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SEASONAL CHANGES OF THE TESTES IN THE MARSH FROGE *RANA RIDIBUNDA* PALLAS, 1771

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ABSTRACT

Samples of marsh frog included 148 sexually mature males were collected in Baghdad from December 1992 to December 1993 to December 1993. The testis weight was expressed as percentage of the body weight. The percent mean weights of testis were at their minimal weight (0.255%) during April (spawning period).

Testis weight has increased until reached its greatest average weight in August (0.785%). During the winter there is a slight decrease in weight with a more obvious fall at the spawning months. From the results obtained from the present work on *Rana ridibunda* and from the observations on annual cycle in testis weight of some temperate zone anurans we notice that testes tend to be lowest after spawning and the testis cycle seems to be correlated with geographic range of distribution.

INTRODUCTION

Amphibia usually respond adaptively to the thermal changes. Frogs retreat to hibernation on the approach of cold weather and reappear on the advent of spring warmth (Noble, 1931).

Numerous studies devoted to the hibernation of amphibians and particularly to role and effect of the environmental temperature on spermatogenesis (Mizell, 1964; Brenner, 1969; Cooke, 1977; Maruyama, 1979; Jorgensen etal., 1979; Christopher *et al.*, 1993). Liver glycogen contents appear to be closely corrected to the change in gonad weight of frogs (Mizell, 1964) and lizards (Raheem and Dehlawi, 1989). A number of authors, among them was Van Oordt (1960), have demonstrated that control of spermatogenesis is directly related to the gonadotropic hormones of the pituitary gland in amphibia. Van Oordt (1960) has distinguished two basic types of reproductive patterns, in anurans, which may be termed as continuous and discontinuous cycle. In the subtropical Mediterranean frogs (ex.*R. esculenta*), the spermatogenetic cycle is continuous, but in the more northern parts of their distribution range the production of spermatozoa becomes interrupted during the colder winter months.

To my knowledge no information about spermatogenetic cycle of marsh frog in Iraq is found in the literature. The present work provides the first detailed analysis of the annual cycle of testis with a population of *Rana ridibunda* living under natural condition as far possible.

MATERIALS AND METHODS

Samples of frogs were obtained monthly from December 1992 to December 1993. The animals included 138 sexually mature males of the marsh frog caught in Baghdad and its suburbs. Frogs were killed with ether fumes, the testes were immediately dissected out and weighed. The testis weights were expressed as percentage of the body weight. The body weight of the studied frog does not include the weight of the stomach contents. Testis weights

were deducted from the total body weight. Differences in mean testis weights of all animals were evaluated by the student (t) test at level of 0.05 (significant).

RESULTS

Observations of frogs in the field indicated that almost all frogs had disappeared from the study field in late December 1992 and reappeared around the sixteenth of March 1993. The temperature of the air reached the minimum in January (7.1 + 3.2 ºC) and in February (10.5 + 5.4 ºC). The seasonal changes in weight of the testis are shown in fig (1). The percent mean weights of testis were at of their minimal weight during April (spawning period) (0.255%). Testis weight has continuously increased in May sample until reached its greatest average weight in August (0.785%)

Table (1): Mean percent testis weight (g) of the marsh frog *Rana ridibunda*.

Month	No.	Weight of testes as percent body wt.	
		Mean	SE
Jan. 1993	9	0.323	0.022
Feb.	11	0.316	0.034
Mar.	17	0.306	0.007
Apr.	15	0.255	0.004
May	19	0.474	0.066
June	9	0.477	0.044
July	9	0.665	0.064
Aug.	10	0.785	0.093
Sept.	8	0.533	0.059
Oct.	16	0.411	0.002
Nov.	14	0.457	0.078
Dec.	11	0.425	0.039

From August to December, the relative weight dropped then remained almost constant till March. During the winter there is a slight decrease in weight, with a more obvious fall at the spawning months (March and April). Mean testis weights collected in October to December do not differ from those of male obtained during hibernation (January and February) and during the breeding season (March and April) ($P > 0.05$). Mean testis weight collected in August was significantly different than those the breeding season.

DISCUSSION

The pattern of annual testicular cycle as observed in the marsh frog in Baghdad, seem to be similar to some anurans of Temperate Zone. The general cycle of testis development agrees closely with that found by other workers (Smith, 1950; Van Oordt, 1956) on *Rana temporaria* and (Lofts, 1964) on *Rana esculenta*. The maximum testis mean weight of both species was observed in August. From August to December the relative weight dropped then remained almost constant till a minimum weight in March for *R. temporaria* and in May for *R. esculenta*. The present work shows, almost, the same pattern of cycle. During the winter there is a slight decrease in weight with a more obvious fall at the spawning period (March and April). This is due, probably, to the transfer of spermatozoa to the vesicula seminalis and to the intense spermiation during this time. Histological examination by Jorgensen *et al.* (1979) revealed that sections of testis from frogs taken in August contain mature spermatozoa and spermatide fill almost the entire testis. Sections of testes at the spawning period show few spermatozoa.

The increase in weight of testis from April-August, which was observed in *R. ridibunda*, probably caused by a wave of spermatogenetic activity of germinal cysts packing the seminiferous tubules. From August to December is a phase marked by the decline of spermatogenesis (Jorgensen *et al.*, 1979).

The best comparison of gonadal cycles was given by Jorgensen *et al.* (1979). The mean weight of testes of *R. esculenta* in Switzerland (1901) was 0.35% in August and the minimum (after spawning) was 0.2% in June. In Germany (1923) the maximum was 0.43% in July and the minimum (after spawning) was 0.19% in May. In Holland (1964) the maximum was 0.27% in August and the minimum (after spawning) was 0.14% in Janury. The maximum mean weight of testes of *R. nigromaculata* in China was 0.16% in Sept. and the minimum was 0.07% in June-July.

From these observations on the annual cycle in testis weight of some temperate zone anurans and the results obtained from the present work on *R. ridbunda* we notice that testes tend to be lowest after spawning and the testis cycle of anurans seems to be correlated, in general, with geographic range of distribution.

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يخدلتي لمفلا تلرغ ة ل ا عدنغتاع قنتسملا ***Rana ridibunda***

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الخلاصة

ع جمتم ١٤٨ كن . د ا .غبن م ًايسحتجض ا لك ة نت سمللعفضر .كن .حذ تمو نا ة نس لوأ ١٩٩٢ تقدلو نو نا ة ي غلو ١٩٩٣ .نزون م يو لما بسن ل يصلخا زورع ّعلمقل م ىلح ا . ه . لمو ة سه نيذأ .. ناكيطخا نو . ل ة وبئلمقب . سلل لا . .منإ (٢٥٥.٠%) يه .ش للاخ نا سي ن (هج ...تنتلو ..ف). ًاليجد .. . تي. لخزو دلزلي إ بأ رهشفي ىه ل لسعمي لم أ لصو ن إ (٧٨٥.٠%) لثلنهريه شأللاحظ حلطو . هج ع ملتشلقر . فل خنز و . لفي لي ي ل قنطلق ن جوانزل الك ل كهتاعنت . لمعرف ضيلمفحج ل انذ . للا. ن . م ا هيل إ طمبو ة ل تمتيلاجئ ا نلا ن إ ة ل تعلم ا ة. ة نلت ا.. ئابوليلخا نزو . ل ةيو .سلاقو د للات . جلالمان مي حظ ا نز نلظ . للا ن في را.. غ ا يز و ل ل ا ب ةلاقعالم حظ لة ي ن سلا ورد . ل الجوز . . لثا عبه . ىلم سمنأ ا طبه ي نا ويحل .

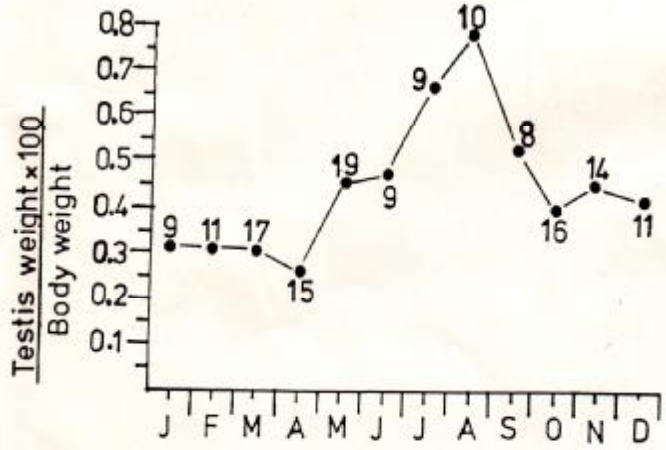

Fig. 1. Seasonal changes in weight of testis in Rana ridibunda. Numerals indicate sample sizes.