Occurrence and Relative Abundance of *Tylototriton* Species During Breeding Season in Taunggyi University Campus, Taunggyi, Shan State

Nang Cherry Oo*, Nang Chaw Su Aye**

Abstract

Two species of *Tylototriton* were observed in Taunggyi University Campus. *Tylototriton verrucosus* and *Tylototriton shanorum* confined to family Salamandridae were studied in the breeding season from May to October, 2017 and 2018. During the study period, totally 106 individuals were collected from four study sites. In the study period, the total number of individuals were recorded as highest population (33 individuals) in June, 2017 and 2018. The lowest population was found in September, 2017 and 2018. *T. verrucosus* was more abundance in all study sites than that of *T. shanorum* in all study sites. Total number of individuals in study site II was more than that of study site I, III and IV. Relative abundance of two species were very common in four study sites. The population of two species were loss in yearly.

Keywords -Salamandridae, *Tylototriton,* occurrence, Taunggyi University Campus

Introduction

Salamanders are a group of amphibians typically characterized by their lizard-like appearance, with slender bodies, blunt snouts, short limbs projecting at right angles to the body, and the presence of a tail in both larvae and adults.

There are about 760 living species of salamanders. One-third of the known salamander species are found in North America. In about 90% of all species, fertilization is internal. Reproduction is usually seasonal and salamanders may migrate to breeding grounds.

Salamanders commonly live in mountain streams, hiding in logs or beneath rocks and stones. They inhabit close to 3,000 ft while others live near sea level. Amphibians as a whole have been impacted heavily by human interaction. Pollution, land development, traditional medicines, deforestation and other human activities put them in danger.

Tylototriton is a genus of newts, known as crocodile newts or kobby newts. About 32 known species are recorded in this genus. The genus *Tylototriton* currently consist of 22 species with a distribution from Nepal, Bhutan and India east-ward to China and southwards to Indochina (Nishikawa *et al.*, 2013 a).

* Associate Professor, Department of Zoology, Yadanabon University

** Lecturer, Department of Zoology, Taunggyi University

Tylototriton has been reported from eastern and Western China, Nepal, Sikkim and Darjeeling in India, Burma, northern Thailand, northern Vietnam and Okinawa in Japan (Zhao *et al.*, 1988). Members of the genus *Tylototriton* have long been recorded from northern and eastern parts of Myanmar and have been traditionally classified as *T. verrucosus* Anderson, 1871 (Gyi, 1969).

T. verrucosus has been collected from Sagaing Region and Kachin States in Northern Myanmar and the Shan Plateau in Eastern Myanmar. *T. shanorum* has been found as a newt endemic in Taunggyi, Shan State, Myanmar near the lentic bodies of water at an elevation of around 14,000 meters (Nishikawa *et al.*, 2014).

Two species of newts were observed from Taunggyi University Campus. Present work was conducted with the following objectives:

- to verify the occurrence of *Tylototriton* species in Taunggyi University Campus
- to determine the population of newts in breeding season

Matherials and Method

Study Area

Taunggyi University is located between latitude 20° 45' 11.39"N, Longitude 97° 0.3' 1.80"E, with an elevation of 1,436 m (4,712 ft) above sea level and nearest city to Taunggyi (Fig.1).

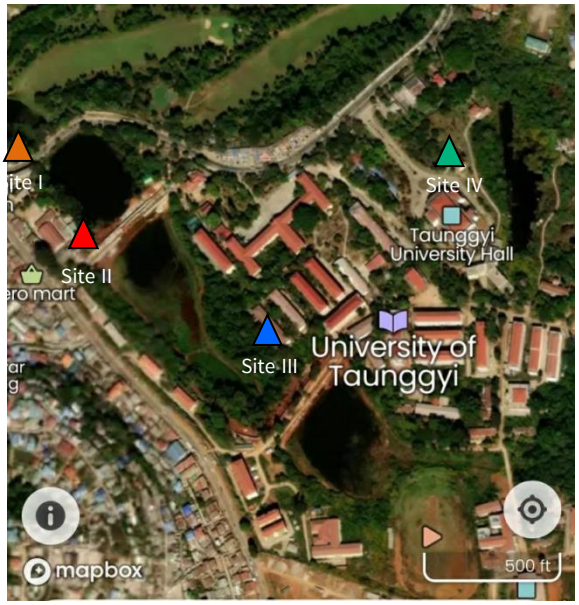

Fig. 1 Location Map of Taunggyi University Campus

Study Sites

There are four study sites which had permanent ponds and rain puddles.

Study Period

The present study was conducted from May to October (breeding season) 2017 and 2018.

Specimens Collection

The presence of absence of salamander was carried out by using method of Visible Encounter Surveys (VES). For this kind of survey, the observer walks through a designated area and visually searches for animals (Manenti *et al.*, 2008).

Indentification

Identification of collected specimens was done according to Anderson (1871) and Nishikawa *et al.*, (2013, 2014).

Data Analysis

$$\text{Relative Abundance} = \frac{\text{Total number of Individual of a species}}{\text{Total number of Individual of all species}}$$

vC = very common (having relative abundance 0.0500 and above)

C = common (having relative abundance 0.0100 and above less than 0.0500)

uC = uncommon (haivng relative abundance less than 0.0100) (Bisht *et al.*, 2004)

Meteorological Parameters

Monthly mean temperature, mean relative humidity and rainfall were kindly provided by Hydrology and Meteorology Department of respective township.

Plate 1. Four Study Sites of breeding ponds in Taunggyi University Campus

Results

A total two species of *Tylototriton* were observed from four study sites during breeding season (May to October) 2017 and 2018.

Phylum - Chordata

Class - Amphibia

Order - Caudata

Family - Salamandridae

Subfamily - Pleurodelinae

Genus - *Tylototriton*

Species (1) - *T. verrucosus* (Anderson, 1871)

Species (2) - *T. shanorum* (Nishikawa, Matisui & Rao, 2014)

During the study period, a total 106 individuals of two species were collected from four study sites.

Table 1. Monthly total number of individuals and meteorological parameters during breeding season, 2017 and 2018

Months	Number of individuals	Temperature (°C)	Rainfall (mm)	Humidity (%)
May	33	28.3	48.26	50
June	34	26.11	50.8	60
July	25	25.6	48.26	70
August	12	25.6	58.42	74
September	2	26.11	50.8	30
October	-	26.11	35.56	19

Table 2. Occurrence and abundance of *Tylototrition* species from four study sites

Species	Study Site I	Study Site II	Study Site III	Study Site IV	Total	Relative Abundance	Average Relative Abundance
T. verucosus	14	24	12	16	66	0.6226	vC
T. shanorum	6	16	4	14	40	0.3773	vC
Total	20 (19.04%)	40 (38.09%)	16 (15.23%)	30 (27.61%)	106		

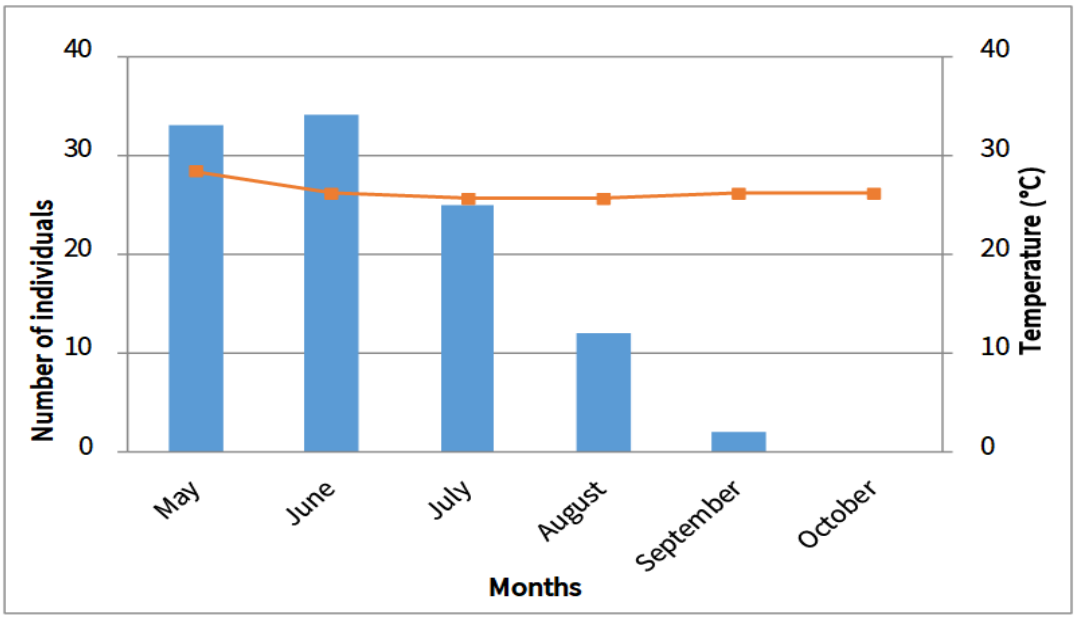

Figure 2. Relationship between monthly individuals and Temperature

The highest population was observed in June of 2017 and 2018 (34 individuals) and the lowest population was found in September of 2017 and 2018 (2 individuals). Temperature and rainfall of these months were the same (26.11ºC) and (50.8 mm) but humidity was found to be difference as 60% in June and 30% in September (Table 1).

In the present study, 66 individuals of *T. verrucosus* of 40 individuals of *T. shanorum* were collected from all study sites. The highest population (40 individuals) were recorded in the study site II and the lowest population (16 individuals) was observed in the study site III (Table 2).

The relative abundance of two species was found to be very common. The relative abundance of *T. verrucosus* (0.6226) was more abundance than that of *T. shanorum* (0.3773) (Table 2).

Tylototriton verrucosus *Tylototriton shanorum*

Plate 2. Occurrence of Tylototrition species in four Study Sites

Discussion

A total of 106 individuals belonging to two species *Tylototriton verrucosus* (66 individuals) and *Tylototriton shanorum* (40 individuals) were recorded from May to October, 2017 and 2018.

Pe Than Kyaw and Mar Lar Htwe (2017) observed that (79 individuals) of *Tylototriton shanorum* were collected from Taunggyi Township area. Based on the present result, 40 individuals of *T. shanorum* were collected from Taunggyi University Campus only. Therefore, *T. shanorum* was found to be very common in the present study area.

In the present study, the highest population of two species were observed in June and the lowest population in September. The temperature and rainfall of June and September had no differences. But, the highest population was observed in the hight humidity of June (60%) and the lowest population was collected in the low humidity of September (30%). Therefore, population differences of those months may be related to the humidity.

The breeding season of *T. ziegleri* in northern Vietnam was previsouly thought that last from April to May (Nishikawa *et al*., 2013b). The breeding season of *T. vietnamensis* was recorded that last from June to July (Bohme *et al*., 2010).

There were no specimens in the months of December to May of the years in almost every study sites and they could not seen only two months (April and May) in Lindley Inn Village of Pindaya Township (Pe Than Kyaw, 2017).

During the present study, the two species were not seen in October. *T. verrucosus* and *T. shanorum* were preferred shady hiding place, but these place were disappearing with the building constructions in Taunggyi University Campus and the main breeding ponds for two species were threatened by lacking off the water flow.

Many species of Asian newts are threatened with extinction from overexploitation for traditional medicine and international pet trade (IUCN, 2014).

In the present study, the study sites were faced cut off the inflow of water and nearly dry out. Deforestration and human activity may lead to degrade the population of *Tylototriton* species in the study area. The population of two species were loss in year to year.

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