

ANTS COLLECTED DURING THE SCIENTIFIC EXPEDITION GROUP SURVEY BS 638, ARKARoola WILDLIFE SANCTUARY, CAMP 'ARK', SEPTEMBER 2009.

Annette Vincent

Email: ann.vin@bigpond.net.au

INTRODUCTION:

At the time of the survey the Arkaroola Wilderness Sanctuary was in a nine-year drought and needed some scientific data as to what was present and what was unique to the area. This data would give them a scientific argument as to why mining should not be allowed in this Wilderness Sanctuary. This was the first biological survey of the Arkaroola Wilderness Sanctuary by the Scientific Expedition Group, with another scheduled in 2011.

Ants were collected from 139 of the 160 micro-pits put out at the 16 sites over two four-night periods. The sites were chosen for their diversity of vegetation. The 80 micro-pits put out during the Week 1 collected 288 ants (17 were empty), significantly lower in numbers than the 80 micro-pits in Week 2 when 662 ants (6 were empty) were collected. Overall, a total of 19 genera were collected, this includes the macro-pits and opportunistic collecting in the area.

LOCATION:

Camp 'ARK', Arkaroola Wilderness Sanctuary, is in the northern part of the Flinders Ranges, approximately 600 km north of Adelaide, South Australia. The base camp was at the Old Arkaroola Homestead, 4 km south of Arkaroola Village (30° 18.692' S, 139° 20.134' E). The survey was conducted around the Arkaroola Village; north, (along the Ridge-top Track 20 km), south, east and west of the Arkaroola Village.

Arkaroola Wildlife Sanctuary covers 610 square kilometres of Spinifex-covered hillsides and red rocky peaks. The area was proclaimed a reserve in 1968 to protect the integrity of this internationally significant area (Weidenbach 2008). Some of the region's most unique species are found nowhere else in the world, such as the Flinders Ranges Purple-spotted Gudgeon and the Spidery Wattle (SA Government 2010).

ARKARoola LAND SYSTEM:

The region is recognised for its outstanding geological features, many of which are unique to science and of international significance, especially within the Arkaroola Gorge, Mount Gee, Mount Painter and the Armchair areas. The layers of sedimentary rocks that were laid down, crushed and folded into mountains, were then worn down by erosion and pushed up again to form these eroded jagged profiles. Around Mount Painter, volcanic matter has broken through the sediments to form granite mountains rich in minerals. This is one of the areas where the mining companies would like to mine.

HISTORY:

Several tribes of Aboriginal people lived in this area for 1000's of years. The prospectors arrived in the 1860's looking for copper, gold, and uranium, followed by the graziers who found the best feed on the plains, but the water was in the gorges.

Reg Sprigg bought the lease in 1968 and after removing the sheep in 1970, he set about developing the property as a private Wildlife Sanctuary. Arkaroola Village was established and roads were made radiating from it to places of interest. The very scenic ridge-top road, which was made by Exoil NL while prospecting for uranium in 1968, was one of the main areas of this survey (Love 2009).

CLIMATE:

The mean annual rainfall is 249 mm (over 72 years). Arkaroola has more fine days than wet ones. Good rains fell in 1967, 1971, 1972, 1974, and 1989. The last good rains were in 2000. From 2001 to 2009 the average yearly rainfall was 175 mm. (Sprigg 2011).

The temperature in September can vary from 5–25° C with low humidity. It is hot in summer. The mean summer temperature is 33.4° C and winters are mild with a mean temperature of 17.4° C. The mean summer rainfall is 30.9 mm (over 72 yrs). The mean winter rainfall is 14.6 mm.

The mean relative humidity at 9 a.m. is 52% and at 3 p.m. is 35% (over 22 yrs). The mean wind speed at 9 a.m. is 9.6 km/h and at 3 p.m. is 13.5 km/h (BOM 2009).

METHOD:

Macro-pitfalls, Micro-pitfalls and Opportunistic collecting:

Sixteen sites were surveyed. (For the methods used for setting up the macro-pits and micro-pits see Vincent 2010b.) The ARK 009–016 micro-pits set up during **Week 1**, were left out over 4 nights, from 21–24 September. During **Week 2**, ARK 001–008 micro-pits, were left out from 26–29 September.

The opportunistic collecting was done on opposite weeks to the micro-pit collecting (Alonso 2000). The ants were identified, counted into genera at the South Australian Museum and checked by John Weyland, using Shattuck 1999 as a reference.

RESULTS:

Ant numbers and genera:

The *total number of ants collected* during **Week 1** at sites ARK 009–016, from **micro-pits** was 288, ranging from 8–66 per site. During **Week 2**, sites ARK 001–008, had a total of 662, ranging from 37–226 per site. A total of 950 ants were collected in the micro-pits during the two weeks (**Tables 1 and 2**). Very few ants were collected in the **macro-pits**.

Week 1, the *total number of ants* collected in macro-pits was 34, ranging 0–24 from only 3 sites. These included the larger-sized *Calomyrmex*, *Camponotus*, *Idomyrmex*, *Polyrhachis* and *Rhytidoponera*.

During **Week 2** the total number of specimens in the macro-pits was 187, ranging from 7–44. A total of 221 ants were collected in the macro-pits. Ants collected **opportunistically** are shown in **Tables 3 and 4**.

Table 1: Summary of ant genera collected in **micro-pits** at sites ARK 009–016 during Week 1, from 21–25 September, 2009.

Genera	Site:	9	10	11	12	13	14	15	16	Total	Sites/ Genus
<i>Camponotus</i>				3		1	2	4		10	4
<i>Creumatogaster</i>								10		10	1
<i>Doleromyrma*</i>								1		1	1
<i>Dolichoderus*</i>				2		1		1		4	3
<i>Iridomyrmex</i>	31	14	28	3	21	18	14	22		151	8
<i>Melophorus</i>			8					3	3	14	3
<i>Meranoplus</i>				5	3				3	11	3
<i>Monomorium</i>	1		13				3	3	7	27	5
<i>Pheidole</i>						3		1		4	2
<i>Ponera</i>											
<i>Rhytidoponera</i>	1	8	10			9	7	13	3	51	7
<i>Tapinoma</i>											
<i>Tetramorium</i>			2					3		5	2
No. of ants/site	33	22	66	8	38	30	53	38	288		
No. of Genera/site	3	2	7	2	6	4	10	5	11		

* = Only found during Week 1.

Table 2: Summary of ant genera collected in **micro-pits** at sites ARK 001–008 during Week 2, from 26–30 September, 2009.

Genera	Site:	1	2	3	4	5	6	7	8	Total	Sites/ Genus
<i>Calomyrmex*</i>				2	1					3	2
<i>Camponotus</i>	1	3	18	3	3			2		30	6
<i>Creumatogaster</i>	3			6	199	6		4		218	5
<i>Iridomyrmex</i>	16	59	5	32	2	25	31	41		211	8
<i>Leptogenys*</i>			5							5	1
<i>Melophorus</i>		1		20	3			6		30	4
<i>Meranoplus</i>			10					3		13	2
<i>Monomorium</i>	17		5	27	11	8	7			75	6
<i>Pheidole</i>			2	4				6		12	3
<i>Ponera*</i>							1			1	1
<i>Rhytidoponera</i>	18	3	3	15	8	1	6	4		58	8
<i>Tapinoma*</i>				2						2	1
<i>Tetramorium</i>			1				3			4	2
No. of ants/site	55	84	37	106	226	50	55	49	662		
No. of Genera/site	5	8	6	8	6	7	6	3	13		

* = Only found during Week 2.

Table 3: Summary of ant genera collected **opportunistically** at sites ARK 001–008 during Week 1, from 21–24 September, 2009.

Genera	Site:	1	2	3	4	5	6	7	8	Total	Sites/ Genus
<i>Calomyrmex</i>			5	2				7	4	18	4
<i>Camponotus</i>		1		1		2	1		24	29	5
<i>Crematogaster</i>		5				6			1	12	3
<i>Dolichoderus</i>				2						2	1
<i>Iridomyrmex</i>		1	5	1	8		16	11	13	55	7
<i>Melophorus</i>			3		2					5	2
<i>Meranoplus</i>									9	9	1
<i>Monomorium</i>					1			1		2	2
<i>Odontomachus*</i>			10					2		12	2
<i>Podomyrma</i>				2						2	1
<i>Polyrhachis*</i>								1		1	1
<i>Rhytidoponera</i>		5						1	2	8	3
No. of ants/site		12	23	8	11	8	17	23	53	155	
No. of Genera/site		4	4	5	3	2	2	6	6	12	

* = Collected opportunistically only in Week 1.

Table 4: Summary of ant genera collected **opportunistically** at sites ARK 009–016 during Week 2, from 26–30 September, 2009.

Genera	Site:	9	10	11	12	13	14	15	16	Total	Sites/ Genus
<i>Calomyrmex</i>									7	7	1
<i>Camponotus</i>			1		4		2		16	23	4
<i>Crematogaster</i>			5							5	1
<i>Dolichoderus</i>			12							12	1
<i>Iridomyrmex</i>		81	9	16	3	21	5	19	14	168	8
<i>Melophorus</i>				1				3		4	2
<i>Meranoplus</i>									2	2	1
<i>Monomorium</i>			1				1	1		3	3
<i>Pheidole*</i>					2					2	1
<i>Podomyrma</i>				5						5	1
<i>Polyrhachis</i>											
<i>Rhytidoponera</i>			1		1		4		2	8	4
No. of ants/site		81	29	22	10	21	12	23	41	239	
No. of Genera/site		1	7	5	5	1	4	4	5	13	

* = Collected opportunistically only in Week 2.



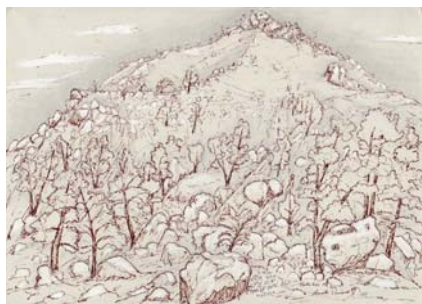
Arkaroola Survey Site ARK 001



Arkaroola Survey Site ARK 002



Arkaroola Survey Site ARK 003



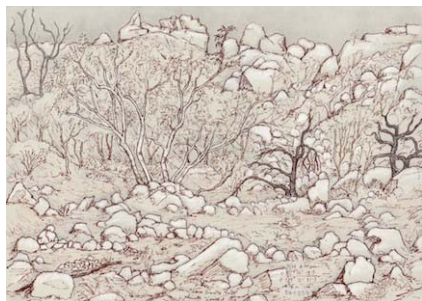
Arkaroola Survey Site ARK 004



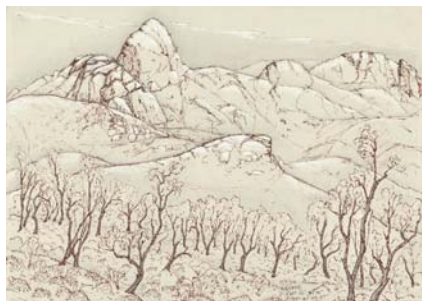
Arkaroola Survey Site ARK 005



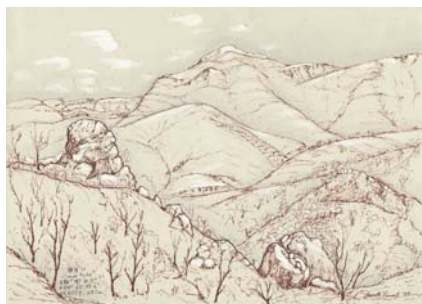
Arkaroola Survey Site ARK 006



Arkaroola Survey Site ARK 007



Arkaroola Survey Site ARK 008



Arkaroola Survey Site ARK 009



Arkaroola Survey Site ARK 0010



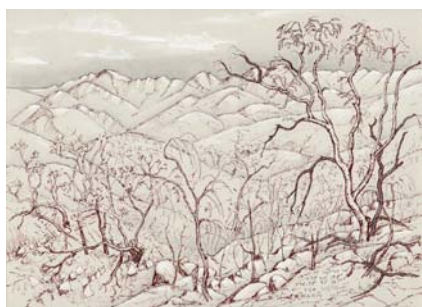
Arkaroola Survey Site ARK 0011



Arkaroola Survey Site ARK 0012



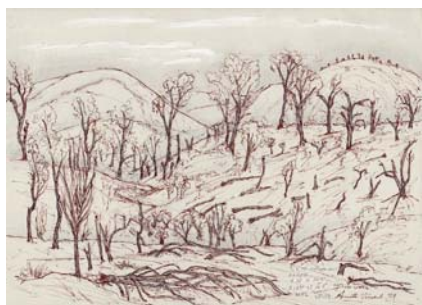
Arkaroola Survey Site ARK 0013



Arkaroola Survey Site ARK 0014



Arkaroola Survey Site ARK 0015



Arkaroola Survey Site ARK 0016

RESULTS: (cont'd.)

Weather:

Week 1 had a dust storm with maximum wind gusts of 69 km/h. The daily maximum temperatures ranged from 22.5–30.7° C, while the average maximum was 25.7° C. The relative humidity ranged from 17–57%.

Week 2 maximum daily temperatures ranged from 19.2–24.0° C, while the average maximum was 20.8° C. The relative humidity ranged from 15–50% (BOM 2009).

Vegetation:

- ARK 001: *Triodia irritans* (Spinifex) grassland on rocky knoll, with *Ptilotus exaltatus* (Mulla Mulla) and *Acacia tetragonophylla* (Dead Finish) with emergent *Eucalyptus intertexta* (Gum-barked Coolibah).
- ARK 002: Sparse shrubland of *Acacia tetragonophylla* and *Senna artemisioides* ssp. (Cassia) over *Ptilotus obovatus* (Silver Mulla Mulla) and *Portulaca oleracea* (Common Purslane).
- ARK 003: Dense shrubland of *Melaleuca glomerata* (Inland Paperbark) over sandy creek bed with emergent *Eucalyptus camaldulensis* var. *obtusa* (Northern River Red Gum) and very sparse understorey with *Cassinia laevis* (Curry Bush).
- ARK 004: *Callitris glaucophylla* (Northern Cypress-pine) woodland over *Acacia tetragonophylla*, *Eremophila alternifolia* (Narrow-leaved Emu Bush) and *Ptilotus obovatus*.
- ARK 005: *Triodia irritans* grassland with emergent *Eucalyptus intertexta*, *Acacia tetragonophylla* and *A. confluens* (Arkaroola Wattle).
- ARK 006: *Acacia confluens* and *Dodonaea viscosa* ssp. *angustissima* (Narrow-leaved Hop-bush) shrubland with emergent *Eucalyptus intertexta*.
- ARK 007: *Eremophila alternifolia*, *E. freelingii* (Rock Emu Bush) and *Acacia confluens* shrubland with emergent *Eucalyptus intertexta*, over *Triodia irritans*.
- ARK 008: Low open woodland of *Eucalyptus intertexta*, over *Eremophila freelingii* and *Senna artemisioides* ssp.
- ARK 009: *Acacia aneura* (Mulga), *A. tetragonophylla* (Dead Finish), *Eremophila freelingii* (Rock Emu Bush) shrubland over Chenopod understorey and a few *Capparis mitchellii* (Native Orange).
- ARK 010: *Xanthorrhoea quadrangulata* (Yakka) grassland with emergent *Callitris glaucophylla* over *Cassinia laevis* (Curry Bush) and *Ptilotus obovatus* (Silver Mulla Mulla).
- ARK 011: *Melaleuca glomerata* (Inland Paper-bark) shrubland with emergent *Callitris glaucophylla* and *Eucalyptus camaldulensis* var. *obtusa* (Northern River Red Gum) and *Triodia irritans* (Spinifex).
- ARK 012: *Eucalyptus gillii* (Curly Mallee) low open woodland, over *Acacia tetragonophylla*, *Eremophila freelingii* and *Senna artemisioides* ssp. (Cassia) with *Exocarpos aphyllus* (Leafless Cherry).
- ARK 013: *Eucalyptus camaldulensis* var. *obtusa*, over *Melaleuca glomerata*, *Senna artemisioides* ssp. and *Enchylaena tomentosa* (Ruby Saltbush).

- ARK 014: *Eucalyptus gillii* and *Acacia araneosa* (Spidery Wattle) over *Triodia irritans* grassland with Chenopod understorey including *Salsola kali* (Buckbush).
- ARK 015: *Eucalyptus gillii* with emergent *Callitris glaucophylla*, over *Eremophila freelingii*, *Triodia irritans* and Chenopod understorey.
- ARK 016: *Acacia rivalis* (Silver Wattle) over sparse Chenopod shrubland with emergent (but senescent) *Acacia aneura* (Mulga), and *Eucalyptus intertexta* (Gum-barked Coolibah).

DISCUSSION:

Ant Abundance:

The very low numbers of ants that were collected during this survey, compared with the two previous SEG expeditions (Vincent 2010a and Vincent 2010b) is probably due to the continuing 9-year drought. The difficulty at Arkaroola was that most of the sites were very rocky and finding cracks or making a hole for the micro-pit was very difficult.

The weather during the two weeks varied greatly. The dry conditions, combined with the higher temperatures, the dust storm and high winds of Week 1, greatly reduced the number of ants during that week. Small ants would have been blown away. The number of the larger-sized ants, collected opportunistically is probably due to the number of people and the length of time spent collecting (**Tables 1, 2, 3, & 4**).

Genera Richness:

The *richness* of genera of Formicidae in this area was 19, this being the total number of genera recorded during the survey. The number of genera present seems to depend on the ability of the site to collect and retain moisture. Sites with more vegetation cover seem to have a more genera as they slow the evaporation rates of any rain or heavy dew.

The number of genera found in the micro-pits during **Week 1** was 11, ranging from 2–10, and Week 2 had 13 genera ranging from 3–8.

Micro-pits:

Iridomyrmex, the aggressive opportunistic ant, was found at every site during both weeks. It dominated 12 of the 16 sites.

Meranoplus dominated at site ARK 012 with 62% and *Iridomyrmex* had 36%. *Camponotus* dominated at ARK 003 with 49% followed by *Iridomyrmex* with 14%.

In 10 micro-pits at ARK 005, a Spinifex-covered slope, *Crematogaster* dominated with 88%. Only 2 specimens of *Iridomyrmex* occurred in one micro-pit at this site.

Rhytidoponera dominated at ARK 001 with 33%, followed closely by *Monomorium* with 30% and *Iridomyrmex* with 29%.

Rhytidoponera occurred at 15 of the 16 sites but not at ARK 012; this site was very dry and rocky with Curly Mallee.

Week 1, *Doleromyrma* and *Dolichoderus* were found only in micro-pits, not in macro-pits nor opportunistically; they are very small in size.

Week 2, *Calomyrmex*, *Leptogenys*, *Ponera* and *Tapinoma* were found only in the micro-pits of this week.

Macro-pits:

At 5 sites no ants were collected during Week 1, but ants were collected at every site during Week 2.

Camponotus was collected at every site during Week 2 but at only 2 sites during Week 1. *Rhytidoponera* was found at 7 of the 8 sites during Week 2 and in 2 sites ARK 011 and ARK 013 during Week 1.

Iridomyrmex at 6 sites Week 2 and at 2 sites Week 1.

Polyrhachis occurred at 3 sites, ARK 007, ARK 011 and ARK 012.

Dolichoderus occurred only at ARK 003 during Week 2.

Opportunistic Collecting:

Even though ants were collected opportunistically during the opposite week to the micro-pit collecting, more ants were collected during the second week. (Had our ability to collect ants improved with time?) Three genera were collected only opportunistically: *Odontomachus* a large specimen found at ARK 002 and ARK 007; *Podomyrma* (usually found on trees) were collected at ARK 003 and ARK 011; and *Myrmecia* (Inch Ants) were found around the BBQ and swimming pool areas of the Arkaroola Village where it was easy to find food and water, but not at any of the SEG sites. *Myrmecia* are rarely caught in micro-pits.

ACKNOWLEDGEMENTS:

Duncan MacKenzie, Scientific Leader of the SEG team; Marg Sprigg, Manager of Arkaroola Wilderness Sanctuary, for her help in organising accommodation and transport to the sites so that I could draw them. John Weyland for his continuing help; Mark Stevens and the Collection Manager Peter Hudson, for the use of the SA Museum ant collection and the Entomology Section's micro-pits. Naila Ahmed for her help in the field and the Scientific Expedition Group team for making the collecting possible.

REFERENCES:

- Alonso, L.E. (2000). Ants as indicators of diversity. In 'Ants: Standard Methods for Measuring and Monitoring Biodiversity'. (Edited by D. Agosti, J.D. Majer, L.E Alonso and T.R. Schultz) pp. 80–88. Biological Diversity Series. Smithsonian Institution Press, Washington, DC.
- BOM (2009). September 2009 Daily Weather Observations, Moomba, South Australia, Australian Government Bureau of Meteorology.
- Love, J. (2009). Handbook for Arkaroola, SEG expedition 2009.
- SA Government (2010). 'Seeking a Balance.'
- Shattuck, S.O. (1999). Australian Ants: Their Biology and Identification. *Monographs on invertebrate taxonomy*, 3. CSIRO Publishing, Melbourne, Australia.
- Sprigg, M. (2011). 'From the Ark', Rain Special 15/03/11.
- Vincent, A. (2010a). Ants collected during the Scientific Expedition Group Survey 587 Gawler Ranges National Park, Camp 'KDO', September 2007. *The South Australian Naturalist* **84**(1): 53–59.
- Vincent, A. (2010b). Ants collected during the Scientific Expedition Group Survey BS 612, Marqualpie Region, Camp 'KE', September 2008. *The South Australian Naturalist* Vol. **84**(2): 85–93.
- Weidenbach, K. (2008). 'Rock Star'. East Street Publications, Hindmarsh, Adelaide, South Australia.