

Second World Congress of Herpetology

Adelaide, South Australia

29 December 1993 – 6 January 1994

## Abstracts

### Scientific Programme Committee

Kraig Adler  
Roger Avery  
Wolfgang Böhme  
S. Don Bradshaw  
C. Michael Bull (Coordinator)  
William E. Duellman  
Jean Lescure  
Roger S. Seymour  
Michael J. Tyler (Chair)

These abstracts were edited and compiled by Margaret Davies and Rachel M. Norris.

Some abstracts were edited to conform with size and style constraints. If we have misinterpreted data, we apologise, but time did not allow further communication with authors.

Abstracts are arranged alphabetically by surname of the senior author. Again we apologise if we have inadvertently transposed any surnames — no disrespect is intended. Each abstract is further identified by a key code that indicates the session in which the paper is to be presented.

ing blood melatonin rhythms in the scincid lizard *Tiliqua rugosa*. The phase of the plasma melatonin rhythm in *T. rugosa* can be dramatically altered by the imposition of a thermocycle (hot or cold pulse) at different times relative to the photocycle. Further, the duration of the thermocycle affects the shape of the melatonin curve in a 12L:12D photoperiod. The amplitude and phase of the melatonin peak are also influenced by the amplitude of the thermocycle in this photic environment. In constant light and constant dark, an imposed thermocycle can entrain the melatonin rhythm. Combined, these results indicate that several features of the thermoperiod contribute to the phase, duration and amplitude of melatonin rhythms in *T. rugosa* lizards, most likely via a circadian mechanism. Ectotherms, therefore, probably rely upon both thermoperiodic and photoperiodic environmental cues in their seasonal physiological adaptations. Some preliminary evidence is presented suggesting that acclimation to the photothermal environment can influence thermoregulatory behaviour. The phase relationship between light and temperature cycles is a major determinant in this acclimatory process. The possible involvement of pineal melatonin as an encoder of such photothermal information is discussed. [KEYWORDS: melatonin, pineal, thermocycle, photocycle, lizard, rhythm].

Fisher  
508

Population genetics and speciation of island lizards, with reference to the genus *Gehyra* (Gekkonidae). ROBERT N. FISHER. *Center for Population Biology, University of California, Davis, California, 95616, United States of America and Dept of Biology 0116, University of California San Diego, La Jolla, California, 92093, United States of America.* The relationships of the four species of *Gehyra* that occur on non-landbridge Pacific islands were studied to determine the minimum number of dispersal events necessary for their colonisation. Two species have a wide range (*oceanica* and *mutilata*) within the region studied. *G. mutilata* is found outside the study area as well. The other two species (*brevipalmata*, and *vorax*) are endemic to this region and are geographically restricted. Protein variation using starch gel electrophoresis and mtDNA sequence for the cytochrome B gene were compared for samples of all four species, and other species of the genus. These data indicate that each species represents a different invasion from Papua New Guinea or Southeast Asia. *G. mutilata* and *G. oceanica* were sampled together on several archipelagos and were found to have very different patterns of genetic variation between populations. *G. oceanica* represents a widespread species with local subpopulations, while *G. mutilata* is an anthropophilic species that is widespread with no protein variation indicating possible human aided transport across the Pacific. *Gehyra oceanica* was studied in more detail to determine whether its current distribution was entirely natural or human modified (commensal or stowaway). Protein variation was analysed for 13 island groups from across its range in the Pacific. Based on fixed allelic differences, the species consists of two natural groups in the Pacific, a northern (Micronesian) and a southern (Melanesian and Polynesian) form. The northern form has very similar gene frequencies across its range in Micronesia. The southern form has the greatest allelic diversity in the south central Pacific. The F statistics for *G. oceanica* in the south fall within the range of values for mainland Australian species of *Gehyra* that are not human commensals. The results found for the molecular data in the genus *Gehyra* were consistent with that for other island lizards. [KEYWORDS: dispersal, evolution, biogeography, lizards, geneflow,

bryos. Although sometimes thin, a capsule can cause significant limitation of oxygen uptake, and retard embryonic development. Paradoxically, however, jelly capsules are essential for adequate oxygenation of the embryos, because they separate the eggs in an egg mass and limit local competition between embryos for available oxygen. The size and metabolic intensity of an egg mass are limited by (1) the size and development rate of embryos, (2) the changing geometry of individual capsules, (3) the shape and surface area of the egg mass, (4) the composition of the interstitial spaces between eggs, and (5) the site of oviposition, including temperature, oxygen tension, and natural convective currents. Adaptations within these constraints are investigated quantitatively in selected species with diverse reproductive modes. Terrestrial egg masses tend to collapse and stick to the substrate because of gravity and surface tension, thus eliminating airspaces between the eggs and forcing oxygen to diffuse through the jelly from only one direction. Thus terrestrial egg masses must be small or thinly spread, unless the eggs have rigid capsules that create air-spaces between them, or they are laid in foam which facilitates oxygen diffusion and also supplies oxygen directly from the bubbles. Aquatic egg masses can be large because they are supported in water where gravity and surface tension do not deform the mass. Oxygen can invade the mass from all surfaces, and convection of free water in channels between the eggs can be driven by solar heating of the egg mass or by other mechanisms. Foam nesting in aquatic breeders is a means to support the egg mass in better oxygenated water near the surface. [KEYWORDS: amphibian, eggs, egg masses, respiration, jelly, foam, oxygen].

Shaffer

S01

**Phylogenetic relationships of the salamander family Ambystomatidae: a molecular perspective.** H. BRADLEY SHAFFER. *Section of Evolution and Ecology, University of California, Davis, CA 95616, United States of America.* The salamander family Ambystomatidae consists of two "groups" which together account for 29 bisexual species. Across the U.S. are 14 taxa characterised by deep divergences and relatively little intraspecific variation. Although the relationships of these species is still not completely resolved, a fundamental conflict between morphological and molecular (allozyme and mitochondrial DNA sequence) data exists over the monophyly of the subgenus *Linguaelapsus* (*mabeei*, *tezanum*, *barbouri*, *annulatum*, *cingulatum*). The remainder of the family is included in the 15 species of the *tigrinum* group, a closely related, monophyletic set of species that is widely distributed over the U.S. and central Mexico. Detailed, population-level allozyme and mitochondrial DNA sequence results for these salamanders confirm that this is a recent, "explosive" radiation, resulting in the rapid evolution of morphological and life-history characteristics, including the multiple origins of metamorphic failure and paedomorphic adults. Our currently available data indicate that both 14 North American species and the *tigrinum* group involved rapid, nearly synchronous diversifications of lineages; the first occurring in the distant past, while the *tigrinum* radiation is a relatively recent event. Thus, the *tigrinum* group serves as an excellent model for recent, rapid speciation and divergence, while the other bisexual species may be better suited to examine long-term trends in morphology and ecological adaptation. [KEYWORDS: Ambystomatidae, phylogeny, allozymes, mtDNA sequences, salamander].

Shaffer et al.

**The genetics of decline: a case study of the California tiger salamander, *Ambystoma tigrinum*.**

*ambystoma californiense*. H. BRADLEY SHAFFER, SCOTT STANLEY, AND ROBERT F. FISHER. *Section of Evolution and Ecology, University of California, Davis, CA 95616, United States of America* *Ambystoma californiense* is a declining member of the tiger salamander complex that is confined to the grassland/vernal pool habitat of central California. For the past three years we have collected ecological, genetic, and historical information on the reasons for decline of this previously abundant pond-breeding amphibian. Our allozyme results, based on 84 populations and over 1,000 individuals, document extremely low levels of genetic variation, but deep genetic substructure and high  $F_{st}$  values among those populations that are variable. Our mitochondrial DNA sequence data also demonstrate high levels of population substructure, including great divergence among populations that are identical at 26 allozyme loci. One explanation for these conflicting molecular results is that migration is relatively rare, but that when it does occur, it is primarily male-biased. Our ecological field data confirm that introduced fishes (including the mosquito control vector *Gambusia*) and bullfrogs (*Rana catesbeiana*) exclude *Ambystoma* from lowelevation breeding sites. Since the salamanders also face a natural ecological barrier at high elevations, the entire vernal pool community is becoming restricted to a fragmented, linear strip of grassland with no opportunity for migration or local recolonization to occur. The combination of natural philopatry, sex-biased dispersal, and anthropogenic habitat destruction demands that several grassland reserves are required to maintain the genetic diversity found in *A. californiense*. [KEYWORDS: *Ambystoma californiense*, declining amphibians, metapopulations, allozymes, mtDNA sequences].

**The herpetofauna of Danggali Conservation Park.** ROBERT D. SHARRAD. *University of South Australia, Smith Rd, Salisbury East, SA 5109 Australia.* Danggali is a large South Australian park (250,000 ha) on the NSW border between Renmark and Broken Hill. Although sheep once grazed this semi-arid region, the vegetation is sufficiently intact for the park to be classified as a World Biosphere Reserve. For the last seven years staff and students of the Conservation and Park Management course of Uni SA have spent two weeks each autumn surveying the flora and fauna of Danggali. These and earlier studies reveal a satisfying variety of reptiles (55 spp) and two frogs. These species are listed and aspects of their natural histories illustrated. Sharrad C06-162

**The industrial frog rearing: technological and technical basis of culture.** SHCHUPAK E.L. *Institute Ecology of Plant and Animal, Ural Dep., Russia Acad., Ekaterinburg, Russia.* The culture of green frog compels investigators attention because of the quantity of frog in nature is reduced, furthermore capture frog for scientific and commercial needs results in disturbance of ecological balance. System of industrial frog rearing is elaborated by the group of population ecology of Amphibia. Organisation of large experimental frog's farms on the basis of fish hatcheries is the step for the solution of the problem. Resource saving technology is basis of frog farm, since in course of exploitation there are no damage to structure and productivity of natural communities and this technology promote to complex use of the territory. In fish hatchery there exist favourable conditions for high rate of revolution or frog population; growth rate of tadpoles and froglets exceeds the analogical indices in nature. Organisation's structure of frog farms vouches for its stable exploitation. The wide-scale, many-year observations Shchupak C06-164