

# Sonoran Desert Millipede (*Orthoporus ornatus*) and Giant African Millipede (*Archispirostreptus gigas*) Burrow Casts

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**Principle Investigator:** Dan Hembree

**Project Duration:** 2007 – 2008

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## **Sonoran Desert Millipede (*O. ornatus*)**

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**Total Burrows: 10**

*Vertical Shafts (5)*

SB1, SB2, SB6, SB8, SB9

*Subvertical Shafts (3)*

SB5, SB7, SB10

*U-Shaped Burrows (1)*

SB3

*Y-Shaped Burrows (1)*

FP4B, FP1

*Other burrows (2)*



## **Giant African Millipede (*A. gigas*)**

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**Total Burrows: 8**

*Subvertical Shafts (2)*

AB6, AB8

*O-Shaped Burrow (1)*

AB5

*U-Shaped Burrows (2)*

AB7, AB2

*Helical Burrows (2)*

AB3, AB4

*Mazework (1)*

AB1



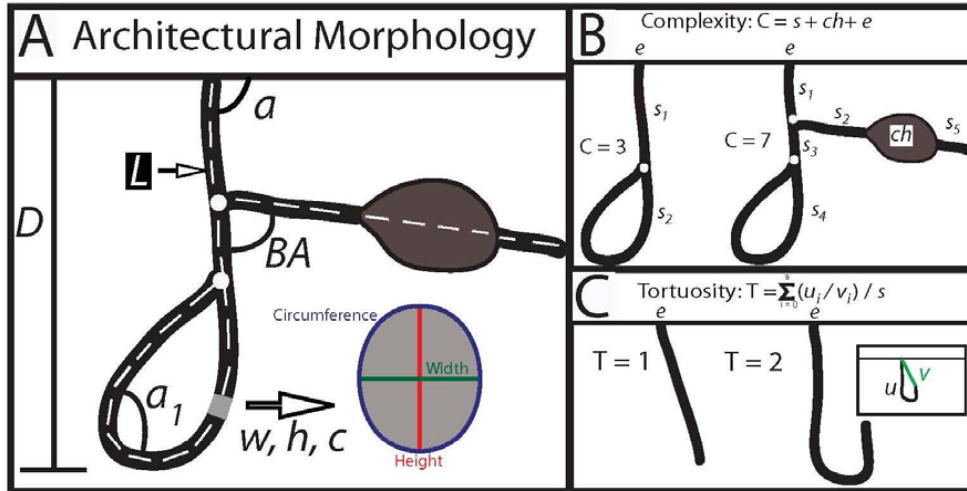
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**Bags of Burrow Casts**

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<b>Bag #</b>	<b>Casts Contained</b>	<b>Architecture</b>
1	SB1, SB2, SB6, SB8, SB9	VS
2	SB5, SB7, SB10	SS
3	SB11, SB12, SB13 (12&13 are connected)	JS
4	SB3 SB4	US YS
	<b>Not Bagged</b>	
	AB6, AB8	SS
	AB5	OS
	AB7, AB2	US
	AB3, AB4	HB
	AB1	MW

# Burrow Measurements



# Experimental Setup

A. Basic morphology experiments				
Soil composition	Soil density	Soil moisture	<i>Archispirostreptus gigas</i> burrows	<i>Orthorporus ornatus</i> burrows
70–30% organic-clay	Loose (0.03 kg/cm <sup>3</sup> )	Moist	All forms; 100–200 mm deep	All forms; 100–140 mm deep
B. Soil composition variation				
Soil composition	Soil density	Soil moisture	<i>A. gigas</i> burrows	<i>O. ornatus</i> burrows
100% organic	Loose (0.03 kg/cm <sup>3</sup> )	Moist	All forms; 100–200 mm deep	All forms; 100–140 mm deep
50–50% organic-clay	Loose (0.03 kg/cm <sup>3</sup> )	Moist	U-shaped, spiral forms; 50–80 mm deep	All forms; 100–140 mm deep
100% clay	Loose (0.03 kg/cm <sup>3</sup> )	Moist	None	Vertical tunnel & chamber; 30–50 mm deep
C. Soil density variation				
Soil composition	Soil density	Soil moisture	<i>A. gigas</i> burrows	<i>O. ornatus</i> burrows
70–30% organic-clay	Loose (0.03 kg/cm <sup>3</sup> )	Moist	All forms; 100–200 mm deep	All forms; 100–140 mm deep
70–30% organic-clay	Compact (0.13 kg/cm <sup>3</sup> )	Moist	None	All forms; 100–140 mm deep
70–30% organic-clay	Firm (0.25 kg/cm <sup>3</sup> )	Moist	None	Vertical tunnel & chamber; 50–70 mm deep
D. Soil moisture variation				
Soil composition	Soil density	Soil moisture	<i>A. gigas</i> burrows	<i>O. ornatus</i> burrows
70–30% organic-clay	Loose (0.03 kg/cm <sup>3</sup> )	Dry	All forms; 100–200 mm deep	Vertical tunnel and chamber; 50–70 mm deep
70–30% organic-clay	Loose (0.03 kg/cm <sup>3</sup> )	Moist	All forms; 100–200 mm deep	All forms; 100–140 mm deep
70–30% organic-clay	Loose (0.03 kg/cm <sup>3</sup> )	Wet	None	None

	<b>SB1</b>	<b>SB2</b>	<b>SB6</b>	<b>SB8</b>	<b>SB9</b>	<b>SB5</b>	<b>SB7</b>	<b>SB10</b>	<b>SB11</b>	<b>SB12</b>	<b>SB13</b>	<b>SB3</b>	<b>SB4</b>
<b>PAST Identifier</b>	OO1_VS	OO2_VS	OO3_VS	OO4_VS	OO5_VS	OO6_SS	OO7_SS	OO8_SS	OO9_JS	OO10_JS	OO11_JS	OO12_US	OO13_Ys
<b>Architecture</b>	VS	VS	VS	VS	VS	SS	SS	SS	JS	JS	JS	US	YS
<b>Surface openings</b>	1	1	1	1	1	1	1	1	1	1	1	2	2
<b>Maximum depth</b>	13.2	4.6	6.6	8.4	7.1	9.9	12.1	6.2	8.5	11.7	13.6	4.7	8.3
<b>Total length</b>	191.1	4.6	5.8	8.4	7.1	18.2	13.7	12.1	11.1	16.8	15.9	13.8	13.7
<b>Maximum width</b>	2.653	2.55	1.96	1.44	1.85	1.78	1.95	1.25	1.19	1.38	1.99	1.48	1.48
<b>Minimum width</b>	1.37	1.16	1.3	1.3	1.25	0.896	1.37	0.826	0.824	1.14	0.925	1.03	1.08
<b>Average width</b>	1.76	1.84	1.51	1.36	1.46	1.18	1.62	1.12	1.04	1.25	1.37	1.25	1.32
<b>Maximum height</b>	2.92	3.47	2.03	1.5	1.77	1.83	2.43	1.35	1.67	1.39	2.01	1.8	1.72
<b>Minimum height</b>	0.934	1.03	1.36	1.3	1.27	0.925	1.47	0.949	0.778	1.07	0.928	1.12	1.13
<b>Average height</b>	1.76	2.16	1.59	1.41	1.47	1.19	1.81	1.15	1.16	1.21	1.33	1.38	1.31
<b>Average W/H ratio</b>	1.04	0.911	0.951	0.967	0.992	1	0.91	0.982	0.93	1.04	1.03	0.919	1.02
<b>Maximum circumference</b>	8.2	9.7	6	4.3	5	5.8	7.1	4	4.5	4.9	6.1	4.8	4.4
<b>Minimum circumference</b>	3.4	3.1	3.9	4	3.9	3	4.8	3.2	2.5	3.4	2.7	3.5	3.5
<b>Average circumference</b>	5.15	6.4	4.66	4.11	4.33	3.58	5.49	3.6	3.37	3.85	4.13	4.21	3.92
<b>Maximum slope</b>	90	90	76	90	90	90	65	55	90	75	75	50	90
<b>Minimum slope</b>	40	90	76	50	90	0	65	20	40	15	40	0	10
<b>Average slope</b>	65	90	76	70	90	45	65	37.5	65	45	57.5	25	50
<b>Branching angles</b>	45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50
<b>Complexity</b>	4	3	3	2	3	3	3	2	2	2	2	3	4
<b>Tortuosity</b>	0.735	1	1	1	1	1.36	1.01	1.04	1.41	1.22	1.09	1.53	1.04

	AB6	AB8	AB5	AB7	AB2	AB3	AB4	AB1
<b>PAST Identifier</b>	AG1_SR	AG2_SR	AG3_OS	AG4_US	AG5_US	AG6_HB	AG7_HB	AG8_MW
<b>Architecture</b>	SR	SR	OS	US	US	HB	HB	MW
<b>Surface openings</b>	1	1	3	2	2	1	1	3
<b>Maximum depth</b>	9.1	8.7	6.8	6	13.4	9.4	16.8	14.6
<b>Total length</b>	16.5	2.7	26.7	17.4	44.4	24.4	28.2	11.2
<b>Maximum width</b>	5.64	3.458	3.511	3.837	3.77	6.1	6.07	4.22
<b>Minimum width</b>	2.87	2.13	0.276	2.46	2.22	1.39	2.39	1.99
<b>Average width</b>	4.0	3.1	2.8	2.8	2.73	4.69	4.28	3.02
<b>Maximum height</b>	4.22	3.52	3.485	6.94	3.167	4.68	4.06	3.815
<b>Minimum height</b>	3.43	2.53	2.235	2.81	2.19	1.97	2.39	2.12
<b>Average height</b>	3.7	3.0	2.92	3.9	2.71	3.34	4.28	2.84
<b>Average W/H ratio</b>	1.09	1.01	0.96	0.779	1.02	1.4	1.29	1.09
<b>Maximum circumference</b>	14.6	11.3	14.1	17.2	10.9	15.7	15.8	12
<b>Minimum circumference</b>	10.8	6.5	6.5	8.2	7.6	4.2	7.4	6.9
<b>Average circumference</b>	11.9	9.68	10.1	10.26	8.6	12.8	11.9	9.49
<b>Maximum slope</b>	75	90	65	55	85	65	65	90
<b>Minimum slope</b>	0	60	0	0	30	0	65	0
<b>Average slope</b>	37.5	75	32.5	27.5	57.5	32.5	65	45
<b>Branching angles</b>	NA	NA	90	NA	NA	NA	NA	60
<b>Complexity</b>	3	2	5	3	3	2	4	7
<b>Tortuosity</b>	1.38	1.14	1.96	1.93	2.78	2.84	1.68	0.41