

Supplementary Material for LAMAS, CARLOS JOSÉ EINICKER, SILVIO SHIGUEO
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APPENDIX S1

Geographical data of *Heterostylum* species used for the biogeographic analysis (locality name followed by latitude and longitude, respectively).

Heterostylum croceum: USA, Colorado [state], 39.00, -105.00; Kansas, Trego Co., Medora, 38.1333, -97.8333; New Mexico [state], 35.00, -105.00; Texas, Austin, 30.2669, -97.7428; Texas, Ballinger, 31.7333, -99.9333.

Heterostylum deani: USA, Kansas, Mitchell Co., 39.400, -98.200; Kansas, Manhattan, 39.200, -96.600; California, Berkeley, 37.8667, -122.2667.

Heterostylum duocolor: Argentina, Córdoba, -31.4, -64.1833333.

Heterostylum engelhardti: USA, Arizona, 34.00, -112.00; California, Imperial Co., Glamis, 32.9833, -115.0667; Texas, San Antonio, 29.4167, -98.4833; Utah, Washington Co., St., George, 37.100, -113.5833.

Heterostylum evenhuisi: Brazil, Ceará, Limoeiro, -5.133, -38.100; Ceará, Russas, -4.9833333, -38.0166667; Bahia, Cachoeira de Paulo Afonso, -9.35, -38.233; Bahia, Milagres, -12.8667, -39.8500; Goiás, Miranorte, -9.4766667, -48.4802778; Pará, Castanhal, -1.3, -47.9166667; Pará, Bragança, -1.05, -46.766; Pernambuco, Petrolina, -9.4, -40.5; Rio Grande do Norte, Ceará-Mirim, -5.6333333, -35.4333; São Paulo, Batatais, -20.8833333, -47.6166667; Argentina, Cordoba, Cordoba, -31.4, -64.18333.

Heterostylum ferrugineum: Brazil, Ceará, Limoeiro, -7.3166, -38.55; Ceará, Fortaleza, -3.7166, -38.5; Bahia, Santa Rita, -12.2833, -41.0167; Goiás, Goiânia, -16.6666667, -49.2666667; Mato Grosso, Cerrado, -12.50, -51.47, Mato Grosso do Sul, Dourados, -22.2166667, -54.8, Mato Grosso, Xavantina, -14.6666667, -52.35, Mato Grosso do Sul, Porto Murtinho, -20.4333333, -55.20000, Roraima, Boa Vista, 2.8166667, -60.6666667; Bolivia, Santa Cruz, El Carmen, -18.8500, -58.5833; British Virgin Islands, Road Town, 18.500, -64.500; American Virgin Islands, 18.500, -64.4333; Puerto Rico, San Juan, 18.46833, -66.10611; Paraguay, Assuncion, -25.2666667, -57.6666667.

Heterostylum helvolum: Mexico, Sinaloa [state], 25.00, -106.00; Sonora [state], 29.333, -110.6667; Tamaulipas [state], 24.00, -98.7500; Zacatecas [state], 23.00, -103.00.,

Heterostylum haemorrhoidicum: Cuba, [Havana], 23.1319444, -82.3641667; Haiti, [Porto Principe], 18.5391667, -72.335; Dominican Republic, Santo Domingo, 18.500, -69.9500.

Heterostylum hirsutum: Brazil, Mato Grosso do Sul, Porto Murtinho, -21.6389435275, -57.7060618893; Argentina, Patquia, -30.05, -66.88333333; Colombia, Magdalena, [Santa Marta], 11.2472222, -74.2016667; Venezuela, Par., Catia La Mar, 10.36, -67.02.

Heterostylum maculipennis: Brazil, São Paulo, Praia Grande, -24.0167, -46.4167; Rio de Janeiro, Angra dos Reis, -22.9833, -44.2833; Rio de Janeiro, Nova Friburgo, -

22.2666667, -42.533; Rio de Janeiro, Itatiaia, -22.5, -44.5666667; Santa Catarina, Nova Teutônia, -27.1167, -52.2833.

Heterostylum pallipes: Dominican Republic, Santo Domingo, 18.500, -69.9500, Haiti [país], 19.00, -72.4167.

Heterostylum robustum: Canadá, Alberta [província], 55.00, -115.00; Mexico, Baja California Norte[state], 30.00, -115.00; Baja California Sur, [state], 26.00, -112.00; Coahuila de Zaragoza [state], 27.333, -102.00; Guerrero [state], 17.6667, -100.00; Morelos [state], 18.7500, -99.00; Nuevo León [state], 25.6667, -100.00; Puebla [state], 18.8300, -98.00; Sinaloa [state], 25.00, -106.00; Sonora [state], 29.333, -110.6667; Tamaulipas [state], 24.00, -98.7500; USA, Arizona, Douglas, 31.333, -109.5333; Arizona, Florence, 33.0167, -111.3833; Missouri, Brownsville, 38.9500, -93.400; Utah, [state], 40.00, -110.00; Oklahoma [state], 35.00, -98.00; Oregon [state], 44.00, -120.00; Texas, Waco, 31.533, -97.133; Texas, Fabens, 31.500, -106.1500; Washington, Yakima Co., Wapato, 46.4333, -120.4167

Heterostylum rufum: Brazil, Amapá, Porto Platon, 0.7000, -51.4500; Bahia, Santa Rita, -12.2833, -41.0167; Bahia, Olivença, -14.9500, -39.0167; Ceará, Limoeiro, -5.133, -38.100; Ceará, Barbalha, -7.2500, -39.2500; Espírito Santo, Conceição da Barra, -18.600, -39.7667; Goiás, Goiânia, -16.6666667, -49.266; Mato Grosso, Nhambiquara, -12.7500, -59.800; Mato Grosso, Chapada dos Guimarães, -15.3333, -55.7333; Mato Grosso, Utariti, -13.0333, -58.2833; Mato Grosso do Sul, Maracajú, -21.6333, -55.1500; Maranhão, Imperatriz, -5.5333, -47.4667; Pará, Alter do Chão (rio Tapajós), -2.1567, -54.9500; São Paulo, Marília, -22.2167, -

49.9333; São Paulo, Sertãozinho, -22.3167, -46.0500; British Guiana [country],
5.00, -59.00; México, Tabasco [state], 18.2500, -92.6667; American Virgin Islands,
18.500, -64.4333; Guatemala, San José, 13.8167, -90.3167; Venezuela, Cerro de La
Neblina, 0.797856, -66.00174.

APPENDIX S2

List of materials examined.

Apiformyia australis Yeates, 2008 – none specimen examined. Morphological characters based on Yeates (2008).

Heterostylum croceum Painter, 1930 - none specimen examined. Morphological characters based on Hall & Evenhuis (1981).

Heterostylum deani Painter, 1930 - Paratypes. USA, Kansas, 25-VIII-1975, 1 female, R.H. Painter; deposited in BPBM; Kansas, 9-VIII-1921, 1 females, R.C. Smith; deposited in BPBM.

Heterostylum engelhardti Painter, 1930 - none specimen examined. Morphological characters based on Hall & Evenhuis (1981).

Heterostylum evenhuisi Cunha & Lamas, 2005 - Holotype male: BRAZIL, Ceará: Limoeiro, VI - 1940, Shannon & Alves, (26.494); deposited in MZUSP; Paratypes. BRAZIL, Pará: Castanhal, VII-1964, 1 female, Sebastião Laroca; deposited in DZUP; Bragança, 14-VIII-1977, 3 females, W. L. Overal; deposited in MPEG; Ceará: Limoeiro, VI - 1940, 1 male (26.486) and 1 female (26.488), Shannon & Alves; deposited in BPBM; 2 males (26.490 and 26.492) and 5 females (26.485, 26.487, 26.489, 26.491 and 26.493), Shannon & Alves; Russas, II-1940, 1 female (26.506), Shannon & Alves; deposited in MZUSP; Rio Grande do Norte: Ceará Mirim, X-1940, 1 female (26.541), D. Alves; deposited in MZUSP; Pernambuco: Petrolina, VII-1974, 5 females, N. Papavero; deposited in MZUSP; Goiás: Miranorte, BR 14, III -1965, 1 male and 1 female, L. Gomes; deposited in MPEG; Bahia: Cachoeira de Paulo Afonso, Rio São Francisco, 11-VII-1951, 1 male (954); deposited in MNRJ; São Paulo: Batatais, III-1943, 1 male

(26.434) and 2 females (26.451 and 26.435), A. Stafuzza; IV-1945, 1 male (26.419), Pde. Pereira; deposited in MZUSP; Tamoio, XII-1944, 2 males (26.513 and 26.514), M. Barreto; deposited in MZUSP.

Heterostylum ferrugineum (Fabricius, 1805) - BRAZIL, Ceará: Fortaleza, 22-I-1975, 2 females (62586 and 62587), O. Diog.; Limoeiro, VI - 1940, 1 male (26.497), Shannon & Alves; deposited in MZUSP; Goiás: Goiânia, 20-III-1962, 1 female, F. M. Oliveira; deposited in DZUP; Mato Grosso do Sul: Cerrado (12°50'S, 51°47'W), 10-II-1968, 1 male and 1 female, O. W. Richards; deposited in BMNH; Murtinho, I-1930, 1 male, R. Spitz; deposited in DZUP; Murtinho, XII-1929, 1 female (637), R. Spitz; deposited in MNRJ; Dourados, 1 female (950); deposited in MNRJ; Xavantina, 02-IV-1953, 1 female (633), M. Alvarenga; deposited in MNRJ; BOLIVIA, El Carmen, 27-II-1954, 1 female, C. Gans & F. Pereira; deposited in DZUP; El Carmen, II-1955, 1 male (634), Comissão I.O. Cruz; deposited in MNRJ.

Heterostylum haemorrhoidicum (Loew, 1863) - DOMINICAN REPUBLIC, St. Domingo, Sweedie, 2 males (55.1); deposited in BMNH.

Heterostylum helvolum Hall & Evenhuis, 1981 - none specimen examined.
Morphological characters based on Hall & Evenhuis (1981).

Heterostylum hirsutum (Thunberg, 1827) - ARGENTINA, La rioja: Patquia, XII-II – 1932-1933, 1 male and 1 female, K.J. Hayward; deposited in BMNH; VENEZUELA, Federal District: Paroquia Catia La Mar. Escuela Naval. Aprox. 10°36'N, 67°02'O; 5 m.s.n.m. Xerofitic vegetation (espinal), 22-IX-1987, 1 female (947), 28-VII-1987, 1 male (948), 18-VIII-1988, 2 males (949); deposited in MNRJ.

Heterostylum maculipennis Cunha & Lamas, 2005 - Holotype male: BRAZIL, São Paulo: Praia Grande, Fazenda Rondonea. II – 1945, M. Carrera, (26.483); deposited in MZUSP; Paratypes. BRAZIL, Rio de Janeiro: Nova Friburgo, Mury, 31-I-1965, 2 females, Gred & Guimarães; deposited in MZUSP; Itatiaia (700m), 28-XII-1947, 1 female (26.484), J. F. Zikan; deposited in MZUSP; Angra dos Reis, Japuhya, I-1935, 1 female (638), Dario Mendes; deposited in MNRJ; Santa Catarina: Nova Teutonia (27°11'B. 52°23'L.), 1939, 2 females, Fritz Plaumann. Deposited in BMNH.

Heterostylum pallipes Bigot, 1892 - DOMINICAN REPUBLIC, St. Domingo, Sweedie, 1 male and 1 female (55.1); Hearme, 1 female (54.76); deposited in BMNH.

Heterostylum robustum (Osten Sacken, 1877) – none examined specimen. Morphological states of characters used in this paper are available in Hall & Evenhuis (1981).

Heterostylum rufum (Oliver, 1789) - BRAZIL, Amazonas, Serra da Neblina [VENEZUELA, Amazonas, Cerro de la Neblina], 4-XII-1965, 1 male and 3 females, E. Dente; Amapá, Porto Platon, 10.IX.1957, 1 male, J. Lane; 19.IX.1957, 1 male and 1 female, K. Lenko; Bahia: Olivença, VII.1974, 1 male and 2 females; Santa Rita, IV-1958, 2 males and 2 females, E. Dente; Ceará: Limoeiro, VI-1940, 1 female, Shannon e Alves, deposited in MZUSP; Barbalha, V-1969, 5 females (952), M. Alvarenga; deposited in MNRJ; Espírito Santo: Conceição da Barra, 19-24-VIII-1968, 1 male, C.&C.T. Elias; deposited in DZUP; Goiás: Goiânia, 20-III-1962, 3 males, F.M. Oliveira; deposited in DZUP; Mato Grosso: Maracajú, III.1937, 1 male and 1 female, Shannon & Lane; V.1937, 1 female (26382), deposited in MZUSP; Nhambiquara, XI-1960, 2 females, M. Alvarenga; deposited

in DZUP; Chapada dos Guimarães, Fazenda Buriti, 13-XI-1982, 1 female, Márcio Zanuto e W. Overal; deposited in MNRJ; Mato Grosso do Sul: Utiariti, X-1966, 1 female, Lenko & Pereira, Deposited in MZUSP; Maranhão: Imperatriz, 21-III-1962, 9 males, 20-II-1962, 18 females, F.M. Oliveira; deposited in DZUP; Pará: Serra Norte, road of Fofoca, 20-VIII-1984, 1 female, Márcio Zanuto, 16-IX-1985, 1 male, M.F. Torres, 24-IX-1985, 1 male, M.F. Torres; deposited in MPEG; Serra Norte, Serraria, 27-VII-1985, 1 female, suspended trap:1.6m; deposited in MPEG; Alter do Chão, rio Tapajos, 1 male (54.18), H.W. Bates; deposited in BMNH; São Paulo: Marília, 4-13-I-1968, 1 female, M. Carrera; Sertãozinho, Monteiro, III-1934, 1 female (636); deposited in MNRJ; British Guiana, 1907, 1 female (1907-330), Dr. K.S. Wise; deposited in BMNH.

Toxophora aurea Macquart, 1848 - BRAZIL: 17-VII-1928, 1 female (781), AM Parko col., n° de proc. 11/836 (MNRJ); Amapá: Porto Platon, 20-IX-1957, 2 females e 1 male (782), Campos collection, K. Lenko col (MNRJ), 21-IX-1957, 1 female, 18-IX-1957, 1 male, J Lane col. (MZUSP); Amazonas: Audes, VI-1948, 1 female (786), JCM Carvalho col. (MNRJ); Manaus, 27-IX-1955, 1 female (785), 30-XII-1955, 1 male (785), Ellias e Roppa col. (MNRJ); Distrito Federal: Brasília, I-1961, 1 female e 1 male (783), HS Lopes col. (MNRJ); Mato Grosso: Fazenda Murтинho, XII-1929, 1 female (778), R Spitz col., HS Lopes det. (MNRJ); Utiariti, Rio Papagaio, 7-VIII-1961, 1 male, K Lenko col. (MZUSP); Pará: Belém Utinga, VII-1936, 1 female (779), Almeida col., HS Lopes det. (MNRJ); Piratuba, Abaere, 1938, 1 female (784), Ceelva col. (MNRJ); Rio Acará, 23-VIII-1954, 2 females, N Cerqueira col. (1 MNRJ e 1 MZUSP); Urucurituba, 4-IV-??, 1 female (20.071), CHT Towncend col. (MZUSP); Rio de Janeiro: Duque de Caxias, São Bento, I-1954 e 5-I-1955, 2 females, PA Teles col. (MZUSP); Petrópolis, Retiro Pedro Rio,

25-I-1957, 1 female, CA Campos Seabra col. (MZUSP); São Paulo: Araçatuba, Fazenda Jacareatinga, XI-1962, 1 male, Lane e Rabello col. (MZUSP); Castilho, left margin of Paraná river, X-1964, 1 female e 1 macho, Exp. Depto. Zool. (MZUSP); Onda Verde, Fazenda São João, I-1946, 1 male (20.080), F Lane col. (MZUSP); Porto cabral, Paraná river, 20-31-III-1944, 1 female e 1 male (20.069), Trav., Carrera e E Dente col. (MZUSP); Rio Claro, I-1941, 1 male (20.084), Pde. Pereira col. (MNRJ); Severínia, XII-1940, 1 female (20.076), AG Silva col. (MZUSP); PARAGUAY: Assuncion, XI-1943, 1 female (780), Mis. Cient. Brasil col. (MNRJ); SURINAME: Marowijine river, VII-1965, 1 male (7236), Cambridge Expedition, EAM Gale col. (MNRJ).

Triploechus bellus Philippi, 1865 – CHILE: Santiago: Rincón El Arbol, Aculeo, X-1969, 4 females and 1 male, L.E. Peña col. (MZUSP); Cantillana, 2000m, Cord. de La Costa, XII-1969, 2 females, L.E. Peña col. (MZUSP); Valparaiso: Marga Marga, Cuesta Valparaiso, 5-X-1969, 1 male, L.E. Peña col (MZUSP); Ñuble: Cord. Chillán, La Invernada, XII-1969, 1 female (MZUSP).

Triploechus heteronevrus Macquart, 1850 – CHILE: Santiago: Rincón El Arbol, Aculeo, X-1969, 1 female and 10 males, L.E. Peña col. (MZUSP); Cantillana, 2000m, Cord. de La Costa, XII-1969, 7 males, L.E. Peña col. (MZUSP); Valparaiso: Rio Blanco, XI-1969, 1 female, L.E. Peña col. (MZUSP); Tarapacá: Zapahuiria, 3000m, 18° 16'S, 69° 36'W, 9-IX.1999, 1 male, F. Zanella col. (MZUSP).

Triploechus novus Williston, 1893 - none specimen examined. Morphological characters based on Hall & Evenhuis (1981).

APPENDIX S3

DIVA optimizations.

1) settings: maxareas=7, hold=1000

optimal reconstruction requires 10 dispersals

optimal distributions at each node:

node 13 (anc. of terminals 4-5): A

node 14 (anc. of terminals 3-5): A

node 15 (anc. of terminals 2-5): A

node 16 (anc. of terminals 1-5): A

node 17 (anc. of terminals 7-8): B

node 18 (anc. of terminals 6-8): BCDEF

node 19 (anc. of terminals 11-12): CG DG CDG EG CEG DEG CDEG

node 20 (anc. of terminals 10-12): G

node 21 (anc. of terminals 9-12): BG

node 22 (anc. of terminals 6-12): BCDEFG

node 23 (anc. of terminals 1-12): ABCDEFG

2) settings: maxareas=4, hold=1000

optimal reconstruction requires 13 dispersals

optimal distributions at each node:

node 13 (anc. of terminals 4-5): A

node 14 (anc. of terminals 3-5): A

node 15 (anc. of terminals 2-5): A

node 16 (anc. of terminals 1-5): A

node 17 (anc. of terminals 7-8): B BF

node 18 (anc. of terminals 6-8): B BC BD BCD BE BCE BDE BCDE F BF BCF
BDF BCDF BEF BCEF BDEF

node 19 (anc. of terminals 11-12): CG DG CDG EG CEG DEG CDEG

node 20 (anc. of terminals 10-12): C BC D BD CD BCD E BE CE BCE DE
BDE CDE BCDE G BG CG BCG DG BDG CDG BCDG EG BEG CEG
BCEG DEG BDEG CDEG

node 21 (anc. of terminals 9-12): B BC BD BCD BE BCE BDE BCDE BG BCG
BDG BCDG BEG BCEG BDEG

node 22 (anc. of terminals 6-12): B BC BD BCD BE BCE BDE CDE BCDE
BCF BDF CDF BCDF BEF CEF BCEF DEF BDEF CDEF BG BCG BDG
CDG BCDG BEG CEG BCEG DEG BDEG CDEG BFG CFG BCFG DFG
BDFG CDFG EFG BEFG CEFG DEFG

node 23 (anc. of terminals 1-12): AB ABC ABD ABCD ABE ABCE ABDE
ACDE ABCF ABDF ACDF ABEF ACEF ADEF ABG ABCG ABDG
ACDG ABEG ACEG ADEG ABFG ACFG ADFG ACFG