

ELECTRONIC SUPPLEMENTARY INFORMATION

Intercontinental dispersal of giant thermophilic ants across the Arctic during early Eocene hyperthermals

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CONTENTS

- A. Supplementary table 1: Estimates of mean annual precipitation for fossil sites.
- B. Supplementary table 2: Modern large ant localities and climates.
- C. References.

A. Supplementary table 1

Estimates of mean annual precipitation (in cm/year) for fossil sites. Estimates from new analyses from data in Greenwood & Wing (1995) (data not available for Ekfeld and Bournemouth); and Green River Formation sites from Wilf (2000) comparable with the Farson Fish beds where *T. lubei* was found.

locality	MAP	MAP error
with Formiciinae		
Messel	99.3	-30.0, 43.0
Puryear	120.3	-36.4, 52.1
Green River Fm.		
Little Mt. (Wilf 2000)	76.9	-23.2, 33.2
Niland Tongue (Wilf 2000)	100	-30.3, 43.4

B. Supplementary table 2

Locality and climate data for modern ants with any caste over 3 cm in length. Mean annual temperature (MAT), coldest quarter mean temperature (CQMT) in °C and mean annual precipitation (MAP) in cm/year estimated using WorldClim software (Hijmans et al. 2005).

Species	Latitude	Longitude	MAT	CQMT	MAP	reference
<i>Dorylus</i>						
<i>D. wilverthi</i>	2.11667	21.4	25.3	24.6	176.5	Emery 1899
<i>D. wilverthi</i>	-4.32483	15.31247	25.5	23.4	136.9	Emery 1899
<i>D. wilverthi</i>	1.88602	19.76058	25.3	24.7	183.7	Forel 1909
<i>D. wilverthi</i>	-4.26663	15.28373	25.6	23.4	137.3	Santschi 1910
<i>D. wilverthi</i>	-4.23444	15.55028	25.6	23.6	140.5	Stitz 1910
<i>D. wilverthi</i>	0.05278	32.465	21.4	20.7	157.1	Forel 1912
<i>D. wilverthi</i>	-4.86666	12.86667	25.0	22.2	124.3	Forel 1913
<i>D. wilverthi</i>	0.56267	25.08778	25.4	24.7	178.8	Wheeler 1922a
<i>D. wilverthi</i>	1.31851	27.54371	25.1	24.4	185.7	Wheeler 1922b
<i>D. wilverthi</i>	3.73626	29.71363	24.6	23.4	154.7	Wheeler 1922b
<i>D. wilverthi</i>	2.38831	27.30364	24.0	23.3	208.0	Wheeler 1922b
<i>D. wilverthi</i>	2.93333	26.83333	24.1	23.3	194.9	Wheeler 1922b
<i>D. wilverthi</i>	6.26667	-4.93333	27.0	25.7	117.6	Wheeler 1922a
<i>D. wilverthi</i>	3.45394	25.70084	24.2	23.6	172.1	Santschi 1939

<i>D. wilverthi</i>	0.76309	24.43891	24.7	24.1	176.1	Raignier & 1955
<i>D. wilverthi</i>	1.43194	31.3525	22.6	21.6	138.1	Taylor 2005
<i>D. wilverthi</i>	-0.28333	30.11667	21.0	20.7	121.9	Taylor 2005
<i>D. wilverthi</i>	2.5	16.16667	24.8	24.2	163.6	Taylor 2005
<i>D. wilverthi</i>	2.49999	27.61667	24.0	23.3	211.9	Santschi 1935
<i>D. wilverthi</i>	2.84648	9.88494	25.6	24.5	269.9	Wasmann 1917
<i>D. wilverthi</i>	0.56667	30.36667	19.5	19.1	143.6	antweb
<i>D. wilverthi</i>	-2.76017	20.37867	24.9	24.5	186.2	antweb
<i>D. wilverthi</i>	0.22004	34.93607	19.6	18.7	186.1	antweb
<i>D. wilverthi</i>	0.22111	34.93111	19.6	18.7	186.1	antweb
<i>D. wilverthi</i>	0.28333	34.88333	20.0	19.0	188.3	Peters et al. 2009
<i>D. wilverthi</i>	7.31667	11.58333	25.7	24.7	151.6	Schöning et al. 2007
<i>D. wilverthi</i>	3.37	13.11	23.4	22.7	163.8	Schöning et al. 2008
<i>D. wilverthi</i>	4.15	25.16667	24.9	24.2	166.7	Schöning et al. 2008
<i>D. wilverthi</i>	0.5	30.4	19.9	19.5	135.6	Schöning et al. 2008
<i>D. wilverthi</i>	0.28333	30.11667	21.6	21.2	116.6	Schöning et al. 2008

Camponotus

<i>C. gigas</i>	4.91667	117.66667	24.3	24.0	231.4	antweb
<i>C. gigas</i>	6.03333	116.7	21.9	21.7	223.6	Pfeiffer & Linsenmair 2000
<i>C. gigas</i>	5.73833	101.41556	25.5	24.8	233.3	Watanasit et al. 2007
<i>C. gigas</i>	5.75333	101.41639	25.3	24.6	233.3	Watanasit et al. 2007
<i>C. gigas</i>	5.76028	101.41028	25.3	24.6	233.3	Watanasit et al. 2007
<i>C. gigas</i>	6.03333	116.7	21.9	21.7	223.6	Pfeiffer & Linsenmair 2000
<i>C. gigas</i>	4.55442	115.15419	26.8	26.5	390.9	Orr et al. 1996
<i>C. gigas</i>	5.61667	101.13333	24.8	24.2	242.0	S. Watanasit pers. comm.
<i>C. gigas</i>	7	100.5	27.4	26.3	189.9	S. Watanasit pers. comm.
<i>C. gigas</i>	8.76667	99.78333	25.4	24.0	206.8	S. Watanasit pers. comm.
<i>C. gigas</i>	8.85	99.61667	25.0	23.6	202.4	S. Watanasit pers. comm.

Myrmecia

<i>M. brevinoda</i>	-30.642829°	151.502566°	12.8	6.5	81.0	Clark, 1951
<i>M. brevinoda</i>	-30.340131°	152.711827°	15.2	9.9	198.5	Clark, 1951
<i>M. brevinoda</i>	-28.812744°	153.278714°	19.4	14.3	142.9	Clark, 1951
<i>M. brevinoda</i>	-28.655779°	151.933881°	15.1	8.8	83.1	Clark, 1951
<i>M. brevinoda</i>	-28.230720°	152.245522°	16.8	10.6	74.3	Clark, 1951
<i>M. brevinoda</i>	-27.561302°	151.955505°	16.8	10.8	90.8	Clark, 1951
<i>M. brevinoda</i>	-17.268273°	145.474570°	20.6	16.7	167.5	Clark, 1951
<i>M. brevinoda</i>	-16.925397°	145.775178°	24.7	21.3	242.1	Clark, 1951
<i>M. brevinoda</i>	-16.821483°	145.634187°	23.0	19.6	218.4	Clark, 1951
<i>M. brevinoda</i>	-17.676166°	145.114452°	21.6	17.4	87.2	Clark, 1951
<i>M. brevinoda</i>	-17.607962°	145.483226°	19.7	15.6	144.9	Clark, 1951

Dinoponera

<i>D. gigantea</i>	-2.43984	-54.72362	26.0	25.4	212.9	Kempf 1971
<i>D. gigantea</i>	-1.45504	-48.50248	26.9	26.5	242.2	Kempf 1971

<i>D. gigantea</i>	-0.60804	-47.77598	26.8	26.2	286.5	Kempf 1971
<i>D. gigantea</i>	-0.51667	-51.23333	27.0	26.3	252.3	Kempf 1971
<i>D. gigantea</i>	-1.16361	-48.46805	27.1	26.5	228.0	Kempf 1971
<i>D. gigantea</i>	-1.90204	-55.51956	26.8	26.2	193.2	Kempf 1971
<i>D. gigantea</i>	-5.81732	-46.144	26.2	25.5	124.4	Kempf 1971
<i>D. gigantea</i>	-2.98333	-47.51667	26.5	26.1	185.2	Fourcassié & Oliveira 2002
<i>D. longipes</i>	-5.22891	-78.46107	24.3	23.8	200.6	Kempf 1971
<i>D. lucida</i>	-20.32634	-40.29	24.7	22.7	111.4	Kempf 1971
<i>D. lucida</i>	-19.05237	-40.14892	24.0	22.0	119.1	Kempf 1971
<i>D. lucida</i>	-22.57645	-44.96343	20.2	17.1	144.8	Kempf 1971
<i>D. mutica</i>	-8.76183	-63.90196	26.1	25.3	210.4	Kempf 1971
<i>D. mutica</i>	-16.47129	-54.6371	24.9	22.4	152.3	Kempf 1971
<i>D. mutica</i>	-12.42504	-64.42068	26.2	25.2	149.6	Kempf 1971
<i>D. mutica</i>	-13.02748	-58.28282	24.3	22.7	209.6	Kempf 1971
<i>D. mutica</i>	-16.25704	-56.62466	26.1	23.6	124.0	Kempf 1971
<i>D. mutica</i>	-19.52711	-54.04207	24.5	22.0	148.0	Kempf 1971
<i>D. mutica</i>	-12.00566	-53.40295	25.0	23.7	235.9	Kempf 1971
<i>D. mutica</i>	-15.89729	-52.23008	25.7	23.7	159.5	Kempf 1971
<i>D. mutica</i>	-16.366667	-60.95	23.3	20.8	112.5	Kempf 1971
<i>D. quadriceps</i>	-6.83869	-35.13653	25.7	23.9	125.0	Kempf 1971
<i>D. quadriceps</i>	-7.11631	-34.98121	25.6	24.0	159.4	Kempf 1971
<i>D. quadriceps</i>	-5.7	-37.63333	27.8	27.0	72.7	Kempf 1971
<i>D. quadriceps</i>	-5.63518	-35.42024	25.8	24.4	109.0	Kempf 1971
<i>D. quadriceps</i>	-5.79261	-35.21341	25.8	24.3	142.6	Kempf 1971
<i>D. quadriceps</i>	-5.86006	-35.34983	25.8	24.4	113.4	Kempf 1971
<i>D. quadriceps</i>	-9.80659	-36.11528	24.3	22.5	133.8	Kempf 1971
<i>D. quadriceps</i>	-8.05428	-34.88126	25.8	24.4	179.9	Kempf 1971
<i>D. quadriceps</i>	-8.00352	-35.02143	25.1	23.6	156.9	Kempf 1971
<i>D. quadriceps</i>	-8.35966	-36.69487	21.9	19.4	68.0	Kempf 1971
<i>D. quadriceps</i>	-8.00937	-34.85528	26.0	24.5	171.9	Kempf 1971
<i>D. quadriceps</i>	-11.08969	-43.14178	25.7	24.7	64.7	Kempf 1971
<i>D. quadriceps</i>	-10.71521	-43.63919	24.7	23.3	95.6	Kempf 1971
<i>D. quadriceps</i>	-13.24765	-43.41476	25.4	24.1	82.9	Kempf 1971
<i>D. quadriceps</i>	-9.41098	-38.23584	25.9	23.7	53.4	Kempf 1971
<i>D. quadriceps</i>	-9.964	-39.164	23.5	21.0	50.0	Kempf 1971
<i>D. quadriceps</i>	-12.35	-38.73333	23.5	21.3	127.5	Kempf 1971
<i>D. quadriceps</i>	-11.19264	-38.04376	24.1	21.9	78.1	Monnin & Peeters 1998

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