

# Welcome to ASSAB 2011



As you will glean from the scientific programme, animal behaviour research is thriving in Australasia. We look forward to an exciting conference.

We thank the many volunteers for their help to organise the conference. Conference volunteers are wearing yellow shirts with the ASSAB Logo and will help with questions.

All talks will be held in South Theatre 1  
(adjacent to Car Park 7 off Biology Road)

Poster sessions will be held in the SILC building  
(adjacent to Car Park 9; we will walk there from South Theatre 1)

## **Here a few housekeeping details:**

Refreshments are provided if you have registered. These include:

- Tea/Coffee (served in anchor court)
- Lunch (served in anchor court)
- Wine and cheese for the poster session (served in the SILC Building)

Buses are available to transport delegates from 7:30 AM and 6:45 PM leaving to and from Flinders University to:

- Glenelg (Comfort Inn Haven Marina)
- (we could arrange transport on Tue to Big4 Marion Holiday Park, but have not had requests)

## **Have a wonderful conference!**

Sonia Kleindorfer & Jeremy Robertson  
ASSAB Conference Organisers 2011

### ***With support from:***

*Flinders Research Centre for Climate Adaptation and Animal Behaviour  
Bachelor of Ecotourism, Flinders University  
Bachelor of Science (Animal Behaviour), Flinders University  
Alexandrina Cheese Company, South Australia*

### ***And generous sponsorship from:***

*Banrock Station Wine and Wetland Centre, South Australia*

## ASSAB Monday 11 April

8:30	Welcome
8:40	Dr Jan Hemmi Sensory constraints and behavioural options in predator avoidance
9:20	Professor John Endler Testing hypotheses about sexual selection and species recognition using sensory ecology
10:00 – 10:30	Tea/Coffee and REGISTRATION (pick up name tags after plenary talks)

10:30	<u>Chen, I-Ping</u> , Symonds, M.R.E., Hugall, A.F., Melville, J. and Stuart-Fox, D. Colour pattern evolution in Australian dragon lizards (Agamidae)
10:40	<u>Ben Knott</u> , Wayne L. Davies, Livia S. Carvalho, Mathew Berg, James K. Bowmaker, Andrew T.D. Bennett and David M. Hunt Opsins and oil droplets in a parrot showing intraspecific plumage colour variation
10:50	<u>Chloé A. Raderschall</u> and Jan M. Hemmi Habituation in Fiddler crabs: Stimulus identification under natural conditions
11:00	<u>Vlahos, Lisa</u> , Hemmi J.M. and Valter, K. Behavioural and anatomical evidence for colour vision in the Common Brushtail Possum ( <i>Trichosurus vulpecula</i> ).
11:10	<u>Daniel B. Zurek</u> , Ximena J. Nelson and David C. O'Carroll Mapping of optics on the behaviour of jumping spiders
11:20	<u>Eirik Sjøvik</u> and Andrew B. Barron The mechanisms behind drug reward, studied in honey bees
11:30	<u>Anne Gaskett</u> Orchid colours and deceptive pollination
11:40	<u>Patrick Schultheiss</u> and Ken Cheng Search strategies of Australian desert ants
11:50	<u>Judith Reinhard</u> , Amanda Robinson, Mandyam Srinivasan and Jason Mattingley Honeybees pay attention: perceptual pop-out and attentional capture experienced by a mini-brain

12-1:30	Lunch
---------	-------

1:30	<u>Madeleine Yewers</u> , Emily McLeod, Michael Magrath and Raoul Mulder Personality differences related to alternative social roles in the cooperatively breeding superb fairy-wren
1:40	<u>Diane Colombelli-Négrel</u> , Mark Hauber, Jeremy Robertson, Frank J. Sulloway, Herbert Hoi, Matteo Griggio and Sonia Kleindorfer Vocal cues reveal intruder nestlings: Evidence for an acoustical host-parasite arms race that starts inside the egg
1:50	<u>Abbie E. Mason</u> and Joseph R. Waas Can Aussies and Kiwis understand each other? The response of little blue penguins to geographic variation in male calls.
2:00	Paul G. McDonald Cooperative birds can differentiate between the alarm calls of both familiar and novel individuals: a mechanism for shaping cooperative propensity in societies?
2:10	<u>Anne E Wignall</u> Male or meal?: the function of 'shuddering' by male spiders
2:20	<u>Karen L. Cheney</u> , Alexandra S. Grutter, Simon P. Blomberg and Justin Marshall Visual signalling in coral reef fishes: the cleaner fish 'uniform'
2:30	<u>André Walter</u> and Mark A. Elgar The evolution of silken web decorations in orb web spiders
2:40	<u>Raoul Ribot</u> , Mathew Berg, Katherine Buchanan, John Endler and Andy Bennett Vocal variation corresponds with genetic population structure in a parrot
2:50	Dominique A. Potvin and Raoul A. Mulder The evolution of song dialects in an Australian bird species: a preliminary analysis

3:00 – 3:30	Tea/Coffee
3:30	<u>Piyankarie Jayatilaka</u> , Sarah Gourmaud, Ajay Narendra and Jochen Zeil What does a homing ant look at? Gaze direction and view reconstruction in jack jumper ants
3:40	<u>Marianne Peso</u> and Andrew B. Barron Honey bee social pheromones effect worker biogenic amines and ovary development
3:50	<u>A.Wystrach</u> , G. Beugnon and K. Cheng Visual navigation in ants.
4:00	<u>Taylor, G. J.</u> , Luu, T., Ball, D. and Srinivasan, M. V. Keeping up the pace: Honeybee flight speed regulation in a tethered flight arena.
4:10	<u>Richard Peters</u> and Simon Allen Movement signal choreography unaffected by receiver distance in the Australian Jacky lizard, <i>Amphibolurus muricatus</i>
4:20	<u>Eliza Middleton</u> , Ajay Narendra and Jochen Zeil Tandem recruitment and navigational information in the Australian sugar ant <i>Camponotus consobrinus</i>
4:30	<u>Coleman, R.A</u> and Williams, E.M.R. Not all resting sites are equal: The role of previous occupancy in determining limpet resting sites
4:40	Matthew Bulbert Motion-oriented signallers: signalling with toes, tails, tongues and now tibia
4:50	<u>Huveneers C</u> , Bruce B, Rogers PJ, Beckmann C and Semmens J The influence of the cage-diving industry on the 3D-swimming behaviour of white sharks
5:00	Wine and Poster Session in SILC Building

## ASSAB Tuesday 12 April

8:30	Welcome
8:40	Dr Luciana Möller The secret social life of dolphins: alliances, friendships and kinship ties
9:20	Dr Peggy Rismiller and Mike McKelvey Labour of Life: Behaviour of wild echidnas versus research(er) longevity
10:00 -10:30	Tea/Coffee

10:30	<u>Barry, Manuela</u> and Brunton, Dianne H Duvaucel's geckos – lizards with complex sociality?
10:40	<u>Sarah Withers</u> , Mark E. Hauber and Stuart Parsons A test of the habitat saturation hypothesis: Using translocation to investigate the effects of density and nest site availability on cooperation
10:50	<u>Stephan T. Leu</u> , Peter M. Kappeler and C. Michael Bull The influence of refuge sharing on social behaviour in the lizard <i>Tiliqua rugosa</i>
11:00	<u>Taneal Cope</u> , Raoul Mulder, Steve Donnellan and Peter Dunn The mating system of the incubator bird (Malleefowl: <i>Leipoa ocellata</i> )
11:10	<u>Katharina J. Peters</u> , Guido J. Parra and Luciana M. Möller Effects of swim-with dolphin tourism on the behaviour and group structure of bottlenose dolphins in South Australia
11:20	<u>Isobel Booksmythe</u> , Catherine Hayes, Michael Jennions and Patricia Backwell Fiddler crabs adjust helping behaviour depending on neighbour familiarity
11:30	<u>Murray Fea</u> , Gregory Holwell and Margaret Stanley Distribution Modelling and Kin Recognition in <i>Miomantis caffra</i>
11:40	<u>Wohlfeil, C.K.</u> , Godfrey, S.S., Bradley, J., Gardner, M. G. and Bull, C.M. Social networks and the transmission of ticks through a sleepy lizard population
11:50	<u>Guido J. Parra</u> , Peter J. Corkeron, Peter Arnold Grouping and fission-fusion dynamics in Australian snubfin and Indo-Pacific humpback dolphins

12-1:30	Lunch
---------	-------

1:30	<u>Ruchira Somaweera</u> and Richard Shine Parental care behaviour of freshwater crocodiles in tropical Australia
1:40	<u>Julie Riordan</u> and Greg Johnston Cooperation or conflict? The presence of “marginal” chicks increases nestling conflict in the black-faced cormorant
1:50	<u>Wendy J. King</u> <sup>1</sup> and Marco Festa-Bianchet <sup>2</sup> Adoption of pouch young in eastern grey kangaroos
2:00	<u>Edward Minot</u> , Richard Seaton and John Holland Should I come or should I go -- nest sites for New Zealand Falcons
2:10	<u>Muhammad Tahir</u> , Abida Butt, Shafaat Yar Khan, Kawaja Raees Ahmad and Sadia Nawaz Effects of Acetochlor (Herbicide) on the survival and avoidance behaviour of spiders
2:20	<u>Amanda Franklin</u> , Zoe Squires and Dr. Devi Stuart-Fox Energetic, predation and lifetime costs incurred during mating in dumpling squid, <i>Euprymna tasmanica</i>
2:30	<u>Amy Edwards</u> , A/Prof Anne Goldizen, Emily Best and Dr. Simon Blomberg Nutritional Status, Social Factors and Predation Influence Vigilance Behaviours in Female Eastern Grey Kangaroos, <i>Macropus giganteus</i>
2:40	<u>Mirjam Guesgen</u> , Ngaio Beausoleil, Ed Minot, Mairi Stewart and Kevin Stafford The effects of age and sex on pain sensitivity in newborn lambs
2:50	<u>Miya Warrington</u> , Jonathan Wright, Nichola Raihani, Andrew F. Russell and Simon C. Griffith Life-history strategies in the cooperatively breeding Apostlebird, <i>Struthidea cinerea</i>
3:00 – 3:30	Tea/Coffee

3:30	<u>Marie C. Diquelou</u> and Andrea S. Griffin. Innovation in the Indian mynah and the noisy miner: investigating the underpinning factors.
3:40	Dr Bradley Smith and Dr Carla Litchfield Cognition and behaviour in captive dingoes ( <i>Canis dingo</i> )
3:50	<u>Guez David</u> A different perspective on age related associative and non associative learning performance in honeybees.
4:00	<u>Amanda L. Greer</u> , Raoul Schwing, Gyula K. Gajdon and Ludwig Huber Wild and captive kea ( <i>Nestor notabilis</i> ) behave very differently on an inserting objects task
4:10	<u>Tanya Latty</u> and Madeleine Beekman Brainless behaviour: Irrationality and speed-accuracy trade-offs in a giant amoeba ( <i>Physarum polycephalum</i> )
4:20	<u>Alecia Carter</u> , Harry Marshall, Robert Heinsohn and Guy Cowlshaw Evaluating animal personalities: do subjective assessments and objective experiments of boldness measure the same thing?
4:30	<u>Bradley, J.K.</u> , Godfrey, S.S. and Bull, C.M. Personalities and Behavioural Syndromes in Sleepy Lizards ( <i>Tiliqua rugosa</i> ).
4:40	<u>Emily Best</u> Anne Goldizen Personality and social structure in the eastern grey kangaroo ( <i>Macropus giganteus</i> )
4:50	<u>Kate Thorn</u> A vision for environmental conservation: The case of Banrock Station
5:00	Wine and Poster Session in SILC Building
6:00	AGM Meeting in the SILC Building

## ASSAB Wednesday 13 April

8:30	Welcome
8:40	Professor Leigh Simmons Sexual selection and the evolution of primary sexual traits
9:20	Associate Professor Mariella Herberstein The role of model species in behavioural research
10:00 -10:30	Tea/Coffee

10:30	<u>Noriyoshi Kawasaki</u> , James Bourne, Anne Peters and Bob Wong Heritability of reproductive traits in captive Common Marmosets ( <i>Callithrix jacchus</i> )
10:40	<u>Katja Hogendoorn</u> and <u>Michael A. Keller</u> Mating strategy and sex ratio in the blue-banded bee <i>Amegilla murrayensis</i> , and implications for the evolution of male dimorphism
10:50	<u>Katherine Gill</u> , Mark Elgar, Ellen van Wilgenburg and David Macmillan Investigation of variation in the aggressive behaviour of the green tree ant, <i>Oecophylla smaragdina</i> .
11:00	Holly Caravan, <u>Tom Chapman</u> and Michael Schwarz Stuttering steps to sociality
11:10	<u>Bruno A. Buzatto</u> , Leigh W. Simmons and Joseph L. Tomkins Genetic interactions between parental genomes affect the expression of alternative male phenotypes in the mite <i>Rhizoglyphus echinopus</i>
11:20	<u>Katherine Barry</u> , Gregory Holwell and Marie Herberstein A paternity advantage for speedy males? Sperm precedence patterns and female re-mating frequencies in a sexually cannibalistic praying mantid.
11:30	<u>Louise Allen</u> , Mariella Herberstein, Gregory Holwell and Katherine Barry How the threat of sperm competition affects male mating strategy in praying mantids
11:40	<u>Jody O'Connor</u> , Diane Colombelli-Negrel, Jeremy Robertson and Sonia Kleindorfer Blurred species boundaries in Darwin's tree finches: using song and morphology to interpret gene flow patterns
11:50	<u>Shelley Myers</u> , Thomas Buckley and Greg Holwell Evaluating speciation in the New Zealand stick insect <i>Clitarchus</i>

12-1:30	Lunch
---------	-------

1:30	<u>Valeria Zanollo</u> , Matteo Griggio, Jeremy Robertson and Sonia Kleindorfer Male mate choice for spotty females
1:40	<u>Kate D L Umlers</u> , Gregory I Holwell and Marie E Herberstein Turquoise Tournaments: fierce combat in male chameleon grasshoppers.
1:50	<u>Zoe Squires</u> , Dr. Mark Norman, Dr. Bob Wong and Dr. Devi Stuart-Fox What benefits do female Dumpling Squid gain from multiple matings?
2:00	<u>Christina J. Painting</u> , Thomas R. Buckley, Robert J. B. Hoare and Gregory I. Holwell Fear no weevil! Mating tactics in the New Zealand giraffe weevil
2:10	<u>J.L. Woodgate</u> , S. Leitner, M.L. Berg, C.K. Catchpole, A.T.D. Bennett & K.L. Buchanan Does developmental stress affect female mate choice preferences?
2:20	<u>Mathew Berg</u> , Raoul Ribot, Justin Eastwood, Leo Joseph, Katherine Buchanan and Andrew T. D. Bennett Assortative mating and population divergence in the circular overlapping crimson rosella ( <i>Platycercus elegans</i> ) complex
2:30	<u>Rebecca Bennik</u> Battle of the sexes: Sexual conflict in the lichen tuft moths.
2:40	Dr Carla Litchfield, <u>Jillian Ryan</u> and Nicola Brewer Behaviour and enclosure use of two Giant Pandas ( <i>Ailuropoda Melanoleuca</i> ) at the Adelaide Zoo
2:50	<u>Brown, Jennifer Sue</u> ; Telbisz, Regina M; Toukhsati and Samia R When A Shelter Becomes A Home: The Ethical Considerations Surrounding Environmental

	Enrichment.
3:00 – 3:30	Tea/Coffee
3:30	<u>Stephanie Godfrey</u> , Caroline Wohlfeil, Pradip Gyawali and Michael Bull Networks and parasite transmission in the sleepy lizard, <i>Tiliqua rugosa</i> : the importance of host and parasite behaviour.
3:40	<u>Justin Eastwood</u> , Mathew Berg, Raoul Ribot, Brianna Spolding, Ken Walder and Andy Bennett. Beak and feather disease virus in crimson rosellas: transmission, nestling growth and survival.
3:50	<u>Nicole Lowrey</u> Extended phenotypes in animal communication: the function of petal-displays in fairy wrens
4:00	<u>Aaron Harmer</u> and Josh Madin Trade-offs between silk and web investment in orb-web spiders
4:10	<u>S. Schwarz</u> , A. Wystrach, L. Albert and K. Cheng Ocelli functions in the desert ant <i>Melophorus bagoti</i>
4:20	<u>Naïla Even</u> and Andrew Barron Stressed-out honey bees: exploring the physiology of stress in a social system.
4:30	<u>Clare Crowhurst</u> , Valeria Zanollo, Jeremy Robertson and Sonia Kleindorfer White flank spots signal feeding dominance in Diamond Firetail females
4:40	<u>Coraline Chapperton</u> <sup>1</sup> and Laurent Seuront <sup>1,2,3</sup> Cooling down in the heat: the importance of thermoregulatory behaviours in intertidal ectotherms.
4:50	<u>Aaron L. Fenner</u> , Stephanie S. Godfrey and C. Michael Bull Social structure and parasite infection patterns in a network of endangered lizards, <i>Tiliqua adelaidensis</i>
5:00	Conclusion and Prizes
6:00	Bus leaves for Dinner
7:00	Conference Dinner at the Stamford Grand Hotel in Glenelg (registration required)

## Post-conference Field Trips

### Kangaroo Island

Organised by Groovy Grape

Kristy Cutts

Marketing Coordinator

T: +61 8 8440 1645

Email: [marketing@groovygrape.com.au](mailto:marketing@groovygrape.com.au)

### Yookamurra Wildlife Sanctuary

Organised by Sonia and Jeremy (conference organisers)

Wildlife Educator and Field Ecologist

Australian Wildlife Conservancy

Yookamurra Sanctuary

Tel (08) 8562 5011

[www.australianwildlife.org](http://www.australianwildlife.org)

- Bus departs Glenelg (Comfort Inn Haven Marina) at noon on 14 April
- Bus returns to Adelaide by 3 pm on 15 April
- Please bring: sleeping bag, torch, wine or preferred beverages
- BBQ and breakfast provided

## ASSAB Posters

Kieren Beaumont, Duncan Mackay and Molly Whalen

Effects of fire and elaiosome condition on seed dispersal by ants of a myrmecochorous plant, *Pultenaea daphnoides*.

Natalie Bland, Nikolai Liebsch, Sara Taremi Horoufi and Mandyam Srinivasan

Do honeybees actively avoid mid-air collisions?

Dominic Cross (PhD Student – USyd, CSIRO), Dr Sarah Mansfield (USyd), Dr Mary Whitehouse (CSIRO), and Dr Sharon Downes (CSIRO)

Better management of cotton refuges within the best management practices framework.

Simone Dalgairns, Don Driscoll and Sonia Kleindorfer

Local habitat use after fire events in Blue-breasted fairy wrens

Scott Fabricant, Mariella Herberstein and Darrell Kemp

Mechanisms and Functions of Colour in the Hibiscus Harlequin Bug

William Feeney, Mark McCormick and Richard Rowe

Predatory ecology between the colour morphs of a common piscivore on juvenile coral reef fishes

Raelene Giffney, Darrell Kemp and Marie Herberstein

The evolution of sexual dimorphism in the hibiscus harlequin bug *Tectocoris diophthalmus*

Lisa Hodgkin, Matthew Symonds and Mark Elgar

Collective decision-making in gregarious *Perga* sawfly larvae

Shao-chang Huang and Judith Reinhard

Love enters through the eyes: Sexual selection via female colour polymorphism in the damselfly *Ischnura heterosticta* (Insecta: Odonata)

Eunice Jingmei Tan and Daiqin Li

Decorating for food or camouflage?

Nikolai Liebsch, Eliza Middleton and Mandyam Srinivasan

Angry honeybees: Does target size, shape or colour matter?

Brendon Meulders, Don Driscoll, Jeremy Robertson and Sonia Kleindorfer

Do Inland Thornbills disperse after fire?

Milla Mihailova<sup>1,2</sup>, Sonia Kleindorfer<sup>1</sup>, Diane Colombelli-Négrel<sup>1</sup>, Herbert Hoi<sup>3</sup>, Matteo Griggio<sup>3</sup>, Jeremy Robertson<sup>1</sup>

Song discrimination in superb fairy-wren subspecies

Jody O'Connor, Jeremy Robertson & Sonia Kleindorfer

Begging behaviour predicts food provisioning in parasitised Darwin's finch chicks.

Andre Steckenreuter, Robert Harcourt and Luciana Möller

Are Speed Restriction Zones an effective management tool to mitigate the impact of Australia's biggest dolphin-watching industry?

## **Addendum to printed programme**

The following posters are not listed (but the abstracts are in the programme)

Eunice Jingmei Tan and Daiqin Li  
Decorating for food or camouflage?

P. Andreas Svensson, Topi K. Lehtonen and Bob B. M. Wong  
The interval between sexual encounters affects male courtship tactics

## ASSAB 2011 Plenary Abstracts

### Testing hypotheses about sexual selection and species recognition using sensory ecology

**John A. Endler**

*Centre for Integrative Ecology, School of Life & Environmental Sciences, Deakin University  
John.Endler@deakin.edu.au*

#### **Abstract**

Bowerbird males build and decorate bowers which are used only for attracting mates and mating; females then go off to build a nest and raise young on their own. Decorations placed on bowers make use of colours which are innovations rather than elaborations of the male's plumage, they increase the within-signal visual contrast as well as the signal-background contrast. The layout of the ornaments with gray and white objects increasing in size with the distance from the avenue entrance results in a more even background pattern as seen by the female within the bower during male displays than if he placed the objects at random with respect to size; this is the only use of forced perspective outside of humans, and may result in the court appearing smaller than it is (from the female's view) and hence the decorations and displaying male may look larger. Brightly coloured objects are placed on the court outside the female's view until the male picks them up and waves them in front of the female; resulting in a sudden appearance of colour. The forced perspective may increase the coloured object contrast as well as making them appear larger or more stimulating. Contradictions between motion parallax and perspective depth cues may further increase the visual contrast of the male display. Colour combinations in plumage may be a species recognition trait and shows character displacement among the Australian Bowerbirds and this has interesting implications for mechanisms of speciation.

### Sensory constraints and behavioural options in predator avoidance

**Jan M. Hemmi**

*ARC Centre of Excellence in Vision Science, Evolution, Ecology & Genetics, Research School of Biology, PoBox 475, The Australian National University, Canberra, ACT 2601*

[Jan.hemmi@anu.edu.au](mailto:Jan.hemmi@anu.edu.au)

#### **Abstract**

Mating systems, foraging strategies, and movement patterns of animals, all involve the processing of information – both at the sensory and the cognitive level. In order to identify the behavioural options animals have, and to determine the subtle selective forces that, have, and continue to shape their behaviour, we need to build an understanding of information processing under evolutionary-relevant conditions. In predator-prey interactions, for example, sensory constraints limit the amount and accuracy of information the prey has available when making escape decisions. Sensory capability, therefore, influences the prey's behavioural options, limiting and structuring its escape responses. Using fiddler crabs as the model species, we are in the unique position to be able to measure behavioural responses and the exact visual information they have available during predation events, simultaneously. This can be done in the crabs' natural social and physical environment, which allows us to reconstruct the visual information fiddler crabs use to make decisions about whether and how to respond to approaching predators. In this talk, I will explore the relationship between the fiddler crabs' eye design, the information they are able to

extract from their sensory input stream and the organisation of their anti-predator responses. The decision making process in fiddler crabs is mainly limited by their relatively low resolution and their inability to measure the size and distance of approaching objects – limitations they share with many small animals. I will show that these simple limitations force the crabs to respond very early and indiscriminately to approaching objects and that the limitations dominate and shape the crabs' entire escape strategy. I will also speak about, what happens to the structure of the escape response when crabs are taken out of their natural context.

## **The role of model species in behavioural research**

**Mariella Herberstein**

*Department of Biological Sciences, Macquarie University, North Ryde, NSW2109*

[Marie.herberstein@mq.edu.au](mailto:Marie.herberstein@mq.edu.au)

### **Abstract**

Rather than bore you all with a detailed description of my research over the past 10 years, I would like to talk about model species and how they have influenced theory development in behaviour. We all try to sell our favorite species as the 'perfect model species' to journals and granting bodies, but what are the characteristics of a model species? Is it the applicability to other species or the level of research depth due to ample background research. I will then illustrate how the peculiarities of some model species have driven large sections of research in behaviour and ask what the research world would look like if by chance a different model were chosen. I will finish with a credo for research on the strange and obscure.

## **The secret social life of dolphins: alliances, friendships and kinship ties**

**Luciana M. Möller**

*Cetacean Ecology, Behaviour and Evolution Lab, School of Biological Sciences, Flinders University of South Australia. luciana.moller@flinders.edu.au*

### **Abstract**

Many mammals live in groups during all or part of their lives, and individuals decide whether to join groups and which groups to join to maximise their fitness. Bottlenose dolphins live in fission-fusion societies where individuals join and leave groups on a fluid basis yet maintain close associations with specific individuals. We investigated male and female social structure, male reproductive strategies, and the influence of sex and kinship on dolphin social networks using a long-term photo-identification, behavioural, and genetic datasets from an embayment population of Indo-Pacific bottlenose dolphins from eastern Australia. We found that males show complex patterns of alliance formation, with strong and enduring alliances and less stable partnerships, which cooperate to herd females for mating. Genetic analysis suggested that males do not form these alliances preferentially with male relatives and therefore mechanisms other than kin selection might be foremost in the development and maintenance of cooperation between these males. Paternity analysis showed that male alliance formation is a successful strategy to enhance male reproductive output, particularly for those in larger alliances. By contrast, female social bonds were based on kinship ties and friendships, with certain preference for associations between females in similar reproductive state. Interestingly, we found that female bisexual kinship ties appear to play an important role in maintaining the social cohesion of dolphin networks.

## Labour of Life: Behaviour of wild echidnas versus research(er) longevity

**Peggy Rismiller and Mike McKelvey**

*Pelican Lagoon Research & Wildlife Centre, Kangaroo Island, South Australia*  
[echidna@kin.net.au](mailto:echidna@kin.net.au)

### **Abstract**

The Short-beaked echidna (*Tachyglossus aculeatus*) is known as Australia's most common native mammal, by distribution not numbers. Their solitary, cryptic life style and longevity has made documenting echidna behaviour, life history and biology a challenge. Scientists in the 1880's learned from indigenous people that echidna courtship and breeding took place during the winter months. A plethora of questions about echidna behaviour, activity and reproductive biology arose at this time. These remained largely unanswered until extended field investigations began in 1988. For the past 23 years I have been living and working in the field monitoring a population of echidnas. This focus has provided answers to basic questions posed in 1834 about the how, what and where of short-beaked echidna biology. Studying a population of free living individual has provided opportunities for behavioural research that have led to the identity of individual personality traits, intraspecific population behaviours and much more. TIME spent in the field observing individuals has been the key to unravelling echidna biology, discovering age of sexual maturity, frequency of reproduction, activities of lactating females and fate of the young, along with many other intricacies of daily life from birth to death. But there is more. The echidna, one of the oldest surviving mammals, still holds secrets. How does the female select her mate or does she? Are there environmental or complex social cues that determine which and how many females breed in any given year? Has regulating population size been one of the echidna's keys to survival? Can/will a female continue breeding until the end of her life span? Behaviour and biology, the challenge continues.

## Sexual selection and the evolution of primary sexual traits

**Leigh W. Simmons**

*Centre for Evolutionary Biology, School of Animal Biology (M092), The University of Western Australia*  
[Leigh.simmons@uwa.edu.au](mailto:Leigh.simmons@uwa.edu.au)

### **Abstract**

Male genitalia exhibit patterns of divergent evolution, to the extent that male genital morphology is widely used by taxonomists for species identification. Sexual selection is increasingly argued as being an important factor in the evolutionary divergence of male genital morphology. In particular, sexual selection via female choice has been argued to drive the elaboration of male genitalia, thereby blurring the distinction between primary and secondary sexual traits. Here I provide an overview of our published and unpublished work on a model system, the dung beetle *Onthophagus taurus*, which has provided a comprehensive empirical evaluation of the role of sexual selection in genital evolution.

## **ASSAB 2011 Conference Abstracts**

### **How the threat of sperm competition affects male mating strategy in praying mantids**

**Louise Allen, Mariella Herberstein, Gregory Holwell and Katherine Barry**

*Room 282, E8A Eastern Rd, Macquarie University, Sydney, NSW 2109*  
[louise.allen@mq.edu.au](mailto:louise.allen@mq.edu.au)

#### **Talk Abstract**

Praying mantids are charismatic insects known for their sexually cannibalistic behaviour. The mating behaviour of these animals has received attention in previous studies, however less well known is the response of males to sperm competition. It is likely that males of praying mantid species can respond to the risk of sperm competition due to male biased sex ratio by adjusting development and sperm allocation. In high-male densities it would be expected that males accelerate development to scramble to females and transfer more sperm to dilute sperm that is already possibly present. This study uses the false garden mantid, *Pseudomantis albofimbriata*, from the east coast of Australia to investigate these predictions. Juvenile males were housed in two different density treatments 3:1 and 1:3 (male:female). Here we present the results for male development, willingness to mate and the number of sperm transferred.

### **Behavioural budget, respiratory patterns and proximity of southern right whales mother-calf pairs: Setting up a baseline for measuring human impacts.**

**Naysa Balcazar, Dr Guido Parra, Dr Luciana Moller and Dr Rebecca Pirzl**

*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide, SA 5001, Australia.*  
[Balc0007@flinders.edu.au](mailto:Balc0007@flinders.edu.au)

#### **Talk Abstract**

Little information is available on the behaviour of southern right whale mother-calf pairs within Australian waters. As a result, the ability of wildlife managers to assess impacts from anthropogenic activities is limited. The Head of Bight (HOB) in South Australia is an important calving and mating aggregation site for southern right whales. This area attracts over 20,000 people each year during the calving season and is currently under increasing pressures from the whale watching industry. We used continuous focal follow observations from a shore based platform to investigate the behavioural budget, respiratory patterns, and proximity of southern right whale mother-calf pairs at the HOB during August 2010. We conducted a total of 27hrs of observations on 36 different mother-calf pairs. Mother-calf pairs at the HOB spent most of their time travelling at the surface within 0.5 body lengths of each other. Blow intervals indicated that calves have a limited dive capacity and spend most of their time at the surface. Mothers appear to compensate for this by diving less frequently and coming to the surface to breathe approximately every 2 minutes. Based on blow intervals, surface-active behaviour and nursing appears to place the greatest energy demands on the mother. Our results indicate that mothers and calves share a strong relationship in regards to synchronising behaviours, spending more time at the surface, and staying in close proximity. These strategies appear to be functional and behavioural adaptations to assist calves' development and to minimise risks to the calf. Disturbances to mother-calf association and behaviour, particular separation of mother and calf, could be detrimental to the calves' development and should be taken into account in future impact assessment studies.

## Duvaucel's geckos – lizards with complex sociality?

**Manuela Barry and Dianne H Brunton**

*Ecology & Conservation Group, INS, Massey University Albany, PB 102-904, Albany, Auckland, New Zealand*

*m.barry@massey.ac.nz*

### **Talk Abstract**

Traditionally, lizards have been considered to exhibit little social organisation, mainly showing territorial-based polygynous social systems and solitary life styles. However, within the past decade, detailed studies focussing on a few taxa have revealed that lizard social systems are more diverse than previously thought. For instance, some species show long-term monogamy, form permanent aggregations or stable-kin associations. Little is known about the social organisation of New Zealand's endemic lizards. Anecdotal reports have suggested that the long-lived Duvaucel's geckos (*Hoplodactylus duvaucelii*) share diurnal shelter sites, although nothing is known about the permanency or composition of such groups. Information on the causation and function of aggregative behaviour in taxonomically independent groups could help to understand fundamental aspects of the evolution of sociality in lizards. Surveys over several seasons revealed that wild *H. duvaucelii* aggregated in diurnal shelter sites year-round. Shelters were typically shared by mixed sex groups that included juveniles. Small groups were also formed in laboratory experiments despite an excess of optimised shelters. Male-female combinations were more common than same sex pairs and males avoided each other. However, grouping patterns in laboratory trials were not influenced by familiarity or relatedness between conspecifics. In scent choice experiments geckos showed the ability to discriminate scent from conspecifics in relation to their sex, familiarity and relatedness status. The year-round occurrence of male-female groups with young, as well as the scent discrimination abilities of *H. duvaucelii* in combination with their life history traits (longevity, viviparity, delayed maturity, high site fidelity) show strong convergences to some highly social lizard species (i.e. of the Australian scincid lineage *Egernia*). Thus, *H. duvaucelii* may potentially form social groups that could be comprised of kin; and therefore may exhibit a level of social organisation that has not been reported in gekkonid lizards before. Information on juvenile dispersal rates, genetic relationships among group members as well as temporal stability of shelter aggregations is needed to clarify this.

## A paternity advantage for speedy males? Sperm precedence patterns and female re-mating frequencies in a sexually cannibalistic praying mantid.

**Katherine Barry, Gregory Holwell and Marie Herberstein**

*Dept Biological Sciences, Macquarie University NSW 2109*

*kate.barry@mq.edu.au*

### **Talk Abstract**

Scramble competition polygyny is expected when females and/or resources are widely dispersed and not easily monopolized by males, or when there is an abundance of mates during an extremely restricted reproductive period. Additional factors such as first male sperm precedence or low female re-mating rate might further explain the propensity of males to engage in scramble competition. The sexually cannibalistic praying mantid *Pseudomantis albofimbriata* exhibits a polygynous mating system, where females exist in low-density populations and male competition manifests as the race to find females rather than as direct physical fighting. Here, we aim to determine whether there is a paternity advantage for the first-male to mate and/or a low frequency of female remating. First, we determined sperm precedence patterns in *P. albofimbriata* using the sterile male technique. Second, we tested the likelihood of female re-mating in *P. albofimbriata* by comparing the close-range approach behaviour and frequency of successful mating attempts for males when paired with virgin as opposed to recently mated females, and by

comparing the frequency of long-distance male attraction between virgin and mated females. We found no paternity advantage for the first male to mate, rather a second male advantage. Although mated females were not rejected by males when approached from close-range, they were chemically unattractive to males searching from a distance. Since initial mate attraction in many praying mantids, including *P. albofimbriata*, is mediated via long-distance chemical communication, we believe the latter result is more ecologically relevant and therefore more important. These results suggest that the relatively low frequency of female re-mating observed in *P. albofimbriata* may be an additional factor driving scramble competition in this system.

## **Effects of fire and elaiosome condition on seed dispersal by ants of a myrmecochorous plant, *Pultenaea daphnoides*.**

**Kieren Beaumont, Duncan Mackay and Molly Whalen**

*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide, SA 5001, Australia, kieren.beaumont@flinders.edu.au*

### **Poster Abstract**

Seed dispersal by ants (myrmecochory) is a mutualism facilitated by a food reward (the elaiosome) attached to the seeds. Seed-fates may be influenced by changes in the abundances of ant species and by the seed-handling behaviours of ants, once seeds reach their nests. This study investigated the effects of elaiosome condition and fire history on the rate and distance of seed dispersal by ants. We also characterised the elaiosome condition of seeds discarded by two common seed-dispersing ant species, *Pheidole* sp. A and *Rhytidoponera metallica*. Our study was conducted in the Mount Lofty Ranges, South Australia and used seeds of a common ant-dispersed plant, *Pultenaea daphnoides*.

In an experiment involving feeding seeds to nests, seeds discarded by *R. metallica* colonies had approximately 50% of the elaiosomes remaining. *R. metallica* discarded 43.6% of the seeds fed to them, while *Pheidole* colonies did not discard any seeds. The effects of four elaiosome conditions on seed removal and dispersal were investigated including “Intact”, “Handled” (seeds previously manipulated in nests of *Rhytidoponera* ants and then discarded), “Cut” (ca. 50% of the elaiosomes removed), and “Removed” elaiosomes. Seed removal was faster in burnt plots than in unburnt plots. Seeds without elaiosomes were removed significantly slower than seeds with all other elaiosome conditions.

*Rhytidoponera metallica* contributed most to seed dispersed in both burnt (50%) and unburnt (80%) plots. Seeds dispersal curves differed between habitats types due to a greater contribution to dispersal by *Pheidole* ants in burnt habitat. We found that *R. metallica* can facilitate subsequent myrmecochory, by discarding seeds with some elaiosome remaining, while seeds dispersed to *Pheidole* nest remain there.

Our study shows that the seed-handling behaviours of two ant species are likely to facilitate different seed-fates and that the contribution of these ants to seed-fate can be influenced by fire history.

## **Battle of the sexes: Sexual conflict in the lichen tuft moths.**

**Rebecca Bennik, Thomas R. Buckley<sup>2</sup>, Robert J. B. Hoare<sup>2</sup>, and Gregory I. Holwell<sup>1</sup>**

*School of Biological Sciences, University of Auckland, New Zealand  
rben085@aucklanduni.ac.nz*

### **Talk Abstract**

Many animal species may be defined by the morphology of their male genitalia. Closely related species very similar in general morphology may still display a wide variation in male genital morphology.

Therefore, genital evolution appears to be a rapid and divergent process (1,2). There are three main theories behind genital evolution. Previous assumptions for diversification in genital morphology were based on species isolation (lock and key hypothesis) and pleiotropy, but subsequent comparative research has failed to support these hypotheses (2). Recent comparative and experimental research has proposed sexual selection to be the best explanation of the driver of rapid and divergent evolution of genitalia (3,4,5); one promising hypothesis involves the theory of sexual conflict (6,7,8,9,10). Sexual conflict may drive genital evolution through opposing selection of male and female reproductive strategies. Genital adaptations that allow males a competitive advantage may consequently reduce female fitness. Females may counter adapt to reduce the harm imposed by male adaptations, leading to an evolutionary arms race via sexually antagonistic co-evolution (SAC) (6,9,10). Species within the genus *Izatha* (Lepidoptera: Oecophoridae) are candidates for exploring the occurrence of sexual conflict. Within this genus, males of some species have detachable spines (deciduous cornuti) in which they eject all into the female reproductive tract during their first mating, apparently causing damage (11). Some species lack deciduous cornuti, but have permanently attached sclerotised teeth on the phallus, whilst others lack these structures all together. A molecular and morphological phylogenetic analysis of the genus will provide insight into the evolution of these complex genitalic adaptations. Behavioural experimentation assessing female longevity post-mating with virgin and non-virgin males, compared with virgin females will help elucidate the effect of the deciduous cornuti. Utilising micro-computed tomography, the functional morphology of male and female genitalia of species with deciduous cornuti will also be examined.

## **Assortative mating and population divergence in the circular overlapping crimson rosella (*Platycercus elegans*) complex**

**Mathew Berg, Raoul Ribot, Justin Eastwood, Leo Joseph, Katherine Buchanan and Andrew T. D. Bennett**

*Centre for Integrative Ecology, School of Life and Environmental Sciences, Deakin University, Pigdons Road, Waurin Ponds VIC 3217  
mathew.berg@deakin.edu.au*

### **Talk Abstract**

Assortative mating among divergent populations is thought to promote pre-mating reproductive isolation through direct mate choice, and may therefore play an important role in speciation. While assortative mating is a widely reported phenomenon, the circumstances in which it arises, how some traits are involved and some are not, and its contributions to population differences are often not known. Rare cases of ring species, or circular overlaps, offer an excellent opportunity to study the processes involved in speciation, because they show how clinal variation across interbreeding populations may lead to species-level differences. We studied two intermediate, clinally-varying populations of the circular overlapping crimson rosella complex of south-eastern Australia, which has been a long-held ring species. Hitherto, populations of this complex have been defined by the striking variation in yellow/orange/red plumage, which is based on psittacofulvin pigments unique to parrots. We measured traits likely to be involved in sexual signalling and mate choice, including plumage coloration and body size, among breeding pairs to evaluate the contribution of assortative mating to population divergence. Surprisingly, we found no assortative mating for psittacofulvin coloration. We found that pigmentation was strongly associated with climate, and was incongruent with microsatellite variation, indicating a role for selection in maintaining diversity. Conversely, ultraviolet-blue coloration, which is based on feather nanostructure and appears to be condition dependent, showed assortative mating in both populations. Assortative mating by body size was also present. Our results suggest that structural coloration is a more significant sexual signal than pigmentary coloration in this parrot. We propose that population history, natural selection and sexual selection interact to maintain diversity in this species, in the face of ongoing gene flow.

## **Personality and social structure in the eastern grey kangaroo (*Macropus giganteus*)**

**Emily Best and Anne Goldizen**

*School of Biological Sciences, The University of Queensland, St Lucia, Brisbane, QLD, 4072*  
*emily.best@uqconnect.edu.au*

### **Talk Abstract**

Female social organisation is a little-studied aspect of macropod behavioural ecology. Eastern grey kangaroos (*Macropus giganteus*) are among the most social macropod species and were traditionally thought to have very little structure beyond a loose fission-fusion social system. However, recent studies suggest more complex social structures exist with females preferentially associating with certain others. We have been observing associations between 170 individually identified female kangaroos in Sundown National Park, Queensland for more than a year. Network analysis is being used to test the significance of female associations within the kangaroo mob through the application of quantitative measures of social structure at the individual and community level. These associations are being analysed in the context of measured attributes such as relatedness, reproductive state, body condition and personality. Currently, little is known about the effect of personality on social structure. We are exploring the effect individual variation in personality along a bold-shy continuum on measures of sociality including number of associates, distance to nearest neighbour and average group size. The results will permit greater insight into the mechanisms and functions underpinning and underpinned by social structure.

## **Do honeybees actively avoid mid-air collisions?**

**Natalie Bland, Nikolai Liebsch, Sara Taremi Horoufi and Mandyam Srinivasan**

*Queensland Brain Institute, University of Queensland, St Lucia, QLD 4072, Australia; ARC Centre of Excellence in Vision Science, Australian National University, Canberra, ACT 2601, Australia.*  
*n.bland@uq.edu.au*

### **Poster Abstract**

In nature, mid-air collisions between two or more honeybees are rarely observed. We have investigated whether honeybees possess a pre-programmed ability to actively avoid collisions, or whether collisions are avoided purely by chance. Bees were trained, by food reward, to fly through a constricted environment in the form of a narrow tunnel, to increase the likelihood of collisions or near misses. Their flights were filmed and reconstructed in three dimensions. The data was analysed to address the following questions: Do honeybees actively avoid mid-air collisions? If so, what strategies do they employ?

## **Fiddler crabs adjust helping behaviour depending on neighbour familiarity**

**Isobel Booksmythe, Catherine Hayes, Michael Jennions and Patricia Backwell**

*Evolution, Ecology & Genetics, Research School of Biology, Building 116, The Australian National University, Canberra, 0200 Australia*  
*isobel.booksmythe@anu.edu.au*

### **Talk Abstract**

Fiddler crabs defend individual territories, and fight repeatedly with their neighbours to establish and maintain territory boundaries. Yet despite competition between neighbours and the costs of territory defence, fiddler crabs have been shown to sometimes help their neighbours repel intruding individuals. Theory predicts that it can sometimes be less costly to help a familiar neighbour in territory defence than to renegotiate boundaries with a new and potentially stronger neighbour. In support of this prediction, helping is most likely to occur when the potential helper is larger than the neighbour under attack, and the intruder is intermediate in size between the two neighbours.

In this talk I will explore in detail the conditions necessary for cooperative territory defence, and factors influencing the likelihood that help is provided. I will present the results of a study that used simulated territory intrusions and neighbour replacements to investigate the effects of neighbour familiarity on helping behaviour.

## **Personalities and Behavioural Syndromes in Sleepy Lizards (*Tiliqua rugosa*).**

**Bradley, J.K., Godfrey, S.S. and Bull, C.M.**

*Flinders University, School of Biological Sciences, PO BOX 2100, Adelaide SA 5001*  
*Brad0217@flinders.edu.au*

### **Talk Abstract**

Individuals often differ in their behaviour consistently across time and contexts. These consistent individual differences can be referred to as personalities. A similarly related concept to personalities is behavioural syndromes in which individuals each have two or more correlated behavioural traits. The existence of personalities or behavioural syndromes shifts traditional thinking in behavioural ecology as it suggests that an individual can be constrained from behaving optimally in all contexts. An important implication is therefore that an individual's personality is likely to represent different fitness strategies, all of which have trade-offs in a varying environment. Also, a recent challenge emerging in this field is how to quantify personalities. This study aimed to document personalities and survey for behavioural syndromes in population of 16 sleepy lizards (*Tiliqua rugosa*) near Mt Mary, South Australia. Lizards were tested in repeated behavioural assays for personality traits for aggression and boldness. Lizards were also monitored over the spring to early summer period, the time when lizards were most active, with a 'lizard datalogger' which monitored step counts and GPS locations over a four month period allowing a range of lizard activity parameters to be calculated. This study reports distinct differences between individual lizards for aggression and boldness but also in their activity parameters estimated from 'lizard dataloggers' which we argue also reflects lizard personalities. Crucial for further studies of personalities and behavioural syndromes in sleepy lizards, is the exploration of the fitness trade-offs that occur as a result of these different behavioural strategies.

## **When A Shelter Becomes A Home: The Ethical Considerations Surrounding Environmental Enrichment.**

**Brown, Jennifer Sue; Telbisz, Regina M; Toukhsati and Samia R**

*Soi Dog Foundation, 167/9 Moo4, Soi Mai Khao 10, Tambon Mai Khao, Amphur Talang, Phuket, 83110 Thailand,*  
*[jennifersuebrown@fas.harvard.edu](mailto:jennifersuebrown@fas.harvard.edu)*

### **Talk Abstract**

Environmental enrichment (EE) for confined animals has received considerable attention in recent years and the goal of providing more than ‘food and shelter’ is becoming a key aspect of ethical animal husbandry practices. The argument for providing appropriate enrichment for captive animals is an intuitively persuasive one. Enrichment is intended to help animals realise behaviours that are species appropriate; give the animal some control over its environment; and with the addition of novel stimuli help animals to cope with stress, boredom, and adapt to changes in their environment. While there is an increasing body of literature and on-going development of ethical guidelines to justify the use of EE in institutionalised settings, such as laboratories and zoos, there appears to be less rigorous promulgation of ethical guidelines for EE use in companion animal shelters. In this paper we will briefly explore the range of ethical issues relating to long-term companion animal residency in shelters, then move on to an in-depth examination of the ethical arguments surrounding the use of environmental enrichment in these facilities, including the reasons for the lack of universal enrichment guidelines for shelters. We will argue that the requirements for ethical long-term care at these facilities align with captive animal husbandry practices. Additionally, we will discuss the strong need to examine the efficacy of EE in the shelter environment so that ethical obligations can be appropriately realised. Finally, with this obligation in mind, we will propose a novel study to examine toy introduction as an enrichment tool for street dogs (*canis familiaris*) presently housed in long-stay, large-group kennel runs at a no-kill animal shelter in Thailand.

## **Motion-oriented signallers: signalling with toes, tails, tongues and now tibia**

**Matthew Bulbert**

*85 campbell drive Wahroonga NSW 2076*  
*[matthew.bulbert@mq.edu.au](mailto:matthew.bulbert@mq.edu.au)*

### **Talk Abstract**

Animals convey information using signals that appeal to one or more sensory channels of the intended receiver. A signalling mode, that appeals entirely to the visual sensitivities of their receiver are motion-oriented displays. In general, research on the role of visual displays has been largely restricted to interspecific communication. Yet potentially the most interesting examples of visual signals come from interactions between unrelated species. Many lurers for instance use motion-oriented signals to attract the attention of potential prey. The signal is never beneficial to the receiver. So determining how such a system could be maintained, let alone have evolved, is challenging. The nymphs of the feather-legged assassin bugs rely on visual signalling to not only entice their ant-prey to come near but to stimulate the ant to grab the bugs’ hind legs. For a lurer, the signal is expected to appeal only to receivers that are highly visual, and often predaceous themselves. We have discovered that this signal works not only on visually oriented predaceous ants but also on ant individuals that have limited visual capacity and/or are scavengers. We show for the latter circumstance the signal is modified to account for the lack of visual sensitivity. The initial waving signal has seemingly little influence on these ants. Instead they respond to an amplification of the leg waving stimulated by contact with the ant. We suggest that for some ant species

the signal acts to antagonise the ant individual into attacking through physical bombardment. The ramifications of these findings will be discussed,

## **Genetic interactions between parental genomes affect the expression of alternative male phenotypes in the mite *Rhizoglyphus echinopus***

**Bruno A. Buzatto, Leigh W. Simmons and Joseph L. Tomkins**

*Centre for Evolutionary Biology, School of Animal Biology (M092), The University of Western Australia, 35 Stirling Highway, Crawley 6009, WA, Australia.*

[bruno.buzatto@gmail.com](mailto:bruno.buzatto@gmail.com)

### **Talk Abstract**

Few studies have explored the genetic mechanisms that influence the inheritance of conditional male dimorphism. In order to investigate whether interactions between parental genomes affect the expression of alternative male phenotypes, we established nine inbred lines of the male dimorphic mite *Rhizoglyphus echinopus*, a species in which males are either fighters or scramblers. We crossed the inbred lines using an incomplete diallel design, with an average of two replicates for each selected cross. Nymphs were isolated and raised to adulthood with *ad libitum* food. At adulthood, male morph was recorded for all male offspring. The data were analysed with a mixed effects generalized linear model. The probability of a nymph becoming a fighter was independent of sire morph, but significantly influenced by the interaction between sire and dam lines. This is the first study to investigate an influence of interaction effects between maternal and paternal genotypes on the ratio of conditional alternative reproductive phenotypes. These results shed light on the complex and poorly understood genetic architecture of male morph determination through a threshold trait. Moreover, these interaction effects could allow polyandrous females to vary the morph ratio in the male offspring they produce, according to which male sire their eggs.

## **Evaluating animal personalities: do subjective assessments and objective experiments of boldness measure the same thing?**

**Alecia Carter, Harry Marshall, Robert Heinsohn and Guy Cowlshaw**

*The Fenner School of Environment and Society, Building 43, The Australian National University, Acton, Canberra, ACT 0200*

[alecia.carter@anu.edu.au](mailto:alecia.carter@anu.edu.au)

### **Talk Abstract**

The animal personality literature is currently divided into two approaches to personality assessment, subjective personality ratings and objective experimentation, but these methods have never been compared in a wild population. We assessed the boldness of wild chacma baboons *Papio ursinus* using both subjective and objective methods. Boldness was objectively assessed when individuals were presented with a novel food item during natural foraging. The boldness of the same individuals was rated subjectively on a 5-point scale by experienced observers. The objective and subjective assessments of boldness were found to correlate positively and significantly. However, when considered categorically, bold and shy objectively defined and subjectively rated baboons were found to differ. We suggest that this is due to the different methodologies of each approach; subjective assessments consider personality in absolute terms (using pre-defined criteria) and multiple contexts, while objective assessments consider personality in relative terms (using experimental scores relative to the population average) and in limited contexts. We encourage animal personality researchers to consider adopting both methodologies in future studies. We also propose that future studies restrict their analyses to continuous data. However, if

individuals must be categorized we suggest that researchers either a) analyse only those individuals categorised as bold or shy by both objective and subjective approaches, or b) if these two methods cannot be employed simultaneously, restrict their analyses to those individuals that fall into the more extreme values of a continuous scale.

## **Stuttering steps to sociality**

**Holly Caravan<sup>1</sup>, Tom Chapman<sup>1</sup> and Michael Schwarz<sup>2</sup>**

<sup>1</sup>*Department of Biology, Memorial University, St. John's, NL, CANADA, A1B 3X9;* <sup>2</sup>*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide SA 5001, Australia.*

[tomc@mun.ca](mailto:tomc@mun.ca)

### **Talk Abstract**

Within the radiation of gall-inducing thrips on Australian *Acacia* emerged a defensive caste (soldiers).

This caste is made up of males and females, and between species this caste differs in number of soldiers, sex ratio and degree of fighting ability and reproductive output. Comparative studies suggest that these soldiers have likely emerged from a reproductive-morph that traded reproduction for fighting ability. One species, *Kladothrips intermedius*, shows substantial morphological differences between sexes: females have more robust forelimbs, and males have longer wings. These differences might suggest that males are less committed in their morphology to a fighting role. We tested fighting ability between sexes and found that females are not more effective fighters, but they appear to be more willing to engage in fighting behaviour. While, increased wing length in males was associated with decreased willingness to fight. Thus, the individuals within this caste appear to not be equally committed to a defensive role suggesting that the trajectory of social evolution may differ between the sexes in the gall-inducers. We review the impact of these latest results on social trajectory in thrips.

## **Cooling down in the heat: the importance of thermoregulatory behaviours in intertidal ectotherms.**

**Coraline Chapperon<sup>1</sup> and Laurent Seuront<sup>1,2,3</sup>**

<sup>1</sup>*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide SA 5001, Australia;*

<sup>2</sup>*South Australian Research and Development Institute, Aquatic Sciences, West Beach SA 5022, Australia;* <sup>3</sup>*Centre National de la Recherche Scientifique, France*

[coraline.chapperon@flinders.edu.au](mailto:coraline.chapperon@flinders.edu.au)

### **Talk Abstract**

The recent integration of physiological responses of ectotherms in climate change models has provided a greater insight into the species thermal window of adaptation and hence future distribution ranges. However, there are gaps which continue to persist in these climate change models. In particular, it is critical to integrate (i) the space-time heterogeneity in thermal stress and in the organism body temperature, and (ii) the organism behavioural responses to thermal stress. Here, thermal imaging was used to assess the space-time variability in both substratum and snail temperatures inhabiting tropical and temperate intertidal areas. Temperatures of two snail species (i.e. *Littoraria scabra* and *Nerita atramentosa*) and surrounding substrata were examined focussing upon the individual microhabitat position and status (i.e. solitary, aggregated). Substratum temperature appeared to be the main determinant of *N. atramentosa* and *L. scabra* body temperatures. This result stresses the need to include variables other than single climatic variables such as air temperature in climate change models. This is specifically

relevant since climatic variables are poorly correlated to animals in nature. In addition, both substratum and snail temperatures appeared to be highly variable at small spatial scales. These mosaics of temperature patterns at the microhabitat level reinforce the evidence that thermal heterogeneity at the niche level likely surpasses that which is observed at larger spatial scales (e.g. latitude). Thermoregulatory behaviours (e.g. aggregation) appeared to be species- and habitat-specific and to vary seasonally. Nevertheless, both species were able to select thermally favourable substrata under high thermal stress in order to adjust their body temperatures. This demonstrates an ability to explore and take advantage of the thermal heterogeneity of the surrounding environment. This flexibility in snail behaviour and the identified thermal environment heterogeneity at the niche level could potentially increase the local survival of mobile ectotherms in a warming world.

## **Colour pattern evolution in Australian dragon lizards (Agamidae)**

**Chen, I-Ping.<sup>1</sup>, Symonds, M.R.E.<sup>1</sup>, Hugall, A.F.<sup>1</sup>, Melville, J.<sup>2</sup>, Stuart-Fox, D.<sup>1</sup>**

*Zoology Department, University of Melbourne, Victoria 3010 Australia  
i.chen2@pgrad.unimelb.edu.au*

### **Talk Abstract**

Many animals communicate using elaborate visual signals such as conspicuous colours and patterns, which are influenced by numerous selective forces. For most taxa, however, the relative influences of natural and sexual selection on types of colour and pattern exhibited and the complexity of colour pattern elements remain unclear. In this study, we applied phylogenetic comparative approaches to examine the evolution of colour patterns in 69 Australian agamid lizard species, a morphologically and ecologically diverse group that relies primarily on visual communication. We examined types of colour pattern on 9 body regions that comprise dorsal, lateral, and ventral areas, and their relationship to indices reflecting different selective pressures from both visual predators and conspecifics. Indices of natural selection included habitat openness, life style, and substrate types, while our indices of sexual selection were the degree of sexual dichromatism and body size dimorphism (SSD). Sexual dichromatism and SSD on exposed dorso-lateral body regions were associated with the use of carotenoid- or pteridine-based red-yellow colours, while sexual dichromatism of hidden ventral areas was correlated with the use of melanin-based black colour. Both sex differences in colour pattern complexity and the degree of complexity in males were associated with sexual dichromatism and SSD. These results suggest that the evolution of colour pattern complexity is driven primarily by sexual selection in Australian agamid lizards and that the prevalence of different types of colour on different body regions potentially reflects different signalling strategies. By contrast, we found no correlation between any ecological factors with the use of types of colour and pattern or with the degree of colour pattern complexity, which suggests that the influence of natural selection is difficult to identify within a broad phylogenetic comparative study.

## **Visual signalling in coral reef fishes: the cleaner fish ‘uniform’**

**Karen L. Cheney, Alexandra S. Grutter, Simon P. Blomberg, N. Justin Marshall**

*School of Biological Sciences, The University of Queensland, St Lucia, Brisbane, QLD 4072  
k.cheney@uq.edu.au*

### **Talk Abstract**

Marine cleaning symbioses are classic examples of mutualism: cleaners remove and consume ectoparasites from ‘client’ fish, while clients benefit from a reduction in ectoparasites. However, how clients recognise cleaners and decide not to eat them is unclear. Colour and body pattern are thought to be important in

signalling cleaning services to coral reef fish, and we tested the long-held belief that cleaner fish display a blue 'guild' colouration. Using colour analytical techniques and phylogenetic comparisons, we show that cleaner fish are more likely to display a blue colouration, in addition to a yellow colouration, compared to non-cleaner fish. Using theoretical vision models, we show that, from the perspective of potential signal receivers, blue is the most spectrally contrasting colour against coral reef backgrounds, while yellow is most contrasting against blue water backgrounds or against black lateral stripes. Finally, behavioural experiments confirm that blue within the cleaner fish pattern attracts more client reef fish to cleaning stations. Cleaner fish have evolved some of the most conspicuous combinations of colours and patterns in the marine environment and this is likely to underpin the success of the cleaner-client relationship on the reef.

## **Not all resting sites are equal: The role of previous occupancy in determining limpet resting sites**

**Coleman, R.A and Williams, E.M.R.**

*Centre for Research on Ecological Impacts of Coastal Cities, School of Biological Sciences, Marine Ecology Laboratories (A11), The University of Sydney, NSW 2006 Australia.*  
*ross.coleman@sydney.edu.au*

### **Talk Abstract**

In many mobile animals, it is assumed that the habitat patches are differentiated by the resource value to an organism. For many invertebrates, we have no idea which resource axes may be important and, moreover, we do not necessarily understand the value of microhabitat. For non-homing limpets on rocky shores, such as *Cellana tramoserica*, the distribution of animals is often thought to be indicative of food or refuge resources. Using manipulative experiments, we show that the distribution of *C. tramoserica* is actually dependent on the previous occupants of any particular resting site, in that if limpets are removed, incoming limpets will occupy previous resting sites in a much greater proportion than occupying new resting sites. This pattern held also for size-frequency distributions, such that site occupied by small limpets are much more likely to be occupied by incoming small limpets than large ones. From this, we have new evidence that decisions to occupy a microhabitat may not solely be based on resource values but also are associated with public information about previous microhabitat occupants.

## **Vocal cues reveal intruder nestlings: Evidence for an acoustical host-parasite arms race that starts inside the egg**

**Diane Colombelli-Négrel, Mark Hauber, Jeremy Robertson, Frank J. Sulloway, Herbert Hoi, Matteo Griggio, and Sonia Kleindorfer**

*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide 5001, Australia;*  
*Department of Psychology, Hunter College of the City University of New York, NY, USA;*  
*Institute of Personality and Social Research, University of California, Berkeley;*  
*Konrad Lorenz Institute for Ethology, Vienna, Austria*  
*colo0007@flinders.edu.au*

### **Talk Abstract**

Avian hosts pay a high cost for rearing brood parasites and thus continuously evolve strategies to detect them, while the brood parasites evolve ever more efficient means to deceive their hosts<sup>1</sup>. Until recently,

this evolutionary arms race was believed to end once the host accepted the egg of the brood parasite into its nest<sup>1, 2</sup>. Superb fairy-wrens (*Malurus cyaneus*) have taken the race a step further because they are one of the few birds known to desert nestling brood parasites<sup>3</sup>. Wrens use acoustic cues to distinguish the nestling parasite, and – true to an arms’ race – horsfield’s bronze-cuckoo (*Chalcites basalis*), their main brood parasite, mimics the begging calls of fairy-wrens<sup>3</sup>. Here, we show (1) that female superb fairy-wrens call to their unhatched eggs, (2) the female incubation calls have a distinct signature element; and (3) the mother’s signature element is present (measured using a similarity index) in the subsequent begging call of her nestlings. Playback experiments of nestling begging calls (same nest, different nest, cuckoo nestling) showed that adult wrens (both males and females) respond differently to the different begging calls with lower feeding, higher vigilance and more alarm calls at nests with playback of different nestlings and cuckoos. Interestingly, the response intensity was comparable to different nests and cuckoos, suggesting that parent wrens did not recognise the cuckoo per se, but differentiated “own” versus “other”. We conclude that female fairy-wrens use a self-reference phenotype matching mechanism<sup>18</sup> for discrimination of intruder nestlings (brood parasites) depending on the similarity between the mothers’ templates (signature elements) and the nestlings’ labels (nestling begging calls).

## **The mating system of the incubator bird (Malleefowl: *Leipoa ocellata*)**

**Taneal Cope, Raoul Mulder, Steve Donnellan, Peter Dunn**

*University of Melbourne, Department of Zoology, Parkville Campus, VIC 3010  
t.cope@pgrad.unimelb.edu.au*

### **Talk Abstract**

The type of breeding system can have a large effect on the loss of genetic variation in small populations. Biased reproductive success can limit populations by reducing genetic variation. If a relatively small number of males monopolise breeding, as in polygynous species, then genetic drift will occur faster than in a monogamous species. The understanding of genetic variation within a population, as well as the variation in genetic contribution of individuals to future generations, is essential for conservation and management of that species. Malleefowl are an endangered species occurring throughout Southern Australia. Many Malleefowl populations have become small and isolated due to land clearance. As part of a wider study on the conservation genetics of this species, this study focused on their mating system. Malleefowl have been noted as generally monogamous, although polygamy has been recorded in this species. As is the case with most bird species, the social mating system is often a poor reflection of genetic paternity. This study investigated the paternity of chicks from 15 mounds within a closed population of Malleefowl. Mounds were observed to determine laying activity and eggs from complete clutches were harvested and raised to hatching in incubators. The analysis of genetic paternity and sibship were used to determine the mating system. This is the first study to undertake molecular investigation of paternity in Malleefowl.

## **Better management of cotton refuges within the best management practices framework.**

**Dominic Cross, Dr Sarah Mansfield, Dr Mary Whitehouse and Dr Sharon Downes**

*Australian Cotton Research Institute, Locked Bag 59, Narrabri, NSW 2390  
dominic.cross@csiro.au*

### **Poster Abstract**

The implementation of Bt cotton has reduced the use of chemicals by suppressing *Helicoverpa armigera* and *H. punctigera* pest populations. This does however result in selection for resistance to Bt as any pests

tolerant to Bt survive and convey their resistant genes to 100% of the next generation. To maintain susceptibility to Bt in pest populations, refuges of unsprayed non-Bt cotton are planted with Bt cotton so that susceptible populations dilute any acquired resistance, preventing Bt cotton from becoming ineffective at controlling pest populations. Planting an unsprayed crop carrying high numbers of invertebrates and with a low yield potential can appear counterintuitive to growers. Therefore, quantifying and improving the efficacy of refuges is necessary to maintain industry support. As disease, predator and parasitoid populations increase with increasing densities of *Helicoverpa*, these agents could cause excessive mortality in *Helicoverpa* as larvae numbers increase. Consequently large numbers of *Helicoverpa* larvae may result in fewer *Helicoverpa* moths. Part of the research will identify if there is a point at which the density of *Helicoverpa* in the crop causes the population to crash, and whether this point varies between refuge types. Though still in its infancy, the project will determine the best management strategy for refuges in cotton to ensure maximal output of Bt susceptible moths. From the practical perspective, the information gained will enable growers to be confident that they are getting the best biological benefit from their refuges via the most cost-effective means. From a biological perspective, the project will examine the interguild effects of high herbivore numbers.

## **White flank spots signal feeding dominance in Diamond Firetail females**

**Clare Crowhurst, Valeria Zanollo, Jeremy Robertson, Sonia Kleindorfer**

*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide 5001, Australia;  
Crow0999@flinders.edu.au*

### **Talk Abstract**

Plumage colour can be used as an honest signal to convey health and status. The Diamond Firetail (*Stagonopleura guttata*) is an endemic Australian finch with bright plumage in both males and females, and white spots on the black flanks of the underwing. Females have more white flank spots than males; and females with more white flank spots had higher cell-mediated immune response (PHA-test). Here, we test the signalling function of white flank spot display during feeding contests because birds display white flank spots during feeding. Diamond Firetails are a flocking bird, preferring to eat in a group than alone. We used an experimental design to test for feeding dominance in a group living bird, also in relation to sex. Our results showed that spot number predicted access to food in females but not males, using two choice trial chambers and in single food arenas. We experimentally manipulated spot number and found the same pattern, showing that birds use spot number to assess feeding dominance in this species. The intriguing question is why this pattern was stronger in females. We will test female investment of carotenoids into eggs as a function of social food dominance.

## **Local habitat use after fire events in Blue-breasted Fairy-wrens.**

**Simone Dalgairns, Don Driscoll and Sonia Kleindorfer**

*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide 5001, Australia;  
Australian National University  
simone.dalgairns@flinders.edu.au*

### **Poster Abstract**

Fire regimes are predicted to influence animal movement and foraging behaviour. Despite the importance of fire to Australian ecological systems, there is little information on focal species responses to altered habitats as the result of burn age, which is important for sustainable

conservation of threatened or declining species. In this study, I examine foraging behaviour in the Blue breasted fairy-wren across three burn ages (burnt, regrowth, mature), with replicate plots in two conservation parks with different fire histories. I test the prediction that birds will have different foraging behavior across different burn ages (looking at substrate, technique, and height), and furthermore, that morphology across burn age will be different, if birds are selected for phenotype-habitat matching in post-fire colonisation events. The data I present support both predictions: birds in the mature sites probed more in the leaf litter, and these birds had longer and more pointed bills than birds in recently burnt and regrowth sites that gleaned prey from the surface.

## **Innovation in the Indian mynah and the noisy miner: investigating the underpinning factors.**

**Marie C. Diquelou and Andrea S. Griffin.**

*School of Psychology, University of Newcastle, University Drive, Callaghan NSW 2308, Australia.*

*m.c.diquelou@gmail.com*

### **Talk Abstract**

When introduced into a new environment, individuals are likely to need to use resources previously unknown to them, in other words, to innovate. This idea is supported by recent meta-ecological analyses revealing that there are higher frequencies of anecdotal reports of foraging innovations in the ornithological literature for species that have succeeded in becoming established outside their natural range than for species that have been unsuccessful. We used a problem-solving task -an experimental proxy of innovation rate- to measure the innovative ability of the highly invasive Indian mynah (*Acridotheres tristis*) and to compare it with the innovative ability of the native noisy miner (*Manorina melanocephala*) with which Indian mynahs cohabit. In each species, we measured a range of behavioural and morphological variables to explore the underpinning mechanisms and correlates of innovation. In both species we found support for “innovative personalities”. Statistical modelling revealed that motor flexibility and motivation best explained inter-individual variation in propensity to problem-solve. Confirming parallel field experiments, the Indian mynah showed much higher success in the problem-solving tasks, however, than the noisy miner. These results provide the first experimental evidence pointing to a key role of innovation in the success of a worldwide invader.

## **Beak and feather disease virus in crimson rosellas: transmission, nestling growth and survival.**

**Justin Eastwood, Mathew Berg, Raoul Ribot, Brianna Spolding, Ken Walder and Andy Bennett.**

*School of Life and Environmental Sciences, Deakin University, Victoria, 3217, Australia.*  
*jreas@deakin.edu.au*

### **Talk Abstract**

The Beak and feather disease virus (BFDV) is a highly infectious circovirus that is one of the most common viruses in parrot population. It causes feather, beak and claw deformities by disrupting keratin production, along with strong immunosuppression. Mortality in captive birds is high, particularly among

young birds, and usually results from secondary infections. For these reasons, this virus is of major conservation concern for many endangered parrots, but to date little is known about the prevalence effects of infection in wild populations. We screened wild, breeding crimson rosellas (*Platycercus elegans*) for BFDV infection using quantitative PCR, and found a high prevalence of infection in the study population. We also measured nestling mortality, growth and infection weekly, to investigate the transmission of infection during reproduction, and the effects of BFDV on parental care and reproductive success. We discuss the influence BFDV infection may have on reproductive performance and life histories in wild parrots.

## **Nutritional Status, Social Factors and Predation Influence Vigilance Behaviours in Female Eastern Grey Kangaroos, *Macropus giganteus***

**Amy Edwards, A/Prof Anne Goldizen, Emily Best and Dr. Simon Blomberg**

*School of Biological Sciences, University of Queensland, Brisbane, QLD 4072*  
*amy.edwards@uqconnect.edu.au*

### **Talk Abstract**

While vigilance has been studied in an extensive range of prey species, few studies have accounted for variation among individuals when trying to understand what factors influence anti-predator and social vigilance. We investigated the vigilance behaviours of 30 individually recognisable female eastern grey kangaroos at Sundown National Park, Queensland. A minimum of ten five-minute samples were taken for each individual. The direction of gaze, stance used and length of each vigilance event were recorded and analysed using mixed-effects models. The main aim was to determine what influenced vigilance behaviour, alongside data relating to nutritional status, predation risk and social factors. Our main finding was that anti-predator vigilance was influenced by factors relating to nutrition and predation risk, while social vigilance was influenced by social factors and predation risk. There was no significant individual variation in any aspect of vigilance that was not explained by these factors. Vigilance is an important, complex part of anti-predator behaviour, and is probably linked to many other aspects of behaviour, such as personality. Further investigation of personality, stress levels and genetic relatedness alongside vigilance and grouping behaviour may lead to greater insight into the evolution of anti-predator and social behaviours.

## **Stressed-out honey bees: exploring the physiology of stress in a social system.**

**Naila Even and Andrew Barron**

*Macquarie University, 209 Culloden Road, 2122 NSW, Marsfield Australia*  
*naila.even@gmail.com*

### **Talk Abstract**

The stress response is well described in mammals. It involves the Hypothalamo-Pituitary-Adrenal (HPA) axis, the autonomic nervous system and behavioral components like the fight or flight response. However, are there similar general stress responses in insects? Here we explore the stress responses in honeybees (*Apis mellifera*) by applying various stressors, and examining behavioral and neurobiological responses, particularly the role of biogenic amines and neurohormones in response to various stressors.

To explore if the stress pathways have been modified by social evolution to contribute to behavioral specialization in social honey bees, we examine stress responses of guard bees and other behavioral castes. Guard bees sacrifice their lives to defend the colony from threats. Here we test the hypothesis that guard bees are more sensitive to stressors than hive bees or foragers.

This study will reveal general stress pathways in insects, and show how they have been adapted by the process of social evolution to develop behavioral specialisation.

## **Mechanisms and Functions of Colour in the Hibiscus Harlequin Bug**

**Scott Fabricant, Mariella Herberstein and Darrell Kemp**

*Department of Biological Sciences, Faculty of Science, Macquarie University, NSW 2109, Australia.*

*scott.fabricant@mq.edu.au*

### **Poster Abstract**

Colour patterns in insects may be used as signals for mate attraction, predator avoidance (eg crypsis), conspicuous warning colouration (eg aposematism), conspecific recognition, or any combination of such. In each of these contexts, there are multiple selection pressures acting on the evolution of colour patterns, including signaler/receiver physiology, phylogenetic history, and both biotic and abiotic elements in their ecology. Many Scutelleridae ('jewel bugs') have bright contrasting colour patterns frequently treated as 'aposematic' in the literature. Many also feature rich, saturated iridescent colour patches. However, not every species is conspicuous, or iridescent, and these traits appear to have evolved multiple times within this family. To unravel the proximate mechanisms and evolution of colour patterns in jewel bugs I will perform morphological, spectroscopic, ultrastructural (EM) and chemical analysis on target species. Here I present preliminary data on the Hibiscus Harlequin Bug (*Tectocoris diopthalmus*), identifying the pigments and components of cuticular ultrastructure responsible for colour production. Physiology of receivers is also considered using visual models of bug and avian vision receptors. The broad objectives are to reveal what avenues are available to create variation and new colour patterns, and the physiological constraints that evolution may be under. In future work, ecological data will identify the environmental influences on colour patterns, while a phylogeny will be created to provide an evolutionary context.

## **Distribution Modelling and Kin Recognition in *Miomantis caffra***

**Murray Fea, Gregory Holwell and Margaret Stanley**

*University of Auckland, New Zealand*

*Mfea015@auckland.ac.nz*

### **Talk Abstract**

Species distribution modelling is being used more and more often for examining the potential range of invasive species. However, this use poses several challenges for prediction using computer models, including the often limited spatial and ecological data that are available and the requirement to project into a novel environment. *Miomantis caffra* is a mantid native to South Africa, which has become successful in urban fringe environments since its discovery in New Zealand in the late 1970s. It is similar in many ecological traits to its native counterpart *Orthodera novaezealandiae*, creating potential for competitive displacement of this species. The model MaxEnt (Maximum Entropy) is used to make predictions for *M. caffra*'s potential distribution in New Zealand under the sub-optimal conditions which typify the task. In addition, this project examines the resilience of *M. caffra* oothecae in differing climatic zones to provide an independent range prediction based on separate data. The results of these two approaches will be: 1) combined to provide an overall best estimate of the species' potential range and 2) compared to evaluate the performance of MaxEnt under different input conditions. *M. caffra* is also of interest from a behavioural perspective. Because it is a highly cannibalistic species and because many nymphs hatch from each ootheca, we might expect some degree of kin recognition and discrimination to have arisen in order

to minimise siblicide. This is tested by comparing the cannibalism rate among nymphs in groups of siblings and non-siblings. Preliminary results suggest that no restraint is shown towards cannibalising siblings relative to non-siblings. This is interesting because it is thought that cannibalism as a foraging method is more likely to evolve if close relatives can be avoided, due to the penalty incurred to the inclusive fitness of the attacker.

## **Predatory ecology between the colour morphs of a common piscivore on juvenile coral reef fishes**

**William Feeney<sup>1,2</sup>, Mark McCormick<sup>1</sup> and Richard Rowe<sup>1</sup>**

<sup>1</sup> *ARC Centre of Excellence for Coral Reef Studies, and School of Marine and Tropical Biology, James Cook University, Townsville, Queensland 4811, Australia*

<sup>2</sup> *Current Address: Evolution, Ecology and Genetics, Research School of Biology, the Australian National University, Canberra, ACT, 0200, Australia*

*william.feeney@anu.edu.au*

### **Abstract**

Despite the hypothesised importance of piscivorous mesopredators as influential regulators of the composition of coral reef fish communities, few studies have investigated their predatory ecology or examined their impact on juvenile fish populations. Applying behavioural observations, this study investigated the predatory ecology of the two colour morphs of a common coral reef mesopredator the dottyback, *Pseudochromis fuscus* at the reef flats surrounding Lizard Island on the northern Great Barrier Reef, Australia. Dottybacks exhibited two distinct feeding strategies; an ambush and an aware strategy. The ambush feeding strategy was less common, more effective and resulted in more successful captures of juvenile fishes than the aware feeding strategy. Their predatory schedule exhibited no diurnal variation. The number of predatory strikes did not increase with standard length, but the success rate and impact on juvenile fishes did increase with standard length. This resulted in estimated hourly impacts on juvenile fish ranging from 0.61 in small *P. fuscus* individuals (5.45 per day) to 3.1 in large *P. fuscus* individuals (27.89 per day). The predatory ecology of *P. fuscus* did not vary between the colour morphs. Yellow morphs were found to inhabit smaller, more complex home ranges dominated by branching corals while brown morphs inhabited larger, less complex home ranges dominated by coral rubble. The number of juvenile fishes within the home ranges did not vary, while variation in juvenile fish composition within home range occurred between colour morphs. Colour polymorphisms in this species may be a result of polymorphic crypsis. These observations of the predatory ecology of *P. fuscus* support the hypothesis that in coral reef systems, piscivorous mesopredators are important regulators of coral reef fish community compositions.

## **Social structure and parasite infection patterns in a network of endangered lizards, *Tiliqua adelaidensis***

**Aaron L. Fenner, Stephanie S. Godfrey and C. Michael Bull**

*School of Biological Sciences, Flinders University. Box 2100, Adelaide SA 5001*  
*aaron.fenner@flinders.edu.au*

### **Talk Abstract**

Early models of parasite dynamics assumed a homogeneous host population with all individuals equally likely to become infected. More recently, increased awareness of individual variation and susceptibility among hosts, and the behaviour and social structuring within the host population, can play a significant

role in the transmission of parasites. We explored social networks in a solitary, territorial scincid, the endangered pygmy bluetongue lizard, and the associated infection patterns of two indirectly transmitted parasites (a tick and a nematode). In the analysis we asked how important are adjacent home ranges for the movement of each parasite around the population, and can we derive insights into the transmission dynamics of each parasite. In the case of ticks, we found infected individuals were significantly more strongly connected to neighbouring lizards. For nematodes, we found no significant difference in network connectivity between infected and uninfected individuals. However, when we examined the connectivity of infected individuals to lizards who moved through the population (drifters), we found infected individuals were more strongly connected to drifters than uninfected individuals. For endangered species, understanding how parasites are transmitted through the population is important for the conservation (in regards to disease outbreaks) and management strategies (translocations, relocations) of species.

## **Energetic, predation and lifetime costs incurred during mating in dumpling squid, *Euprymna tasmanica*.**

**Amanda Franklin, Zoe Squires and Dr. Devi Stuart-Fox**

*Department of Zoology, The University of Melbourne, Victoria, 3010  
amandamf@pgrad.unimelb.edu.au*

### **Talk Abstract**

Despite the benefits of sexual reproduction, various costs are associated with mating such as injury and a reduced lifespan, yet these costs have been comprehensively examined in very few taxa. Cephalopods (squids, octopus and cuttlefish) exhibit a variety of costly mating strategies, such as extended copulation (>1 hour). All species studies to date are polyandrous (females mate multiply), which may compound the costs associated with mating. I investigated three potential costs of mating in dumpling squid (*Euprymna tasmanica*); energy expenditure, increased predation risk and reduced female longevity. Squid were able to swim against a current for significantly less time after mating than prior to mating, regardless of sex, mating duration or mass, demonstrating a clear energetic cost of mating. I then investigated predation costs of mating by measuring the behavioural response of mating pairs to three different predation environments (no predator, predator introduced before mating commenced and predator introduced during mating). Preliminary results indicate that squid mate for a similar duration in all three situations but are much more likely to exhibit defensive and escape behaviours in response to a predator. Given that the species is semelparous, dumpling squid may prioritise current reproductive opportunities because future reproductive opportunities may be limited. Lastly, I will quantify female longevity costs by comparing the adult lifespan of virgin, singularly and multiply mated females. Because virgin females lay eggs, this experiment will disentangle the cost of mating from the cost of reproduction (mating, egg production and parental care), which few studies have achieved. Together, these experiments will provide insight into the trade-off between costs and benefits of mating frequency, an area of evolutionary biology that has far reaching consequences for understanding sexual conflict and the evolution of mating strategies.

## **Orchid colours and deceptive pollination**

**Anne Gaskett**

*School of Biological Sciences, The University of Auckland, Private Bag 92019 Auckland 1142, New Zealand.*  
*a.gaskett@auckland.ac.nz*

### **Talk Abstract**

Visual signals such as floral colour are primary pollinator attractants. Orchids have long been thought to use colour in pollinator attraction and deception, but colour is likely to function quite differently in rewarding than in nectarless or deceptive pollination systems.

Food-deceptive orchids lack nectar, but still attract foraging male and female insects. Hungry insects may forage fruitlessly on these orchids, but they nonetheless transfer orchid pollen. In food deceptive orchids, colour can function in Batesian floral mimicry of a single specific, model flowering plant species. More commonly, food deceptive orchids have the generalised appearance of rewarding flowers without specific mimicry of any particular model species. Besides mimicry, orchids may also exploit pollinators' sensory biases or innate preferences for certain wavelengths and colour contrasts. Here I present new data on spectral reflectance of food deceptive *Caladenia* orchids from Western Australia.

## **The evolution of sexual dimorphism in the hibiscus harlequin bug *Tectocoris diophthalmus***

**Raelene Giffney, Darrell Kemp, Marie Herberstein**

*Dept of Biological Sciences, Macquarie University, North Ryde, Sydney Australia.*  
*raelene.giffney@mq.edu.au*

### **Talk/Poster Abstract**

Over time selective pressures have driven the evolution of widespread differences in relation to the appearance, behaviour and physiology of each of the sexes. The degree of sexual dimorphism is often astounding, given the mechanisms operating to achieve and maintain these differences operate within an almost identical genome. Sexual dichromatism is expected to indicate the phenotypic signature of sexual selection, either past or present. Theory predicts that traits subject to sexual selection are also highly condition dependant in their expression, due to the trade-off between viability optima and the fitness benefits of heightened sexual attractiveness. *Tectocoris diophthalmus* or the hibiscus harlequin bug is a sexually dichromatic member of the jewel bug family Scutelleridae. Male bugs exhibit patches of bright iridescent structural colouration on their scutellum on a background of dark orange/red pigment, believed to be ornamental, whilst the larger female bugs have smaller, often absent, colour patches on a paler yellow/orange pigmented background. The hibiscus harlequin bug is considered an ideal candidate species for testing theories on sexual signalling, condition dependence and the genetic architecture for the evolution and maintenance of sexual dimorphism. The extent of the inter- and intra-sexual variation in the cover of iridescent colouration and how it varies with body size is analysed and presented in the context of current theories on the role of condition-dependence traits in the evolution of sexual dimorphism.

## **Investigation of variation in the aggressive behaviour of the green tree ant, *Oecophylla smaragdina*.**

**Katherine Gill, Mark Elgar, Ellen van Wilgenburg and David Macmillan**

*Zoology Department, The University of Melbourne, Victoria 3010*  
*k.gill2@pgrad.unimelb.edu.au*

### **Talk Abstract**

For social animals, such as ants, protecting the integrity of the colony and its contents are vital for survival. Thus, it necessary for individuals to recognize whether other individuals are friends or foes, a process referred to as nestmate recognition. Social insects use the hydrocarbons present on the cuticle to distinguish between nestmates and non-nestmates, typically responding aggressively to the latter. There is considerable variation in this aggressive response, and the source of that variation is poorly understood but may be influenced by the degree of similarity in cuticular hydrocarbons between colonies, the frequency of prior interactions between colonies and the value of the defended resource. We investigated the variation in the aggressive behaviour of the green tree ant, *Oecophylla smaragdina*, a highly territorial, arboreal species from northern Queensland. Field experiments revealed that ants from colonies that had experienced repeated incursions from non-nestmates were more aggressive than ants that had not been so exposed. This was not a generalised response, suggesting that the colony acquires a collective memory of prior interactions. Furthermore, aggressive behaviour of the green tree ant was attributed, at least in part, to the condition of the antennae but not to relative age of the animal. This study demonstrates that the aggressive behaviour of green tree ants is condition- and experience-dependant.

## **Networks and parasite transmission in the sleepy lizard, *Tiliqua rugosa*: the importance of host and parasite behaviour.**

**Stephanie Godfrey, Caroline Wohlfeil, Pradip Gyawali and Michael Bull**

*School of Biological Sciences, Flinders University, PO Box 2100, Adelaide, SA 5001, Australia.*  
*Stephanie.Godfrey@flinders.edu.au*

### **Talk Abstract**

Understanding how different parasites spread through wildlife populations is essential to conservation management. Host behaviour is a critical component of this, since the patterns of contact among hosts can influence the pathways for the direct transmission of contagious pathogens. However, other aspects of host behaviour may influence the transmission of parasites that have infectious stages in the off-host environment, or require a vector or intermediate host as a part of the transmission cycle. We used social networks to explore links between different aspects of host behaviour and transmission pathways for parasites with different transmission modes in the sleepy lizard (*Tiliqua rugosa*). We attached Global Positioning System (GPS) loggers to 60 lizards during their activity season (September – December) in 2009, in the mid-north of South Australia. The loggers continuously recorded the activity and location of lizards. From the GPS locations, we constructed networks to model the transmission of (1) contagious pathogens, using a contact network, (2) ticks, using a refuge-sharing network, and (3) intestinal parasites, using a space-sharing network. Each of the different networks had a different structure, suggesting that the each of the parasites had different transmission pathways within the same host population. We then compared the derived networks with empirical measures of parasite load. More strongly positioned individuals in the refuge-sharing network had higher tick burdens. However, there was no relationship between connectedness of individuals in the space-sharing network and intestinal parasite infection.

Instead, the average intensity of space sharing was positively associated with infection with intestinal parasites. Our findings suggest that networks are useful in understanding parasite transmission for parasites in wildlife populations, depending on their transmission mode.

## **Wild and captive kea (*Nestor notabilis*) behave very differently on an inserting objects task.**

**Amanda L. Greer, Raoul Schwing, Gyula K. Gajdon and Ludwig Huber**

*School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch, New Zealand*

*Manda.greer@gmail.com*

### **Talk Abstract**

Kea (*Nestor notabilis*) are well known for their exceptionally playful and explorative behaviour and anecdotes about their intelligence abound. Over the last decade there have been a series of scientific investigations into their problem solving abilities which have revealed that in certain tasks the kea's performance rivals even that of the chimpanzee. However, these studies have repeatedly found differences in the performance of captive and wild birds. Captive kea are known to improve in their performance through social learning whereas no evidence of this has yet been found in the wild population. Captive kea also outperform their wild counterparts in experiments designed to test understanding of means-end relationships.

For the current experiment we tested wild birds using the 'tube toy' paradigm. The birds were offered two hollow, vertical tubes mounted on a board and a pile of toddler toys of various shapes and colours, most of which were of a suitable size to be inserted into the tubes. Although there was no food reward for inserting the toys into the tubes, placing objects in different relationships to one another in order to examine and then repeat an effect (tertiary circular reactions) is a typical phase that human and at least some primate toddlers go through. When captive kea are offered this apparatus they routinely play with the toys, insert toys into the tubes and also combine them with the tops of the tubes. However, although they were highly motivated to play with both the toys and the tubes, no wild kea was observed to insert objects into tubes during 592 minutes of observations and only seven toy-tube combinations were observed. This adds to the growing body of data that suggests captive and wild kea have qualitatively different exploration behaviour.

## **The effects of age and sex on pain sensitivity in newborn lambs**

**Mirjam Guesgen, Ngaio Beausoleil, Ed Minot, Mairi Stewart and Kevin Stafford.**

*Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Palmerston North, New Zealand*

*mguesgen@gmail.com*

### **Talk Abstract**

Sheep routinely undergo painful husbandry procedures including castration and tail docking. Many countries, including New Zealand, have regulations that promote animal welfare by carrying out castration and docking as early as possible. These regulations are based on a body of work that shows that older lambs show a greater frequency of pain-related behaviour after docking or castration than younger lambs. This suggests that older animals find these experiences more painful than younger ones. The aim of this study was to investigate the effects of age and sex on pain sensitivity in lambs using a laser thermal

stimulus. Lambs' nociceptive thresholds were measured at 1, 3, 5, 7, 9 or 12 days of age using a purpose-built remote carbon dioxide laser device. There was no significant effect of sex, relationship, test or age on lambs' latency to respond. However, there is a significant interaction effect of sex and age ( $p=0.009$ ), with males showing a significantly greater latency to response at 12 days old than females but no difference was observed between males and females prior to 7 days old. This research is novel, in that it shows that differences in male and female pain sensitivity are not present in neonatal lambs, but rather develop or are learned over the first weeks of life. Future research will look beyond 12 days to see whether males continue to become less sensitive to pain and females more sensitive, thus giving us a more complete picture of the ontogeny of pain processing development in male and female lambs.

## **A different perspective on age related associative and non-associative learning performance in honeybees.**

**David Guez**

*Dept. of Psychology, The Australian National University, Canberra, ACT, 0200, Australia  
David.guez@mac.com*

### **Talk Abstract**

Investigations into honeybee learning using the sugar elicited proboscis extension reflex (PER) have revealed differences with age. In addition, comparisons between associative and non-associative learning performance using PER have uncovered surprising discrepancies. Whilst associative learning has been shown to improve with age, non associative learning, such as habituation, has shown an apparent decline in performance with age. Here we investigated changes in the sugar elicited PER threshold using 6 different sugars to evaluate the relative value of a given sugar solution as a bee ages. Our results revealed an interesting switch in sugar response between the ages of 7 and 8 days when sucrose or fructose was presented. Sucrose threshold decreased suddenly between 7 and 8 days of age. Response to fructose ceased completely at day 8 and this was not due to a suppression in perception. Our sucrose results explain the apparent discrepancies that have been observed between associative and non associative learning performance in honeybees. We suggest that in associative learning the perceived value of the sugar reward increases with age and so learning appears to improve. Conversely, in non associative learning the stimulus value increases with age, and subsequently habituation of the response is harder to achieve. We discuss the importance of perspective on interpreting behavioural data, especially when conducting age related experiments in honeybees. In addition, we propose evolutionary reasons for the discrepancies we observed in sugar threshold response and relate these to the caste structure within the honeybee colony.

## **Trade-offs between silk and web investment in orb-web spiders**

**Aaron Harmer and Josh Madin**

*Department of Biological Sciences, Macquarie University, Sydney 2109, Australia  
aaron.harmer@mq.edu.au*

### **Talk Abstract**

Ecosystem variation through time and space exposes spiders to changes in prey type and abundance, microhabitat structure, predator abundance and competition from invasive species. The ability of spiders to cope with changing conditions is largely determined by plasticity in web biomechanical function (the interaction between web architecture and silk properties). While spiders are known to vary web architecture in response to foraging conditions, we have limited understanding of how spiders actively vary silk properties or web biomechanical function. As silk production and web-building are metabolically

and energetically expensive, it is likely that spiders face trade-offs between aspects of web architecture and the mechanical properties of silks. For instance, a hungry spider may build a larger web, spreading its silk more thinly to increase its chances of catching at least some prey, while a well-satiated spider may become more selective in its prey capture by building a smaller web, concentrating silk in a smaller area, and increasing its chance of stopping large profitable prey. Alternatively, if an orb-web spider modifies the energy-absorbing capacity of its web by changing the ratio of dragline and capture silk, does it modify silk properties to compensate for, or to facilitate, such structural shifts? We examine trade-offs between silk properties and web architecture by manipulating spider foraging conditions, including prey size and abundance, and microhabitat structure. Prey capture is critical for spiders to be able to mature and reproduce and so their ability to cope with variation in foraging conditions has important fitness consequences.

## **Collective decision-making in gregarious *Perga* sawfly larvae**

**Lisa Hodgkin, Matthew Symonds and Mark Elgar**

*Department of Zoology, University of Melbourne University, Parkville Victoria 3010  
l.hodgkin@pgrad.unimelb.edu.au*

### **Poster Abstract**

Group living in insects is widespread and encompasses a diverse range of behaviours and strategies. Sociality can enhance an individual's ability to detect predators, locate resources, find a mate and increase their rate of development and survival. However, insects living socially may have a greater risk of predation, disease transmission and competition for resources. Nevertheless, an interesting consequence of group living is the opportunity to make collective decisions. How groups make these collective decisions and what factors have an influence is not fully understood. We investigated whether ecological factors influenced a group's collective decision to begin foraging in *Perga* sawflies in a eucalypt plantation on Philip Island, Victoria. *Perga* sawflies are highly social, forming large larval aggregations that synchronise feeding and development. Colonies feed nocturnally, and the decision to begin foraging can have serious consequences. Moving earlier increases visibility to potential predators and moving later means less opportunity to feed. We expected that larger, older colonies would travel further to obtain sufficient food and thus leave earlier. In contrast, smaller, more vulnerable colonies may leave later to minimise predation. We monitored numerous sawfly colonies to examine whether time, temperature or light initiate colony movement. We will discuss our results in terms of evolutionary costs and benefits of aggregation size and how these are influenced by various ecological constraints.

## **Mating strategy and sex ratio in the blue-banded bee *Amegilla murrayensis*, and implications for the evolution of male dimorphism**

**Katja Hogendoorn and Michael A. Keller**

*The University of Adelaide, Waite Campus, Adelaide SA 5005  
katja.hogendoorn@adelaide.edu.au*

### **Talk Abstract**

Male dimorphism involves the existence of two distinct morphological classes of males within a single population. Such male dimorphism has evolved in several bee species, including the bee genus *Amegilla* (Anthophorini). As in other insect species, male dimorphism is correlated with male mating behaviour. In the case of *Amegilla*, large males actively defend emerging virgin females at the nest site, whereas small males patrol flowers away from the nesting site.

We studied the size distribution of males of *Amegilla murrayensis* in relation to mating behaviour in captivity. Compared to female size, there is a wide distribution in male sizes, but no male dimorphism. However, the males had two distinct mate searching strategies, and males that had territories at nesting sites were significantly larger than males that patrolled on flowers.

The investment strategies of females in male offspring and the implications for the evolution of male dimorphism will be discussed.

## **Bird and moth richness and diversity in native and exotic tree plantations**

**Daniel Hoops**

*Australian National University, Australia.*

*Daniel.hoops@anu.edu.au*

### **Poster Abstract**

In areas with high rates of deforestation, commercial tree plantations hold a high potential for biodiversity conservation. There is an urgent need to determine which characteristics of commercial plantations make the best suitable habitat for native fauna. We compared the bird and moth assemblages in native tree and exotic teak tree plantations in Panama. Using point counts, we recorded 56 bird species only in native tree plantations, 19 species only in teak tree plantations and 44 species in both plantation types. With light traps, we collected 84 moth morphospecies exclusively from native tree plantations, 28 exclusively from teak tree plantations, and 64 from both plantation types. Bird and moth richness and diversity were greater in native tree plantations than in teak tree plantations. Bird abundance, but not moth abundance, was higher in native tree plantations. Birds that prefer forest habitat, edge habitat, and grassland habitat were richer and more abundant in native tree plantations. All feeding guilds were richer and more abundant in native tree plantations, except carnivorous birds which were richer and more abundant in teak tree plantations. These results indicate a higher conservation value for plantations of native trees. We suggest that the production of native trees be promoted over teak trees in the tree farming industry.

## **Love enters through the eyes: Sexual selection via female colour polymorphism in the damselfly *Ischnura heterosticta* (Insecta: Odonata)**

**Shao-chang Huang and Judith Reinhard**

*Queensland Brain Institute, The University of Queensland, St Lucia QLD 4072, Australia.*

*shaochang.huang@uqconnect.edu.au*

### **Poster Abstract**

Many insects display conspicuous colour patterns on their wings and bodies, which serve a range of functions in inter- and intra-specific communication. Colour signals are used to either detect or deter predators, to attract prey, or to identify suitable mating partners. Colour signals have been particularly well investigated with respect to sexual selection, among other in damselflies (Odonata, Zygoptera). Many damselfly species from the genus *Ischnura* show female-limited colour polymorphism. Several hypotheses have been put forward to explain the mechanisms for maintenance of female colour polymorphism, including female mate choice. Using the damselfly *Ischnura heterosticta* (Common Bluetail), we are investigating whether and how this species uses colour signals for communication and mate choice. *I. heterosticta* is widespread in Australia, and can be observed throughout the year around still water habitats, such as ponds, lakes or lagoons. Males of *I. heterosticta* are blue, but the females have two colour morphs: andromorphs (male-like blue colouration) and gynomorphs (green-grey colouration). Males and

the two types of females coexist in the same habitats, and surprisingly, show no significant territorial behaviours. The population distribution of the two female morphs varies significantly, and we will show how female body colouration affects mating and oviposition. Physiological studies of *I. heterosticta* colour vision and the colour reflectance spectra of their bodies give first insights how males and females use colour signals to recognize potential mates and determine the individual qualities from the visual cues displayed on the wings and bodies. This study will help us understand the mechanisms underlying sexual selection in *I. heterosticta*.

## **The influence of the cage-diving industry on the 3D-swimming behaviour of white sharks**

**Huveneers C<sup>1,2</sup>, Bruce B<sup>3</sup>, Rogers PJ<sup>1,2</sup>, Beckmann C<sup>2</sup> and Semmens J<sup>4</sup>**

<sup>1</sup>*Threatened, Endangered and Protected Species subprogram, SARDI – Aquatic Sciences, West Beach, Adelaide, South Australia, 5165, Australia;* <sup>2</sup>*School of Biological Sciences, Flinders University, Bedford Park, Adelaide, South Australia, 5043, Australia;* <sup>3</sup>*CSIRO Marine and Atmospheric Research, Hobart, Tasmania, 7000, Australia;* <sup>4</sup>*Tasmanian Aquaculture and Fisheries Institute, Tarooma, Hobart, Tasmania, 7053, Australia.*  
*Charlie.huveneers@sa.gov.au*

### **Talk Abstract**

The white shark (*Carcharodon carcharias*) is a distinctive species which occurs world-wide in coastal temperate and subtropical regions. The combination of slow life history characteristics and world-wide concerns regarding their population status has prompted their protection across a number of jurisdictions. Research on the movement patterns of white sharks has identified that there are specific sites such as pinniped colonies which may represent important habitat for the white sharks. Some of these pinniped colonies that have significant white shark activity are also targeted by ecotourism operators such as in Australia, South Africa, Mexico and California, where lucrative and expanding industries have developed around cage-diving activities. These sites are also areas where white sharks are most vulnerable to interactions and interferences from human activities. During cage-diving activities, operators commonly use berley (mixture of minced fish and blood) to attract sharks close to the boat for viewing. The impact of berley activity on the behaviour of white sharks is unknown and requires further investigation to ensure that appropriate management arrangements are established to minimise the impacts of the cage-diving industries worldwide. A Vemco Radio-Acoustic Positioning (VRAP) system was deployed off North Neptune Island, South Australia to investigate the movements of white sharks during berleying activities. The VRAP system enables fine-scale modeling of the swimming behaviour of the tagged sharks through continuous recording of positions and depths within 1 m accuracy. Ten white sharks were externally tagged with continuous V16P between November 2009 and December 2010. Whereas some individuals did not remain within the study site and left a short time following tagging, others showed some level of residency and evidence of time partitioning between two berleying vessels. Results from the project will provide data that will help managers to ensure a sustainable cage-diving industry minimising the impacts of the industry on white shark populations.

## **What does a homing ant look at? Gaze direction and view reconstruction in jack jumper ants**

**Piyankarie Jayatilaka, Sarah Gourmaud, Ajay Narendra and Jochen Zeil**

*Division of Evolution, Ecology & Genetics, Research School of Biology, ARC Centre of Excellence in Vision Science, The Australian National University, Canberra, ACT 2601, Australia.*

*piyankarie.jayatilaka@anu.edu.au*

### **Talk Abstract**

Individual jack jumper ants visit specific trees to locate food and are familiar with this route from nest to tree. On what navigational knowledge is this familiarity based and what do ants know about their wider environment?

We addressed these questions by displacing homing ants 10m away from the nest in 8 different compass directions. We found that displaced ants at the release sites look around briefly and then head directly towards their nest, irrespective of whether they possess home vector information through path integration (full vector ants) or not (zero vector ants). Thus, these results cannot be explained by either path integration or pheromone trails. To understand this remarkable navigational ability, we filmed ant behaviour at 10 m release sites and 5 m along the ants' path towards the nest and recorded the visual scene from ant perspective. We then identified the parts of the scene ants were looking at when reorientating. In this talk, I will describe the salient features available to ants in their environment and discuss how ants may use these features to know where to go even when released at locations where they most probably have never been before.

## **Decorating for food or camouflage?**

**Eunice Jingmei Tan and Daiqin Li**

*University of Melbourne, Zoology Department, Parkville, VIC 3010*

*Eunice.t@gmail.com*

### **Poster Abstract**

Web decorations have intrigued scientists since their discovery. Many species of orb-weavers are documented to incorporate a variety of materials such as prey remains, silk ribbons and plant detritus into the orb webs. It appears to be counter-intuitive for spiders to add web decorations as these may make the web – and thus the spider – more conspicuous to predators, or allow insect prey to perceive the presence of the web and the associated dangers. To unravel the functional significance of web decorations, this study combines inter-specific comparative studies including field observations and experimental laboratory studies of a genus of web-decorating spiders, *Cyclosa*. We show that web decorations function primarily as luring signals to attract prey. While in certain instances they do provide some degree of concealment from predators, web decorations can also increase predation risk by advertising the presence of the spider. The opposing selective pressures of improving foraging success while reducing predation risks possibly contribute to the observed inconsistent incidence and signal polymorphism of web decoration types.

## **Heritability of reproductive traits in captive Common Marmosets (*Callithrix jacchus*)**

**Noriyoshi Kawasaki, James Bourne, Anne Peters and Bob Wong**

*Gippsland Field Station, Monash University, Lot 1 Lawless Road, Churchill, VIC 3842, Australia  
noriyoshi.kawasaki@monash.edu*

### **Talk Abstract**

In the case of kin selection, alloparental care in cooperative breeding systems is expected to provide indirect fitness benefit to the alloparents by increasing the fitness of their close relatives. However, detecting the fitness effects of alloparental care is problematic since such effects can often be difficult to disentangle from other confounding factors such as the quality of the parent and/or habitat. Common marmosets (*Callithrix jacchus*) are small neotropical primates that live in a group of extended family members which consists of a dominant breeding pair and several male and female subordinate group members. They are cooperative breeders whereby all group members provide care for the infant of the dominant pair. Using 10-years worth of breeding records from a captive colony of common marmosets, we employed quantitative genetic techniques to investigate the heritability of reproductive traits, including infant birth weight and growth rate, length of interbirth period, success of subsequent reproduction, lifetime offspring number and the ratio of live and still births, and postpartum weight change of breeders. The results showed high heritability in most of the reproductive traits examined, suggesting that there may be strong parental effects on reproductive success in common marmosets. Our findings also indicate that the alloparental care provided by subordinate group members, at least in captive environments, may not have significant indirect fitness effects.

## **Adoption of pouch young in eastern grey kangaroos**

**Wendy J. King<sup>1</sup> and Marco Festa-Bianchet<sup>2</sup>**

<sup>1</sup>*School of Biological Sciences, University of Queensland, St. Lucia QLD 4072, Australia;*

<sup>2</sup>*Département de Biologie, Université de Sherbrooke, Sherbrooke, Qc, J1K 2R1, Canada.  
wendy.king@uqconnect.edu.au*

### **Talk Abstract**

In mammals, adoption and nursing of another female's offspring is rare, and mostly restricted to cooperatively breeding and/or highly social species that form kin groups. These adoptions are thus usually interpreted as a result of kin selection rather than misdirected care. Eastern grey kangaroos may form female kin groups because females appear philopatric. A 3-year study of a population in Wilsons Promontory National Park, Victoria, revealed 5 adoptions among 115 juveniles (4%). Four adoptions involved reciprocal switches between two mothers and one case involved an adoption by a marked mother whose pouch young disappeared. Adoptive mothers and young displayed affiliative behaviours similar to those of biological pairs several months after permanent pouch emergence. Adoptions occurred at the "in and out" stage of young development and did not seem to involve closely related individuals. These adoptions appear to be caused by misdirected care in a high-density population, and suggest poorly developed mother-offspring recognition mechanisms.

## Opsins and oil droplets in a parrot showing intraspecific plumage colour variation

Ben Knott<sup>1</sup>, Wayne L. Davies<sup>2</sup>, Livia S. Carvalho<sup>3</sup> Mathew Berg<sup>1</sup>, James K. Bowmaker<sup>3</sup>, Andrew T.D. Bennett<sup>1</sup> and David M. Hunt<sup>3</sup>

<sup>1</sup>*School of Life & Environmental Sciences, Deakin University, Pigdons Road, Geelong, VIC 3217, Australia Ben.knott@deakin.edu.au*

### Talk Abstract

The Australian parrot *Platycercus elegans* shows considerable intraspecific plumage colour variation across the species range, with subspecies showing three colour forms: crimson, yellow, and an intermediate adalaidae form. Sensory drive theories predict that differences in an animal's perception of colour could drive the extreme plumage variation observed within *P. elegans*. This makes this species an ideal potential candidate for intraspecific variation in the physiology of vision, which is hitherto unreported in birds. We studied the potential for both short-term environmental variables and long-term evolutionary factors to cause such variation in *P. elegans*. For the environmental factors, we studied the effects of dietary manipulations on the carotenoid-rich retinal oil droplets that strongly influence spectral sensitivity, and found diet caused complex changes in the absorbance of these droplets. For the long term factors, avian vision is based on five light sensitive visual pigments and the basic molecular sequences of these were required from *P. elegans* before searching for variation between colour morphs. Retinal RNA was obtained from three wild adalaidae morphs for sequencing. The protein opsin of the low light sensitive rod visual pigments possessed a 25 amino acid extension unknown in any animal, and features of the extension could increase the acuity of vision, and therefore encourage behaviour, in lower light conditions. Differences in ambient light in which birds are active could cause adaptive changes in colour vision and, through sensory drive, subsequently lead to the divergence in plumage colour. Furthermore, the SWS1 visual pigment was found to be ultraviolet sensitive, suggesting these parrots use ultraviolet cues for some aspects of visual behaviour.

## Brainless behaviour: Irrationality and speed-accuracy trade-offs in a giant amoeba (*Physarum polycephalum*)

**Tanya Latty and Madeleine Beekman**

*School of Biological Sciences, University of Sydney, Macleay Building (A12), Sydney, NSW, 2006  
Tanya.latty@sydney.edu.au*

### Talk Abstract

The acellular slime mould *Physarum polycephalum* is a single-celled, multinucleate, amoeboid organism. Yet, despite lacking a brain (or any form of centralized information processing) slime mould amoebas are capable of making trade-offs between risk and food quality. Here I report on recent evidence suggesting that *Physarum polycephalum* (like humans and other neurologically sophisticated organisms) are irrational. Models of decision-making often assume that individuals behave rationally by assessing the absolute value of options rather than by comparing amongst available options. However, experimental evidence suggests that animals and humans use comparative decision-making strategies, leading to 'irrational' decisions. When offered a choice between two food types (A and B), slime mould amoebas showed no preference for either option. However, when a 'decoy' option was added to the choice set, the amoebas preference for the option A increased dramatically, suggesting that the slime mould uses comparative valuation strategies and is 'irrational'. In a separate experiment, we found evidence that slime moulds are susceptible to speed accuracy trade-offs such that slime moulds that make fast decisions also tend to make bad decisions. These results highlight the similarities between decision making in humans and slime moulds.

## **The influence of refuge sharing on social behaviour in the lizard *Tiliqua rugosa***

**Stephan T. Leu, Peter M. Kappeler and C. Michael Bull**

*School of Environmental and Life Sciences, University of Newcastle, Callaghan NSW 2308, Australia; School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide 5001, Australia;*  
*stephan.leu@newcastle.edu.au*

### **Talk Abstract**

Refuge sharing by otherwise solitary individuals during periods of inactivity is an integral part of social behaviour and has been suggested to be the precursor to more complex social behaviour. We compared social association patterns of active versus inactive sheltering individuals in the social Australian sleepy lizard, *Tiliqua rugosa*, to empirically test the hypothesis that refuge sharing facilitates social associations while individuals are active. We fitted 18 neighbouring lizards with Global Positioning System (GPS) recorders to continuously monitor social associations among all individuals, based on location records taken every 10 min for 3 months. Based on these spatial data, we constructed three weighted, undirected social networks. Two networks were based on empirical association data (one for active and one for inactive lizards in their refuges), and a third null model network was based on hypothetical random refuge sharing. We found patterns opposite to the predictions of our hypothesis. Most importantly, association strength was higher in active than in inactive sheltering lizards. That is, individual lizards were more likely to associate with other lizards while active than while inactive and in shelters. Thus, refuge sharing did not lead to increased frequencies of social associations while lizards were active, and we did not find any evidence that refuge sharing was a precursor to sleepy lizard social behaviour. Our study of an unusually social reptile provides both quantitative data on the relationship between refuge sharing and social associations during periods of activity and further insights into the evolution of social behaviour in vertebrates.

## **Angry honeybees: Does target size, shape or colour matter?**

**Nikolai Liebsch, Eliza Middleton and Mandyam Srinivasan**

*Queensland Brain Institute, University of Queensland, St Lucia, QLD 4072, Australia*  
*and ARC Centre of Excellence in Vision Science, Australian National University, Canberra, ACT*  
*2601, Australia*  
*n.liebsch@uq.edu.au*

### **Poster Abstract**

The basic sensory capabilities of honeybees are fairly well studied. In particular vision and olfaction, which seem to play the most important roles in a bee's life. But most studies focus exclusively on 'normal' scenarios, whereas little is known about how a bee's perception / mechanisms might change in 'extreme' situations like when they go into 'attack' mode to defend their hive. This study investigates the visual cues that draw most attention as a target in aggravated honeybees. We developed a method to 'aggravate' honeybees and investigated the intensity of their aggression (number of hits) towards different targets. We presented them with targets differing in size, shape, colour and contrast to elucidate how they modulate their behaviour in order to perform this highly exquisite and demanding task effectively.

## **Extended phenotypes in animal communication: the function of petal-displays in fairy wrens**

**Nicole Lowrey**

*University of Melbourne (Parkville campus), Tin Ally, Melbourne, Victoria 3010  
nlowrey@student.unimelb.edu.au*

### **Talk Abstract**

Animals often manipulate their environment in displays such as 'tool use' for their own fitness advantages. Objects used as tools have been well documented, yet objects used for communication purposes have only recently been studied. Richard Dawkins described these as the 'extended phenotype' of the animal. The functions and evolutionary significance of these displays are poorly understood. This study will observe the influence of petal-carrying displays seen in fairy-wrens on female mate choice decisions of *Malurus cyaneus*. It will focus on effects a) petal colour variation and b) presence and absence of her social mate, have on female choice of an extra-pair partner. These findings will improve understanding of a unique display system, and contribute to Australia's standing as leaders in the global research community. It will also demonstrate the importance of interactions of an organism with its environment, and how conservation efforts are vital to maintain environment integrity.

## **Can Aussies and Kiwis understand each other? The response of little blue penguins to geographic variation in male calls.**

**Abbie E. Mason and Joseph R. Waas**

*Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton 3240,  
New Zealand,  
aem20@waikato.ac.nz*

### **Talk Abstract**

Genetic evidence suggests that little blue penguins (*Eudyptula minor*) in Otago, New Zealand are more closely related to penguins in Australia than to those in the rest of New Zealand. To examine geographical variation in calls and whether variation leads to discrimination between local and foreign individuals, we conducted playback studies at Phillip Island, Australia and Oamaru, Otago. Pairs in burrows were exposed to male advertising calls recorded in three different areas: Otago, Phillip Island and Banks Peninsula (NZ), in addition to pigeon 'coos' as a control. We found no differences in the penguins' behavioural response to calls, other than a tendency for birds at both Phillip Island and Oamaru to respond more promptly to calls of birds from Banks Peninsula. Bank Peninsula penguins are larger and may produce lower frequency calls. We are also conducting an analysis of intra- versus inter-population variation in acoustic parameters to identify differences between calls from different locations (previous analyses suggest that there may be differences consistent with the genetic evidence). If differences occur in the acoustic structure of the calls, our findings demonstrate that the birds do not detect them, or do not alter their response based on the differences they detect.

## **Cooperative birds can differentiate between the alarm calls of both familiar and novel individuals: a mechanism for shaping cooperative propensity in societies?**

**Paul G. McDonald**

*Behavioural and Physiological Ecology Research Centre, Zoology, School of Environmental and Rural Sciences, University of New England, Armidale 2351.*

*paul.mcdonald@une.edu.au*

### **Talk Abstract**

Despite scores of studies focusing on why cooperation is found in animal societies, few have assessed the mechanism by which cooperation is mediated. This is unfortunate, as understanding *how* cooperation might occur is critical to determining *why* it occurs. For example, many hypotheses rely on at least some form of individual discrimination, yet the extent to which this occurs in animal societies has rarely been tested. I therefore investigated the ability of wild Noisy Miners (*Manorina melanocephala*), a highly social species frequently living in colonies of over a hundred individuals, to discriminate between the mobbing calls of different individuals. Over 25 exemplars of the 'chur' call were recorded from each of 17 birds from a colony at Macquarie University. These calls were then used as stimuli in habituation-discrimination paradigm (HDP) trials. This involved playing different exemplars of one bird to a given focal bird housed in a sound chamber. Initially, focal birds rapidly orientated towards the speaker, however responses dwindled overtime and eventually ceased. A call recorded from a different individual was then broadcast and, if the focal bird perceived the two individual's calls as different, orientation towards the speaker was predicted to resume. Trials were carried out on 34 birds: 17 captured from the same Macquarie colony (and thus highly familiar with the calls of individuals used in trials), and 17 birds from an entirely different colony completely novel to the exemplars used in trials. Both groups successfully discriminated between the calls of the different individuals. This unique result opens the door for experiments targeting reciprocity, image scoring and a range of cooperative hypotheses previously thought to be largely operating in the realm of higher primates.

## **The burning question: how does fire affect birds?**

**Brendon Meulders<sup>1</sup>, Don Driscoll<sup>2</sup>, Sonia Kleindorfer<sup>1</sup>**

*<sup>1</sup>School of Biological Sciences, Flinders University, <sup>2</sup>Australian National University  
Brendon.meulders@flinders.edu.au*

### **Poster Abstract**

Despite fire patterns being identified as a key threatening process for many Australian bird species, empirical evidence that demonstrates the mechanisms driving such threats remains sparse. This study addresses fitness costs of fire regimes by examining nest predation for different predator types across burn age. Specifically we test the hypothesis that patterns of nesting outcome (survived, depredated) are different across different burn ages, and that this pattern is explained by differences in nest site vegetation, including concealment. We use artificial nests to test predictions about nesting outcome in relation to nest concealment, and use both open-cupped and domed nests. From marks left on plasticine eggs, we infer predator type (rodent, avian). We test the following predictions: (1) Nest predation will be higher in the recently burnt sites, and higher in domed versus cup nests across all burn ages, (2) vegetation per burn age will be significantly different, with higher vegetation (height, concealment) in the mature sites and lower vegetation (height, concealment) in recently burnt sites, and (3) within each site, nest site vegetation concealment will be correlated with avian predation (because birds are visually hunting predators) but not rodent predation (rodents use olfactory cues to locate nests).

## Tandem recruitment and navigational information in the Australian sugar ant *Camponotus consobrinus*

**Eliza Middleton, Ajay Narendra and Jochen Zeil**

*The Australian National University, Canberra*  
*eliza.middleton@anu.edu.au*

### **Talk Abstract**

We are interested in the navigation and recruitment strategies of the Australian sugar ant, *Camponotus consobrinus*, and in particular, how these relate to the foraging ecology of this species. I have begun to record the daily pattern of foraging activity and find that foragers begin activity late in the day and continue foraging throughout the night. Here I concentrate on the unusual recruitment strategy of sugar ants. *Camponotus consobrinus* use a method of individual recruitment, termed tandem running, which has been described for a few other ant species, such as *Camponotus sericeus* and *Pachycondyla obscuricornis*. Recruits are led to food sources by tandem leaders, but return to the nest on their own. Up to now, it is not known, what navigational information recruits learn in this mode of recruitment. Recent work in *Temnothorax albipennis* indicates that tandem running ants rely to some extent on vision for navigation (Franklin et al. 2010 *Behav Ecol Socio*). However, the visual information the ants use is unknown. By performing separation and displacement experiments on tandem running pairs, I attempt to identify the visual information tandem running ants acquire and use. Recruits that are displaced laterally to their tandem run direction can either (1) be lost, as indicated by continuing search movements; (2) move back in the direction where the nest would be had they not been displaced (indicating path integration); (3) compensate for the displacement and return to the nest (indicating landmark guidance); (4) compensate for the displacement and head for recruitment goal (indicating that they actually are experienced foragers); (5) continue foraging in any direction (indicating that they know where they are and have given up on being recruited).

## Song discrimination in superb fairy-wren subspecies

**Sonia Kleindorfer<sup>1</sup>, Milla Mihailova<sup>1,2</sup>, Diane Colombelli-Négrel<sup>1</sup>, Herbert Hoi<sup>3</sup>, Matteo Griggio<sup>3</sup>, Jeremy Robertson<sup>1</sup>**

<sup>1</sup>*School of Biological Sciences, Flinders University;* <sup>2</sup>*Deakin University;* <sup>3</sup>*Konrad Lorenz Institute for Ethology*  
*mmihailo@deakin.edu.au*

### **Poster abstract**

The complex song of birds is a sexually selected trait that functions as a barrier to reproduction in many species. Quantifying population-level discrimination of song informs our understanding of the role of sexual selection for speciation. In this study, we compare song characteristics and response to song playback in two allopatric populations (island, mainland) of superb fairy-wren (*Malurus cyaneus*) in South Australia; the two populations are sub-species that have been separated by an oceanic barrier (14 km) for ~9000 years. Both males and females sing the complex chatter song; therefore, we analyse male and female song characteristics (including frequency bandwidth, duration, number of elements) and response to playback. The differences in song characteristics were as follows: island song had higher dominant frequency than mainland song; some song elements differed between island and mainland birds; and males had longer and more complex song than females. Next, we compare response to playback of male song from three stimuli (island, mainland, control) across location (island, mainland). Both males and females responded more to local versus distant song, and least to the control. Our results provide evidence for rapid reproductive divergence shaped by song divergence and discrimination between the mainland and island

subspecies of *M. cyaneus*. While there has been some gene flow between the two study populations in the last 9000 years, our results on song divergence suggest an accelerated path of discrimination in the face of gene flow or secondary contact.

## **Should I come or should I go -- nest sites for New Zealand Falcons**

**Edward Minot, Richard Seaton and John Holland**

*Ecology Group PN624, Institute of Natural Resources, Massey University. Private Bag 11222, Palmerston North 4442, New Zealand*  
*e.minot@massey.ac.nz*

### **Talk Abstract**

Recently, the New Zealand falcon (*Falco novaeseelandiae*) has been found breeding in exotic radiata pine plantations, where their numbers have increased, at least over the past decade. The birds nest on the ground almost exclusively in clear cuts or areas with pines less than 4 years old. With a 28-year rotation from planting to harvesting, a forestry compartment is suitable for breeding for only 3 to 4 years in every 28. Thus, after four years, pairs move to breed in a new clear cut. Essentially, the birds nest in ephemeral, early succession habitat. This creates a dilemma for a breeding pair, especially in the third or fourth year of breeding in the same area. Pairs are more successful when breeding together in the same location than when a pair is newly formed or when breeding at a new site. Moreover, a pair is more likely to divorce if they vacate a site than if they remain. Balanced against that, there are apparent advantages for moving to a new site. Recent clear cuts offer more prey, easier hunting and possibly fewer predators. The costs and benefits of moving and staying will be explored.

## **Evaluating speciation in the New Zealand stick insect *Clitarchus***

**Shelley Myers, Thomas Buckley and Greg Holwell**

*Landcare Research, Private Bag 92170, Auckland, New Zealand*  
*myerss@landcareresearch.co.nz*

### **Talk Abstract**

The New Zealand stick insect species *Clitarchus hookeri* is of great interest to biology as this species undergoes a multitude of evolutionary strategies of interest to ecologists. In the south island of New Zealand only parthenogenetic female *Clitarchus* exist, in the North Island both males and females are present and reproduce sexually. In the Far North of New Zealand, this widely-distributed stick insect species is replaced by an ecologically similar and undescribed species of *Clitarchus*. This species is differentiated on the basis of male terminalia, egg morphology and mitochondrial DNA. Populations sampled between the two species show intermediate morphology. Mitochondrial DNA sequences give a clear indication that the two *Clitarchus* species form a hybrid zone. The aim of my research is to quantify the intra and interspecific variation in clasper structure of *Clitarchus* populations across Northland. It is likely that variation in genital structures represents the differing abilities of male control and mating duration. This talk will provide an overview of the behavioural experiments which will be used to identify the level of mate discrimination occurring between *Clitarchus* populations and describe the correlating morphological differences.

## **Begging behaviour predicts food provisioning in parasitised Darwin's finch chicks.**

**Jody O'Connor, Jeremy Robertson & Sonia Kleindorfer**

*School of Biological Sciences, Flinders University, Bedford Park, Adelaide, SA 5001, Australia*  
*Jody.oconnor@flinders.edu.au*

### **Poster Abstract**

The parental food compensation hypothesis explains small or negligible impacts of blood-sucking hematophagous nest parasites on altricial chicks. Parents can provision extra food to compensate for energy loss due to parasitism, which helps to maintain chick growth rates. But few studies have examined sibling conflict for parental care and its influence on parental food distribution to individual chicks. In this study, we used a within-nest camera system in wild Darwin's small ground finch (*Geospiza fuliginosa*) nests to examine parental food distribution to chicks in relation to the strength of chick begging behaviour, and the relative contribution of each parent to compensatory behaviours. We show experimentally that: (1) parents regurgitated food into parasitised chicks' beaks more than twice as often as they did for parasite-free chicks, (2) strongly begging chicks were allocated more food, and survived longer than weakly begging chicks, (3) *P. downsi* fly larvae parasitism did not reduce chick growth rates, and (3) both parents contributed equally to compensatory feeds, but females provided 100% of grooming visits to parasitised chicks. Despite the compensatory effect of increased parental feeding on chick growth rates, parasitised chicks died after a mean 3.2 days, and *P. downsi* parasitism caused 60-80% of chick mortality across years. Ultimately, we show that *P. downsi* larval feeding is costly and prompts adaptive responses in both parent and chicks, which are not sufficient to compensate for the negative impacts of parasitism.

## **Blurred species boundaries in Darwin's tree finches: using song and morphology to interpret gene flow patterns**

**Jody O'Connor, Sonia Kleindorfer, Diane Colombelli-Negrel, and Jeremy Robertson**

*School of Biological Sciences, Flinders University, Bedford Park, Adelaide, SA 5001, Australia*  
*Jody.oconnor@flinders.edu.au*

### **Talk Abstract**

Darwin's finches are renowned for the variation in beak size between the 15 species, whereby beak size is shaped by natural selection for foraging efficiency. Male song characteristics, like trill rate and frequency bandwidth, are correlated with beak morphology. This relationship has opened up new questions about the role of song in sexual signaling and its role in speciation for this group of birds. Here, we examine species boundaries in three Darwin tree finch species on Floreana Island, because their evolutionary history is unclear given small sample size to date. We examine gene flow and interpret patterns of gene flow against beak morphology, song characteristics, and response to interspecific playback of song. Darwin's medium tree finch is endemic to the highland forest of Floreana Island whereas the small and large tree finch also occur on 8-9 other islands. We show that species boundaries between sympatric populations of the small and large tree finch on Floreana Island are maintained by strong assortative mating based on beak morphology and song. Small and large tree finches responded strongly to song playback of their own species only, however the medium tree finch is indiscriminate in its response to small, medium or large tree finch song. Morphological data of all 3 study species identify "borderline" individuals with beak and body measurements that are intermediate between the medium and either the small or large tree finch. Thus the boundaries between these three sympatric species appear to be "blurred", suggesting recent speciation of the medium tree finch and evidence for hybridisation.

## Fear no weevil! Mating tactics in the New Zealand giraffe weevil

**Christina J. Painting**<sup>1</sup>, **Thomas R. Buckley**<sup>2</sup>, **Robert J. B. Hoare**<sup>2</sup>, and **Gregory I. Holwell**<sup>1</sup>

<sup>1</sup> *University of Auckland, School of Biological Sciences, Private Bag 92019, Auckland Mail Centre, Auckland 1142;* <sup>2</sup> *Landcare Research, Private Bag 92170, Auckland, New Zealand.*  
*cpai015@aucklanduni.ac.nz*

### **Talk Abstract**

Males of many animal species display enlarged structures that are used as weapons during combat with competing males to gain access to females or resources. Due to naturally high variation in body and weapon size within a species it is expected that smaller males will have a lower competitive advantage during contests. In some species this high size variation has led to the evolution of alternative reproductive tactics where the smallest males adopt different behaviours during mate searching and mating than larger males. The behaviour of small males is often less aggressive than the behaviour of large males, and does not require the use of the weapon in male-male competition. Males of the New Zealand giraffe weevil (*Lasiorhynchus barbicornis*) possess an elongated rostrum used in intrasexual competition to gain access to females for reproduction. However, due to the extreme variation in male size (body length 16 mm – 90 mm) it is expected that small males will be less successful in using aggressive means to defend females, and will therefore adopt alternative behaviours to achieve copulations. My research will explore the evolution of size-related alternative reproductive tactics in the giraffe weevil, and will determine the effects of ecological factors such as local density and sex ratio on the success of these tactics.

## Grouping and fission-fusion dynamics in Australian snubfin and Indo-Pacific humpback dolphins

**Guido J. Parra**<sup>1,2</sup>, **Peter J. Corkeron**<sup>3,4</sup> and **Peter Arnold**<sup>5</sup>

<sup>1</sup>*Cetacean Ecology, Behaviour and Evolution Group, School of Biological Sciences, Flinders University, Adelaide, SA 5001, Australia;* <sup>2</sup>*South Australian Research and Development Institute (SARDI), Aquatic Sciences, 2 Hamra Avenue, West Beach, SA 5024, Australia;* <sup>3</sup>*Bioacoustics Research Program, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, NY 14850;* <sup>4</sup>*The New England Aquarium, Central Wharf, Boston, MA 02110-3399;* <sup>5</sup>*Museum of Tropical Queensland, 70 -102 Flinders Street, Townsville Queensland 4810, Australia.*  
*Guido.parra@flinders.edu.au*

### **Talk Abstract**

Dolphins live in complex social systems with a wide variety of grouping and association patterns. Understanding the spatiotemporal variation of these associations (fission-fusion dynamics) is necessary to test hypotheses about ecological determinants of social patterns. In this study, we use boat-based surveys, photo-identification, focal observations, classic association analyses and modern social network techniques to quantify variation in the grouping patterns and fission-fusion dynamics of small, sympatric populations of Australian snubfin *Orcaella heinsohni*, and Indo-Pacific humpback dolphins, *Sousa chinensis*, off the north-east coast of Queensland. Based on current knowledge of their feeding ecology and predation risk, we investigated basic predictions of socio-ecological theory on the group size and fission-fusion patterns of both dolphin species. School sizes of snubfin dolphins were larger and more stable, irrespective of behavioural activity, than those of humpback dolphins. While both species showed non-random patterns of association and structure in their association patterns, the social network of snubfin dolphins was characterized by numerous strong associations, whereas the strength of the humpback dolphin's social network did not differ from random. Modelling of temporal patterns of association indicated long-lasting associations were an important feature of snubfin dolphins' fission-fusion dynamics. In contrast,

associations among humpback dolphins over time were best described by short term relationships. As predicted by socio-ecological theory, the contrasting grouping and fission-fusion dynamics of snubfin and humpback dolphins appears to be a response to different feeding habits and prey availability. Future studies involving molecular techniques and direct quantification of food availability and predation risk will help elucidate the suite of interacting ecological, social and evolutionary factors shaping their social structures.

## **Honey bee social pheromones effect worker biogenic amines and ovary development**

**Marianne Peso and Andrew B. Barron**

*Macquarie University Department of Biology, 209 Culloden Rd., Marsfield, NSW 2122, Australia.  
marianne.peso@mq.edu.au*

### **Talk Abstract**

Honey bee workers have two potential life histories: normally in a healthy colony workers are sterile and help the queen by nursing her offspring, but if a colony loses its queen or is failing workers can develop their ovaries and produce male brood of their own. Clearly the behavioural and physiological development of a worker is influenced by the condition of its colony, but what information signals colony condition to workers, and how bees acquire and weight this information is not well understood. Queen and brood pheromones are two key colony signals that influence worker development. Here we explore how these signals work independently and in combination to influence the physiological state of workers. Bees were caged and raised with all combinations of queen and brood pheromone for 14 days. After 14 days, bees were collected for ovary dissection. Previous work has shown that exposure to queen pheromone decreases dopamine levels in young bees (Kocher et al. 2009). To examine the effect of both queen and brood pheromone on worker biogenic amines, a subset of bees were sampled at two and four days of age for HPLC analysis. In addition, we examined the relationship between biogenic amine levels and ovary development. Our work will reveal how complex insect societies function on the level of the individual bee and help improve management of the honey bee for the honey and pollination industries.

## **Movement signal choreography unaffected by receiver distance in the Australian Jacky lizard, *Amphibolurus muricatus***

**Richard Peters and Simon Allen**

*Dept. of Zoology, La Trobe University, Bundoora VIC 3128, Australia.  
richard.peters@latrobe.edu.au*

### **Talk Abstract**

The influence of signalling context on movement-based signalling strategies is becoming clearer. We recently demonstrated that the Australian lizard *Amphibolurus muricatus* varied temporal aspects of their tail flicking in calm and windy conditions. The lizards lengthened the duration of tail flicking and switched to intermittent signalling. Environmental motion therefore exerts a strong effect on the signalling strategies of this lizard. It also demonstrated that lizards are sensitive to the efficacy of their motion signals and are able to make adjustments when necessary. Building upon these results, we examined whether receiver distance also influences signalling strategies. Indeed fiddler crabs are known to make fine-scale distance-dependent adjustments. With the variation possible in tail flicking dynamics, from small amplitude flicks

involving only the tip of the tail through to large amplitude, whole tail movements that sweep three-dimensional space, we were interested to see if the same context sensitivity applied. We predicted that lizards might adjust signalling, particularly if they use small amplitudes for nearby receivers. The use of minimal movements at close distances would likely reduce signalling costs, particularly in terms of increased visibility to predators. At greater distances, however, small amplitudes may be difficult to resolve due to limits in spatial acuity. We found, however, that signalling lizards did not modify their introductory tail flicking in response to distant viewers in the absence of competing, irrelevant plant image motion despite significant reductions in signal structure at the eye of the viewer. The magnitude of resultant effect sizes strongly suggests that receiver distance does not contribute to signalling strategies as much as the presence of motion noise in the environment.

## **Effects of swim-with dolphin tourism on the behaviour and group structure of bottlenose dolphins in South Australia**

**Katharina J. Peters, Guido J. Parra and Luciana M. Möller**

*Cetacean Ecology, Behaviour and Evolution Group, School of Biological Sciences, Flinders University, Adelaide, SA 5001, Australia; South Australian Research and Development Institute (SARDI), Aquatic Sciences, 2 Hamra Avenue, West Beach SA 5024, Australia  
pete0198@flinders.edu.au*

### **Talk Abstract**

Tourism activities involving watching and swimming with wild dolphins enjoy great popularity in Australia. While the number of operators offering these experiences has increased in recent years, the impacts to the animals involved are still poorly understood. This study assessed the impact of boat and swimmer interactions on the behaviour and group structure and spread of bottlenose dolphins (*Tursiops* sp.) in Adelaide coastal waters, South Australia. Behavioural observations and photo-identification of dolphins were conducted between March and May 2010 onboard the only tourist boat offering dolphin watching and swim-with-dolphins in this area. Feeding and travelling behaviours significantly decreased when swimmers were in the water while milling increased. After the interactions with the swimmers ended, the proportions of these behaviours returned to similar levels to those observed before the interactions started. The direction of movement of the dolphins away or towards the boat and swimmers was also significantly affected by swimmer presence in the water. Groups with calves were less likely to approach swimmers to within 5 m than groups without calves. Small groups (1-4 animals) were also less likely to approach swimmers to within 5 m compared to large groups (>4 animals). By contrast, group spread was not significantly affected by the tourism activity. The estimated exposure of individual dolphins to the tourist activity was low, with dolphins spending an estimated less than one percent of their overall time budget in the presence of the tourist boat. Results from this study suggest that the current impact of the local dolphin watching and swim-with-dolphin tourist boat on groups of bottlenose dolphins appears to be short-term, with a low level exposure to individual dolphins.

## **The evolution of song dialects in an Australian bird species: a preliminary analysis**

**Dominique A. Potvin and Raoul A. Mulder**

### **Talk Abstract**

Behavioural and ecological factors contribute highly to the diversification of island populations of animals and humans, both culturally and evolutionarily. Silvereeyes (*Zosterops lateralis*) are native Australian songbirds that have naturally colonized isolated islands between Australia and New Zealand in the past two centuries. This unique species distribution is a perfect natural experiment testing how the song of one species might change to become distinct dialects within a known timeframe. Here I present results from the analysis of frequency-based and syllable-based song qualities from different island and mainland populations of silvereeyes, providing evidence that environment may affect song and contribute to divergence.

## **Habituation in Fiddler crabs: Stimulus identification under natural conditions**

**Chloé A. Raderschall and Jan M. Hemmi**

*ARC Centre of Excellence in Vision Science, Building 46, Research, School of Biology, The Australian National University, Canberra, ACT 0200, Australia.  
u4367443@anu.edu.au*

### **Talk Abstract**

Fiddler crabs (*Uca vomeris*) are constantly threatened by a variety of shore birds from which they escape by retreating into their individual burrows. Their low visual acuity and inability to accurately estimate the distance to an approaching predator forces them to initially respond to anything they detect moving in the sky. Despite the limited information these crabs have available, they can learn to decrease their responsiveness to repeatedly approaching harmless objects, a process known as habituation. How then, given their low visual acuity, do fiddler crabs safely recognise such harmless objects? This question is particularly interesting, as under natural conditions stimuli constantly vary and are not always clearly defined. In order to investigate this question, we habituated fiddler crabs to a repeatedly approaching dummy predator while they were foraging in their natural environment. Following this habituation phase the approach direction of the dummy was then altered to test whether the crabs still considered the manipulated dummy as the same category of objects they had learned to ignore (testing phase). During the habituation phase, the crabs' response probability declined with successive dummy encounters. Fiddler crabs thus, clearly habituated to the repeatedly approaching dummy. Upon a change in approach direction, however, the crabs' response probability recovered, indicating that approach direction is one of the criteria crabs use to identify an object. Moreover, the fact that fiddler crabs treated two identical looking objects differently when they approached from a different direction in their environment, suggests that habituation in fiddler crab is associative, which is contrary to most definitions of habituation. Overall, our results demonstrate that habituation is not just a general decline in response probability, but, at least in the context of predation, highly stimulus specific.

## **Honeybees pay attention: perceptual pop-out and attentional capture experienced by a mini-brain**

**Judith Reinhard, Amanda Robinson, Mandyam Srinivasan, Jason Mattingley**

*Queensland Brain Institute, The University of Queensland, St Lucia QLD 4072, Australia.  
j.reinhard@uq.edu.au*

### **Talk Abstract**

Attention is a crucial mechanism ensuring that the brain filters sensory stimuli so that only behaviourally relevant inputs are selected for further processing. This enables an animal to prioritise sensory inputs, cognitive operations, and motor responses. Most research into attention has been conducted in humans, showing that attention is controlled by stimulus-driven processes (bottom-up) as well as goal-directed mechanisms (top-down control).

Here, we present behavioural data demonstrating the existence of both stimulus-driven and goal-directed mechanisms of attention in an animal with a miniature brain, the honeybee *Apis mellifera*. Free-flying honeybees were presented with stimuli of different shape and colour displayed on a horizontal computer screen. As an index of attention, the flyover and landing behaviour of individual honeybees on the different stimuli was analysed. Two experiments were conducted: first we presented the bees with a group of stimuli, one of which differed by colour or motion (pop-out stimulus). The bees flew over and landed significantly more often on the pop-out stimulus, indicating that a stimulus with a distinctive feature draws the attention of honeybees in much the same way it does in humans. However, honeybees detect this pop-out feature using a different mechanism than humans, namely serial visual search rather than parallel search. In the second experiment, honeybees showed goal-directed behaviour by learning to distinguish a target from distracters in a stimulus set. The bees continued to land on this target even when new distracter stimuli were introduced. The bees' attention in flyovers, however, was significantly captured by distracter stimuli with a novel colour, that is the honeybees' goal-directed attention towards a target was modulated by salient stimuli through bottom-up mechanisms. Our results suggest that insects experience and use the same attentional mechanisms for sensory processing as higher vertebrates including humans.

## **Vocal variation corresponds with genetic population structure in a parrot**

**Raoul Ribot, Mathew Berg, Katherine Buchanan, John Endler, Andy Bennett**

*School of LES, Deakin University, Pigdons Road, 3217, Waurin Ponds, VIC, Australia.  
Raoul@deakin.edu.au*

### **Talk Abstract**

Divergence in learned traits, such as vocalizations in species that have vocal learning (including some birds, primates, bats, and cetaceans), could potentially act as a rapidly evolving isolating mechanism between populations. This could result in an association between vocal variation and recent population genetic structure in vocal learners. We studied geographic variation in the calls of the crimson rosella (*Platycercus elegans*) parrot complex, by recording contact calls in >1200km of continuous rosella populations along a major river system. In this area, analyses of 14 microsatellite loci and mtDNA ND2 sequences have revealed clear genetic population structure, despite the lack of geographic isolation. We found significant differences in three of five acoustic variables (fundamental frequency, mean frequency modulation, and position of the peak frequency in the call) corresponding with the known microsatellite genetic clusters found in this area. Accordingly, we also detected significant isolation-by-distance in these variables. In addition, we found clear evidence of bimodality of acoustic features where these genetic clusters meet. Thus, this study provides new evidence that learned vocal variation can be associated with

reductions in gene flow across geographically continuous populations. These results suggest that recent genetic divergence and vocal learning are associated in this bird.

## **Cooperation or conflict? The presence of “marginal” chicks increases nestling conflict in the black-faced cormorant**

**Julie Riordan and Greg Johnston**

*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide, SA 5001, Australia  
Riordan.julie@gmail.com*

### **Talk Abstract**

This paper reports on measurements of competitive and cooperative interactions and insurance value of offspring in three-chick clutches of the black-faced cormorant (*Phalacrocorax fuscescens*), a species endemic to southern Australia. Studies of parent offspring conflict have focussed on competitive interactions and insurance value of offspring in many taxa. Less attention has been paid to facilitation/cooperation. We tested the facilitation hypothesis by experimentally manipulating brood size in black-faced cormorants and measuring (a) levels of parental provisioning, (b) nestling interactions, and (c) survival rates. However, while additional eggs provided insurance against the loss of previously laid eggs, we found little evidence of cooperation among nestlings. Rather, the presence of “marginal” chicks reduced the survival rates of “core” chicks. This suggests that older chicks do not benefit from having younger siblings present due to an increase in competitive interactions. This study confirms that cooperation does not occur between black-faced cormorant nestlings and further supports the focus on competition when studying behavioural interactions among this group of birds.

## **Behaviour and enclosure use of two Giant Pandas (*Ailuropoda Melanoleuca*) at the Adelaide Zoo**

**Dr Carla Litchfield, Jillian Ryan and Nicola Brewer**

*School of Psychology, University of South Australia. St Bernards Road, Magill, South Australia, Australia.  
ryajc001@mymail.unisa.edu.au, Carla.Litchfield@unisa.edu.au*

### **Talk Abstract**

Behavioural research with captive animals is important for establishing a baseline behavioural description, which contributes to the husbandry of the animals and allows keepers to identify extraordinary or maladaptive behaviours as they occur. Giant Pandas are a critical symbol for conservation, and the Adelaide Zoo has recently received the first two Giant Pandas to be housed outside of the Northern Hemisphere. An observational study was conducted over the period of July – September, 2010, in order to assess the daily activity and enclosure use of the individually housed Giant Pandas. Both animals spent significant proportions of their day engaged in *resting*, *feeding* and in *locomotion*. Consistent with the behaviour of other captive Giant Pandas, Wang Wang (male) spent a higher proportion of time engaged in *active* behaviours, *feeding*, and *scent-marking* than Funi (female), reflecting a sex difference. A time of day effect was observed, with time spent *resting* peaking during Midday (12 – 1pm) at approximately 80% for Funi and 60% for Wang Wang. Partway through the study, Funi began to exhibit an idiosyncratic or aberrant behaviour, in the form of performing somersaults in the doorway to the off-exhibit area, combined with stereotypic pacing. In response to this, Zoo management imposed an enclosure swap, which saw a decline in stereotypic behaviours for Funi from around 11% of daily behaviour budget to around 4%.

Wang Wang exhibited a slight increase in stereotypic behaviours after the enclosure swap (from around 5% to around 6%). The animal's behavioural budgets are comparable to those observed in Giant Pandas housed in captivity in the Northern Hemisphere, which provides an indication of their adjustment to the Australian climate. Current research is utilising the same methodology to assess the animal's adaptation to the hot, dry Australian summer and high visitor levels.

## **Search strategies of Australian desert ants**

**Patrick Schultheiss and Ken Cheng**

*Dept. of Biological Sciences, Macquarie University, Sydney NSW 2109, Australia,  
patrick.schultheiss@mq.edu.au*

### **Talk Abstract**

The Australian desert ant *Melophorus bagoti* is well known for the sophisticated navigational abilities of its foragers, namely visually guided navigation and path integration. They use these to reach previously visited foraging areas and also to return home to the nest. If these mechanisms fail, they can engage in searching behaviour to locate a place, e.g. the nest entrance. We looked at the structure of these search paths in detail, in particular at the interplay of searching behaviour and the processes of navigation. In a first experiment, foragers were trained to feeders at different distances. They were left to return home in the natural, visually cluttered environment, and caught just before they entered the nest. After transfer to a distant test-field (with very different visual surrounds), they immediately began searching for the (now non-existent) nest entrance. Ants with a longer homebound run adjusted their search path to cover a greater area. This can be seen as an adaptation to the cumulative error of the path integration system. Interestingly, this error is not eliminated by the process of visual navigation. In a second experiment, we investigated the search paths of foragers around the natural nest entrance, and how they change with the amount of visual information around the nest. Searching ants restricted their search to a smaller area when the visual clutter was increased. The search paths can also be described by fitting optimal search models to the data. Different search strategies are used by the ants in the two experiments. In the unfamiliar test-field, the search is best described by a mixture of two exponential functions, whereas in familiar surrounds around the nest, a single exponential function fits best.

## **Ocelli functions in the desert ant *Melophorus bagoti***

**S. Schwarz, A. Wystrach, L. Albert and K. Cheng**

*Macquarie University, BBE, 209 Culloden Road, 2122 Marsfield-Sydney, NSW, Australia.  
sebastian.schwarz@mq.edu.au*

### **Talk Abstract**

Many hymenoptera use their visual system for navigation. While insect compound eyes have been well studied less is known about the second visual system, the ocelli. Here we demonstrate navigational functions of the ocelli in the visually guided desert ant *Melophorus bagoti*. These ants rely on both visual landmarks and path integration. We conducted experiments to reveal the role of ocelli in the perception and use of celestial compass information and landmark guidance. Our results demonstrated that the ocelli of *M. bagoti* could read celestial compass information but could not use terrestrial landmarks for homing. We also showed that the ocelli mediate a distinct compass from the one mediated by the compound eyes. Ants that had travelled a two-legged outbound route and were tested with covered compound eyes and uncovered ocelli did not rely on the directional information of their global path integrator, but headed

instead towards the last travelled direction. We suggest that ocelli mediate a distinct path integration system from the one mediated by the compound eyes.

## **Cognition and behaviour in captive dingoes (*Canis dingo*)**

**Dr Bradley Smith and Dr Carla Litchfield**

*School of Psychology, University of South Australia. St Bernards Road, Magill, South Australia, Australia.*

*[Bradley.Smith@unisa.edu.au](mailto:Bradley.Smith@unisa.edu.au), [Carla.Litchfield@unisa.edu.au](mailto:Carla.Litchfield@unisa.edu.au)*

### **Talk Abstract**

Past studies have shown that wild canids (e.g., wolves) perform well on problem-solving tasks because of their social lifestyle and ability to hunt prey as a coordinated group. Domestic dogs, on the other hand, are more skilled at solving problems that require social communication with humans because of domestication and their evolution within human societies. It was unclear how dingoes, a wild canid of Australia would compare to wolves and dogs on similar tasks. A set of three cognitive experiments were conducted with sanctuary raised dingoes. Firstly, dingoes were tested for their comprehension of human social cues (e.g. pointing) to locate hidden food on the object-choice paradigm. Dingoes successfully followed most human given cues, outperforming wolves, and performing at comparable levels to dogs. Secondly, the ‘rope task’ was conducted to see if dingoes would look toward a familiar human during an unsolvable task. Like wolves, they did not seek assistance from the human. Thirdly, the ‘detour task’ was conducted which requires the successful detour of a barrier to reach a reward. Dingoes outperformed dogs, with dingoes as young as thirteen weeks able to complete the task with low latency and minimal errors. The results support previous findings of differences in cognitive functioning between wild and domestic canids, with wild canids (such as wolves and dingoes) being more adept at non-social problem solving tasks than domestic dogs. It is possible that the different evolutionary pathways of wolves and domestic dogs have led to differences in problem solving abilities. In this presentation, an example of higher order behaviour in dingoes will also be presented, in which a dingo moves a table, using it as a ‘tool’ to gain the height required to reach an object initially out-of-reach.

## **Aerial alarm calling by male fowl (*Gallus gallus*) reveals subtle new mechanisms of risk management.**

**Artemi Kokolakis, K-lynn Smith and Chris Evans**

*Macquarie University, 209 Culloden Rd, Marsfield, NSW 2109*

*[Klynn.smith@mq.edu.au](mailto:Klynn.smith@mq.edu.au)*

### **Talk Abstract**

Alarm calling is a classic problem in evolutionary biology. Although a signaller may increase the likelihood of survival for group members, which typically include kin and mates, there are inherent risks associated with any behaviour that increases conspicuousness to predators. Callers can increase their indirect benefits by calling only in the presence of an appropriate audience and manage concomitant costs by judicious investment. Possible tactics for controlling costs include flexibility in call structure and timing, as well as sensitivity to the environmental and social factors that predict personal vulnerability. We examined individual variation in the alarm calling behaviour of male fowl in naturalistic social groups. Previous studies of cost management have focused on variation at the level of alarm call rate. We used

wireless sound recording and remote video monitoring to test for more subtle variation in signal structure and timing. These were then mapped onto individual mating success and moment-to-moment changes in environmental and social context. As expected, alarm calling is sensitive to both social rank and mating success. We also found systematic variation in call structure as a function of proximity to a rival male and refuges. Taken together, these results reveal several novel tactics for risk-management.

## **Parental care behaviour of freshwater crocodiles in tropical Australia**

**Ruchira Somaweera and Richard Shine**

*Reptile Ecology Lab, School of Biological Sciences, The University of Sydney, NSW,  
ruchira.somaweera@gmail.com*

### **Talk Abstract**

Parental care behaviours are widespread in crocodylians but poorly known for the Australian freshwater crocodile (*Crocodylus johnstoni*). It is probably the only crocodylian species that lacks nest guarding behaviour, a lack that has been attributed to an absence of native mammalian egg predators in Australia. As a part of an ongoing broader study on the ecology of *C. johnstoni* at Lake Argyle in the arid east Kimberley region of tropical Australia, we studied nesting and crèche formation behaviours of this species through remotely-triggered digital cameras in nesting sites and field observations. The lack of suitable nest-sites forces the crocodiles to concentrate nesting in small areas, and a unique predator guild (mammalian rather than reptilian) predares on nests throughout the incubation period (unlike elsewhere in the species range, where nest predation is concentrated in the first few weeks post-laying). Upon hatching, parents transport neonates to nurseries and some adults guard crèches (sometimes made up of more than one clutch) for up to two months. The importance of these behavioural aspects for the survival and recruitment of young will be discussed.

## **The mechanisms behind drug reward, studied in honey bees**

**Eirik Søvik and Andrew B. Barron**

*Macquarie University, Department of Biological Sciences, 209 Culloden rd, Marsfield NSW,  
2122,  
eirik.sovik@mq.edu.au*

### **Talk Abstract**

Drugs of abuse exert their effect by altering the function of brain reward systems. We have used honey bees as a model system to investigate the mechanisms that allow drugs of abuse to alter brain reward processing and to examine conserved mechanisms, shared between vertebrates and invertebrates, involved in this process. The honey bee is an ideal model system for studying these mechanisms as it is a well-studied organism in neuroscience, and because bees have a reward response to cocaine that is similar to that of humans. The brain reward system in humans is primarily driven by dopamine signalling, and cocaine works by altering dopaminergic signalling. In bees, dopamine is not the primary neurotransmitter system affected by cocaine, rather a closely related neurotransmitter system seems to be more affected. These findings will be discussed in relation to the overall goal of investigating the mechanisms underlying drug reward.

## What benefits to female Dumpling Squid gain from multiple matings?

**Zoe Squires, Dr. Mark Norman, Dr. Bob Wong and Dr. Devi Stuart-Fox**

*Zoology Department, University of Melbourne, Victoria 3010 Australia  
z.squires@pgrad.unimelb.edu.au*

### **Talk Abstract**

Sex differences in reproductive investment lie at the heart of sexual conflict. One especially intriguing and controversial aspect of sexual conflict is the evolution and maintenance of female polyandry, particularly in systems where females receive no direct benefits from mating multiply, and where mating is highly costly. Under such scenarios, theory predicts that polyandrous females may be able to increase their reproductive success by taking advantage of the genetic benefits of mating with multiple males. These benefits can be in the form of ‘good’ genes obtained by trading-up partners, or ‘compatible’ genes obtained by females hedging their bets. Here we investigate this conundrum using a model system, the Southern Dumpling Squid (*Euprymna tasmanica*). Females were mated polyandrously (with two different males, one for whom it was his first mating, and one for whom it was his second mating) or monandrously (with one male once, or with the same male twice). Analysis of mating behaviours showed that male squid spent significantly longer in stage one of mating, when mating with a virgin female, but not when mating with a non-virgin female ( $p < 0.001$ ,  $F_{1,49} = 39.61$ ). The first stage of mating comprises of the male squid flushing water into the female’s mantle cavity, arguably to remove previous male’s spermatangia. Even though polyandrous females did not produce more eggs, or have more hatching success, they produced eggs faster than monandrous females ( $p = 0.03$ ,  $F_{2,27} = 4.07$ ). This indicates a significant benefit of polyandry, because producing eggs faster in the wild may translate into higher reproductive fitness if reproductive bouts are cut short by predation or environmental change. These results demonstrate, to our knowledge, the first benefit of polyandry in any cephalopod.

## Are Speed Restriction Zones an effective management tool to mitigate the impact of Australia’s biggest dolphin-watching industry?

**Andre Steckenreuter, Robert Harcourt and Luciana Möller**

*Macquarie University, North Ryde, NSW 2109, Australia,  
School of Biological Sciences, Flinders University, SA 5042, Australia,  
andre.steckenreuter@mq.edu.au*

### **Poster Abstract**

The small, genetically distinct population of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in Port Stephens, New South Wales, is the target of the largest dolphin-watching industry in Australia and falls within the recently created Port Stephens - Great Lakes Marine Park. The effectiveness of Speed Restriction Zones (SRZ) as a management tool in this area was investigated during their first year of their implementation by comparing dolphin usage and behaviour to adjacent Control Zones (CZ) of similar habitat. For this purpose, boat-based surveys and dolphin focal follows were carried out in the zones between August 2008 and August 2009. Results showed that dolphin-watching boats use SRZ and CZ with similar frequency, while recreational boats used the CZ more frequently in summer. The behaviour of dolphins is also different between zones, with individuals in summer feeding more frequently in CZ and not resting in SRZ. However, there were no significant differences in the usage of the zones by different age classes. This study suggests that SRZ are so far inadequate to mitigate the impacts of the dolphin-watching industry on the targeted dolphin population. It provides important information for the management agencies to assist with the development of a local management plan for dolphin-watching

within this marine park. However, the results presented here are also relevant for the conservation of dolphins and the management of dolphin-watching industries elsewhere, particularly new industries, where management strategies may incorporate marine protected areas including zoning plans.

## **The interval between sexual encounters affects male courtship tactics**

*P. Andreas Svensson, Topi K. Lehtonen and Bob B. M. Wong*  
*Deakin University, Melbourne, Australia*  
*andreas.svensson@deakin.edu.au*

### **Poster Abstract**

Courtship displays can enhance male mating success, but are often costly. Thus, instead of courting all females indiscriminately, males could strategically adjust their signalling effort by directing greater courtship towards females of higher reproductive quality. However, plasticity in male courtship intensity remains a largely neglected aspect of sexual selection. Theory predicts that the expression of such plasticity should depend on both the order, and the rate, with which potential mates are encountered. We tested these predictions in a fish, the Australian desert goby, *Chlamydogobius eremius*. Males preferentially courted the larger of two simultaneously encountered females, probably because larger females are also more fecund. We then investigated male courtship under different sequential scenarios, that is, presenting one female at a time. We found a "previous female effect", with males adjusting their signalling output based on the size of the female they had encountered previously. However, males did not adjust their courtship in this way when the interval between female presentations was longer. Thus, both variation in mate quality, mate encounter rate and previous experiences affected male reproductive decisions. Our findings underscore the importance of considering temporal aspects of mate encounters when trying to understand how mate selection operates in nature.

## **Effects of Acetochlor (Herbicide) On The Survival And Avoidance behaviour Of Spiders**

**Muhammad Tahir, Abida Butt, Shafaat Yar Khan , Kawaja Raees Ahmad<sup>1</sup> and Sadia Nawaz**

*Department of Biological Sciences, University of Sargodha, Punjab, Pakistan*  
*hafiztahirpk1@yahoo.com*

### **Talk Abstract**

Present study was designed to evaluate the potential effects of Acetochlor (herbicide) on the survival and avoidance behaviour of lycosid spiders e.g., *Lycosa terrestris* Butt *et al.*, 2006 and *Pardosa birmanica* Siman 1884. During the topical toxicity experiment, *Pardosa birmanica* was found to be more susceptible to Acetochlor than *Lycosa terrestris*. Although we observed 10% mortality at field rate concentration by topical exposure however, we did not observe any mortality during residual toxicity experiment for both spider species even at double field rate concentration. There was no difference in the time spent by both species on the herbicide or water treated part of filter paper. It is concluded that use of Acetochlor at the recommended field rate in the agricultural field is safe for tested spider species, which are important biological control agents in the study area.

## **Keeping up the pace: Honeybee flight speed regulation in a tethered flight arena**

**Taylor, G. J., Luu, T., Ball, D. and Srinivasan, M. V.**

*Queensland Brain Institute, University of Queensland, St Lucia, QLD 4072, Australia  
and ARC Centre of Excellence in Vision Science, Australian National University, Canberra, ACT 2601, Australia  
gavin.taylor@uqconnect.edu.au*

### **Talk Abstract**

Flying honeybees use visual information for tasks ranging from low-level speed control and obstacle avoidance to higher-level navigation tasks, such as odometry and path integration. However, until now visually guided honeybee flight behaviour has been predominantly studied in free flight conditions. This study describes a novel paradigm that uses tethered honeybees in a virtual reality flight arena. A stationary honeybee in tethered flight is presented with a panoramic image that simulates flight in a tunnel, on four computer-controlled monitors. A force transducer monitors the honeybee's flight thrust, and provides the honeybee with closed loop control of the speed of the translational image motion that it experiences during attempted forward flight. The performance of the bees in regulating the speed of the image, and therefore the apparent speed of their flight through the environment, will be described.

## **Turquoise Tournaments: fierce combat in male chameleon grasshoppers.**

**Kate D L Umbers<sup>1</sup>, Gregory I Holwell<sup>2</sup>, and Marie E Herberstein<sup>1</sup>**

*Dept. Biological Sciences, Macquarie University, 2109, NSW  
katedlumbers@gmail.com*

### **Talk Abstract**

Colour change and sexual signals are rarely linked directly to temperature. Yet, in the chameleon grasshopper (*Kosciuscola tristis*), males, but not females, change colour in response to ambient temperature. Males are black when their body temperature is below 10°C and turquoise to blue when 25°C or hotter and colouration across the male population is variable at any given temperature. Late in the mating season, commencing at the warmest time of the day, males engage in fierce combat over females. In this study, we tested the hypothesis that brightly coloured males win competitions over duller males. We observed males in the field fighting over ovipositing females and also took an experimental approach. Emulating the natural skewed sex ratio, we set up semi-natural mating arenas with groups of five males and a single female. We measured male mating success and aggressiveness and compared those traits to male brightness and the size of various body parts likely to be under selection. We describe the nature of male combat and the aggressive behaviours male use to fend off or attack each other. Our results suggest that brighter males do not necessarily win fights, but that the brightness of contestants is correlated. We suggest that brightness may indicate fighting ability or willingness to escalate fights and discuss these results in the context of contest escalation theory.

## **Behavioural and anatomical evidence for colour vision in the Common Brushtail Possum (*Trichosurus vulpecula*).**

**Vlahos, L.M., Hemmi, J.M. and Valter, K.**

*PO BOX 8197, Australian National University, Canberra ACT 0200*  
*lisa.vlahos@anu.edu.au*

### **Talk Abstract**

With the recent discovery of three cone types in an Australian marsupial, the fat-tailed dunnart, trichromatic colour vision in mammals is no longer restricted to primates. Not all marsupials, however, are trichromatic. The tammar wallaby has only two cone types, and thus dichromatic colour vision. To investigate the diversity of marsupial colour vision, we used immunohistochemistry and behavioural techniques to test for colour vision in the Common Brushtail Possum (*Trichosurus vulpecula*). Using antibodies known to label both short and medium wavelength sensitive cones in most mammals, we have so far found only two cone types present in the retina, with a low cone to rod ratio typically seen in highly nocturnal mammals. Using a two-alternative forced choice paradigm, we were able to show behavioural colour vision. From almost 3000 trials, the possum showed a persistent preference towards using brightness over colours during visual discriminations. By introducing spatial information which faded over time, we were able to encourage the subject to choose between colours irrespective of brightness. Our increment threshold spectral sensitivity and ocular media transmission results suggest that these possums can see a small amount of ultraviolet light, but certainly not as much as other trichromatic marsupials. These findings highlight the diversity of colour vision within Australian marsupials, with a trichromatic dunnart, a dichromatic wallaby that readily uses colour information, and now a possum which is capable of seeing colours, but prefers to use brightness over colour as a cue during visual discriminations.

## **The evolution of silken web decorations in orb web spiders**

**André Walter, Mark A. Elgar**

*Department of Zoology, University of Melbourne, Parkville 3010*  
*awalter@unimelb.edu.au*

### **Talk Abstract**

Animal signals may derive from an elaboration of previous forms or may be an innovation. Unravelling the evolution of the latter is challenging because the signalling effect may have evolved from a non-signalling biological trait. Silken web decorations of the orb web spider genus *Argiope* have become a model system to investigate innovative signals. For over 100 years, biologists have struggled to explain why spiders adorn their webs with additional silk structures, paradoxically producing a conspicuous signal on a construction whose function is to entangle unsuspecting prey. Numerous hypotheses have been proposed to unravel the adaptive significance of web decorations. However, although previously suggested functions may well explain the maintenance of the decorating behaviour they still lack a plausible explanation for its evolutionary origin. We here highlight the difficulties in discriminating between the evolution and maintenance of the web decorating behaviour. Drawing on recent research that focuses on physiological processes, we provide a novel model of the evolutionary progression of web decorating behaviour.

## Life-history strategies in the cooperatively breeding Apostlebird, *Struthidea cinerea*

**Miya Warrington<sup>1</sup>, Jonathan Wright<sup>2</sup>, Nichola Raihani<sup>3</sup>, Andrew F. Russell<sup>4</sup> and Simon C. Griffith<sup>1</sup>**

<sup>1</sup>*Department of Biology; Macquarie University, Sydney,* <sup>2</sup>*Institute of Biology, NTNU, Trondheim, Norway,* <sup>3</sup>*Institute of Zoology, Zoological Society of London, London, UK,* <sup>4</sup>*Animal and Plant Sciences, University of Sheffield, Sheffield, UK*  
*Miya.Warrington@mq.edu.au*

### **Talk Abstract**

We investigated parentage and relatedness using 13 microsatellite loci in an arid zone population of the Australian apostlebird. In this highly social species, groups of kin and non-kin cooperate to rear young and no pair in our population has successfully fledged any offspring without the aid of helpers-at-the-nest. We have monitored this population since 2004 and all individuals (>500) have been colour-banded and blood sampled. During the breeding season we monitored a population of about 15 social groups, with an average of six adults per group. During the non-breeding season social groups aggregate and individuals live together in larger groups (up to 40 members). The membership of particular breeding groups is variable across years as individuals come back out of the larger winter aggregation. Molecular data from this fission-fusion society provides important insight on individual mating strategies within the context of fine scale genetic structure, and the balance of the costs and benefits of philopatry, kin selection, and dispersal, as individuals attempt to optimize individual fitness.

## Male or meal?: the function of ‘shuddering’ by male spiders

**Anne E Wignall**

*Department of Biological Sciences, Macquarie University, North Ryde, NSW 2109, Australia.*  
*anne.wignall@mq.edu.au*

### **Talk Abstract**

Male spiders courting in the webs of females risk the female mis-identifying them as prey and attacking, or even killing them before copulation. Therefore it is expected that a male spider entering a web will signal his identity to the female to reduce the likelihood of an aggressive response. I tested whether male shuddering, a repeated, anterior-posterior rocking of the whole body functions to reduce female aggression. Shuddering was selected as a candidate signal as males perform this behaviour immediately upon contact with the females’ web, and continue to ‘shudder’ at intervals throughout the period they are in the web. Adult female *Argiope keyserlingi* were presented with prey in the web and their responses recorded. These responses were compared to treatments when there was a simultaneous, intermittent vibration played back into the web (with prey also present). The vibration treatments were ‘shudders’, white noise, ‘waggles’ (another common male-generated vibration) and 30 Hz sine waves. The latency of females to attack the prey (if at all) and differences in female response behaviour were compared across treatments. Shuddering may be a highly conserved behaviour in web-building spiders, demonstrating the importance of quick responses to prey in the web by females, but also recognition of conspecifics for opportunities to reproduce.

## **A test of the habitat saturation hypothesis: Using translocation to investigate the effects of density and nest site availability on cooperation**

**Sarah Withers, Mark E. Hauber and Stuart Parsons**

*School of Biological Sciences, The University of Auckland,  
Private Bag 92019, Auckland Mail Centre, Auckland 1142,  
New Zealand  
s.withers@auckland.ac.nz*

### **Talk Abstract**

Cooperative breeding in the form of ‘helping’ behaviour represents the ultimate evolutionary puzzle because individuals forego breeding to help raise young that they did not sire. Helping behaviour may impart both direct and indirect benefits to both helpers and breeders, while helping can also incur costs through lost direct reproduction by the helper, or owing to food shortage in the presence of too many helpers in the breeders’ territory. The decision to help and to retain helpers therefore depends on a variety of ecological and social factors that may put helpers and breeders at conflict with one another. Specifically, habitat saturation due to high densities or limited resource availability may be a primary factor in the evolution of helping behaviour as subordinate individuals may gain more from remaining in natal territories as helpers if the habitat is currently saturated and independent breeding is unlikely. However, the benefits of helping under high density may or may not be realized for breeders. This research will test the habitat saturation hypothesis, by investigating the cooperative breeding behaviour of the North Island New Zealand rifleman (*Acanthisitta chloris granti*). The rifleman is a threatened endemic species with a fragmented and declining distribution. In February 2008, the first translocation of North Island rifleman was carried out, creating a low density site which can be compared to the high density source population. This translocation was followed up at a second site, thereby replicating the treatment and contributing to general ecological conclusions to be drawn from this research. The habitat saturation hypothesis predicts that individuals are more likely to cooperatively breed at higher densities and/or with limited resource availability. To test this hypothesis, we investigated the effects of density and nest site availability on the frequency and dynamics of cooperative breeding attempts of the rifleman. The results of this study will contribute to discussion on the evolution of cooperation and provide a basis for studies utilising opportunities to investigate evolutionary processes using species-management methodologies. Additionally, this research will provide vital information relevant to the use of translocation as a species-management tool, and will contribute to discussion regarding the implications of human-induced density changes on managed cooperative species.

## **Social networks and the transmission of ticks through a sleepy lizard population**

**Wohlfeil, C K<sup>1</sup>, Godfrey, S.S.<sup>1</sup>, Bradley, J.<sup>1</sup>, Gardner, M. G.<sup>1</sup> and Bull, C.M.<sup>1</sup>**

*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide SA 5001, Australia.  
caroline.wohlfeil@flinders.edu.au*

### **Talk Abstract**

Understanding how parasites or disease spread through a population is crucial to the conservation of wildlife populations. We explored the pathways of indirect parasite transmission in the sleepy lizard (*Tiliqua rugosa*) using refuge-sharing networks and DNA fingerprinting (currently in development). The parasite was the reptile tick, *Bothriocroton hydrosauri*, and the project aimed to track this three host ecto-parasite through the sleepy lizard transmission network. Over two successive activity seasons (Sept – Jan),

we collected GPS locations every 10 minutes of lizard activity. We tracked 48 lizards in season one (2008/2009) and 61 lizards in season two (2009/2010). We used GPS loggers that continuously recorded the activity and location of lizards, to deduce the frequency of opportunities for indirect parasite transmission through asynchronous refuge sharing. We recorded parasite loads of lizards every 12 days. We constructed a directed, weighted network based on asynchronous use of common refuges within the infectious period of the tick, to estimate the risk of infection for each lizard. We found that lizards with higher connectivity in this transmission network had higher tick loads as expected. We plan to analyse microsatellite genotypes of ticks to confirm that there is higher genetic relatedness among ticks on hosts that are more connected in the transmission network. We have also added pulses of genetically unique larvae to hosts and we will harvest adult ticks this season to further test of the role of the transmission network. This study will improve our understanding of lizard social behaviour and how it might influence the spread of diseases.

## **Does developmental stress affect female mate choice preferences?**

**J.L. Woodgate, S. Leitner, M.L. Berg, C.K. Catchpole, A.T.D. Bennett and K.L. Buchanan**

*School of Life & Environmental Sciences, Deakin University, Pigdons road, Waurin Ponds, VIC 3217, Australia.*

*joewoodgate@hotmail.com*

### **Talk Abstract**

This study tests whether developmental stress affects the ability of females to discriminate between potential mates on the basis of visual and acoustic signals. Early developmental stress has been shown to have detrimental effects on the development of various secondary sexual traits in male birds, including song output, reducing their attractiveness to females. Reductions in song complexity are thought to be associated with neural changes in the song control system. Although female birds use the same nuclei for assessing song, the effects of developmental stress on female preferences have largely been left unaddressed. In this study we tested the influence of nutritional stress on mate choice preferences. Female zebra finches were raised under control conditions or nutritional stress and were partially cross-fostered. In adulthood, female mate choice preferences were assessed for 1) visual preferences using an Amsterdam apparatus and 2) acoustic song preferences using song playback. In the visual choice experiment neither stressed nor control females showed agreement in preference ranking of males. Interestingly, stressed females were found to be significantly less active than controls suggesting an effect of developmental stress on motivation or sampling behaviour. In the acoustic choice experiment, all females preferred more complex male songs but stressed and control females did not differ in either the strength or direction of their preferences. Our findings suggest that rearing environment has long term fundamental effects on adult behaviour that might have significant consequences for mate choice. Nonetheless, these results imply that adverse developmental conditions do not impair females' ability to discriminate between songs on the basis of complexity and thus to obtain information about potential mates' developmental history.

## **Visual navigation in ants.**

**A. Wystrach, G. Beugnon and K. Cheng**

*BBE, 209 Culloden Road, 2122 Marsfield-Sydney, NSW*  
*wystrach@cict.fr*

### **Talk Abstract**

View-based matching has been proposed in 1983 to explain how foraging bees relocate their hive or a food source by vision. The concept of view based matching is simple and parsimonious: the agent relies on a view previously memorised at the goal location, and moves in order to minimise the mismatch between its current view and the memorised view. When the two views match, the goal is reached. Although the general concept of this theory is now widely accepted to describe insect visual navigation, little is known about the mechanisms of perception, memory and processing involved. The present work focuses on these three aspects of view based matching in combining behavioural experiments with the ant *Melophorus bagoti* and a modelling approach based on panoramic images recorded on the field.

## **Personality differences related to alternative social roles in the cooperatively breeding superb fairy-wren**

**Madeleine Yewers, Emily McLeod, Michael Magrath and Raoul Mulder**

*The University of Melbourne, Zoology Department, Victoria 3010*  
*m.yewers@pgrad.unimelb.edu.au*

### **Talk Abstract**

Individual animals show behavioural consistency and correlations between behaviours across time and context. These suites of clustered behaviours are labelled as animal 'personality' and in many species, they are heritable and have important fitness consequences. Personalities challenge evolutionary theory, as contrary to notions of behavioural plasticity, they suggest that individuals may be limited in their behavioural expression. Although personalities are known from many taxa, they have rarely been studied in social species. The cooperative breeding system of the superb fairy-wren *Malurus cyaneus* provides an excellent opportunity to investigate how alternative social roles may correlate with personality differences. Here we use captive behavioural assays combined with detailed field observations to test for the presence of personalities and differences in expression between dominant and subordinate males in superb fairy-wrens. We found high repeatability for all measured personality traits. We found that exploratory individuals were also bolder, more active and more aggressive. Dominant males were more aggressive, exploratory and shyer than subordinate males. These results provide evidence for adaptive behavioural specialisation of roles leading to the co-existence of personality types, and challenge the notion that personality is fixed over time, development and in changing contexts.

## Male mate choice for spotty females

**Valeria Zanollo, Matteo Griggio, Jeremy Robertson and Sonia Kleindorfer**

*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide SA 5001, Australia.  
zano0006@flinders.edu.au*

### **Talk Abstract**

Darwin's idea that male ornaments evolve through female choice is now widely accepted and has been found in many taxa. Conversely, male choice of females on the basis of their ornaments has only been recently developed. Even in species with normal sex roles, female ornaments are not simply a by-product of male ornaments, but could evolve through inter-sexual selection (male mate choice) or intra-sexual competition over resources other than males. The Diamond Firetail is an endemic Australian finch that is socially monogamous and exhibits biparental care. The sexes are apparently monomorphic with a striking plumage of red, black and white, with white spots on the black flanks. We previously showed that females have more spots than males, and in females spot number was related to the cell-mediated immune response (PHA-test). Finches probably use the spots for signaling because they expose the spots in different behavioural contexts. In particular, spots are completely exposed by males during sexual displays, but also by females when approaching a displaying male. These observations together with preliminary data on assortative pairing suggest the number of female spots is a criterion in male mate preferences. Here we report on two experiments on male mate selection. We experimentally reduced or increased female spot number in one set of trials, and kept the original spot number in another set of trials. Males consistently preferred females with many spots. These findings confirm our idea that the number of female spots is a reliable signal that males might use to assess female quality during mate choice.

## Mapping of optics on the behaviour of jumping spiders

**Daniel B. Zurek, Ximena J. Nelson and David C. O'Carroll**

*Department of Brain, Behaviour and Evolution, Macquarie University, 209 Culloden Rd, 2122  
Marsfield NSW  
daniel.zurek@gmail.com*

### **Talk Abstract**

Salticids are equipped with an intricate modular visual system, consisting of three anatomically distinct pairs of eyes. The formidable optics of the forward-facing anterior median (AM), or primary, eyes of salticids have been extensively investigated - as has their input on visually guided behaviour. The secondary eyes (anterior lateral, AL and posterior lateral, PL) eyes mediate orientation turns in response to visual stimuli in their fields of view. These whole-body optomotor responses have the goal of bringing a part of the visual field into a 'fixation region', which in the case of salticids, is the field of view of the AM eyes. However, the role of the secondary pairs of eyes should not be underestimated. Often regarded as pure motion detectors, the functional division between secondary and primary eyes is not as clear-cut as once believed. This applies especially to the AL eyes, which possess not only a wide field of view in which target motion is reliably detected, but also remarkable acuity. Using ophthalmoscopic methods, we composed the first detailed map of the retina of jumping spider secondary eyes. Our results show that the AL retina has distinct regions of differential acuity increasing toward the anterior of the spider, and that this has clear behavioural ramifications. We analyzed orienting turns of salticids to computer-generated dot stimuli, specifically measuring the area of the visual field in which the AL eyes mediate these optomotor responses. Furthermore, we obtained velocity and magnitude characteristics of whole-body saccades made during tracking sequences, which underline their apparent similarity to vertebrate eye saccades.