

Maintenance of Thyroid Activity with Some Steroids in Hypophysectomized and Gonadectomized Catfish, *Mystus vittatus* (Bloch)

Teleostean pituitary, like mammalian, exhibit regulation of thyroid function, as it contains and releases thyrotropin¹⁻³. An increase in thyroid activity has been reported after androgens administration, without any increase in thyrotrophs or TSH level of pituitary gland^{4,5}. It was thought^{4,5} that this increase in thyroid activity, in response to androgens, was not the effect of thyrotropin but was the result of direct action of steroids upon thyroid. However, the above findings are insufficient to establish any conclusion on the mode of action of steroids, because in the above experiments workers have not used hypophysectomized animals and any inference drawn in the presence of pituitary would not be free from doubt. In this communication, results of thyroid activity, in hypophysectomized and gonadectomized *Mystus vittatus*, in response to testosterone propionate, estrogen and cortisone have been reported. *M. vittatus* was specially selected for this investigation, because in this species seasonal changes of thyroid cycle, epithelial cell height, radioiodine uptake, TSH levels of the pituitary and their relationships are well known⁶⁻⁹. Thyroidal radioiodine (¹³¹I) uptake was taken as a criterion for the measurement of thyroid activity, as this test is more sensitive than histological response¹⁰.

There was a steep fall in thyroid activity within 3 weeks of hypophysectomy. I.p. injections of estrogen at suitable dose (15 µg/fish, twice a week for 3 weeks) enabled hypophysectomized *M. vittatus* (male) to maintain normal thyroid activity (Table). Testosterone propionate administration (150 µg/fish, twice a week for 3 weeks) was highly effective, which not only restored the normal activity but boosted it about 1½ times to that of controls. In females the results were similar to those of males in response to above steroids. As far as the positive

response of thyroid activity is concerned, these results are in agreement with those observed by MATTY⁴ in *Sparisoma* and SINGH⁵ in *Mystus*. However, they noticed^{4,5} manifold increase in thyroid activity, which could possibly be due to unhypophysectomized fishes used in their investigations. Cortisone treatment (10 µg/fish, twice a week for 3 weeks) was as effective as estrogen in raising the deminished thyroid activity of hypophysectomized individuals of either sex. This finding is not in concurrence with those reported by RASQUIN and ATZ¹¹ in *Astyanax* and CHAVIN¹² in *Carassius* in response to cortisone. Their negative results^{11,12} might be due to various factors interfering at some steps of thyroid physiology; such as (1) the presence of pituitary in recipients of steroid treatment and (2) their results are based on histological observations of thyroid follicles, where the response is very slow and indecisive.

The administration of estrogen, cortisone and testosterone propionate at the dose levels cited above in males of *M. vittatus*, which were hypophysectomized and castrated, proved to be ineffective in restoring the normal thyroid activity (Table). On the other hand, in such females the above treatment was highly effective and their results were comparable with those of controls and of specimens which were hypophysectomized only.

The data of the present experiment clearly demonstrate a very significant increase in the thyroid activity of hypophysectomized *M. vittatus*, after the estrogen, cortisone and testosterone propionate administration. It appears that the above steroids directly influence the thyroid gland and are potent enough to maintain its activity in the absence of thyrotropic hormone of the pituitary. The mode of action of steroids requires further investigation. However, the role of testis in controlling the action of steroids upon thyroid is not very clear. These steroids probably react at molecular level to increase the general metabolic rate which in turn influences thyroid physiology¹³.

Zusammenfassung. Beim amerikanischen Wels *Mystus vittatus* (Bloch) wurde festgestellt, dass die Radiojodaufnahme der Schilddrüse nach Hypophysektomie durch Cortison und Sexualhormone wieder normalisiert werden kann.

T. P. SINGH¹³

Department of Zoology, University of Udaipur,
Udaipur (Rajasthan, India), 17 October 1968.

Thyroid activity of hypophysectomized and castrated male

<i>Mystus vittatus</i> *			
Batches ^a	Group A ^b Treatment	Maximum % of thyroidal I-131 uptake mean ± s.e.	Signifi- cance ^c
1	Testosterone propionate 150 µg/fish	23.46 ± 1.18	P < 0.001
2	Estrogen 15 µg/fish	15.20 ± 0.60	P < 0.005
3	Cortisone 10 µg/fish	15.68 ± 0.75	P < 0.005
4	Only saline injection	2.75 ± 0.20	
5	Sham operated control given saline injection	14.30 ± 0.54	P < 0.005
Group B ^c			
6	Testosterone propionate 150 µg/fish	10.60 ± 0.40	P < 0.95
7	Estrogen 15 µg/fish	7.25 ± 0.28	P < 2.40
8	Cortisone 10 µg/fish	6.50 ± 0.30	P < 2.85
9	Only saline injection	2.40 ± 0.10	
10	Sham operated control given saline injection	13.80 ± 0.54	

* All experiments were carried out at 22–25°C and specimens of each batch received individually 6 injections in total i.p. (twice a week for 3 weeks), of respective treatments. ^b Specimens were hypophysectomized 3 weeks before the start of steroid treatment. ^c Specimens were both hypophysectomized and castrated 3 weeks prior to the start of steroid treatment. ^d Each batch had 6 specimens. * All P values of group A are against batch 4, and of group B against batch 10.

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¹³ Present address: Department of Zoology, Banaras Hindu University, Varanasi-5, India.