Fish and Shellfish Diseases in Culture Systems

VI. The need for anaesthetics

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The significance of anaesthetics in various disciplines is quite well known as they help live animals, to be in a reflexless state of condition, for studying their physiology, performing surgery and so on.

In general, the anaesthetics are central nervous system (CNS) depressants, and the fundamental principle behind the application of anaesthetics is to cause reversible depression, in the sensory centres of the brain at various levels, which finally ceases reflex actions. It causes depression first in the cortex (stage of analgesia), then the basal ganglia and cerebellum (stage of delirium or excitement) followed by spinal cord (stage of surgical anaesthesia). Any excess exposure to the drug causes the involvement of medulla, paralysis of the respiratory and vasomotor centres which finally leads to death.

Anaesthetics, in the field of fish pathology is quite unavoidable, as they are required for performing minor as well as major surgery in them. The principle behind the mechanism of anaesthesia in fishes is almost similar to that of human beings.

The methods ef inducing anaesthesia in fishes is by hypothermia, inhalation and injection.

Hypothermia is a physical method of inducing anaesthesia (cooling of the body for 10–15 minutes, in order to reduce oxygen requirements of the cells). This method has its limitations.

Inhalation can be successfully done by adding the anaesthetic in the gill irrigating water. Here, the anaesthetic is absorbed into the blood stream through the gills.

Injection can be given intramuscular, intra peritoneal, intra venous and intracranial.

Intracranial injection makes fishes immovable for about an hour. For inducing anaesthesia by injection, fish being mute and an aquatic animal, has to be made immovable first by

the application of inhalation. Due to the absence of convenient size of superficial blood vessels in fishes, it is difficult to perform vein injections. So, ihhalation is considered to be an easy and effective method of inducing anaesthesia.

Chloretone is a good anaesthetic for shallow (short term) anaesthesia. But, MS 222 (Tricaine methane sulphonate) is a better anaesthetic for deep (long term) anaesthesia, for 10–30 minutes. Adequate care has to be taken in administering the correct dosage. The usual rate, of use, for chloretone is 0.1 % (wt/vol) and MS 222 is 0.01 % (wt/vol). This is sufficient for immobilising a fish weighing approximately 200 gm to 4000 gm. Details regarding these two chemicals are presented in table 1.

Other kinds of fish anaesthetics are:

1. Carbon dioxide
2. Chloral hydrate
3. Ether
4. Methylpentynol
5. Novacaine
6. 2–Phenoxyethanol
7. Quinaldine
8. Sodium amytal
9. Tribromoethanol
10. Tertiary-amyl alcohol

To recover from the effect of anaesthetic in time, the handling of the fish and its anaesthetization should be as gentle as possible to minimise stress and shock as the fish which are quiescent before and during anaesthesia may recover fast.

Piscine anaesthesiology is a new field of research in which much remains to be known.

TABLE 1

DETAILS OF TWO FISH ANAESTHETICS

Sl. No.	Common name	Chemical name	Dose	Time for Immobilisation (in minutes)	Recovery	Effect on fish	Effect on human beings	Remarks
1.	Chloretone/ Chlorobutanol	/B/B/B/ trichloro-tert-butyl-alcohol	0.1%	2–5	3–7	Short term aneasthesia	Irritant	When the fish is immersed in a solution of anaesthetic, an initial phase of excitmeut takes place followed by erratic swimming. Then, the fish become inactive and sink to the bottom of the water body, Anaesthetised fish may be removed immediately for the "purpose". Time for immobilisation and recovery vary with species, So, behaviour of the fish may be observed carefully while they are being anaesthetised to avoid cardiac arrest due to excess anaesthesia. The anaesthetic is cheap and locally available. It is not desirable to use the anaesthetised fish for food within the following 21 days of anaesthetisation.

Sl. No.	Common name	Chemical name	Dose	Time for immobilisation (in minutes)	Recovery	Effect on fish	Effect on human beings	Remarks
2.	MS 222	Tricaine methane sulphonate	0.01%	2–5	2–5	Short and deep anaesthesia	Negligible toxic effect	When the fish is immersed in a solution of anaesthetic, an initial phase of excitment takes place followed by erratic swimming. Then, the fish become inactive and sink to the bottom of the water body. Anaesthetised fish may be removed immediately for the "purpose". Time for immobilisation and recovery vary with species. So, behaviour of the fish may be observed carefully while they are being anaesthetised to avoid cardiac arrest due to excess anaesthesis. The chemical is not easily available locally. It is not desirable to use the anaesthetised fish for food within the following 21 days of anaesthetisation.