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BEHAVIOUR AND PHYSIOLOGY

Spacing between calling males of the African Reed Frog, *Hyperolius puncticulatus* (Pfeffer, 1893) in Amani Pond

Abstract

Intermale spacing in calling males of the African Reed Frog, *Hyperolius puncticulatus* (Pfeffer, 1893), was investigated in Amani Pond. Call amplitude, frequency, and rate were investigated for the possible effects they might have on male spacing. The study showed that there is definite spacing of calling males in the pond, as determined by nearest calling neighbour distance. This distance could however not be explained by any of the call parameters investigated in the study. The distance between nearest calling neighbours range between 36 cm and 332 cm. Most calling males (62% of individuals counted in the first period) exhibited fidelity to call site in the study.

Viviane V. Hoveka, Desert Research Foundation, Namibia
Robstein L. Chidavaenzi, Natural History Museum, Zimbabwe

2000

Spacing and calling patterns among males of *Hyperolius puncticulatus* and *Hyperolius mitchelli*

Abstract

Two different morphs of *Hyperolius* frogs (*H. puncticulatus* and *H. mitchelli*) were studied at Amani Pond to determine the factors that influence their calling behaviour. Several individuals were located in different areas of the pond and their calling patterns were described recording frequency, intensity and choice of the calling sites. No correlation was found between the measured parameters and the spacing, suggesting that there are particular behaviours influencing the distance between calling males which still need investigation. Size showed no correlation with any of the other variables. Differences between the two morphs were also investigated to find out whether they belong to different species. Size and calling intensity were very similar whereas frequency and the choice of calling site showed some variation. The variations notwithstanding, we believe that the two morphs could be two different colour forms of the same species.

Andrea Benocci, University of Siena, Italy
Juliet Nansikombi, Makerere University, Kampala, Uganda
Peter C. K. Atuora, University of Ghana

2000

Does the Puddle Frog, *Phrynobatrachus krefftii*, return to the same place every night?

Abstract

Mark-recapture technique was used to answer the question whether *Phrynobatrachus krefftii*, Boulenger, 1909 (Ranidae) return to the same resting place night after night. *P. krefftii* spends the day on ground and the night on plant leaves. The study was carried out in two different localities in

the Amani Nature Reserve over a period of seven nights. In total 82 individuals were marked and 158 recaptures were recorded. *P. krefftii* showed a high tendency of returning to the same place. Seventy-five percent of the recaptured frogs had moved less than one metre within the period of five days. Only eight frogs (9 %) had moved a distance of two meter or more, no frogs had moved more than six metres. We noticed a significant difference in the height of the resting places between the two localities.

Markus Franzén, Swedish University of Agricultural Science, Uppsala, Sweden

Walter Hirschmann, University of Vienna, Austria

2001

Differential tadpole response to pond and stream predators

Abstract

Tadpoles have adopted different strategies to escape predators. In this study we examined tadpole response to predators. *Hyperolius spinigularis* was found in a pond and *Rana angolensis* and *Bufo brauni* were collected from a stream. All tadpoles were exposed to a pond predator (water scorpion) and a stream and pond predator (dragonfly larvae). *H. spinigularis* reacted to the water scorpion by lowering its activity level whereas *B. brauni* reacted by raising its activity level. *R. angolensis* did not respond to the water scorpion.

H. spinigularis and *B. brauni* are both found in ponds with water scorpions and it is therefore no surprise that both species react to this predator. *R. angolensis* is never found in ponds and has no adaptations to the predator. No tadpoles changed their activity level in the presence of the dragonfly larvae. It is possible that dragonflies are too common or too rare for the tadpoles to evolve any specific adaptation to this predator.

Jennifer Sun, University of California Los Angeles, USA

Nina Kirkegaard, University of Aarhus, Denmark

2005

Characterisation of the vocalisations of *Nectophrynoides tornieri* Roux, 1906 (Anura: Bufonidae)

Abstract

We studied the vocalisation of *Nectophrynoides tornieri* by analysing the different components of their calls. We report that the predominant element of their vocalisations, a series of single-pulse calls progressing into double-pulse calls, is most likely to be under sexual selection. However, with the exception of a tendency for larger males to have a faster double-pulse rate, the size of a male does not appear to be correlated with call characteristics.

Donal Smith, University College Dublin, Ireland

Vinodkumar Saranathan, Yale University, USA

Tenna Kragh Boye, Aarhus University, Denmark

2006

Does habitat type influence the rate of evaporative water loss (EWL) in frogs? A multi-species test on Eastern African frogs

Abstract

Frogs are widespread and occur even in water limited environments. As an adaptation, frogs might have evolved reduced water loss via the skin. This study compares water loss for species of five families occurring in different micro-habitats in a montane forest ecosystem. We found that,

regardless of the species identity, large frogs lose more water (in $\text{mg} \cdot \text{cm}^{-2} \cdot \text{sec}^{-1}$) than small frogs. Size-corrected evaporative water loss was higher in stream-side living frogs, followed by ground- and arboreal frogs. This finding suggests that reduced EWL might be an adaptation to a habitat with restricted water access.

Camilla Wadlund, Lund University, Sweden

Janine Hall, University of Zurich, Switzerland

2008

Potential of the yellow throat as an honest indicator for male strength in *Phrynobatrachus krefftii*

Abstract

Phrynobatrachus krefftii is one of the few frog species that uses mainly visual signals for communication rather than acoustic ones. The highly territorial males exhibit their bright yellow throat during male-male antagonistic interactions. This conspicuous signal could provide a certain amount of information of a male's strength, thereby working as an honest indicator. We predicted that there should be correlations between the colour pattern of the throat and body features, explicitly the leg constitution. We found evidence for the potential of the yellow throat to work as an honest indicator in intraspecific communication, as it provides information about the body size and the leg size.

Alexandre Farkas, University of Fribourg, Switzerland

Pedro Patrício, Faculdade de Ciências da Universidade de Lisboa, Portugal

Sylvia Reiter, University of Vienna, Germany

2008

The show must go on, but at what cost? Looking for compensating traits to the conspicuous colouration in *Phrynobatrachus krefftii*

Abstract

Krefft's Puddle Frog (*Phrynobatrachus krefftii*) is over all a cryptic species. However, males use visual signalling in intra-specific communication by exposing their bright yellow vocal sacs. Being conspicuous may as well pose danger to these animals as they are prone to be easily recognized and preyed upon. Therefore we expected to find compensating traits for conspicuousness in Krefft's Puddle Frogs. Comparisons were made between three groups of individuals: yellow-throated males, yellowish-throated females and white-throated females. A second comparison was made between males with differences in throat brightness. In both comparisons we measured wariness and jumping performance. Our results indicate that males which we considered to be more conspicuous showed higher wariness than the less conspicuous males. Also, we found slight differences in wariness between the three groups of individuals (but these results were not in all cases significant). In the comparisons made for jumping performance we found no more correlation than expected by chance. This might suggest that conspicuous individuals did not develop better locomotive traits than less conspicuous individuals.

Sofya Dolotovskaya, Lomonosov Moscow State University, Russia

Oluwakayode Michael Coker, University of Ibadan, Nigeria

Joris Jan Willem Buis, University of Wageningen, The Netherlands

2008

Push-ups as territorial displays in *Nectophrynoides tornieri* in the Amani Nature Reserve, Tanzania

Abstract

Males of *Nectophrynoides tornieri* were observed while displaying a peculiar posture; the males stood with their fore and hind legs stretched (“push-up”). This study examined possible causes for the push-up position and when it is displayed; our findings support the hypothesis that the push-up position is a territorial display. Where the presence of another male only evokes sit-up displays in a majority of the tested males, a playback of male vocalisations evokes a display of the push-up position often accompanied by calling. There was no correlation between the sit-up or the push-up display and the presence of a female *N. tornieri* in a male territory.

Iris Starnberger, University of Vienna, Austria

Pepijn Kamminga, University of Leiden, The Netherlands

Victor Chik Fosah, University of Buea, Cameroon

2009

Impacts of washing detergents on aquatic invertebrates and on tadpole development in Amani Nature Reserve

Abstract

The aim of this study was to investigate the impact of washing detergent use on aquatic fauna. Three different washing points were chosen as sampling sites along the Emau River in the Amani Nature Reserve, Tanzania and macroinvertebrates were sampled in four points above and below each washing points using kick sampling method. Meanwhile fifty tadpoles of *Bufo brauni* were treated in the laboratory with different simulated detergent concentrations to analyse their development. Results showed the lowest diversity of macroinvertebrates occurred in the first slower downstream sampling points while the experimental study on tadpoles did not show any significant growth differences across all given treatment conditions.

Luyan Wang, University of Siena (Italy), China

Yamenah Gomez, University of Basel, Switzerland

2009

The effect of invasive milfoil on abundance and predator-prey interactions of water scorpions and tadpoles in Amani Pond, Amani Nature Reserve

Abstract

Effects of invasive plant species on higher trophic level interactions are rarely studied. *Myriophyllum spicatum* is an invasive aquatic weed species that has spread in recent years to dominate Amani Pond in the East Usambara Mountains of Tanzania. Here we present the results of an investigation into the effect of weed density on the abundance and interaction of *Hyperolius* species tadpoles and water scorpions within the pond. Through a series of laboratory experiments we found that scorpions and tadpoles show significant preference for weeded habitats. Tadpoles took longer to resettle when they were subjected to ‘scorpion water’ and predation rate was higher in non-weeded than weeded microcosm habitats. These results indicate that weed encroachment may offer benefits such as provision of refuge from predation but at high density may cause a decrease in anuran abundance in Amani Pond.

Sarah Luke, University of Cambridge, UK

Jenny Sturgeon, University of Edinburgh, UK

2009

DISTRIBUTION

Do anuran species show preference for certain sites in the Amani Pond?

Abstract

The aim of the project was to determine whether different species of anuran show a preference for particular sites in the Amani Pond. Data collection was carried out by means of visual identification surveys at night. For each individual encountered we recorded the species, their length, height above water level and the species of plant on which they were found. Results showed that there is very little preference for specific heights, except for the largest species which was always at water level. Preference for plant species has been found for *Hyperolius pusillus* alone. Possible consequences of species being in close proximity are discussed with reference to their evolution and behavioural ecology.

Anna Durrans, University of Liverpool, UK

Natalia Giorgini Riva, University of Siena, Italy

1998

The effect of harvesting of water weed (*Myriophyllum*) on the frogs and other fauna of Amani Pond, Tanzania

Abstract

Amani Pond is an artificial pond located in Amani Nature Reserve, East Usambara Mountains, Tanzania. It contains a high diversity and abundance of frogs, and is almost completely covered in water weed of the genus *Myriophyllum*, which the local people harvest on a regular basis. The aim of our study was to investigate whether this harvesting has an effect on the frogs and other selected inhabitants of the pond. This question was addressed by comparing random samples of harvested and unharvested areas of the pond and by conducting an experimental harvest of the weed. We were unable to conclude whether the harvesting was having an effect and further work is necessary before any management recommendations can be made, although it is tentatively suggested that the biotic diversity of the pond could be enhanced by actively managing the vegetation.

Elizabeth Akinyi Odhiambo, National Museums of Kenya, Kenya

Ben Dixon, University of Cambridge, UK

2000

Is there a relationship between leaf litter habitat and *Arthroleptis* frog abundance in Amani Botanical Garden?

Abstract

Five sites with *Arthroleptis* frogs were studied in Amani Botanical Gardens. Sixty-seven frogs were observed from four different species belonging to this genus. Site A was found to have the highest mean number of *Arthroleptis*. This is thought to be partly because of ground-dwelling termites in the area, giving a plentiful food supply. No significant correlation was found to exist between the number of *Arthroleptis* found and the leaf litter variables studied. It was found that the numbers of frogs appeared to be higher where canopy cover was denser.

Elizabeth Carabine, University College London, UK

Rita McGrath, National University of Ireland, Ireland

2002

Factors determining the diversity and abundance of hyperolid frogs in the emergent vegetation in Amani Pond, Tanzania

Abstract

Amphibians have diverse habitats and are universally threatened as a result of human activities. This study was carried out on the emergent Cyperacean reeds in the Amani Pond. The main objective was to investigate the factors which could determine the diversity and abundance of hyperolid frogs in the pond. Investigations revealed that cutting of the Cyperaceans resulted in a complete absence of frogs. Density of the Cyperaceans, water depth, height and time (day or night) were found to have a positive correlation with the abundance and diversity of the hyperolid frogs. Our results also showed an invasion of the Cyperaceans by *H. spinigularis* during the second week of the study.

Victoria Nneoma Ujoh, University of Benin, Nigeria

Geert van de Wiel, Wageningen University and Research Centre, The Netherlands

2003

Diversity and abundance variations of anurans with habitat strata across Amani swamp, East Usambara Mountains, Tanzania

Abstract

A comparative study to investigate diversity and abundance of anurans in habitat strata was conducted from 16–27 September, 2005 at Amani swamp within the Amani Nature Reserve. Anurans were studied in three habitat types using both acoustic and visual 50 m × 10 m strip transects. Habitat types were classified according to the vegetation types. Anuran assemblages were highest in fern complex, followed by *Cyperus* reeds, while *Myriophyllum* ranked last. The Shannon Wiener index strikingly showed that species diversity was higher in *Cyperus* reed ($H' = 1.25$) than in *Myriophyllum* ($H' = 1.20$) and in the fern complex ($H' = 1.05$).

Stephen Mahinya, Sokoine University, Tanzania

Gilbert Razafimanjato, The Peregrine Fund, Madagascar

2005

Vegetation and height preference of juvenile frogs (*Hyperolius*) in the Amani Pond, Amani Nature Reserve, Tanzania

Abstract

Like other amphibians, anurans (frogs and toads) are usually restricted to moist or humid areas. *Hyperoliidae*, a common frog family of East Africa needs emergent vegetation as well. In this study the frog abundance on vegetation in Amani Pond, situated in Amani Nature Reserve was investigated. Transects were analysed and two cage set-ups were build in the Amani Pond. It was found that a high diversity of plants, increased frog abundance. Another finding was that *Myriophyllum aquaticum*, an invasive water weed, can become a problem, since it reduces habitat for the juvenile frogs.

Josephine Scott-Manga, University of Sierra Leone, Sierra Leone

Jacob Beeuwkes, Wageningen University, The Netherlands

2005

Spatial distribution patterns of two hyperolid frog species in Amani Pond

Abstract

We studied the spatial pattern in calling males of two closely related frog species *Hyperolius mitchelli* and *Hyperolius punctitulatus* in the Amani Pond and found this to be an aggregated pattern within the two habitats studied. Clustering was strongly associated with thick clumps of vegetation in one habitat and sedges in the other. Even though the location of clusters was not constant within habitats, the clusters were always associated with vegetation. There may be a behavioural influence on spatial distribution in these species; however, results indicate that this may still be associated with habitat.

Oluwashola Olaniyan, University of Jos, Nigeria

Severine Buechel, University of Fribourg, Switzerland

2006

Biogeography of pond-breeding amphibians in Amani Nature Reserve, Tanzania

Abstract

Anthropogenic disturbances can shape natural habitats, and thus species composition and abundance. We determined the distribution and abundance of amphibian species in the Amani Nature Reserve across these human modified gradients by investigating how wetland size, proximity and other habitat/anthropogenic variables can influence amphibian communities. We used Nocturnal Visual Encounter Surveys in 10 selected wetlands. There was no correlation between species richness or abundance with wetland size and proximity. In addition, there was no correlation with anthropogenic variables. This may have implications for amphibian conservation in wetland habitats irrespective of size and proximity with other wetlands.

Gilbert Adum, Kwame Nkrumah University of Sci. and Tech., Ghana

Joana Ribeiro, Faculty of Sciences, University of Lisbon, Portugal

Kiros Welegerima, Mekelle University, Ethiopia

2010
