1 Supported by Grant HD-07049 from the National Institutes of Health. The CI-628 was generously provided by Parke, Davis (Ann Arbor, Michigan, USA).
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Thyroid activity in response to some gonadal steroids in methallibure-treated *Heteropneustes fossilis* (Bloch)[1]

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Summary. Methallibure treatment is as effective as hypophysectomy in reducing thyroid activity in *H.fossilis*. Sex steroids (TP and EB) administration restored thyroid activity in methallibure-treated females to normal level, but failed to elicit any response in males. This drug seems to block TSH secretion and thyroid hormone synthesis in *H.fossilis*.

Studies on thyroid-gonad interrelationship in teleosts have yielded debatable results. Some workers[3-6] have reported heightened thyroid activity associated with gonadal development and spawning, while others[7,8] have observed diminished thyroid activity in that sexual phase. Increased thyroid activity during spawning may also be related to variation in physical activity rather than gonadal function[4,9]. A direct augmenting effect of hormonal steroid therapy on thyroids activity has also been recorded[10-13]. Methallibure (a derivative of bis-thiourea) has been successfully used to alter the secretion of gonadotropin and to prevent the action of gonadotropins on ovary[14-16] and testes[17,18]. Except for some histological evidence[17], no work has apparently been done to investigate the effect of methallibure on thyroid physiology of teleosts. In the present experiments, an attempt has been made to compare the effect of methallibure on thyroid activity with that of hypophysectomy. In methallibure-treated fish, the response of thyroid after sex steroid therapy has also been evaluated.

For this project 84 adult specimens (42 of each sex) of *H.fossilis* with average weight 70 g (60–80 g) and length 22.5 cm (20–25 cm) were collected from ponds around Varanasi. They were fed on minced liver on alternate days. Aquarium temperature was not controlled, the variation was uniform in all the aquaria and ranged from 23 to 25 °C. Specimens were divided into 2 groups for 2 experiments. The details of treatment, time interval, number and sex of specimens are given in tables 1 and 2. The techniques already published for hypophysectomy[13] and for estimation of thyroidal activity[11,19] have been used in this project. All injections were given i.p., and the volume of each injection was 0.2 ml. p-values for significance were calculated by Student's t-test.

Response of thyroid after hypophysectomy and methallibure treatment in both sexes is given in table 1. 2 weeks treatment of methallibure at the dose of 100 µg/g thrice a week reduced the thyroid activity to the level comparable to that which resulted after hypophysectomy. Both sexes gave similar response after hypophysectomy, as well as after methallibure administration (table 1). Results of sex steroid therapy in specimens pretreated with methallibure are given in table 2. In females, lost thyroid activity was restored almost to the normal level within 2 weeks of testosterone/propionate (TP), estradiol benzoate (EB) and thyroid stimulating hormone (TSH) administration. But in males except TSH, both the sex steroids tested failed to induce any increase in thyroid activity (table 2). TSH treatment was partially effective. Findings clearly indicate that methallibure treatment, like hypophysectomy, effectively reduced thyroid activity. It seems this drug blocks normal thyroid functioning, probably either by inhibiting TSH secretion or preventing the action of circulating TSH on thyroid or impairing thyroid hormone synthesis. Reduced thyroid activity in response to methallibure treat-

Table 1. Comparison of thyroid activity in hypophysectomized specimens with that of methallibure-treated ones in *H.fossilis*

Batch*	Sex	Treatment	Maximum thyroidal ^{131}I uptake in % (mean ± SEM)	CR**
1	Female	Hypophysectomized	3.77 ± 0.50	8.10 ± 0.65 ($p<0.01$)
2	Female	Methallibure 100 µg/fish thrice a week for 2 weeks	2.84 ± 0.24	10.18 ± 1.06 ($p<0.05$)
3	Female	Sham operated given 0.6% saline injection	15.80 ± 1.22	20.00 ± 1.36
4	Male	Hypophysectomized	2.00 ± 0.72	9.15 ± 0.87 ($p<0.05$)
5	Male	Methallibure 100 µg/fish thrice a week for 3 weeks	4.06 ± 0.74	8.00 ± 0.50 ($p<0.01$)
6	Male	Sham operated given 0.6% saline injection	16.00 ± 1.45	21.08 ± 2.30

*Each batch had 6 specimens; **$CR = \frac{PB^{131}I\ CPM}{^{131}I\ CPM + PB^{131}I\ CPM} \times 100$; p-values in batches 1 and 2 are against batch 3 and in 4 and 5 against batch 6.

Table 2. Effect of gonadal steroids on thyroid activity in methallibure-treated *H.fossilis*

Batch*	Sex	Treatment/fish (3 injections a week for 3 weeks)	Maximum thyroidal ^{131}I uptake in % (mean ± SEM)	CR
7	Female	TP 100 µg/injection	14.65 ± 0.88	22.35 ± 1.40 ($p < 0.01$)
8	Female	EB 100µg/injection	16.84 ± 1.20	23.76 ± 1.36 ($p < 0.01$)
9	Female	TSH 10 µg/injection	15.88 ± 1.47	22.00 ± 1.08 ($p < 0.01$)
10	Female	0.6% saline injection	3.45 ± 0.22	7.98 ± 0.66
11	Male	TP 100 µg/injection	2.67 ± 0.32	8.00 ± 0.45 (NS)
12	Male	EB 100 µg/injection	3.98 ± 0.24	8.30 ± 0.52 (NS)
13	Male	TSH 10 µg/injection	8.56 ± 1.60	13.70 ± 1.35 ($p < 0.05$)
14	Male	0.6% saline injection	2.55 ± 0.18	7.00 ± 0.20

*Each batch had 6 specimens; p-values in 7-9 batches are against batch 10 and in 11-13 are against batch 14.

ment, as evaluated by histological parameter, has been recorded in Poecilia[17]. This chemical compound is equally potent in controlling thyroid function and controlling gonadal function[15,16]. Administration of TP and EB in methallibure-treated female fish enhanced thyroid activity almost to the level of controls. Increase in thyroid activity in response to sex steroids in *H.fossilis* is similar to those reported by Matty[10] in *Sparisema* and Singh[11,17] in *Mystus*. Matty[10] observed many folds of increase of thyroid epithelium as a result of direct action of androgen upon thyroid. In intact as well as in hypophysectomized *Mystus*, Singh[11-13] has noticed elevated thyroid ^{131}I-uptake after androgen, estrogen and cortisone injections. Histological or only ^{131}I-uptake techniques are not absolutely safe for the estimation of thyroid function. The findings of these workers are either based on histological[10,17] or ^{131}I-uptake[11-13] methods; therefore their conclusions are questionable. Total thyroidal ^{131}I-uptake, PB^{131}I and CR used together are more dependable and consistent methods for estimation of thyroid activity. Failure of both TP and EB in promoting thyroid activity in methallibure-treated males is not clear. This observation is identical to that recorded in castrated *Mystus*[12]. Singh[12] has noticed that steroid therapy was ineffective if hypophysectomized specimens of *Mystus* were castrated also prior to steroid therapy. Conditions under which castration or methallibure-treatment in male fish prevents restoration of thyroid activity after sex steroid injections, are being investigated. Further data on the pathway of action of this drug over thyroid are being processed and the result will be reported elsewhere. Apparently methallibure prevents TSH secretion as well as thyroid hormone synthesis.

1 Financial assistance in the form of SRF from ICAR, New Delhi to one of us (R.B.R.), gift of methallibure from ICI Ltd., UK and TSH from NIH, USA, to T.P.S. are gratefully acknowledged.
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Optic lobe neurosecretory cells of an Indian spider *Cryptophora* sp. (Areinidae)

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Summary. In all the 3 pairs of optic lobes of *Cryptophora* sp. there are small groups of monopolar PF^- neurosecretory cells which take on a green colour by PF technique and red by Azan. Their function is unknown, but they may be involved with photoperiodically controlled activity rhythms.

The problem of neurosecretion among arachnids, and especially spiders, has not gained much importance as yet. Sasira Babu[2] was the first to give a complete picture of PF neurosecretory cells in the central nervous system of an American spider *Argiope*. Prasad and Kulshreshthra[2] gave the first description of neurosecretory cells in the central nervous system of an Indian spider *Pholcus kapuri* Tikader. While the PF neurosecretory cells found in the nervous system have been described in almost all invertebrate groups, not much is known about PF^- neurosecretory cells. Such neurosecretory cells were known to occur in the optic stalks of crustaceans, but Ganguly[3] described them in the