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ANTS COLLECTED DURING THE SCIENTIFIC EXPEDITION GROUP SURVEY 587[1], GAWLER RANGES NATIONAL PARK, CAMP 'KDO', SEPTEMBER 2007.

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INTRODUCTION

Ants were collected from 158 micro-pits (two were not found), put out at 16 sites, over two four-day periods. The sites were chosen for their diversity of vegetation. The micro-pits put out at eight sites during the first week contained significantly greater numbers of ants than those put out during the second week of the survey. A total of 27 ant genera were recorded. The weather during the two weeks varied greatly.

LOCATION

Camp 'KDO', Gawler Ranges National Park is approximately 60 km north of Minnipa, which is on Highway 1 in the mid-north of Eyre Peninsula, South Australia.

Gawler Ranges National Park is approximately 1,660 square kilometres of ancient volcanic hills and valleys of the southern Gawler Ranges, and was established in 2000. It is here where the volcanic rock meets recently formed dunes.

HABITAT

The park spans the transition zone between the agricultural and pastoral regions of northern Eyre Peninsula. The flora and fauna have affinity with communities in eastern Australia and far western Australia. Numerous species within the park are at the extreme edge of their natural distribution, making this area a crossroad for species to the north, south, east, and west. The Gawler Ranges as a whole, separate temperate Eyre Peninsula from the arid South Australian interior. Northern parts of the ranges show affinities with the arid zone but southern parts, especially within the park, show temperate Eyre Peninsula, indicated by the presence of sclerophyllous vegetation and a slight predominance of winter rainfall (Love 2007).

CLIMATE

It is mild-to-hot in summer and cool-to-cold in winter, with a low unreliable rainfall and a high evaporation rate throughout the year. Average annual rainfall in the park ranges from 300 mm in the south to 200 mm in the north, with higher rainfall in the elevated parts of the ranges in the north of the park. This area regularly experiences long dry periods (BOM 2007).

GEOLOGY

The Gawler Ranges National Park protects unique geological features, which are the result of massive volcanic eruption about 1,500 million years ago. These rocks have never been buried but have been exposed to the elements since formation. Thus this landscape is one of the oldest of its type in the world.

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[1] Survey number and camp code allocated by the Department for Environment and Heritage for the Biological Survey of South Australia database records.

ALTITUDE

Peaks range from approximately 60 m above sea level in the southern portion to 460 m on the summit of Nukey Bluff in the extreme north-east of the park. Numerous rounded peaks rise to 200 m and more in the northern two-thirds of the park. Almost 1,500 million years of weathering has exposed spectacular cliffs of columnar rhyolite, referred to as organ pipe formations, along with rock holes, springs and intermittent waterfalls throughout the hills (DEH 2006).

VEGETATION

Within the Gawler Biogeographic Region, Laut *et al.* (1977) recognised the following associations that are included in the park:

Gawler Environmental Association: Steep, rounded, accordant hills and long foot slopes, separated by broad flood plains. There is a mixed cover of low, open woodland with shrub understory, low mixed chenopod shrubland and herbaceous vegetation, (the northern half of the park).

Pine Lodge Environmental Association: A sandy plain with low and numerous irregular dunes. The vegetation cover is of low, open woodland and open mallee scrub with an understory of mixed chenopod shrubs and grasses and is used for extensive stock grazing. This association covers most of the Scrubby Peak area of the park to the north-west of the Minnipa to Yardea road.

Yellabinna Environmental Association: Plains with closely spaced easterly-trending dunes and occasional rock outcrops. The cover is open mallee scrub with chenopod shrubland or grassy understory. Only a very small area of this association has been used for extensive livestock grazing. In the park it occurs on the extreme western boundary.

CAMPSITE LOCALITY

Camp KDO (Lat. 32º 29.69' S, Long. 135º 21.86' E), in the Gawler Ranges National Park, is approximately 60 km north of Minnipa, South Australia. The survey was conducted on the western part of the national park. Sites 1–8 were chosen along a north-western loop of approximately 55 km from base camp and sites 9–16 were in a south-western direction covering approximately 35 km round trip back to base camp.

METHOD

Macro-pitfalls, micro-pitfalls and Elliott traps:

At each site one standard pitline was constructed within the same habitat type. Six macro-pits were placed at 10 m intervals in the ground, flush with the surface. The line was then connected by a 30 cm-high, fly-wire fence. Four Elliott traps were placed in the vicinity of the same habitat type. Ten micro-pits were placed at each site. Six of these small 10 cm deep and 2 cm diameter vials containing 75% ethanol were placed flush with the ground surface and parallel, about 1.5 m to one side of the macro-pit line. Four were placed about 1 m to one side of the Elliott traps. Pink flagging tape was used to mark the position of the micro-pits. These micro-pits were left open for the whole trapping period of four nights (Alonso 2000).

Micro-pits were placed at Sites KDO 001–008 on 17 September and collected on 21 September 2007. The following week, micro-pits were put out at Sites KDO 009–014 on 21 September and Sites KDO 015 and KDO 016 were put out early on 22 September. All micro-pits from Sites KDO 009–016 were collected on 25 September 2007. Sites KDO 009 and KDO 014 had only Elliott traps and two

micro-pits were not found. Site KDO 015 had two micro-pits replaced as something was pulling them out. Micro-pits were inspected each day for evaporation and if needed, the ethanol was topped up (Alonso 2000).

The ants were identified and counted into genera at the South Australian Museum by the author and checked by Rodney Hutchinson and John Weyland, using Shattuck (1999) as a reference.

RESULTS

Ant numbers and genera:

The number of ants collected during each four-day period at Sites 1–8 and 9–16, sorted into their genera, are shown in **Tables 1 and 2**.

Weather: The weather was very different between the two periods of collecting.

Week 1, 17–21 September 2007 had very heavy localised rain and wind. The camp kitchen tent was swamped. The Bureau of Meteorology station at Minnipa had 3.4mm of rain. The daily maximum temperatures ranged from 17.8°–29.5° C, (ave. maximum 23.3° C) with the minimum ranging from 2.3°–12.6° C. We woke to ice on the puddles after the rain, at the base camp site.

Several days had particularly strong winds, varying from a maximum wind gust of 65 km/h on the 18 September to 80 km/h on 19 September (BOM Minnipa September 2007). The relative humidity ranged from 20%–78%.

Week 2, 21–25 September 2007 had no rain and the temperatures were warmer. The maximum daily temperatures ranged from 24.5°–30.3° C with the average being 27.6° C. The winds were milder with the maximum wind gust on 22 September being 67 km/h (BOM Minnipa September 2007). The relative humidity ranged from 11%–70%.

DISCUSSION

Ant abundance:

The *total number of ants collected* during Week 1 was 5,554, while during Week 2 the numbers were greatly reduced, and only 1987 ants were collected, with a total of 7541 ants collected in the micro-pits during the two weeks.

The *number of ants at each site*, during Week 1 ranged from 140 to 2,696, while during the second week it ranged from 86 to 539. (*See* **Tables 1 & 2**.)

Genera richness:

The total number of genera in the Family Formicidae, recorded during the survey was 27. Twenty genera were recorded during Week 1 and 20 during Week 2.

The number of genera found at Sites KDO 001–008, ranged from 7–14, while during the following week, the number ranged from 6–10.

- KDO 001 situated on a sandy plain of mixed mallee and shrubs, had the greatest diversity with 14 genera represented (**Table 1**), the highest number of genera at any one site during this survey.
- KDO 003 and KDO 005 had 11 genera each;
- KDO 002, KDO 007 and KDO 015 had 10 genera;
- KDO 004 and KDO 008 had 9 genera.
- KDO 006, KDO 009, KDO 011, KDO 012, and KDO 013, had 7 genera while the remaining 3 sites, KDO 010, KDO 014, and KDO 016 had only 6 genera present.

Table 1: Number of ants in different genera collected from micro-pits at Sites 1–8.

Genera Site	1	2	3	4	5	6	7	8	Total*	Sites/ Genus
Adlerzia ‡			2						**2**	**1**
Aphaenogaster	5	62		15	7		6		**95**	**5**
Camponotus	1		5	1		3	44	4	**58**	**6**
Cerapachys ‡			3						**3**	**1**
Crematogaster	7	98	8	37	45				**195**	**5**
Doleromyrma									**-**	**-**
Dolichoderus									**-**	**-**
Iridomyrmex	85	391	228	179	835	247	2563	120	**4648**	**8**
Mayriella ‡	1								**1**	**1**
Melophorus	7	5	42	3	6	3	31	23	**120**	**8**
Meranoplus	1	2			3			1	**7**	**4**
Monomorium	4	11	51	5	1		17		**89**	**6**
Myrmecia									**-**	**-**
Oligomyrmex ‡	1								**1**	**1**
Opisthopsis ‡				1					**1**	**1**
Pachycondyla									**-**	**-**
Papyrius	3	1			16			15	**35**	**4**
Paratrechina									**-**	**-**
Pheidole	9	3	39	4	49	41	23	19	**187**	**8**
Plagiolepis									**-**	**-**
Podomyrma ‡					1				**1**	**1**
Polyrhachis									**-**	**-**
Rhytidoponera	4		1			1	1	3	**10**	**5**
Solenopsis ‡	2		1						**3**	**2**
Stigmacros		3					1		**4**	**2**
Tapinoma	10	10		2	20	2	8	13	**65**	**7**
Tetramorium			5		1	20	2	1	**29**	**5**
No. of ants/site	**140**	**586**	**385**	**247**	**984**	**317**	**2696**	**199**	**(5554)**	
No. of genera/site	**14**	**10**	**11**	**9**	**11**	**7**	**10**	**9**		

* = Total no. of ants of each genus collected in micro-pits at Sites 1–8 during Week 1.
‡ = only collected during Week 1.

During Week 1, 7 genera were found that were not found during the second week of the survey. They were: *Adlerzia, Cerapachys, Mayriella, Oligomyrmex*, *Opisthopsis, Podomyrma* and *Solenopsis* (**Table 1**).

During Week 2, 7 genera were found that were not found in the first week. They were: *Doleromyrma, Dolichoderus, Myrmecia, Pachycondyla, Paratrechina, Plagiolepis,* and *Polyrhachis* (**Table 2**).

Table 2: Number of ants in different genera collected from micro-pits at Sites 9–16.

Genera Site	9	10	11	12	13	14	15	16	Total*	Sites/ Genus
Adlerzia									-	-
Aphaenogaster		36							**36**	**1**
Camponotus	2	1	3				2		**8**	**4**
Cerapachys									-	-
Crematogaster	22								**22**	**1**
Doleromyrma ‡	3					2			**5**	**1**
Dolichoderus ‡				1				2	**3**	**2**
Iridomyrmex	370	47	34	16	56	71	220	502	**1316**	**8**
Mayriella									-	-
Melophorus	6	15	19	16	1	4	26	16	**103**	**8**
Meranoplus							1		**1**	**1**
Monomorium	14	76		33	9		4	2	**138**	**6**
Myrmecia ‡			1						**1**	**1**
Oligomyrmex									-	-
Opisthopsis									-	-
Pachycondyla ‡						1			**1**	**1**
Papyrius							3		**3**	**1**
Paratrechina ‡	11					1			**12**	**2**
Pheidole		27	115	8	34	107	4	16	**311**	**7**
Plagiolepis ‡							1		**1**	**1**
Podomyrma									-	-
Polyrhachis ‡							1		**1**	**1**
Rhytidoponera	1				1		2		**4**	**3**
Solenopsis									-	-
Stigmacros				1	1			1	**3**	**3**
Tapinoma			4	11	1				**16**	**3**
Tetramorium			2						**2**	**1**
No. of ants/site	**429**	**202**	**178**	**86**	**103**	**186**	**264**	**539**	**(1987)**	-
No. of genera/site	**8**	**6**	**7**	**7**	**7**	**6**	**10**	**6**		

* = Total no. of ants of each genus collected in micro-pits at Sites 9–16 during Week 2.
‡ = only collected during Week 2

The two most dominant genera which occurred at all 16 sites were *Iridomyrmex* and *Melophorus*, followed by *Pheidole*, which occurred at 15 sites; *Monomorium* at 12 sites; *Camponotus* and *Tapinoma* at 10 sites; *Rhytidoponera* at 8 sites; *Aphaenogaster*, *Crematogaster* and *Tetramorium* at 6 sites; *Meranoplus*, *Papyrius* and *Stigmacros* at 5 sites, while *Dolichoderus*, *Paratrechina* and *Solenopsis* occurred at 2 sites.

Ten genera, *Adlerzia, Cerapachys, Mayriella, Myrmecia, Oligomyrmex, Opisthopsis, Pachycondyla, Plagiolepis, Podomyrma* and *Polyrhachis,* occurred at only one site during the survey. Many of these occurred as only one to three specimens at that site (**Tables 1 & 2**).

Weather conditions may explain the significantly larger numbers of *Iridomyrmex* which were collected during Week 1, 4,648 in total, with 2,563 specimens coming from Site KDO 007 and 1,114 of these from just one micro-pit at this site. This is situated on a sandy level plain with Bluebush and tall mallee. Were they washed out of their colonies by the rain and one micro-pit was in the path of the wash? This highly abundant aggressive genus has a strong competitive influence on the other genera. *Iridomyrmex* is found in open habitats where it can move fast to any available food. Site KDO 005 totalled 835 *Iridomyrmex,* with 350 specimens coming from just one micro-pit. This site consisted of a sandy NW-facing dune with low mallee and *Callitris*. Site KDO 002 totalled 391 *Iridomyrmex*, with 230 specimens coming from one micro-pit; this site was on a sandy tree-covered slope. *Iridomyrmex* outnumbered all other genera collected during Week 1 at each of Sites 1–8.

Looking at the number of specimens in each genus, except for *Iridomyrmex* in Sites 2–8, they are all below 100 per site during Week 1.

Genera from Week 1 with some of the highest numbers are shown below (**Table 1**).

- KDO 001: The genus *Iridomyrmex* was represented by 85 specimens and *Tapinoma* was next with 10. Fourteen genera were present, the highest number for any site.
- KDO 002: *Crematogaster* had 98 specimens and *Aphaenogaster* 62.
- KDO 003: *Monomorium* was second with 51 specimens, followed by *Melophorus* with 42 and *Pheidole* 39.
- KDO 004: *Crematogaster* was second with 37 specimens.
- KDO 005: *Crematogaster* was a close third with 45 specimens, behind *Pheidole* with 49.
- KDO 006: *Pheidole* was second with 41 and *Tetramorium* third with 20 specimens.
- KDO 007: *Camponotus* was second with 44 followed by *Melophorus* with 31 specimens.
- KDO 008: *Melophorus* was second with 23 specimens and *Pheidole* third with 19.

During Week 2*, Iridomyrmex* dominated at only four of the eight sites, KDO 009, KDO 013, KDO 015 and KDO 016, the numbers being 370, 56, 220 and 502 respectively. At Sites KDO 010 and KDO 012, *Monomorium* dominated, while at Sites KDO 011 and KDO 014 *Pheidole* dominated. These generalised Myrmicinae are unspecialised but highly competitive genera.

Sites KDO 009 and KDO 014 had only Elliott traps, i.e. the site was too steep and rocky for the macro-pits.

Genera from Week 2 with some of the highest numbers are shown below (**Table 2**).

- KDO 009: *Iridomyrmex* dominated with 370 specimens; second was *Crematogaster* with 22, followed by *Monomorium* with 14.
- KDO 010: *Monomorium* dominated with 76 specimens, *Iridomyrmex* was second with 47 and *Aphaenogaster* third with 36.
- KDO 011: *Iridomyrmex* was second with 34 specimens, *Pheidole* had the highest number with 115 and *Melophorus* was third with 19.

- KDO 012: *Iridomyrmex* was equal second with *Melophorus* having 16 specimens, *Monomorium* being the highest with 33.
- KDO 013: *Iridomyrmex* had 56 specimens; *Pheidole* with 34 was second, followed by *Monomorium* with 9.
- KDO 014: *Pheidole* again dominated with 107 specimens; *Iridomyrmex* was second with 71 and *Melophorus* third with 4.
- KDO 015: *Iridomyrmex* had 220 specimens; *Melophorus* was second with 26, followed by *Monomorium* and *Pheidole* with 4 each.
- KDO 016: *Iridomyrmex* had 502 specimens; *Melophorus* and *Pheidole* were second with 16 each.

Rhytidoponera, an opportunistic genus, occurred at 8 sites but were low in numbers with a total of 10 in Week 1 and 4 in Week 2. They are large solitary foragers and do not interact very strongly with other ants.

Melophorus, a climate specialist genus, ranged from 3–42 per site during Week 1 with a total of 120 specimens and from 1–26 during Week 2 with a total of 103.

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