

the wall of the inner chamber (Figs. 1 & 2, s), leaving a definite lumen between them. Distally, the inner chamber is connected with the lumen of the outer chamber by an opening (Figs. 1 & 2, o). Basally, the spermathecal duct appears to consist of a double tube one inserted into another, the inner one being connected with the inner chamber while the outer one is continuous with the wall of the spermatheca at the base forming further distad the spermathecal duct. Functionally, when the muscles of the spermatheca contract and immediately relax, a partial vacuum is created inside the spermatheca and the released sperms rush through the outer ring at the base of the spermatheca (the inner ring remaining closed) and reach the lumen of the outer chamber. From the outer chamber they reach the inner chamber through the opening at (o). These sperms thus get mixed up with the secretions of the accessory gland and undergo necessary physiological changes in the inner chamber. Subsequently, when the wall of the spermatheca again contract the basal outer ring closes on the inner ring and the mature sperms are expelled from the inner chamber through the opening of the inner tube at the base of the spermatheca into the spermathecal duct thereby reaching the vaginal portion of the bursa. Thus, the outer and inner tubes at the base of the spermatheca appear to act in the Bruchids respectively as afferent and efferent ducts for the ingress and egress of sperms.

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April 22, 1949.

\*The presence of Cup-shaped structures at the distal ends of the bursa in *Bruchus minutissimus* Motsch., *B. pisorum* L., & *B. affinis* Frol., goes against such a hypothesis.

1. Mukherji, D., and Bhuya, A. H., *Jour. Morph.*, Philadelphia, 1937, **61**, 175-214. 2. Sharp, D., and Muir, F., *Trans. Ent. Soc.*, London, Part III, 1912-13. 3. Zacher, F., *Arb. Biol. Reichsanst.*, 1930, **18**, 254-93.

**ON SPAWNING CONDITIONS AND LARVICIDAL PROPENSITIES OF *CARASSIUS AURATUS*\***

In Japan gold fishes are naturally distributed even in the smallest streams and are used as food.<sup>1</sup> They have got themselves natura-

lised in North American waters where they are known to grow to a size of two feet<sup>2,3</sup>; whereas in India they thrive only in garden pools and cisterns where they are cultured as ornamental fishes. They attain a maximum size of eight inches in length.

Although Khan<sup>4</sup> has studied the spawning of this fish from the Punjab, the conditions under which it breeds have not been ascertained. An attempt was made by us to study the conditions under which the fish thrives and breeds in three different places with varying meteorological conditions in South India; and the results are briefly stated below:

Physico-chemical conditions	Madras	Mangalore	Anantharajupettah
Date	14-12-1948	27-11-1948	5-2-1949
Turbidity in cm.	>30.0	>30.0	>30.0
Temperature in °C.	24.4	29.3	27.8
pH value	7.2	7.0	8.35
Dissolved O <sub>2</sub> (mg./litre)	4.6	5.2	3.5
Free CO <sub>2</sub> (p.p. 100,000)	0.954	0.347	nil
Bicarbonates (p.p. 100,000)	18.610	5.185	49.833
Chlorides as chlorine (p.p. 100,000)	10.4	4.2	14.0
Silicates as SiO <sub>2</sub> (p.p. 100,000)	1.4	present	2.301
Phosphates as P (p.p. 100,000)	0.004	present	0.1083
Nitrates as N (p.p. 100,000)	nil	nil	nil

The fish spawns throughout the year with maxima from May to August and from November to January. In Mangalore, South Kanara District (lat. 12° 52' N. and long. 74° 50' E.), where the climate is humid with an average rainfall of 130 inches per year and the atmospheric temperature ranges from 68 to 98° F., the fish has been observed to breed prolifically in garden ponds. It was found to spawn in cement cisterns in Anantharajupettah, Cudappah District (lat. 14° 20' N. and long. 79° 5' E.) which is one of the most arid parts of the Madras Province situated in the interior. The annual rainfall varies from 20 to 30 inches. The temperature rises to 100° F. in summer and falls to 55° F. in winter. In Madras (lat. 12° 5' N. and long. 80° 20' E.) where the mean temperature is between 75 and 88° F., the fish has been observed to breed in aquarium jars containing the City Corporation tap water. In all these places

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