for metabolic energy release. In *B. guerini* eyestalk removal leads to decrease in free aminoacid contents in different tissues like muscle, gill, hepatopancreas and heart, which were incorporated by increase in the total protein contents of the tissues[11]. The decreased blood glucose level in this crab after eyestalk ablation is possibly due to the stimulation of glycogenesis[12]. There is also evidence to show that eyestalk ablation leads to increased lipid synthesis and gluconeogenesis[4,13–15]. In fact, the utilization of aminoacids as an important source of energy-producing compounds is well-demonstrated amongst the crustaceans[16]. It may therefore be suggested that decreased aminoacid contents in the blood after eyestalk ablation may be due to their catabolism for energy release in the absence of sugars, because of its utilization in the process of lipid synthesis and glycogenesis. As such variations in total aminoacids seen in the present study are justifiable and their utilization for energy release and incorporation into tissue proteins seems to be under the control of eyestalk principle.

The sinus gland extracts did not change protein and aminoacid levels suggesting that the factor influencing the protein metabolism is not present in the sinus gland. It is possible that the factor produced in the X-organ complex of the eyestalk is released directly into the blood stream instead of being stored in the sinus gland. The central nervous structures also did not affect the protein and aminoacid levels suggesting the absence of any factors in these structures which would influence protein metabolism. The present study thus shows that the protein and aminoacid levels are under the control of eyestalk.

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RAT UTERINE BIOASSAY FOR THE RESIDUAL EFFECT OF THE ADMINISTERED TESTOSTERONE ACETATE IN THE CARP, *CYPRINUS CARPIO* (L.)

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To achieve higher growth rate and to induce sex reversal/sterility in fish, gonadal hormones are employed in aquaculture experiments[1,2]. One of the impediments for the use of steroids in aquaculture is the lack of information on residual concentrations of the used exogenous hormone in fish destined for human consumption.

In the present investigation, bioassay studies were conducted to detect the effect of residual hormonal concentration in the muscle of the sex steroid-treated fish, at the end of the 14-month post-

treatment rearing period. It is hoped the information gained from such studies could provide supporting data for approved use of these hormones in aquaculture and their safety for the consumer.

One-day-old carp hatchlings were divided into four groups and reared in plastic pools during the hormone treatment period. The different treatments were 300 and 400 ppm of testosterone acetate through diet. The treatment period was 30 days. Later the fish were reared for 14 months (438 days) on hormone-free diet in cement cisterns (20 m^2).

After the post-treatment rearing period, 5 fish from each treatment were descaled, deveined, deboned and kept in a thermostatic oven at 55 ± 1°C for 3 days for complete drying. The dried powder was stored in airtight bottles at room temperature. Pellets were prepared by mixing the dried fish powder (50 g) with 2.5 g of wheat flour. The pellets were kept in oven at 55°C for 3 h before feeding.

Female albino rats of Wistar strain (90 to 100 day-old) weighing 100–125 g body weight and exhibiting regular four-day cycles were subjected to bilateral ovariectomy[3]. The rats were divided into 6 groups and fed on commercial rat pellets. A week after overiectomy, these rats were used for the experiment. The groups are as below: I. Control rats fed with routine rat pellets; II. Control rats fed with pellets from control fish; III. Control rats fed with routine rat pellets with 13 μg of 17β-oestradiol/100 g feed; IV. Rats fed with pellets prepared from fish treated with 400 ppm of testosterone acetate, and V. Rats fed with pellets prepared from fish treated with 300 ppm of testosterone acetate.

Table 1 *Uterine weight of ovariectomized rats fed on control and hormone-treated fish*

	Uterine weight (mg)	Uterine weight ± S.E. Per cent of body weight
Control group		
I	90.20 ± 8.88 (10)	0.0738 ± 0.0050
II	95.17 ± 7.95 (6)	0.0912 ± 0.006
III	105.60 ± 9.60 (10)	0.1288 ± 0.0138*
Treated group		
IV	67.67 ± 13.72 (6)	0.0639 ± 0.0110
V	87.33 ± 4.23 (6)	0.0794 ± 0.00035

Figures in parentheses indicate number of animals in each group; * lsdt $P < 0.05$.

Twenty four hours after feeding started, the vaginal smear was examined and the rats were sacrificed.

The uterine and body weights of the ovariectomized rats were recorded (table 1). Considering uterine weight as the per cent of body weight, there was no difference in the ovariectomized rats which were in negative control and testosterone acetate-treated groups ($P > 0.05$). As expected, the positive control rats showed a significant increase in uterine weight as a percentage of body weight ($P < 0.05$). Due to a presumable bioconversion of androgens to oestrogens[4], oestradiol-17β was used as a positive control.

Steroid metabolism in fish appears to be similar to that in other vertebrates[5], though the specific metabolism of methyltestosterone is not clearly understood in fish. In the carp, *C. carpio* isotopic equilibrium was reached in the major body tissues two days after oral ingestion of ^{3}H-testosterone[6]. Radioactivity was heavily concentrated in gall bladder, liver and alimentary tract. This is consistent with the generally held view that elimination of these steroids from fish is via the enterohepatic pathway. Twenty days after the labelled hormone was withdrawn, the average level of radioactivity in the muscle of the fish decreased to 5 ng/g. Thus, feeding of hormone-treated fish powder did not cause any significant increase in the uterine weight of the ovariectomized rats, suggesting lack of uterotrophic effect and the possible lack of residual concentrations of the administered sex steroids. The lack of oestrogenic effect with any of the tested steriod hormones suggests the absence of the residual problem.

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