organization not visib	le, Leafle	t Attachme	nt not visible, Petiole
Teeth / cm	46		3	Lam	inar L:W ratio not visible. Lami	Attaenm	ent not visi not visible	. Medial Symmetry not
sinus shape	47	47.1	angular	visib	le, Base Symmetry not visible, Ba	ise Symm	etry - , Lo	bation unlobed, Margin
tooth shapes	48		cc/cv	Type	e serrate, Special Margin Feature	s not visib	le, Apex A	ngle not visible, Apex
tooth shapes	48		st/cv	Base	e shape -, Terminal Apex Featur	es not visi	ible, Surfac	e Texture not visible,
tooth shapes	48		st/st	Surf	icial Glands not visible, Primary V	/ein Fran	nework pin	nate, Naked Basal Veins
tooth shapes	48			not v fram	visible, Number of Basal Veins I,	Agrophic pmous Ir	c Veins cor iterior seco	npound, Major 20 vein ndaries not visible Minor
principal vein	49	49.1	present	seco	ndary course craspedodromous, I	erimargi	nal veins al	sent, Major secondary
principal vein termination	50	88	not visible	spac	ing not visible, Variation of secon	ndary ang	le not visib	le, Major secondary
course of accessory vein	51	88	not visible	dista	l course not visible, vein frequen	e not visit cy not vis	ible, Intersec	ostal tertiary vein fabric
features of the tooth apex	52	88	not visible	sinue	ous opposite percurrent, Angle of	percurre	nt tertiaries	obtuse, vein angle
·				to m Veir visib vena cm 3 tooth acce	ability not visible, Epithedial tertua idvein, extredial course basiflexe n Fabric opposite percurrent, Quin le, FEV branching not visible, FE tion not visible, Tooth spaceing irr 8, sinus shape angular, tooth shape 1 shapes, principal vein present, 1 essory vein not visible, features of	the soft v d, Externing v termina egular, N es cc/cv, t principal f the tooth	vein tertiary vein Fabric ation not via umber of c tooth shape vein termin apex not v	course looped, Quatemary not visible, Areolation not sible, Marginal Ultimate orders of teeth one , Teeth / s st/cv, tooth shapes st/st, ation not visible, course of isible.

$\ensuremath{\mathbb{C}}$ Manual of Leaf Architecture



GA27 HM

DNMH spec. # 23777 DMNH loc. # 412

<u>GA28</u>	j	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	2	Section II. Venation	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 20 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
Laminar size	8_	8.4	notophyll		Variation of secondary angle	32	32.4	proximally
Laminar L:W ratio	9		2:1		Major secondary attachment	33	33.4	deflected
Laminar Shape	10	10.4	oblong	Inter	proximal course	34.1	88	not visible
Medial Symmetry	11	11.1	symmetrical	2 °	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	88	not visible
Margin Type	14	14.2.2	serrate		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	18.2	obtuse		Exterior tertiary course	38	88	not visible
Base shape	19	88	not visible	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
ection III. Teeth				Text l	Description:			
Tooth spacing	44	44.2	irregular	Lea	f Attachment not visible, Leaf Arrangen	nent not vi	sible, Lea	f Organization not
Number of orders of teeth	45	45.1	one	visib	le, Leaflet Organization not visible, Le	aflet Attac	hment no	t visible, Petiole
Teeth / cm	46		3	Lan	ures not visible, Position of Blade Attac inar L:W ratio 2:1. Laminar Shape oble	nment ma	rginal, La I Symmet	minar size notopnyll, try symmetrical. Base
sinus shape	47	47.2	rounded	Sym	metry symmetrical, Base Symmetry - ,	Lobation u	inlobed, 1	Margin Type serrate,
tooth shapes	48		st/st	Spec	cial Margin Features not visible, Apex A	Angle not v	visible, Ap	bex Shape not visible,
tooth shapes	48		c c/st	Ape	x Features not visible, Surface Texture	not visible	, Surficial	l Glands not visible,
tooth shapes	48			Prin	ary Vein Framework pinnate, Naked E	Basal Veins	absent, 1	Number of Basal Veins
tooth shapes	48			1, A	grophic Veins simple, Major 20 vein fra	amework s	semicrasp	edodromous, Interior
principal vein	49	88	not visible	abse	nt. Major secondary spacing decreasing	2 proximal	lv. Variat	ion of secondary angle
principal vein termination	50	88	not visible	smo	othly decreasing proximally, Major sec	ondary atta	chment d	leflected, proximal
course of accessory vein	51	88	not visible	cou	se not visible, intersecondary length no	t visible, d	istal cours	se not visible, vein Angle of percurrent
for the set of the set of	52	00		terti	aries not visible, vein angle variability n	ot visible,	Epimedia	l tertiaries not visible,
reatures of the ooth apex	52	00	liotvisiore	adm visib Are Mar teet tootl visib	edial course not visible, exmedial cours lee, Quaternary Vein Fabric not visible, olation not visible, FEV branching not v ginal Ultimate venation not visible, Tot o noe , Teeth / cm 3, sinus shape round 1 shapes, tooth shapes, principal vein m lee, course of accessory vein not visible	se not visib Quinterna isible, FEV oth spacing ed, tooth sl not visible, , features of	le, Exteri ry Vein F 7 terminat g irregular napes st/st principal of the toot	or tertiary course not abric not visible, tion not visible, r, Number of orders of t, tooth shapes cc/st, vein termination not h apex not visible.



GA28 HM

DNMH spec. # 23766 DMNH loc. # 412

<u>GA29</u>	I	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	23.1	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	2º Major 20 vein framework	27	27.1.2	semicraspedodromous
Petiole Features	6	88	not visible	Interior secondaries	28	28.1	absent
				Minor secondary course	29	29.3	semicraspedodromous
Features of the Blade:				Perimarginal veins	30	0	absent
Position of Blade Attachment	7	88	not visible	Major secondary spacing	31	31.1	regular
Laminar size	8	8.3	microphyll	Variation of secondary angle	32	32.1	uniform
Laminar L:W ratio	9		6:2.5	Major secondary attachmen	33	33.3	excurrent
Laminar Shape	10	10.4	oblong	Inter- proximal course	34.1	34.1.2	perpendicular to midvein
Medial Symmetry	11	11.1	symmetrical	2° intersecondary length	34.2	34.2.1	<50% of subjacent seconda
Base Symmetry	12	88	not visible	distal course	34.3	99	n/a
Base Symmetry	12		-	vein frequency	34.4	34.4.3	>1 per intercostal area
Lobation	13	13.1	unlobed	3º Intercostal tertiary vein fabric	35	88	not visible
Margin Type	14	14.2.2	serrate	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	88	not visible	Exterior tertiary course	38	88	not visible
Base shape	19	88	not visible	4 ^o 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	44.2	irregular	Leaf Attachment not visible, Leaf Arrar	gement not	visible, L	eaf Organization not
Number of orders of teeth	45	45.1	one	visible, Leaflet Organization not visible, Features not visible, Position of Plade A	Leaflet At	tachment	not visible, Petiole
Teeth / cm	46		1.5	microphyll, Laminar L:W ratio 6:2.5, La	minar Shaj	be oblong	, Medial Symmetry
sinus shape	47	47.2	rounded	symmetrical, Base Symmetry not visible	Base Sym	metry -,	Lobation unlobed,
tooth shapes	48		cv/cv	Anex Shape not visible Anex Shape -	atures not v Base Angl	isible, Ap e not visib	bex Angle not visible, ble. Base shape not
tooth shapes	48		st/st	visible, Base shape -, Terminal Apex F	eatures not	visible, S	urface Texture not
tooth shapes	48		st/c v	visible, Surficial Glands not visible, Prin	ary Vein F	ramewor	k pinnate, Naked Basal
tooth shapes	48			framework semicraspedodromous. Inter	, Agrophic ior seconda	ries abser	ipie, Major 20 vein it. Minor secondary
principal vein	49	49.1	present	course semicraspedodromous, Perimarg	inal veins a	bsent, Ma	jor secondary spacing
principal vein termination	50	88	not visible	regular, Variation of secondary angle un provimal course perpendicular to midve	iform, Maj	or second	ary attachment excurrent,
course of accessory vein	51	88	not visible	secondary, distal course n/a, vein freque	ncy >1 per	intercosta	il area, Intercostal tertiary
features of the tooth apex	52	88	not visible	vein fabric not visible, Angle of percurr	ent tertiarie	s not visib	ble, vein angle variability
				not visible, Epimetrai retraines not visa- course not visible, Exterior tertiary cour visible, Quinternary Vein Fabric not visible, Tooth spacing irregular, Number of ord rounded, tooth shapes cv/cv, tooth shape principal vein present, principal vein ter not visible, features of the tooth apex no	se not visib ble, Areola Marginal U ers of teeth mination no t visible.	le, Quater ition not v Ultimate v one , Tee 1 shapes s 5t visible,	nor visible, exhicutar isible, FEV branching enation not visible, eth / cm 1.5, sinus shape t/cv, tooth shapes , course of accessory vein



GA29 HM

DNMH spec. # 23773 DMNH loc. # 412

<u>GA30</u>	J	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	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	Agrophic Veins	26	26.2.2	compound
Leaflet Attachment	5	88	not visible	2º Major 20 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
Features of the Blade:				Perimarginal veins	30	0	absent
Position of Blade Attachment	7	7.1	marginal	Major secondary spacing	31	31.1	regular
Laminar size	8	8.4	notophyll	Variation of secondary angle	32	32.1	uniform
Laminar L:W ratio	9		5:4	Major secondary attachment	33	33.3	excurrent
Laminar Shane	10	10.3	ovate	provimal course	34.1	88	not visible
Medial Symmetry	11	11.1	symmetrical	inter-	34.2	88	not visible
Page Symmetry	12	12.1	symmetrical	z distal agurea	24.2	00	not visible
Base Symmetry	12	12.1	symmetrical	distal course	24.5	00	not visible
Dase Symmetry	12	. 12.1	- unlohod	3° Intercent Least Children	34.4	00	not visible
Lobation	13	14.2.2		a nercostar teruary vein fabric	25.1.2	00	not visible
Margin Type	14	14.2.2	serrate	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	18.2	obtuse	Exterior tertiary course	38	88	not visible
Base shape	19	19.1.4	concavo-convex	4 ^o 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	44.2	irregular	Leaf Attachment not visible, Leaf Arrange	ment not v	isible, Lea	af Organization not
Number of orders of teeth	45	45.2	two	visible, Leaflet Organization not visible, Le	eaflet Atta	chment no	ot visible, Petiole
Teeth / cm	46		4	Features not visible, Position of Blade Atta	chment ma	arginal, La I Symmetr	aminar size notophyll,
sinus shape	47	47.2	rounded	Symmetry symmetrical, Base Symmetry -	Lobation	unlobed,	Margin Type serrate,
tooth shapes	48		st/st	Special Margin Features not visible, Apex	Angle not	visible, Á	pex Shape not visible,
tooth shapes	48		st/cv	Apex Shape - , Base Angle obtuse, Base s	hape conca	vo-conve	x, Base shape - ,
tooth shapes	48		cv/cv	visible. Primary Vein Framework palmate	Naked Ba	asal Veins	absent. Number of
tooth shapes	48			Basal Veins 3, Agrophic Veins compound,	Major 20	vein fram	ework
principal vein	49	49.1	present	craspedodromous, Interior secondaries not	visible, M	inor seco	ndary course
principal veni	50	50.2.1	present	Variation of secondary angle uniform, Ma	or seconda	secondary ary attachi	ment excurrent,
principal vein termination	50	50.2.1	at apex of tooth	proximal course not visible, intersecondary	length no	t visible, c	listal course not visible,
course of accessory vein	51	88	not visible	vein frequency not visible, Intercostal terti	ary vein fa	bric not v	isible, Angle of
features of the tooth apex	52	88	not visible	not visible, admedial course not visible, ex	medial cou	irse not vi	isible. Exterior tertiary
				course not visible, Quaternary Vein Fabric visible, Areolation not visible, FEV branch visible, Marginal Ultimate venation not visi orders of teeth two, Teeth / cm 4, sinus sh st/cv, tooth shapes cv/cv, tooth shapes, pri termination at apex of tooth, course of acc apex not visible.	not visible ing not visi ble, Tooth ape rounde ncipal veir essory vein	, Quintern ible, FEV spacing i ad, tooth sl n present, n not visibl	nary Vein Fabric not termination not rregular, Number of hapes st/st, tooth shapes principal vein le, features of the tooth



GA30 HM

DNMH spec. # 23774 DMNH loc. # 412

	1	ranniy	: Lauraceae?	?? Genus and Species: cf. "Sassafrass"					
Section I. Leaf Characters		score	description	Sectio	n II. Venation	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 20 vein framework	27	27.1.1	craspedodromous	
Petiole Features	6	88	not visible		Interior secondaries	28	0	absent	
					Minor secondary course	29	29.3	semicraspedodromous	
Features of the Blade:					Perimarginal veins	30	0	absent	
Position of Blade Attachment	7	88	not visible		Major secondary spacing	31	31.1	regular	
Laminar size	8	8.5	mesophyll		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	10.3	ovate		proximal course	34.1	34.1.1	parallel to major secondari	
Medial Symmetry	11	11.1	symmetrical	Inter- 2º	intersecondary length	34.2	34.2.1	<50% of subjacent secondar	
Base Symmetry	12	88	not visible	-	distal course	34.3	88	not visible	
Base Symmetry	12	00	-		vein frequency	34.5	34.4.1	< 1 per intercostal area	
Lobation	13	. 13.2.2	ninnately lobed	3° L	tercostal tertiary vein fabric	35	351114	chevroned opposite percurre	
Morgin Tuno	14	14.2.2	correcto	5 11	and of porqueront tortionic	2512	25 1 2 1	enevioned opposite percurre	
Special Margin Ecotures	14	00	serrate not visible	r	voir angle voriability	35.1.2	00 00	acute not visible	
Special Margin Features	10	16.1			Faine dial tentionice	27	27111		
Apex Aligie	10	17.2	acute			27.2.1	27.2.1.2		
Apex Snape	17	17.3	acuminate		admedial course	37.2.1	37.2.1.3	perpendicular to midvein	
Apex Snape	1/		-		exmedial course	37.2.2	37.2.2.2	basifiexed	
Base Angle	18	88	not visible	40	Exterior tertiary course		38.3	terminating at the margin	
Base shape	19	88	not visible	4 =0	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 Desc	ription:				
Tooth spacing	44	44.1	regular	Leaf Att	achment not visible, Leaf Arra	ngement	not visible,	Leaf Organization not	
Number of orders of teeth	45	45.1	one	visible, L	eaflet Organization not visible	e, Leaflet	Attachmen	t not visible, Petiole	
Teeth / cm	46		1	mesophy	11. Laminar L:W ratio not visib	le. Lamir	har Shape o	vate, Medial Symmetry	
sinus shape	47	47.2	rounded	symmetr	ical, Base Symmetry not visible	e, Base S	ymmetry -	, Lobation pinnately	
tooth shapes	48		st/st	lobed, M	argin Type serrate, Special Ma	argin Fea	tures not vis	sible, Apex Angle acute,	
tooth shapes	48		st/cv	visible, F	Base shape Terminal Apex	Features 1	not visible.	Surface Texture not	
tooth shapes	48		cc/cv	visible, S	urficial Glands not visible, Prin	mary Vei	n Framewo	rk pinnate, Naked Basal	
tooth shapes	48			Veins no	ot visible, Number of Basal Ve	ins 1, Ag	rophic Vei	ns compound, Major 20	
principal vein	49	49.1	present	course s	emicraspedodromous, Perimar	ginal vein	s absent N	laior secondary spacing	
principal vein termination	50	50.2.1	at apex of tooth	regular,	Variation of secondary angle u	niform, N	Aajor secon	dary attachment excurrent,	
	51	0	-ht	proximal	course parallel to major secon	ndaries, ir	nterseconda	ry length <50% of	
course of accessory vein	51	0	absent	Intercos	al tertiary vein fabric chevron	ed opposi	te percurrer	ty < 1 per intercostal area,	
features of the tooth apex	52	88	not visible	tertiaries percurre Exterior Quintern visible, F spacing : tooth sha present, features	a cuten vein angle variability n nt, admedial course perpendici- tertiary course terminating at ary Vein Fabric not visible, Ar EV termination not visible, M EV termination to visible, M regular, Number of orders of t pes st/st, tooth shapes st/cv, too principal vein termination at a of the tooth apex, not visible	ot visible, ular to mic the margin reolation arginal U eeth one oth shape pex of too	, Epimedial dvein, exm n, Quaterna not visible, ltimate ven , Teeth / cn s cc/cv, too	tertiaries opposite edial course basiflexed, y Vein Fabric not visible, FEV branching not ation not visible, Tooth 1, sinus shape rounded, th shapes, principal vein of accessory vein absent,	



GA31 HM

DNMH spec. # 48356 DMNH loc. # 500

Section J. Lead Charactear score description Leaf Anschment 1 88 not viable Leaf Anschment 3 88 not viable Leaf Anschment 4 88 not viable Leaffer Quantation 4 88 not viable Leaffer Anschment 7 1 marginal Laminar Stage 8 not viable 2 2.1.1 absent Position of Biad Anschment 7 7.1 marginal Marginal Properties 2.2.1.1 absent Laminar Stage 8 8.1 not viable 2 3.1.1 properties Medial Symmetry 11 1.1.1 symmetrical 3.3.1 properties Base Symmetry 12 - - - - Base Ange 16 1.6.1 accondury ange condury ange variability - - Base Ange 19 - - - - Base Ange 19	<u>GA32</u>	J	Family	:	Genus and Species:
Leaf Anachemet 1 8 88 not visible Leaf Cryanziton 4 88 not visible Leafter Anachemet 5 88 not visible Reide Fatures 6 88 not visible Pedice Fatures 6 88 not visible Reide Fatures 7 7 7.1 marginal Laminar LW ratio 9 7 7.1 marginal Laminar LW ratio 9 8.4 not visible Laminar LW ratio 10 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	Section I. Leaf Characters		score	description	Section II. Venation char. score description
Leaf Arrangement288not visibleLeafed Organization488not visibleLeafed Organization588not visibleLeafed Atachement77.1ranginalPetiole Features688not visiblePetiole Features688not visiblePetiole Features688not visiblePetiole Features77.1ranginalLaminar Skap10.1ellipticLaminar Skap10.1ellipticLaminar Skap10.1ellipticMedial Symmetry121.2.1Special Margin Features13ranginalBase Symmetry122.2arranAper Shape10.1ellipticTerminal Apes Shape10.1ellipticAper Shape10.1ellipticAper Shape10.1ellipticSpecial Margin Features13acuteAper Shape17.Aper Shape17.Terminal Apes Features20absentSpecial Margin Features23Aper Shape1919.1.1ass mays1888Number of orders of the data88Aper Shape19Terminal Apes Features20ass mays18Number of orders of the data18Aper Shape19Number of orders of the data18Aper Shape19Number of orders of the data18 <td>Leaf Attachment</td> <td>1</td> <td>88</td> <td>not visible</td> <td>1º Primary Vein Framework 23 23.1 pinnate</td>	Leaf Attachment	1	88	not visible	1º Primary Vein Framework 23 23.1 pinnate
Leaf Organization 3 88 not visible Leafte Attachment 5 88 not visible Periodic Features 6 88 not visible Periodic Features 7 7.1 marginal Position of Black Attachment 7 7.1 marginal Laminar XM ratio 8 not visible 13 13.1 regelative regular Laminar XM ratio 9 13 13.1 regular 13.1 13.1 regular Laminar XM ratio 9 3 not visible 14.2 14.3 14.3 </td <td>Leaf Arrangement</td> <td>2</td> <td>88</td> <td>not visible</td> <td>Naked Basal Veins 24 24.1 absent</td>	Leaf Arrangement	2	88	not visible	Naked Basal Veins 24 24.1 absent
Lastlet Organization 4 88 not visible Lastlet Autochment 5 88 not visible Peciok Features 6 88 not visible Peciok Features 6 88 not visible Position of Black Attochment 7 7.1 regarded/organization Position of Black Attochment 8 8.4 not visible Position of Black Attochment 8 8.4 not visible Major secondary count 30 0 abcent Major secondary count 31 11 cegular Major secondary angle 32 21 uniform Major secondary angle 32 22.1 uniform Major secondary angle 33 excurrent Major secondary angle 33 excurrent Major secondary angle 32 11 ergalar excurrent Major secondary angle 33 excurrent Major secondary angle 32 12.1 symmetry 12.1 symmetry 12.1 symmetry Base Symmetry 12 12.2 secondary secondary	Leaf Organization	3	88	not visible	Number of Basal Veins 25 1
Lenfle Attuchment 5 88 not visible Proteins Fortures of the Black Proteins of Black Attachment 7 7.1 marginal Laminar LW ratio 8 8.4 notphyll Laminar LW ratio 9 10 10.1 elliptic Major secondary spacing 31 31.1 regular Major secondary spacing 32 22.1 uniform Major secondary spacing 34.4 88 not visible Terminal Apex Shape 17 1.7.3 acuminate Apex Shape 17 17.3 acuminate Apex Shape 18 18.1 acute Base Angle 19 1 Terminal Apex Features 20 0 abent Surface Texture 21 88 not visible Surface Texture 21 88 not visible Text Description Text D	Leaflet Organization	4	88	not visible	Agrophic Veins 26 26.1 absent
Petide Features 68not visibleFeatures of the Blade:Interior secondaries228.1absentPosition of Blade Attachment77.1marginalNamor secondary course3232.1uniformLaminar Skap88.4notophylit31Major secondary spacing3131.1regularMajor secondary attachment3333.3ecurrentMedial Symmetry1211.1symmetrical33absentBase Symmetry1212.1symmetricalabsentionabsentionBase Symmetry1212.2symmetricalabsentionabsentionApex Angle1616.1acuteabsentionabsentionApex Shape77.3acuminateacuteabsentionApex Shape1919.1.1straightBase Angle1818.1acuteacuteApex Shape1919.1.1straightBase Angle1818.1acuteSpecial III Apex Feature288not visibleStrifted ICando288not visibleStrifted ICando288not visibleStrifted ICando44.2irregularStrifted ICando44.2irregularStrifted ICando44.2irregularStrifted ICando44.2irregularStrifted ICando44.2irregularStrifted ICando44.2irregu	Leaflet Attachment	5	88	not visible	2º Major 20 vein framework 27 27.1.1 craspedodromous
Minor secondary course98not viablePosition of Blade Attachment77.1marginalLaminar LW ratio88An otophyliLaminar LW ratio933.1Laminar LW ratio933.1Laminar LW ratio10ellipticMass Symmetry1212.1symmetricalBase Symmetry1212.1symmetricalBase Symmetry1212.1symmetricalBase Symmetry1212.1symmetricalApex Shape1616.1acuteApex Shape177.3acuminateApex Shape1717.3acuminateApex Shape1919.1.1straightBase Angle1818.1acuteBase Angle191.1.1straightBase Angle191.1.	Petiole Features	6	88	not visible	Interior secondaries 28 28.1 absent
Features of the Blade:Position of Blade Attachment88.4notphyllLaminar Livrato88.4notphyllLaminar Livrato93:1Major secondary space3:2Laminar Shape1010.1ellipticMedial Symmetry1111.1symmetricalBase Symmetry1212.1symmetricalBase Symmetry1212.1symmetricalBase Symmetry1213.3unlobedMargin Fatures1818.1auniateApex Shape1717.3acuminateApex Shape1616.1acuteApex Shape1917.1acutinateBase Angel1818.1acuteBase Angel1919.1.1straightBase Angel<					Minor secondary course 29 88 not visible
Position of Blade Attachment 7 7, 71, marginal Laminarise 8 8, 84, notylabil Laminar LW ratio 3 91, 31, 31, 33, 33, 33, 33, 33, 33, 33, 3	Features of the Blade:				Perimarginal veins 30 0 absent
Laminar Size88.4nonophyllLaminar Lawr ratio931Laminar Size931Major secondary angle3232Major secondary angle3333.3Res Symmetry1111.1Base Symmetry1212.1Base Symmetry1212.1Base Symmetry1212.1Base Symmetry1212.1Margin Type1414.2.2Special Margin Type1616.1Apex Xagle1616.1Apex Sagle1717.3Apex Sagle1717.3Base Angle1818.1Base Angle1919.1.1Base Angle1919.1.1Base Angle1919.1.1Base Angle1919.1.1Base Angle1919.1.1Base Angle1919.1.1Base Angle1010.1Base Angle1010.1Base Angle10.1.1Base Angle11.1.1Base Angle11.1.1.1.1.1.1.1.1.1	Position of Blade Attachment	7	7.1	marginal	Major secondary spacing 31 31.1 regular
Laminar Shape 10 10.1 elliptic Medial Symmetry 12 12.1 symmetrical Base Symetry 12 12.1 symmetrical Base Symetry 12 12.1 symmetrical Base Symetry 12 12.1 symmetrical Base Symetry 12 13 18 not visible Apex Stape 17 17.3 acuminate Apex Stape 17 17.3 acuminate Apex Stape 19 19.1.1 straight Base shape 10 10 10 10 10 10 10 10 10 10 10 10 10	Laminar size	8	8.4	notophyll	Variation of secondary angle 32 32.1 uniform
Laminar Shape 40 10.1 elliptic Medial Symmetry 11 11.11. symmetrical Base Symmetry 12 12.12.1 symmetrical Base Symmetry 12 12.12.1 symmetrical Base Symmetry 12 12.12.1 symmetrical Base Symmetry 12 12.12.1 symmetrical Base Symmetry 12 14.2.2 serrate Special Margin Forentees 15 88 not visible Apex Shape 17 17.3 acuminate Apex Shape 17 17.3 acuminate Base Angle 18 18.1 acute Base Shape 19 19.1.1 stright Base Shape 19 10.1 elliptic Base Shape 19 10.1 elliptic Base Shape 19 10.1 elliptic Surficial Clands 22 88 not visible Terminal Apex Features 20 0 absent Surficial Clands 22 88 not visible Terminal Apex Features 20 0 absent Surficial Clands 22 88 not visible Terminal Apex Features 20 0 absent Surficial Clands 22 88 not visible Terminal Apex Features 20 0 absent Surficial Clands 22 88 not visible Terminal Apex Features 20 0 absent Surficial Clands 22 88 not visible Terminal Apex Features 20 8 Not visible Surficial Clands 22 88 not visible Terminal Apex Features 20 8 Not visible Terminal Apex Features 20 8 Not visible Surficial Clands 22 88 not visible Terminal Apex Features 20 88 not visible Terminal Apex Features 20 88 not visible FEV branching 42.1 88 not visible FEV branching 42.1 88 not visible Tervite 31.1 angular stort sold, Larger 44 44.2 irregular Number of orders of testh 45 45 1 one Terd for 46 51 88 not visible principal visit 49 88 not visible features of the tooln apex 52 88 not visible	Laminar L:W ratio	9		3:1	Major secondary attachment 33 33.3 excurrent
Medial Symmetry1111.1symmetrical Base Symmetry1212.1symmetrical symmetrical Base Symmetry1212.1symmetrical symmetrical Base Symmetry13.1unbed symmetrical Base Symmetry1414.2.2symmetrical symmetrical Base Angle1616.1acute symmetrical Base Angle1616.1acute symmetrical Base Angle1717.3acute symmetrical Base Shape1717.3acute symmetrical Base Shape1818.1acute statisticExterior terration symmetrical Base Shape1919.1.1straight statisticBase Shape Surface Texture1818.1acute straight Base Shape191.1.1straight statistic5"Quinternary Vein Fabric 3938not visibleSurface Texture288not visible4444.2irregular statistic44.42irregular statisticNumber of orders of text tooh shapes mprincipal vein4444.2irregular statistic12.418not visibleStatistic104444.2irregular statistic12.418not visible12.418.8Statistic11.1angular statistic13.1angular statistic14.414.2irregular statisticStatistic17.3and visible14.444.2irregular istatistic12.418.8not visibleStatistic18.819.1.1istatistic14.414.2ir	Laminar Shape	10	10.1	elliptic	proximal course 34.1 88 not visible
Base Symmetry 12 12.1 symmetrical Base Symmetry 12 1.2 1.1 mubod Lobation 13 13.1 unbodd Margin Type 14 14.2.2 serrate Special Margin Features 15 8.8 not visible Apex Angle 16 16.1 acute Apex Shape 17 1.7.3 acutinate Apex Shape 19 19.1.1 straight Base shape 19 19.1.1 straight Base shape 19 . - Terminal Apex Features 20 0 absent Surface Texture 21 8.8 not visible Suo	Medial Symmetry	11	11.1	symmetrical	2 ° intersecondary length 34.2 88 not visible
Base Symmetry12.Lobation1313.1unlobedMargin Type1414.2.2serateSpecial Margin Features1588not visibleApex Shape171.7.3acuminateApex Shape171.7.3acuminateApex Shape19Base Angle191.serateBase Angle19Terminal Apex Features200absent3"TerreruptionSurface Texture2188not visibleSurface Texture2188not visibleSurface Texture2188not visibleSurface Texture2188not visibleSurface Texture2188not visibleSurface Texture2188not visibleTech /cm4444.2irregularTooh spacing4444.2irregulartooh shapes4547.1angulartooh shapes481.settooh shapes481.tooh shapes481.tooh shapes541.tooh shapes54tooh shapes54tooh shapes54tooh shapes54tooh shapes58tooh shapes58tooh shapes54tooh shapes58tooh shapes58tooh shapes58tooh shapes52to	Base Symmetry	12	12.1	symmetrical	distal course 34.3 88 not visible
John Stering13.1unlobedMargin Fatures1588not visibleSpecial Margin Fatures1588not visibleApex Angle1616.1acuteApex Shape17Base Angle1818.1acuteBase Angle1919.1.1straightBase Shape19Terminal Apex Features200Surface Texture2188not visibleSurface Texture2188not visibleSurface Texture2188not visibleTerminal Apex Seare444.2irregularYooh shapes4545.1oneTech /em4747.1angularYooh shapes48and visibleprincipal vein termination5088not visibleprincipal vein termination5088not visibleprincipal vein termination5088not visiblecours of accessory vein5188not visibleprincipal vein termination5088not visiblecours of accessory vein5188not visiblefeatures of the tooth shapes48not visiblecours of accessory vein5188not visiblefeatures of the tooth shapes5288not visiblecours of accessory vein5188not visiblefeatures of the tooth shapes5288not visiblefeatures o	Base Symmetry	12		-	vein frequency 34.4 88 not visible
Margin Type1414.2.2serrateSpecial Margin Features1588not visibleApex Shape171.7.3acuminateApex Shape171.7.3acuminateApex Shape171.7.3acuminateApex Shape1818.1acuteBase Angle1818.1acuteBase Angle191.1.1straightBase Angle191.2.1straightBase Angle20absentSurface Texture21.8not visibleSurface Texture21.8not visibleSurface Texture21.8not visibleSurface Texture21.8not visibleSurface Texture1.1straightSurface Texture1.1straight<	Lobation	13	13.1	unlobed	3° Intercostal tertiary vein fabric 35 88 not visible
Special Margin Features158.8not visibleApex Ange1616.1acuteApex Ange17Base Ange17Base Ange1917.1Base Ange191.1.Straface Texture200absent200Surface Texture21Roman Mark19Surface Texture21Surface Texture21Number of orders of tecth42Straface Texture11Tech /cm4444.2irregular toolt shapesToolt shapes48toolt shapes5288not visibleFeatures of the toolt space5288not visibletoolt shapes5288not visiblefeatures of the toolt space5288not visiblefeatures of the toolt space5288not visiblefeatures of the toolt space	Margin Type	14	1422	serrate	Angle of percurrent tertiaries 3512 88 not visible
Apex Ange161616acuteApex Shape1717.3acuminateApex Shape1818.1acuteBase Ange1818.1acuteBase Ange19Base Shape19Terminal Apex Features200absentSurface Texture2188not visibleSurface Texture4444.2irregularNumber of orders of text45.1oneTextures not visible, Leaf Arangement not visible, Leaf Organization notVisible set 4845.1tooth shapes48principal vein termination5088not visibleprincipal vein termination5088not visiblereatures of the tooth apex5288not visiblereatures of the tooth apex5288not visiblereatures of the tooth apex52 </td <td>Special Margin Features</td> <td>15</td> <td>88</td> <td>not visible</td> <td>vein angle variability 36 88 not visible</td>	Special Margin Features	15	88	not visible	vein angle variability 36 88 not visible
Apex Shape171.0.3acuminate admedial course37.2.188not visibleApex Shape17 </td <td>Anex Angle</td> <td>16</td> <td>16.1</td> <td>acute</td> <td>Enimedial tertiaries 37 88 not visible</td>	Anex Angle	16	16.1	acute	Enimedial tertiaries 37 88 not visible
Apex Supp17Base Angle1818.1. a cutleBase Angle1818.1. a cutleBase shape19Terminal Apex Features200absent2288Surface Texture2188Surface Texture4444.2Terth /m4444.2Terth /m45.1oneTerth /m45.1oneTerth /m451Tooth spacing4444.2tooth shapes48tooth shapes48tooth shapes48tooth shapes48tooth shapes48tooth shapes48tooth shapes5188not visibleprincipal viein5188not visibleprincipal viein5188not visiblefeatures of the tooth apex5288not visiblefeatures of the tooth apex5288not visibleprincipal viein51	Apex Shape	17	17.3	acuminate	admedial course 37.2.1 88 not visible
 Base shape 19 19.1.1 straight Base shape 19 19.1.1 straight Base shape 19 19.1.2 straight Base shape 19 19.1.3 straight Base shape 19 19.1.4 straight Base shape 19 19.1.5 straight Surface Texture 20 0 absent Surface Texture 21 88 not visible Surface Texture 21 88 not visible FEV branching 42.1 88 not visible Fet Description: Leaf Attachment not visible, Leaf Organization not visible, Leaf Organization not visible, Leaf Organization not visible, Leaf Attachment not visible, Paramarginal, Laminar size notophyll, Laminar LW ratio 31, Laminar Shape ellipic, Medial Symmetry symmetrical, Base Symmetry -1, Lobation unblock, Margin Type serrate, Special Margin Features not visible, Perimarginal Veins 39 and Veins 1, Agrophic Veins Auge acute, Apex Shape acutumate, Apex Shape - , Base Angle acute, Base Shape - , Texture on Visible, Perimarginal Veins 39 and Veins 1, Agrophic Veins Auge acute, Base Shape - , Base Shap	A new Shape	17	1715	-	exmedial course 37.2.2 88 not visible
Base shape191.1straightBase shape19Terminal Apex Features200absentSurface Texture2188not visibleSurface Texture44.1irregularNumber of orders of teeth45.1oneText Program2sinus shape10 oth shapes48110 oth shapes48	Base Angle	18	18.1	acute	Exterior tertiary course 38 88 not visible
Base shape 191917.1.1at angle angle5"Quinternary Vein Fabric3000indivisibleTerminal Apex Features200absent388not visible88not visibleSurface Texture2188not visibleFEV branching42.188not visibleSurface Texture2188not visibleFEV branching42.288not visibleSection III. TeethTooth spacing4444.2irregular45.1one45.1oneTeeth / cm4622sinus shape4717.1angularsifsttooth shapes4848angularsifstsoft10.64Attachment not visible, Leaf PC attachmert not visible, Perinary intrary	Base shape	10	10.1	straight	4° Oustarrary Vain Fabric 30 88 not visible
Lass and p 1	Base shape	10	19.1.1	suaigin	5° Quaternary Vein Fabric 40 88 not visible
Tertininal Apex relatives 20 0 adskint Surface Texture 21 88 not visible Surfacial Glands 22 88 not visible Surfacial Glands 22 88 not visible Section III. Teeth Tooth spacing 44 44.2 irregular Number of orders of teeth 45 45.1 one Jaminar L. W ratio 31.1 Leaf Art addres not visible, Leaf Arrangement not visible, Leaf Attachment not visible, Readed Vaganization not visible, Readed Vaganization of Visible, Reader Organization of Visible, Reader Margin Tepetation of Visible, Reader Vaganization Visible, Reader Vaganization Visible, Reader Vaganization Visible, Reader Vagani Vaga	Terminal Apex Features	20		abcant	A realation 41 88 not visible
Surface Texture2188not visibleSurface Texture2188not visibleSurface Texture2188not visibleSurface Texture2288not visibleSurface Texture4444.2irregularNumber of orders of teeth4545.1oneTeeth / cm462sinus shape4747.1angulartooth shapes4845.1oneTeeth / sinus shape4747.1angulartooth shapes48st/sttooth shapes48st/sttooth shapes48st/sttooth shapes48st/stcoth shapes48st/stprincipal vein termination5088principal vein termination5088not visiblecourse of accessory veinfeatures of the tooth apex5288not visiblefeatures of the tooth apex5288not visibleCourse of accessory vein188not visiblefeatures of the tooth apex5288not visibleCourse of accessory vein188not visiblefeatures of the tooth apex5288not visible <t< td=""><td>Terminar Apex Teatures</td><td>20</td><td>0</td><td>absent</td><td>EEV bronching 42.1 88 not visible</td></t<>	Terminar Apex Teatures	20	0	absent	EEV bronching 42.1 88 not visible
Surficial Glands 22 88 not visible Surficial Glands 22 88 not visible Tooth spacing 44 44.2 irregular Number of orders of tech 45 45.1 one Tech / cm 46 2 sinus shape 47 47.1 angular tooth shapes 48 tooth shapes 50 88 not visible features of the tooth apex 52 88 not visible	Surfa an Torturn	21	00	not visible	FEV termination 42.2 88 not visible
Section III. Factor Section III. Teeth Number of orders of teeth 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1<	Surficial Glands	21	88	not visible	Marginal Ultimate vanation 43 88 not visible
Section III TeethTooth spacing4444.2irregularNumber of orders of teeth4545.1oneTeeth / cm462sinus shape47tooth shapes48tooth shapes48ourse of accessory vein5188< not visible	SurrelarGlands	22	88	not visible	Warginar Omnate Venauon 45 88 not visible
Tooth spacing4444.2irregularNumber of orders of teeth4545.1oneTeeth / em462sinus shape4747.1angulartooth shapes4847tooth shapes4848tooth shapes4848tooth shapes4848principal vein4988principal vein4988noricipal vein termination5088not visiblefeatures of the tooth apex5288not visible6410708870707070718872887370747075707570 <t< td=""><td>Section III. Teeth</td><td></td><td></td><td></td><td>Text Description:</td></t<>	Section III. Teeth				Text Description:
Number of orders of teeth4545.1oneTeeth / cm462situs shape4747.1angulartooth shapes4847tooth shapes4848tooth shapes4848tooth shapes4848tooth shapes4849principal vein4988principal vein5088principal vein5088not visible71features of visible88principal vein5088not visible88principal vein5088not visible88not visible <td>Tooth spacing</td> <td>44</td> <td>44.2</td> <td>irregular</td> <td>Leaf Attachment not visible Leaf Arrangement not visible Leaf Organization not</td>	Tooth spacing	44	44.2	irregular	Leaf Attachment not visible Leaf Arrangement not visible Leaf Organization not
 Features not visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar Liw ratio 3:1, Laminar Shape elliptic, Medial Symmetry al, Base Symmetrical, Base Symmetry and Type serrate, Special Margin Teatures not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape -, Jeawinat Apex Shape +, Jeawinat Apex Shape	Number of orders of teeth	45	45.1	one	visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole
InclumentZLammarShapeElliptic, Medial Symmetry symmetrical, Basesinus shape4747.1angulartooth shapes48st/sttooth shapes48angularprincipal vein4988not visibleprincipal vein5088not visiblefeatures of the tooth apex5288not visiblefeatures of the tooth apex5288not visiblerout sible, features of the tooth apex5288not visiblefeatures of the tooth a	Teeth / cm	46	45.1	2	Features not visible, Position of Blade Attachment marginal, Laminar size notophyll,
tooth shapes48tooth shapes48tooth shapes48tooth shapes48tooth shapes48tooth shapes48tooth shapes48tooth shapes48principal vein49principal vein5088not visibleprincipal vein termination5088not visiblefeatures of the tooth apex5288not visiblefeatures of the tooth apex5288not visiblecurse of the tooth apex5288not visiblefeatures of the tooth apex5288not visible70special88not visible88not visible88not visible88not visible88not visible88not visible88not visible88not visible988898not visible9898989898989898<	sinus shane	40	47.1	angular	Laminar L:W ratio 3:1, Laminar Shape elliptic, Medial Symmetry symmetrical, Base
tooth shapes48tooth shapes48tooth shapes48tooth shapes48tooth shapes48principal vein49principal vein49grophic vein solution50solution88not visible88not visible<	tooth shapes	18	47.1	et/et	Special Margin Features not visible, Apex Angle acute, Apex Shape acuminate, Apex
tooth shapes48tooth shapes48tooth shapes48principal vein4988principal vein4988principal vein5088not visiblesocondaries absent, Minor secondary course not visible, Perimarginal veins absent, Minor secondary course not visible, Perimarginal veins absent, Minor secondary spacing regular, Variation of secondary angle uniform, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary spacing regular, Variation of secondary angle uniform, Major secondary spacing regular, Variation of secondary lengthfeatures of the tooth apex5288not visiblesocondaries absent, Surficial lertiariar secondary lengthnot visiblesocondaries absent, Surficial lertiaries not visible, Anteriation of visible, Aurital course not visible, FEV branching not visible, FEV branching not visible, Aurital course not visible, aurital course and visible, Aurital course not visible, Auri	tooti shapes	40		30 31	Shape - , Base Angle acute, Base shape straight, Base shape - , Terminal Apex
tooth shapes48tooth shapes48principal vein4988principal vein termination5088not visible5088course of accessory vein5188not visible5288not visible88not visible5288not visible5288not visible5288not visible5288not visible5252not visible52not visible52not visible53not visible54not visible55not vis	tooth shapes	48			Features absent, Surface Texture not visible, Surficial Glands not visible, Primary
tools shapes principal vein4988 snot visible principal vein termination5088 snot visible sources of accessory vein5188 snot visible sources of accessory vein5188 snot visible sources of accessory vein5288 snot visible sources termination5288 snot visible sources termination5388 s100 sources termination5388 s100 sources termination54 sources termination5588 s100 sources termination100 sources termination torisible, termination torisible, termination termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, termination torisible, terminat	tooth shapes	48			Agrophic Veins absent, Maior 20 vein framework craspedodromous, Interior
principal vein termination5088not visibleprincipal vein termination5088not visiblecourse of accessory vein5188not visiblefeatures of the tooth apex5288not visiblestatures of the tooth apex5288not visiblereatures of the tooth apex5288not visiblegrant505288not visiblereatures of the tooth apex525288reatures of the tooth apex5252reatures of the tooth apex52reatures of the tooth apex53reatures of the tooth apex54reatures of the tooth apex54reatures of the tooth apex54reatures of the tooth apex not visiblereatures of the tooth apex	tooth shapes	48	00		secondaries absent, Minor secondary course not visible, Perimarginal veins absent,
principal vein termination 50 88 not visible course of accessory vein 51 88 not visible features of the tooth apex 52 88 not visible not visible, Exterior tertiary course not visible, admedial course not visible, August lertiary vein fabric not visible, Angle of percurrent tertiary course not visible, August lertiary vein fabric not visible, Angle of percurrent tertiary course not visible, August lertiary vein fabric not visible, Exterior tertiary course not visible, August lertiary voisible, Quaternary Vein Fabric not visible, Cuinternary Vein Fabric not visible, Argust lertiary voisible, Quaternary Vein Fabric not visible, Cuinternary Vein Fabric not visible, Argust lertiary not visible, Fibre of tertiary course not visible, Argust lertiary voisible, Quaternary Vein Fabric not visible, Cuinternary Vein Fabric not visible, Argust lertiary not visible, Fibre of tertiary course not visible, Argust lertiary not visible, Fibre of tertiary course not visible, Argust lertiary voisible, Quaternary Vein Fabric not visible, Cuinternary Vein Fabric not visible, Argust lertiary not visible, Fibre vanching not visible, Fibre vanching not visible, Fibre vanching not visible, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.	principal vein	49	88	not visible	Major secondary spacing regular, Variation of secondary angle uniform, Major
course of accessory vein 51 88 not visible features of the tooth apex 52 88 not visible vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability not visible, Exterior tertiaries not visible, Marginal Ulimate venation not visible, Guinternary Vein Fabric not visible, Marginal Ulimate venation not visible, Tooth spacing irregular, Number of orders of teeth / cm 2, sinus shape angular, tooth shapes style, 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, and the termination of visible, and the termination of visible, termination of visible, termination not visible, terminatin not visible, termination not visible, terminatin not visi	principal vein termination	50	88	not visible	not visible, distal course not visible, vein frequency not visible, Intercostal tertiary
features of the tooth apex 52 88 not visible features of the tooth apex 52 88 not visible, admedial course not visible, Amedial course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Arcolation not visible, FEV branching not visible, FEV ternination not visible, Marginal Ulimate venation not visible, Tooth spacing irregular, Number of orders of teeth ore 1, sinus shape angular, tooth shapes st/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.	course of accessory vein	51	88	not visible	vein fabric not visible, Angle of percurrent tertiaries not visible, vein angle variability
visible, Quinternary Vein Fabic not visible, Arcolation not visible, FEV branching not visible, EEV ternination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth (or n, sinus shape angular, tooth shapes st/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.	features of the tooth apex	52	88	not visible	not visible, Epimedial tertiaries not visible, admedial course not visible, exmedial
not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth spacing irregular, Number of orders of teeth one , Teeth / en 2, sinus shape angular, tooth shapes svist, tooth shapes, itooth shapes, not shapes, principal vein not visible, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.					visible, Ouinternary Vein Fabric not visible, Areolation not visible, FEV branching
Tooth spacing irregular, Number of orders of teeth one , Teeth / cm 2, sinus shape angular, tooth shapes st/st, tooth shapes, tooth shapes, inoth shapes, inoth shapes, inoth shapes, principal vein not visible, or not visible, features of the tooth apex not visible.					not visible, FEV termination not visible, Marginal Ultimate venation not visible,
anguar, uoun snapes sost, uoun snapes , uoun snapes , uoun snapes , uoun snapes , principai vem not visible, principal vein termination not visible, course of accessory vein not visible, features of the tooth apex not visible.					Tooth spacing irregular, Number of orders of teeth one, Teeth / cm 2, sinus shape
features of the tooth apex not visible.					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.
					1



GA32 HM

DNMH spec. # 23770 DMNH loc. # 412

<u>GA33</u>		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 23.1 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 20 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
Features of the Blade:				Perimarginal veins 30 0 absent
				abruptly increasing
Position of Blade Attachment	7	88	not visible	Major secondary spacing 31 31.5 proximally
Laminar size	8	8.4	notophyll	Variation of secondary angle 32 32.2 inconsistent
Laminar L:W ratio	9		not visiible	Major secondary attachment 33 88 not visible
Laminar Shape	10	10.3	ovate	Inter- proximal course 34.1 88 not visible
Medial Symmetry	11	11.1	symmetrical	2° 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 ^o Intercostal tertiary vein fabric 35 88 not visible
Margin Type	14	14.2.2	serrate	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	88	not visible	Exterior tertiary course 38 88 not visible
Base shape	19	88	not visible	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	44.2	irregular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not
Number of orders of teeth	45	45.1	one	visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole
Teeth / cm	46		1	Laminar L:W ratio not visible. Laminar Shape ovate. Medial Symmetry symmetrical
sinus shape	47	47.1	angular	Base Symmetry not visible, Base Symmetry - , Lobation unlobed, Margin Type
tooth shapes	48		st/st	serrate, Special Margin Features not visible, Apex Angle not visible, Apex Shape not
tooth shapes	48			Terminal Apex Features not visible, Surface Texture not visible, Surficial Glands not
tooth shapes	48			visible, Primary Vein Framework pinnate, Naked Basal Veins absent, Number of
tooth shapes	48			Basal Veins 1, Agrophic Veins absent, Major 20 vein framework craspedodromous,
principal vein	49	49.1	present	veins absent, Major secondary spacing abruptly increasing proximally, Variation of
principal vein termination	50	50.2.1	at apex of tooth	secondary angle inconsistent, Major secondary attachment not visible, proximal
course of accessory vein	51	51.1.1	looped	course not visible, intersecondary length not visible, distal course not visible, vein frequency not visible. Intercostal tertiany vein fabric not visible. Angle of percurrent
	52	00	noopeu	tertiaries not visible, vein angle variability not visible, Epimedial tertiaries not visible,
features of the tooth apex	52	88	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 , tooth
				tooth, course of accessory vein looped, features of the tooth apex not visible.



GA33 HM

DNMH spec. # 23772 DMNH loc. # 412

<u>GA34</u>]	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	5	Section II. Venation	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 testooned
Leaflet Attachment	5	88	not visible	2°	Major 20 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
Features of the Blade:					Perimarginal veins	30	0	absent abruptly increasing
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	31.5	proximally
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	32.2	inconsistent
Laminar L:W ratio	9		7:4		Major secondary attachment	33	33.4	deflected
Laminar Shape	10	10.4	oblong		Intersecondary proximal course	34.1	0	absent
Medial Symmetry	11	11.1	symmetrical	Inter-	intersecondary length	34.2	00	n/a
Page Symmetry	12	12.1	symmetrical	<u>,</u>	distal access	24.2	00	n/a
Dase Symmetry	12	12.1	symmetrical		uisiai course	34.3 24.4	99	n/a
Base Symmetry	12	•	-		vein irequency	34.4	99	iva convex opposite
T -1	12	12.1	unlahad	30	Intercostal tertiony your f-b-i-	25	251112	percurrent
Lobation	13	13.1	antira	Ĩ	Angle of personant tarti	25 1 2	25 1 2 2	obtuca
Margin Type	14	14.1	enure		Angle of percurrent ternaries	35.1.2	35.1.2.2	obiuse
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
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
ection III. Teeth				Text l	Description:			
Tooth spacing	44	99	n/a	Lea	f Attachment not visible, Leaf Arra	ngement	not visible,	Leaf Organization not
Number of orders of teeth	45	99	n/a	VISIC	ures not visible. Position of Riade /	ttachme	Attachmen	Laminar size notophyll
Teeth / cm	46	99	5	Lan	inar L:W ratio 7:4, Laminar Shape	oblong, 1	Medial Syn	metry symmetrical, Base
sinus shape	47	99	n/a	Sym	metry symmetrical, Base Symmetry	y - , Loba	ation unlob	ed, Margin Type entire,
tooth shapes	48		n/a	Spec	x Shane - Base Angle refley Base	e shape c	ordate Rec	, Apex Shape not visible, e shape - Terminal Apey
tooth shapes	48			Feat	ures not visible, Surface Texture no	ot visible,	Surficial C	Blands not visible, Primary
tooth shapes	48			Veir	n Framework pinnate, Naked Basal	Veins al	osent, Num	ber of Basal Veins 1,
tooth shapes	48			Agr	ophic Veins compound, Major 20 v	ein frame	ework festo	oned brochidodromous,
principal vein	49	99	n/a	Peri	marginal veins absent, Maior second	idary space	cing abrunt	v increasing proximally.
principal vein termination	50	99	n/a	Var	iation of secondary angle inconsiste	nt, Major	secondary	attachment deflected,
course of accessory vein	51	99	n/a	vein	frequency n/a. Intercostal tertiary	, meiseco vein fabri	c convex o	posite percurrent. Angle
features of the teath	52	00	n/a	of p	ercurrent tertiaries obtuse, vein ang	gle variab	ility consist	ent, Epimedial tertiaries
reaules of the tool apex	52	,,	IΓα	oppo basi perc brar visib n/a, prin n/a.	site percurrent, admedial course po flexed, Exterior tertiary course loo urrent, Quinternary Vein Fabric no ching not visible, FEV termination ole, Tooth spacing n/a, Number of 4 tooth shapes n/a, tooth shapes, toot cipal vein termination n/a, course o	empendicu ped, Qua ot visible, not visible orders of h shapes f accesso	Ilar to midve ternary Vei Areolation e, Margina teeth n/a, 7 , tooth shap ry vein n/a,	ein, exmedial course n Fabric opposite not visible, FEV I Ultimate venation not feeth / cm 5, sinus shape es, principal vein n/a, features of the tooth apex
				n/a, prin n/a.	tooth shapes n/a, tooth shapes , toot cipal vein termination n/a, course o	h shapes f accesso	, tooth shap ry vein n/a,	es , principal vein n/a, features of the tooth apex



GA34 HM

DNMH spec. # 24088 DMNH loc. # 412

<u>GA35</u>	1	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	Sec	ction II. Venation	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 20 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	30.1	marginal secondary
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-	Intersecondary proximal course	34.1	88	not visible
Medial Symmetry	11	88	not visible	2 °	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 1	4.1	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°	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 I	Description:			
Tooth spacing	44	99	n/a	Leaf	Attachment not visible, Leaf Arra	ngement n	ot visible,	Leaf Organization not
Number of orders of teeth	45	99	n/a	visib	le, Leaflet Organization not visible	, Leaflet A	Attachmen	t not visible, Petiole
Teeth / cm	46		n/a	Feat	ures not visible, Position of Blade A	ttachmen	t marginal	I, Laminar size notophyll,
sinus shape	47	99	n/a	visib	le, Base Symmetry not visible, Base	e Symmetr	v - , Lob	ation unlobed, Margin

tooth shapes 48

tooth shapes 48 tooth shapes 48 tooth shapes 48 principal vein 49

principal vein termination 50

course of accessory vein 51

features of the tooth apex 52

n/a

99 n/a

99 n/a

99 n/a

99 n/a

Levin Machinem Nov Hook, Jewishle, Leaflet Attachment Nov Hook, Jewishle, Leaflet Organization not visible, Lacinar that thatchment 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, Agrophic Veins absent, Mior 20 vein framework simple prochiddormous, Interior secondariz sabsent, Mior secondary ourse not visible, Perimarginal veins marginal secondary angle uniform, Major secondary attachment excurrent, Intersecondary poximal course not visible, interscondary length not visible, distal course not visible, visible, visible, visible, visible, distal course not visible, Aretirary vein fabric not visible, Anger Opercurrent trainars not visible, retrained levaniability not visible, Epimedial tertiaries not visible, Arcolation not visible, exemedial course not visible, FEV termination not visible, Marginal Ultimate venation not visible, Footh spacing in/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, ficture, and via termination n'a, course of accessory vein n'a, faures after not visible, vein fapic not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth shapes n'a, tooth shapes, tooth shapes, principal vein n'a, ficture and no n'a, sinus shape n'a, tooth



GA35 HM

DNMH spec. # 23775 DMNH loc. # 412

<u>GA36</u>	I	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	Sect	on II. Venation	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 20 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	88	not visible
Position of Blade Attachment	7	88	not visible		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		7:4		Major secondary attachment	33	33.4	deflected
Laminar Shape	10	10.1	elliptic	Inter-	Intersecondary proximal course	34.1	88	not visible
Medial Symmetry	11	11.1	symmetrical	2°	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	88	not visible		Exterior tertiary course	38	88	not visible
Base shape	19	88	not visible	4°	Ouaternary 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
					5			
ection III. Teeth				Text Desc	ription:			
Tooth spacing	44	99	n/a	Leaf At	tachment not visible, Leaf Arra	ngement	notvisit	ole, Leaf Organization
Number of orders of teeth	45	99	n/a	not vis	Eastures not visible Desition of vi	sible, Lea	aflet Atta	achment not visible,
Teeth / cm	46		n/z	size no	tophyll Laminar L: Wratio 7.4	Laminar	Shane el	lliptic Medial
sinus shape	47	99	n/a	Symme	try symmetrical, Base Symmetri	ry not vis	ible, Bas	se Symmetry -,
tooth shapes	48		n/a	Lobatio	on unlobed, Margin Type entire,	Special	Margin I	Features not visible,
tooth shapes	48			Apex A	ngle not visible, Apex Shape n	ot visible	, Apex S	hape -, Base Angle
tooth shapes	48			not vis	ible, Base shape not visible, Bas	e shape	- , Termi	nal Apex Features not
tooth shapes	48			Framew	ork ninnate Naked Basal Vein	s absent	Numbe	r of Basal Veins 1
principal vein	49	99	n/a	Agroph	ic Veins absent, Major 20 vein	framewo	rk simpl	e brochidodromous,
principal vein termination	50	99	n/a	Interio	secondaries absent, Minor seco	ondary co	urse not	visible, Perimarginal
course of accessory vein	51	99	n/a	veins n	ot visible, Major secondary space	cing decr	easing p	roximally, Variation of
features of the tooth apex	52	99	n/a	second	ary angle uniform, Major second	dary attac	chment d	effected,
·				distal c fabric r variabi visible Quatern Areolat Margin of teeth	ourse not visible, vein frequenc; ot visible, Angle of percurrent! lity not visible, Epimedial tertia exmedial course not visible, Ex iary Vein Fabric not visible, ou ion not visible, FEV branching al Ultimate venation not visible n nd, Teeth / cm n/2, sinus shap borse tooth chanse microinel	y not visi ertiaries ries not v tterior ter internary not visib c, Tooth s e n/a, too	ble, Inte not visible, ac tiary cou Vein Fa le, FEV t spacing n th shapes	ny reinginitor visione, roostal tertitary vein le, vein angle Imedial course not inse not visible, abrie not visible, abrie not visible, //a, Number of orders s n/a, tooth shapes, vein termination n/a



GA36 HM

DNMH spec. # 24171 DMNH loc. # 412

<u>GA37</u>	I	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	Sec	tion II. Venation	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 20 vein framework	27	27.3.1	simple brochidodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1	absent
					Minor secondary course	29	29.2	simple brochidodromous
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
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	32.4	proximally
Laminar L:W ratio	9		2:1		Major secondary attachment	33	33.4	deflected
Laminar Shape	10	10.1	elliptic	Inter- 2º	Intersecondary proximal course	34.1	34.1.1	parallel to major secondaries
Medial Symmetry	11	11.1	symmetrical		intersecondary length	34.2	34 2 2	>50% of subjacent
Base Symmetry	12	12.1	symmetrical		distal course	343	88	not visible
Base Symmetry	12	12.1	-		vain fragueney	34.4	88	not visible
Laborian	12	. 12.1	- unlohad	30	Intersectal tartiany vain fabric	25	00	not visible
Mannin Tama	13	13.1	uniobed	5		2512	00	not visible
Margin Type	14	14.1	enure		Angle of percurrent terturies	33.1.2	00	not visible
Special Margin Features	15	00	not visible			30	00	not visible
Apex Angle	16	88	not visible		Epimedial tertiaries	3/	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	18.2	obtuse		Exterior tertiary course	38	88	not visible
Base shape	19	19.1.1	straight	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 Des	cription:			
Tooth spacing	44	99	n/a	Leaf At	tachment not visible, Leaf Arrar	gement	notvisib	le, Leaf Organization not
Number of orders of teeth	45	99	n/a	visible	, Leaflet Organization not visible	, Leaflet	Attachm	ent not visible, Petiole
Teeth / cm	46		n/a	Feature	s not visible, Position of Blade	Attachme	nt margi	nal, Laminar size
sinus shape	47	99	n/a	notoph	yll, Laminar L: W ratio 2:1, Lam	inar Shap	e elliptic	c, Medial Symmetry
tooth shapes	48		n/a	Morgin	Type entire Special Margin Fe	cal, Base	t visible	Apex Apgle potyisible
tooth shapes	48			Anex S	hape not visible Apex Shape -	Base An	gle obtu	se Base shape straight
tooth shapes	48			Base sh	hape -, Terminal Apex Features	not visib	le, Surfa	ce Texture not visible,
tooth shapes	48			Surfici	al Glands not visible, Primary Vo	ein Fram	ework pi	nnate, Naked Basal
principal vein	49	99	n/a	Veins	absent, Number of Basal Veins	l, Agroph	nic Veins	absent, Major 20 vein
· · · · · · · · ·	50	00		framew	ork simple brochidodromous, In	terior see	condaries	s absent, Minor
principal vein termination	50	99	n/a	second	ary course simple brochidodrom	ous, Perin	narginal	veins absent, Major
course of accessory vein	51	99	n/a	decreas	ing proximally Major secondar	vattachm	ent defle	ected Intersecondary
features of the tooth apex	52	99	n/a	proxim	al course parallel to major secon	daries, in	tersecon	dary length >50% of
				subjace Interco visible admedi not vis visible visible orders , tooth	ent secondary, distal course not v stal tertiary vein fabric not visibl , vein angle variability not visibl al course not visible, exmedial c ible, Quatemary Vein Fabric not , Areolation not visible, FEV bra , Marginal Ultimate venation not of teeth n/a, Teeth / cm n/a, sinu: shapes, tooth shapes, principal	isible, ve le, Angle e, Epime ourse not visible, (nching no visible, s shape n vein n/a, f the toot	in freque of percu dial tertia t visible, Quintern ot visible Tooth sp /a, tooth principal	encý not visible, rrent tertiaries not uries not visible, Exterior tertiary course ary Vein Fabric not , FEV termination not acing n/a, Number of shapes n/a, tooth shapes l vein termination n/a,



GA37 HM

DNMH spec. # 23776 DMNH loc. # 412

<u>GA38</u>]	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	Se	ction II. Venation	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	26.1	absent
Leaflet Attachment	5	88	not visible	2°	Major 20 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 °	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°	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°	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 De	escription:			
Tooth spacing	44	99	n/a	Leaf	Attachment not visible, Leaf Arra	ingemen	t not visib	le, Leaf Organization
Number of orders of teeth	45	99	n/a	not v	isible, Leaflet Organization not vi	isible, Le	aflet Atta	chment not visible,
Teeth / cm	46		n/a	Petio	le Features not visible, Position o	fBlade	Attachmer	nt marginal, Laminar
sinus shape	47	99	n/a	size n	notophyll, Laminar L: W ratio not	visible, l	Laminar S	hape elliptic, Medial
tooth shapes	48		n/a	Lobat	tion unlobed Margin Type entire	Snecial	Margin F	eatures not visible
tooth shapes	48			Apex	Angle not visible, Apex Shape n	ot visibl	e, Apex Sl	hape -, Base Angle
tooth shapes	48			acute	, Base shape straight, Base shape	- , Term	inal Apex	Features not visible,
tooth shapes	48			Surfa	ce Texture not visible, Surficial C	Glands n	ot visible,	Primary Vein
principal vein	49	99	n/a	Frame	ework pinnate, Naked Basal Veir	is absen	t, Number	of Basal Veins I,
principal vein termination	50	99	n/a	Interi	or secondaries absent. Minor seco	ondarv c	ourse not	visible. Perimarginal
course of accessory yein	51	99	n/a	veins	fimbrial vein, Major secondary s	pacing d	ecreasing	proximally, Variation
factures of the teeth area	52	00	n/a	ofsec	condary angle uniform, Major sec	ondary a	ittachmen	t basally decurrent,
reatures of the tool apex	52	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ша	Inters n/a, v percu visib midv margi visib visib order shape	secondary proximal course absent ein frequency n/a, Intercostal terr irrent, Angle of percurrent tertiari le, Epimedial tertiaries not visible ein, exmedial course basiflexed, in, Quaternary Vein Fabric not vi le, Areolation not visible, FEV br. le, Marginal Ultimate venation no s of teeth n/a, Teeth / cm n/a, sim es, tooth shapes, tooth shapes, p	t, interse tiary veir es acute, e, admed Exterior sible, Qu anching ot visible us shape rincipal	condary le h fabric sir vein angl ial course tertiary co internary not visible , Tooth sp n/a, tooth vein n/a, p	ngth n/a, distal course nuous opposite le variability not perpendicular to ourse terminating at the Vein Fabric not e, FEV termination not xacing n/a, Number of shapes n/a, tooth rincipal vein



GA38 HM

DNMH spec. # 23776 DMNH loc. # 412

<u>GA39</u>		Family	: Rhamnaceae?	Genus and Species: "Rhamnus" goldiand
Section I. Leaf Characters		score	description	Section II. Venation char. score description
Leaf Attachment	1	88	not visible	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
				eucampiouromous
Lasflat Attachment	5	00	not visible	Major 20 vein framework 27 27 21 2 brochidodromous di
Deticle Features	5	88	not visible	Interior secondaries 28 28 1 about
reuble reatures	0	00	not visible	Minor secondary course 29 20.2 simple breakidadron
Features of the Plader				Perimerginal vains 30 201 marsinal secondary
Position of Plada Attachment	7	7.1	manginal	Major secondary spacing 31 21.1 rowler
L aminor aiza	,	/.1 8.6	maaranhull	Variation of secondary analo 22 22.1 uniform
Laminar Size	0	8.0	2.1	Major cocondary attachment 22 22.1 uniform
Laminar L.w Tatio	10	10.2	2.1	Intersecondary anatimal course 24.1 0 sheart
Madial Summation	10	10.5	ovate	ter-
De se Summetry	11	11.1	symmetrical	distal accurate 24.2 00 m/a
Base Symmetry	12	12.1	symmetrical	distal course 34.3 99 H/a
Base Symmetry	12		-	Ven frequency 34.4 99 n/a
Lobation Mensin Teme	13	13.1	unobed	Angle of accommentationic 251.2.251.2.2 shares
Margin Type	14	14.1	entire	Angle of percurrent tertuaries 35.1.2 35.1.2.2 obtuse
Special Margin Features	15	88 16 1	not visible	Enimedial testinging 27, 27, 1, 1, 1, and 2, 27, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
Apex Angle	10	10.1	acute	Epimedial tertiaries 3/ 3/.1.1.1 opposite percurrent
Apex Shape	17	17.3	acuminate	admedial course 37.2.1 37.2.1.3 perpendicular to mic
Apex Shape	17		-	exmedial course 37.2.2 37.2.2.2 basiflexed
Base Angle	18	18.2	obtuse	Exterior tertiary course 38 38.2 looped
Base snape	19	88	not visible	Quaternary Vein Fabric 39 88 not visible
Base snape	19		-	Quinternary ven rabric 40 88 not visible
Terminal Apex reatures	20	88	not visible	EEV hereshing 42.1 88 not visible
Seefers Testers	21	00		FEV branching 42.1 88 not visible
Surface Texture	21	88	not visible	Marginal I Utimata vanation 42.2 88 not visible
Surnetar Glands	22	00	not visible	Marginal Onlinate venauon 45 88 not visible
Section III. Teeth				ext Description:
Tooth spacing	44	99	n/a	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organiza
Number of orders of teeth	45	99	n/a	not visible, Leaflet Organization not visible, Leaflet Attachment not visible
Teeth / cm	46		n/a	size macronhyll Laminar I: Wratio 2:1 Laminar Shane ovate Medial
sinus shape	47	99	n/a	Symmetry symmetrical. Base Symmetry symmetrical. Base Symmetry
tooth shapes	48		n/a	Lobation unlobed, Margin Type entire, Special Margin Features not visibl
tooth shapes	48			Apex Angle acute, Apex Shape acuminate, Apex Shape -, Base Angle of
tooth shapes	48			Base shape not visible, Base shape -, Terminal Apex Features not visible
tooth shapes	48			Surface Texture not visible, Surficial Glands not visible, Frimary vein Framework ninnate Naked Basal Veins absent Number of Basal Veins 1
principal vein	49	99	n/a	Agrophic Veins compound, Major 20 vein framework eucamptodromous
principal vein termination	50	99	n/a	becoming brochidodromous distally, Interior secondaries absent, Minor
course of accessory vein	51	99	n/a	secondary course simple brochidodromous, Perimarginal veins marginal
features of the tooth apex	52	99	n/a	secondary, Major secondary spacing regular, Variation of secondary angle
reatures of the tool apex	52	"	ii/a	uniform, Major secondary attachment basally decurrent, intersecondary
				frequency n/a . Intercostal tertiary vein fabric straight opposite percurrent,
				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 rabric not visible, Quinternary vein rabric not visible, Areolation not visible FEV branching not visible FEV termination not vi
				Marginal Ultimate venation not visible. Tooth spacing n/a. Number of ord
				teeth n/a, Teeth / cm n/a, sinus shape n/a, tooth shapes n/a, tooth shapes , t
				shapes, tooth shapes, principal vein n/a, principal vein termination n/a, co



GA39 HM

DNMH spec. # 45892 DMNH loc. # 3791

<u>GA40</u>		anniy	. Alt	caceae	Genus and Species. Thenocues sp.
tion 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 20 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- proximal course 34.1 99 n/a
Medial Symmetry	11	99	n/a		2° 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
tion III. Teeth					Text Description:
Tooth spacing	44	99	n/a		Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,
Number of orders of teeth	45	99	n/a		Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a,
Teeth / cm	46		n/a		Position of Blade Attachment n/a, Laminar size n/a, Laminar L: W ratio
sinus shape	47_	99	n/a		Symmetry - Lobation n/a Margin Type n/a, Special Margin Features
tooth shapes	48		n/a		n/a, Apex Angle n/a, Apex Shape n/a, Apex Shape -, Base Angle n/a,
tooth shapes	48				Base shape n/a, Base shape - , Terminal Apex Features n/a, Surface
tooth shapes	48				Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked
tooth shapes	48				Basal veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major
principal vein	49	99	n/a		20 vent framework n/a, interfor secondaries n/a, withor secondary course n/a Perimarginal vents n/a Major secondary spacing n/a Variation of
principal vein termination	50	99	n/a		secondary angle n/a, Major secondary attachment n/a, proximal course n/a
course of accessory vein	51	99	n/a		intersecondary length n/a, distal course n/a, vein frequency n/a, Intercosta
features of the tooth apex	52	99	n/a		tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle
reatures of the tool apex	52	"	11/a		variability n/a, Epimedial tertiaries n/a, admedial course n/a, exmedial
					Ouinternary 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 th
					tooth apoy n/o


GA40 HM

DNMH spec. # 46874 DMNH loc. # 412

<u>GA41</u>]	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	23.1	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
Leaflet Attachment	5	88	not visible	2°	Major 20 vein framework	27	27.3.1	simple brochidodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1	absent
					Minor secondary course	29	29.2	simple brochidodromous
Features of the Blade:					Perimarginal veins	30	0	absent
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	31.2	irregular
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	32.2	inconsistent
Laminar L:W ratio	9		not visible		Major secondary attachment	33	33.3	excurrent
Laminar Shape	10	10.3	ovate	Int	Intersecondary proximal course	34.1	34.1.1	parallel to major secondaries
M . 4:-1 Common toru		11.1		2°		24.2	24.2.1	<50% of subjacent secondary
Medial Symmetry	11	11.1	symmetrical		intersecondary length	34.2	34.2.1	
Base Symmetry	12	12.1	symmetrical	1	distal course	34.3	34.3.1	reticulating
Base Symmetry	12	•	-		vein frequency	34.4	34.4.1	< 1 per intercostal area
Lobation	13	13.1	unlobed	3°	Intercostal tertiary vein fabric	35	35.1.1.1.2	convex 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	36.3.1	basally concentric
Anex Angle	16	88	not visible		Enimedial tertiaries	37	37111	opposite percurrent
A nev Shape	17	88	not visible		admedial course	37 2 1	37 2 1 3	perpendicular to midvein
A new Shape	17	00	-		exmedial course	37.2.1	37 2 2 2 2	basiflexed
Base Angle	18	183	- reflex		Exterior tertiary course	37.2.2	38.2	looped
Base Aligie	10	10.2.1	aandata	<u>4</u> °	Quatamany Vain Echnia	20	20.2.2	issocial setionate
Base shape	10	19.2.1	cordate	5°	Qualernary Vein Fabric	40	00	not visible
Taminal Anar Easterna	20		-	5	Quimernary veni rabite	40	00	not visible
Terminal Apex reatures	20	88	not visible		Areolation EEV has a shine	41	88	not visible
		00			FEV branching	42.1	88	not visible
Surface lexture	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	Le	af Attachment not visible. Leaf Arranger	nent not v	isible. Lea	f Organization not
Number of orders of teeth	45	99	n/a	vis	ible, Leaflet Organization not visible, Le	aflet Atta	chment not	visible, Petiole
Teeth / cm	46		n/a	Fea	atures not visible, Position of Blade Attac	hment m	arginal, La	minar size notophyll,
sinus shane	47	99	n/a	La Ba	minar L:W ratio not visible, Laminar Sha se Symmetry symmetrical Base Symmetric	rv - I ol	Medial Sy	mmetry symmetrical
tooth shapes	18		n/a	en	tire, Special Margin Features not visible,	Apex An	gle not visi	ble, Apex Shape not
tooth shapes	40		iva	vis	ible, Apex Shape - , Base Angle reflex,	Base shap	e cordate,	Base shape -,
tooth shapes	40			Te	rminal Apex Features not visible, Surfac	e Texture Naked Ba	not visible	, Surficial Glands not
tootii shapes	40			Ba	sal Veins 1, Agrophic Veins compound,	Major 20	vein frame	work simple
tooth shapes	48	00		bro	ochidodromous, Interior secondaries abse	ent, Minor	secondary	course simple
	49	99	n/a	bro Va	chidodromous, Perimarginal veins absen riation of secondary angle inconsistent.	nt, Major : Major sec	secondary s ondarv atta	spacing irregular, chment excurrent.
principal vein termination	50	99	n/a	Int	ersecondary proximal course parallel to 1	najor sec	ondaries, in	tersecondary length
course of accessory vein	51	99	n/a	<5 int	0% of subjacent secondary, distal course	reticulati	ng, vein fre	equency < 1 per
features of the tooth apex	52	99	n/a	pe	rcurrent tertiaries obtuse, vein angle varia	ability bas	ally concer	ntric, Epimedial
				ter	tiaries opposite percurrent, admedial cou	rse perpe	ndicular to	midvein, exmedial
				co	urse basiflexed, Exterior tertiary course	looped, Q	uaternary V	Vein Fabric irregular
				no	t visible. FEV termination not visible. Ma	rginal Ul	timate vena	isible, FEV branching
				То	oth spacing n/a, Number of orders of tee	th n/a, Te	eth / cm n/a	i, sinus shape n/a,
				too	th shapes n/a, tooth shapes, tooth shapes	, tooth sh	apes, prin	cipal vein n/a,
				pri n/a	ncipal vein termination n/a, course of ac	cessory v	ein n/a, feat	tures of the tooth apex
				11/8				
				1				
				1				



GA41 HM

DNMH spec. # 23768 DMNH loc. # 412

		Family	: <u> </u>		Genus and Species:			
tion I. Leaf Characters		score	description	Se	ection II. Venation	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		5
Leaflet Organization	4	88	not visible		Agrophic Veins	26	26.2.2	compound
Leaflet Attachment	5	88	not visible	2°	Major 20 vein framework	27	27.3.1	simple brochidodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1	absent
					Minor secondary course	29	29.2	simple brochidodromous
Features of the Blade:					Perimarginal veins	30	0	absent
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	31.2	irregular
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	32.6	one pair acute basal secondaries
Laminar L:W ratio	9		4:3		Major secondary attachment	33	33.3	excurrent
Laminar Shape	10	10.1	elliptic	Intor	Intersecondary proximal course	34.1	0	absent
Medial Symmetry	11	11.1	symmetrical	2°	intersecondary length	34.2	99	n/a
Base Symmetry	12	12.1	symmetrical		distal course	34.3	99	n/a
Base Symmetry	12		-		vein frequency	34.4	99	n/a
Lobation	13	13.1	unlobed	3°	Intercostal tertiary vein fabric	35	35.1.1.1.2	convex opposite percurrent
Margin Type	14	14.1	entire	_	Angle of percurrent tertiaries	35.1.2	35121	acute
Snecial Margin Features	15	88	not visible		vein angle variability	36	36.2	consistent
A nev A ngle	16	16.1	acute		Enimedial tertiaries	37	37.1.4	mixed
Apex Shape	17	17.3	acuminate		admedial course	37.2.1	37 2 1 1	narallel to subjacent secondary
Apex Shape	17	17.5	-		exmedial course	37.2.1	37 2 2 1	parallel to intercostal tertiary
Base Angle	18	18.2	obtuse		Exterior tertiary course	38	38.2	looped
Dase Aligie Dase skare	10	10.1.2.1	rounded	4°	Quatamany Vain Eahnia	20	00	not visible
Dase shape	19	19.1.5.1	Tounded	5°	Quaternary Vein Fabric	39	00	not visible
Tamminal Anay Fastures	20		-	5	Quinternary Veni Fabric	40	00	not visible
Terminal Apex reatures	20	88	not visible		Areolation	41	88	not visible
Conferrer Treatment	21	00			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 Olumate venation	45	88	not visible
ation III Tooth				Toxt I	Deservition			
Tooth manine	44	00	n/a	Last	Attachment net visible. Leef Arma		at visible I	asf Organization not
Tooli spacing	44	99	ii/a	visib	le. Leaflet Organization not visible.	Leaflet /	Attachment	not visible. Petiole Features
Number of orders of teeth	43	99	n/a	not v	visible, Position of Blade Attachmen	nt margina	l, Laminar	size notophyll, Laminar
leeth / cm	46	00	n/a	L:W	ratio 4:3, Laminar Shape elliptic, M	fedial Syr	nmetry syn	metrical, Base Symmetry
sinus snape	4/	99	n/a	Feat	ures not visible. Apex Angle acute.	Anex Sha	o, Margin ine acumina	ate. Apex Shape - Base
tooth shapes	48		n/a	Ang	le obtuse, Base shape rounded, Base	e shape -	, Terminal	Apex Features not visible,
tooth shapes	48			Surf	ace Texture not visible, Surficial Gl	lands not	visible, Pri	mary Vein Framework
tooth shapes	48			pinna	ate, Naked Basal Veins absent, Nur nound Major 20 vein framework si	mber of B	asal Veins	5, Agrophic Veins
tooth shapes	48			abse	nt, Minor secondary course simple	brochidod	romous, Pe	rimarginal veins absent,
principal vein	49	99	n/a	Majo	or secondary spacing irregular, Vari	iation of s	econdary a	ngle one pair acute basal
principal vein termination	50	99	n/a	seco	ndaries, Major secondary attachment	course n/	nt, Intersec	ondary proximal course
course of accessory vein	51	99	n/a	tertia	ary vein fabric convex opposite perc	current, A	ngle of per	current tertiaries acute, vein
features of the tooth anex	52	99	n/a	angl	e variability consistent, Épimedial te	rtiaries n	nixed, admo	edial course parallel to
				subja cour Arec Ultir cm r	cent secondary, exmedial course pr se looped, Quaternary Vein Fabric Jation not visible, FEV branching n nate venation not visible, Tooth spac //a, sinus shape n/a, toth shapes n/a inal vein n/a, princinal vein termina	arallel to i not visible ot visible, cing n/a, l , tooth sha ation n/a,	intercostal t e, Quintern FEV termi Number of apes, tooth course of a	ertiary, Exterior tertiary ary Vein Fabric not visible, nation not visible, Marginal orders of teeth n/a, Teeth / shapes, tooth shapes, concerny with n/a feature of



GA42 HM

DNMH spec. # 46478 DMNH loc. # 3791

<u>GA43</u>		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 20 vein framework	27	88	not visible		
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	88	not visible		
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	88	not visible		
Laminar size	8	8.5	mesophyll		Variation of secondary angle	32	32.6	one pair acute basal secondaries		
Laminar L:W ratio	9		not visible		Major secondary attachment	33	33.3	excurrent		
Laminar Shape	10	88	not visible	Inte	r- Intersecondary proximal course	34.1	34.1.1	parallel to major secondaries		
Medial Symmetry	11	88	not visible	2 °	intersecondary length	34.2	34.2.2	>50% of subjacent secondary		
Base Symmetry	12	12.1	symmetrical		distal course	34.3	34.3.2	parallel to subjacent major secondary		
Base Symmetry	12		-		vein frequency	34.4	34.4.1	< 1 per intercostal area		
Lobation	13	13.1	unlobed	3°	Intercostal tertiary vein fabric	35	35.1.1.1.2	convex 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	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	37.2.1.2	parallel to intercostal tertiary		
Base Angle	18	18.2	obtuse		Exterior tertiary course	38	88	not visible		
Base shape	19	19.1.3	convex	4°	Quaternary Vein Fabric	39	39.1.3	mixed 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		
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		
6 J W T J				T	- D - 1 - 1					
Section III. Teeth			,	lex	t Description:					
I ooth spacing	44	99	n/a	Le	eaf Attachment not visible, Leaf	Arrange	ementnot	visible, Leaf Organization not		
Number of orders of teeth	45	99	n/a	Fé	stures not visible Position of B	lade Att	achment r	narginal Laminar size		
leeth / cm	46	00	n/a	m	esophyll, Laminar L:W ratio no	t visible	Laminar	Shape not visible, Medial		
sinus shape	47	99	n/a	S	mmetry not visible, Base Symr	netry sy	nmetrical	, Base Symmetry - , Lobation		
tooth shapes	48		n/a	uı	nlobed, Margin Type entire, Spe	cial Mar	gin Featu	es not visible, Apex Angle		
tooth shapes	48			no	ot visible, Apex Shape not visibl	e, Apex	Shape -,	Base Angle obtuse, Base		
tooth shapes	48			SI Ta	ape convex, Base snape -, Ierr	ninal Ap	icible Pri	es not visible, Surface		
tooth shapes	48			pi	nnate. Naked Basal Veins pres	ent. Num	ber of Ba	sal Veins 5. Agrophic Veins		
principal vein	49	99	n/a	cc	ompound, Major 20 vein framew	ork not	visible, In	terior secondaries absent,		
principal vein termination	50	99	n/a	Μ	inor secondary course not visib	le, Perin	narginal ve	eins not visible, Major		
course of accessory vein	51	99	n/a	se	condary spacing not visible, Va	riation o	fseconda	ry angle one pair acute basal		
features of the tooth apex	52	99	n/a	se	condaries, Major secondary atta	chment	ex current,	Intersecondary proximal length $>50\%$ of subjects		
				se	condary, distal course parallel to	o subiac	ent 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							
				cc	ourse parallel to intercostal tertia	ıry, Exte	rior tertiai	y course not visible,		
					uaternary Vein Fabric mixed pe	rcurrent,	Quintern	ary Vein Fabric not visible,		
				M	arginal Ultimate venation not v	isible Ta	ooth snaci	ng n/a. Number of orders of		
				te	eth n/a, Teeth / cm n/a, sinus sh	ape n/a,	tooth shap	es n/a, tooth shapes, tooth		
				sł	apes, tooth shapes, principal v	ein n/a, j	principal v	vein termination n/a, course of		



GA43 HM

DNMH spec. # 46482 DMNH loc. # 3792

<u>GA44</u>	1	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	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	26.2.2	compound
Leaflet Attachment	5	88	not visible	2°	Major 20 vein framework	27	27.3.1	simple brochidodromous
Petiole Features	6	88	not visible		Interior secondaries	28	28.1	absent
					Minor secondary course	29	29.2	simple brochidodromous
Features of the Blade:					Perimarginal veins	30	30.1	marginal secondary
Position of Blade Attachment	7	88	not visible		Major secondary spacing	31	88	not visible
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	Inte	Intersecondary proximal course	34.1	88	not visible
Medial Symmetry	11	88	not visible	2°	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	35.1.1.1.1	straight 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	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	88	not visible		Exterior tertiary course	38	38.2	looped
Base shape	19	88	not visible	4°	Ouaternary Vein Fabric	39	39.1.2	alternate percurrent
Base shape	19		-	5°	Quinternary Vein Fabric	40	40.1.2	irregular reticulate
Terminal Apex Features	20	88	not visible		Areolation	41	41.2.2	moderate development
					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
					8			
ection III. Teeth				Text	Description:			
Tooth spacing	44	99	n/a	Lea	f Attachment notvisible, Leaf Arrar	igement	notvisibl	e, Leaf Organization
Number of orders of teeth	45	99	n/a	not	visible, Leaflet Organization not vis	sible, Lea	aflet Atta	chment not visible,
Teeth / cm	46		n/a	Peti	mesonbull Laminar I: Wratio not	visible 1	laminar S	t not visible, Laminar
sinus shape	47	99	n/a	Mee	tial Symmetry not visible. Base Syr	nmetrv r	not visible	Base Symmetry
tooth shapes	48		n/a	Lob	ation unlobed, Margin Type entire,	Special	Margin Fe	eatures not visible,
tooth shapes	48			Ape	x Angle not visible, Apex Shape no	ot visible	, Apex Sh	ape -, Base Angle not
tooth shapes	48			V1S1	ble, Base shape not visible, Base sh	ape -, T	erminal A	pex Features not
tooth shapes	48			V1SI Erai	nework pinnate Naked Basal Veing	ncial G	Number	of Basal Veins 5
principal vein	49	99	n/a	Agr	ophic Veins compound. Major 20 v	ein fram	ework sin	nple brochidodromous.
principal vein termination	50	99	n/a	Inte	rior secondaries absent, Minor seco	ndary co	urse simp	le brochidodromous,
course of accessory yein	51	99	n/9	Peri	marginal veins marginal secondary	, Major s	econdary	spacing not visible,
for the second s	52	00		Var	iation of secondary angle not visible	e, Major	secondar	y attachment excurrent,
features of the tooth apex	52	99	n/a	Inte	rsecondary proximal course not visit	ible, inte	rsecondar	y length not visible,
				fabi vari per loo irre visi Too too prir	ic straight opposite percurrent, Ang ability not visible, Epimedial tertiar sendicular to midvein, exmedial con ped, Quatemary Vein Fabric alterna gular reticulate, Areolation moderat ble, FEV termination not visible, M th spacing n/a, Number of orders of th shapes n/a, tooth shapes; tooth sh cipal vein termination n/a, course o	le of per ries oppo urse basil te percur e develo arginal U f teeth n/ napes, to f accesso	stie percu site percu flexed, Ex rent, Quin pment, FE Jltimate v a, Teeth / oth shape ory vein n.	triaries acute, vein angle rrent, admedial course terior tertiary course aternary Vein Fabric V branching not enation not visible, cm n/a, sinus shape n/a, s, principal vein n/a, 'a, features of the tooth



GA44 HM

DNMH spec. # 45890 DMNH loc. # 3793

<u>GA45</u>]	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	Sectio	on II. Venation	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 20 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	30.1	marginal secondary
Position of Blade Attachment	7	7.1	marginal		Major secondary spacing	31	31.2	irregular
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	32.2	inconsistent
Laminar L:W ratio	9		not visible		Major secondary attachment	33	33.4	deflected
Laminar Shape	10	88	not visible	Inter-	Intersecondary proximal course	34.1	88	not visible
Medial Symmetry	11	88	not visible	2 °	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	18.2	obtuse		Exterior tertiary course	38	88	not visible
Base shape	19	19.1.1	straight	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 Desci	ription:			
Tooth spacing	44	99	n/a	Leaf Att	achment not visible. Leaf Arra	ngement	notvisi	ble. Leaf Organization not
Number of orders of teeth	45	99	n/a	visible,	Leaflet Organization not visibl	le, Leafle	t Attach	nent not visible, Petiole
Teeth / cm	46		n/a	Features	s not visible, Position of Blade	Attachm	ent marg	inal, Laminar size
sinus shape	47	99	n/a	notophy	ull, Laminar L: W ratio not visit	ole, Lami	nar Shar	e not visible, Medial
tooth shapes	48		n/a	Symmet	ry not visible, Base Symmetry	not visit	ole, Base	Symmetry -, Lobation
tooth shapes	48			visible.	Apex Shape not visible. Apex	Shape	Base At	of visible, Apex Angle not
tooth shapes	48			straight	, Base shape -, Terminal Apex	Features	s not visi	ble, Surface Texture not
tooth shapes	48			visible,	Surficial Glands not visible, P	rimary Vo	ein Fran	ework pinnate, Naked
principal vein	49	99	n/a	Basal V	eins absent, Number of Basal	Veins 1,	Agrophi	c Veins absent, Major 20
principal vein termination	50	99	n/a	course n	nework eucamptodromous, in	terior sec marginal	ondaries seconda	absent, Minor secondary
course of accessory vein	51	99	n/a	spacing	irregular, Variation of seconda	ary angle	inconsis	tent, Major secondary
factures of the testh successory with	51	00	ii/a	attachm	ent deflected, Intersecondary p	roximal	course n	ot visible, intersecondary
reatures of the toolin apex	52	"	wa	length n tertiary variabil exmedia Fabric n FEV bra venation n/a, sinu principa features	not visible, distal course not visible, Angle o ity not visible, Epimedial tertia al course not visible, Exterior tu ot visible, Quinternary Vein F inching not visible, FEV termin n not visible, Tooth spacing n/a is shape n/a, tooth shapes n/a, t al vein n/a, principal vein termi of the tooth apex n/a.	ible, vein of percurr iries not v ertiary co abric not nation no a, Numbe o oth shaj nation n/a	i frequen ent tertia visible, au urse not visible, t visible, r of orde pes, too a, course	cy not visible, Intercostal rires not visible, vein angle dimedial course not visible, visible, Quaternary Vein Areolation not visible, Marginal Ultimate rs of teeth n/a, Teeth / cm h shapes, tooth shapes, of accessory vein n/a,



GA45 HM

DNMH spec. # 45485 DMNH loc. # 3791

<u>GA46</u>]	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 23.1 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 20 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	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		1.5:1	Major secondary attachment 33 33.1 decurrent
Laminar Shape	10	10.1	elliptic	Inter- Intersecondary proximal course 34.1 88 not visible
Medial Symmetry	11	11.1	symmetrical	2° 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	16.1	acute	Epimedial tertiaries 37 88 not visible
Apex Shape	17	17.3	acuminate	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	88	not visible	4° Quaternary Vein Fabric 39 88 not visible
Base shape	19		-	5° Ouinternary 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,
Number of orders of teeth	45	99	n/a	Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not
Teeth / cm	46		n/a	visible, Position of Blade Attachment marginal, Laminar size notophyll, Laminar L:W
sinus shape	47	99	n/a	visible, Base Symmetry -, Lobation unlobed, Margin Type entire, Special Margin
tooth shapes	48		n/a	Features not visible, Apex Angle acute, Apex Shape acuminate, Apex Shape - , Base
tooth shapes	48			Angle acute, Base snape not visible, Base snape -, Terminal Apex Features not visible, Surface Texture not visible Surficial Glands not visible. Primary Vein Framework
tooth shapes	48			pinnate, Naked Basal Veins absent, Number of Basal Veins 1, Agrophic Veins absent,
tooth shapes	48			Major 20 vein framework eucamptodromous, Interior secondaries absent, Minor
principal vein	49	99	n/a	secondary course not visible, Perimarginal veins absent, Major secondary spacing decreasing proximally. Variation of secondary angle uniform Major secondary
principal vein termination	50	99	n/a	attachment decurrent, Intersecondary proximal course not visible, intersecondary length
	51	00		not visible, distal course not visible, vein frequency not visible, Intercostal tertiary vein
course of accessory vein	51	99	n/a	visible, Epimedial tertiaries not visible, admedial course not visible, exmedial course not
features of the tooth apex	52	99	n/a	visible, Exterior tertiary course not visible, Quaternary Vein Fabric not visible,
				Quinternary Vein Fabric not visible, Areolation not visible, FEV branching not visible,
				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

<u>GA47</u>	1	Family	:	Genus and Species: Cornophyllum newberryii					
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	
Leaf Arrangement	2	88	not visible		Naked Basal Veins	24	24.2	present	
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 20 vein framework	27	88	not visible	
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	7.1	marginal		Major secondary spacing	31	31.2	irregular	
Laminar size	8	8.4	notophyll		Variation of secondary angle	32	32.4	smoothly decreasing proximally	
Laminar L:W ratio	9		not visible		Major secondary attachment	33	33.3	excurrent	
Laminar Shape	10	88	not visible	Int	er- Intersecondary proximal course	34.1	88	not visible	
Medial Symmetry	11	11.1	symmetrical	20	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	35.1.2.1	acute	
Special Margin Features	15	88	not visible		vein angle variability	36	36.2	consistent	
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	18.2	obtuse		Exterior tertiary course	38	88	not visible	
Base shape	19	19.1.3	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	
Terminar Apex Features	20	00	not think		EEV branching	42.1	88	not visible	
Surface Texture	21	88	not visible		EV branding	42.1	88	not visible	
Surficial Glands	22	88	not visible		Marginal Ultimate venation	42.2	88	not visible	
Surnau Clanas		00				15	00		
ection III. Teeth				Text	Description:				
Tooth spacing	44	99	n/a	Le	af Attachment not visible, Leaf Arrangem	nent not v	isible, Leaf	Organization not	
Number of orders of teeth	45	99	n/a	vis	sible, Leaflet Organization not visible, Lea	iflet Atta	chment not	visible, Petiole Features	
Teeth / cm	46		n/a	no	t visible, Position of Blade Attachment m	arginal, L	aminar size	notopnyii, Laminar	
sinus shape	47_	99	n/a	Sv	mmetry symmetrical. Base Symmetry	Lobation	unlobed. N	largin Type entire.	
tooth shapes	48		n/a	Sp	ecial Margin Features not visible, Apex A	ngle not	visible, Ape	x Shape not visible,	
tooth shapes	48			Ap	ex Shape -, Base Angle obtuse, Base sha	ipe conve	x, Base sha	pe -, Terminal Apex	
tooth shapes	48			Fe	atures not visible, Surface Texture not vi	sible, Sur	ficial Gland	s not visible, Primary	
tooth shapes	48			Ve	ein Framework pinnate, Naked Basai Veir grophic Veins absent Maior 20 vein fram	ns preser ework no	tvisible In	of Basal Veins 1, terior secondaries	
principal vein	49	99	n/a	ab	sent, Minor secondary course not visible,	, Perimar	ginal veins	absent, Major	
principal vein termination	50	99	n/a	se	condary spacing irregular, Variation of se	condary	- angle smoo	thly decreasing	
course of accessory yein	51	99	n/a	pr	oximally, Major secondary attachment ex	current,	Intersecond	ary proximal course	
fortunes of the treth crow	52	00	- /-	no	t visible, intersecondary length not visible	le, distal	course not v	visible, vein frequency	
leatures of the tooth apex	52	99	n/a	De	rcurrent tertiaries acute, vein angle varia	ability cor	isistent. En	imedial tertiaries not	
				vis	sible, admedial course not visible, exmedi	al course	not visible,	Exterior tertiary	
				co	urse not visible, Quaternary Vein Fabric	not visibl	e, Quintern	ary Vein Fabric not	
				vis	sible, Areolation not visible, FEV branchin	ng not vis	ible, FEV ter	mination not visible,	
				M	arginal Ultimate venation not visible, To	oth spacir	ng n/a, Num	iber of orders of teeth	
				to	a, recurry unitya, situs snape n/a, tooth oth shapes, principal vein n/a, principal v	vein term	a, coorn sh ination n/a	apes, couris snapes, . course of accessory	
				ve	in n/a, features of the tooth apex n/a.			,	



GA47 HM

DNMH spec. # 45891 DMNH loc. # 3793

<u>GA40</u>]	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	Sec	tion II. Venation	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 20 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	7.1	marginal		Major secondary spacing	31	31.1	regular
Laminar size	8	8.3	microphyll		Variation of secondary angle	32	32.1	uniform
Laminar L:W ratio	9	015	5:2		Major secondary attachment	33	33.3	excurrent
Laminar Shape	10	10.1	elliptic		Intersecondary provinal course	34.1	88	not visible
Medial Symmetry	11	11.1	symmetrical	Inter-	intersecondary length	34.2	88	not visible
Base Symmetry	12	12.1	symmetrical	-	distal course	34.2	88	not visible
Base Symmetry	12	12.1	symmetrical		vain fraquancy	34.5	88	not visible
Labation	12	. 13.1	unlohad	30	Intercostal tertiary year fabric	25	251112	sinuous opposite percurrent
Monoin Tuno	1.0	13.1	antina	5	A nole of noncommont tentionics	2512	25 1 2 2	shiuous opposite percurrent
Special Manain Ecotures	14	14.1	enure		Angle of percurrent tertaries	35.1.2	00	ootuse not visible
Special Margin reatures	15	00	not visible		Faine dial tentionie	30	00	not visible
Apex Angle	10	10.1	acute		Epimedial tertaries	27.2.1	88	not visible
Apex Snape	17	17.5	acuminate		admediai course	37.2.1	88	not visible
Apex Shape	1/		-		exmedial course	37.2.2	88	not visible
Base Angle	18	18.1	acute	40	Exterior tertiary course	38	. 88	not visible
Base shape	19	19.1.3.1	rounded	4 = °	Quaternary Vein Fabric	39	88	not visible
Base shape	19	•	-	2	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
				T D				
Section III. Teeth				Text De	scription:			
Tooth spacing	44	99	n/a	Leaf A	tachment not visible, Leaf Arranger	ment not v	/isible, Lea	t Organization not
Number of orders of teeth	45	99	n/a	Feature	es not visible, Position of Blade Attac	chment m	arginal, La	minar size microphyll
Teeth / cm	46		n/a	Lamina	ar L:W ratio 5:2, Laminar Shape ellip	ptic, Med	ial Symmet	ry symmetrical, Base
sinus shape	47	99	n/a	Symme	try symmetrical, Base Symmetry - ,	Lobation	unlobed, N	Margin Type entire,
tooth shapes	48		n/a	Shape	- , Base Angle acute, Base shape ro	unded, Ba	se shape -	, Terminal Apex
tooth shapes	48			Featur	es not visible, Surface Texture not vi	isible, Sur	ficial Gland	ls not visible, Primary
tooth shapes	48			Vein F	ramework pinnate, Naked Basal Vei	ins absen	t, Number o	of Basal Veins 1,
tooth shapes	48			second	aries absent. Minor secondary course	e not visit	ole. Perimar	ginal veins absent.
principal vein	49	99	n/a	Major	secondary spacing regular, Variation	n of secon	dary angle	uniform, Major
principal vein termination	50	99	n/a	second	ary attachment excurrent, Intersecon	idary proz	cimal course cible vain f	e not visible, Fraquancy not visible
course of accessory vein	51	99	n/a	Interco	ostal tertiary vein fabric sinuous oppo	osite perci	urrent, Ang	le of percurrent
features of the tooth aney	52	99	n/9	tertiari	es obtuse, vein angle variability not v	visible, Ep	oimedial ter	tiaries not visible,
	52	,,	ina	admed visible Areola Margir n/a, Te tooth sl	ial course not visible, exmedial cour; Quaternary Vein Fabric not visible, tion not visible, FEV branching not v lal Ultimate venation not visible, Toc eth / cm n/a, sinus shape n/a, tooth sh apes, principal vein n/a, principal v	se not visi , Quintern visible, FE oth spacin hapes n/a vein termi	ible, Exterio ary Vein Fa V terminat g n/a, Numi , tooth shap nation n/a,	or tertiary course not abric not visible, ion not visible, ber of orders of teeth es, tooth shapes, course of accessory



GA48 HM

DNMH spec. # 48375 DMNH loc. # 500

<u>GA49</u>]	Family	:		Genus and Species:			
Section I. Leaf Characters		score	description	Sectio	n 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	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	2°	Major 20 vein framework	27	27.1.2	semicraspedodromous
Petiole Features	6	88	not visible		Interior secondaries	28	88	not visible
					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	88	not visible
Laminar size	8	8.5	mesophyll		Variation of secondary angle	32	88	not visible
Laminar L:W ratio	9		10:7		Major secondary attachment	33	33.3	excurrent
Laminar Shape	10	10.3	ovate	Inter-	Intersecondary proximal course	34.1	88	not visible
Medial Symmetry	11	11.1	symmetrical	2°	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	14.2.2	serrate		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	88	not visible		Exterior tertiary course	38	88	not visible
Base shape	19	88	not visible	4°	Quaternary Vein Fabric	39	88	not visible
Base shape	19		-	5°	Ouinternary Vein Fabric	40	88	not visible
Terminal Apex Features	20	88	not visible		Areolation	41	88	not visible
1 A					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
					0			
ection III. Teeth				Text Desci	iption:			
Tooth spacing	44	44.2	irregular	Leaf Atta	chment not visible, Leaf Arranger	nent not vi	sible, Lea	f Organization not
Number of orders of teeth	45	45.2	two	visible, L	eaflet Organization not visible, Le	aflet Attac	hment no	t visible, Petiole
Teeth / cm	46		1	reatures	not visible, Position of Blade Attac Laminar I W ratio 10:7 Lamin	ar Shape of	visible, L	aminar size lial Symmetry
sinus shape	47	47.2	rounded	symmetri	cal, Base Symmetry not visible, Ba	ise Symme	try - , Lo	bation unlobed,
tooth shapes	48		st/st	Margin T	ype serrate, Special Margin Featu	res not visi	ble, Apex	Angle not visible,
tooth shapes	48		cv/cv	visible, B	ase shape Terminal Apex Feat	ures not vis	sible. Surf	ace Texture not
tooth shapes	48			visible, Si	rficial Glands not visible, Primar	y Vein Fra	mework	pinnate, Naked Basal
tooth shapes	48			Veins ab	sent, Number of Basal Veins 3, A	grophic Ve	ins comp	ound, Major 20 vein
principal vein	49	88	not visible	course no	t visible. Perimarginal veins abser	secondarie nt. Major se	s not visit	spacing not visible.
principal vein termination	50	88	not visible	Variation	of secondary angle not visible, M	ajor secon	dary attac	hment excurrent,
course of accessory voim	51	88	not visible	Interseco	ndary proximal course not visible,	intersecor	dary leng	th not visible, distal
course of accessory vem	51	00	not visible	visible. A	ngle of percurrent tertiaries not visible	sible, vein	angle var	iability not visible,
features of the tooth apex	52	88	not visible	Epimedia	l tertiaries not visible, admedial co	ourse not v	isible, ex1	nedial course not
				visible, E	sterior tertiary course not visible,	Quaternar	Vein Fal	bric not visible,
				visible, Fl	EV termination not visible, Margir	al Ultimat	e venation	n not visible, Tooth
				spacing in	regular, Number of orders of teet	h two , Tee	th / cm 1,	sinus shape rounded,
				tooth shap	es st/st, tooth shapes cv/cv, tooth	shapes, to	oth shape	s, principal vein not
				features of	of the tooth apex not visible.	e, course o	accesso	y veni not visible,
				1				

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GA49 HM

DNMH spec. # 48358 DMNH loc. # 500

<u>GA50</u>	J	Family	:	Genus and Species:			
Section I. Leaf Characters	-	score	description	Section II. Venation	char.	score	description
Leaf Attachment	1	88	not visible	1º 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 ^e Major 20 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
Features of the Blade:				Perimarginal veins	30	0	absent
Position of Blade Attachment	7	7.1	marginal	Major secondary spacing	31	88	not visible
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	10.4	oblong	Inter- proximal course	34.1	88	not visible
Medial Symmetry	11	11.1	symmetrical	2° 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	88	not visible
Margin Type	14	14.2.2	serrate	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	18.2	obtuse	Exterior tertiary course	38	88	not visible
Base shape	19	19.2.1	cordate	4° Quaternary Vein Fabric	39	88	not visible
Base shape	19		_	5° Quinternary Vein Fabric	40	88	not visible
Terminal Anex Features	20		not visible	Areolation	41	88	not visible
r of mining r open r outair os	20	00	not visione	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	42.2	88	not visible
Surrear Sands		00	not visiole			00	
Section III. Teeth				Text Description:			
Tooth spacing	44	44.2	irregular	Leaf Attachment not visible, Leaf Arranger	nent not v	isible, Lea	of Organization not
Number of orders of teeth	45_	45.1	one	visible, Leaflet Organization not visible, Le	aflet Atta	chment no	t visible, Petiole
Teeth / cm	46		1	Laminar L:W ratio not visible, Laminar Sha	pe oblong	g, Medial S	Symmetry
sinus shape	47	47.2	rounded	symmetrical, Base Symmetry symmetrical,	Base Sym	metry - ,	Lobation unlobed,
tooth shapes	48		st/st	Margin Type serrate, Special Margin Featu Apex Shape not visible Apex Shape - Ba	res not vis se Angle (ible, Apex	Angle not visible, se shape cordate Base
tooth shapes	48		cv/cv	shape -, Terminal Apex Features not visib	le, Surface	e Texture	not visible, Surficial
tooth shapes	48			Glands not visible, Primary Vein Framewor	k basal ac	rodromou	s, Naked Basal Veins
tooth shapes	48			present, Number of Basal Veins 5, Agrophi framework semicraspedodromous Interior	c Veins co secondario	ompound,	Major 20 vein Minor secondary
principal vein	49	49.1	present	course semicraspedodromous, Perimargina	l veins abs	ent, Majo	r secondary spacing not
principal vein termination	50	88	not visible	visible, Variation of secondary angle not vi	sible, Maj	or seconda	ary attachment
course of accessory vein	51	88	not visible	not visible, vein frequency not visible, inter	rsecondary	y length no tiary vein f	ot visible, distal course fabric not visible.
ft	50	00		Angle of percurrent tertiaries not visible, ve	in angle v	ariability	not visible, Epimedial
reatures of the tooth apex	32	00	not visible	tertiaries not visible, admedial course not vi	isible, exm	nedial cou	rse not visible, Exterior
				Eabric not visible Areolation not visible FE	V branch	ot visible, (Quinternary Vein sible FEV termination
				not visible, Marginal Ultimate venation not	visible, 7	Footh space	ing irregular, Number
				of orders of teeth one , Teeth / cm 1, sinus	shape rou	nded, toot	h shapes st/st, tooth
				snapes cv/cv, tooth shapes, tooth shapes, p	vein not v	em presen visible fea	t, principal vein atures of the tooth apex
				not visible.	, em not ,		anes of the tooli upor



GA50 HM

DNMH spec. # 48354 DMNH loc. # 500

ection I. Leaf Characters				
Leaf Attachment		score	description	Section II. Venation char. score description
Leaf Autominent	1	88	not visible	1° Primary Vein Framework 23 23.2.1.2 suprabasal 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 20 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
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
Laminar size	8	8.5	mesophyll	Variation of secondary angle 32 32.1 uniform
Laminar L:W ratio	9		5:3	Major secondary attachment 33 33.3 excurrent
Laminar Shape	10	10.3	ovate	Inter- proximal course 34.1 88 not visible
Medial Symmetry	11	11.1	symmetrical	2° 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	3º Intercostal tertiary vein fabric 35 88 not visible
Margin Type	14	14.2.2	serrate	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	16.1	acute	Epimedial tertiaries 37 88 not visible
Apex Shape	17	17.2	convex	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	0	absent	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
ection III. Teeth				Text Description:
Tooth spacing	44	44.1	regular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not
Number of orders of teeth	45	45.1	one	visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole
Teeth / cm	46		2	Features not visible, Position of Blade Attachment marginal, Laminar size
sinus shape	47	47.2	rounded	mesophyll, Laminar L: W ratio 5:3, Laminar Shape ovate, Medial Symmetry
tooth shapes	48		cv/cv	Margin Type servate 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, Agrophic
principal vein termination	50	50.2.1	at apex of tooth	weins simple, Major 20 vein framework craspedodromous, Interior secondaries
acumos of according to be	51	00	not visible	Major secondary spacing decreasing proximally. Variation of secondary angle
course of accessory vem	51	00	not visible	uniform, Major secondary attachment excurrent, proximal course not visible,
features of the tooth apex	52	88	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, admedia
				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

<u>GA52</u>		Family	Platanaceae		Genus and Species:		Platan	ites marginata
Section I. Leaf Characters		score	description		Section II. Venation	char.	score	description
Leaf Attachment	1	88	not visible	1°	Primary Vein Framework	23	23.2.1.1	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	26.2.2	compound
Leaflet Attachment	5	88	not visible	2°	Major 20 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
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	8.3	microphyll		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	10.1	elliptic	Int	er- proximal course	34.1	88	not visible
Medial Symmetry	11	88	not visible	2 °	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	35.1.1.3	mixed percurrent
Margin Type	14	14.2.2	serrate		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	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	18.1	acute		Exterior tertiary course	38	88	not visible
Base shape	19	19.1.3.1	rounded	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	44.1	regular	Le	af Attachment not visible, Leaf Arra	ingemen	t not visib	ele, Leaf Organization
Number of orders of teeth	45	45.1	one	nc	t visible, Leaflet Organization not v	isible, Le	aflet Atta	achment not visible,
Teeth / cm	46		3	Pe	tiole Features not visible, Position of	f Blade A	Attachmen	nt not visible,
sinus shape	47	47.2	rounded	La	minar size microphyll, Laminar L: V	V ratio no	ot visible,	Laminar Shape
tooth shapes	48		st/st	S	mmetry - Lobation unlobed Marg	in Type	serrate Si	necial Margin
tooth shapes	48		st/c v	Fe	atures not visible, Apex Angle not v	isible, A	pex Shap	e not visible, Apex
tooth shapes	48		cv/st	Sh	ape -, Base Angle acute, Base shap	be rounde	d, Base s	hape -, Terminal
tooth shapes	48			A	bex Features not visible, Surface Tex	ture not	vısible, S	urficial Glands not
principal vein	49	49.1	present	V1 ab	sidie, ritmary vein Framework bas	aractino	ins comp	ound Major 20 vein
principal vein termination	50	50.2.1	at apex of tooth	fra	amework craspedodromous. Interior	secondai	ies absen	t. Minor secondary
course of accessory vein	51	88	not visible	co	urse craspedodromous, Perimargina	l veins at	sent, Ma	jor secondary spacing
factures of the teeth area	52	00	not visible	in	egular, Variation of secondary angle	e uniform	, Major s	econdary attachment
reatures of the tool apex	52	00	IOLVIMOR	ex co mi nc pe nc vi nc Nu sh ve	current, proximal course not visible urse not visible, vein frequency not ixed percurrent, Angle of percurrent it visible, Epimedial tertiaries oppos rpendicular to midvein, exmedial cc ti visible, Quaternary Vein Fabric no sible, Areolation not visible, FEV br t visible, Marginal Ultimate venatio imber of orders of teeth one, Teeth apes st/st, tooth shapes st/cv, tooth s in present, principal vein terminatio	, intersectivisible, Intersectivisible, Intertiaries ite percurburse basis of visible, anching n not vis / cm 3, s hapes cv, n at apex	ondary le ntercostal obtuse, v rrent, adm flexed, E Quintern not visibl- ible, Too inus shap /st, tooth of tooth,	ngth not visible, distal I tertiary vein fabric vein angle variability nedial course ixterior tertiary course ixterior tertiary course ary Vein Fabric not e, FEV termination th spacing regular, se rounded, tooth shapes, principal course of accessory



GA52 HM

DNMH spec. # 48373 DMNH loc. # 500

<u>GA53</u>	Family: Rhamnacea			ne?	? Genus and Species:		"Zizyphus" sp.			
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	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 20 vein framework	27	27.2.1	eucamptodromous		
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	30.3	fimbrial vein		
Position of Blade Attachment	7	88	not visible		Major secondary spacing	31	31.2	irregular		
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	10.1	elliptic	Inte	r- proximal course	34.1	88	not visible		
Medial Symmetry	11	11.1	symmetrical	2 °	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	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	37.2.2.1	parallel to intercostal tertiary		
Base Angle	18	18.2	obtuse		Exterior tertiary course	38	88	not visible		
Base shape	19	19.1.3.1	rounded	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	Lea	at Attachment not visible, Leaf Arranger	nent not v	usible, Lea	f Organization not t visible Petiole		
Number of orders of teeth	45	99	n/a	Fea	itures not visible, Position of Blade Attac	hment nc	t visible, L	aminar size notophyll,		
Teeth / cm	46		n/a	Lai	minar L:W ratio not visible, Laminar Sha	pe ellipti	c, Medial S	ymmetry		
sinus shape	47	99	n/a	syn Ma	nmetrical, Base Symmetry symmetrical, rgin Type entire, Special Margin Featur	Base Sym	metry -, I ble Anex	Lobation unlobed, Angle not visible		
tooth shapes	48		n/a	Ap	ex Shape not visible, Apex Shape - , Ba	se Angle	obtuse, Bas	se shape rounded, Base		
tooth shapes	48			sha	pe - , Terminal Apex Features not visib	le, Surfac	e Texture r	not visible, Surficial		
tooth shapes	48			Gla Nu	mber of Basal Veins 5 Agrophic Veins	rk paimat simple M	e, Naked B laior 20 vei	asal veins absent, in framework		
tooth shapes	48			euc	amptodromous, Interior secondaries abs	ent, Minc	r secondar	y course		
principal vein	49	99	n/a	cra	spedodromous, Perimarginal veins fimb	rial vein,	Major seco	ndary spacing		
principal vein termination	50	99	n/a	exc	current, proximal course not visible, inter	rsecondar	y length no	t visible, distal course		
course of accessory vein	51	99	n/a	not	visible, vein frequency not visible, Inter	rcostal ter	tiary vein f	abric straight opposite		
features of the tooth apex	52	99	n/a	per Eni	current, Angle of percurrent tertiaries of medial tertiaries opposite percurrent ad	otuse, ven medial co	angle vari	ability not visible, ndicular to midvein		
				exr Qu not Ult	nedial course parallel to intercostal tertia aternary Vein Fabric not visible, Quinter visible, FEV branching not visible, FEV imate venation not visible, Tooth spacin	ry, Exter mary Vei terminat g n/a, Nu	ior tertiary n Fabric no ion not visil mber of or	course not visible, t visible, Areolation ble, Marginal ders of teeth n/a, Teeth		
				/ cr prii fea	n n/a, sinus shape n/a, tooth shapes n/a, t ncipal vein n/a, principal vein terminatio tures of the tooth apex n/a.	ooth shap n n/a, cou	es , tooth sl irse of acce	hapes , tooth shapes , ssory vein n/a,		

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GA53 HM

DNMH spec. # 46478 DMNH loc. # 3791

<u>GA34</u>	Family:			Genus and Species:			
ection I. Leaf Characters		score	description	Section II. Venation char. s	core 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 2	5.2.2 compound		
Leaflet Attachment	5	88	not visible	2° Major 20 vein framework 27 2	7.1.1 craspedodromous		
Petiole Features	6	88	not visible	Interior secondaries 28	28.2 present		
				Minor secondary course 29	29.3 semicraspedodromous		
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	8.4	notophyll	Variation of secondary angle 32	32.2 inconsistent		
Laminar L:W ratio	9		not visible	Major secondary attachment 33	33.1 decurrent		
Laminar Shape	10	10.1	elliptic	proximal course 34.1	0 absent		
Medial Symmetry	11	11.1	symmetrical	2° intersecondary length 34.2	99 n/a		
Base Symmetry	12	12.1	symmetrical	distal course 34.3	99 n/a		
Base Symmetry	12		-	vein frequency 34.4	99 n/a		
Lobation	13	13.2.1	palmately lobed	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		
Anex Angle	16	88	not visible	Enimedial tertiaries 37 37	1.1.1 opposite percurrent		
A pex Shape	17	88	not visible	admedial course 37.2.1 37	2.1.3 perpendicular to midvein		
A new Shape	17	00	-	exmedial course 37.2.2 37	2.2.1.5 perpendicular to indiveni 2.2.1 parallel to intercostal tertiary		
Rase Angle	18		not visible	Exterior tertiory course 38	22.2.1 parametrio intercostar tertiary		
Base shape	10	88	not visible	4° Quaternary Vain Fabric 30	88 not visible		
Base shape	10	88	not visible	5° Ovintementy Vein Februar 40	22 not visible		
Tarminal A new Factures	20		-	5 Quinternary vein Fabric 40	88 not visible		
Terminar Apex Features	20	00	not visible	FEW hereshine 42.1	88 not visible		
	21	00		FEV branching 42.1	88 not visible		
Surface Texture	21	88	not visible	FEV termination 42.2	88 not visible		
Surficial Gialids	22	00	not visible	Warginar Onimate venation 45	88 Hot VISIDIE		
ection III Teeth				Text Description.			
Tooth spacing	44	00	n/a	Leaf Attachment not visible Leaf Armnoement not visible	a Leaf Organization not		
Number of orders of teeth	44	99	n/a	visible, Leaflet Organization not visible, Leaflet Attachm	ent not visible, Petiole		
Tooth / om	45	99	n/a	Features not visible, Position of Blade Attachment not vis	ible, Laminar size notophyll,		
ieeu / en	40	00	ii/a	Laminar L:W ratio not visible, Laminar Shape elliptic, M	edial Symmetry		
sinus shape	4/	99	n/a	lobed. Margin Type entire. Special Margin Features not v	isible. Apex Angle not		
tooth shapes	48		n/a	visible, Apex Shape not visible, Apex Shape - , Base An	gle not visible, Base shape		
tooth shapes	48			not visible, Base shape -, Terminal Apex Features not v	isible, Surface Texture not		
tooth shapes	48			Veins absent. Number of Basal Veins 3. Agrophic Veins	compound. Major 20 vein		
tooth shapes	48			framework craspedodromous, Interior secondaries preser	it, Minor secondary course		
principal vein	49	99	n/a	semicraspedodromous, Perimarginal veins absent, Major	secondary spacing irregular,		
principal vein termination	50	99	n/a	proximal course absent intersecondary length n/a, distal	course n/a, vein frequency		
course of accessory vein	51	99	n/a	n/a, Intercostal tertiary vein fabric straight opposite percu	irrent, Angle of percurrent		
features of the tooth apex	52	99	n/a	tertiaries obtuse, vein angle variability not visible, Epime	dial 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, 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.			



GA54 HM

DNMH spec. # 23767 DMNH loc. # 412

<u>GA55</u>]	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 23.2.1.1 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	2º Major 20 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- proximal course 34.1 88 not visible				
Medial Symmetry	11	11.1	symmetrical	2° 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	3º 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 ⁶ 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				
Number of orders of teeth	45	99	n/a	visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole Features not visible. Position of Blade Attachment not visible. Laminar size				
Teeth / cm	46		n/a	mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial				
sinus shape	47	99	n/a	Symmetry symmetrical, Base Symmetry symmetrical, Base Symmetry - , Lobation				
tooth shapes	48		n/a	visible, Apex Shape not visible, Apex Shape - , Base Angle acute, Base shape				
tooth shapes	48			concavo-convex, Base shape - , Terminal Apex Features not visible, Surface Texture				
tooth shapes	48			not visible, Surficial Glands not visible, Primary Vein Framework basal				
tooth shapes	48			simple, Major 20 vein framework eucamptodromous, Interior secondaries absent,				
principal vein	49	99	n/a	Minor secondary course not visible, Perimarginal veins absent, Major secondary				
principal vein termination	50	99	n/a	spacing irregular, Variation of secondary angle not visible, Major secondary attachment excurrent proximal course not visible intersecondary length not visible				
course of accessory vein	51	99	n/a	distal course not visible, vein frequency not visible, Intercostal tertiary vein fabric				
features of the tooth apex	52	99	n/a	straight opposite percurrent, Angle of percurrent tertiaries obtuse, vein angle				
				exmedial course not visible, Exterior teriary course not visible, Quatemary 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 text n'a, Texth / cm n'a, sinus shape n'a, tooth shapes n/a, tooth shapes, tooth shapes, tooth shapes, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.				
				4				

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GA55 HM

DNMH spec. # 48360 DMNH loc. # 500

<u>GA56</u>		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 20 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- proximal course	34.1	99	n/a	
Medial Symmetry	11	99	n/a	2° 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	
				g				
Section III. Teeth				Text Description:				
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangeme	nt n/a, Le	af Organ	ization	n/a,
Number of orders of teeth	45	99	n/a	Leaflet Organization n/a, Leaflet Atta	chment n/	a, Petiol	e Featur	es n/a,
Teeth / cm	46		n/a	Position of Blade Attachment n/a, Lan	ninar size	n/a, Lan	ninar L:	Wratio
sinus shape	47	99	n/a	n/a, Laminar Snape n/a, Medial Symm	ietry n/a, I	Base Syr	nmetry lorgin E	n/a, Base
tooth shapes	48		n/a	n/a, Apex Angle n/a, Apex Shape n/a.	Apex Sh	ape - B	ase Ang	le n/a.
tooth shapes	48			Base shape n/a, Base shape -, Termin	al Apex F	reatures	n/a, Sur	face
tooth shapes	48			Texture n/a, Surficial Glands n/a, Prin	nary Vein	Framev	vork n/a	, Naked
tooth shapes	48			Basal Veins n/a, Number of Basal Ve	1ns n/a, A	grophic	Veins n	/a, Major
principal vein	49	99	n/a	20 vein framework n/a, Interfor second	ondary se	, withor s	a Varia	tion of
principal vein termination	50	99	n/a	secondary angle n/a, Major secondary	attachme	ntn/a, p	n, varia roximal	course n/a.
course of accessory vein	51	99	n/a	intersecondary length n/a, distal cours	e n/a, veir	frequer	icy n/a,	Intercostal
for the set of accessory vehic	51	00		tertiary vein fabric n/a, Angle of percu	rrent terti	aries n/a	, vein a	ngle
reatures of the tooth apex	52	99	n/a	variability n/a, Epimedial tertiaries n/a	a, admedia	al course	n/a, exi	medial
				Ouinternary Vein Fabric n/a Areolati	on n/a FF	V branc	hing n/s	ii/a, FFV
				termination n/a, Marginal Ultimate ve	nation n/a	, Tooth	spacing	n/a,
				Number of orders of teeth n/a, Teeth /	cm n/a, si	inus shaj	be n∕a, t	ooth
				shapes n/a, tooth shapes, tooth shapes	, tooth sh	apes, pi	incipal	vein n/a,
				principal vein termination n/a, course	of accesso	ory vein	n/a, feat	tures of the
				tootn apex n/a.				
Reproductive axis								
				Γ				

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GA56 HM

DNMH spec. # 48368 DMNH loc. # 500

<u>A57</u>	Family:			Genus and Species:
ction 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 20 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- proximal course 34.1 99 n/a
Medial Symmetry	11	99	n/a	2° 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
ction III. Teeth				Text Description:
Tooth spacing	44	99	n/a	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,
Number of orders of teeth	45	99	n/a	Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a,
Teeth / cm	46		n/a	Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio
sinus shape	47	99	n/a	n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base
tooth shapes	48		n/a	Symmetry -, Lobation n/a, Margin Type n/a, Special Margin Features
tooth shapes	48			Base shape n/a, Base shape -, Terminal Apex Features n/a. Surface
tooth shapes	48			Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked
tooth shapes	48			Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major
principal vein	49	99	n/a	20 vein framework n/a, Interior secondaries n/a, Minor secondary course
nrincinal vein termination	50	00	n/a	n/a, Perimarginal vems n/a, Major secondary spacing n/a, Variation of
principar veni termination	50		u	intersecondary length n/a, distal course n/a, vein frequency n/a Intercostal
course of accessory vein	51	99	n/a	tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle
features of the tooth apex	52	99	n/a	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, Ouinternary 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



GA57 HM

DNMH spec. # 23771 DMNH loc. # 412

<u>GA58</u>]	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 88 not visible				
Leaf Arrangement	2	88	not visible	Naked Basal Veins 24 88 not visible				
Leaf Organization	3	88	not visible	Number of Basal Veins 25 not visible				
Leaflet Organization	4	88	not visible	Agrophic Veins 26 88 not visible				
Leaflet Attachment	5	88	not visible	2º Major 2o vein framework 27 27.3.1 simple brochidodromous				
Petiole Features	6	88	not visible	Interior secondaries 28 88 not visible				
				Minor secondary course 29 29.2 simple brochidodromous				
Features of the Blade:				Perimarginal veins 30 88 not visible				
Position of Blade Attachment	7	88	not visible	Major secondary spacing 31 88 not visible				
Laminar size	8	88	not visible	Variation of secondary angle 32 88 not visible				
Laminar L:W ratio	9		not visible	Major secondary attachment 33 88 not visible				
Laminar Shape	10	88	not visible	proximal course 34.1 88 not visible				
Medial Symmetry	11	88	not visible	2° 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	88	not visible	3° Intercostal tertiary vein fabric 35 35.1.1.2 alternate percurrent				
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				
Anex 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	88	not visible	Exterior tertiary course 38 38.2 looped				
Base shape	19	88	not visible	4° Quaternary Vein Fabric 39 3913 mixed percurrent				
Base shape	19		-	5° Ouinternary Vein Fabric 40 40.1.2 irregular reticulate				
Terminal Anex Features	20	88	not visible	Areolation 41 41.2.2 moderate development				
Terriniar riper Teatan es	20	00	not visiole	FEV branching 42.1 88 not visible				
Surface Texture	21	88	not visible	FFV termination 42.2 88 not visible				
Surface Texture	21	88	not visible	Marginal Ultimate venation 43 88 not visible				
burneur Gunds		00	not visiole	Marginar Chinate Feration 15 00 not fibilite				
ection III. Teeth				Text Description:				
Tooth spacing	44	99	n/a	Leaf Attachment not visible. Leaf Arrangement not visible. Leaf Organization not				
Number of orders of teeth	45	99	n/a	visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole				
Teeth / cm	46		n/a	Features not visible, Position of Blade Attachment not visible, Laminar size not				
sinus shape	47	99	n/a	not visible. Base Symmetry not visible. Base Symmetry - Lobation not visible				
tooth shapes	48		n/a	Margin Type entire, Special Margin Features not visible, Apex Angle not visible,				
tooth shapes	48			Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape not				
tooth shapes	48			visible, Base shape -, Terminar Apex relatives not visible, Surface rextine not visible, Surficial Glands not visible, Primary Vein Framework not visible, Naked				
tooth shapes	48			Basal Veins not visible, Number of Basal Veins not visible, Agrophic Veins not				
principal vein	49	99	n/a	visible, Major 20 vein framework simple brochidodromous, Interior secondaries not				
principal tem	50	00		visible, Major secondary spacing not visible, Variation of secondary angle not visible,				
principal vein termination	50	99	n/a	Major secondary attachment not visible, proximal course not visible, intersecondary				
course of accessory vein	51	99	n/a	length not visible, distal course not visible, vein frequency not visible, Intercostal				
features of the tooth apex	52	99	n/a	angle variability not visible. Epimedial tertiaries not visible, admedial course not				
				used that the state of the s				


GA58 HM

DNMH spec. # 48362 DMNH loc. # 500

<u>GA59</u>]	Family	<i>r</i> :	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	23.1	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 20 vein framework	27	88	not visible			
Petiole Features	6	88	not visible	Interior secondaries	28	88	not visible			
				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	8.4	notophyll	Variation of secondary angle	32	88	not visible			
Laminar L:W ratio	9		6:1.5	Major secondary attachment	33	88	not visible			
Laminar Shape	10	10.2	obovate	Inter- proximal course	34.1	88	not visible			
Medial Symmetry	11	11.1	symmetrical	2° 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	16.1	acute	Epimedial tertiaries	37	88	not visible			
Apex Shape	17	17.3	acuminate	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	88	not visible	4° Quaternary Vein Fabric	39	88	not visible			
Base shape	19	00	-	5° Quinternary Vein Fabric	40	88	not visible			
Terminal Apex Features	20	88	not visible	Areolation	41	88	not visible			
rennarripen reatares	20	00	not vibiolo	FEV branching	42.1	88	not visible			
Surface Texture	21	88	not visible	FEV termination	42.1	88	not visible			
Surficial Glands	22	88	not visible	Marginal Ultimate venation	42.2	88	not visible			
Sarriolari Olarido		00	101 101010	ininginar chanate venation	15	00	not visiole			
Section III. Teeth				Text Description:						
Tooth spacing	44	99	n/a	Leaf Attachment not visible. Leaf Arrange	ment not vi	sible, Le	af Organization not			
Number of orders of teeth	45	99	n/a	visible, Leaflet Organization not visible, Le	eaflet Attac	chment no	ot visible, Petiole			
Teeth / cm	46		n/a	Features not visible, Position of Blade Atta	chment not	visible, l	Laminar size notophyll,			
sinus shane	47	99	n/a	Laminar L:W ratio 6:1.5, Laminar Shape o Base Symmetry not visible Base Symmetry	bovate, Me	on unlob	ed Margin Type			
tooth shapes	48		n/a	entire, Special Margin Features not visible,	Apex Ang	gle acute,	Apex Shape acuminate,			
tooth shapes	48		104	Apex Shape - , Base Angle acute, Base shi	ape not visi	ble, Base	shape -, Terminal			
tooth shapes	48			Primary Vein Framework pinnate. Naked I	Basal Veins	s absent.	Number of Basal Veins			
tooth shapes	48			1, Agrophic Veins not visible, Major 20 ve	in framewo	ork not vi	sible, Interior			
principal vein	49	99	n/a	secondaries not visible, Minor secondary c	ourse not v	isible, Pe	rimarginal veins			
	50	00	1/4	Major secondary spacing irregular, Major secondary attachment not visible, pr	oximal cou	irse not v	isible, intersecondary			
principal vein termination	50	99	n/a	length not visible, distal course not visible,	vein frequ	ency not	visible, Intercostal			
course of accessory vein	51	99	n/a	tertiary vein fabric not visible, Angle of pe	rcurrent ter	tiaries no	t visible, vein angle			
features of the tooth apex	52	99	n/a	exmedial course not visible. Exterior tertiar	iot visible,	admedia ot visible	. Quatemary Vein			
				exmedial course not visible, Exterior tertiary course not visible, Quatemary Vein Fabric not visible, Accounternary 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 not, a tooth shapes, stooth shapes, sprincipal vein n/a, principal vein termination n/a, course of accessory vein n/a, features of the tooth apex n/a.						



GA59 HM

DNMH spec. # 48372 DMNH loc. # 500

<u>GA60</u>	Family: Moraceae			Genus and Species: "Ficus" planicostata
Section I. Leaf Characters		score	description	Section II. Venation char. score description
Leaf Attachment	1	88	not visible	1° Primary Vein Framework 23 23.2.1.1 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 20 vein framework 27 88 not visible
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 31.2 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 33.1 decurrent
Laminar Shape	10	88	not visible	proximal course 34.1 88 not visible
Medial Symmetry	11	88	not visible	2° 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 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 36.2 consistent
Anex Angle	16	88	not visible	Epimedial tertiaries 37 37.1.1.1 opposite percurrent
Apex Shape	17	88	not visible	admedial course 37.2.1.3 perpendicular to midvein
Apex Shape	17		-	exmedial course 37.2.2 37.2.2.2 basiflexed
Base Angle	18	18.2	obtuse	Exterior tertiary course 38 88 not visible
Base shape	19	1914	concavo-convex	4 ^o Ouaternary 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
Terminar Apex Teatares	20	00	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
Surrear Gands	22	00	not visible	Warginar Okinate Venatori 45 00 not visible
Section III. Teeth				Text Description:
Tooth spacing	44	99	n/a	Leaf Attachment not visible. Leaf Arrangement not visible. Leaf Organization not
Number of orders of teeth	45	99	n/a	visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole
Teeth / cm	46		n/a	Features not visible, Position of Blade Attachment marginal, Laminar size mesophyll,
sinus shane	47	99	n/a	Laminar L:W ratio not visible, Laminar Shape not visible, Medial Symmetry not visible Base Symmetry not visible Base Symmetry - Lobation unlobed Margin
tooth shapes	48		n/a	Type entire, Special Margin Features not visible, Apex Angle not visible, Apex Shape
tooth shapes	48			not visible, Apex Shape -, Base Angle obtuse, Base shape concavo-convex, Base
tooth shapes	48			Glands not visible. Primary Vein Framework basal actinodromous. Naked Basal
tooth shapes	48			Veins absent, Number of Basal Veins 3, Agrophic Veins simple, Major 20 vein
principal vein	40	99	n/9	framework not visible, Interior secondaries absent, Minor secondary course
principal veni	42	,,,	iva	Variation of secondary angle not visible. Major secondary attachment decurrent.
principal vein termination	50	99	n/a	proximal course not visible, intersecondary length not visible, distal course not visible,
course of accessory vein	51	99	n/a	vein frequency not visible, Intercostal tertiary vein fabric straight opposite percurrent,
features of the tooth apex	52	99	n/a	Angle of percurrent fertianes obtuse, vein angle variability consistent, Epimedial tertiaries opposite percurrent, admedial course percendicular to midvein, exmedial
				course basiflexed, Exterior tertiary course not visible, Quatemary 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 n'a, tooth space 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.



GA60 HM

DNMH spec. # 48363 DMNH loc. # 500

<u>GA61</u>	J	Family	: Juglandaceae	e 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 23.1 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 20 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						
Features of the Blade:				Perimarginal veins 30 0 absent						
Position of Blade Attachment	7	88	not visible	Major secondary spacing 31 31.1 regular						
Laminar size	8	8.5	mesophyll	Variation of secondary angle 32 32.1 uniform						
Laminar L:W ratio	9		not visible	Major secondary attachment 33 33.1 decurrent						
Laminar Shape	10	88	not visible	proximal course 34.1 88 not visible						
Medial Symmetry	11	11.1	symmetrical	2° 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	14.2	serrate	Angle of percurrent tertiaries 35.1.2 88 not visible						
Snecial Margin Features	15	88	not visible	vein angle variability 36 88 not visible						
Anex Angle	16	88	not visible	Enimedial tertiaries 37 88 not visible						
Apex Shape	17	88	not visible	admedial course 37.2.1 88 not visible						
Apex Shape	17	88	not visible	avmedial course 37.2.2 88 not visible						
Pasa Angle	19		- not visible	Exterior tertiory course 28 88 not visible						
Base shape	10	88	not visible	4° Quatarnary Vain Fabria 20 88 not visible						
Dase shape	19	00	not visible	5° Quantinary Vein Fabria 40 88 meterialla						
Base shape	19		-	40 88 notvisible						
Terminal Apex Features	20	88	not visible	Areolation 41 88 not visible						
Seefere Territory	21	00		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 Olumate venation 45 88 not visible						
ection III Teeth				Text Description:						
Tooth spacing	44	44 1	regular	Leaf Attachment not visible. Leaf Arrangement not visible. Leaf Organization not						
Number of orders of teeth	45	45.1	one	visible, Leaflet Organization not visible, Leaflet Attachment not visible, Petiole						
Teeth / cm	46	10.1	1	Features not visible, Position of Blade Attachment not visible, Laminar size						
sinus shane	40	47.2	rounded	mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial						
tooth shapes	18	47.2	st/av	unlobed, Margin Type serrate, Special Margin Features not visible, Apex Angle not						
tooth shapes	40		stet	visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape						
tooth shapes	48		au at	not visible, Base snape -, Terminal Apex Features not visible, Surface Texture not visible Surficial Glands not visible Primary Vein Framework pinnate Naked Basel						
tooti shapes	40			Veins absent, Number of Basal Veins 1, Agrophic Veins not visible, Major 20 vein						
tooth shapes	48	40.1	anocont	framework craspedodromous, Interior secondaries absent, Minor secondary course not						
principal vein	49	49.1	present	visible, Perimarginal vents absent, Major secondary spacing regular, Variation of secondary angle uniform Major secondary attachment decurrent proving course not						
principal vein termination	50	50.2.1	at apex of tooth	visible, intersecondary length not visible, distal course not visible, vein frequency not						
course of accessory vein	51	88	not visible	visible, Intercostal tertiary vein fabric not visible, Angle of percurrent tertianes not						
features of the tooth apex	52	88	not visible	visible, vein angle variability not visible, Epimedial tertiaries not visible, admedial						
				course not visible, exmedial course not visible, Exterior tertnary course not visible, Quaternary Vein Fabric not visible, Quinternary Vein Fabric not visible, Areginal Ultimate venation not visible, FEV termination not visible, Marginal Ultimate venation not visible, Tooth shapes st/ox, tooth shapes st/o						



GA61 HM

DNMH spec. # 48357 DMNH loc. # 500

<u>GA62</u>	A62 Family:				Genus and Species:			
Section I. Leaf Characters		score	description	1	Section II. Venation	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	26.2.1	simple
Leaflet Attachment	5	88	not visible	2°	Major 20 vein framework	27	27.1.2	semicraspedodromous
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	7.1	marginal		Major secondary spacing	31	31.2	irregular
Laminar size	8	8.5	mesophyll		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	10.1	elliptic	Inter	- proximal course	34.1	88	not visible
Medial Symmetry	11	11.1	symmetrical	2 °	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	serrate		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	19.1.1	straight	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
ection III. Teeth				Text	Description:			
Tooth spacing	44	44.2	irregular	Lea	f Attachment not visible, Leaf Arranger	nent not v	isible, Lea	f Organization not
Number of orders of teeth	45	45.1	one	Feat	ble, Leaflet Organization not visible, Le	afiet Atta	arginal La	visible, Petiole
Teeth / cm	46		1	Lan	ninar L:W ratio not visible, Laminar Sha	pe ellipti	c, Medial S	ymmetry
sinus shape	47	47.2	rounded	sym	metrical, Base Symmetry symmetrical,	Base Syn	imetry - , I	obation unlobed,
tooth shapes	48		st/cv	Ape	x Shape not visible, Apex Shape -, Ba	se Angle	acute, Base	shape straight, Base
tooth shapes	48			shar	e -, Terminal Apex Features not visib	le, Surfac	e Texture r	ot visible, Surficial
tooth shapes	48			Glan	nds not visible, Primary Vein Framewo	rk pinnate	e, Naked Ba	nsal Veins absent,
tooth shapes	48			sem	icraspedodromous, Interior secondaries	absent, N	Ainor secor	idary course not
principal vein	49	49.1	present	visit	ole, Perimarginal veins absent, Major se	condary	spacing irre	gular, Variation of
principal vein termination	50	50.2.1	at apex of tooth	seco	ondary angle uniform, Major secondary ole intersecondary length not visible di	attachme stal cours	nt excurren e not visibl	t, proximal course not
course of accessory vein	51	88	not visible	visit	ble, Intercostal tertiary vein fabric straig	ght opposi	te percurre	nt, Angle of percurrent
features of the tooth apex	52	88	not visible	terti	aries obtuse, vein angle variability not v	isible, Ep	imedial ter	tiaries not visible,
				visit Are Mar teet shap toot	ecual course not visible, exhectant cours loc, Quaternary Vein Fabric not visible, olation not visible, FEV branching not v ginal Ultimate venation not visible, Too h one , Teeth / cm 1, sinus shape round pes, tooth shapes, principal vein preser h, course of accessory vein not visible,	Quintern isible, FE oth spacir ed, tooth at, princip features o	ary Vein Fa V terminat ag irregular shapes st/cv al vein term of the tooth	or tertary course not boric not visible, ion not visible, , Number of orders of , tooth shapes, tooth nination at apex of apex not visible.



GA62 HM

DNMH spec. # 48367 DMNH loc. # 500

		unning	•	Genus and Species:				
Section I. Leaf Characters		score	description	Section II. Venation char. score description				
Leaf Attachment	1	88	not visible	1º Primary Vein Framework 23 88 not visible				
Leaf Arrangement	2	88	not visible	Naked Basal Veins 24 88 not visible				
Leaf Organization	3	88	not visible	Number of Basal Veins 25 not visible				
Leaflet Organization	4	88	not visible	Agrophic Veins 26 88 not visible				
Leaflet Attachment	5	88	not visible	2º Major 20 vein framework 27 27.3.1 simple brochidodromous				
Petiole Features	6	88	not visible	Interior secondaries 28 88 not visible				
				Minor secondary course 29 29.2 simple brochidodromous				
Features of the Blade:				Perimarginal veins 30 88 not visible				
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- proximal course 34.1 88 not visible				
Medial Symmetry	11	88	not visible	2° 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 35.1.1.2 alternate percurrent				
Margin Type	14	14.2	serrate	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 37.1.1.3 mixed 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	88	not visible	Exterior tertiary course 38 38.2 looped				
Base shape	19	88	not visible	4° Ouaternary Vein Fabric 39 39.1.3 mixed percurrent				
Base shape	19		-	5° Ouinternary Vein Fabric 40 88 not visible				
Terminal Apex Features	20	88	not visible	Areolation 41 41.2.2 moderate development				
· · · · · · · · · · · · · · · · · · ·				FEV branching 42.1 42.1.3 mostly one branched				
Surface Texture	21	88	not visible	FEV termination 42.2 42.2.1 simple				
Surficial Glands	22	88	not visible	Marginal Ultimate venation 43 88 not visible				
ection III. Teeth				Text Description:				
Tooth spacing	44	44.1	regular	Leaf Attachment not visible, Leaf Arrangement not visible, Leaf Organization not				
Number of orders of teeth	45	45.1	one	Features not visible, Position of Blade Attachment not visible, Laminar size				
Teeth / cm	46		1	mesophyll, Laminar L:W ratio not visible, Laminar Shape not visible, Medial				
sinus shape	47	47.2	rounded	Symmetry not visible, Base Symmetry not visible, Base Symmetry -, Lobation				
tooth shapes	48		st/st	visible, Apex Shape not visible, Apex Shape -, Base Angle not visible, Base shape				
tooth shapes	48			not visible, Base shape -, Terminal Apex Features not visible, Surface Texture not				
tooth shapes	48			visible, Surficial Glands not visible, Primary Vein Framework not visible, Naked				
tooth shapes	48			visible. Major 20 vein framework simple brochidodromous. Interior secondaries not				
principal vein	49	49.1	present	visible, Minor secondary course simple brochidodromous, Perimarginal veins not				
principal vein termination	50	50.2.1	at apex of tooth	visible, Major secondary spacing irregular, Vanation of secondary angle not visible, Major secondary attachment excurrent, proximal course not visible, intersecondary				
course of accessory vein	51	51.1.1	looped	length not visible, distal course not visible, vein frequency not visible, Intercostal				
features of the tooth apex	52	99	n/a	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 basiltexed, 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 / em 1, sinus shape rounded, tooth shapes slyst, tooth shapes, tooth shapes, note shapes, sprincipal vein present, principal vein termination at apex of tooth, course of accessory vein looped, features of the tooth				



GA63 HM

DNMH spec. # 42882 DMNH loc. # 413

<u>GA64</u>]	Family	: Salicaceae	Genus and Species: "Populus" nebrascens						
Section I. Leaf Characters		score	description	Section II. Venation char. score description						
Leaf Attachment	1	88	not visible	1 ^o Primary Vein Framework 23 88 not visible						
Leaf Arrangement	2	88	not visible	Naked Basal Veins 24 88 not visible						
Leaf Organization	3	88	not visible	Number of Basal Veins 25 n/a						
Leaflet Organization	4	88	not visible	Agrophic Veins 26 88 not visible						
Leaflet Attachment	5	88	not visible	2 ⁶ Major 20 vein framework 27 88 not visible						
Petiole Features	6	88	not visible	Interior secondaries 28 88 not visible						
				Minor secondary course 29 88 not visible						
Features of the Blade:				Perimarginal veins 30 88 not visible						
Position of Blade Attachment	7	88	not visible	Major secondary spacing 31 88 not visible						
Laminar size	8	88	not visible	Variation of secondary angle 32 88 not visible						
Laminar L:W ratio	9		not visible	Major secondary attachment 33 88 not visible						
Laminar Shape	10	88	not visible	nter- proximal course 34.1 88 not visible						
Medial Symmetry	11	88	not visible	2° 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	88	not visible	3º Intercostal tertiary vein fabric 35 88 not visible						
Margin Type	14	88	n/a	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	88	not visible	Exterior tertiary course 38 88 not visible						
Base shape	19	88	not visible	4 ^e Ouaternary 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						
Terrimar riper reasones	20	00	not visione	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						
				5						
Section III. Teeth				Text Description:						
Tooth spacing	44	88	not visible	Leaf Attachment n/a, Leaf Arrangement n/a, Leaf Organization n/a,						
Number of orders of teeth	45	88	not visible	Leaflet Organization n/a, Leaflet Attachment n/a, Petiole Features n/a,						
Teeth / cm	46		not visible	Position of Blade Attachment n/a, Laminar size n/a, Laminar L:W ratio						
sinus shape	47	88	not visible	n/a, Laminar Shape n/a, Medial Symmetry n/a, Base Symmetry n/a, Base						
tooth shapes	48		not visible	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						
tooth shapes	48			Base shape n/a, Base shape Terminal Apex Features n/a, Surface						
tooth shapes	48			Texture n/a, Surficial Glands n/a, Primary Vein Framework n/a, Naked						
tooth shapes	48			Basal Veins n/a, Number of Basal Veins n/a, Agrophic Veins n/a, Major						
principal vein	49	88	not visible	20 vein framework n/a, Interior secondaries n/a, Minor secondary course						
nrincinal vain termination	50	88	not visible	n/a, Perimarginal Veins n/a, Major secondary spacing n/a, Variation of						
principal veni termination	50	00		intersecondary length n/a distal course n/a vein frequency n/a Intercosta						
course of accessory vein	51	88	not visible	tertiary vein fabric n/a, Angle of percurrent tertiaries n/a, vein angle						
features of the tooth apex	52	88	not visible	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 vention 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.						

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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.

	Num				
Morphotype ID	Horizon A	Horizon B	Horizon C	Horizon D	Totals
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.