# REGENERATION OF THE GONADS IN REPTILES

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After removal of one of the gonads (testis or ovary) from lizards, compensatory hypertrophy of the residual organ takes place. After bilateral partial resection of the testis or ovary, the weight of the injured organs is restored.

No studies of regeneration of the gonads in reptiles could be found in the accessible literature. Other workers also have pointed out the absence of such investigations [1].

Nevertheless, the comparative study of regeneration of the gonads is of great interest because their regeneration in higher (mammals) and lower (amphibians) vertebrates pursues a different course.

The investigation described below was carried out to study the course of regeneration in the gonads of the lizard (Phrynocephalus mystacens Poll.) following total and partial gonadectomy associated with the removal or preservation of the fellow gonad.

## EXPERIMENTAL METHOD

Experiments were carried out on lizards (Ph. mystacens Poll.) in the following series: I) total removal of both gonads; II) unilateral removal of the gonads; III) bilateral partial removal of gonads; IV) unilateral partial removal of the testis. The experimental lizards were divided into three groups: 1) initial control (the lizards of this group were sacrificed on the 1st day of the experiment); 2) experimental; 3) final control (the lizards of this group were sacrificed together with the experimental animals).

Experiments were carried out during June-August, 1967, on lizards aged 1.5-2 years. The body length of the females was 65-67 mm, and of the males 69-72 mm. From June to August is the period of greatest activity and of ovulation of these animals. The operations (injury to the gonads) were carried out during the first half of June.

## EXPERIMENTAL RESULTS

Series I. Two months after total bilateral gonadectomy on 20 females and 30 males, no regeneration was found.

Series II. Thirty days after unilateral removal of the ovary, the mean weight of the residual intact ovary was $26.8 \pm 0.01$ mg, which was 1.6 times greater than the weight of the removed ovary. The relative weight of the intact ovary was 0.18%, and that of the removed ovary 0.1% (Table 1).

The removed ovary contained 49 follicles, the intact ovary 61, and at the beginning of the experiment the intact ovary contained 70 follicles and the control 48.

The weight of the testis of the experimental lizards 45 days after unilateral removal of the testis was $52 \pm 6$ mg, while that of the controls was $18 \pm 2$ mg, i. e., during the experiment the testis increased in size by almost three times compared with the control (Table 2).

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TABLE 1. Changes in Weight of Ovaries during Experiment (Unilateral Removal of Gonads)

| Index | Initial control | Final control | Experiment |
|---|---|---|---|
| No. of lizards | 10 | 10 | 10 |
| Body wt., g | 16,0 | 15,1 | 14,5 |
| Weight of ovaries, mg | | | |
| left | 12,5 | 10,6 | — |
| right | 18,1 | 16,2 | 25,8 |
| both | 30,6±0,014 | 26,8±0,015 | — |

TABLE 2. Changes in Weight of Testes during Experiment (Unilateral Gonadectomy)

| Index | Initial control | Final control | Experiment |
|---|---|---|---|
| No. of lizards | 10 | 10 | 30 |
| Body wt., g | 21,4 | 16,9 | 19,0 |
| Weight of testes, mg | | | |
| left | — | 18,5±2,5 | — |
| removed | — | — | 51,2±8,0 |
| intact | — | — | 52,7±6,0 |
| Wt. of testes in % of body weight | — | 0,1 | 0,27 |

TABLE 3. Changes in Weight of Ovaries and in Number of Follicles during Experiment (Bilateral Partial Gonadectomy)

| Index | Beginning of experiment | End of experiment | Final control |
|---|---|---|---|
| No. of lizards | 10 | 10 | 10 |
| Body wt., g | 14,0 | 13,5 | 15,0 |
| Weight of both ovaries, mg | — | 27,3 | 27,0 |
| of resected parts, mg | 19,4 | — | — |
| of ovaries in per cent of body wt. | — | 0,20 | 0,18 |
| Number of follicles in both ovaries | 10,5 | 6,0 | 9,0 |

TABLE 4. Changes in Weight of Testes during Experiment (Unilateral Partial Gonadectomy)

| Index | Initial control | Final control | Beg. of experiment | End of experiment |
|---|---|---|---|---|
| No. of lizards | 10 | 10 | 10 | 10 |
| Body wt., g | 21,4 | 18,4 | 19,6 | 16,4 |
| Weight of right testis: | | | | |
| in mg | 74±3 | 78±1 | — | 81±3 |
| in % of body weight | 0,33 | 0,42 | — | 0,50 |
| Weight of left testis: | | | | |
| in mg | 96±5 | 96±3 | — | 160±18 |
| in % of body weight | 0,45 | 0,52 | — | 1,0 |

Histological investigation revealed a much greater number of sex cells at different stages of development in the ampullae of the testes of the experimental lizards than of the controls.

Hence, after complete removal of one gonad from both female and male lizards, compensatory hypertrophy of the intact organ takes place. This hypertrophy is reflected by an increase in the weight of the organ and intensification of gametogenesis.

Series III. Thirty days after partial removal of both ovaries, an increase in their weight was observed up to the weight of the two control ovaries. The relative weight of the ovaries in the experimental animals was 0.2%, compared with 0.18% in the controls (Table 3).

The number of follicles in the ovaries of the experimental animals was smaller than in the control ovaries. Compared with the beginning of the experiment, their number was not increased.

The increase in weight of the ovaries evidently took place through an increase in size of the follicles.

Series IV. Six months after removal of half of the left testis the weight of the injured organ was considerably increased and was greater than the weight of the testis in the control animals. The testis contained ampullae with a large number of small spermatogonia. The intact testis showed no increase in size (Table 4).

## LITERATURE CITED

1. L. D. Liozner, Arkh. Anat., No. 1, 96 (1965).