USE OF NATURAL AND SYNTHETIC HORMONES IN INDUCED BREEDING OF FISHES :

Induced breeding of fishes with the pituitary injection has become very popular and provides a reliable method of obtaining pure seed for pisciculture. Investigators have realised the necessity of finding other inexpensive, convenient and dependable ovulating agents, to replace the pituitary extract for induced breeding. A few purified natural and synthetic hormones have been tested successfully. Mammalian hormones have been used for ovulation and spawning in fishes. Of all the mammalian hormones, chorionic gonadotropin (CG) has provided good results, probably because CG behaves like the luteinizing hormone (LH), which is believed to be responsible for maturation of gonads in fish. Human chorionic gonadotropin (HCG) has been used to induce ovulation and spawning in fishes like *Perca fluviatilis*, *Fundulus*, *Cirrhinus mrigala*, *Cyprinus carpio*, *Carassius auratus*, *Heteropneustes fossilis*, *Clarias batrachus* etc. The crude or partially purified human pregnancy urine, as well as highly purified preparations of HCG (Prolan, Antuitrin 'S', Gonatropin) have been used successfully in several species of fishes. Sundararaj and Goswami (1966) successfully induced H. *fossilis* to spawn with an injection of 75-100 IU of HCG. A mixture of CG and mammalian pituitary extract known as 'Synahorin' has also been used in combination with fish pituitary.

Pregnant mare serum (PMS) is predominantly FSH like in action, and has not been found to stimulate the ovulation and spawning in fishes. But sundararaj and Goswami (1966) could induce spawning in *H. fossilis* with a very high dose of 500 IU of PMS. Similar results were obtained by Yamazaki on the gold fish *Carassius auratus*. Experiments have also shown that administration of HCG to unilaterally ovariectomised catfish, *H. fossilis*, causes an increase in the number of large yolk laden oocytes in the remaining ovary. Mammalian FSH is ineffective, but catfish injected with 3 mg LH/fish brought about profuse spawning.

Besides the above pituitary or placental hormones, certain gonadal steroids are also known to be good ovulating agents. For example ripe eggs could be obtained in *Misgurnus fossilis*, by treatment with methyl testosterone and progesterone, but this could not be confirmed by other investigators. Certain adrenocorticosteroids, *viz.* Deoxycorticosterone acetate (DOCA), 17-hydroxycorticosterone, 11-dehydroxycorticosterone, and corticosterone are reported to induce ripening of eggs in *H. fossilis*.

Thus, available information suggests that the human chorionic gonadotropin (HCG) and some steroids especially, deoxycorticosterone can be used as a substitute for pituitary extract for inducing spawning in cultivated fishes.

INDUCED BREEDING BY HYPOPHYSATION

It is well known that the gonadotrophic hormones (FSH and LH) secreted by the pituitary gland play an important role in the maturation of the gonads and spawning in fishes. The Brazilians were the first to succeed in inducing spawning by injecting fish with pituitary extract. Russians have also successfully applied this technique for artificial breeding of sturgeons. In USA, important cultivated fishes are bred with the help of pituitary injections. The Indian and the Chinese carps are also induced to breed by the administration of fish pituitary hormones and the method has become very popular for obtaining commercial production of seed of the cultivated species.

In India, Khan (1938) was the first to successfully induce *Cirrhinus mrigala* to spawn by injecting mammalian pituitary hormone, and Chaudhari (1955) succeeded in inducing *Esomus danricus* to spawn by intraperitoneal injection of pituitary gland from *Catla*. Ramaswamy and Sundararaj (1956) succeeded in inducing spawning in *Heteropneustes fossilis and Clarias batrachus*. Later, several carps *Labeo rohita, L. bata, Cirrhinus mrigala, C. reba* etc. were successfully bred by injecting pituitary extract (Chaudhuri and Alikunhi, 1957). Now this technique is very popular in obtaining fish seed for commercial pupose.

In fishes, the pituitary gland lies in a well protected depression the myodome, on the floor of the skull. For getting the pituitary, the upper part of the skull is removed by a knife or bone cutter. The brain is lifted to reach the gland, which is preserved for future use in one of the followings :

(i) Absolute alcohol in sealed tube in a dessicator at room temperature.

(ii) Acetone which dehydrates and hardens the gland. After 36 hours, the gland is dried on a filter paper and stored in sealed phials in a refrigerator.

The gland retains its potency for 6 months in acetone method and for 2-5 years in the alcohol method. Glands from freshly killed fishes are preferred, but those from 5-7 days old ice-preserved specimen also give good results. There is a seasonal difference in the potency of the pituitary glands collected from donor fish before spawning, immediately after spawning and also from unripe fishes. For success in induced breeding glands should be collected from fully mature, healthy donor fish. Although hormones from unrelated fishes have been found to be active it is always