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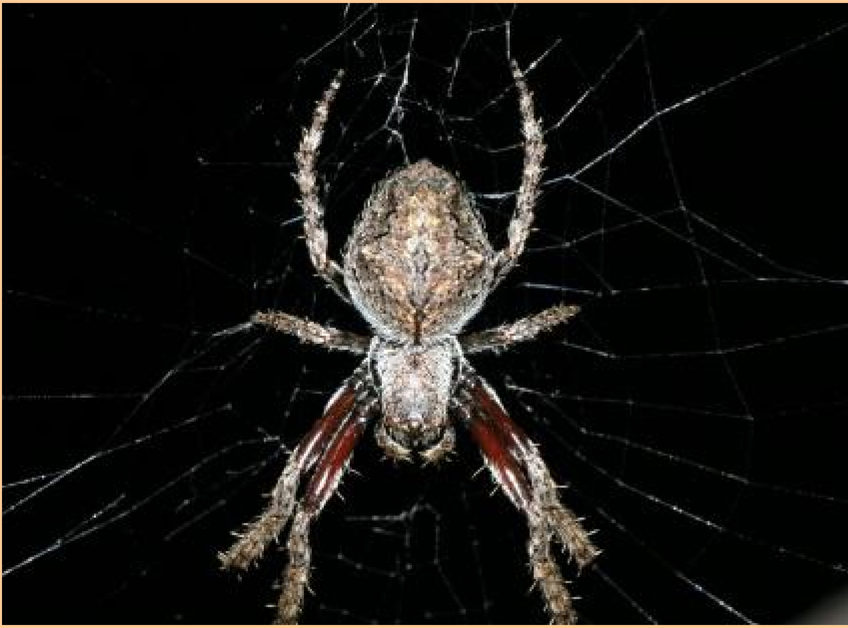

Newsletter of the Australasian Arachnological Society

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We aim to promote interest in the ecology, behaviour and taxonomy of arachnids of the Australasian region.

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ARTICLES

The newsletter depends on your contributions! We encourage articles on a range of topics including current research activities, student projects, upcoming events or behavioural observations.

Please send articles to the editor:

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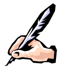
COVER PHOTOGRAPH:
Eriophora pustulosa ♀ (Victoria)
Volker Framenau

EDITORIAL



This issue is a bit late (January instead of December), since the “Invertebrates 2005” meeting in Canberra in December with the Symposium on Australasian Arachnology took up all my attention. It was indeed an exciting meeting, with one of the highlights being the informal dinner for everybody **not** working on animals with 6 legs! Thanks to Barry Richardson for organizing this dinner at his local soccer club! You can find all abstracts of the oral and poster presentations on arachnology from the meeting in this issue. Stay also tuned for a conference report in the next issue of *Australasian Arachnology*. Tracey Churchill took the opportunity of the meeting to reflect on our society’s history (pages 13). Naturally, thanks to all others who contributed articles to this issue. Great to see, that there is student activity in arachnology, with two abstracts of theses dealing with spiders (Gaynor Owens and Matt Bruce). Steve Nunn delivers a great natural history account on an Australian theraphosid, however, I couldn’t fit his whole article into this issue and a second part of his contribution will appear in the next *Australasian Arachnology*.

With the New Year, my research focus changes from my beloved wolf spiders to an equally fascinating group, orb-weaving spiders of the subfamily Araneinae. You can find some background information on the Australian Araneinae in this issue.

All the best for 2006, and keep the contributions rolling in!

Volker

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THESIS ABSTRACTS

Conserving Biodiversity in the Rangelands: Are Land Systems Effective Surrogates for Spider Assemblages?

Gaynor Owen

Honours Thesis, Curtin University of Technology, January 2005

Supervisors: Dr. Karl Brennan' Bruce Ward

Effective conservation planning requires understanding ecological processes as well as the spatial and temporal patterning of biota. Here, environmental surrogates, such as land systems derived for the pastoral industry, may assist in the design of nature reserves. Previous investigations show support for land systems as surrogates for biodiversity in the rangelands. However, few studies examining the effectiveness of land systems as surrogates consider spiders. Here I determine if land systems might act as surrogates for spiders and then examine how plant species, vegetation structure and soil might influence spider assemblages. I determine if plants and spiders are patterned more finely than land systems by testing for differences between landforms higher and lower within one land system. Finally, I determine if higher taxonomic levels (families) are effective surrogates for spider species.

Fig. 1: Gaynor Owen vacuuming spiders from spinifex (*Triodia*) in the Sherwood land system.

Data were collected from Lorna Glen Station in the rangelands of Western Australia. To test if there was an overall difference in spider assemblages between land systems, two different land systems were examined, Sherwood (Fig. 1) and Bullimore (Fig. 2). To assess if spider assemblages differed between landforms, the Bullimore land system was further divided into areas higher and lower in the landscape: Bullimore Dune and Bullimore Flat. To understand the influence of environmental/biotic factors on spider assemblages, vegetation species, vegetation structure and soil properties were measured.

Fig. 2: Bullimore dune habitat.

Significant differences in spider species and family compositions occurred between the Bullimore and Sherwood land systems. Spider assemblages are potentially responding to clear differences in vegetation species, vegetation structure and soil properties. The most important soil property that correlates with spider assemblages was 'texture size'. Plant species *Solanum lasiophyllum* (Solanaceae) and *Dicrastylis brunnea* (Lamiaceae) showed a weaker relationship with spider assemblages, while the vegetation structural category 'bare ground' showed a stronger correlation. Spider species composition differed significantly between the Bullimore Flat and Bullimore Dune landforms, however spider family composition did not. This suggests spiders are less sensitive at the family level than the species level between landforms. Differences in spider species composition between the Bullimore Dune and Bullimore Flat landforms are potentially attributed to the heterogeneity of soil properties, vegetation structure and vegetation species within the Bullimore land system.

Fig. 3: The shuttlecock wolf spider, *Mainosa longipes* (L. Koch), in its burrow.

These results show that environmental surrogates, such as land systems, are not able to accurately represent entire spider species richness and diversity in the rangelands of Western Australia. Moreover, the higher taxonomic approach is not appropriate in achieving a full understanding of the heterogeneity and patchiness of the biota within the landscape. The importance of choosing the appropriate resolution/grain size is discussed. Recommendations for effective biodiversity monitoring within the rangelands of Western Australia are made.

The Function and Phylogeny of Web Decorations in Orb-web Spiders

Matt Bruce

Submitted for the degree of Doctor of Philosophy, Macquarie University, May 2005.

Supervisor: Mariella Herberstein

The aim of my study was to illuminate the function, variability (ontogenetic and phylogenetic), spectral reflectance and phylogeny of the curious silk structures termed web decorations or stabilimenta. These structures have attracted the attention of scientists for more than 100 years. Yet, it has been only in the past 15 years that the various functions proposed for web decorations have been experimentally tested. Furthermore, during this period the variation in these structures, both phylogenetic and ontogenetic has become apparent.

First, I tested the hypothesis that web decorations increase the foraging success of *'Araneus' eburnus* by attracting prey to the web. Using field correlations and field manipulations I showed that decorated webs capture more prey per web area than undecorated webs. However, this is only the case in undisturbed habitats, perhaps due to differences in prey assemblages between undisturbed and disturbed habitats.

Whist the UV-reflective nature of web decorations has long been established, their visibility to prey and predators has never been objectively assessed. I used spectrophotometric analyses to show that the decorations of five tested spider species are visible to honey bees and birds over short and long distances. Furthermore, the discoid decorations of *Argiope mascordi* may provide some protection against arthropod predators as the spiders' abdomen and the decoration silk may be of a similar colour. However, the decorations of *A. mascordi* are inefficient at camouflaging the spider against birds, despite the overlap between the spider's body and decoration.

Spiders in the genus *Argiope* are the most studied in terms of their decorating behaviour. Furthermore, they show the highest known degree of ontogenetic and phylogenetic variation in decoration forms. To date there has been no attempt to reconstruct the phylogenetic relationships within this genus. By tracing web decoration polymorphism onto the first molecular phylogeny of this genus, I revealed that the linear form is likely to be ancestral and that the cruciate form has evolved several times. Moreover, at least one reversion to linear decorating has occurred.

I also investigated ecological factors that may contribute to the variation in web decorating behaviour in *Argiope keyserlingi*. These spiders should reduce their foraging investment (including investment in web decorations) in the presence of predators. However, I found no evidence that these spiders were able to detect the presence of mantid predators. Perhaps spiders require more than one cue to assess the danger from predators.

Furthermore, I examined the relationship between ontogenetic and phylogenetic differences in decoration forms and the frequency of including web decorations. My work highlights the significant ontogenetic variation in decorating behaviour across three species. Consistent differences in linear versus cruciate decorating behaviour in the sympatric *Argiope aetherea* and *A. picta* from convergent lines of evidence suggest that these patterns perform different functions and have different costs and benefits associated with them. These costs and benefits are likely to be habitat specific and will influence both the frequency at which spiders include decorations and which decoration form (eg. linear or cruciate) is the most beneficial.

Overall, my results suggest that future studies should pay more attention to the potential costs and benefits of including web decorations as this approach will illuminate the reasons behind both phylogenetic and ontogenetic web decoration polymorphism and the considerable phylogenetic and ontogenetic variation in web decoration frequency.

Travel into the unknown: the Australian orb-weaving spiders of the subfamily Araneinae

by Volker W. Framenau
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The Australian Biological Resources Studies (ABRS) has granted me financial support from 2005 – 2008 to revise the orb-weaving spiders of the subfamily Araneinae, in collaboration with Nicolaj Scharff from the University of Copenhagen. This study will mainly be conducted at the Western Australian Museum and I encourage all professional and amateur arachnologists to send me araneid spiders to be included in this project! We are in particular interested in the generally less conspicuous, but taxonomically important males!!!

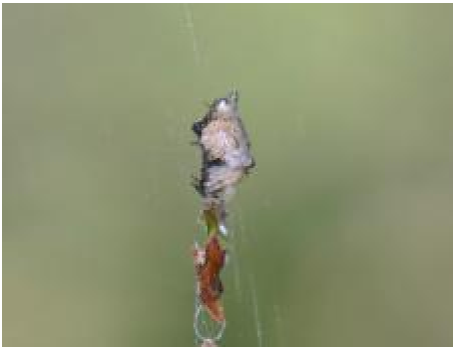

Fig. 1: *Cyclosa* sp. from Christmas Island.

Due to their conspicuous webs, the common orb-weavers of the spider family Araneidae are among the best-known group of spiders, and with some 2,800 species in 163 genera it is one of the largest spider families world-wide (Platnick 2005). More than 900 scientific papers have been published on araneids since the turn of the century and members of this family have been the subject of considerable phylogenetic and evolutionary research (see Scharff and Coddington 1997, and references therein). These studies investigated some classical evolutionary problems, e.g. the evolution of web forms (including the form and function of web stabilimenta), but also address spider mating behaviour (e.g. sperm competition and sexual size dimorphism) and foraging tactics.

The majority of research on orb-weaving spiders has focussed on the subfamily Araneinae, which forms one of two major clades and is the most speciose subfamily within the Araneidae (Scharff and Coddington 1997). Araneinae contain the 'typical' areneids: largely nocturnal, active and fast predators and spinners of conventional orb-webs. During the day, they usually rest in a camouflaged retreat away from the hub. Their morphology is fairly uniform, the clypeus usually low and the legs are spiny. Male and female genitalia are the most complex within the family (Scharff and Coddington 1997, Griswold *et al.* 1998). The subfamily Araneinae is not very well defined, but two characters support their monophyly: the presence of tubercles on the male pedipalpal femora and the presence of a scape on the female epigyne (Scharff and Coddington 1997). Additional synapomorphies of large clades within the Araneinae include the presence of a terminal apophysis in the male pedipalp ('*terminal apophysis clade*') and a hook on the coxae of the first leg in males ('*coxal hook clade*') (Scharff and Coddington 1997, see also Grasshoff 1968, Levi 1983, Davies 1988).

In Australia, recent studies were published on the cryptic ecology of Western Australian *Carepalxis* (Main 1999) and the foraging behaviour of *'Araneus' eburnus* (Bruce *et al*. 2004). In a study on the effects of spider bites, 21.4% of 750 bites were caused by araneids, including the Araneinae (second only to the Sparassidae) (Isbister and Gray 2002).

Taxonomic History of Araneinae in Australia

Despite their omnipresence, diversity and well-studied behaviour, Araneidae belong to one of the taxonomically least-studied spider groups in Australia. The subfamily Araneinae is particularly poorly known, as the single comprehensive revisionary work on Australasian araneids (Levi 1983) deals with three non-araneine genera. Only one fairly recent study deals with Australian Araneine at the species level (Davies, 1980).

In Australia, the subfamily Araneinae is currently represented by 142 species in 13 genera (*Poltys* is currently being revised by Helen Smith, Australian Museum) (species worldwide/in Australia in parentheses; from Platnick 2005):

Anepsion Strand, 1929	(17/2)
Araneus Clerck, 1757	(686/97)
Cyclosa Menge, 1866	(171/6)
Dolophones Walckenaer, 1837	(16/16)
Eriophora Simon, 1864	(20/5)
Heurodes Keyserling, 1886	(3/1)
Larinia Simon, 1874	(46/1)
Lipocrea Thorell, 1878	(5/2)
Neoscona Simon, 1864	(94/1)
Poltys C.L. Koch, 1843	(11/11)
Paraplectanoides Keyserling, 1886	(3/3)
Verrucosa McCook, 1888	(7/1)
Wixia O. P.-Cambridge, 1882	(2/1)

In addition, the following two genera are unplaced as their morphology has not been critically studied since their original description:

Acroaspis Karsch, 1878	(2/2)
Collina Urquhart, 1891	(1/1)

The majority of these species were named by authors working in the late 19th or early 20th century. The descriptions are generally poor and inadequately illustrated, and since only a minority of species has been taxonomically treated since their original description, few can be recognised without recourse to the type specimens. Some faunistic links of the tropical Australian fauna certainly exist to south-east Asia. A considerable number of araneine spiders from Papua New Guinea have been treated in a series of studies by F. Chrysanthus, that may also help to identify Australian species (e.g. Chrysanthus 1960, 1961, 1969, 1971). The majority of Australian Araneinae (97 species; ≈ 67%) is placed in the genus *Araneus,* which is believed not to occur in Australia (Levi 1991). It has long been recognized that the loose generic usage of *Araneus* persisted more on grounds of convenience than a proper evaluation of monophyly and needs radical revision. Numerous species from all over the world listed in *Araneus* bear only distant relationship with the type species *Araneus diadematus* Clerck, 1757 (Court and Forster 1988, Levi 1991).

The most recent key to eight families of Australian orb-weaving spiders (Davies 1988) is more than 15 years old and only allows a generic level identification of some Araneidae, including 11 genera of Araneinae. Most importantly, the key does not provide any further aid in the identification of the 97 Australian species of '*Araneus'*, which were represented by only a single species, '*Araneus' eburnus*. Davies (1988) also recognised the misplacement of the Australian '*Araneus'* as the species within this genus have a paramedian apophysis on the male pedipalp (absent in true *Araneus*; Levi 1991) and a single tibial spine on the pedipalp (two spines in *Araneus*).

Systematics/higher level classification

The phylogenetic analysis of world-wide araneid genera by Scharff and Coddington (1997) provides an up-to-date systematic framework for our study. However, Araneinae itself and clades within araneines lack convincing support. To improve the resolution of the araneine part of the tree, Scharff and Coddington (1997) suggested coding various genital characters in more detail and the addition of further taxa. Due to an expected high level of endemism of Australian Araneinae with many new taxa and potentially new characters, our project will provide an extremely promising extension to Scharff and Coddington's (1997) study in resolving higher-level phylogenetic questions in the Araneidae even on a worldwide scale.

References

Bruce M.J., Heiling A.M. and Herberstein M.E. 2004. Alternative foraging strategies in the orb-web spider '*Araneus' eburnus* (Araneidae, Araneae). *Ann. Zool. Fenn.* **41**: 563-575.

Chrysanthus, F. 1960. Spiders from south New Guinea III. *Nova Guinea Zool.* **3**: 23-42.

Chrysanthus, F. 1961. Die Gattung *Anepsion* Strand 1929 (Arach., Araneae: Araneidae-Araneinae). *Senck. biol.* **42**: 463-477.

Chrysanthus, F. 1969. Additional remarks on the genus *Anepsion* Strand, 1929 (Araneae, Argyopidae). *Zool. Med.* **44**: 33-39.

Chrysanthus, F. 1971. Further notes on the spiders from New Guinea I (Argyopidae). *Zool. Verh*. **113**: 1-52

Court, D.J. and Forster, R.R. 1988. Araneidae-Araneinae. In: *The Spiders of New Zealand. Part VI* (Forster, R.R., Milledge, A.F. and Court, D.J., eds). *Otago Mus. Bull.* **6**: pp. 68-124.

Davies, V.T. 1980. Two large Australian orb-weaving spiders, *Eriophora transmarina* (Keyserling 1865) and *Eriophora biapicata* (L. Koch 1871). *Mem. Qd Mus.* **20**: 125-133.

Davies, V.T. 1988. An illustrated guide to the genera of orb-weaving spiders in Australia. *Mem. Qd Mus.* **25**: 273-332.

Grasshoff, M. 1968. Morphologische Kriterien als Ausdruck von Artgrenzen bei Radnetzspinnen der Subfamilie Araneinae (Arachnida: Araneae: Araneidae). *Abh. Senck. Naturforsch. Ges.* **516**: 1-100.

Griswold, C.E., Coddingtion, J.A., Hormiga, G. and Scharff, N. 1998. Phylogeny of the orb-web building spiders (Araneae, Orbiculariae: Deinopoidea, Araneoidea). *Zool. J. Linn. Soc.* **123**: 1-99.

Isbister, G.K. and Gray, M. R. 2002. A prospective study of 750 definite spider bites, with expert spider identification. *Q. J. Medicine* **95**: 723-731.

Levi, H.W. 1983. The orb-weaver genera *Argiope*, *Gea*, and *Neogea* from the

Western Pacific region (Araneae: Araneide, Argiopinae). *Bull. Mus. Comp. Zool.* **150**: 247-338.

Levi, H.W. 1991. The Neotropical and Mexican species of the orb-weaver genera *Araneus*, *Dubiepeira*, and *Aculepeira* (Araneae: Araneidae). *Bull. Mus. Comp. Zool.* **152**: 167-315.

Main, B.Y. 1999. Note on the biogeography and natural history of the orbweaving spider *Carepalxis* (Araneae, Araneidae), including an gumnut mimic from southwestern Australia. *J. Arachnol.* **27**: 183-188.

Platnick, N.I. 2005. The World Spider Catalogue, Version 5.5. American Museum of Natural History. *http://research.amnh.org/entomology/ spiders/catalog/INTRO1.html.*

Scharff, N. and Coddingtion, J.A. 1997. A phylogenetic analysis of the orb-weaving spider family Araneidae (Arachnida, Araneae). *Zool. J. Linn. Soc.* **120**: 355-434.

A continuing 6-year-study of a long lived semi-arid zone Australian tarantula: 1. Natural history of *Selenotypus sp. "glenelva"* (Araneae, Theraphosidae)

Steven C. Nunn

(For editorial reasons, this article on *Selenotypus sp. "glenelva"* has been split into two. The upcoming issue of *Australasian Arachnology* will feature the second part dealing with the life cycle of this species)

Very little research has been conducted on Australia's Theraphosidae, both from a taxonomic and ecological aspect. With the exception of several reviews (Main 1985, Raven 1985, Smith 1987) and two transfers (Schmidt 1995, 2002), the taxonomic state of Australian theraphosids had not been investigated in detail, until Raven (2005) published the first new description of a theraphosid on Australian soil, *Coremiocnemis tropix* Raven, 2005. This work is indeed significant in that there is a new genus desribed here. In addition, Robert Raven announced an upcoming revision of the Australian Theraphosidae.

Little to nothing is known of the behaviour of Australian theraphosids. Kotzman (1986, 1990) contributed some notable work that covered aspects of the biology of *Selenocosmia stirlingi* (Hogg, 1901) and looked at annual activity patterns. Main (1982) studied arid adaptions of *Selenocosmia stirlingi*, in particular burrow construction and foraging strategies. I have reported on the predation upon *Selenocosmia crassipes* (Koch, 1874) by a *Hemipepsis sp.* wasp (Nunn, 2002).

Very little research has been conducted on life cycles of any of the Theraphosidae. Males of certain New World species mature in 10-11 years and conspecific females in 10-13 years (Baerg, 1963). Baerg & Peck (1970) noted a specimen which probably reached 24 years of age in captivity. While there have been several other works published on life cycles in theraphosids (Célérier, 1992; among the more noteworthy), knowledge in this area is sparse. In this research note the complete life cycle of *Selenotypus sp. "glenelva"* is illustrated, with additional notes on prospective captive breeding to 2nd generation of this species (*Editorial comment: Part 2 on the life cycle of S. sp. "glenelva" will appear in the next issue of* Australasian Arachnology).

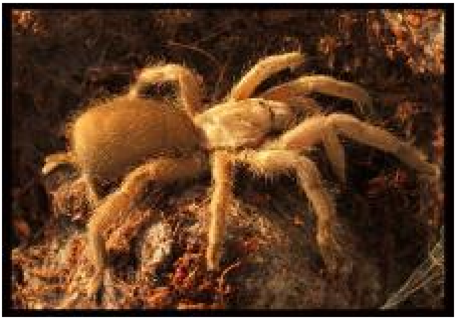

Fig. 1: Female of Selenotypus sp. "glenelva".

Life Cycle and natural history of Australian tarantulas

In Australia, male tarantulas usually mature between May-July each year and can be seen wandering looking for conspecific females from this time on through most of winter, representing the breeding season for our theraphosids (pers. obs.). Females will create an egg sac around September-November and, if successful, 2nd instar spiderlings will emerge around 5-7 weeks later. Depending on the species, between 100-250 eggs per sac are typical. Australian tarantulas inhabit a diversity of habitats. There are several Australian genera and their life cycles vary greatly, with some species maturing in under 1½ years, others in 6 years and over. Both obligate and opportunistic retreat structures are constructed by Australian tarantulas, seemingly depending on geographic conditions. Along the coastal regions in the tropics, wet sclerophyl conditions are typical and in this habitat opportunistic burrows are the retreat of choice. Entrances are usually found under rocks or logs along steep inclines. However, in the semi-arid and arid regions, obligate burrows are constructed, and whilst often found on slopes of hills, they are also common on flat, plain surfaces.

Fig. 2: Typical habitat for *Selenotypus sp. "glenelva"*

Ecological and behavioural observations on Selenotypus sp. "glenelva"

The theraphosid *Selenotypus sp. "glenelva"* is an inland, semi-arid zone spider, living in obligate burrows for most of its life. These burrows can be found on plain flat terrain. They are between 25-40cm deep and are a typical obligate burrow "J" shape. They have an expanded area at the end that the spider usually resides in during the daytime. This chamber also serves as the moulting chamber. At night, the spider will move to the mouth of the burrow with the first two pair of legs stretched out, waiting to sense prey in the immediate vicinity. Sometimes the spider will leave the burrow entirely to find food, although rarely, if ever, straying more then 30cm from the entrance. Food remains have been found often when digging out burrows and are composed of snail shells, beetle and millpede exoskeletons. Less often, small vetebrate remains, such as frog, skink and mouse bones and some hair and skin are found (generic/specific identification of prey items unkown). Burrow plugging behaviour (Minch, 1979) has been observed in both winter and summer, with old exuvia and food remains mixed with dirt and silk utilised in the plug construction.

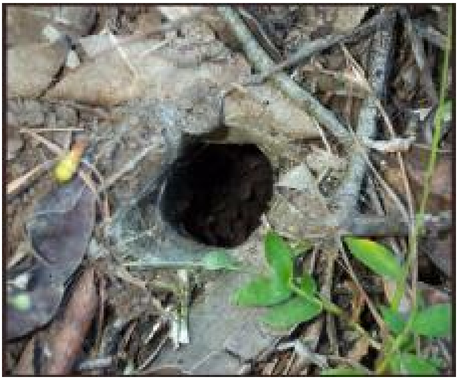

Fig. 3: Burrow entrance of *Selenotypus sp. "glenelva"*

Only 10% of burrows have contained juveniles and these juveniles were generally 1-2 instars from sexual maturity. However, I found the occasional early instar specimen under rocks (although these were very difficult to locate).

(To be continued in the next issue.)

References

Baerg, W.J. 1963. Tarantula life history records. *J. New York Ent. Soc.* **71**: 233-238.

Baerg, W.J., Peck, W.B. 1970. A note on the longevity and moult cycle of two tropical theraphosids. *Bull. Brit. Arachnol. Soc.* **1**: 107-108.

Célérier, M.L. 1992: Fifteen years experience of breeding a theraphosid spider from Ivory Coast. *Scodra griseipes* Pocock, 1897, in captivity. In *Arachnida: Proceedings of a Symposium on Spiders and their Allies* (Cooper, J.E., Pearce-Kelly, P. & Williams, D.L., eds), London, pp. 99-110.

Kotzman M. 1986. Aspects of the Biology of *Selenocosmia stirlingi* Hogg (Araneae: Theraphosidae). Ph.D. Thesis, Monash University, Australia.

Kotzman, M. 1988. Sexual differentiation in juveniles of *Selenocosmia stirlingi* Hogg (Araneae: Theraphosidae) based on cuticular structures. *Aust. Entomol. Soc. Misc. Publ.* **5**, 49-54.

Main, B.Y. 1982. Adaptations to arid habitats by mygalomorph spiders. In: *Evolution of the Flora and Fauna of Arid Australia*. (W.R. Barker & P.J.M. Greenslade, eds). Frewville, South Australia, Peacock Publications in association with Australian Systematic Botany Society and ANZAAS South Australian Division pp 273-283.

Main B.Y. 1985: Mygalomorphae. In: Walton, D. W. (ed.), Zoological Catalogue of Australia, 3. Arachnida: Mygalomorphae, Araneomorphae in part, Pseudoscorpionida, Amblypygi, and Palpigradi. Australian Government Publishing Service, Canberra, pp. 1–48.

Minch, E.W. 1979. Burrow entrance plugging behaviour in the tarantula *Aphonopelma chalcodes* Chamberlin (Araneae: Theraphophosidae). *Bull. Br. Arachnol. Soc.* **4**, 414-420.

Nunn S.C. 2002. Observations on the behaviour of a predatory wasp, *Hemipepsis sp.* (Hymenoptera, Pompilidae), and its prey, *Selenocosmia crassipes* (Araneae, Theraphosidae). *Aust. Arachnol.* **64**: 5-7.

Raven, R.J. 1985. The spider infraorder Mygalomorphae (Araneae): cladistics and systematics. *Bull. Amer. Mus. Nat. Hist.* **182**: 1-180.

Raven R.J. 2005. A new tarantula species from northern Australia (Araneae, Theraphosidae) *Zootaxa* **1004**: 15–28.

Smith, A.M. 1987. The Tarantula: Vlassification and Identification Guide (2nd edition) Fitzgerald Publishing, London, 178 pp.

Schmidt, G.E.W. 1995. Gehören "*Selenocosmia" crassipes* (L. Koch, 1873) und "*Selenocosmia" stirlingi* Hogg, 1901 (Araneida: Theraphosidae: Selenocosmiinae) wirklich zu *Selenocosmia* Ausserer, 1871? *Arachnologisches Magazin,* **3**: 1–12.

Schmidt, G.E.W. 2002. Neues *Phlogius*–Material (Araneae: Theraphosidae: Selenocosmiinae) aus Papua-Neuguinea und Beschreibung des Männchens von *Phlogius papuanus* (Kulczynski, 1908). *Tarantulas of the World* **70**: 3–9

A short history of the Australasian Arachnological Society

by Tracey Churchill

The society was formed in November 1979 by Robert Raven, when he was an enthusiastic technical officer for Dr Valerie Todd-Davies, the then curator of Arachnology at the Queensland Museum, Brisbane. Robert created the society's newsletter "*Australasian Arachnology*" to foster communication amidst colleagues and interested amateurs that were spread across a large geographical area. Dr Raven managed the membership for a number of years and produced 24 issues of *Australasian Arachnology* overall, with various taxa depicting the covers. He is now curator of Arachnology at the Queensland Museum, in Brisbane, and continues to be an avid supporter of the society.

Robert Raven, the founder of the Australasian Arachnological Society photographed at the 16th International Congress of Arachnology in Gent

In 1983, Richard Faulder, of Yanco Agricultural Institute, became administrator to manage the growing membership. Richard also assumed editorial responsibilities producing issues 10-20 of the newsletter whilst Robert

Raven was overseas doing his post-doctoral research. Having returned from overseas in 1985, Robert Raven took up the editorial reigns again with issue 21, although Richard continued to print the newsletter.

In May 1986, the first meeting of Australasian arachnologists was held as a special symposium of the 17th Annual General Meeting of the Australian Entomological Society in Tunanda/South Australia. It was a great success. Twelve papers were presented, and eleven were published in a special proceedings volume in 1988: "Australian Arachnology" edited by Andy Austin and N. Heather. (The Australian Entomological Society Miscellaneous Publication No. 5)

In January 1989, Robert Raven produced his last issue, no. 35, before handing over to Mark Harvey, today Senior Curator of Arachnology at the Western Australian Museum, Perth. Mark soon adopted his trademark cover picture of *Nicodamus peregrinus*, drawn by Graham Milledge. Newsletters continued to be produced by Mark with help from Julianne Waldock, until issue 54.

At the international arachnological meeting in Chicago in 1998, Mark offered Tracey Churchill, then with CSIRO in Darwin, the editorial position. From April 1999 to May 2004, Tracey produced issues 55-69 with cover pictures of a variety of taxa. She also introduced sections to cover student projects to encourage the growing interest in arachnid ecology at university level. Tracey was keen to see a website developed and an informal committee evolved with Volker Framenau and former editors of the society newsletter.

At the international arachnological meeting in South Africa in 2001, former editors gathered to discuss the options for the next Australian meeting.

In June 2004, Volker Framenau, in a post-doctoral position at the Western Australian Museum, took over the editorial reigns from issue 70. Since Volker's research also covered taxonomy and ecology, he could continue broadening the newsletter content. In line with the growing use of online facilities, Volker offered the newsletter as a pdf-version, naturally adopting a lycosid as its first cover page. He was instrumental in getting the society website up and running in August 2005. Through this medium the society hopes to deliver arachnological information to a wider audience and increase the participation in the society. This will also serve to justify more frequent meetings that can bring together the geographically dispersed membership.

Volker was also keen to facilitate a national meeting and teamed up with Mariella Herberstein, Barry Richardson and Mark Harvey to introduce a special symposium, "Australasian Arachnology - Evolution, Ecology and Conservation", at the Combined Australian Entomological Society, Society of Australian Systematic Biologists and Invertebrate Biodiversity and Conservation Conference in December 2005, in Canberra.

"Invertebrates 2005"

Symposium: Australasian Arachnology – Evolution, Ecology and Conservation

Abstracts

This section contains the abstracts of the presentations (oral and poster) of the Symposium on "**Australasian Arachnology – Evolution, Ecology and Conservation**" as part of the "Combined Australian Entomological Society, Society of Australian Systematic Biologists and Invertebrate Biodiversity and Conservation Conference" from the 4th – 9th December in Canberra, Australia. I have also listed all abstracts on arachnology, which were not part of the two official sessions of our symposium on Tuesday and Wednesday.

Abstracts are listed in alphabetical order of the presenting author (bold and underlined).

We will also aim to list these abstracts on the webpage of the Australasian Arachnological Society in early 2006 (check frequently at www.australasian-arachnology.org).

Systematics and Biology of the Australasian Golden Orb-Weaving Spiders

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Members of the genus *Nephila* are ubiquitous in Australasia and well known because of the large females that are found in extensive orb webs constructed partly of bright yellow silk. Here we present the results of a detailed taxonomic and phylogenetic study that demonstrates five species are present in the region, three of which occur on continental Australia. More than 50 junior synonyms exist for these five species, and largely result from the isolated work of European spider taxonomists in the 19th and early 20th centuries. *Nephila pilipes* (F.), the largest species, occurs in the closed forests of eastern and northern Australia, New Guinea and south-east Asia; *N. plumipes* (L.) is found in eastern Australia and islands of the near south-west Pacific; *N. tetragnathoides* (Walckenaer) inhabits Fiji, Tonga and Niue; *N. antipodiana* (Walckenaer) occurs to the north of mainland Australia and into south-east Asia; while *N. edulis* (Labillardière) is found across Australia as well as in New Guinea, New Zealand and New Caledonia. Analysis of 37 allozyme loci shows that *N. pilipes* is very distinct from the other species, displaying "fixed differences" at 80% of loci examined, while *N. plumipes* and *N. tetragnathoides* are the most closely related, being diagnosable at just 15% of these loci. No significant genetic differentiation was found between 10 populations of *N. edulis* sampled across the continent. A number of biological attributes including diurnal activity, extreme sexual dimorphism, wide prey range and large population size, render the members of this genus as favoured

models for ecological and behaviour research on spiders.

The Long-Spinneret Ground Spiders, Prodidomidae Simon, 1884, of Australia – and example

Barbara C. Baehr

Queensland Museum, PO Box 3300, South Brisbane, Q. 4101

In 1990 Norman Platnick redefined the family Prodidomidae including now only those gnaphosoid spiders with greatly elongated piriform gland spigot bases accompanied by highly plumose or scaled setae. The Prodidomidae are an excellent example of the extraordinarily diverse fauna of Australia. Although only ten species were previously known from the region, now the Australian Prodidomidae consist of seven genera and 137 species. The genus *Prodidomus* contains 8 species. Seven species are newly described from Western Australia, the Northern Territory, and Queensland. From the genus *Molycria*, only the widespread species *M. mammosa* (O. P.-Cambridge) and *M. quadricauda* (Simon) were already described, 34 species were newly described. The new genus *Wydundra* is described from 40 new Australian species. *Molycria splendida* Simon is transferred to the new genus *Wesmaldra*, and 13 new species of *Wesmaldra* are described from Western Australia and the Northern Territory. *Molycria flavipes* Simon is transferred to the new genus *Nomindra* and 15 new species of *Nomindra* are described. The male of *Cryptoerithus occultus* Rainbow is described for the first time, and 18 new species are assigned to *Cryptoerithus*. Adult males and females of *Myandra cambridgei* Simon and *M. bicincta* Simon are described for the first time, as are two new species of *Myandra*. The possible relationships of the Prodidomidae are analysed with NONA.

Revision of the *Habronestes* species of Queensland (Araneae: Zodariidae). An example for species richness and variation

Barbara C. Baehr

Queensland Museum, PO Box 3300, South Brisbane, Q. 4101

The yellow spotted Ground Spiders, *Habronestes*, belong to one of the most diverse Ant Spider genera in Australia. Twenty-eight species are already described but about 80 species are still without names. They are small to medium sized spiders (2–12mm) and most species can be easily recognized by their colour pattern and their special kind of male pedipalps. Most yellow spotted Ground Spiders are diurnal and feed predominantly on ants, mimicking their behaviour and sometimes even their chemical traits.
In Australia, the ant fauna is one of the most important components in all ecosystems. This could be the reason for the unique high diversity and the extreme evolutionary success of the yellow spotted Ground Spiders, *Habronestes* in Australia.

Queensland inhabits three quite distinctive *Habronestes* species–groups: the *H. macedonensis*–group with big anterior median eyes, the *H. australiensis*-group with extremely large posterior median eyes, and the *H. pictus*-group with quite small eyes. To date, 9 described and 17 new species are recognized. This revision of the *Habronestes* species of Queensland will reveal the exciting world of ant spiders, describing the species and make them useful:

- for any survey undertaken to understand the Biological Diversity of the Australian terrestrial invertebrate fauna, because most of the ant spider species have a distinct distribution or occur only in distinct habitats;

- as "Indicator Species" in environmental conservation, because they are restricted to certain habitats as well as to certain ant species.

The Australian Zodariids will be therefore an important spider family to support the functioning of the *Enviroment Protection and Biodiversity Conservation Act 1999.*

Effect of burning on densities of Acari (Arachnida) and Collembola (Insecta) in New Zealand indigenous grassland

Barbara I.P. Barratt, P. Tozer, R. Wiedemer, C.M. Ferguson, & P.D. Johnstone

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Indigenous tussock grasslands in New Zealand have a history of extensive pastoralism, and burning has been used as a management tool to remove litter to improve establishment of oversown pasture species, and to promote palatable tussock growth for livestock. In recent years, however, considerable areas of tussock grassland have been formally protected for conservation values. As a result, conservation land managers, as well as farmers require information on the impacts of both managed burns carried out in spring, and accidental fires, which usually occur in drier conditions in summer. This study investigated the impact of spring and summer fires on the predominant soil microarthropods, Collembola and Acari at two sites in Otago, in the South Island of New Zealand. These sites represented higher and lower altitude native grassland sites. Quantitative sampling was carried out before and for up to 26 months after burning on replicated 1ha plots. Collembola and mite abundance in unburned plots covered a similar range at both sites with an average over three years of about 18,000-20,000m^{-2} at each site. At both sites, Mesostigmata and Oribatida (Acari), and Isotomidae (Collembola) were the dominant groups represented. Burning in spring reduced densities of Oribatida after treatment at both sites for the duration of the study. However, after initial post-burn reductions in density, populations of Isotomidae and Poduridea (Collembola) recovered in the second year after burning. Prostigmata (Acari) appeared to be unaffected by fire. Further sampling will be required in order to determine the time required for these microarthopod communities to recover from the effects of disturbance to the environment caused by fire, and to ascertain the extent to which community structure will change in response to changes in vegetation composition that have occurred, and the meso- and macroarthropod communities with which they interact.

A comparative phylogeographic study of two niche differentiated funnel web spider species

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The forest floor provides multiple habitat niches for a diverse range of invertebrate taxa. As part of a broad-scale comparative phylogeography project examining population structure amongst saproxylic (dependent upon decomposing wood) invertebrates, this study compares the phylogeography of funnel web spider species from disparate habitats. The two species of interest share similar ecological characteristics, geographic range and are closely related, however each occupies a distinct habitat niche: *Hadronyche* sp. 1 burrows within decomposing logs, while *Atrax* sp. 1 burrows in soil on the forest floor. The niche partitioning of these species allows this study to separate species and habitat as contributing factors to the survival of resident populations through the glacial-interglacial cycles that characterised the Quaternary (1.8Mybp). Phylogeography was investigated using the mitochondrial gene COI and analysed using distance methods, maximum likelihood and statistical parsimony. *Atrax* sp. 1 displayed high levels of sequence divergence (average = 0.075), and deep phylogeographic structuring of haplotypes while *Hadronyche* sp. 1 showed evidence of a recent colonisation event and a subsequent explosive radiation (average sequence diversity 0.011). These findings suggest differential responses to historical climate change.

Closed habitat occupation compromises foraging profitability in the orb web spider *Argiope keyserlingi*

Blamires, Sean J., Michael B. Thompson & Dieter F. Hochuli

Heydon Laurence Building A08, School of Biological Sciences, University of Sydney, Sydney, New South Wales 2006

Open habitats may be more profitable for foraging, but they are associated with considerable costs, such as increased predation and exposure to climatic extremes. These costs are most intense for stationary, trap-building foragers who need to weigh up the costs and benefits of using open habitats. We measured orb web architecture and prey availability, size and diversity for the spider *Argiope keyserlingi* in closed and open habitats in the field and laboratory to determine if occupancy of closed habitats influences foraging profitability. We used generalized linear modeling to determine the factors acting on web architecture in closed habitats. *Argiope keyserlingi* built webs with smaller capture areas, lower to the ground, and with smaller spiral distances in closed compared to open habitats. The types of decorations added to webs do not differ in open and closed habitats in the field but are more fully cruciform in enclosed areas in the laboratory. Prey abundance is similar in the two habitats, but the prey items in the closed habitat are smaller and dominated by Diptera and

Hymenoptera. Space availability is responsible for the smaller areas and spiral distances of webs in closed habitats. It is less profitable for *A. keyserlingi* to forage in closed habitats and it is likely that they trade off foraging profitability against costs associated with occupying open habitats.

Conserving invertebrate biodiversity in the rangelands: are land systems effective surrogates for spider assemblages?

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Effective conservation planning requires understanding ecological processes as well as the spatial and temporal patterning of biota. Here, environmental surrogates, such as land systems derived for the pastoral industry, can identify and fill gaps in the reserve system. Previous investigations show strong support for land systems as surrogates for biodiversity in the rangelands. However, few studies have considered spiders in testing land systems as surrogates. This research project was specifically aimed at determining if land systems might act as a surrogate for spiders at Lorna Glen Station in the rangelands of Western Australia. We tested the overall difference in spider assemblages between two different land systems; Bullimore and Sherwood. Furthermore, we examined whether spider assemblages were patterned more finely than land systems by testing for differences between landforms that were topographically higher or lower within the Bullimore land system. To understand the influence of environmental/biotic factors on spider assemblages, vegetation species, vegetation structure and soil properties were measured. Significant differences in spider species composition occurred between the Bullimore and Sherwood land systems. Spider species composition also differed significantly between the land forms within the Bullimore. The most important correlates of the spider assemblages were soil texture size and the proportion of bare ground. We conclude that environmental surrogates based on land systems, are not able to accurately represent entire spider assemblages and that a more fine grained approach such as landforms might be needed.

Crab spiders (Araneae: Thomisidae): up close and personal

Cathy Car

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Despite their ecological significance and potential as an indicator group, little is known about the patterns of distribution and abundance of Australian crab spiders (Araneae: Thomisidae). In order to address this lack of knowledge, Thomisidae were chosen as a focal group within several areas of remnant woodlands in the South Western Slopes region of NSW. This study documented the species diversity of thomisids associated with the understorey vegetation of four study sites. In addition, the relationships between thomisid species richness and abundance and the following were investigated: attributes of the vegetation, seasonal influences and abiotic factors. When looked at on a fine taxonomic scale, thomisids showed considerable variation, both temporally and spatially, in their responses to environmental factors. Responses of genera and age groups within genera did not mirror those of the family as a whole. There appeared to be two main groups of thomisid genera: those that matured in spring and were influenced by the flowering of shrubs and those, that matured in summer and were influenced by other factors. Age groups within genera also did not respond in the same way to environmental factors. While thomisids were easily sampled and contained an appropriate diversity of species, they were not readily identifiable to species level. Their responses to environmental variables were complex and unpredictable. One is forced to conclude therefore, that thomisids as a whole are not particularly suitable as indicator taxa.

New species of ant-mimicking spiders (Salticidae: Myrmarachne) from North Queensland

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Myrmarachne (Araneae: Salticidae) is a large genus of ant-mimicking jumping spiders, with over 200 recognised species. *Myrmarachne* occur in most parts of the world, however they are especially widespread in the tropics. In Australia there are relatively few named and described species of *Myrmarachne*. During their development, *Myrmarachne* mimic different ant species from those mimicked by the adult. Most adult *Myrmarachne* species are polymorphic in colour and pattern, as well as being sexually dimorphic. This means that classifying *Myrmarachne* species based on the individuals' appearances can be misleading. This project involves developing appropriate means for differentiating *Myrmarachne* species, and in the process describing and naming the most commonly occurring *Myrmarachne* species from the Townsville area, North Queensland. Information on the ecology and biology, as well as morphological features that can be used to distinguish between species will be presented. This project can be expanded to other areas of Australia once efficient means of distinguishing *Myrmarachne* species have been found.

Legions with eight legs: taxonomy and systematics of the Australian wolf spiders (Araneae, Lycosidae)

Volker W. Framenau

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Wolf spiders represent one of the dominant spider families world-wide, both in diversity and local abundance. They can be found from the seashore to the alpine zone on Mt Kosciuszko. In particular habitats, such as the banks of gravely rivers and streams in the

Australian Alps, they represent 70% of the macro-invertebrate fauna. Consequently, wolf spiders are frequently encountered in pitfall trap based ecological and conservation studies and are used as model organisms in evolutionary research.
I have examined more than 15,000 records (> 40,000 specimens) of wolf spiders from Australian museums over the last three years during a revision of the Lycosidae funded by the Australian Biological Resources Studies (ABRS). Following revision, the Australian fauna is estimated to include 500 species in ca. 25 genera and three subfamilies. Lycosinae (11,989 records) dominate the Australian fauna, followed by a currently unnamed Australasian subfamily (3,482 records) and the Venoniinae (384 records). The lycosine genus *Tasmanicosa* with one fifth of all records, is the most common genus and includes the omnipresent Garden Wolf Spider, *T. godeffroyi* (1,048 records), and Leuckart's Wolf Spider, *T. leuckartii* (818 records). This presentation provides an overview of the Australian wolf spider fauna and introduces important diagnostic features at subfamily, generic and species level. A number of genera are specialised, either in habitat (*Tetralycosa*, on or near salt lakes and seashores), distribution (*Tuberculosa*, tropical), or burrow morphology (*Hoggicosa*, trapdoor lid; *Mainosa*, shuttlecock palisade). Whilst a generic framework has been developed for most Australian species, not all questions could be resolved. Future studies on Australian lycosids should focus on the genera *Venator*, with a large number of arid zone species, and *Artoria*, common along the southeast coast and the southwest.

Arachnids in the conservation arena – two case studies using comparative phylogeographic methods

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Despite the preponderance of invertebrates in all ecosystems, they are only rarely used in detailed phylogeographic studies. To assist efforts to understand the conservation significance of two different regions of Western Australia, we undertook detailed molecular and morphological studies on two separate arachnid clades within Western Australia, spiders of the genus *Moggridgea* (Araneae, Migidae) in the southwest, and schizomids of the genus *Draculoides* (Schizomida, Hubbardiidae) in the Pilbara.

A mtDNA phylogeography of *Moggridgea* showed deep genetic structuring between populations that was partly concordant with lineages defined using morphological characters, and a nuclear gene (rRNA ITS). *Moggridgea tingle* was found to occur from Walpole to

Margaret River. Other populations from isolated montane refuges (Stirling Ranges, Porongurup Ranges and Mt Manypeaks) were represented by distinct and concordant lineages of mtDNA and nuclear genes, consistent with the presence of more than one species amongst these elevated regions. Species of *Draculoides* occur in karst systems on North-West Cape and Barrow Island and are newly recorded from within pisolite-dominated mesas in the Pilbara. A combined morphological and molecular study on all Pilbara populations and a selection of North-West Cape and Barrow Island populations shows significant divergence between the two regions. The recognition of the North-West Cape and Barrow Island species is validated by the molecular study. Considerable molecular divergence between the Pilbara populations is supported by small but consistent differences in key morphological features, suggesting that each mesa is inhabited by separate species of *Draculoides*. The mesas were formed during the Tertiary but are now isolated from each other by terrains that are unsuitable for dispersal of *Draculoides*.

These studies highlight the usefulness of studying arachnids that exhibit all the traits of short-range endemism. Combined molecular and morphological studies provide compelling evidence for deep divergences between elevated landforms in different regions of Western Australia.

Evolution of flower signal exploitation by crab spiders

Astrid M. Heiling[1], Anne E. Wignall, Ken Cheng, Lars Chittka & Marie E. Herberstein[1]

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In plant evolution, flower signals are key innovation that initiated a communication system to the benefit of both signaler (flower) and receiver (insect). Visual, olfactory and tactile flower signals lure pollinating insects to the reproductive organs of the flower, where insects find profitable food sources (nectar and pollen) and in turn provide reproductive service to the plant. Crab spiders intrude this communication system by ambushing pollinating insects, for example bees, on flowers. We aimed to investigate the effect of evolutionary history of crab spiders and their bee prey on bee behaviour.

We experimentally tested the response of crab spiders and bees to flower signals such as flower colour, flower smell and symmetry patterns. Moreover, we investigated the effect of crab spider presence on flowers on bee behaviour. Australian crab spiders (*Thomisus spectabilis* and *Diaea evanida*) and bees that co-evolved with their predators (*Trigona carbonaria*) showed no coinciding flower choice, while European honeybees (*Apis mellifera*) that did not co-evolve with Australian crab spiders preferred flower symmetry patterns and flower smell that also attracted spiders. The presence of crab spider on flowers visually manipulates the appearance of flowers to both co-evolved and not co-evolved bees. Australian crab spiders on flowers manipulated the flower signal in a way that deterred co-evolved bees (*Australoplebia australis*), but attracted European honeybees.

Predation is a key selective force that shapes behavioural adaptations of prey, and our results suggest the evolution of an antipredator-response in bees, which share a phylogenetic history with their predators. In contrast, such antipredatory adaptations are missing in bees that did not co-evolve with Australian crab spiders.

Genital damage and cannibalism in spiders: a review and prospectus

Marie E. Herberstein

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Traditionally, male reproductive success was thought to be limited only by the number of females he can coerce into mating. However, the cannibalistic tendencies in some spiders place an obvious limit to male reproductive potential: in some species, males will only mate once or twice with a single female before he is eaten. Recent work on the morphology of male and female genitalia in a variety of spiders has uncovered an additional limitation to male reproduction: genital damage. Here I will present a short summary of known cases of genital damage in spiders from the literature and my own collaborative work. Sterility as a result of genital damage may have important implications to the evolution and maintenance of sexual cannibalism, as the cost of cannibalism to a sterile male may be very low.

Do dominant spider structure rock outcrop assemblages?

Dieter F. Hochuli, J. K. Webb

Institute of Wildlife Research, School of Biological Science, Heydon-Laurence Building (A08), The University of Sydney, NSW 2006

The invertebrate fauna of rock outcrops on Hawkesbury sandstone are poorly understood despite the threats posed by bush rock collection, listed as a key threatening process in New South Wales. The outcrops are resource poor habitats dominated by predators and opportunists competing for retreat sites whose quality is characterized by their thermal properties. We experimentally removed the dominant flat rock spiders (*Hemicloea major*) from their retreat sites to assess their impact on the assemblages of these habitats. We performed the experiment at 9 sites nested within three independent plateaus in Morton National Park around 160km south of Sydney. Four months after spider removal, rocks were recolonised by a range of fauna including juvenile flat rock spiders and other predators including skinks, geckos, other spiders and centipedes. Numerous potential prey items (primarily cockroaches, *Laxta* sp.) also colonized rocks where spiders were removed. In confirming that competition for high quality retreat sites is intense on rock outcrops, our results also show that high densities of predators in these systems mean that potential regulation of assemblages through top-down processes is tempered by competition from other predators. The importance of competition in these systems highlights the threats caused by human removal of prime habitat and the urgency for action to control the threatening process

Burrowing behaviour and aerial tube construction in *Misgolas robertsi* (Mygalomorphae: Idiopidae)

Sydney Jordan

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The aim of this poster is to describe burrowing behaviour and aerial tube construction in a mygalomorph spider. *Misgolas robertsi* are trapdoor spiders that construct a silken aerial tube above the entrance to their burrows. Specimens of *M. robertsi* were collected from the field and maintained in a laboratory. Burrowing behaviour was recorded and analysed for each specimen using cameras attached to VCRs. A number of specific behaviours and the stages involved in burrow excavation and aerial tube construction will be described in detail. Experiments were also carried out in the laboratory to test whether the aerial tube aided in the capture of flying insects. These results will also be discussed.

Where did my colour go? The systematics and biology of the '*bicolor* group' of Australian wolf spiders (Araneae, Lycosidae)

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In 1973, Rolly McKay coined the term '*bicolor* group' for a group of large Australian wolf spiders with a striking leg and body colouration. The legs have alternate pale and dark colouration with different species displaying different colour combinations of leg segments. In addition, several species have characteristic, contrasting bands on the abdomen. Unusual within wolf spiders, in which males often incorporate a visual component into their courtship display, males of most species within the *bicolor* group lose their distinct colouration when moulting to adults. Therefore, although present in collections, males have not been attributed to matching females, and it is mainly the females that were illustrated for the nine species currently recognised. Our research shows that the species of the *bicolor* group represent a monophyletic group at generic level, not only unified by their distinct colouration, but also male and female genitalic features. *Hoggicosa* Roewer, 1960, with *Lycosa errans* Hogg, 1905 as type species, is the valid name for this Australian genus, although at present all species are misplaced in the northern hemisphere genus *Lycosa*. Three species, including the type of the genus *L. errans*, are considered junior synonyms of *L. castanea* Hogg, 1905. Five new species are described for the first time, resulting in a total of eleven species. These large and colourful lycosids are well distributed through western and southern Australia, found predominately in arid and semi-arid areas. Living in burrows, several species construct a trap door from sand or pebbles.

Molecular phylogenetic reconstruction of the wolf spiders (Araneae: Lycosidae): implications for classification, biogeography and the evolution of web building behaviour

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Wolf spiders are one of the largest spider families, and although the family Lycosidae is generally considered to represent a monophyletic taxon, the internal classification of the group is still uncertain. Several subfamilies and tribes are still in use but most are without clear definitions or have not been demonstrated as clearly monophyletic. The family includes a range of prey-capture strategies ranging from web-building species (generally with long posterior spinnerets) to burrow-dwellers and vagrants. Whilst the web-building groups are generally postulated as being the most basal within the family, this supposition has never been tested within a robust phylogenetic framework. In order to enhance the current understanding of lycosid relationships, phylogenies of 70 lycosid species were reconstructed by parsimony and Bayesian methods using three molecular markers; the mitochondrial genes *12S rRNA*, *NADH1*, and the nuclear gene *28S rRNA*. The resultant trees from the mitochondrial markers were used to assess the current taxonomic status of the Lycosidae and to assess the evolutionary history of sheet-web construction in the group. The results suggest that a number of genera are not monophyletic, and that some subfamily relationships need to be reassessed. In addition, a major clade of strictly Australasian taxa may require the creation of a new subfamily. The analysis of sheet-web building in Lycosidae revealed that the interpretation of this trait as an ancestral state relies on two factors: 1) an asymmetrical model favouring the loss of sheet-webs, and 2) that the suspended silken tube of *Pirata* is directly descended from sheet-web building

Endangered species, science, ethics and communication: the tarantula's publishing dilemma

Robert J. Raven

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Biodiversity is important, both to be recognised and documented. Australian Whistling spiders or Tarantulas (family Theraphosidae), it is believed, are being taken out of the Queensland wild at the rate of 10,000 spiders per year without apparent control. In 2003, NT implemented regulations, which prohibits the import of spiders and encourages captive breeding. In Queensland, 4 species are currently listed as "threatened" but its legislation requires only that commercial sellers and breeders register and pay an annual license fee. Apart from standard permits required for collection in National Parks and other protected areas, no other state has implemented any regulation, on keeping, rearing or selling native spiders. Although only 9 species of the family were described (of which only 5 are presently considered valid) for Australia, based on my revision, the actual number is closer to 40. Contrary to early views, few species are widespread; several are known only from one locality and have not been recollected for 100 years. Many species occur predominantly in areas privately owned for either agriculture or cattle. Because these spiders are so little known, when many new species are described from Australia, a high premium (both nationally and internationally) will be placed upon their “heads”. Collectors will use the co-ordinate data provided in the monograph to locate the spiders and will substantially reduce the populations and probably threaten entire species unless proactive protection orders and strategies are put in place now. That is of course unless a triage solution is found: descriptions may be published without specific localities, species may be lumped (as they are now), or the monograph need not be published…

Distributional Patterns of Jumping spiders (Araneae: Salticidae) in Australia

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A total of 4104 locality records for specimens of 51 genera were stored in BioLink. Maps of observed and predicted (using BIOCLIM) distributions were prepared for each genus. The predicted distributions were combined to provide estimates of the number of genera likely to be found at each locality.

The current distribution of genera is predicted by their bioclimatic profiles rather than by their origins or ecology. Some Oriental genera, however, have not reached southwestern WA, though bioclimatic conditions there are predicted to be suitable for them. Maximum regional diversity is predicted for central eastern Queensland, though diversity at single locations is highest further south in the NSW/Qld border region. The locations of hotspots are therefore scale dependent. The results highlight the shortcomings of past fieldwork in Australia, which has concentrated on the higher rainfall areas. It seems likely that inland Australia will support a large, highly endemic, fauna adapted to the region and ultimately, perhaps forty or more genera could be found in each region. The results show the possibility of using the maps of predicted distribution of genera not only for biogeographic analyses but also for conservation management and survey purposes.

Abundance and distribution of the Tree-Stem Trapdoor Spider, *Aganippe castellum* in the Eastern West Australian wheatbelt

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The Tree-Stem Trapdoor Spider (*Aganippe castellum*, family: Ctenizidae) is currently classified as rare and likely to become extinct. It has a distinct above-ground burrow structure which separates it from other trapdoor spider species with an aerial, webbed tube extending up against the base of a tree or shrub. It also has clusters of bilaterally grouped twig lines, which drape to the ground on its left and right side which direct foraging prey (mainly ants) past the mouth of the nest. The nest of foraging base also supplies a brood chamber of eggs and spiderlings and protection from predators, parasites and the physical environment.

As the species exhibits prodigal dispersal (scattering widely) and settles in isolation some distance from the parents (in open ground), it is at a disadvantage with a regard to foraging (less concentrated prey), reproduction (the males' search for females is longer and more dangerous) and habitat (a viable population requires a relatively large area of habitat).

There are currently twelve populations of *A. castellum* in the east West Australian wheatbelt. From preliminary site surveys the abundances of these populations are found to range from 6 individuals (or active burrows) to over 190 individuals. During this project the four largest population sites will be surveyed to determine the total number of burrows. The results will be mapped to update the current abundance and distribution record of *A. castellum*. This poster will also describe the population dynamics and burrow characteristics/structures of *A. castellum*.

Chromosomal phylogeography of *Delena cancerides*

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The Australian social huntsman spider, *Delenca cancerides*, encompasses a numer of chromosomally distinct races. These include an ancestral population wit an entirely telocentric genome, a metacentric bivalent-forming population saturated from Robertsonian fusions, and a number of raches with monobrachial homology, which leads to the formation of sex-linked, alternately segregating chains at male meiosis.

Spiders from throughout southeastern Australia were examined, and eight new karyomorphs identified, possibly representing as many as eleven new races. These occupy clearly delineated geographic ranges within a continuous distribution. Three of the new forms have single sex-linked meiotic chains, similar to those previously reported, and five carry pairs of chains. Stable systems involving more than one chain of chromosomes have not previously been observed in any organism.

A very different sort of chromosomal diversity has also been found in the Victorian high country. Within a very small area, four different forms have been identified that have rings of chromosomes, as well as tow types with pairs of rings. These populations all have a diversity of ring types present, intermixed with metacentric bivalent forming individuals. This means *Delena* undoubtedly has the most structurally diverse karyotype known.

An overview of the taxonomy, biology and behaviour of the genus *Poltys* in Australia (Araneae: Araneidae)

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Poltys is an interesting orb-weaving genus, which is distributed from Africa westwards to Japan and southwards through mainland Australia. Despite this wide distribution the genus is poorly known. Some Australian species of *Poltys* have evolved an unusually large range of abdomen variation in shape and colouration in the females. This has led to taxonomic confusion when combined with micro males, which are hard to match to females, and were rarely collected before the present study. *Poltys* are nocturnally active, building finely meshed orb webs at night and reingesting them around dawn. By day they hide on dead twigs, often in exposed positions. In some areas successful exploitation of this microhabitat makes them one of the most common spiders. This is unusual for very cryptic animals in open situations, which are often well dispersed. The key to this success may be their variability combined with some behavioural traits.

This overview will provide a brief summary of the taxonomy of the Australian species. The range of variation will be illustrated along with the camouflage this can confer when on the correct substrate. Behavioural observations and other background information will help to fill in some gaps in our knowledge of these nocturnal and cryptic araneids.

Evidence of a latitudinal gradient in spider diversity in Australian cotton

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If a latitudinal gradient in species diversity is largely governed by spatial heterogeneity, then the diversity of a community in a monoculture should be identical, irrespective of where it occurs. Spiders are the dominant community in Australian cotton, which is grown along a latitudinal gradient. We tested to see if spider diversity in cotton changed with latitude, and if the spider community in cotton in different parts of Australia was structurally identical. We sampled seven sites extending over 20^{o} of latitude. At each site we sampled 1-3 fields 3-5 times during the cotton-growing season using pitfall traps and beatsheets, recording all the spiders collected to family. We found that spider communities in cotton are diverse, making them suitable for a conservation biological control program. We also found that spider diversity increased from high to low latitudes, and the communities were different, even though the spiders were in the same monocultural habitat. Spider beatsheet communities around Australia were dominated by different families, and responded differently to seasonal changes, indicating that different pest groups would be targeted at different locations. These results show that diversity can increase from high to low latitudes, even if spatial heterogeneity is held constant, and that other factors external to the cotton crop are influencing spider species composition. Other models, which may account for the latitudinal gradient observed in this study, are discussed.

Systematics of the web-building wolf spider genus *Venonia* (Araneae, Lycosidae)

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The enigmatic, Oriental wolf spider genus *Venonia* (type species *V. coruscans* Thorell, 1894) belongs to one of the few true web-building genera within the Lycosidae. Their small sheet-webs with funnel-like retreats are generally found in the ground layer of vegetation, e.g. on lawns and meadows, but also in depressions of the soil and under roots of trees. Web-building has generally been considered ancestral within wolf spiders, supported by morphological evidence such as the presence of three tarsal claws, however this notion remains contentious. Members of the genus *Venonia* are easily identified within the Lycosidae due to a unique combination of somatic and genitalic characters. Most conspicuous is a posterodorsal white spot on the abdomen just above the spinnerets on an otherwise uniformly dark, small spider. The cymbium of the male pedipalp is truncated anterolaterally and the tegular apophysis is membranous. The female epigyne has a central depression. Our revision recognises nineteen species, which nearly doubles the number of currently known species. *Venonia gabrielae* Barrion and Litsinger, 1995 from the Philippines is considered a junior synonym of *V. micans* (Simon,

1898) and *V. spirocysta* (Chai, 1991) from China does not conform to the generic diagnosis of *Venonia*. *Venonia* has a tropical distribution (Australia, Borneo, China, Malaysia, New Guinea, Philippines, Singapore), with the exception of *V. micarioides*, that occurs along the east coast of Australia into the temperate climate of Victoria and it is also present in southern Western Australia. Somatic morphology does not show great interspecific variability and our cladistic analysis with *Anomalosa kochi* (Simon, 1898) as outgroup concentrates mainly on male and female genitalia. This analysis results in distinct clades within *Venonia* and allows an interpretation of the biogeographical history of the genus.

Recent Australasian Arachnological Publications

Baehr, B.C. 2005. The generic relationships of the new endemic Australian ant spider genus *Notasteron* (Araneae, Zodariidae). *Journal of Arachnology* **33**, 445-455.

Brennan, K.E.C., Majer, J.D. & **Moir, M.L. 2005.** Refining sampling protocols for inventorying invertebrate biodiversity: influence of drift-fence length and pitfall trap diameter on spiders. *Journal of Arachnology* 33, 681-702.

Bruce, M.J., Heiling, A.M. & **Herberstein, M.E.** 2005. Spider signals: are web decorations visible to birds and bees? *Biology Letters* **1**, 299-302.

Cho, B.-S., Yoo, J.-S., Kim, Y.-J., Jung, J. & **Kim, J.-P.** 2005. Spider fauna of Odaesan (Mt.), Gangwon-do, Korea. *Korean Arachnology* **21**, 33-62.

Clemente, C.J., McMaster, K.A., Fox, L., Meldrum, L. Main, B.Y. & Stewart, T. 2005. Visual acuity of the sheet-web building spider *Badumna insignis* (Araneae, Desidae). *Journal of Arachnology* **33**, 726-734.

Framenau, V.W. 2005. The wolf spider genus *Artoria* Thorell in Australia: new synonymies and generic transfers (Araneae, Lycosidae). *Records of the Western Australian Museum* **22**, 265-292.

Framenau, V.W. 2005. Gender specific differences in activity and home range reflect morphological dimorphism in wolf spiders (Araneae, Lycosidae). *Journal of Arachnology* **33**: 334-346.

Fromhage, L., Elgar, M. A. & **Schneider, J.M.** 2005. Faithful without care: the evolution of monogyny. *Evolution* **59**, 1400–1405.

Gardzinska J., Zabka M. 2005. A revision of the spider genus *Chalcolecta* Simon, 1884 (Araneae: Salticidae. *Annales Zoologici, Warszawa* **55**: 437-448.

Gray, M.R. 2005. A revision of the spider genus *Taurongia* (Araneae, Stiphidoidae) from southeastern Australia. *Journal of Arachnology* **33**, 490-500.

Griffiths, J.W., Paterson, A.M. & **Vink, C.J.** 2005. Molecular insights into the biogeography and species status of New Zealand's endemic *Latrodectus* spider species: *L. katipo* and *L. atritus* (Araneae, Theridiidae). *Journal of Arachnology* **33**, 776-784.

Herberstein, M.E., Barry, K., Turoczy, M.A., Wills, E., Youssef, C. & **Elgar M.A. 2005**. Post-copulation mate guarding in the sexually cannibalistic St Andrew's Cross spider (Araneae, Araneidae). *Ethology, Ecology and Evolution* **17**, 17-26.

Herberstein, M.E., Gaskett, A.C., Schneider, J.M., Vella, N.G.F. & **Elgar M.A. 2005**. Limits to male copulation frequency: sexual cannibalism and sterility in St Andrews Cross spiders (Araneae, Araneidae). *Ethology* **111**, 1050—1061.

Kim, J.-P., Jung, J., Park, Y.-C. & **Yoo, J.-S.** 2005. Check list of Korean Aranea spiders. *Korean Arachnology* **21**, 75-154.

Lee, Y.-B., Yoo, J.-S., Jung, F. & **Kim, J.-P.** 2005. Study on the distribution properties of ground dwelling spiders in Korea according to taxonomic composition. *Korean Arachnology* **21**, 21-32.

Lee, Y.-B., Yoo, J.-S., Jung, J. & **Kim, J.-P.** 2005. Geographic distributional properties of ground dwelling spiders n Korea. *Korean Arachnology* **21** 63-74.

Lehtinen, P.T. 2005. Review of the Oriental wolf spider genus *Passiena* (Lycosidae, Pardosinae). *Journal of Arachnology* **33**, 398-407.

Nelson, X.J., Jackson, R.R., Edwards, G.B. & Barrion, A.T. 2005. Living with the enemy: jumping spiders that mimic weaver ants. *Journal of Arachnology* **33**, 813-819.

Nelson, X.J., Jackson, R.R. & Sune, G. 2005. Use of *Anopheles*-specific prey-capture behavior by the small juveniles of *Evarcha culicivora*, a mosquito-eating jumping spider. *Journal of Arachnology* **33**, 541-548.

Schneider, J.M. & **Elgar, M.A.** 2005. The combined effects of pre- and post-insemination sexual selection on extreme variation in male body size. *Evolutionary Ecology* **19**, 419-433.

Smith, H.M. 2005. A preliminary study of the relationships of taxa included in the tribe Poltyini (Araneae, Araneidae). *Journal of Arachnology* **33**, 468-481.

Tomasiewicz, B. & **Framenau, V.W.** 2005. Larval chaetotaxy in wolf spiders (Araneae, Lycosidae): systematic insights on subfamily level. *Journal of Arachnology* **33**, 415-425.

Volschenk, E.S. 2005. A new technique for examining surface microsculpture of scorpions. *Journal of Arachnology* **33**, 820-825.

Zschokke, S. & Herberstein, M.E. 2005. Laboratory methods for maintaining and studying web-building spiders. *Journal of Arachnology* **33**, 205-213.

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