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Foam to Home: Factors influencing foam nest formation and larval development of *Chirixalus simus* Annandale, 1915.

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Abstract

During Covid -19 nationwide lockdown we have studied the foam nest formation and reproductive behaviour of *Chirixalus simus* Annandale, 1915 in West Bengal, India. Temperature and humidity are two key factors regulating nest formation. Few plants are preferred over others for nest formation during early monsoon.
Keywords: *Chirixalus simus*, Foam nest, Reproduction

Introduction

Animals create egg foams mainly for reproduction or protection of juvenile forms. Frogs species that form foam enclosures for their eggs are largest constructions among land animals. These nests are extraordinary for their stability under unfavourable environmental conditions. and the diversity of sites in which they are produced, such as on the surface of water. *Chirixalus* Boulenger,1893 previously used to classify Asian species of *Chiromantis* and later synonymized with that genus. From the records it is evident that the Indo-Chinese distribution of genus *Chirixalus* presently known by 14 species. The Annandale's tree frog (*Chirixalus simus* Annandale, 1915) passes the winter and summer in leaf axils of trees with the commencement of the monsoons arrive to feed and breed on beard grass (*Andropogon squarossus)* and love grass (*Eragrostris cyanosuroides)* in West Bengal (Deuti *et al*, 2000).
Very few published materials are available to support reproductive strategies and factors regulating foam nest formation in *Chirixalus simus.* In this study we have studied the factors influencing foam nest formation.

Materials and methods

During lockdown We have started our work on 13 of July 2020. We have continued the work for next two weeks. From 7th to 12th day we found no nest probably because of no rain. During that time, we have selected three places roughly 150 feet apart where foam nests were formed above the temporary water puddle. We have studied 21 foam nests along with larval development. We counted the number of frogs, measured the length and width of foam along with the distance from water level. On 26 July 2020 one 48 hours foam was collected and placed into tanks of fresh water after 5 days we add water from same temporary puddle.

Results

Chirixalus simus is an early breeder. Breeding activity starts with the arrival of the monsoon and continues for few weeks, but we have documented most of the breeding and foam-nest construction ensue early. The amplexus was axillary type, only the females took part in foam-nest construction by cross-wise movement of their hind limbs, which frothed up the foam and dispersed the eggs inside it. Before amplexus, males of *Chirixalus simus* called from 6 p.m. onwards perched on selected branches in bushes at heights of 36-105 cm above the water level (Table 1). When females arrived, the males increased their activity and intensity of their call. At the end of the formation males leaves the place first followed by female. Within 48 hours of formation nest deliquesces primarily with rain. As rain water probably acts as an indicator of hatching out of the nest. On next day the colour of the foam-nests frequently turn yellowish from white. We have noted *Polypedates maculatus* (J.E. Gray,1830), Checkered keelback, *F. piscator* (Schneider,1799) as frequent visitor and also documented constant presence of *Euphlyctis cyanophlyctis* (Schneider,1799) through the period of nest development, under temporary water puddle probably due to grab the fertilized egg from foam nest as food. Figures 1- 15 shows different stages of the species development.

Figure 1: First day of foam nest forming

Figure 2: Second day of foam nest

Table 1: Annual number of wildlife attacks in and around CNP, Nepal, during 2014-2018

Spot 1	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**7-12 days**	**Day 13**	**Plant of choice**
Temperature	29	30	29	28	29	30	No nest. Rain in 12th day morning to even	27	*Achyranthes aspera*
Humidity %	89	78	82	84	88	82		90	
Number of frogs	10	2	3	4	3	0		9	*Lantana camara*
Number of foam nest	3	1	1	1(new)	1	0		3	
Distance from water		(104, 94, 86, 36, 43.68 cm)							
Nest length		5.2cm, 4.5cm, 6.8cm,5.8cm, 2.8cm(incomplete),							
Nest width		4.3cm, 4.3 cm, 3.1cm,2.7cm,1.9cm(incomplete),							
Spot 2	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	7-12	Day 13	Plant
Temperature	29	30	29	28	29	30	No nest	27	*Achyranthes aspera*
Humidity %	89	78	82	84	88	82		90	
No. of frogs	6	0	3		0	0		0	
No. of foam nest	1	0	1	0	0	0		0	
Distance from water		99.06cm	93.21cm						
Nest length		6.3 cm	4.8cm						
Nest width		3.2 cm	3.2cm						
Spot 3	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	7-12	Day13	Plant
Temperature	29	30	29	28	29	30	No nest	27	*Lantana camara*
Humidity %	89	78	82	84	88	82		90	
No. of frogs	17	4	5	2	0	0		5	
Number of foam nest	4	2(new)	1	1	0	0		1	*Syzygium jambolana*
Distance from water		82.55, 72.39, 92.71, 76.7, 94.4, 99.31, 93.21, 105 cm							
Nest length		5,4, 4.3,7.4,6.4,6.6,2.9,5.3,3.9 cm							
Nest width		3.6, 3.2,2.7,3.7,5.6,3.4,2.3,2.1 cm							

Figure 3: Males are very active before nest formation

Figure 4: *Chirixalus simus*, male

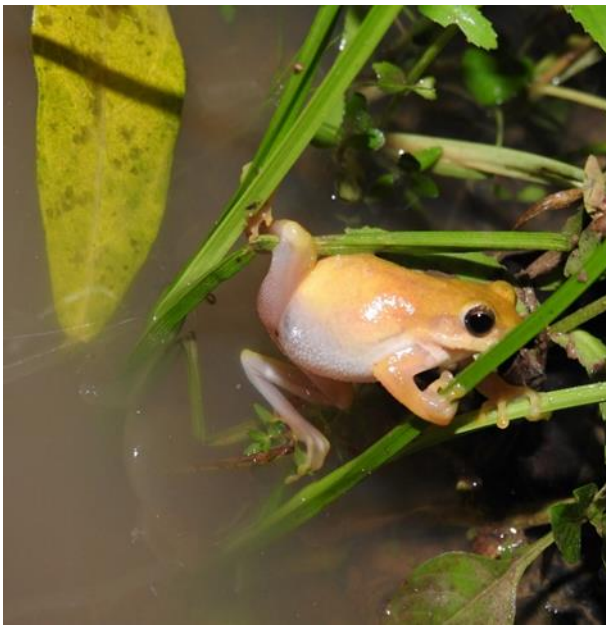

Figure 5: Female, visit to water puddle just before nest formation

Figure 6: Nests are about to fall in water

Figure 7. Foam nest and temporary water puddle one

Figure 8. The foam-nest of *Chirixalus simus delequesces* with rain after 2 days

Figure 9. Very beginning of larval development. Day one

Figure 10. Transparent larva, clearly visible different internal organs

Figure 11. Mature larva about 20 days

Figure 12. Frequent visitor in water puddle

Figure 13. Checkered keelback is there to take fertilized egg

Figure 14. Documented Constant presence of *Euphlyctis cyanophlyctis* through the nest formation

Figure 15: Nests were frequently attacked by ants

Discussion

Nest construction by *Chirixalus simus* is an interesting process in terms of formation, construction process, choice of place and plant selection. Mixing of the female's secretions and water during the first phase of nest formation is the perfect example of unification. Mixing of fluid directly with water would result in rapid dilution of the surfactant proteins essential to produce foam. Deuti *et al.* (2000) reports that *C. dudhwaensis* Ray,1992 in Dehradun, India reproduces only around temporary water bodies where they make foam-nests on overhanging vegetation, 60-180 cm above the water. Our study noted new height record for nest building in *Chirixalus simus*. *Achyranthes aspera*, *Lantana camara* and *Syzygium jambolana* were noted as plant of choice for nest formation of *Chirixalus simus.* Shape, position and broad leaf surface are the key factors for leaf selection. Due to wind and distances from water puddle sometimes foam nests were grounded in wrong places and dried out soon. Humidity is the limiting factors along with temperature for nest formation in *Chirixalus simus.* Second day's humidity is playing crucial role for development, with sudden decreased humidity (below 80) foam nest dried out soon. Nest formation, development and maintenance is depending chiefly on high humidity. Tadpole development in laboratory condition is very fascinating to watch though the development is very slow comparing with natural

condition 28 days (Banerjee 2014) primarily due to food available. The tail reached a length of 9 mm in 25 days, maintained the same length for 3 days and was resorbed completely with few days. The body however, grew up to 9 mm in 39 days and maintained this length until the tail was resorbed completely.

References

Banerjee A. 2014. Jelly Secretion by a Foam-nesting Tree Frog Chiromantis simus (Anura: Rhacophoridae): An Unreported Behaviour. Alytes 31(3-4): 77-82.

Deuti K. 2001. Breeding Ecology of Annandale's Frog Chiromantis simus (Anura: Rhacophoridae) near Kolkata, West Bengal. Journal of Bombay Natural History Society. 98(3). 341-344.

Deuti K., Biswas S., Ahmed M.F., Dutta, S.K. 2000. Rediscovery of *chirixalus simus* Annandale,1915 from Assam and West Bengal, eastern India. Hamadryad 25: 215-217.