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APPENDIX B:
WOODY DICOT SPECIES AND MORPHOTYPES IN THE BIGHORN BASIN
FLORAS

The fossil dicot leaves in this study were divided into the plant morphotypes listed in Table B1. Some of these morphotypes have been formally described and named. For these species, we list the taxonomic affinity and the reference for the most recent description. If a genus is in quotes, we suspect that, although the name is valid, the generic assignment is incorrect. Morphotypes that have not been formally named were given informal morphotype names and Fort Union (FU) or Willwood (WW) formation morphotype numbers. Informal morphotype names are placed in quotes and are not italicized. A full description of the PETM flora is in progress (Wing, Lovelock, Currano, in prep).

Each previously unpublished morphotype was described using the directions in the *Manual of Leaf Architecture* (Ellis et al. 2009). This information is most effectively conveyed using the morphotype sheet designed by E. González and A. Morey. Fifty-eight morphotypes are described here, each with its own morphotype sheet. A Bighorn Basin exemplar was chosen for each species or morphotype, and figures B1 through B10 are photographs of these exemplars. Each exemplar represents the specimen(s) from this study that best shows the distinctive characteristics of the morphotype.

Reference Cited:

Ellis, B., D. C. Daly, L. J. Hickey, K. R. Johnson, J. D. Mitchell, P. Wilf, and S. L. Wing. 2009. *Manual of Leaf Architecture*. Cornell University Press, Ithaca, NY.

Species Name or Morphotype Number	Plant Group	Sites	Bighorn Basin Exemplar	Cross-reference	Figure
<i>Browniea serrata</i> (Newberry) Manchester and Hickey	Cornales, Nyssaceae	P1, P2, P4	USNM 539835		B1. A
<i>Cercidiphyllum genetrix</i> (Newberry) Hickey	Cercidiphyllaceae	P1, P2, P3, P4, E2, E3	USNM 539836, USNM 539837		B1. B,C
<i>Davidia antiqua</i> (Newberry) Manchester	Cornales, Nyssaceae	P1,P2,P3, P4,E3	USNM 539838		B1. D
Dicot sp. FU749 of Currano et al. (2008)		P1, P3, P4	USNM 539839, USNM 539840	Dicot sp. SC1 of Wilf et. al (2006)	B1. E,F
Dicot sp. SC2 of Wilf et al. (2006)		P1	USNM 539841		B1. G
Juglandaceae sp. SC1 of Wilf et al. (2006)	Juglandaceae	P1	USNM 539842, USNM 539843		B1. H,I
<i>Platanus raynoldsi</i> Newberry	Platanaceae	P1, P2, P3, P4, E3	USNM 539844, USNM 539845		B2. A,B
<i>Aesculus hickeyi</i> Manchester	Sapindaceae	P2, E2	USNM 539846		B2. C
" <i>Ampelopsis</i> " <i>acerifolia</i> (Newberry) Brown	?Cercidiphyllaceae, ?Vitaceae	P2, E3	USNM 539847		B2. D
<i>Beringiaphyllum cupanioides</i> (Newberry) Manchester, Crane, and Golovneva	Cornales, Nyssaceae	P2	USNM 539848		B2. E
" <i>Celtis</i> " <i>peracuminata</i> Brown	Celtidaceae	P2	USNM 539849		B2. F
<i>Chaetoptelea microphylla</i> (Newberry) Hickey	Ulmaceae	P2, E3, E5	USNM 539850		B2. G
Dicot sp. LL1 of Wilf et al. (2006)		P2	USNM 539851		B2. H
" <i>Ficus</i> " <i>artocarpoides</i> Lesquereux		P2	USNM 539852		B2. I
Lauraceae sp. LLL1 of Wilf et al. (2006)	Lauraceae	P2	USNM 539853		B3. A
Lauraceae sp. LLL2 of Wilf et al. (2006)	Lauraceae	P2	USNM 539854		B3. B
<i>Persites argutus</i> Hickey	Lauraceae	P2	USNM 539855		B3. C

Species Name or Morphotype Number	Plant Group	Sites	Bighorn Basin Exemplar	Cross-reference	Figure
<i>Zizyphoides flabella</i> (Newberry) Crane, Manchester, and Dilcher	Trochodendraceae	P2, P3, P4, E2, E3	USNM 539856		B3. D
Dicot sp. FU742 [†]		P3	USNM 539857		B3. E
<i>Averrhoites affinis</i> (Newberry) Hickey	?Sapindaceae	P3, E2, E3	USNM 539858		B3. F
Betulaceae sp. FU741 [†]	Betulaceae	P3	USNM 539859		B3. G
Dicot sp. FU745 of Currano et al. (2008)	?Sapindaceae	P3, P4	USNM 539860, USNM 539861, USNM 539862		B3. H,I,J
Juglandaceae sp. FU740	Juglandaceae	P3, E3	USNM 539863	Juglandaceae sp. 2 of Wing et al. (1995)	B4. A
Dicot sp. FU739 [†]		P3	USNM 539864		B4. B
Dicot sp. FU738 [†]		P3	USNM 539865		B4. C
Dicot sp. FU737 [†]		P3	USNM 539866		B4. D
Dicot sp. FU736 [†]		P3	USNM 539867		B4. E
Dicot sp. FU735 [†]		P3	USNM 539868		B4. F
<i>Macginitiea gracilis</i> (Lesquereux) Wolfe and Wehr	Platanaceae	P3, P4, E3, E4	USNM 539870		B4. H
Dicot sp. FU734 [†]		P3	USNM 539871		B4. I
Dicot sp. FU733 [†]		P3	USNM 539872		B4. J
<i>Ternstroemites aureavallis</i> Hickey	Theaceae	P3, P4	USNM 539869		B4. G
Betulaceae sp. FU744 of Currano et al. (2008)	Betulaceae	P4	USNM 539873, USNM 539874		B5. A,B
Dicot sp. FU748 of Currano et al. (2008)		P4	USNM 539875		B5. C

Species Name or Morphotype Number	Plant Group	Sites	Bighorn Basin Exemplar	Cross-reference	Figure
Dicot sp. FU743 of Currano et al. (2008)		P4	USNM 539876		B5. D
Fabaceae sp. FU750 of Currano et al. (2008)	Fabaceae	P4	USNM 509415		B5. E,F
Dicot sp. FU746 of Currano et al. (2008)		P4	USNM 539878		B5. G
<i>Populus wyomingiana</i> (Berry) MacGinitie	Salicaceae	P4, E1, E3, E4, E5	USNM 539879	Dicot XXIII of Wing et al. (1995)	B5. H
Dicot sp. FU747 of Currano et al. (2008)		P4	USNM 539880		B6. A
Fabaceae sp. WW001 of Lovelock (2006); Currano et al. (2008)	Fabaceae	E1	-		-
Fabaceae sp. WW002 of Lovelock (2006); Currano et al. (2008)	Fabaceae	E1	-		-
Dicot sp. WW003 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW004 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW005 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW006 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Fabaceae sp. WW007 of Lovelock (2006); Currano et al. (2008)	Fabaceae	E1, E4	-	<i>Dalbergia</i> sp.1 of Wing et al. (1995), <i>Machaerium</i> sp. of Wing (1998)	-
Dicot sp. WW009 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW010 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW011 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW012 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW013 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Anacardiaceae sp. WW014 of Lovelock (2006); Currano et al. (2008)	Anacardiaceae	E1	-	cf. <i>Rhus</i>	-

Species Name or Morphotype Number	Plant Group	Sites	Bighorn Basin Exemplar	Cross-reference	Figure
Dicot sp. WW015 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW016 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW017 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW018 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW019 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW020 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW021 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW022 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Lauraceae sp. WW023 of Lovelock (2006); Currano et al. (2008)	Lauraceae	E1	-	cf. <i>Phoebe</i>	-
Dicot sp. WW024 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW025 of Lovelock (2006); Currano et al. (2008)		E1	-		-
Dicot sp. WW027 of Lovelock (2006); Currano et al. (2008)		E1	-		-
<i>Alnus</i> sp.	Betulaceae	E2, E3, E5	USNM 539877		B6. B
<i>Acer silberlingi</i> Brown	Sapindaceae	E3	USNM 539881		B6. C
Betulaceae sp. WW030	Betulaceae	E3	USNM 324498		B6. D
Hamamelidaceae sp. WW031	Hamamelidaceae	E3, E2	USNM 37588 IV	Hamamelidaceae sp. 1 of Wing et al. (1995)	B6. E, F
Dicot sp. WW032 [†]		E3	USNM 539882		B6. G
Dicot sp. WW033 [†]		E3	USNM 324469	Dicot XV of Wing et al. (1995)	B6. H

Species Name or Morphotype Number	Plant Group	Sites	Bighorn Basin Exemplar	Cross-reference	Figure
Dicot sp. WW034 [†]		E3	USNM 324456	Dicot XX of Wing et al. (1995)	B6. I
Dicot sp. WW035 of Currano (2009)		E3, E5	USNM 539883, USNM 539884	Dicot XXV of Wing et al. (1995)	B7. A,B,C
" <i>Dombeya</i> " <i>novi-mundi</i> Hickey	Malvaceae	E3, E5	USNM 539885		B7. D
Lauraceae sp. WW036 [†]	Lauraceae	E3	USNM 539886, USNM 539887		B7. E,F
Dicot sp. WW037 [†]		E3	USNM 539988		B7. G,H
Betulaceae sp. WW038 [†]	Betulaceae	E4	USNM 539889		B7. I
Dicot sp. WW039 [†]		E4	USNM 539890		B8. A
Fabaceae sp. WW040 [†]	Fabaceae	E4	USNM 539891		B8. B,C
Fabaceae sp. WW041 [†]	Fabaceae	E4	USNM 539892		B8. D
Dicot sp. WW043 [†]		E4	USNM 539893		B8. E
<i>Platanus guillelmae</i> Goeppert	Platanaceae	E4	USNM 539894		B8. F
Fabaceae sp. WW042 [†]	Fabaceae	E4	USNM 539895		B8. G,H
Dicot sp. WW044 [†]		E4	USNM 539896		B8. I
Dicot sp. WW045 [†]		E4	USNM 539897		B9. A
Dicot sp. WW046 [†]		E4	USNM 539898		B9. B
Dicot sp. WW047 [†]		E4	USNM 539899, USNM 539900		B9. C,D
Dicot sp. WW048 of Currano (2009)		E5	USNM 539901		B9. E
Dicot sp. WW049 of Currano (2009)		E5	USNM 539902		B9. F

Species Name or Morphotype Number	Plant Group	Sites	Bighorn Basin Exemplar	Cross-reference	Figure
Dicot sp. WW050 of Currano (2009)		E5	USNM 539903		B9. G
<i>Aleurites fremontensis</i> (Berry) MacGinitie	Euphorbiaceae	E5	USNM 539904, USNM 539905		B9. H,I
<i>Allophylus flexifolia</i> (Lesquereux) MacGinitie	Sapindaceae	E5	USNM 539906, USNM 539907	Dicot XXXI of Wing et al. (1995)	B9. J,K
Apocynaceae sp. WW051	Apocynaceae	E5	USNM 539908	Apocynaceae sp. 1 of Wing et al. (1995)	B10. A
<i>Cornus hyperborea</i> Heer	Cornaceae	E5	USNM 539909		B10. B
Dicot sp. WW052 of Currano (2009)	?Magnoliaceae	E5	USNM 539910	Dicot III of Wing et al. (1995)	B10. C
Dicot sp. WW053 of Currano (2009)		E5	USNM 539911	Dicot XI of Wing et al. (1995)	B10. D
Lauraceae sp. WW054 of Currano (2009)	Lauraceae	E5	USNM 324466	Dicot X of Wing et al. (1995)	B10. E
Lauraceae sp. WW055 of Currano (2009)	Lauraceae	E5	USNM 539912		B10. F
<i>Luehea newberryana</i> (Knowlton) MacGinitie	Malvaceae	E5	USNM 539913		B10. G
Dicot sp. WW056 of Currano (2009)		E5	USNM 539914		B10. H
Dicot sp. WW057 of Currano (2009)	?Malvaceae	E5	USNM 539915		B10. I
Dicot sp. WW058 of Currano (2009)		E5	USNM 539916		B11. A
Lauraceae sp. WW059 of Currano (2009)	Lauraceae	E5	USNM 539917		B11. B
Dicot sp. WW060 of Currano (2009)		E5	USNM 539918		B11. C
<i>"Platycarya" castaneopsis</i> (Lesquereux) Wing and Hickey	Juglandaceae	E5	USNM 539919		B11. D,E
Lauraceae sp. WW061 of Currano (2009)	Lauraceae	E5	USNM 539920	Dicot XXXVI of Wing et al. (1995)	B11. F,G

Species Name or Morphotype Number	Plant Group	Sites	Bighorn Basin Exemplar	Cross-reference	Figure
Dicot sp. WW062 of Currano (2009)		E5	USNM 539921		B11. H

[†]*New morphotype*

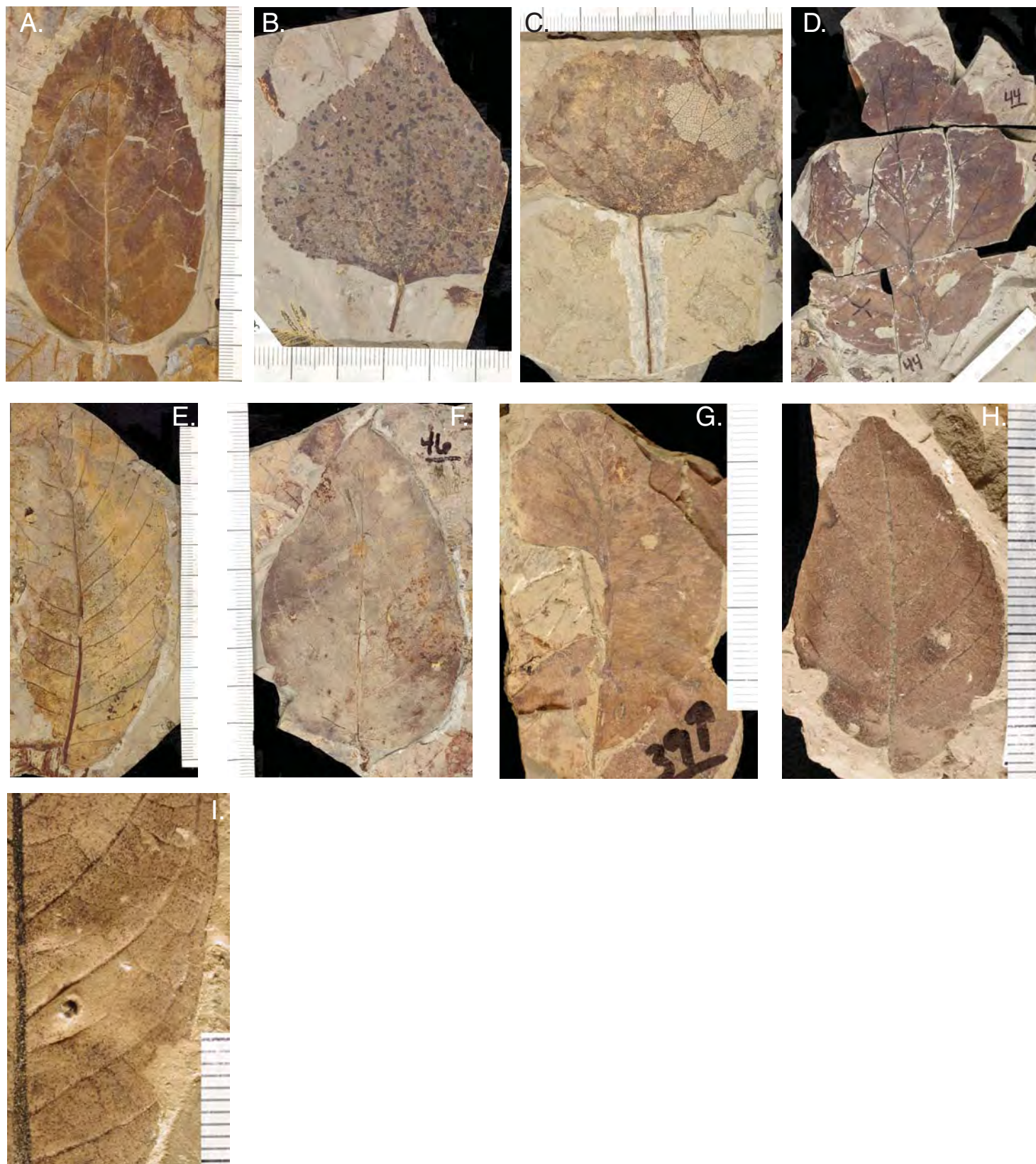


Figure B1. A. *Browniea serrata* (P2, USNM 539835); B. *Cercidiphyllum genetrix* (P4, USNM 539836); C. *Cercidiphyllum genetrix* (P4, USNM 539837); D. *Davidia antiqua* (P3, USNM 539838); E. Dicot sp. FU 749 lateral leaflet (P4, USNM 539839); F. Dicot sp. FU749 terminal leaflet (P4, USNM 539840); G. Dicot sp. SC2 (P1, USNM 539841); H. Juglandaceae sp. (P1, USNM 539842); I. Close-up of peltate hairs on Juglandaceae sp. (P1, USNM 539843).

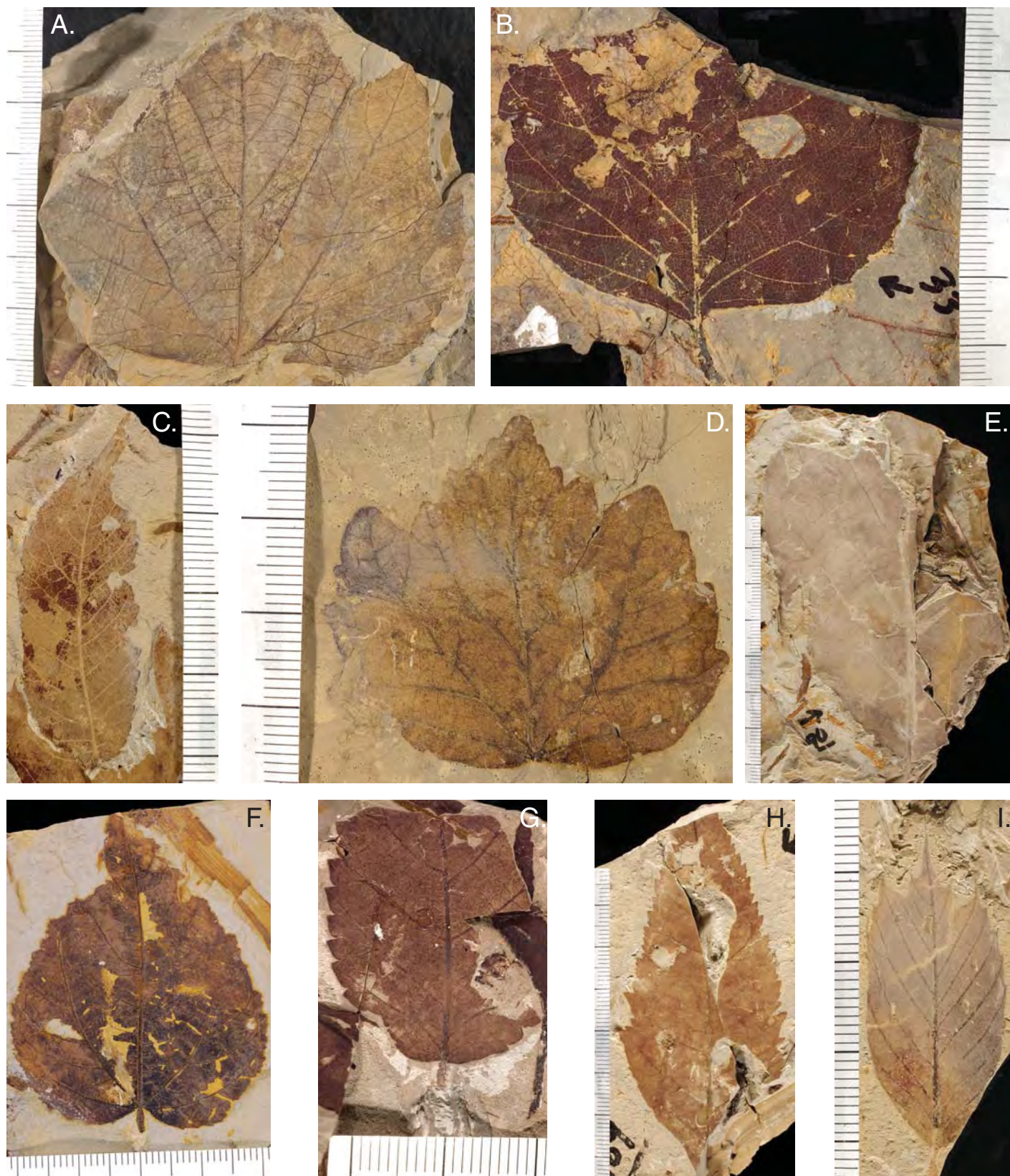


Figure B2. A. *Platanus raynoldsi* (P2, USNM 539844); B. *Platanus raynoldsi* (P4, USNM 539845); C. *Aesculus hickeyi* (P2, USNM 539846); D. “*Ampelopsis*” *acerifolia* (P2, USNM 539847); E. *Beringiaphyllum cupanioides* (P2, USNM 539848); F. “*Celtis*” *peracuminata* (P2, USNM 539849); G. *Chaetoptelea microphylla* (E5, USNM 539850); H. Dicot sp. LL1 (P2, USNM 539851); I. “*Ficus*” *artocarpoides* (P2, USNM 539852).

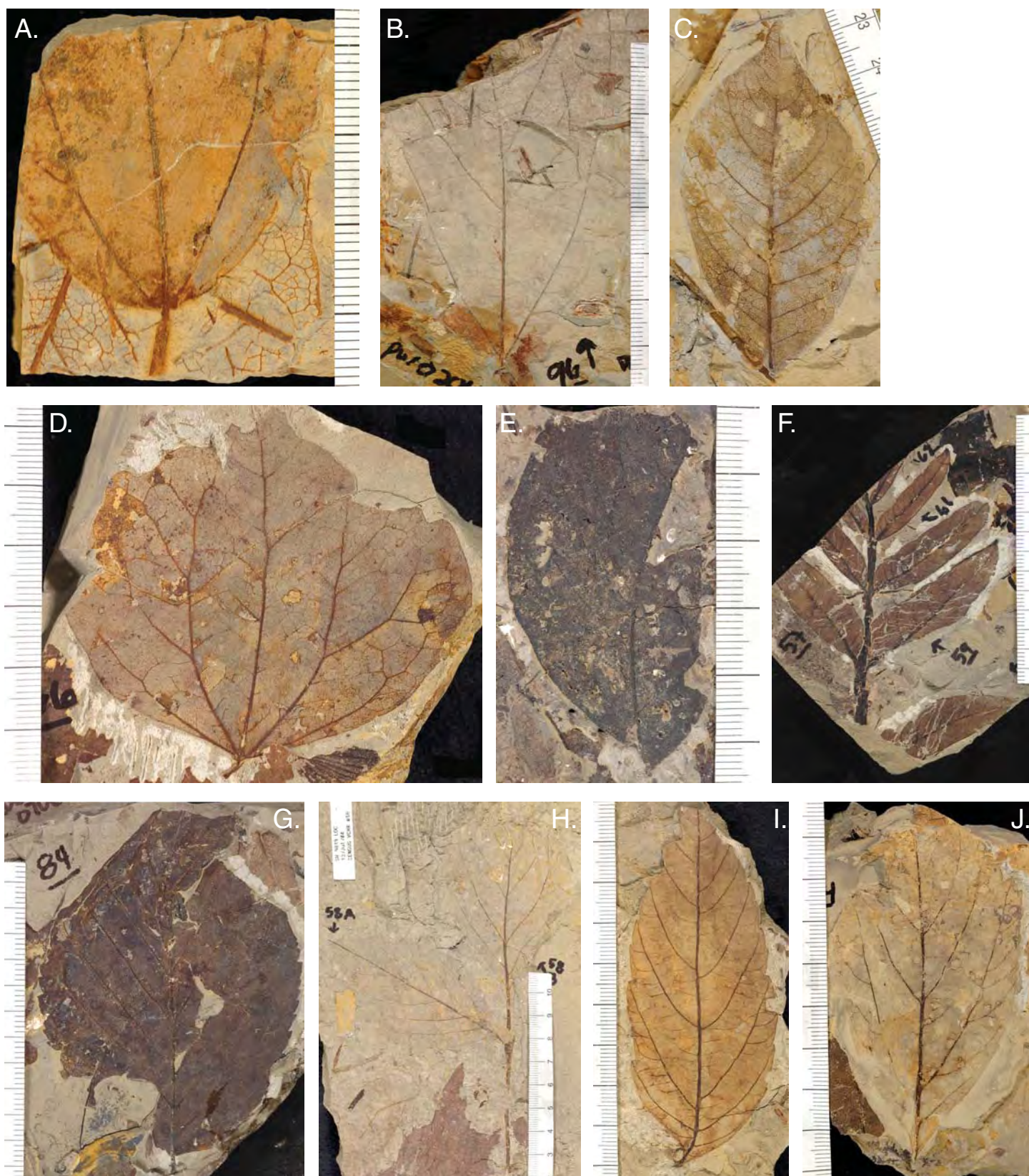


Figure B3. A. Lauraceae sp. LL1 (P2, USNM 539853); B. Lauraceae sp. LL2 (P2, USNM 539854); C. *Persites argutus* (P2, USNM 539855); D. *Zizyphoides flabella* (USNM 539856); E. Dicot sp. FU742 (P3, USNM 539857); F. *Averrhoites affinis* (P3, USNM 539858); G. Betulaceae sp. FU741 (P3, USNM 539859); H. Dicot sp. FU745 showing attachment (P4, USNM 539860); I. Dicot sp. FU745 lateral leaflet (P4, USNM 539861); J. Dicot sp. FU745 terminal leaflet (P4, USNM 539862).

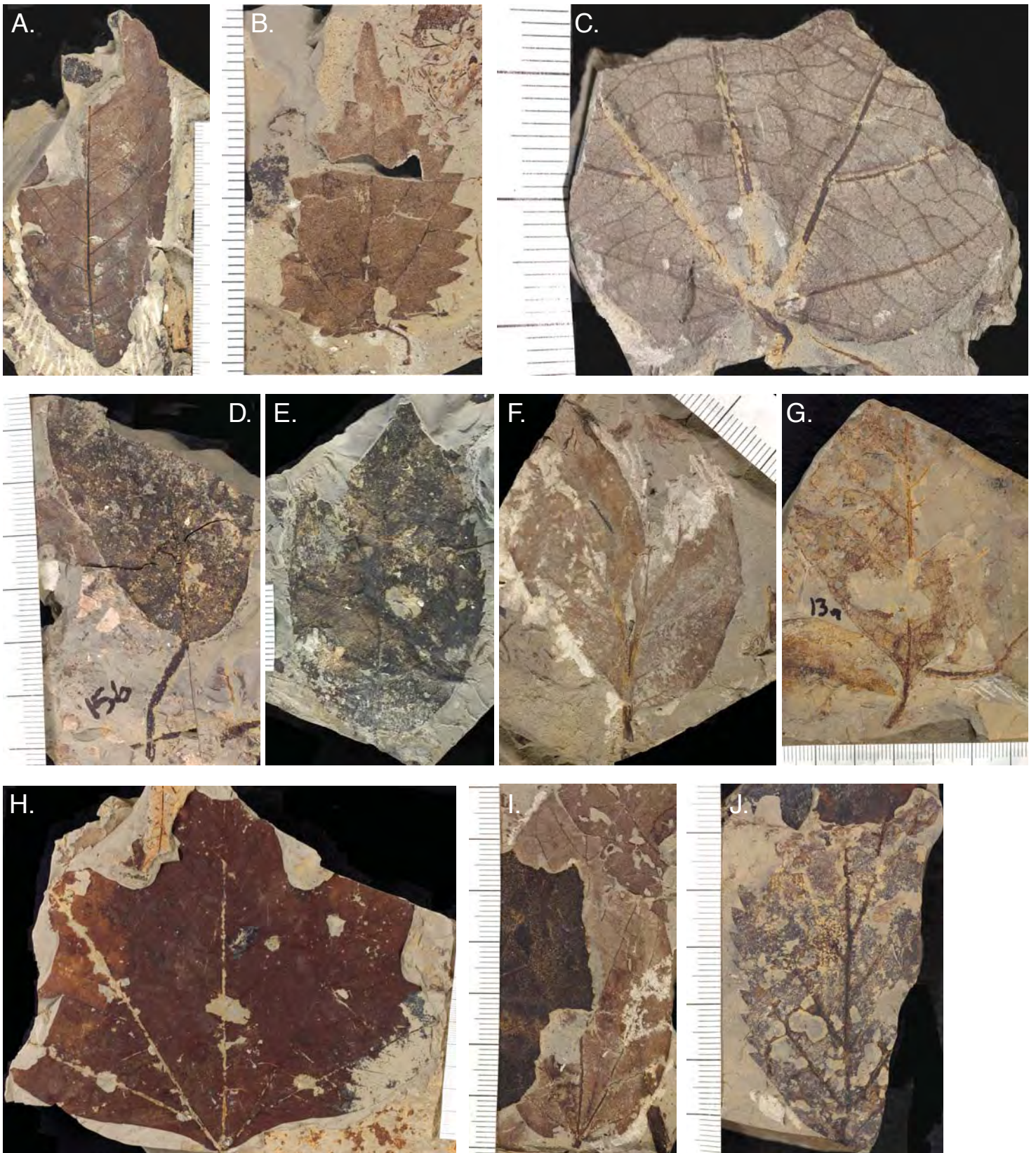


Figure B4. A. Juglandaceae sp. FU740 (P3, USNM 539863); B. Dicot sp. FU739 (P3, USNM 539864); C. Dicot sp. FU738 (P3, USNM 539865); D. Dicot sp. FU737 (P3, USNM 539866); E. Dicot sp. FU736 (P3, USNM 539867); F. Dicot sp. FU735 (P3, USNM 539868); G. *Ternstroemites aureavallis* (P4, USNM 539869); H. *Macginitiea gracilis* (E4, USNM 539870); I. Dicot sp. FU734 (P3, USNM 539871); J. Dicot sp. FU733 (P3, USNM 539872).

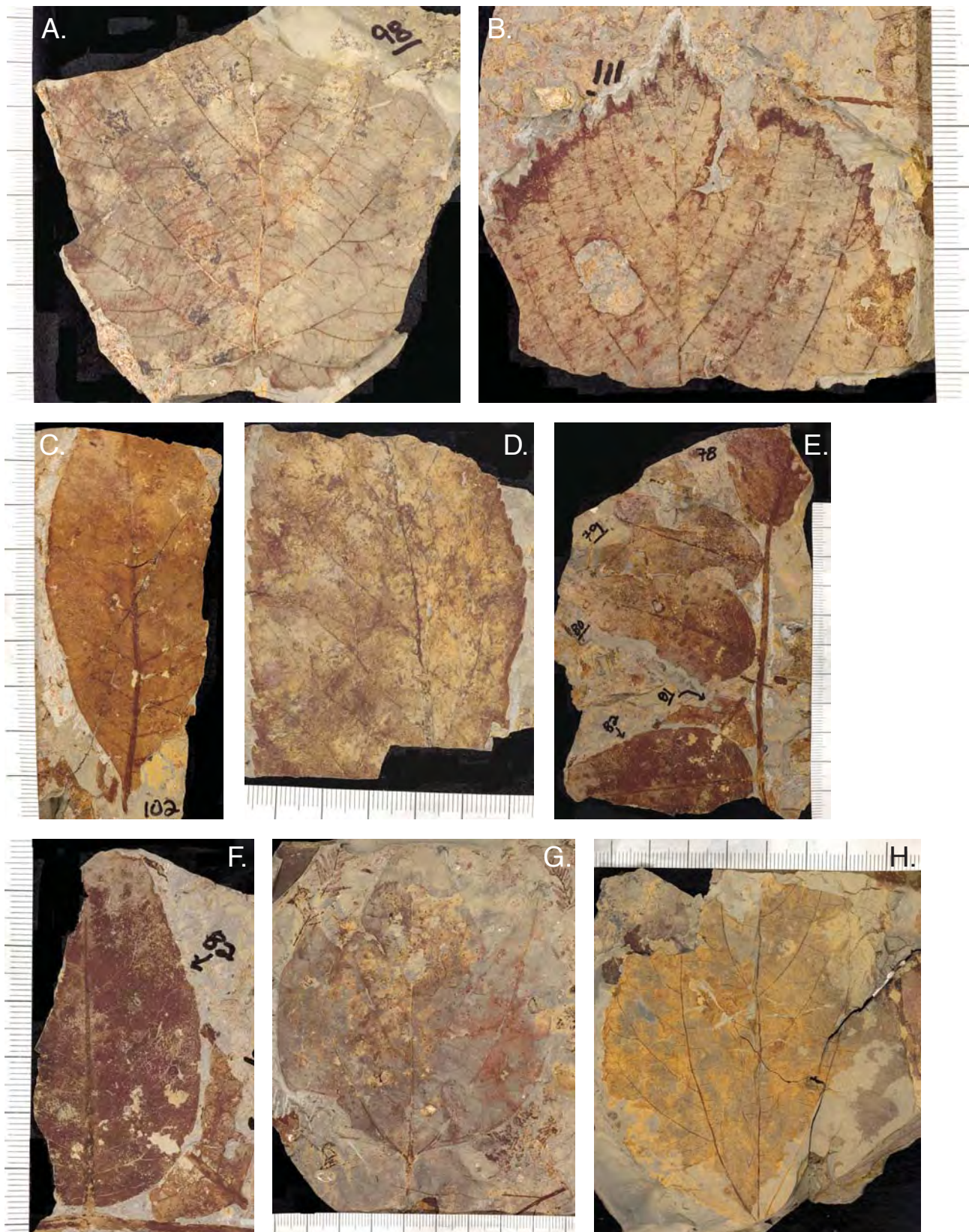


Figure B5. A. Betulaceae sp. FU744 base (P4, USNM 539873); B. Betulaceae sp. FU744 apex (P4, USNM 539874); C. Dicot sp. FU748 (P4, USNM 539875); D. Dicot sp. FU743 (P4, USNM 539876); E. Fabaceae sp. FU750 showing attachment (P4, USNM 509415); F. Fabaceae sp. FU750 (P4, USNM 509415); G. Dicot sp. FU746 (P4, USNM 539878); H. *Populus wyomingiana* (P4, USNM 539879).

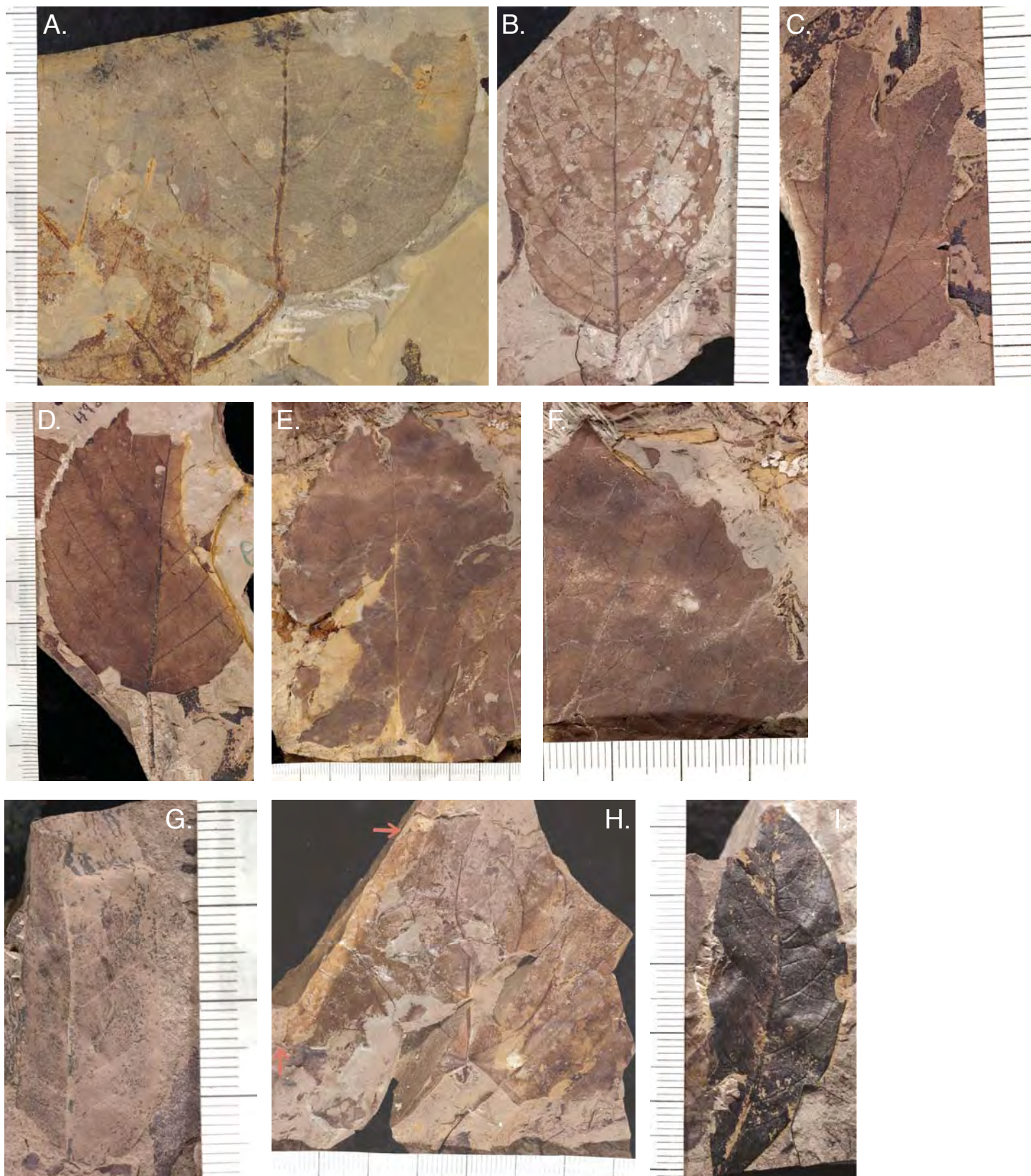


Figure B6. A. Dicot sp. FU747 (P4, USNM 539880); B. *Alnus* sp. (USNM 539877); C. *Acer silberlingi* (E3, USNM 539881); D. Betulaceae sp. WW030 (E3, USNM 324498); E,F. Hamamelidaceae sp. WW031 (USNM 37588 IV); G. Dicot sp. WW032 (E3, USNM 539882); H. Dicot sp. WW033 (E3, USNM 324469), arrows point to teeth; I. Dicot sp. WW034 (E3, USNM 324456).

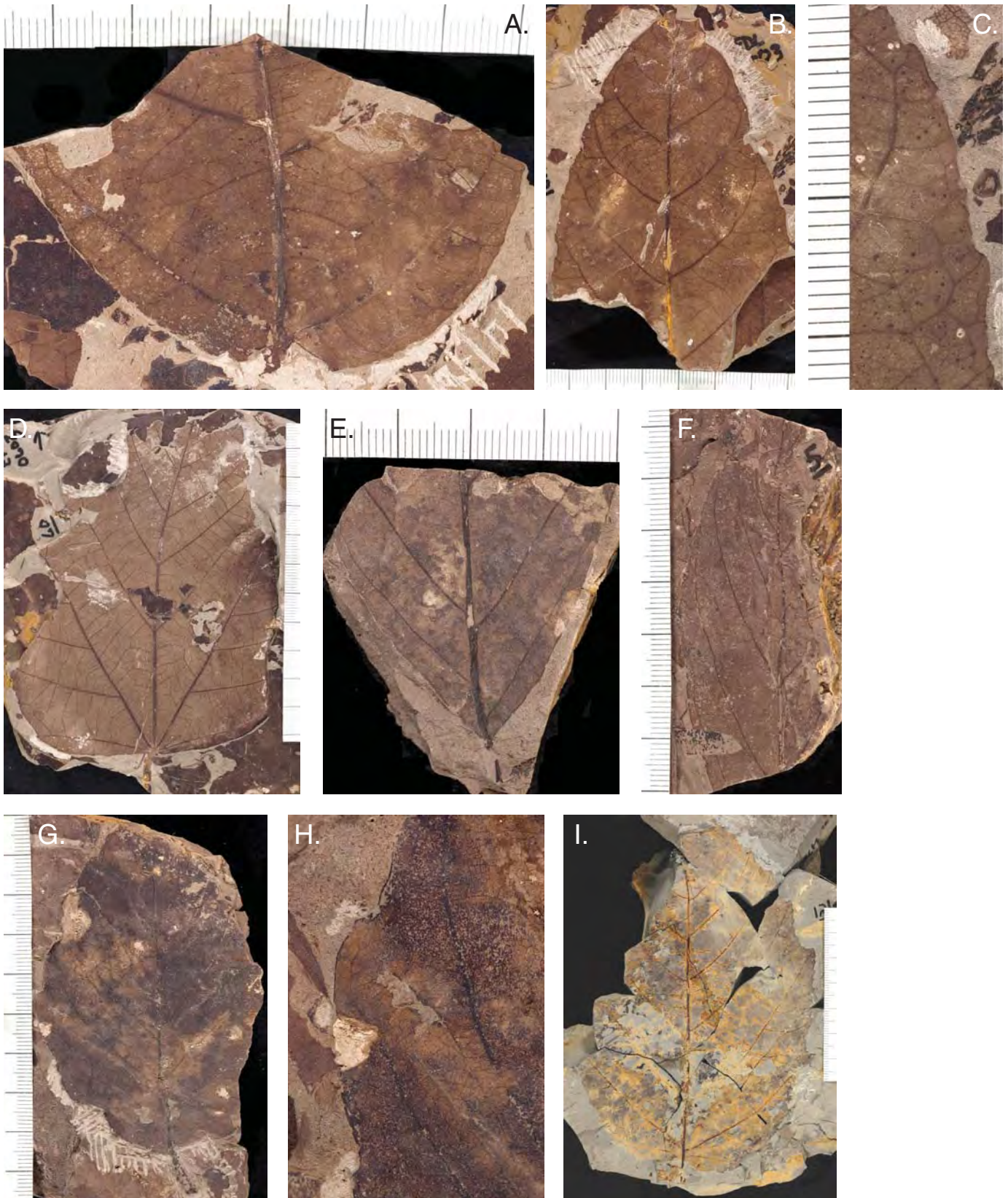


Figure B7. A. Dicot sp. WW035 base (E5, USNM 539883); B, C. Dicot sp. WW035 apex and close-up of teeth (E5, USNM 539884); D. "*Dombeya*" *novi-mundi* (E5, USNM 539885); E. Lauraceae sp. WW036 base (E3, USNM 539886); F. Lauraceae sp. WW036 (E3, USNM 539887); G, H. Dicot sp. WW037 whole leaf and close-up of teeth (E3, USNM 539888); I. Betulaceae sp. WW038 (E4, USNM 539889).

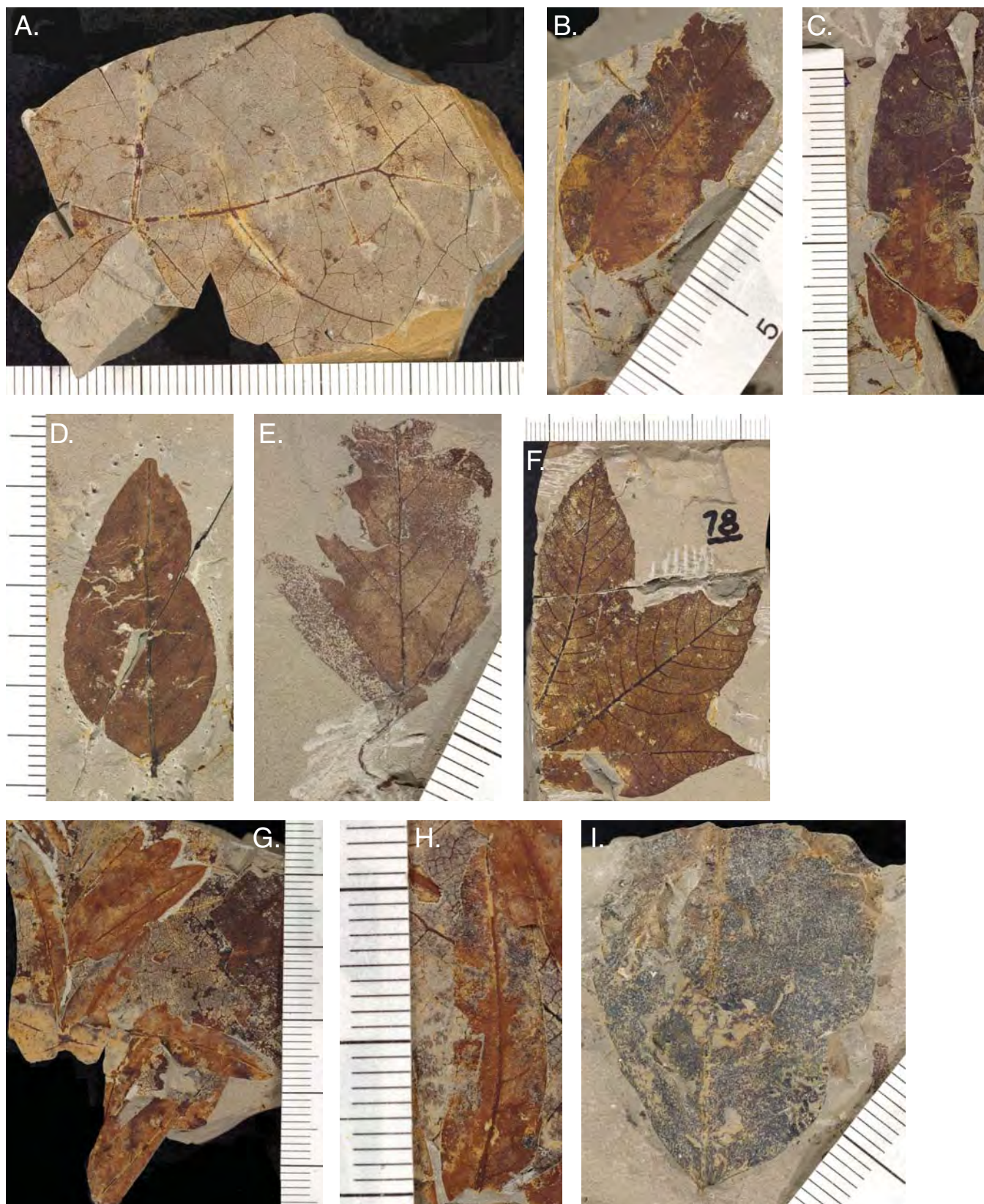


Figure B8. A. Dicot sp. WW039 (E4, USNM 539890); B,C. Fabaceae sp. WW040 (E4, USNM 539891); D. Fabaceae sp. WW041 (E4, USNM 539892); E. Dicot sp. WW043 (E4, USNM 539893); F. *Platanus guillelmae* (E4, USNM 539894); G,H. Fabaceae sp. WW042 (E4, USNM 539895); I. Dicot sp. WW044 (E4, USNM 539896).

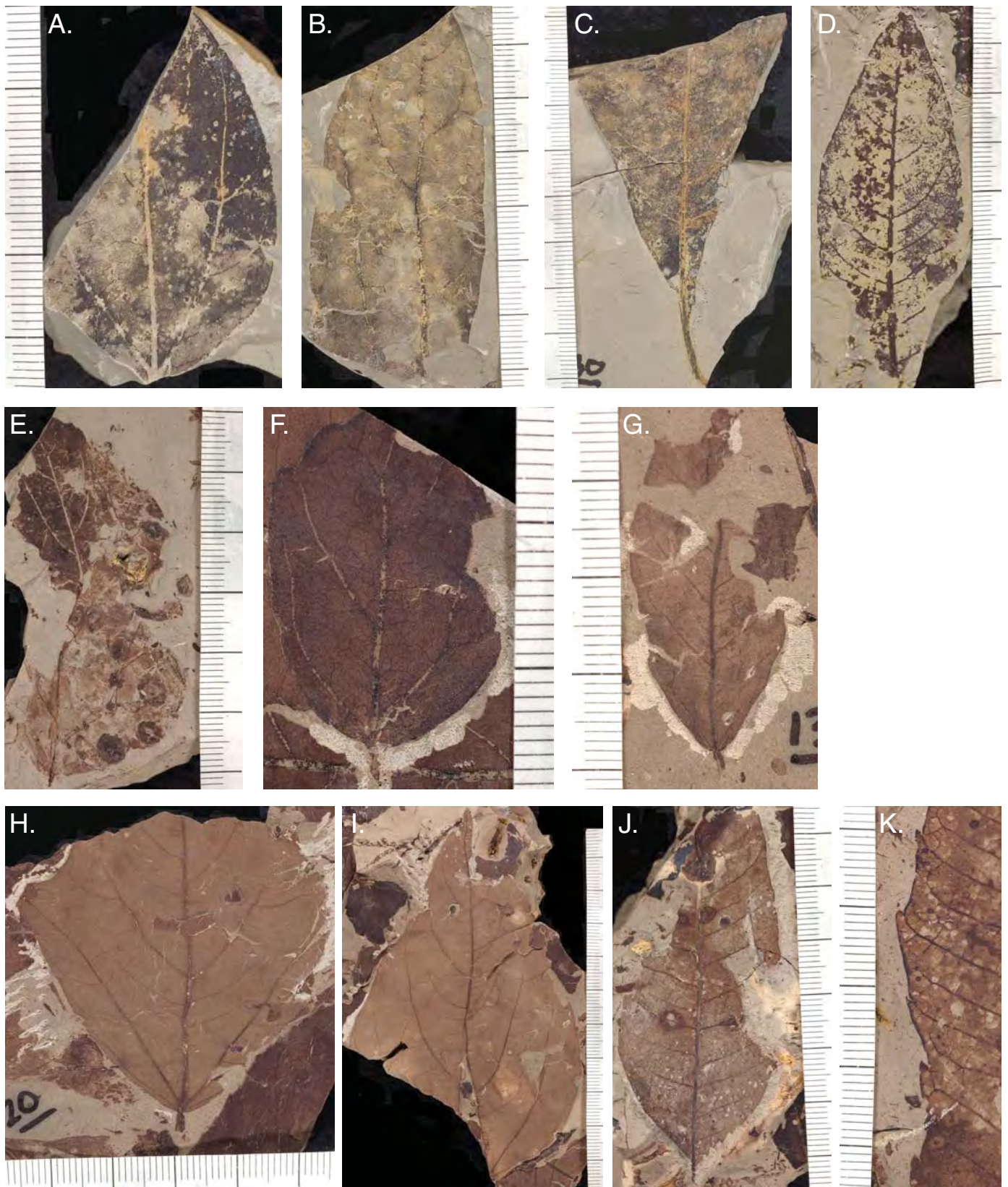


Figure B9. A. Dicot sp. WW045 (E4, USNM 539897); B. Dicot sp. WW046 (E4, USNM 539898); C. Dicot sp. WW047 (E4, USNM 539899); D. Dicot sp. WW047 (E4, USNM 539900); E. Dicot sp. WW048 (E5, USNM 539901); F. Dicot sp. WW049 (E5, USNM 539902); G. Dicot sp. WW050 (E5, USNM 539903); H. *Aleurites fremontensis* (E5, USNM 539904); I. *Aleurites fremontensis* (E5, USNM 539905); J. *Allophylus flexifolia* (E5, USNM 539906); K. *Allophylus flexifolia* teeth (E5, USNM 539907).

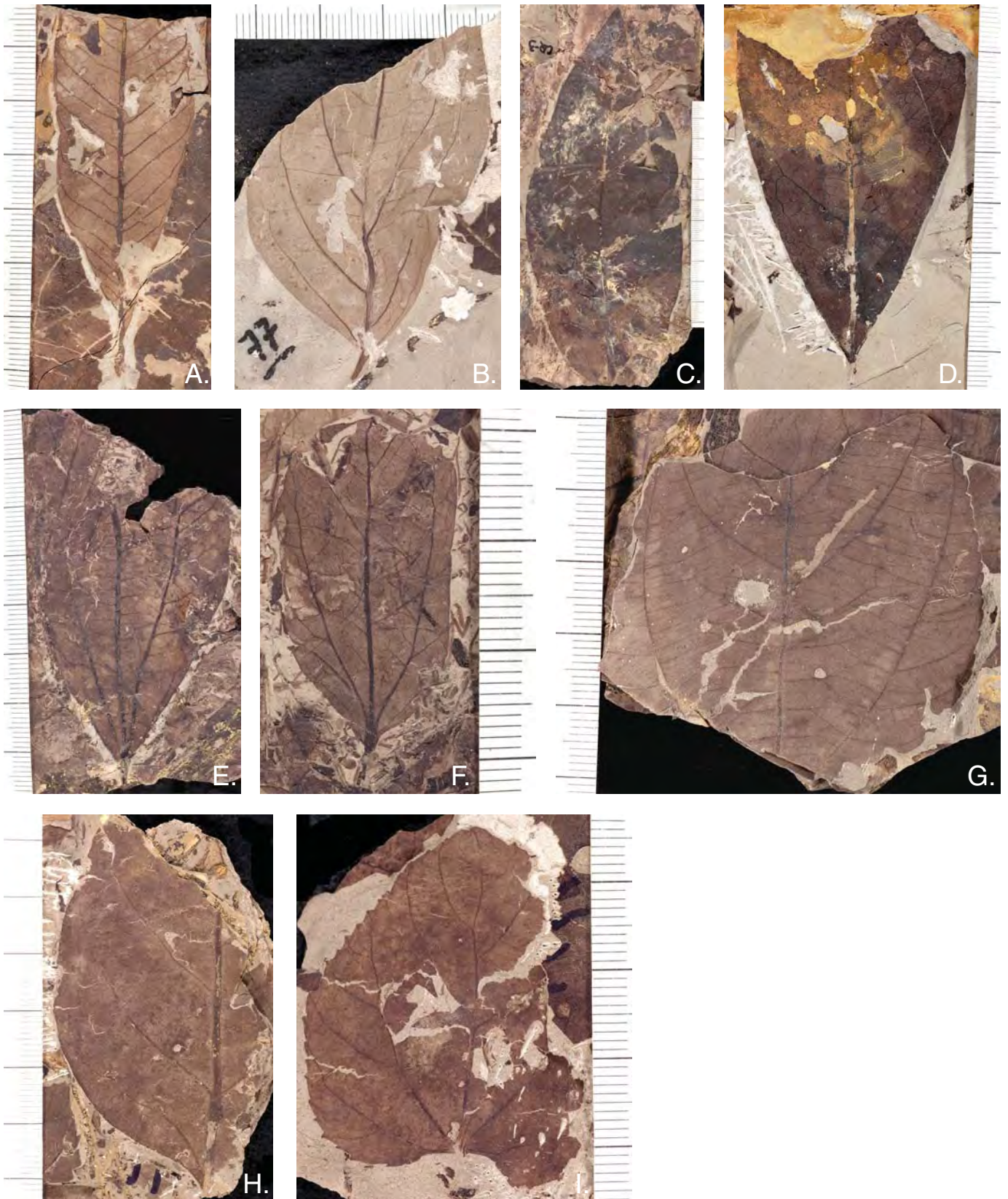


Figure B10. A. Apocynaceae sp. WW051 (E5, USNM 539908); B. *Cornus hyperborea* (E5, USNM 539909); C. Dicot sp. WW052 (E5, USNM 539910); D. Dicot sp. WW053 (E5, USNM 539911); E. Lauraceae sp. WW054 (E5, USNM 324466); F. Lauraceae sp. WW055 (E5, USNM 539912); G. *Luehea newberryana* (E5, USNM 539913); H. Dicot sp. WW056 (E5, USNM 539914); I. Dicot sp. WW057 (E5, USNM 539915).

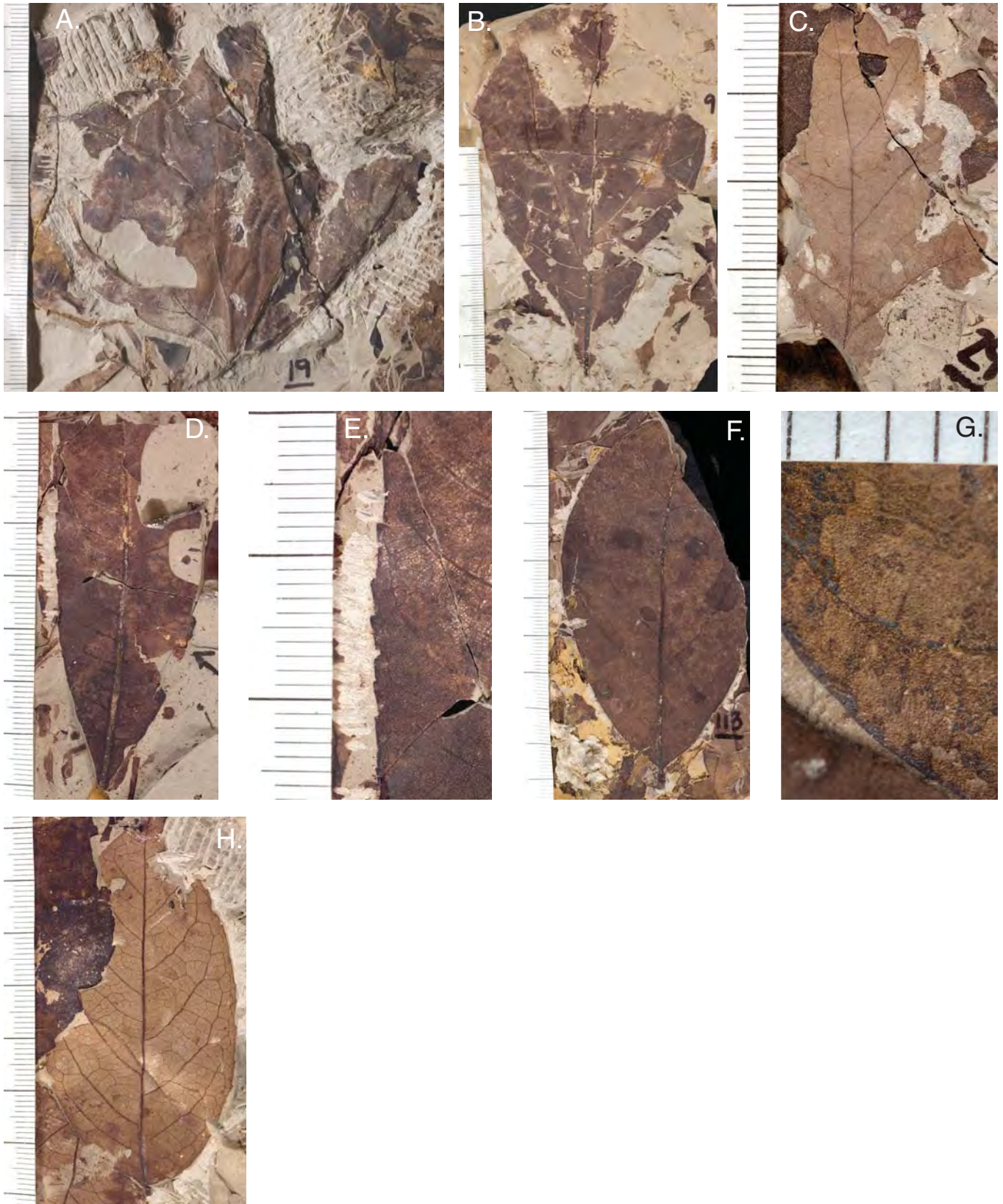


Figure B11. A. Dicot sp. WW058 (E5, USNM 539916); B. Lauraceae sp. WW059 (E5, USNM 539917); C. Dicot sp. WW060 (E5, USNM 539918); D,E. "*Platycarya*" *castaneopsis* (E5, USNM 539919); F. Lauraceae sp. WW061 (E5, USNM 539920); G. Close-up of laminar resin glands on USNM 539920; H. Dicot sp. WW062 (E5, USNM 539921).

MORPHOTYPE

FU749 - Lateral Leaflet

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 539839

OTHERS LOC.

USNM 42411

DIAGNOSTIC FEATURES OF MORPHOTYPE

Crowded basal secondaries, with the lowest pair at a high angle. Slightly inflatedpetiole. Prominent fimbrial vein.Grouped with FU749 - Terminal Leaflet because of venation.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Not PreservedLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Not PreservedLEAF ORGANIZATION: CompoundPETIOLE ATTACHMENT: MarginalBLADE SIZE: Notophyll to MesophyllPETIOLE BASE: Pulvinate?BLADE SHAPE: EllipticPETIOLE GLANDS: BLADE RATIO L:W: > 2:1PETIOLE X-SECTION: LOBATION: UnlobedMARGIN TYPE: UntoothedBASE ASYMMETRY: width and insertionMEDIAL SYMMETRY: AsymmetricalBASE SHAPE: ConvexAPEX SHAPE: AcuminateSpecial Margin Features: BASE ANGLE: AcuteAPEX ANGLE: AcuteTerminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Eucampto brochi distalMINOR-2° Course: MAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: Abruptly increasing toward baseMAJOR 2° SPACING: Decreasing proximallyAGROPHIC VEINS: AbsentINTER-2° proximal course: INTER-2° VEIN LENGTH: INTER-2° distal course: INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Alternate percurrentPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: MixedINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: EXTERIOR 3° COURSE: LoopedEXMEDIAL COURSE: INTERCOSTAL 3° VARIABILITY: Inconsistent

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulateVEINLETS -F/E/V/s: Mostly twice or more branched5° VEIN FABRIC: Irregular reticulateTYPE OF F.E.V. BRANCHING: dendriticMARGINAL VENATION: AbsentF.E.V.s TERMINATIONS: SimpleAREOLATION: Well developedLEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: No TEETH/cm: TEETH GLANDULARITY: TOOTH SHAPE: TOOTH SPACING: PRINCIPAL VEIN: SINUS SHAPE: ACCESSORY VEIN COURSE: PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: NoneCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU749 - Terminal Leaflet

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 539840

OTHERS LOC.

USNM 42411

DIAGNOSTIC FEATURES OF MORPHOTYPE

Crowded basal secondaries, with the lowest pair at a high angle. Slightly inflatedpetiole. Prominent fimbrial vein.Grouped with EFU749 - Lateral Leaflet because of venation.

MQI: _____

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Not PreservedLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Not PreservedLEAF ORGANIZATION: CompoundPETIOLE ATTACHMENT: MarginalBLADE SIZE: Notophyll to MesophyllPETIOLE BASE: Pulvinate?BLADE SHAPE: OvatePETIOLE GLANDS: NoneBLADE RATIO L:W: < 2:1

PETIOLE X-SECTION: _____

LOBATION: UnlobedMARGIN TYPE: UntoothedBASE ASYMMETRY: Basal insertion asymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: RoundedAPEX SHAPE: Acuminate

Special Margin Features: _____

BASE ANGLE: ObtuseAPEX ANGLE: AcuteTerminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Eucampto brochi distal

MINOR-2° Course: _____

MAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: Abruptly increasing toward baseMAJOR 2° SPACING: Decreasing proximallyAGROPHIC VEINS: Absent

INTER-2° proximal course: _____

INTER-2° VEIN
LENGTH: _____

INTER-2° distal course: _____

INTER-2° FREQUENCY: _____

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Alternate percurrentPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: MixedINTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: _____

EXTERIOR 3° COURSE: Looped

EXMEDIAL COURSE: _____

INTERCOSTAL 3° VARIABILITY: Inconsistent

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulateVEINLETS -F/E/V/s: Mostly twice or more branched5° VEIN FABRIC: Irregular reticulateTYPE OF F.E.V. BRANCHING: dendriticMARGINAL VENATION: AbsentF.E.V.s TERMINATIONS: SimpleAREOLATION: Well developed

LEAF RANK: _____

TOOTH FEATURES

ORDERS OF TEETH: _____

No TEETH/cm: _____

TEETH GLANDULARITY: _____

TOOTH SHAPE: _____

TOOTH SPACING: _____

PRINCIPAL VEIN: _____

SINUS SHAPE: _____

ACCESSORY VEIN COURSE: _____

PRINCIPAL VEIN TERM.: _____

SURFACE & CUTICLE FEATURES

FOSSIL-COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: NoneCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

Dicot sp. SC2

GENERAL		MAJOR GROUP	DIC	INFERED FAMILY	ORGAN TYPE	Leaf
EXEMPLAR LOC.	USNM 42401	EXEMPLAR	USNM 539841	OTHERS LOC.		
DIAGNOSTIC FEATURES OF MORPHOTYPE						
Thin, irregularly spaced, cladodromous secondary veins that branch						
several times before reaching the margin. One pair of acute basal secondaries.						
Tertiaries are opposite percurrent to irregular reticulate. MQI:						

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES			
LEAF ATTACHMENT:	Petiolate if simple	LEAFLET ORGANIZATION:	Not Preserved
LEAF ARRANGEMENT:	Not Preserved	LEAFLET ATTACHMENT:	Petiolulate if compound
LEAF ORGANIZATION:	Not Preserved	PETIOLE ATTACHMENT:	Marginal
BLADE SIZE:	Microphyll	PETIOLE BASE:	Not Preserved
BLADE SHAPE:	Elliptic	PETIOLE GLANDS:	Not Preserved
BLADE RATIO L:W:	~2:1	PETIOLE X-SECTION:	Not Preserved
LOBATION:	Unlobed	MARGIN TYPE	Untoothed
BASE ASYMMETRY:	Not Preserved	MEDIAL SYMMETRY:	Not Preserved
BASE SHAPE:	Convex	APEX SHAPE:	Not preserved
BASE ANGLE:	Obtuse	APEX ANGLE:	Not preserved
		Special Margin Features:	
		Terminal apex features:	Not Preserved

PRIMARY & SECONDARY VEIN FEATURES		NAKED BASAL VEINS:	
PRIMARY VENATION:	Pinnate	N° BASAL VEINS:	3
MAJOR 2° Framework:	Cladodromous	Interior 2°	Absent
MAJOR 2° Attachment:		MINOR-2° Course:	
MAJOR 2° SPACING:	Irregular	MAJOR 2° VEIN ANGLE:	Abruptly decreasing toward base
INTER-2° proximal course:	Absent	AGROPHIC VEINS:	Absent
INTER-2° distal course:		INTER-2° VEIN LENGTH:	
		INTER-2° FREQUENCY:	

TERTIARY VEIN FEATURES		PERIMARGINAL VEINS:	
INTERCOSTAL 3°:	Opposite percurrent	PERIMARGINAL VEINS:	Fimbrial vein
EPIMEDIAL 3°:	Opposite percurrent	INTER-3° ANGLE TO 1°:	Obtuse to midvein
ADMEDIAL COURSE:	Perpendicular to midvein	EXTERIOR 3° COURSE:	Not Preserved
EXMEDIAL COURSE:	Basiflexed	INTERCOSTAL 3° VARIABILITY:	Inconsistent

FOURTH & HIGHER ORDER VEIN FEATURES		VEINLETS -F/E/V/s:	
4° VEIN FABRIC:	Irregular reticulate	VEINLETS -F/E/V/s:	Not Preserved
5° VEIN FABRIC:	Irregular reticulate	TYPE OF F.E.V. BRANCHING:	
MARGINAL VENATION:	Absent	F.E.V.s TERMINATIONS:	
AREOLATION:	Moderately developed	LEAF RANK:	

TOOTH FEATURES		
ORDERS OF TEETH:	No TEETH/cm:	TEETH GLANDULARITY:
TOOTH SHAPE:	TOOTH SPACING:	
PRINCIPAL VEIN:	SINUS SHAPE:	
ACCESSORY VEIN COURSE:	PRINCIPAL VEIN TERM.:	

SURFACE & CUTICLE FEATURES		FOSSIL COMPRESSION TEXTURE:	
		FOSSIL COMPRESSION TEXTURE:	Not Preserved
		SURFICIAL GLANDS:	None
		CUTICLE/MESOPHYLL FEATURES:	Not Preserved

MORPHOTYPE

Juglandaceae sp. SC1

GENERAL	MAJOR GROUP	DIC	INFERED FAMILY	Juglandaceae	ORGAN TYPE	Leaf
EXEMPLAR LOC.	USNM 42401	EXEMPLAR	USNM 539842, 539843	OTHERS LOC.		
DIAGNOSTIC FEATURES OF MORPHOTYPE						
Peltate hairs and fewer teeth per secondary than the Juglandaceous leaf from						
Dead Platypus. Fourth order veins are irregular reticulate.						
MQI:						

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT:		LEAFLET ORGANIZATION:	Not Preserved		
LEAF ARRANGEMENT:	Not Preserved	LEAFLET ATTACHMENT:	Sessile		
LEAF ORGANIZATION:	Not Preserved	PETIOLE ATTACHMENT:	Marginal		
BLADE SIZE:	Microphyll	PETIOLE BASE:	Not Preserved		
BLADE SHAPE:	Elliptic	PETIOLE GLANDS:	Not Preserved		
BLADE RATIO L:W:	5:2	PETIOLE X-SECTION:	Not Preserved		
LOBATION:	Unlobed	MARGIN TYPE	Serrate		
BASE ASYMMETRY:	Basal insertion asymmetrical	MEDIAL SYMMETRY:	Symmetrical		
BASE SHAPE:	Convex/cordate	APEX SHAPE:	Acuminate	Special Margin Features:	None
BASE ANGLE:	Obtuse	APEX ANGLE:	Acute	Terminal apex features:	None

PRIMARY & SECONDARY VEIN FEATURES

PRIMARY VENATION:	Pinnate	NAKED BASAL VEINS:	Absent
MAJOR 2° Framework:	Semicraspedodromous	N° BASAL VEINS:	1 Interior 2° Absent
MAJOR 2° Attachment:	Excurent	MINOR-2° Course:	
MAJOR 2° SPACING:	Decreasing proximally	MAJOR 2° VEIN ANGLE:	Smoothly increasing toward base
INTER-2° proximal course:	Parallel to major 2°	AGROPHIC VEINS:	Absent
	Basimixed, not perpendicular to	INTER-2° VEIN LENGTH:	<50% of subjacent 2°
INTER-2° distal course:	subjacent secondary	INTER-2° FREQUENCY:	<1 per intercostal area

TERTIARY VEIN FEATURES

INTERCOSTAL 3°:	Opposite percurrent - straight	PERIMARGINAL VEINS:	None
EPIMEDIAL 3°:	Opposite percurrent	INTER-3° ANGLE TO 1°:	Obtuse to midvein
ADMEDIAL COURSE:	Perpendicular to midvein	EXTERIOR 3° COURSE:	Terminating at the margin
EXMEDIAL COURSE:	Parallel to intercostal 3°	INTERCOSTAL 3° VARIABILITY:	Increasing proximally

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC:	Irregular reticulate	VEINLETS -F/E/V/s:	Not Preserved
5° VEIN FABRIC:	Not Preserved	TYPE OF F.E.V. BRANCHING:	
MARGINAL VENATION:	Not Preserved	F.E.V.s TERMINATIONS:	
AREOLATION:	Not Preserved	LEAF RANK:	

TOOTH FEATURES

ORDERS OF TEETH:	1	No TEETH/cm:	3-5	TEETH GLANDULARITY:	None
TOOTH SHAPE:	cv/cv	TOOTH SPACING:	Regular		
PRINCIPAL VEIN:	Present	SINUS SHAPE:	Angular		
ACCESSORY VEIN COURSE:	Not Preserved	PRINCIPAL VEIN TERM.:	Marginal, at apex		

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE:	Pubescent
SURFICIAL GLANDS:	None
CUTICLE/MESOPHYLL FEATURES:	peltate hairs

MORPHOTYPE

Dicot sp. LL1

GENERAL		MAJOR GROUP	DIC	INFERED FAMILY	ORGAN TYPE	Leaf
EXEMPLAR LOC.	USNM 42042	EXEMPLAR	USNM 539851	OTHERS LOC.		
DIAGNOSTIC FEATURES OF MORPHOTYPE						
Single leaf(let) with two orders of teeth that are fed by the secondary vein or a branch off the secondary. Secondary veins are irregularly spaced and at inconsistent angles.						
MQI:						
LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES						
LEAF ATTACHMENT:	Not Preserved	LEAFLET ORGANIZATION:	Not Preserved			
LEAF ARRANGEMENT:	Not Preserved	LEAFLET ATTACHMENT:	Not Preserved			
LEAF ORGANIZATION:	Not Preserved	PETIOLE ATTACHMENT:	Not Preserved			
BLADE SIZE:	Notophyll	PETIOLE BASE:	Not Preserved			
BLADE SHAPE:	Ovate	PETIOLE GLANDS:	Not Preserved			
BLADE RATIO L:W:	>2:1	PETIOLE X-SECTION:	Not Preserved			
LOBATION:	Unlobed	MARGIN TYPE	Serrate			
BASE ASYMMETRY:	Not Preserved	MEDIAL SYMMETRY:	Asymetrical			
BASE SHAPE:	Not Preserved	APEX SHAPE:	Not preserved	Special Margin Features:	None	
BASE ANGLE:	Acute	APEX ANGLE:	Acute	Terminal apex features:	Not Preserved	
PRIMARY & SECONDARY VEIN FEATURES						
PRIMARY VENATION:	Pinnate	NAKED BASAL VEINS:	Not Preserved			
MAJOR 2° Framework:	Craspedodromous	N° BASAL VEINS:	NP	Interior 2°		
MAJOR 2° Attachment:	Excurent	MINOR-2° Course:				
MAJOR 2° SPACING:	Irregular	MAJOR 2° VEIN ANGLE:	Inconsistent			
INTER-2° proximal course:	Absent	AGROPHIC VEINS:	Absent			
INTER-2° distal course:		INTER-2° VEIN LENGTH:				
INTER-2° FREQUENCY:						
TERTIARY VEIN FEATURES						
INTERCOSTAL 3°:	Irregular reticulate	PERIMARGINAL VEINS:	None			
EPIMEDIAL 3°:	Not preserved	INTER-3° ANGLE TO 1°:				
ADMEDIAL COURSE:		EXTERIOR 3° COURSE:	Terminating at the margin			
EXMEDIAL COURSE:		INTERCOSTAL 3° VARIABILITY:				
FOURTH & HIGHER ORDER VEIN FEATURES						
4° VEIN FABRIC:	Not Preserved	VEINLETS -F/E/V/s:	Not Preserved			
5° VEIN FABRIC:	Not Preserved	TYPE OF F.E.V. BRANCHING:				
MARGINAL VENATION:	Not Preserved	F.E.V.s TERMINATIONS:				
AREOLATION:	Not Preserved	LEAF RANK:				
TOOTH FEATURES						
ORDERS OF TEETH:	2	No TEETH/cm:	4-6	TEETH GLANDULARITY:	None	
TOOTH SHAPE:	cv/cv to st/st	TOOTH SPACING:	Irregular			
PRINCIPAL VEIN:	Present	SINUS SHAPE:	Angular			
ACCESSORY VEIN COURSE:	Looped	PRINCIPAL VEIN TERM.:	Marginal, at apex			
SURFACE & CUTICLE FEATURES						
FOSSIL COMPRESSION TEXTURE:				Smooth		
SURFICIAL GLANDS:				Not Preserved		
CUTICLE/MESOPHYLL FEATURES:				Not Preserved		

MORPHOTYPE

Lauraceae sp. LL1

GENERAL	MAJOR GROUP	DIC	INFERED FAMILY	Lauraceae	ORGAN TYPE	Leaf
EXEMPLAR LOC.	USNM 42042	EXEMPLAR	USNM 539853	OTHERS LOC.		
DIAGNOSTIC FEATURES OF MORPHOTYPE						
Single leaf base that has basally actinodromous secondary veins and 5 basal veins.						
						MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES						
LEAF ATTACHMENT:	Petiolate	LEAFLET ORGANIZATION:				
LEAF ARRANGEMENT:	Not Preserved	LEAFLET ATTACHMENT:				
LEAF ORGANIZATION:	Simple	PETIOLE ATTACHMENT:	Marginal			
BLADE SIZE:	Not Preserved	PETIOLE BASE:	Not Preserved			
BLADE SHAPE:	Not Preserved	PETIOLE GLANDS:	Not Preserved			
BLADE RATIO L:W:	?	PETIOLE X-SECTION:	Not Preserved			
LOBATION:	Unlobed	MARGIN TYPE	Untoothed			
BASE ASYMMETRY:	Symmetrical	MEDIAL SYMMETRY:	Not Preserved			
BASE SHAPE:	Rounded	APEX SHAPE:	Not preserved	Special Margin Features:		
BASE ANGLE:	Obtuse	APEX ANGLE:	Not preserved	Terminal apex features:	Not Preserved	

PRIMARY & SECONDARY VEIN FEATURES				NAKED BASAL VEINS: Absent		
PRIMARY VENATION:	Basal actinodromous	N° BASAL VEINS:	5	Interior 2°		
MAJOR 2° Framework:	Not Preserved	MINOR-2° Course:				
MAJOR 2° Attachment:	Not Preserved	MAJOR 2° VEIN ANGLE:	Not Preserved			
MAJOR 2° SPACING:	Not Preserved	AGROPHIC VEINS:	Not Preserved			
INTER-2° proximal course:	Not Preserved	INTER-2° VEIN LENGTH:				
INTER-2° distal course:		INTER-2° FREQUENCY:				

TERTIARY VEIN FEATURES				PERIMARGINAL VEINS: None		
INTERCOSTAL 3°:	Not Preserved	INTER-3° ANGLE TO 1°:				
EPIMEDIAL 3°:	Not preserved	EXTERIOR 3° COURSE:				
ADMEDIAL COURSE:		INTERCOSTAL 3° VARIABILITY:				
EXMEDIAL COURSE:						

FOURTH & HIGHER ORDER VEIN FEATURES				VEINLETS -F/E/V/s: Not Preserved		
4° VEIN FABRIC:	Not Preserved	TYPE OF F.E.V. BRANCHING:				
5° VEIN FABRIC:	Not Preserved	F.E.V.s TERMINATIONS:				
MARGINAL VENATION:	Not Preserved	LEAF RANK:				
AREOLATION:	Not Preserved					

TOOTH FEATURES						
ORDERS OF TEETH:		No TEETH/cm:		TEETH GLANDULARITY:		
TOOTH SHAPE:		TOOTH SPACING:				
PRINCIPAL VEIN:		SINUS SHAPE:				
ACCESSORY VEIN COURSE:		PRINCIPAL VEIN TERM.:				

SURFACE & CUTICLE FEATURES				FOSSIL COMPRESSION TEXTURE: Not Preserved		
				SURFICIAL GLANDS: Not Preserved		
				CUTICLE/MESOPHYLL FEATURES: Not Preserved		

MORPHOTYPE

Lauraceae sp. LL2

GENERAL	MAJOR GROUP	DIC	INFERED FAMILY	Lauraceae	ORGAN TYPE	Leaf
EXEMPLAR LOC.	USNM 42042	EXEMPLAR	USNM 539854	OTHERS LOC.		
DIAGNOSTIC FEATURES OF MORPHOTYPE						
Basal fragments with 3 primary veins that diverge within 1 mm of each						
other. Epimedial tertiaries are mixed opposite/alternate percurrent						
and widely spaced. MQI: _____						

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES						
LEAF ATTACHMENT:	Petiolate	LEAFLET ORGANIZATION:				
LEAF ARRANGEMENT:	Not Preserved	LEAFLET ATTACHMENT:				
LEAF ORGANIZATION:	Simple	PETIOLE ATTACHMENT:	Marginal			
BLADE SIZE:	Noto to mesophyll	PETIOLE BASE:	Not Preserved			
BLADE SHAPE:	Not Preserved	PETIOLE GLANDS:	Not Preserved			
BLADE RATIO L:W:		PETIOLE X-SECTION:	Not Preserved			
LOBATION:	Unlobed	MARGIN TYPE	Untoothed			
BASE ASYMMETRY:	Symmetrical	MEDIAL SYMMETRY:	Symmetrical			
BASE SHAPE:	Convex	APEX SHAPE:	Not preserved	Special Margin Features:		
BASE ANGLE:	Acute	APEX ANGLE:	Not preserved	Terminal apex features:	Not Preserved	

PRIMARY & SECONDARY VEIN FEATURES				NAKED BASAL VEINS: Absent		
PRIMARY VENATION:	Actinodromous	N° BASAL VEINS:	3	Interior 2°		
MAJOR 2° Framework:	Not Preserved	MINOR-2° Course:	Simple brochidodromous			
MAJOR 2° Attachment:	Excurent	MAJOR 2° VEIN ANGLE:	Not Preserved			
MAJOR 2° SPACING:	Not Preserved	AGROPHIC VEINS:	Absent			
INTER-2° proximal course:	Not Preserved	INTER-2° VEIN LENGTH:				
INTER-2° distal course:		INTER-2° FREQUENCY:				

TERTIARY VEIN FEATURES				PERIMARGINAL VEINS: Fimbrial vein		
INTERCOSTAL 3°:	Opposite percurrent - straight	INTER-3° ANGLE TO 1°:	Obtuse to midvein			
EPIMEDIAL 3°:	Mixed opp/alt percurrent	EXTERIOR 3° COURSE:				
ADMEDIAL COURSE:	Parallel to subjacent 2°	INTERCOSTAL 3° VARIABILITY:				
EXMEDIAL COURSE:	Parallel to intercostal 3°					

FOURTH & HIGHER ORDER VEIN FEATURES				VEINLETS -F/E/V/s: Not Preserved		
4° VEIN FABRIC:	Irregular reticulate	TYPE OF F.E.V. BRANCHING:				
5° VEIN FABRIC:	Irregular reticulate	F.E.V.s TERMINATIONS:				
MARGINAL VENATION:	Not Preserved	LEAF RANK:				
AREOLATION:	Well developed					

TOOTH FEATURES						
ORDERS OF TEETH:		No TEETH/cm:		TEETH GLANDULARITY:		
TOOTH SHAPE:		TOOTH SPACING:				
PRINCIPAL VEIN:		SINUS SHAPE:				
ACCESSORY VEIN COURSE:		PRINCIPAL VEIN TERM.:				

SURFACE & CUTICLE FEATURES				FOSSIL COMPRESSION TEXTURE: Not Preserved		
				SURFICIAL GLANDS: Not Preserved		
				CUTICLE/MESOPHYLL FEATURES: Not Preserved		

MORPHOTYPE

FU742

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM539857

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Entire, asymmetrical leaf that is pinnate, has a strong fimbrial vein, and opposite percurrent
tertiaries.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate if compound

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT.: Marginal

BLADE SIZE: Microphyll

PETIOLE BASE:

BLADE SHAPE: Elliptic

PETIOLE GLANDS.:

BLADE RATIO L:W: ~2:1

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE: Untoothed

BASE ASYMMETRY: Basal insertion asymmetrical

MEDIAL SYMMETRY: Asymmetrical

BASE SHAPE: Straight (cuneate)

APEX SHAPE: Not preserved

Special Margin Features:

BASE ANGLE: Acute

APEX ANGLE: Not preserved

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Pinnate

N° BASAL VEINS: 1 Interior 2°: Absent

MAJOR 2° Framework: Not Preserved

MINOR-2° Course:

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: Uniform

MAJOR 2° SPACING: Regular

AGROPHIC VEINS: Absent

INTER-2° proximal course:

INTER-2° VEIN

LENGTH:

INTER-2°

INTER-2° distal course:

FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - convex

PERIMARGINAL VEINS: Fimbrial vein

EPIMEDIAL 3°: Not Preserved

INTER-3° ANGLE TO 1°: Not Preserved

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: Not Preserved

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY: Not Preserved

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not Preserved

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not Preserved

SURFICIAL GLANDS: Not Preserved

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE**FU741****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

Betulaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539859

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Compound non-glandular teeth, compound agrophics, uniform and abundant
craspedodromous secondaries.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: SimplePETIOLE ATTACHMENT.: MarginalBLADE SIZE: Microphyll to NotophyllPETIOLE BASE: Not PreservedBLADE SHAPE: Ovate

PETIOLE GLANDS.:

BLADE RATIO L:W: 2:1 to 3:2

PETIOLE X-SECTION:

LOBATION: UnlobedMARGIN TYPE SerrateBASE ASYMMETRY: Slightly asymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: Convex or roundedAPEX SHAPE: Acuminate

Special Margin Features:

BASE ANGLE: ObtuseAPEX ANGLE: AcuteTerminal apex features: None**PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 3 Interior 2°: AbsentMAJOR 2° Framework: CraspedodromousMINOR-2° Course: CraspedodromousMAJOR 2° Attachment: ExcurrentMAJOR 2° VEIN ANGLE: UniformMAJOR 2° SPACING: RegularAGROPHIC VEINS: Compound

INTER-2° proximal course:

INTER-2° VEIN

LENGTH:

INTER-2°

INTER-2° distal course:

FREQUENCY:

TERTIARY VEIN FEATURESINTERCOSTAL 3°: Opposite percurrent - str/convPERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Parallel to intercostal 3°EXTERIOR 3° COURSE: Terminating at the marginEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Increasing proximally**FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: Regular reticulateVEINLETS -F/E/V/s: Mostly once branched5° VEIN FABRIC: Reticulate

TYPE OF F.E.V. BRANCHING:

MARGINAL VENATION: Incomplete loopsF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Well developed

LEAF RANK:

TOOTH FEATURESORDERS OF TEETH: 2No TEETH/cm: 5 to 10TEETH GLANDULARITY: NoneTOOTH SHAPE: cv/st, cv/rtTOOTH SPACING: RegularPRINCIPAL VEIN: ProximalSINUS SHAPE: AngularACCESSORY VEIN COURSE: Not PreservedPRINCIPAL VEIN TERM.: Marginal, at apex**SURFACE & CUTICLE FEATURES**FOSSIL COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: NoneCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU 745 - Lateral Leaflet

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Sapindaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 539860, 539861 OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Irregularly spaced, large spherulate teeth fed by a secondary vein or a branch off
of the secondary. Sinuous opposite percurrent tertiaries that are alternate in places.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: PetiolateLEAFLET ORGANIZATION: Odd-pinnateLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: PetiolulateLEAF ORGANIZATION: Pinnately Compound OncePETIOLE ATTACHMENT: MarginalBLADE SIZE: NotophyllPETIOLE BASE: Not PreservedBLADE SHAPE: EllipticPETIOLE GLANDS: BLADE RATIO L:W: 3:1 to 2:1PETIOLE X-SECTION: LOBATION: UnlobedMARGIN TYPE: SerrateBASE ASYMMETRY: Width and InsertionMEDIAL SYMMETRY: AsymmetricalBASE SHAPE: Straight to ConvexAPEX SHAPE: Straight/AcuminateSpecial Margin Features: BASE ANGLE: AcuteAPEX ANGLE: AcuteTerminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: CraspedodromousMINOR-2° Course: CraspedodromousMAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: Abruptly increasing toward baseMAJOR 2° SPACING: Crowded basal secondariesAGROPHIC VEINS: CompoundINTER-2° proximal course: Perpendicular to midvein

INTER-2° VEIN

LENGTH: < 50% subjacent secondaryINTER-2° distal course: Basiflexed, not perpendicular tosubjacent secondaryINTER-2° FREQUENCY: >1 per intercostal area

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - sinuousPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: Terminating at the marginEXMEDIAL COURSE: BasiflexedINTERCOSTAL 3° VARIABILITY: Inconsistent

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not PreservedVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Not PreservedTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: AbsentF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Not PreservedLEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 2No TEETH/cm: 2 to 4TEETH GLANDULARITY: SpherulateTOOTH SHAPE: cv/cv,st/cvTOOTH SPACING: IrregularPRINCIPAL VEIN: MedialSINUS SHAPE: AngularACCESSORY VEIN COURSE: Not PreservedPRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES:

MORPHOTYPE**FU 745 - Terminal Leaflet****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

Sapindaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 539860, 539862

OTHERS LOC.

USNM 42411

DIAGNOSTIC FEATURES OF MORPHOTYPE

Some leaflets have 3 lobes, others just 2 more pronounced teeth. Lateral primaries depart supra-basally and there are generally 2 pairs of secondaries below this departure.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION: Odd-pinnate

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate

LEAF ORGANIZATION: Pinnately Compound Once

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Notophyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Elliptic to Obovate

PETIOLE GLANDS:

BLADE RATIO L:W: 2:1 to 1:1

PETIOLE X-SECTION:

LOBATION: Palmately lobed

MARGIN TYPE: Serrate

BASE ASYMMETRY: Symmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Straight to Convex

APEX SHAPE: Straight/Acuminate

Special Margin Features:

BASE ANGLE: Acute

APEX ANGLE: Odd-lobed acute

Terminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Palinactinodromous

N° BASAL VEINS: 1 Interior 2°: Absent

MAJOR 2° Framework: Craspedodromous

MINOR-2° Course: Craspedodromous

MAJOR 2° Attachment: Decurrent

MAJOR 2° VEIN ANGLE: Abruptly increasing toward base

MAJOR 2° SPACING: Crowded basal secondaries

AGROPHIC VEINS: Compound

INTER-2° proximal course: Perpendicular to midvein

INTER-2° VEIN

LENGTH: < 50% subjacent secondary

Basiflexed, not perpendicular to subjacent secondary

INTER-2° distal course: Basiflexed, not perpendicular to subjacent secondary

INTER-2° FREQUENCY: >1 per intercostal area

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - sinuous

PERIMARGINAL VEINS: Fimbrial vein

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: Perpendicular to midvein

EXTERIOR 3° COURSE: Terminating at the margin

EXMEDIAL COURSE: Basiflexed

INTERCOSTAL 3° VARIABILITY: Inconsistent

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not Preserved

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Absent

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 2

No TEETH/cm: 2 to 4

TEETH GLANDULARITY: Spherulate

TOOTH SHAPE: cv/cv,st/cv

TOOTH SPACING: Irregular

PRINCIPAL VEIN: Medial

SINUS SHAPE: Angular

ACCESSORY VEIN COURSE: Not Preserved

PRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Smooth

SURFICIAL GLANDS: Not Preserved

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU740

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Juglandaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539863

OTHERS LOC.

USNM 37560

DIAGNOSTIC FEATURES OF MORPHOTYPE

Tertiaries are more strongly impressed than in *Aesculus hickeyi*.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION: Odd-pinnate

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate

LEAF ORGANIZATION: Pinnately Compound

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Microphyll to Notophyll

PETIOLE BASE:

BLADE SHAPE: Oblong

PETIOLE GLANDS:

BLADE RATIO L:W: 3:1 to 2:1

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE: Serrate

BASE ASYMMETRY: Width and insertion

MEDIAL SYMMETRY: Asymmetrical

BASE SHAPE: rounded/cordate

APEX SHAPE:

Acuminate

Special Margin Features:

BASE ANGLE: Acute

APEX ANGLE:

Acute

Terminal apex features:

None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Pinnate

N° BASAL VEINS: 1 Interior 2°: Absent

MAJOR 2° Framework: Semicraspedodromous

MINOR-2° Course:

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: Smoothly increasing toward base

MAJOR 2° SPACING: Decreasing proximally

AGROPHIC VEINS: Absent

INTER-2° proximal course:

INTER-2° VEIN
LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - straight

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: Perpendicular to midvein

EXTERIOR 3° COURSE: Variable

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: decr. Exmed & incr. prox.

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulate

VEINLETS -F/E/V/s: Mostly twice or more branched

5° VEIN FABRIC: Freely ramifying

TYPE OF F.E.V. BRANCHING: dendritic

MARGINAL VENATION: Looped

F.E.V.s TERMINATIONS: Simple

AREOLATION: Well developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm: 4 to 6

TEETH GLANDULARITY: Non-specific glandular

TOOTH SHAPE: cv/cv,rt/cv,rt/st

TOOTH SPACING: Regular

PRINCIPAL VEIN: Medial

SINUS SHAPE: Angular

ACCESSORY VEIN COURSE: Runing from sinus

PRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Smooth

SURFICIAL GLANDS: None

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU739

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539864

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Distinctive dentate margin with large teeth whose primary vein enters proximally.

Brochidodromous.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate if compound

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Microphyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Ovate

PETIOLE GLANDS:.

BLADE RATIO L:W: 7:5

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE: Dentate

BASE ASYMMETRY: Symmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Rounded?

APEX SHAPE: Acuminate

Special Margin Features:

BASE ANGLE: Obtuse

APEX ANGLE: Acute

Terminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Not Preserved

PRIMARY VENATION: Palinactinodromous

N° BASAL VEINS: 2? Interior 2°: Absent

MAJOR 2° Framework: Semicraspedodromous

MINOR-2° Course: Craspedodromous

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: Inconsistent

MAJOR 2° SPACING: Irregular

AGROPHIC VEINS: Simple

INTER-2° proximal course:

INTER-2° VEIN

LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - straight

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Perpendicular to midvein

ADMEDIAL COURSE: Parallel to intercostal 3°

EXTERIOR 3° COURSE: Not preserved

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: Not preserved

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not Preserved

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm: 2 to 3

TEETH GLANDULARITY: Non-specific glandular

TOOTH SHAPE: cv/st,fl/st,fl/fl

TOOTH SPACING: Regular

PRINCIPAL VEIN: Proximal

SINUS SHAPE: Angular

ACCESSORY VEIN COURSE: Not Preserved

PRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Smooth

SURFICIAL GLANDS: None

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU738

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539865

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Cordate base and 7 primary veins. Only base found.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate if compound

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Notophyll?

PETIOLE BASE: Not Preserved

BLADE SHAPE: Ovate?

PETIOLE GLANDS:

BLADE RATIO L:W: ?

PETIOLE X-SECTION:

LOBATION: Not Preserved

MARGIN TYPE: Untoothed

BASE ASYMMETRY: Basal width asymmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Cordate

APEX SHAPE: Not preserved

Special Margin Features: Erode

BASE ANGLE: Wide obtuse

APEX ANGLE: Not preserved

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Palinactinodromous

N° BASAL VEINS: 7 Interior 2°:

MAJOR 2° Framework: Eucamptodromous

MINOR-2° Course: Simple brochidodromous

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: Not preserved

MAJOR 2° SPACING: Not preserved

AGROPHIC VEINS: Simple, at least

INTER-2° proximal course:

INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Mixed opp/alt percurrent

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Mixed opp/alt percurrent

INTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: Parallel to intercostal 3°

EXTERIOR 3° COURSE: Looped

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: Basally concentric

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Regular reticulate

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Incomplete loops

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Smooth

SURFICIAL GLANDS: None

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU737

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539866

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Only bases found; untoothed pinnate leaf with a thick petiole and primary vein.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simpleLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Petiolulate if compoundLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: NotophyllPETIOLE BASE: Not PreservedBLADE SHAPE: Not PreservedPETIOLE GLANDS: BLADE RATIO L:W: ?PETIOLE X-SECTION: LOBATION: probably unlobedMARGIN TYPE: UntoothedBASE ASYMMETRY: WidthMEDIAL SYMMETRY: AsymmetricalBASE SHAPE: ConvexAPEX SHAPE: Not preservedSpecial Margin Features: BASE ANGLE: AcuteAPEX ANGLE: Not preservedTerminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Simple brochidodrompusMINOR-2° Course: MAJOR 2° Attachment: ExcurrentMAJOR 2° VEIN ANGLE: ? UniformMAJOR 2° SPACING: Not PreservedAGROPHIC VEINS: AbsentINTER-2° proximal course: INTER-2° VEIN LENGTH: INTER-2° distal course: INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - convexPERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Not PreservedINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: EXTERIOR 3° COURSE: Not preservedEXMEDIAL COURSE: INTERCOSTAL 3° VARIABILITY: Not preserved

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not PreservedVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Not PreservedTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Not PreservedLEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: No TEETH/cm: TEETH GLANDULARITY: TOOTH SHAPE: TOOTH SPACING: PRINCIPAL VEIN: SINUS SHAPE: ACCESSORY VEIN COURSE: PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not PreservedSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU736

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539867

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Differs from DP Betulaceae because it has no agrophics, it is semicraspedodromous,
and its teeth are larger and more glandular.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simpleLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Petiolulate if compoundLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: MicrophyllPETIOLE BASE: Not PreservedBLADE SHAPE: OvatePETIOLE GLANDS: BLADE RATIO L:W: 6:3.5PETIOLE X-SECTION: LOBATION: UnlobedMARGIN TYPE: SerrateBASE ASYMMETRY: SymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: RoundedAPEX SHAPE: StraightSpecial Margin Features: BASE ANGLE: ObtuseAPEX ANGLE: AcuteTerminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: #### Interior 2°: AbsentMAJOR 2° Framework: SemicraspedodromousMINOR-2° Course: MAJOR 2° Attachment: ExcurentMAJOR 2° VEIN ANGLE: Smoothly increasing toward baseMAJOR 2° SPACING: Decreasing proximallyAGROPHIC VEINS: AbsentINTER-2° proximal course: INTER-2° VEIN LENGTH: INTER-2° distal course: INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - straightPERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Parallel to intercostal 3°EXTERIOR 3° COURSE: Not PreservedEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Decreasing exmedially

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not PreservedVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Not PreservedTYPE OF F.E.V. BRANCHING: n.pMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Not PreservedLEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1No TEETH/cm: 4 to 5TEETH GLANDULARITY: Non-specific glandularTOOTH SHAPE: st/cc, fl/ccTOOTH SPACING: RegularPRINCIPAL VEIN: DistalSINUS SHAPE: AngularACCESSORY VEIN COURSE: Straight or concavePRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not PreservedSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU735

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539868

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Unique specimen; either 2 compound leaflets that didn't separate fully or a bi-lobed leaf. Each side of base has different shape. Distinctive hairs on the leaf.
Description here assumes the compound leaflet hypothesis.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate**LEAFLET ORGANIZATION: **Even-pinnate?**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Sessile**LEAF ORGANIZATION: **Pinnately Compound?**PETIOLE ATTACHMENT: **Marginal**BLADE SIZE: **Microphyll**

PETIOLE BASE:

BLADE SHAPE: **Elliptic**

PETIOLE GLANDS:

BLADE RATIO L:W: **5:2**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE: **Serrate**BASE ASYMMETRY: **width and insertion**MEDIAL SYMMETRY: **Asymmetrical**BASE SHAPE: **convex/decurent**APEX SHAPE: **Not preserved**

Special Margin Features:

BASE ANGLE: **Acute**APEX ANGLE: **Acute**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **2** Interior 2°: **Absent**MAJOR 2° Framework: **Eucamptodromous**

MINOR-2° Course:

MAJOR 2° Attachment: **Decurent**MAJOR 2° VEIN ANGLE: **Smoothly increasing toward base**MAJOR 2° SPACING: **Irregular**AGROPHIC VEINS: **Absent**

INTER-2° proximal course:

INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Not Preserved**PERIMARGINAL VEINS: **None**EPIMEDIAL 3°: **Not preserved**INTER-3° ANGLE TO 1°: **Not Preserved**

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: **Not Preserved**

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY: **Not Preserved**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Not Preserved**VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Not Preserved**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Not Preserved**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: **1**No TEETH/cm: **2-3**TEETH GLANDULARITY: **Non-specific glandular**TOOTH SHAPE: **cv/cv**TOOTH SPACING: **Irregular**PRINCIPAL VEIN: **Not Preserved**SINUS SHAPE: **Rounded**ACCESSORY VEIN COURSE: **Not Preserved**PRINCIPAL VEIN TERM.: **Marginal, at apex**

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Pubescent**SURFICIAL GLANDS: **None**CUTICLE/MESOPHYLL FEATURES: **simple hairs**

MORPHOTYPE

FU734

GENERAL

MAJOR GROUP

DIC

INFERED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539871

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Untoothed, actinodromous leaf with 5 primary veins

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate if compound

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT.: Marginal

BLADE SIZE: Notophyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Ovate

PETIOLE GLANDS.:

BLADE RATIO L:W: ~2:1

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE: Untoothed

BASE ASYMMETRY: Symmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Rounded

APEX SHAPE: Not preserved

Special Margin Features:

BASE ANGLE: Obtuse

APEX ANGLE: Acute

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Basal actinodromous

N° BASAL VEINS: 5 Interior 2°: ?

MAJOR 2° Framework: Simple brochidodrompus

MINOR-2° Course: Simple brochidodromous

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: Not Preserved

MAJOR 2° SPACING: Abruptly increasing proximally

AGROPHIC VEINS: Simple

INTER-2° proximal course:

INTER-2° VEIN

LENGTH:

INTER-2°

INTER-2° distal course:

FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - str/sin

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: Parallel to intercostal 3°

EXTERIOR 3° COURSE: Looped

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: Basally concentric

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Alternate percurrent

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Well developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Smooth

SURFICIAL GLANDS: None

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU733

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42411

EXEMPLAR

USNM 539872

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Large teeth that are cv/cv

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Not Preserved

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Not Preserved

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT: Not Preserved

BLADE SIZE: Microphyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Elliptic

PETIOLE GLANDS:.

BLADE RATIO L:W: ?

PETIOLE X-SECTION:

LOBATION: Not Preserved

MARGIN TYPE Serrate

BASE ASYMMETRY: ?Basal insertion asymmetrical

MEDIAL SYMMETRY: Not Preserved

BASE SHAPE: Not Preserved

APEX SHAPE: Not preserved

Special Margin Features:

BASE ANGLE: Acute

APEX ANGLE: Acute

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Not Preserved

PRIMARY VENATION: Pinnate

N° BASAL VEINS: ? Interior 2°: Absent

MAJOR 2° Framework: Craspedodromous or semi-crasp

MINOR-2° Course: Crasp. or semi-crasp.

MAJOR 2° Attachment: Decurrent

MAJOR 2° VEIN ANGLE: Uniform

MAJOR 2° SPACING: Regular

AGROPHIC VEINS: Compound

INTER-2° proximal course:

INTER-2° VEIN
LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - straight

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: Parallel to intercostal 3°

EXTERIOR 3° COURSE: Not Preserved

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: Not Preserved

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not Preserved

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING:

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS:

AREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm:.

TEETH GLANDULARITY: None

TOOTH SHAPE: cv/cv

TOOTH SPACING: Regular

PRINCIPAL VEIN: Medial

SINUS SHAPE: Angular

ACCESSORY VEIN COURSE: Not Preserved

PRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not Preserved

SURFICIAL GLANDS: Not Preserved

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU744

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Betulaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 539873, 539874 OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

2 distinct orders of teeth; the primary order is fed by a secondary vein.Cordate base with crowded basal secondaries and generally 7 basal veinsOpposite percurrent, closely spaced tertiaries

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: SimplePETIOLE ATTACHMENT: MarginalBLADE SIZE: Notophyll to MacrophyllPETIOLE BASE: Not PreservedBLADE SHAPE: Ovate to elliptic

PETIOLE GLANDS:.

BLADE RATIO L:W: 4:3, 7:4

PETIOLE X-SECTION:

LOBATION: UnlobedMARGIN TYPE SerrateBASE ASYMMETRY: SymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: CordateAPEX SHAPE: Acuminate

Special Margin Features:

BASE ANGLE: Wide obtuseAPEX ANGLE: AcuteTerminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 5 or 7 Interior 2°: AbsentMAJOR 2° Framework: CraspedodromousMINOR-2° Course: CraspedodromousMAJOR 2° Attachment: ExcurrentMAJOR 2° VEIN ANGLE: Abruptly increasing toward baseMAJOR 2° SPACING: Decreasing proximallyAGROPHIC VEINS: Compound

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - straightPERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Parallel to intercostal 3°EXTERIOR 3° COURSE: Terminating at the marginEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Basally concentric

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Mixed percurrentVEINLETS -F/E/V/s: Mostly twice or more branched5° VEIN FABRIC: Irregular reticulateTYPE OF F.E.V. BRANCHING: dendriticMARGINAL VENATION: Incomplete loopsF.E.V.s TERMINATIONS: SimpleAREOLATION: Moderately developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 2No TEETH/cm: 5 to 7TEETH GLANDULARITY: NoneTOOTH SHAPE: cv/cv,fl/cv,fl/flTOOTH SPACING: RegularPRINCIPAL VEIN: MedialSINUS SHAPE: Angular

ACCESSORY VEIN COURSE:

ConvexPRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL-COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE**FU748****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

Lauralean?

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 539875

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Long, skinny leaf with a thick petiole and prominent fimbrial vein.Also there is a vein of fine gage that runs along the margin just inside of the fimbrial vein

MQI: _____

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: _____

LEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Petiolulate if compoundLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: MicrophyllPETIOLE BASE: Not PreservedBLADE SHAPE: Elliptic

PETIOLE GLANDS: _____

BLADE RATIO L:W: >2:1

PETIOLE X-SECTION: _____

LOBATION: UnlobedMARGIN TYPE UntoothedBASE ASYMMETRY: InsertionMEDIAL SYMMETRY: AsymmetricalBASE SHAPE: DecurrentAPEX SHAPE: Not preserved

Special Margin Features: _____

BASE ANGLE: AcuteAPEX ANGLE: AcuteTerminal apex features: Not Preserved**PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 3 Interior 2°: AbsentMAJOR 2° Framework: Simple brochidodrompus

MINOR-2° Course: _____

MAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: InconsistentMAJOR 2° SPACING: IrregularAGROPHIC VEINS: AbsentINTER-2° proximal course: Parallel to major 2°

INTER-2° VEIN LENGTH: _____

> 50% subjacent secondaryINTER-2° distal course: ReticulatingINTER-2° FREQUENCY: <1 per intercostal area**TERTIARY VEIN FEATURES**INTERCOSTAL 3°: Opposite percurrent - convexPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: LoopedEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Not Preserved**FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: Not PreservedVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Not PreservedTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Not Preserved

LEAF RANK: _____

TOOTH FEATURES

ORDERS OF TEETH: _____ No TEETH/cm: _____

TEETH GLANDULARITY: _____

TOOTH SHAPE: _____

TOOTH SPACING: _____

PRINCIPAL VEIN: _____

SINUS SHAPE: _____

ACCESSORY VEIN COURSE: _____

PRINCIPAL VEIN TERM.: _____

SURFACE & CUTICLE FEATURESFOSSIL COMPRESSION TEXTURE: Not PreservedSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

FU743

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 539876

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Cv/cv teeth with the most prominent vein running to the sinus, rather than the tooth apex.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Not Preserved**LEAFLET ORGANIZATION: **Not Preserved**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Not Preserved**LEAF ORGANIZATION: **Not Preserved**PETIOLE ATTACHMENT: **Not Preserved**BLADE SIZE: **Notophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Oblong?**

PETIOLE GLANDS:.

BLADE RATIO L:W: **?**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE **Serrate**BASE ASYMMETRY: **Not Preserved**MEDIAL SYMMETRY: **Asymmetrical**BASE SHAPE: **Not Preserved**APEX SHAPE: **Not preserved**

Special Margin Features:

BASE ANGLE: **Not Preserved**APEX ANGLE: **Not preserved**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Not Preserved**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **?** Interior 2°: **Absent**MAJOR 2° Framework: **Semicraspedodromous**

MINOR-2° Course:

MAJOR 2° Attachment: **Excurent**MAJOR 2° VEIN ANGLE: **Inconsistent**MAJOR 2° SPACING: **Irregular**AGROPHIC VEINS: **Not Preserved**

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Opposite percurrent**PERIMARGINAL VEINS: **None**EPIMEDIAL 3°: **Not preserved**INTER-3° ANGLE TO 1°: **Obtuse to midvein**ADMEDIAL COURSE: **Acute to midvein**EXTERIOR 3° COURSE: **Variable**

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY: **Not Preserved**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Not Preserved**VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Not Preserved**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Not Preserved**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: **1**No TEETH/cm: **2 to 3**TEETH GLANDULARITY: **None**TOOTH SHAPE: **cv/cv,fl/cv**TOOTH SPACING: **Regular**PRINCIPAL VEIN: **Medial**SINUS SHAPE: **Angular**

ACCESSORY VEIN COURSE:

ConvexPRINCIPAL VEIN TERM.: **Marginal, at sinus**

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Not Preserved**SURFICIAL GLANDS: **Not Preserved**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

FU750

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Fabaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 509415

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Pulvinulate petiolule, strong fimbrial vein, thick primary vein. Venation is generally poorly organized and difficult to see.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate**LEAFLET ORGANIZATION: **Alternate**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Petiolulate**LEAF ORGANIZATION: **Pinnately Compound Once**PETIOLE ATTACHMENT: **Marginal**BLADE SIZE: **Microphyll**PETIOLE BASE: **Pulvinulate**BLADE SHAPE: **Ovate**PETIOLE GLANDS: BLADE RATIO L:W: **5:2**PETIOLE X-SECTION: LOBATION: **Unlobed**MARGIN TYPE: **Untoothed**BASE ASYMMETRY: **Basal width asymmetrical**MEDIAL SYMMETRY: **Asymmetrical**BASE SHAPE: **Rounded**APEX SHAPE: **Straight**Special Margin Features: BASE ANGLE: **Acute**APEX ANGLE: **Acute**Terminal apex features: **None**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **1** Interior 2°: **Absent**MAJOR 2° Framework: **Simple brochidodrompus**MINOR-2° Course: MAJOR 2° Attachment: **Excurrent**MAJOR 2° VEIN ANGLE: **Abruptly increasing toward base**MAJOR 2° SPACING: **Irregular**AGROPHIC VEINS: **Absent**INTER-2° proximal course: **Parallel to major 2°**

INTER-2° VEIN

LENGTH: **< 50% subjacent secondary**INTER-2° distal course: **Basiflexed, not perpendicular to subjacent secondary**INTER-2° FREQUENCY: **<1 per intercostal area**

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Opposite percurrent - sin/chev**PERIMARGINAL VEINS: **Fimbrial vein**EPIMEDIAL 3°: **Mixed**INTER-3° ANGLE TO 1°: **Obtuse to midvein**ADMEDIAL COURSE: EXTERIOR 3° COURSE: **Looped**EXMEDIAL COURSE: INTERCOSTAL 3° VARIABILITY: **Inconsistent**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not preserved**MARGINAL VENATION: **Absent**F.E.V.s TERMINATIONS: **Not preserved**AREOLATION: **Not Preserved**LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: No TEETH/cm: TEETH GLANDULARITY: TOOTH SHAPE: TOOTH SPACING: PRINCIPAL VEIN: SINUS SHAPE: ACCESSORY VEIN COURSE: PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Smooth**SURFICIAL GLANDS: **None**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

FU746

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

USNM 539878

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Primaries depart supra-basally: 3 primaries diverge from a single point, and then after at least 5 mm, the lateral primaries branch, giving a total of 5 primary veins.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate**

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: **Not Preserved**

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: **Simple**PETIOLE ATTACHMENT.: **Marginal**BLADE SIZE: **Notophyll to Mesophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Elliptic**

PETIOLE GLANDS:.

BLADE RATIO L:W: **~5:4**

PETIOLE X-SECTION:

LOBATION: **Palmately lobed**MARGIN TYPE **Untoothed**BASE ASYMMETRY: **Symmetrical**MEDIAL SYMMETRY: **Symmetrical**BASE SHAPE: **Concave-convex**APEX SHAPE: **Acuminate**

Special Margin Features:

BASE ANGLE: **Obtuse**APEX ANGLE: **Odd-lobed acute**Terminal apex features: **None**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Present**PRIMARY VENATION: **Palinactinodromous**N° BASAL VEINS: **5** Interior 2°: **Present**MAJOR 2° Framework: **Eucamptodromous**MINOR-2° Course: **Eucamptodromous**MAJOR 2° Attachment: **Decurrent**MAJOR 2° VEIN ANGLE: **Inconsistent**MAJOR 2° SPACING: **Irregular**AGROPHIC VEINS: **Absent**

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Mixed opp/alt percurrent**PERIMARGINAL VEINS: **Fimbrial vein**EPIMEDIAL 3°: **Mixed opp/alt percurrent**INTER-3° ANGLE TO 1°: **Obtuse to midvein**ADMEDIAL COURSE: **Perpendicular to midvein**EXTERIOR 3° COURSE: **Looped**EXMEDIAL COURSE: **Basiflexed**INTERCOSTAL 3° VARIABILITY: **Increasing exmedially**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Reticulate**VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Absent**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Not Preserved**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Smooth**SURFICIAL GLANDS: **Laminar**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE**FU747****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 41643

EXEMPLAR

539880

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Many, closely-spaced hairs.Eucamptodromous secondaries, rounded base, strongly impressed oppositepercurrent tertiaries

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: Petiolate if simpleLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Petiolulate if compoundLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: Notophyll?PETIOLE BASE: Not PreservedBLADE SHAPE: Not PreservedPETIOLE GLANDS: BLADE RATIO L:W: Not PreservedPETIOLE X-SECTION: LOBATION: Not PreservedMARGIN TYPE UntoothedBASE ASYMMETRY: Not PreservedMEDIAL SYMMETRY: Not PreservedBASE SHAPE: RoundedAPEX SHAPE: Not PreservedSpecial Margin Features: EroseBASE ANGLE: ObtuseAPEX ANGLE: Not PreservedTerminal apex features: Not Preserved**PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: EucamptodromousMINOR-2° Course: MAJOR 2° Attachment: Basal decurrentMAJOR 2° VEIN ANGLE: Smoothly increasing toward baseMAJOR 2° SPACING: Decreasing proximallyAGROPHIC VEINS: AbsentINTER-2° proximal course: INTER-2° VEIN LENGTH: INTER-2° distal course: INTER-2° FREQUENCY: **TERTIARY VEIN FEATURES**INTERCOSTAL 3°: Opposite percurrent - convexPERIMARGINAL VEINS: Marginal secondaryEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: AbsentEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Basally concentric**FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: Not PreservedVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Not PreservedTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Not PreservedLEAF RANK: **TOOTH FEATURES**ORDERS OF TEETH: No TEETH/cm: TEETH GLANDULARITY: TOOTH SHAPE: TOOTH SPACING: PRINCIPAL VEIN: SINUS SHAPE: ACCESSORY VEIN COURSE: PRINCIPAL VEIN TERM.: **SURFACE & CUTICLE FEATURES**FOSSIL COMPRESSION TEXTURE: PubescentSURFICIAL GLANDS: NoneCUTICLE/MESOPHYLL FEATURES: simple hairs

MORPHOTYPE

WW030

GENERAL	MAJOR GROUP	DIC	INFERED FAMILY	Betulaceae	ORGAN TYPE	Leaf
EXEMPLAR LOC.		EXEMPLAR	USNM 324498	OTHERS LOC.		
DIAGNOSTIC FEATURES OF MORPHOTYPE						
Serrate margin with one order of regularly spaced teeth. Tertiary veins are much more						
closely spaced than on <i>Alnus</i> sp.						
MQI: _____						

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT:	Petiolate	LEAFLET ORGANIZATION:	
LEAF ARRANGEMENT:	Not Preserved	LEAFLET ATTACHMENT:	
LEAF ORGANIZATION:	Simple	PETIOLE ATTACHMENT:	Marginal
BLADE SIZE:	Microphyll to Notophyll	PETIOLE BASE:	Not Preserved
BLADE SHAPE:	Elliptic	PETIOLE GLANDS:	Not Preserved
BLADE RATIO L:W:	~3:2	PETIOLE X-SECTION:	Not Preserved
LOBATION:	Unlobed	MARGIN TYPE	Serrate
BASE ASYMMETRY:	Symmetrical	MEDIAL SYMMETRY:	Symmetrical
BASE SHAPE:	Convex	APEX SHAPE:	Not preserved
BASE ANGLE:	Obtuse	APEX ANGLE:	Not preserved
		Special Margin Features:	None
		Terminal apex features:	Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

PRIMARY VENATION:	Pinnate	NAKED BASAL VEINS:	Absent
MAJOR 2° Framework:	Craspedodromous	N° BASAL VEINS:	1 Interior 2° Absent
MAJOR 2° Attachment:	Basal decurrent	MINOR-2° Course:	
MAJOR 2° SPACING:	Decreasing proximally	MAJOR 2° VEIN ANGLE:	Abruptly increasing toward base
INTER-2° proximal course:		AGROPHIC VEINS:	Compound
INTER-2° distal course:		INTER-2° VEIN LENGTH:	
		INTER-2° FREQUENCY:	

TERTIARY VEIN FEATURES

INTERCOSTAL 3°:	Opposite percurrent - straight	PERIMARGINAL VEINS:	None
EPIMEDIAL 3°:	Opposite percurrent	INTER-3° ANGLE TO 1°:	Obtuse to midvein
ADMEDIAL COURSE:	Perpendicular to midvein	EXTERIOR 3° COURSE:	Terminating at the margin
EXMEDIAL COURSE:	Parallel to intercostal 3°	INTERCOSTAL 3° VARIABILITY:	Increasing exmedially

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC:	Irregular reticulate	VEINLETS -F/E/V/s:	Mostly twice or more branched
5° VEIN FABRIC:	Freely ramifying	TYPE OF F.E.V. BRANCHING:	dendritic
MARGINAL VENATION:	Not Preserved	F.E.V.s TERMINATIONS:	Not Preserved
AREOLATION:	Moderately developed	LEAF RANK:	

TOOTH FEATURES

ORDERS OF TEETH:	One	No TEETH/cm:	3	TEETH GLANDULARITY:	None
TOOTH SHAPE:	st/cv, st/st, cv/cv	TOOTH SPACING:	Regular		
PRINCIPAL VEIN:	Present	SINUS SHAPE:	Angular		
ACCESSORY VEIN COURSE:	Not Preserved	PRINCIPAL VEIN TERM.:	Marginal, on proximal flank		

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE:	
SURFICIAL GLANDS:	
CUTICLE/MESOPHYLL FEATURES:	

MORPHOTYPE

WW031

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Hamamelidaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

SW826

EXEMPLAR

USNM 37588 IV

OTHERS LOC.

USNM 37654

DIAGNOSTIC FEATURES OF MORPHOTYPE

Teeth are fed by either a major or minor secondary, which extends beyond the lamina and ends in a mucronate gland.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate**

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: **Not Preserved**

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: **Simple**PETIOLE ATTACHMENT.: **Marginal**BLADE SIZE: **Microphyll to Mesophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Ovate to elliptic**

PETIOLE GLANDS:.

BLADE RATIO L:W: **3:2 to 4:3**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE **Serrate**BASE ASYMMETRY: **Symmetrical**MEDIAL SYMMETRY: **Symmetrical**BASE SHAPE: **Round/Cord/Dec**

APEX SHAPE:

Straight

Special Margin Features:

BASE ANGLE: **Acute to Obtus**

APEX ANGLE:

AcuteTerminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **5** Interior 2°: **Absent**MAJOR 2° Framework: **Craspedodromous**MINOR-2° Course: **Craspedodromous**MAJOR 2° Attachment: **Decurrent**MAJOR 2° VEIN ANGLE: **Uniform**MAJOR 2° SPACING: **Irregular**AGROPHIC VEINS: **Compound**

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Opposite percurrent - sinuous**PERIMARGINAL VEINS: **Intramarginal secondary**EPIMEDIAL 3°: **Opposite percurrent**INTER-3° ANGLE TO 1°: **Obtuse to midvein**ADMEDIAL COURSE: **Perpendicular to midvein**EXTERIOR 3° COURSE: **Terminating at the margin**EXMEDIAL COURSE: **Parallel to intercostal 3°**INTERCOSTAL 3° VARIABILITY: **Basally concentric**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Mixed percurrent**VEINLETS -F/E/V/s: **Mostly twice or more branched**5° VEIN FABRIC: **Reticulate**TYPE OF F.E.V. BRANCHING: **dendritic**MARGINAL VENATION: **Absent**F.E.V.s TERMINATIONS: **Simple**AREOLATION: **Moderately developed**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: **1**No TEETH/cm: **1 to 3**TEETH GLANDULARITY: **Mucronate**TOOTH SHAPE: **st/cc, cv/cc**TOOTH SPACING: **Regular**PRINCIPAL VEIN: **Medial**SINUS SHAPE: **Rounded**ACCESSORY VEIN COURSE: **Straight or concave**PRINCIPAL VEIN TERM.: **Spinose**

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Smooth**SURFICIAL GLANDS: **None**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE**WW032****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37654

EXEMPLAR

USNM 539882

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Similar in shape to Dicot XX, but venation is better organized and the secondaries are more closely spaced. Base also appears more convex. Only fragments.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: **Not Preserved**LEAFLET ORGANIZATION: **Not Preserved**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Not Preserved**LEAF ORGANIZATION: **Not Preserved**PETIOLE ATTACHMENT.: **Not Preserved**BLADE SIZE: **Microphyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Oblong**

PETIOLE GLANDS:.

BLADE RATIO L:W: **?**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE **Untoothed**BASE ASYMMETRY: **Not Preserved**MEDIAL SYMMETRY: **Not Preserved**BASE SHAPE: **Convex**APEX SHAPE: **Not preserved**Special Margin Features: **Revolute**BASE ANGLE: **Acute**APEX ANGLE: **Acute**Terminal apex features: **Not Preserved****PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: **Not Preserved**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **?** Interior 2°: **Absent**MAJOR 2° Framework: **Eucamptodromous**

MINOR-2° Course:

MAJOR 2° Attachment: **Excurrent**MAJOR 2° VEIN ANGLE: **Uniform**MAJOR 2° SPACING: **Regular**AGROPHIC VEINS: **Absent**

INTER-2° proximal course:

INTER-2° VEIN
LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURESINTERCOSTAL 3°: **Opposite percurrent - straight**PERIMARGINAL VEINS: **None**EPIMEDIAL 3°: **Not preserved**INTER-3° ANGLE TO 1°: **Obtuse to midvein**

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: **Absent**

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY: **Decreasing exmedially****FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: **Not Preserved**VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Not Preserved**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Not Preserved**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURESFOSSIL COMPRESSION TEXTURE: **Not Preserved**SURFICIAL GLANDS: **Not Preserved**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE**WW033****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37654

EXEMPLAR

USNM 324469

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Only fragments preserved, but base is distinct from anything else.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Petiolulate if compoundLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: Notophyll

PETIOLE BASE:

BLADE SHAPE: Not Preserved

PETIOLE GLANDS:.

BLADE RATIO L:W: ?

PETIOLE X-SECTION:

LOBATION: UnlobedMARGIN TYPE SerrateBASE ASYMMETRY: SymmetricalMEDIAL SYMMETRY: Not PreservedBASE SHAPE: CordateAPEX SHAPE: Not preserved

Special Margin Features:

BASE ANGLE: Wide obtuseAPEX ANGLE: Not preservedTerminal apex features: Not Preserved**PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: AbsentPRIMARY VENATION: Basal actinodromousN° BASAL VEINS: 5 Interior 2°: AbsentMAJOR 2° Framework: SemicraspedodromousMINOR-2° Course: SemicraspedodromousMAJOR 2° Attachment: ExcurentMAJOR 2° VEIN ANGLE: Not preservedMAJOR 2° SPACING: IrregularAGROPHIC VEINS: Compound

INTER-2° proximal course:

INTER-2° VEIN
LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURESINTERCOSTAL 3°: Opposite percurrent - conv/sinPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: Not preservedEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Basally concentric**FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: Regular reticulateVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Not PreservedTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURESORDERS OF TEETH: 1No TEETH/cm: 2TEETH GLANDULARITY: NoneTOOTH SHAPE: st/stTOOTH SPACING: Not PreservedPRINCIPAL VEIN: ProximalSINUS SHAPE: RoundedACCESSORY VEIN COURSE: Not PreservedPRINCIPAL VEIN TERM.: Submarginal**SURFACE & CUTICLE FEATURES**FOSSIL COMPRESSION TEXTURE: Not PreservedSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW034

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37654

EXEMPLAR

USNM 324456

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Asymmetric, skinny leaf (likely leaflet). Venation is quite disorganized.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate if simple**LEAFLET ORGANIZATION: **Not Preserved**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Not Preserved**LEAF ORGANIZATION: **Not Preserved**PETIOLE ATTACHMENT.: **Marginal**BLADE SIZE: **Microphyll to Notophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Elliptic to obovate**

PETIOLE GLANDS:.

BLADE RATIO L:W: **4:1 to 2:1**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE **Untoothed**BASE ASYMMETRY: **Basal width asymmetrical**MEDIAL SYMMETRY: **Asymmetrical**BASE SHAPE: **Decurrent**APEX SHAPE: **Acuminate**Special Margin Features: **Revolute**BASE ANGLE: **Acute**APEX ANGLE: **Acute**Terminal apex features: **None**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **1** Interior 2°: **Absent**MAJOR 2° Framework: **Eucamptodromous**

MINOR-2° Course:

MAJOR 2° Attachment: **Excurrent**MAJOR 2° VEIN ANGLE: **Inconsistent**MAJOR 2° SPACING: **Irregular**AGROPHIC VEINS: **Absent**INTER-2° proximal course: **Parallel to major 2°**INTER-2° VEIN LENGTH: **> 50% subjacent secondary**INTER-2° distal course: **Perpendicular to major 2°**INTER-2° FREQUENCY: **~1 per intercostal area**

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Opposite percurrent - str/sin**PERIMARGINAL VEINS: **None**EPIMEDIAL 3°: **Mixed**INTER-3° ANGLE TO 1°: **Variable**

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: **Absent**

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY: **Inconsistent**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Regular reticulate**VEINLETS -F/E/V/s: **Mostly once branched**5° VEIN FABRIC: **Freely ramifying**TYPE OF F.E.V. BRANCHING: **dichotomizing**MARGINAL VENATION: **Incomplete loops**F.E.V.s TERMINATIONS: **Simple**AREOLATION: **Poorly developed**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm: **_____**TEETH GLANDULARITY: **_____**TOOTH SHAPE: **_____**TOOTH SPACING: **_____**PRINCIPAL VEIN: **_____**SINUS SHAPE: **_____**ACCESSORY VEIN COURSE: **_____**PRINCIPAL VEIN TERM.: **_____**

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Not Preserved**SURFICIAL GLANDS: **Not Preserved**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

WW035

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42400

EXEMPLAR

USNM 539883, 539884

OTHERS LOC.

USNM 37654

DIAGNOSTIC FEATURES OF MORPHOTYPE

Base is narrowly cordate; irregularly spaced glandular teeth. Often has cuticle.

Rugose surface texture and laminar glands. Large areoles

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Not Preserved

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Notophyll to Mesophyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Elliptic to Oblong

PETIOLE GLANDS:.

BLADE RATIO L:W: ?

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE Crenate

BASE ASYMMETRY: Basal width asymmetrical

MEDIAL SYMMETRY:

BASE SHAPE: Cordate

APEX SHAPE: Not preserved

Special Margin Features:

BASE ANGLE: Acute

APEX ANGLE: Acute

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Pinnate

N° BASAL VEINS: 5 Interior 2°: Absent

MAJOR 2° Framework: Semicraspedodromous

MINOR-2° Course:

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: Inconsistent

MAJOR 2° SPACING: Irregular

AGROPHIC VEINS: Absent

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - str/conv

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: Obtuse to midvein

EXTERIOR 3° COURSE: Terminating at the margin

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: Consistent

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulate

VEINLETS -F/E/V/s: Mostly twice or more branched

5° VEIN FABRIC: Irregular reticulate

TYPE OF F.E.V. BRANCHING: dendritic

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS: Simple

AREOLATION: Moderately developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm: 1

TEETH GLANDULARITY: Non-specific glandular

TOOTH SHAPE: cv/cv

TOOTH SPACING: Irregular

PRINCIPAL VEIN: Medial

SINUS SHAPE: Rounded

ACCESSORY VEIN COURSE:

Absent

PRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Rugose

SURFICIAL GLANDS: Laminar

CUTICLE/MESOPHYLL FEATURES: trichomes

MORPHOTYPE

WW036

GENERAL

MAJOR GROUP

DIC

INFERED FAMILY

Lauraceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37654

EXEMPLAR

USNM 539886, 539887 OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Laminar glands, thick primary vein, fimbrial vein, and eucamptodromoussecondaries are typical Lauraceous characteristics. Differs from Phoebe mckinneyiin that it does not have a pair of pronounced, acute basal secondaries.

MQI: _____

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION: _____

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: _____

LEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: Microphyll to Mesophyll

PETIOLE BASE: _____

BLADE SHAPE: Elliptic

PETIOLE GLANDS: _____

BLADE RATIO L:W: ~2:1

PETIOLE X-SECTION: _____

LOBATION: UnlobedMARGIN TYPE UntoothedBASE ASYMMETRY: SymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: Straight (cuneate)APEX SHAPE: Acuminate

Special Margin Features: _____

BASE ANGLE: AcuteAPEX ANGLE: AcuteTerminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Eucamptodromous

MINOR-2° Course: _____

MAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: UniformMAJOR 2° SPACING: Decreasing proximallyAGROPHIC VEINS: Absent

INTER-2° proximal course: _____

INTER-2° VEIN
LENGTH: _____

INTER-2° distal course: _____

INTER-2° FREQUENCY: _____

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - str/sinPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Perpendicular to midveinADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: Terminating at the marginEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Consistent

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulateVEINLETS -F/E/V/s: Mostly once branched5° VEIN FABRIC: ReticulateTYPE OF F.E.V. BRANCHING: dichotomizingMARGINAL VENATION: AbsentF.E.V.s TERMINATIONS: SimpleAREOLATION: Well developed

LEAF RANK: _____

TOOTH FEATURES

ORDERS OF TEETH: _____

No TEETH/cm: _____

TEETH GLANDULARITY: _____

TOOTH SHAPE: _____

TOOTH SPACING: _____

PRINCIPAL VEIN: _____

SINUS SHAPE: _____

ACCESSORY VEIN COURSE: _____

PRINCIPAL VEIN TERM.: _____

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: LaminarCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW037

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37654

EXEMPLAR

USNM 539888

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Irregularly spaced, crenate teeth. Very closely spaced and sinuous oppositepercurrent tertiaries, with regular reticulate 4th and 5th order veins and extremely small, paxillate areoles.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: SimplePETIOLE ATTACHMENT.: MarginalBLADE SIZE: Microphyll to MesophyllPETIOLE BASE: Not PreservedBLADE SHAPE: Elliptic

PETIOLE GLANDS:.

BLADE RATIO L:W: 3:2 to 2:1

PETIOLE X-SECTION:

LOBATION: UnlobedMARGIN TYPE CrenateBASE ASYMMETRY: Basal insertion asymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: RoundedAPEX SHAPE: StraightSpecial Margin Features: SinuousBASE ANGLE: ObtuseAPEX ANGLE: AcuteTerminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Craspedodromous

MINOR-2° Course:

MAJOR 2° Attachment: Basal decurrentMAJOR 2° VEIN ANGLE: Smoothly increasing toward baseMAJOR 2° SPACING: RegularAGROPHIC VEINS: Absent

INTER-2° proximal course:

INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - sinuousPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse/perpendic. to midveinADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: LoopedEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Increasing exmedially

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Regular reticulateVEINLETS -F/E/V/s: Mostly unbranched5° VEIN FABRIC: Regular reticulate

TYPE OF F.E.V. BRANCHING:

MARGINAL VENATION: AbsentF.E.V.s TERMINATIONS: SimpleAREOLATION: Paxillate

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1No TEETH/cm: < 1TEETH GLANDULARITY: NoneTOOTH SHAPE: cv/cvTOOTH SPACING: IrregularPRINCIPAL VEIN: ProximalSINUS SHAPE: RoundedACCESSORY VEIN COURSE: Not org. with principalPRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL-COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: NoneCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW038

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Betulaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539889

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Crowded basal secondaries, with the basal-most pair at a very high angle relative to the others. Teeth are fl/fl or fl/cv, which is a distinguishing feature from the Daiye Spa Betulaceous leaf

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate**

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: **Not Preserved**

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: **Simple**PETIOLE ATTACHMENT.: **Marginal**BLADE SIZE: **Mesophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Elliptic**

PETIOLE GLANDS.:

BLADE RATIO L:W: **5:3**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE **Serrate**BASE ASYMMETRY: **Symmetrical**MEDIAL SYMMETRY: **Symmetrical**BASE SHAPE: **Cordate**APEX SHAPE: **Not preserved**

Special Margin Features:

BASE ANGLE: **Wide obtuse**APEX ANGLE: **Not preserved**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **####** Interior 2°: **Absent**MAJOR 2° Framework: **Craspedodromous**MINOR-2° Course: **Craspedodromous**MAJOR 2° Attachment: **Excurrent**MAJOR 2° VEIN ANGLE: **Abruptly increasing toward base**MAJOR 2° SPACING: **Crowded basal secondaries**AGROPHIC VEINS: **Compound**

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Opposite percurrent - straight**PERIMARGINAL VEINS: **None**EPIMEDIAL 3°: **Opposite percurrent**

INTER-3° ANGLE TO 1°:

ADMEDIAL COURSE: **Perpendicular to midvein**EXTERIOR 3° COURSE: **Absent**EXMEDIAL COURSE: **Parallel to intercostal 3°**INTERCOSTAL 3° VARIABILITY: **Incr. exmed. & prox.**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Mixed percurrent**VEINLETS -F/E/V/s: **Mostly unbranched**5° VEIN FABRIC: **Not Preserved**

TYPE OF F.E.V. BRANCHING:

MARGINAL VENATION: **Not Preserved**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Moderately developed**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: **2**No TEETH/cm: **3**TEETH GLANDULARITY: **Non-specific glandular**TOOTH SHAPE: **fl/fl, fl/cv**TOOTH SPACING: **Regular**PRINCIPAL VEIN: **Present**SINUS SHAPE: **Angular**

ACCESSORY VEIN COURSE:

ConvexPRINCIPAL VEIN TERM.: **Marginal, at apex**

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Not Preserved**SURFICIAL GLANDS: **None**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE**WW039****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539890

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Cordate base and 5 primary veins all diverging from a single point. It differs fromWing's Dicot XIV in that there are secondaries closer to the base, the secondariesloop farther from the margin, and there is festooning.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT:

BLADE SIZE: Mesophyll

PETIOLE BASE:

BLADE SHAPE:

PETIOLE GLANDS:

BLADE RATIO L:W:

PETIOLE X-SECTION:

LOBATION: ? Unlobed

MARGIN TYPE

UntoothedBASE SYMMETRY: SymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: Cordate

APEX SHAPE

Not preservedSpecial Margin Features: RevoluteBASE ANGLE: Wide obtuse

APEX ANGLE

Not preservedTerminal apex features: Not Preserved**PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: AbsentPRIMARY VENATION: Basal actinodromousN° BASAL VEINS: 5 Interior 2°: AbsentMAJOR 2° Framework: Simple brochidodromousMINOR-2° Course: Simple brochidodromousMAJOR 2° Attachment: ExcurentMAJOR 2° VEIN ANGLE: Not PreservedMAJOR 2° SPACING: Not PreservedAGROPHIC VEINS: Not Preserved

INTER-2° proximal course:

INTER-2° VEIN

LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURESINTERCOSTAL 3°: Opposite percurrent - straightPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Obtuse to midveinEXTERIOR 3° COURSE: LoopedEXMEDIAL COURSE: BasiflexedINTERCOSTAL 3° VARIABILITY: Basally concectric**FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: Mixed percurrentVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Freely ramifyingTYPE OF F.E.V. BRANCHING: n.pMARGINAL VENATION: AbsentF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Moderately developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURESFOSSIL COMPRESSION TEXTURE: Not PreservedSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW040

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Fabaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539891

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Legume; pinnate with thick primary vein and others difficult to see.Commonly has a lot of very characteristic margin feeding.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: PetiolateLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: PetiolulateLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: Nanophyll to MicrophyllPETIOLE BASE: RegularBLADE SHAPE: OblongPETIOLE GLANDS: NoneBLADE RATIO L:W: 3:1 to 2.2:1

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE

BASE ASYMMETRY: width and insertionMEDIAL SYMMETRY: SymmetricalBASE SHAPE: RoundedAPEX SHAPE: Convex

Special Margin Features:

BASE ANGLE: ObtuseAPEX ANGLE: AcuteTerminal apex features: Spinose

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Simple brochidodrompus

MINOR-2° Course:

MAJOR 2° Attachment: ExcurrentMAJOR 2° VEIN ANGLE: UniformMAJOR 2° SPACING: IrregularAGROPHIC VEINS: AbsentINTER-2° proximal course: Parallel to major 2°INTER-2° VEIN LENGTH: > 50% of subjacent secondaryINTER-2° distal course: ReticulatingINTER-2° FREQUENCY: <1 per intercostal area

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Irregular reticulatePERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Reticulate

INTER-3° ANGLE TO 1°:

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: Looped

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY:

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Freely ramifyngVEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC:

TYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Moderately developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

Special APEX SHAPE:

TOOTH SHAPE:

TOOTH SPACING:

TEETH GLANDULARITY:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE:

Smooth

SURFICIAL GLANDS:

None

CUTICLE/MESOPHYLL FEATURES:

Not Preserved

MORPHOTYPE

WW041

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Fabaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539892

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Ovate clearly brochidodromous leaf, whereas Legume 2 is more oblong and less clearly brochidodromous.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: PetiolateLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: PetiolulateLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT.: MarginalBLADE SIZE: MicrophyllPETIOLE BASE: RegularBLADE SHAPE: OvatePETIOLE GLANDS.: NoneBLADE RATIO L:W: 2.5:1 to 2:1

PETIOLE X-SECTION: _____

LOBATION: UnlobedMARGIN TYPE UntoothedBASE ASYMMETRY: SymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: Straight (cuneate)APEX SHAPE: Convex

Special Margin Features: _____

BASE ANGLE: ObtuseAPEX ANGLE: AcuteTerminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Simple brochidodromous

MINOR-2° Course: _____

MAJOR 2° Attachment: ExcurentMAJOR 2° VEIN ANGLE: UniformMAJOR 2° SPACING: IrregularAGROPHIC VEINS: AbsentINTER-2° proximal course: Parallel to major 2°INTER-2° VEIN LENGTH: > 50% of subjacent secondaryINTER-2° distal course: Parallel to major 2°INTER-2° FREQUENCY: <1 per intercostal area

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: poorly preserved, not perc.PERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Not preservedINTER-3° ANGLE TO 1°: Not Preserved

ADMEDIAL COURSE: _____

EXTERIOR 3° COURSE: Looped

EXMEDIAL COURSE: _____

INTERCOSTAL 3° VARIABILITY: Not Preserved

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulateVEINLETS -F/E/V/s: branched5° VEIN FABRIC: Freely ramifyingTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: LoopedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Poorly developed

LEAF RANK: _____

TOOTH FEATURES

ORDERS OF TEETH: _____

No TEETH/cm: _____

Special APEX SHAPE: _____

TOOTH SHAPE: _____

TOOTH SPACING: _____

TEETH GLANDULARITY: _____

PRINCIPAL VEIN: _____

SINUS SHAPE: _____

ACCESSORY VEIN COURSE: _____

PRINCIPAL VEIN TERM.: _____

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not PreservedSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW043

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539893

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Pinnately lobed and toothed leaf

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate if compound

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Microphyll

PETIOLE BASE:

BLADE SHAPE: Ovate

PETIOLE GLANDS:

BLADE RATIO L:W: 3:2

PETIOLE X-SECTION:

LOBATION: Pinnately lobed

MARGIN TYPE: Serrate

BASE ASYMMETRY: Symmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Straight (cuneate)?

APEX SHAPE: Not preserved

Special Margin Features:

BASE ANGLE: Acute

APEX ANGLE: Not preserved

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Pinnate

N° BASAL VEINS: #### Interior 2°: Absent

MAJOR 2° Framework: Craspedodromous

MINOR-2° Course: Craspedodromous

MAJOR 2° Attachment: Decurrent

MAJOR 2° VEIN ANGLE: Smoothly decreasing toward base

MAJOR 2° SPACING: Regular

AGROPHIC VEINS: Simple, at least

INTER-2° proximal course:

INTER-2° VEIN
LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - convex

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Not Preserved

ADMEDIAL COURSE: Perpendicular to midvein

EXTERIOR 3° COURSE: Not Preserved

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: Not Preserved

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not Preserved

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm: 3

TEETH GLANDULARITY: Non-specific glandular

TOOTH SHAPE: cv/st

TOOTH SPACING: Irregular

PRINCIPAL VEIN: Medial

SINUS SHAPE: Angular

ACCESSORY VEIN COURSE: Not Preserved

PRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Smooth

SURFICIAL GLANDS: None

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE**WW042****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

Fabaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539895

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

The small size and high length to width ratio separate this from the other PN
legumes. The apex has a more pronounced spinose tip than Legume 2.

MQI: _____

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: PetiolateLEAFLET ORGANIZATION: CompoundLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: PetiolulateLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: Nanophyll, microphyllPETIOLE BASE: PulvinulateBLADE SHAPE: EllipticPETIOLE GLANDS: NoneBLADE RATIO L:W: 5:1 to 3:1

PETIOLE X-SECTION: _____

LOBATION: UnlobedMARGIN TYPE: UntoothedBASE ASYMMETRY: width and insertionMEDIAL SYMMETRY: AsymmetricalBASE SHAPE: Rounded

APEX SHAPE

Acute

Special Margin Features:

RevoluteBASE ANGLE: Acute

APEX ANGLE

Straight to convex

Terminal apex features:

Spinose**PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Craspedodromous

MINOR-2° Course: _____

MAJOR 2° Attachment: ExcurrentMAJOR 2° VEIN ANGLE: UniformMAJOR 2° SPACING: RegularAGROPHIC VEINS: AbsentINTER-2° proximal course: Parallel to major 2°

INTER-2° VEIN

LENGTH: > 50% of subjacent 2°INTER-2° distal course: Parallel to major 2°

INTER-2° FREQUENCY:

Not preserved well enough**TERTIARY VEIN FEATURES**INTERCOSTAL 3°: Not PreservedPERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Not preservedINTER-3° ANGLE TO 1°: Not Preserved

ADMEDIAL COURSE: _____

EXTERIOR 3° COURSE: Not Preserved

EXMEDIAL COURSE: _____

INTERCOSTAL 3° VARIABILITY: Not Preserved**FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: Not PreservedVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Not PreservedTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Not Preserved

LEAF RANK: _____

TOOTH FEATURES

ORDERS OF TEETH: _____

No TEETH/cm: _____

TEETH GLANDULARITY: _____

TOOTH SHAPE: _____

TOOTH SPACING: _____

PRINCIPAL VEIN: _____

SINUS SHAPE: _____

ACCESSORY VEIN COURSE: _____

PRINCIPAL VEIN TERM.: _____

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: _____

Smooth

SURFICIAL GLANDS: _____

None

CUTICLE/MESOPHYLL FEATURES:

Not Preserved

MORPHOTYPE

WW044

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539896

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Only one base found.

Teeth are different from everything else at PN.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Not Preserved

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Microphyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Not Preserved

PETIOLE GLANDS:

BLADE RATIO L:W: Not Preserved

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE Serrate

BASE ASYMMETRY: Width & Insertion

MEDIAL SYMMETRY: Asymmetrical

BASE SHAPE: Decurrent

APEX SHAPE: Not preserved

Special Margin Features: Not Preserved

BASE ANGLE: Acute

APEX ANGLE: Not preserved

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Not Preserved

PRIMARY VENATION: Pinnate

N° BASAL VEINS: ? Interior 2°: ?

MAJOR 2° Framework: Not Preserved

MINOR-2° Course: Not Preserved

MAJOR 2° Attachment: Not Preserved

MAJOR 2° VEIN ANGLE: Not Preserved

MAJOR 2° SPACING: Not Preserved

AGROPHIC VEINS: Not Preserved

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Not Preserved

PERIMARGINAL VEINS: Not Preserved

EPIMEDIAL 3°: Not Preserved

INTER-3° ANGLE TO 1°: Not Preserved

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: Not Preserved

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY: Not Preserved

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not Preserved

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm: 1

TEETH GLANDULARITY: Not Preserved

TOOTH SHAPE: cv/st, cv/cv

TOOTH SPACING: Not Preserved

PRINCIPAL VEIN: Not Preserved

SINUS SHAPE: Angular

ACCESSORY VEIN COURSE: Not Preserved

PRINCIPAL VEIN TERM.: Not Preserved

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not Preserved

SURFICIAL GLANDS: Not Preserved

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW045

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539897

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Entire with 3 primary veins that are acrodromous. No secondary veins in the basal half of the leaf.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate if simple**LEAFLET ORGANIZATION: **Not Preserved**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Petiolulate if compound**LEAF ORGANIZATION: **Not Preserved**PETIOLE ATTACHMENT: **Marginal**BLADE SIZE: **Microphyll to Notophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Ovate**PETIOLE GLANDS: BLADE RATIO L:W: **11:5, 2:1**PETIOLE X-SECTION: LOBATION: **Unlobed**MARGIN TYPE: **Untoothed**BASE ASYMMETRY: **Symmetrical**MEDIAL SYMMETRY: **Symmetrical**BASE SHAPE: **Convex to rounded**APEX SHAPE: **Not preserved**Special Margin Features: BASE ANGLE: **Obtuse**APEX ANGLE: **Acute**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Basal actinodromous**N° BASAL VEINS: **3** Interior 2°: **Present**MAJOR 2° Framework: **Eucamptodromous**MINOR-2° Course: **Simple brochidodromous**MAJOR 2° Attachment: **Excurrent**MAJOR 2° VEIN ANGLE: **Inconsistent**MAJOR 2° SPACING: **Abruptly increasing proximally**AGROPHIC VEINS: **Simple**INTER-2° proximal course: INTER-2° VEIN LENGTH: INTER-2° distal course: INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Opposite percurrent - convex**PERIMARGINAL VEINS: **Fimbrial vein**EPIMEDIAL 3°: **Mixed opp/alt percurrent**INTER-3° ANGLE TO 1°: ADMEDIAL COURSE: **Acute to midvein**EXTERIOR 3° COURSE: **Terminating at the margin**EXMEDIAL COURSE: **Basiflexed**INTERCOSTAL 3° VARIABILITY: **Basally concentric**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Regular reticulate**VEINLETS -F/E/V/s: **Mostly twice or more branched**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Dichotomizing**MARGINAL VENATION: **Absent**F.E.V.s TERMINATIONS: **Simple**AREOLATION: **Moderately developed**LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: No TEETH/cm: Special APEX SHAPE: TOOTH SHAPE: TOOTH SPACING: TEETH GLANDULARITY: PRINCIPAL VEIN: SINUS SHAPE: ACCESSORY VEIN COURSE: PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Smooth**SURFICIAL GLANDS: **None**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE**WW046****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539898

OTHERS LOC.

PN

DIAGNOSTIC FEATURES OF MORPHOTYPE

2 primary veins

MQI: _____

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: Not PreservedLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Not PreservedLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: Not PreservedBLADE SIZE: NotophyllPETIOLE BASE: Not PreservedBLADE SHAPE: Elliptic

PETIOLE GLANDS: _____

BLADE RATIO L:W: at least 8:3

PETIOLE X-SECTION: _____

LOBATION: UnlobedMARGIN TYPE UntoothedBASE ASYMMETRY: Not PreservedMEDIAL SYMMETRY: AsymmetricalBASE SHAPE: Not PreservedAPEX SHAPE: ConvexSpecial Margin Features: RevoluteBASE ANGLE: acute?APEX ANGLE: AcuteTerminal apex features: Not Preserved**PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: Not PreservedPRIMARY VENATION: PalmateN° BASAL VEINS: _____ Interior 2°: AbsentMAJOR 2° Framework: Simple brochidodromousMINOR-2° Course: Simple brochidodromousMAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: InconsistentMAJOR 2° SPACING: IrregularAGROPHIC VEINS: AbsentINTER-2° proximal course: Perpendicular to midvein

INTER-2° VEIN

LENGTH: < 50% of subjacent secondaryINTER-2° distal course: ReticulatingINTER-2° FREQUENCY: <1 per intercostal area**TERTIARY VEIN FEATURES**INTERCOSTAL 3°: Opposite percurrent - straightPERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: _____

ADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: LoopedEXMEDIAL COURSE: BasiflexedINTERCOSTAL 3° VARIABILITY: Inconsistent**FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: Regular reticulateVEINLETS -F/E/V/s: Mostly twice or more branched5° VEIN FABRIC: Regular reticulateTYPE OF F.E.V. BRANCHING: dendriticMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: SimpleAREOLATION: Moderately developed

LEAF RANK: _____

TOOTH FEATURES

ORDERS OF TEETH: _____

No TEETH/cm: _____

TEETH GLANDULARITY: _____

TOOTH SHAPE: _____

TOOTH SPACING: _____

PRINCIPAL VEIN: _____

SINUS SHAPE: _____

ACCESSORY VEIN COURSE: _____

PRINCIPAL VEIN TERM.: _____

SURFACE & CUTICLE FEATURESFOSSIL COMPRESSION TEXTURE: Not PreservedSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE**WW047****GENERAL**

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 37560

EXEMPLAR

USNM 539899, 539900 OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Asymmetrical leaf (most likely leaflet) with a thick petiole and primary vein.Eucamptodromous to brochidodromous secondaries.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURESLEAF ATTACHMENT: Petiolate if simpleLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Not PreservedLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: NotophyllPETIOLE BASE: Not PreservedBLADE SHAPE: EllipticPETIOLE GLANDS: BLADE RATIO L:W: at least 3:1PETIOLE X-SECTION: LOBATION: MARGIN TYPE UntoothedBASE ASYMMETRY: width, insertion on someMEDIAL SYMMETRY: AsymmetricalBASE SHAPE: Straight (cuneate)APEX SHAPE: StraightSpecial Margin Features: NoneBASE ANGLE: AcuteAPEX ANGLE: AcuteTerminal apex features: None**PRIMARY & SECONDARY VEIN FEATURES**NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Eucampto brochi distalMINOR-2° Course: MAJOR 2° Attachment: ExcurentMAJOR 2° VEIN ANGLE: UniformMAJOR 2° SPACING: RegularAGROPHIC VEINS: AbsentINTER-2° proximal course: Parallel to major 2°

INTER-2° VEIN

LENGTH: < 50% subjacent secondaryINTER-2° distal course: Perpendicular to major 2°INTER-2° FREQUENCY: <1 per intercostal area**TERTIARY VEIN FEATURES**INTERCOSTAL 3°: Opposite percurrent - str/sinPERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: ADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: Terminating at the marginEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Decreasing exmedially**FOURTH & HIGHER ORDER VEIN FEATURES**4° VEIN FABRIC: Regular reticulateVEINLETS -F/E/V/s: Present5° VEIN FABRIC: ReticulateTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: AbsentF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Well developedLEAF RANK: **TOOTH FEATURES**ORDERS OF TEETH: No TEETH/cm: TEETH GLANDULARITY: TOOTH SHAPE: TOOTH SPACING: PRINCIPAL VEIN: SINUS SHAPE: ACCESSORY VEIN COURSE: PRINCIPAL VEIN TERM.: **SURFACE & CUTICLE FEATURES**FOSSIL COMPRESSION TEXTURE: Not PreservedSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW048

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42402

EXEMPLAR

USNM 539901

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Mangled leaf, and only one found. But teeth are spinose with mucronate glands at the tip.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate if simple**LEAFLET ORGANIZATION: **Not Preserved**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Petiolulate if compound**LEAF ORGANIZATION: **Not Preserved**PETIOLE ATTACHMENT: **Marginal**

BLADE SIZE:

PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Elliptic?**

PETIOLE GLANDS:

BLADE RATIO L:W: **~2:1**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE: **Dentate**BASE ASYMMETRY: **Not Preserved**MEDIAL SYMMETRY: **Not Preserved**BASE SHAPE: **Convex**APEX SHAPE: **Not Preserved**

Special Margin Features:

BASE ANGLE: **Obtuse**APEX ANGLE: **Acute**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

PRIMARY VENATION: **Pinnate**NAKED BASAL VEINS: **Absent**MAJOR 2° Framework: **Craspedodromous**N° BASAL VEINS: **1** Interior 2°: **Absent**MAJOR 2° Attachment: **Excurrent**MAJOR 2° VEIN ANGLE: **Not Preserved**MAJOR 2° SPACING: **Irregular**AGROPHIC VEINS: **Not Preserved**INTER-2° proximal course: **Not Preserved**

INTER-2° VEIN

LENGTH: **Not Preserved**INTER-2° distal course: **Not Preserved**INTER-2° FREQUENCY: **Not Preserved**

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Not Preserved**PERIMARGINAL VEINS: **None**EPIMEDIAL 3°: **Not Preserved**INTER-3° ANGLE TO 1°: **Not Preserved**

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: **Not Preserved**

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY: **Not Preserved**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Not Preserved**VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Not Preserved**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Not Preserved**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: **1**No TEETH/cm: **2**TEETH GLANDULARITY: **Mucronate**TOOTH SHAPE: **cv/cv**TOOTH SPACING: **Not Preserved**PRINCIPAL VEIN: **Medial**SINUS SHAPE: **Angular**ACCESSORY VEIN COURSE: **Not Preserved**PRINCIPAL VEIN TERM.: **Spinose**

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Smooth**SURFICIAL GLANDS: **Laminar**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

WW049

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42403

EXEMPLAR

USNM 539902

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Only one found; crenate leaf with 3 primaries that are palinactinodromous.Venation is quite disorganized - low rank leaf.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simpleLEAFLET ORGANIZATION: Not PreservedLEAF ARRANGEMENT: Not PreservedLEAFLET ATTACHMENT: Petiolulate if compoundLEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT: MarginalBLADE SIZE: MicrophyllPETIOLE BASE: Not PreservedBLADE SHAPE: OblongPETIOLE GLANDS: BLADE RATIO L:W: 5:3PETIOLE X-SECTION: LOBATION: UnlobedMARGIN TYPE: CrenateBASE ASYMMETRY: WidthMEDIAL SYMMETRY: SymmetricalBASE SHAPE: ConvexAPEX SHAPE: Not PreservedSpecial Margin Features: BASE ANGLE: ObtuseAPEX ANGLE: Not PreservedTerminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PalinactinodromousN° BASAL VEINS: 3 Interior 2°: AbsentMAJOR 2° Framework: SemicraspedodromousMINOR-2° Course: SemicraspedodromousMAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: InconsistentMAJOR 2° SPACING: IrregularAGROPHIC VEINS: AbsentINTER-2° proximal course: Parallel to major 2°

INTER-2° VEIN

LENGTH: > 50% subjacent secondaryINTER-2° distal course: ReticulatingINTER-2° FREQUENCY: <1 per intercostal area

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Irregular reticulatePERIMARGINAL VEINS: Fimbrial veinEPIMEDIAL 3°: ReticulateINTER-3° ANGLE TO 1°: ADMEDIAL COURSE: EXTERIOR 3° COURSE: Not PreservedEXMEDIAL COURSE: INTERCOSTAL 3° VARIABILITY:

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulateVEINLETS -F/E/V/s: Not Preserved5° VEIN FABRIC: Freely ramifyingTYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Poorly developedLEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1 or 2No TEETH/cm: 2 to 4TEETH GLANDULARITY: SpherulateTOOTH SHAPE: cv/cv, cv/flTOOTH SPACING: IrregularPRINCIPAL VEIN: MedialSINUS SHAPE: AngularACCESSORY VEIN COURSE: Not PreservedPRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: NoneCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW050

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42403

EXEMPLAR

USNM 539903

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

One pair of acute basal secondaries that runs along the margin.

Cryptic teeth.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate if compound

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Microphyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Elliptic

PETIOLE GLANDS:

BLADE RATIO L:W: 3:1 to 2:1

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE: Serrate

BASE ASYMMETRY: Symmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Convex

APEX SHAPE: Not Preserved

Special Margin Features: Erode

BASE ANGLE: Acute

APEX ANGLE: Not Preserved

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Pinnate

N° BASAL VEINS: 3 Interior 2°: Absent

MAJOR 2° Framework: Eucamptodromous

MINOR-2° Course:

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: One pair acute basal secondaries

MAJOR 2° SPACING: Irregular

AGROPHIC VEINS: Absent

INTER-2° proximal course: Parallel to major 2°

INTER-2° VEIN

LENGTH: < 50% subjacent secondary

INTER-2° distal course: Reticulating

INTER-2° FREQUENCY: <1 per intercostal area

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Irregular reticulate

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Reticulate

INTER-3° ANGLE TO 1°:

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: Looped

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY:

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulate

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC:

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Looped

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Moderately developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm: 1 to 2

TEETH GLANDULARITY: Non-specific glandular

TOOTH SHAPE: cv/cv,cv/cc

TOOTH SPACING: Irregular

PRINCIPAL VEIN: Not Preserved

SINUS SHAPE: Rounded

ACCESSORY VEIN COURSE: Not Preserved

PRINCIPAL VEIN TERM.: Not Preserved

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not Preserved

SURFICIAL GLANDS: Not Preserved

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW051

GENERAL	MAJOR GROUP	DIC	INFERED FAMILY	Apocynaceae	ORGAN TYPE	Leaf
EXEMPLAR LOC.	USNM 42401	EXEMPLAR	USNM 539908	OTHERS LOC.		
DIAGNOSTIC FEATURES OF MORPHOTYPE						
Oblong, untoothed blade with closely-spaced, irregular brochidodromous secondary veins.						
Prominent intersecondaries. Fifth-order veins from mostly square, well-developed areoles.						
MQI:						

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES						
LEAF ATTACHMENT:	Petiolate	LEAFLET ORGANIZATION:				
LEAF ARRANGEMENT:	Not Preserved	LEAFLET ATTACHMENT:				
LEAF ORGANIZATION:	Not Preserved	PETIOLE ATTACHMENT:	Marginal			
BLADE SIZE:	Microphyll	PETIOLE BASE:	Not Preserved			
BLADE SHAPE:	Oblong	PETIOLE GLANDS:	Not Preserved			
BLADE RATIO L:W:	~ 4:1	PETIOLE X-SECTION:	Not Preserved			
LOBATION:	Unlobed	MARGIN TYPE	Untoothed			
BASE ASYMMETRY:	Symmetrical	MEDIAL SYMMETRY:	Symmetrical			
BASE SHAPE:	Straight (cuneate)	APEX SHAPE:	Not preserved	Special Margin Features:	None	
BASE ANGLE:	Acute	APEX ANGLE:	Not preserved	Terminal apex features:	Not Preserved	

PRIMARY & SECONDARY VEIN FEATURES				NAKED BASAL VEINS: Absent		
PRIMARY VENATION:	Pinnate	N° BASAL VEINS:	1	Interior 2°	Absent	
MAJOR 2° Framework:	Simple brochidodromous	MINOR-2° Course:				
MAJOR 2° Attachment:	Excurent	MAJOR 2° VEIN ANGLE:	Inconsistent			
MAJOR 2° SPACING:	Irregular	AGROPHIC VEINS:	Absent			
INTER-2° proximal course:	Parallel to major 2°	INTER-2° VEIN LENGTH:	>50% of subjacent 2°			
INTER-2° distal course:	Parallel to major 2°	INTER-2° FREQUENCY:	~1 per intercostal area			

TERTIARY VEIN FEATURES				PERIMARGINAL VEINS: Fimbrial vein		
INTERCOSTAL 3°:	Opposite percurrent - sinuous	INTER-3° ANGLE TO 1°:	Obtuse to midvein			
EPIMEDIAL 3°:	Opposite percurrent	EXTERIOR 3° COURSE:	Looped			
ADMEDIAL COURSE:	Parallel to subjacent 2°	INTERCOSTAL 3° VARIABILITY:	Inconsistent			
EXMEDIAL COURSE:	Parallel to intercostal 3°					

FOURTH & HIGHER ORDER VEIN FEATURES				VEINLETS -F/E/V/s: Not Preserved		
4° VEIN FABRIC:	Regular reticulate	TYPE OF F.E.V. BRANCHING:				
5° VEIN FABRIC:	Regular reticulate	F.E.V.s TERMINATIONS:				
MARGINAL VENATION:		LEAF RANK:				
AREOLATION:	Well developed					

TOOTH FEATURES						
ORDERS OF TEETH:		No TEETH/cm:		TEETH GLANDULARITY:		
TOOTH SHAPE:		TOOTH SPACING:				
PRINCIPAL VEIN:		SINUS SHAPE:				
ACCESSORY VEIN COURSE:		PRINCIPAL VEIN TERM.:				

SURFACE & CUTICLE FEATURES				FOSSIL COMPRESSION TEXTURE: Not Preserved		
				SURFICIAL GLANDS: Not Preserved		
				CUTICLE/MESOPHYLL FEATURES: Not Preserved		

MORPHOTYPE

WW052

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

EXEMPLAR

USNM 539910

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Very thick cuticle with stellate trichomes visible under the compound scope.Thick primary vein and eucamptodromous secondaries.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: Not PreservedPETIOLE ATTACHMENT.: MarginalBLADE SIZE: Microphyll to MesophyllPETIOLE BASE: Not PreservedBLADE SHAPE: Elliptic to Ovate

PETIOLE GLANDS:.

BLADE RATIO L:W: 5:2 to 2:1

PETIOLE X-SECTION:

LOBATION: UnlobedMARGIN TYPE UntoothedBASE ASYMMETRY: SymmetricalMEDIAL SYMMETRY: SymmetricalBASE SHAPE: Straight to convexAPEX SHAPE: Straight

Special Margin Features:

BASE ANGLE: AcuteAPEX ANGLE: AcuteTerminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PinnateN° BASAL VEINS: 1 Interior 2°: AbsentMAJOR 2° Framework: Eucamptodromous

MINOR-2° Course:

MAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: Smoothly increasing toward baseMAJOR 2° SPACING: RegularAGROPHIC VEINS: Absent

INTER-2° proximal course:

INTER-2° VEIN
LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Mixed opp/alt percurrentPERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Opposite percurrentINTER-3° ANGLE TO 1°: Obtuse to midveinADMEDIAL COURSE: Perpendicular to midveinEXTERIOR 3° COURSE: LoopedEXMEDIAL COURSE: Parallel to intercostal 3°INTERCOSTAL 3° VARIABILITY: Decreasing exmedially

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Opposite percurrentVEINLETS -F/E/V/s: Mostly once branched5° VEIN FABRIC: Regular reticulateTYPE OF F.E.V. BRANCHING: dendriticMARGINAL VENATION: Incomplete loopsF.E.V.s TERMINATIONS: SimpleAREOLATION: Well developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: PubescentSURFICIAL GLANDS: NoneCUTICLE/MESOPHYLL FEATURES: trichomes

MORPHOTYPE

WW053

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42403

EXEMPLAR

USNM 539911

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Festooned brochidodromous, entire leaf with reticulate higher order venation

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate if simple**LEAFLET ORGANIZATION: **Not Preserved**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Petiolulate if compound**LEAF ORGANIZATION: **Not Preserved**PETIOLE ATTACHMENT: **Marginal**BLADE SIZE: **Microphyll to Notophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Elliptic**

PETIOLE GLANDS:.

BLADE RATIO L:W: **3:1 to 2:1**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE **Untoothed**BASE ASYMMETRY: **Symmetrical**MEDIAL SYMMETRY: **Symmetrical**BASE SHAPE: **Straight (cuneate)**APEX SHAPE: **Not preserved**

Special Margin Features:

BASE ANGLE: **Acute**APEX ANGLE: **Acute**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **1** Interior 2°: **Present**MAJOR 2° Framework: **Mixed framework**

MINOR-2° Course:

MAJOR 2° Attachment: **Excurrent**MAJOR 2° VEIN ANGLE: **Smoothly decreasing toward base**MAJOR 2° SPACING: **Regular**AGROPHIC VEINS: **Absent**INTER-2° proximal course: **Parallel to major 2°**

INTER-2° VEIN

LENGTH: **< 50% subjacent secondary**INTER-2° distal course: **Reticulating**INTER-2° FREQUENCY: **<1 per intercostal area**

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Regular reticulate**PERIMARGINAL VEINS: **Fimbrial vein**EPIMEDIAL 3°: **Reticulate**

INTER-3° ANGLE TO 1°:

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: **Looped**

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY:

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Regular reticulate**VEINLETS -F/E/V/s: **Mostly twice or more branched**5° VEIN FABRIC: **Regular reticulate**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Absent**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Moderately developed**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:.

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Smooth**SURFICIAL GLANDS: **None**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

WW054

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Lauraceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 324466

EXEMPLAR

USNM 324466

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

**Palinactinodromous leaf with regular, opposite percurrent tertiaryies
between the 3 primary veins.**

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate**

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: **Not Preserved**

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: **Simple**PETIOLE ATTACHMENT: **Marginal**BLADE SIZE: **Microphyll to Mesophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Elliptic/ovate**

PETIOLE GLANDS:.

BLADE RATIO L:W: **2:1**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE **Untoothed**BASE ASYMMETRY: **Symmetrical**MEDIAL SYMMETRY: **Symmetrical**BASE SHAPE: **Concave-convex**APEX SHAPE: **Not preserved**

Special Margin Features:

BASE ANGLE: **Acute or Obtuse**APEX ANGLE: **Not preserved**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Palinactinodromous**N° BASAL VEINS: **1 to 3** Interior 2°: **Present**MAJOR 2° Framework: **Eucamptodromous**MINOR-2° Course: **Simple brochidodromous**MAJOR 2° Attachment: **Decurrent**MAJOR 2° VEIN ANGLE: **One pair acute basal secondaries**MAJOR 2° SPACING: **Abruptly increasing proximally**AGROPHIC VEINS: **Simple**

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Mixed opp/alt percurrent**PERIMARGINAL VEINS: **None**EPIMEDIAL 3°: **Opposite percurrent**INTER-3° ANGLE TO 1°: **Acute to midvein**ADMEDIAL COURSE: **Acute to midvein**EXTERIOR 3° COURSE: **Looped**EXMEDIAL COURSE: **Basiflexed**INTERCOSTAL 3° VARIABILITY: **Consistent**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Mixed percurrent**VEINLETS -F/E/V/s: **Mostly once branched**5° VEIN FABRIC: **Freely ramifying**TYPE OF F.E.V. BRANCHING: **dichotomizing**MARGINAL VENATION: **Looped**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Moderately developed**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Not Preserved**SURFICIAL GLANDS: **Not Preserved**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

WW055

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Lauraceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

EXEMPLAR

USNM 539912

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Entire leaf with 3 thick primary veins and pair of acute basal secondaries.Venation is very disorganized and does not have the regular, opposite percurrent percurrent tertiaries between the primaries that Lauraceae M1 has.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: SimplePETIOLE ATTACHMENT: MarginalBLADE SIZE: MicrophyllPETIOLE BASE: Not PreservedBLADE SHAPE: Elliptic

PETIOLE GLANDS:.

BLADE RATIO L:W: ~2:1

PETIOLE X-SECTION:

LOBATION: UnlobedMARGIN TYPE UntoothedBASE ASYMMETRY: Not PreservedMEDIAL SYMMETRY: SymmetricalBASE SHAPE: ConcaveAPEX SHAPE: Not preserved

Special Margin Features:

BASE ANGLE: AcuteAPEX ANGLE: Not preservedTerminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: AbsentPRIMARY VENATION: PalinactinodromousN° BASAL VEINS: 5 Interior 2°: PresentMAJOR 2° Framework: Eucamptodromous/BrochidodromousMINOR-2° Course: Simple brochidodromousMAJOR 2° Attachment: DecurrentMAJOR 2° VEIN ANGLE: InconsistentMAJOR 2° SPACING: IrregularAGROPHIC VEINS: Absent

INTER-2° proximal course:

INTER-2° VEIN
LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Irregular reticulatePERIMARGINAL VEINS: NoneEPIMEDIAL 3°: Reticulate

INTER-3° ANGLE TO 1°:

ADMEDIAL COURSE:

EXTERIOR 3° COURSE: Not Preserved

EXMEDIAL COURSE:

INTERCOSTAL 3° VARIABILITY:

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Freely ramifyngVEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC:

TYPE OF F.E.V. BRANCHING: Not PreservedMARGINAL VENATION: Not PreservedF.E.V.s TERMINATIONS: Not PreservedAREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm: TEETH GLANDULARITY: TOOTH SHAPE: TOOTH SPACING: PRINCIPAL VEIN: SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: SmoothSURFICIAL GLANDS: Not PreservedCUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW056

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42403

EXEMPLAR

USNM 539914

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Strong fimbrial vein. Major difference from Cornus is that tertiaries appear to extend farther up the leaf. Tertiaries are also more convex than on Cornus.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate if simple**LEAFLET ORGANIZATION: **Not Preserved**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Petiolulate if compound**LEAF ORGANIZATION: **Not Preserved**PETIOLE ATTACHMENT: **Marginal**BLADE SIZE: **Microphyll to Notophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Ovate to Elliptic**PETIOLE GLANDS: BLADE RATIO L:W: **?**PETIOLE X-SECTION: LOBATION: **Unlobed**MARGIN TYPE: **Untoothed**BASE ASYMMETRY: **Symmetrical**MEDIAL SYMMETRY: **Symmetrical**BASE SHAPE: **Concave**APEX SHAPE: **Not preserved**Special Margin Features: BASE ANGLE: **Obtuse**APEX ANGLE: **Not preserved**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **3** Interior 2°: **Absent**MAJOR 2° Framework: **Festooned semicraspedodromous**MINOR-2° Course: MAJOR 2° Attachment: **Decurrent**MAJOR 2° VEIN ANGLE: **One pair acute basal secondaries**MAJOR 2° SPACING: **Regular**AGROPHIC VEINS: **Absent**INTER-2° proximal course: INTER-2° VEIN
LENGTH: INTER-2° distal course: INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Opposite percurrent - con/str**PERIMARGINAL VEINS: **Fimbrial vein**EPIMEDIAL 3°: **Opposite percurrent**INTER-3° ANGLE TO 1°: **Perpendicular to midvein**ADMEDIAL COURSE: **Perpendicular to midvein**EXTERIOR 3° COURSE: **Variable**EXMEDIAL COURSE: **Parallel to intercostal 3°**INTERCOSTAL 3° VARIABILITY: **Consistent**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Opposite percurrent**VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Not Preserved**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Not Preserved**LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: No TEETH/cm: TEETH GLANDULARITY: TOOTH SHAPE: TOOTH SPACING: PRINCIPAL VEIN: SINUS SHAPE: ACCESSORY VEIN COURSE: PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Smooth**SURFICIAL GLANDS: **None**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

WW057

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

? Malvaceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42400

EXEMPLAR

USNM 539915

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Palmate leaf that looks similar to Dombeya, but the venation is not as well
organized. It does not have the small, square areoles, and it also has naked
basal veins

MQI:**LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES**

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: Simple

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Microphyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Ovate

PETIOLE GLANDS:

BLADE RATIO L:W: ~1:1

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE: Serrate

BASE ASYMMETRY: Symmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Cordate

APEX SHAPE: Convex

Special Margin Features:

BASE ANGLE: Wide obtuse

APEX ANGLE: Obtuse

Terminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Present

PRIMARY VENATION: Basal actinodromous

N° BASAL VEINS: 5 Interior 2° Absent

MAJOR 2° Framework: Craspedodromous

MINOR-2° Course: Craspedodromous

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: Smoothly increasing toward base

MAJOR 2° SPACING: Irregular

AGROPHIC VEINS: Compound

INTER-2° proximal course:

INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Opposite percurrent - convex

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: Variable

EXTERIOR 3° COURSE: Not Preserved

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: Increasing exmedially

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Not Preserved

VEINLETS -F/E/N/s: Not Preserved

5° VEIN FABRIC: Not Preserved

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Not Preserved

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm: 5 to 6

TEETH GLANDULARITY: Spherulate

TOOTH SHAPE: st/st or st/cc

TOOTH SPACING:

PRINCIPAL VEIN: Proximal

SINUS SHAPE: Angular

ACCESSORY VEIN COURSE: Not Preserved

PRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not Preserved

SURFICIAL GLANDS: Not Preserved

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW058

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42406

EXEMPLAR

USNM 539916

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Only one specimen, and it is poorly preserved.

Palmately lobed leaf with glandular teeth.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate if simple

LEAFLET ORGANIZATION: Not Preserved

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT: Petiolulate if compound

LEAF ORGANIZATION: Not Preserved

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Mesophyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Ovate

PETIOLE GLANDS:

BLADE RATIO L:W: ~1:1

PETIOLE X-SECTION:

LOBATION: Palmately lobed

MARGIN TYPE: Dentate

BASE ASYMMETRY: Symmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Concave-convex

APEX SHAPE: Not preserved

Special Margin Features: Revolute?

BASE ANGLE: Obtuse

APEX ANGLE: Not preserved

Terminal apex features: Not Preserved

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Palinactinodromous?

N° BASAL VEINS: 5 Interior 2°: Absent

MAJOR 2° Framework: Craspedodromous?

MINOR-2° Course: Not Preserved

MAJOR 2° Attachment: Excurrent

MAJOR 2° VEIN ANGLE: Not Preserved

MAJOR 2° SPACING: Not Preserved

AGROPHIC VEINS: Compound

INTER-2° proximal course:

INTER-2° VEIN
LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Mixed opp/alt percurrent

PERIMARGINAL VEINS: None

EPIMEDIAL 3°: Mixed opp/alt percurrent

INTER-3° ANGLE TO 1°: Perpendicular to midvein

ADMEDIAL COURSE: Perpendicular to midvein

EXTERIOR 3° COURSE: Not Preserved

EXMEDIAL COURSE: Basiflexed

INTERCOSTAL 3° VARIABILITY:

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Irregular reticulate

VEINLETS -F/E/V/s: Not Preserved

5° VEIN FABRIC: Irregular reticulate

TYPE OF F.E.V. BRANCHING: Not Preserved

MARGINAL VENATION: Not Preserved

F.E.V.s TERMINATIONS: Not Preserved

AREOLATION: Moderately developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH: 1

No TEETH/cm: 1

TEETH GLANDULARITY: Non-specific glandular

TOOTH SHAPE: cv/cv

TOOTH SPACING: Regular

PRINCIPAL VEIN: Medial

SINUS SHAPE: Angular

ACCESSORY VEIN COURSE: Runing from sinus

PRINCIPAL VEIN TERM.: Marginal, at apex

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Not Preserved

SURFICIAL GLANDS: Not Preserved

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW059

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Lauraceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42400

EXEMPLAR

USNM 539917

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Pinnate Lauraceous leaf with a thick pair of secondaries that are more acute than the others and several cm above the base.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Petiolate**

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: **Not Preserved**

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: **Simple**PETIOLE ATTACHMENT: **Marginal**BLADE SIZE: **Notophyll to Mesophyll**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Elliptic**

PETIOLE GLANDS:.

BLADE RATIO L:W: **2:1**

PETIOLE X-SECTION:

LOBATION: **Unlobed**MARGIN TYPE **Untoothed**BASE ASYMMETRY: **Symmetrical**MEDIAL SYMMETRY: **Symmetrical**BASE SHAPE: **Straight (cuneate)**APEX SHAPE: **Not preserved**

Special Margin Features:

BASE ANGLE: **Acute**APEX ANGLE: **Not preserved**Terminal apex features: **Not Preserved**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Absent**PRIMARY VENATION: **Pinnate**N° BASAL VEINS: **1** Interior 2°: **Present**MAJOR 2° Framework: **Eucamptodromous**MINOR-2° Course: **Simple brochidodromous**MAJOR 2° Attachment: **Excurent**MAJOR 2° VEIN ANGLE: **Inconsistent**MAJOR 2° SPACING: **Irregular**AGROPHIC VEINS: **Simple**

INTER-2° proximal course: INTER-2° VEIN LENGTH:

INTER-2° distal course:

INTER-2° FREQUENCY:

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Opposite percurrent - sinuous**PERIMARGINAL VEINS: **Fimbrial vein**EPIMEDIAL 3°: **Opposite percurrent**INTER-3° ANGLE TO 1°: **Variable**ADMEDIAL COURSE: **Acute to midvein**EXTERIOR 3° COURSE: **Looped**EXMEDIAL COURSE: **Parallel to intercostal 3°**INTERCOSTAL 3° VARIABILITY: **Inconsistent**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Opposite percurrent**VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Absent**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Not Preserved**

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Not Preserved**SURFICIAL GLANDS: **Not Preserved**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

WW060

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42406

EXEMPLAR

USNM 539918

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Pinnately lobed leaf, with teeth from 15 Mile Creek. Only one fragmentary specimen.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: **Not Preserved**LEAFLET ORGANIZATION: **Not Preserved**LEAF ARRANGEMENT: **Not Preserved**LEAFLET ATTACHMENT: **Not Preserved**LEAF ORGANIZATION: **Not Preserved**PETIOLE ATTACHMENT: **Not Preserved**BLADE SIZE: **Not Preserved**PETIOLE BASE: **Not Preserved**BLADE SHAPE: **Not Preserved**PETIOLE GLANDS: **Not Preserved**BLADE RATIO L:W: **Not Preserved**PETIOLE X-SECTION: **Not Preserved**LOBATION: **Pinnately lobed**MARGIN TYPE: **Serrate**BASE ASYMMETRY: **Not Preserved**MEDIAL SYMMETRY: **Not Preserved**BASE SHAPE: **Not Preserved**APEX SHAPE: **Convex**Special Margin Features: **Not Preserved**BASE ANGLE: **Not Preserved**APEX ANGLE: **Odd-lobed acute**Terminal apex features: **None**

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: **Not Preserved**PRIMARY VENATION: **Pinnate?**N° BASAL VEINS: **NP** Interior 2°: **NP**MAJOR 2° Framework: **Craspedodromous**MINOR-2° Course: **Craspedodromous**MAJOR 2° Attachment: **Decurrent**MAJOR 2° VEIN ANGLE: **Not Preserved**MAJOR 2° SPACING: **Not Preserved**AGROPHIC VEINS: **Not Preserved**INTER-2° proximal course: **Not Preserved**INTER-2° VEIN LENGTH: **Not Preserved**INTER-2° distal course: **Not Preserved**INTER-2° FREQUENCY: **Not Preserved**

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: **Not Preserved**PERIMARGINAL VEINS: **Fimbrial vein**EPIMEDIAL 3°: **Opposite percurrent**INTER-3° ANGLE TO 1°: **Not Preserved**ADMEDIAL COURSE: **Variable**EXTERIOR 3° COURSE: **Looped**EXMEDIAL COURSE: **Basiflexed**INTERCOSTAL 3° VARIABILITY: **Not Preserved**

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: **Irregular reticulate**VEINLETS -F/E/V/s: **Not Preserved**5° VEIN FABRIC: **Not Preserved**TYPE OF F.E.V. BRANCHING: **Not Preserved**MARGINAL VENATION: **Incomplete loops**F.E.V.s TERMINATIONS: **Not Preserved**AREOLATION: **Poorly developed?**LEAF RANK: **Not Preserved**

TOOTH FEATURES

ORDERS OF TEETH: **2**No TEETH/cm: **3**TEETH GLANDULARITY: **Non-specific glandular**TOOTH SHAPE: **cv/cv**TOOTH SPACING: **Irregular**PRINCIPAL VEIN: **Medial**SINUS SHAPE: **Angular**ACCESSORY VEIN COURSE: **Straight or concave**PRINCIPAL VEIN TERM.: **Marginal, at apex**

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: **Smooth**SURFICIAL GLANDS: **None**CUTICLE/MESOPHYLL FEATURES: **Not Preserved**

MORPHOTYPE

WW061

GENERAL

MAJOR GROUP

DIC

INFERRED FAMILY

Lauraceae

ORGAN TYPE

Leaf

EXEMPLAR LOC.

USNM 42400

EXEMPLAR

USNM 539920

OTHERS LOC.

DIAGNOSTIC FEATURES OF MORPHOTYPE

Resin glands clearly visible all over lamina. Symmetrical, pinnate leaf.

MQI:

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES

LEAF ATTACHMENT: Petiolate

LEAFLET ORGANIZATION:

LEAF ARRANGEMENT: Not Preserved

LEAFLET ATTACHMENT:

LEAF ORGANIZATION: Simple

PETIOLE ATTACHMENT: Marginal

BLADE SIZE: Microphyll to Notophyll

PETIOLE BASE: Not Preserved

BLADE SHAPE: Elliptic

PETIOLE GLANDS:

BLADE RATIO L:W: 3:1 to 2:1

PETIOLE X-SECTION:

LOBATION: Unlobed

MARGIN TYPE: Untoothed

BASE ASYMMETRY: Symmetrical

MEDIAL SYMMETRY: Symmetrical

BASE SHAPE: Convex/Straight

APEX SHAPE:

Straight

Special Margin Features:

BASE ANGLE: Acute

APEX ANGLE:

Acute

Terminal apex features: None

PRIMARY & SECONDARY VEIN FEATURES

NAKED BASAL VEINS: Absent

PRIMARY VENATION: Pinnate

N° BASAL VEINS: 1 Interior 2°: Absent

MAJOR 2° Framework: Simple brochidodrompus

MINOR-2° Course:

MAJOR 2° Attachment: Decurrent

MAJOR 2° VEIN ANGLE: Uniform

MAJOR 2° SPACING: Regular

AGROPHIC VEINS: Simple

INTER-2° proximal course: Parallel to major 2°

INTER-2° VEIN

LENGTH: > 50% subjacent secondary

INTER-2° distal course: Reticulating

INTER-2° FREQUENCY: <1 per intercostal area

TERTIARY VEIN FEATURES

INTERCOSTAL 3°: Mixed opp/alt percurrent

PERIMARGINAL VEINS: Fimbrial vein

EPIMEDIAL 3°: Opposite percurrent

INTER-3° ANGLE TO 1°: Obtuse to midvein

ADMEDIAL COURSE: Perpendicular to midvein

EXTERIOR 3° COURSE: Looped

EXMEDIAL COURSE: Parallel to intercostal 3°

INTERCOSTAL 3° VARIABILITY: Decr exmed, incr prox

FOURTH & HIGHER ORDER VEIN FEATURES

4° VEIN FABRIC: Opposite percurrent

VEINLETS -F/E/V/s: Mostly once branched

5° VEIN FABRIC: Regular reticulate

TYPE OF F.E.V. BRANCHING: dichotomizing

MARGINAL VENATION: Absent

F.E.V.s TERMINATIONS: Simple

AREOLATION: Well developed

LEAF RANK:

TOOTH FEATURES

ORDERS OF TEETH:

No TEETH/cm:

TEETH GLANDULARITY:

TOOTH SHAPE:

TOOTH SPACING:

PRINCIPAL VEIN:

SINUS SHAPE:

ACCESSORY VEIN COURSE:

PRINCIPAL VEIN TERM.:

SURFACE & CUTICLE FEATURES

FOSSIL COMPRESSION TEXTURE: Pitted

SURFICIAL GLANDS: Laminar

CUTICLE/MESOPHYLL FEATURES: Not Preserved

MORPHOTYPE

WW062

GENERAL	MAJOR GROUP	DIC	INFERRED FAMILY	ORGAN TYPE	Leaf
EXEMPLAR LOC.	USNM 42400	EXEMPLAR	USNM 539921	OTHERS LOC.	
DIAGNOSTIC FEATURES OF MORPHOTYPE					
Festooned brochidodromous leaf with small, spinose teeth. Regular, reticulate venation.					
MQI:					

LEAF ATTACHMENT, ORGANIZATION, SIZE, SHAPE AND PETIOLE FEATURES					
LEAF ATTACHMENT:	Petiolate if simple	LEAFLET ORGANIZATION:	Not Preserved		
LEAF ARRANGEMENT:	Not Preserved	LEAFLET ATTACHMENT:	Petiolulate if compound		
LEAF ORGANIZATION:	Not Preserved	PETIOLE ATTACHMENT:	Marginal		
BLADE SIZE:	Microphyll to Notophyll	PETIOLE BASE:	Not Preserved		
BLADE SHAPE:	Elliptic	PETIOLE GLANDS:			
BLADE RATIO L:W:	3:1	PETIOLE X-SECTION:			
LOBATION:	Unlobed	MARGIN TYPE	Serrate		
BASE ASYMMETRY:	Width	MEDIAL SYMMETRY:	Symmetrical		
BASE SHAPE:	Convex, concave	APEX SHAPE:	Straight?	Special Margin Features:	
BASE ANGLE:	Acute	APEX ANGLE:	Acute	Terminal apex features:	Not Preserved

PRIMARY & SECONDARY VEIN FEATURES				NAKED BASAL VEINS:		Absent
PRIMARY VENATION:	Pinnate	N° BASAL VEINS:	1	Interior 2°	Absent	
MAJOR 2° Framework:	Festooned brochidodromous	MINOR-2° Course:				
MAJOR 2° Attachment:	Excurent	MAJOR 2° VEIN ANGLE:	Inconsistent			
MAJOR 2° SPACING:	Regular	AGROPHIC VEINS:	Absent			
INTER-2° proximal course:	Parallel to major 2°	INTER-2° VEIN LENGTH:	> 50% subjacent secondary			
INTER-2° distal course:	Reticulating	INTER-2° FREQUENCY:	<1 per intercostal area			

TERTIARY VEIN FEATURES				PERIMARGINAL VEINS:		None
INTERCOSTAL 3°:	Regular reticulate	INTER-3° ANGLE TO 1°:				
EPIMEDIAL 3°:	Reticulate	EXTERIOR 3° COURSE:	Looped			
ADMEDIAL COURSE:		INTERCOSTAL 3° VARIABILITY:				
EXMEDIAL COURSE:						

FOURTH & HIGHER ORDER VEIN FEATURES				VEINLETS -F/E/V/s:		Mostly once branched
4° VEIN FABRIC:	Regular reticulate	TYPE OF F.E.V. BRANCHING:	dichotomizing			
5° VEIN FABRIC:		F.E.V.s TERMINATIONS:	Simple			
MARGINAL VENATION:	Incomplete loops	LEAF RANK:				
AREOLATION:	Well developed					

TOOTH FEATURES				TEETH GLANDULARITY:		Non-specific glandular
ORDERS OF TEETH:	1	No TEETH/cm:	2 to 4	TOOTH SPACING:	Regular	
TOOTH SHAPE:	cc/cc	SINUS SHAPE:	Angular			
PRINCIPAL VEIN:	Proximal	PRINCIPAL VEIN TERM.:	Spinose			
ACCESSORY VEIN COURSE:	Absent					

SURFACE & CUTICLE FEATURES		FOSSIL COMPRESSION TEXTURE:		Smooth	
		SURFICIAL GLANDS:		None	
		CUTICLE/MESOPHYLL FEATURES:		Not Preserved	