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A STUDY ON BIMODAL OXYGEN OF RESPIROMETRYIN AIR BREATHING FISH: ANABAS TESTUDINEUS(BLOCH)

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Abstract:

In 1985, such an effect was also observed with 5 mg O2.L-1 bimodally respiratory species. These findings in respiratory and behavioural physiology indicate that fish can survive by decrease the vent rates to reduce the toxin intake through respiratory water by using the surface (ASR or air breathing) medium.Several environmental pollutants cause histological changes in fish have been discovered. No exception to this is pesticides. The histological impacts of pesticides, however, remain largely undefined and much of the work recorded is targeted at acute toxicities.Most accidents were highly unspecific or clearly reflective of poisonous insults. As these subtle changes occur not very clearly over long periods of exposure, studies of aquatic animals which have been exposed to a large amount of toxicants are useful in describing or evaluating possible lesions (Meyers and Hendricks, 1988).

Keywords:

Bimodal Oxygen, Freshwater, air Breathing Fish, Fish, ANABAS TESTUDINEUS(BLOCH), ANABAS TESTUDINEUS, BLOCH

Introduction:

The effect on toxicity of surface entry, and its association with dissolved oxygen, has not been taken into account in all these studies. All of them have been toxic. The fact that access under hypoxia is critical for the survival and activity of fish appears to be a grave lapse.Hypoxia leads species of water breathing to the surfaces of the water in order to breathe on the thin surface well oxidised film (Lewis 1970), known by Kramer and Mehegan as Aquatic Surface Breathing (ASR) (1981). With ASR, fish can substantially reduce the frequency of ventilation by what it takes to use the water column (Gee et al. 1978).ASR enhances blood oxygen levels in hypoxic water or increases survival or activity (Burggren 1982) (Kramer or Mehegan 1981, Kramer and McLure 1982). (Kramer and Mehegan 1981, Kramer and McLure 1982). Bimodal fish often rely on access to the surface.These species can breathe dissolved and airborne oxygen and gill ventilation can decrease during air breathing (Johansen 1970). A number of tropical species (Jhingran 1975, p. 790-800) characterises bimodal respiration which are notable for their hypoxis and other stress resistance (Dehadrai and Tripathi 1976) (Dehadrai and Tripathi 1976).

Experiments show that bimodal fish species often respond to the increased demand for oxygen to toxin exposure, relying on air breathing rather than water respiration.Bakthavathsalam or Reddy (1983) showed a large increase in the rate of oxygen absorption from air when exposed to lindane, with an increase of relatively little oxygen absorption from water.Similar effects have been identified for Channa Stristus subjected to metaystox by Natarajan (1981). Although both works did not link fish's survival time to the oxygen absorption of air, such increased dependence on air respiration, rather than water breathing, was to minimise the toxin intake to the greatest extent possible by the breathing water supply.Apart from the air-breathing reports, Smatresk or Cameron have already quoted (1982) During hyperosmotic solutions exposures to gar (Lepisosteus oculatus) has been shown to increase atmospheric usage and decrease use of dissolved oxygen,Similar answers to dissolved carbon dioxide were recorded by Burggren (1978).No research to determine the survival benefit of air breathing or ASR in toxic fish in hypoxic water has been carried out so far.

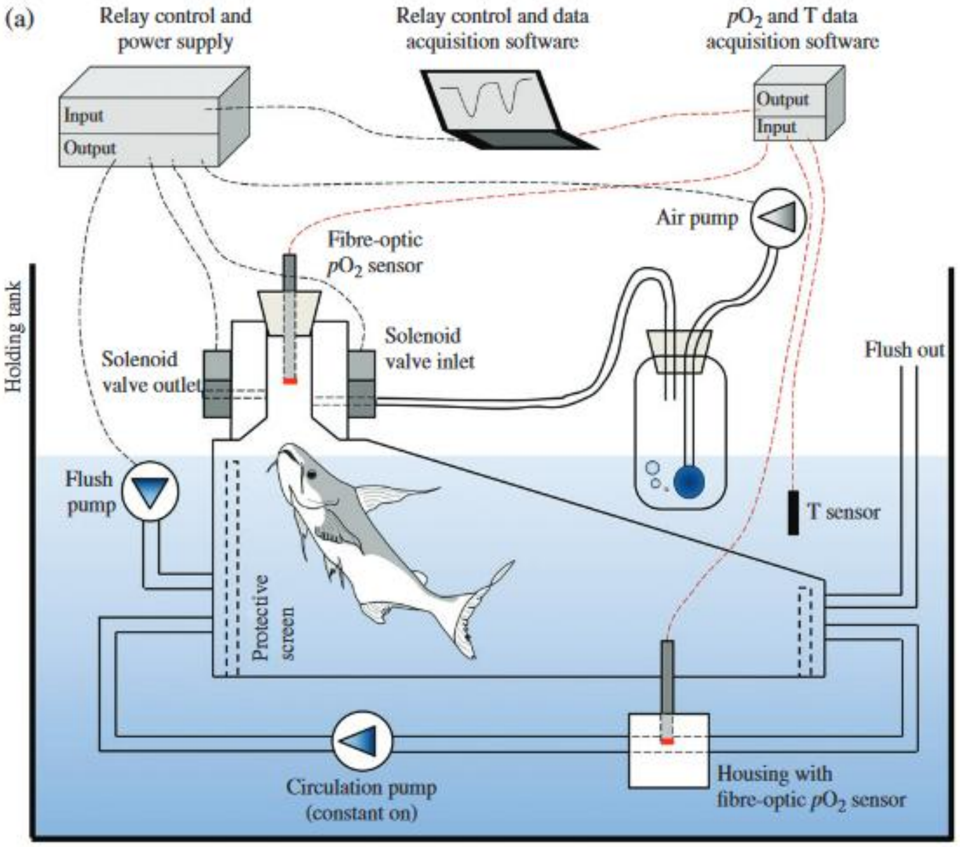

Figure 1: Air-Breathing Fish Respirometry

This analysis was originally made with the following contributions:

1. This research is the first test proof of the toxicity of air- breathing or a water-breathing fish species in the impact of surface entry.
2. This research offers the first test of proofs to show that hypoxia toxicity is increased for a water breathing species, when access to the surface is refused.
3. In addition to earlier studies that showed increased toxicity at lower levels of dissolved oxygen,

this research provides initial evidence of such effects on the water-breathing fish species for protein-like plant toxin.

4. This research is the first to show the toxicity decrease for air- breathing fish with surface access to very low concentrations of dissolved oxygen.

Wakiama et al. (1997) studied the genetic relationship of the 17-anabantoid peppers or classified them into three classes based on the similarity of their alleles:

1. Anabas testudineus, Osphronemus goramy, Ctenopoma acutirostre, Ctenops nobilis or Luciocephalus pulcher.
2. T. trichopterus, T. microlepis, T. pectoralis, Trichogaster leeri, Colisa lalia, Sphaerichthys osphromenoides or Helostoma temmincki.
3. Macropodus opercularis, Parosphromanus deissneri, Trichopis vittatus or daily pseudo-phromenus. Based on these findings, Betta splendens, The Anabantidae, Macropodinae (excluding Ctenops) and Trichogastrinae are regarded as valid taxonomic groups.

General Characteristics of Anabas Testudineus:

The fish has an oblong body with a large head, or a front compressed at a later stage. The mouth is not protractive, or the jaws or vomer are tiny conical teeth. Unlike other teleosts, the gill cells are fused into a single operculum or the opercular or sub-opercular bones do not fuse.Instead they are bound to a thin flexible membrane, with the fish hinged separately in two parts of the gill: the opercular on the suspensorium and thus the sub-percular on the back of the under mandibular. The gill covers very wide open but both ventrally and laterally rotates the sub opercular.

The long dorsal or anal fins consist of spines with soft fin rays. With a larger soft ray segment, the spines of the back or anal are solid. Caudal fin is circled, ctenoid scales.Fish are dark brown to greyish black. Young fish have cross-sectional dark streaks at the back and even at the bottom of the body and tail or a wide obscurant at the base of the caudal fin.

Anabas testudineus displays variations in body colouration or diseased morphological characteristics. The Bengali shapes are relatively elongated as compared with the Madras (Day, 1889).The Das, 1964, described three ecological sub-species: Anabas testudineus riveri (river Anabas), A, based on the morphometric characteristics of the specimen. The lacustri (Anabas lake or tank) or A testudineus. Rice Testudineus (swamp Anabas).The presence of 2 Anabas species in India, A, was first revealed by Rao (1968). Bloch testudineus, 1792, which is distinct fromA. oligolepis Bleeker, 1855 by lower depth of body,

The species Ramaseshaiah and Dutt (1984) compared and found closely related electrophoretically to the two in one ecosystem of Kolleru Lake, Andhra Pradesh.A. The chromosomes of oligolepis are 46, while A. 48 chromosomes have been verified (Dutt or Ramaseshaiah, 1980).In either sex of A, the diploid number of chromosomes is 48. Footnote 4 (Kaur and rivastava, 1965; Nayyar, 1966; Natarajan and Subramanian, 1974).

A. Testudineus is a compulsory air-breathing fish. If the access to the water surface is withheld for longer periods, the fish would be asphyxiated.

Air respiratory organs consisting of a pair of mazes or respiratory mutates which cover the suprabranchial chamber are also known as special structures in four pairs of gills, namely air-breathing accessory organs.Both respiratory organs on one side, with the bucco-pharyngeal cavity on one side and thus the opercular cavity on the other side of the suprabranchial cavity.Many scholars have studied the thorough morphology and anatomy of Anabas' accessory respiratory organs (Misra and Munshi, 1958; Sexena, 1964; Munshi, 1968; Reddy and Natarajan, 1970, 1971; Hughes and Munshi, 1973).

Habitat, food and feeding habits:

A. In all waters in the tropical and subtropical regions, testudineus is present. In abandoned or swampy waters, they are more generally known as their natural dwelling location. While it is mostly a source of fresh water, there is a high tolerance to salinity.A. The 14.0 mm fry testudineus can withstand up to 11.5% salinity (Khan et al., 1976). While fish have an optimal water tolerance of 20-30 OC, it can withstand very low temperatures (Hora and Pillay, 1962).A. Testudineus is very hardy and can be buried in mud like the African Lungfish during the dry season (Thiraphan, 1984).

The spectrum of natural foods A. The testudineus is very large and can range from a filamentous algae diet to a pure canvorous diet. Phytoplankton or zooplankton feed for larvae and young fried, for larvae and adult food on crustaceans, worms, molluscs, algae, high soft plants, organic debris, etc. (Potongkam, 1972).A predator, carnivore (Pandey et al., 1992) or insectivore has been identified as an abortion (Ahyaudin, 1992). The gastric content study shows, however that 204 specimens of Anabas had a stomach content of 19% of crustaceans, 3.5% of insects, 6% molluscs, 9.5% of fishes, 47% of plant debris and 16% of semidigested matter (Nargis and Hossain, 1987).

Major food items in the gut, regardless of spatial and seasonal distribution, were found to be more or less consistent in Bangladesh (Nargis and Hossain, 1987), suggesting that Anabas is an all-fresh food.The stomach pH was 5.96-6.58, which indicates that Anabas is a stomached fish (Pandey et al., 1992). 3-17 days from the start of feeding, during the larval stage, they can only be fed live food (Doolgindachabapom, 1994).

The previous literature review on A. Testudineus shows that only in North India the species was well studied. Furthermore, the knowledge of the species' reproductive biology is fragmentary, while information on the growth of gonads at the cellular level is minimal.For thorough study in Kerala the species has not been considered. The current research therefore aims to learn more about reproductive biology or the associated aspects of Anabas testudineus reproduction (Bloch).

Classification:

Order: Perciformes
Family: Anabantidae
Subborder: Perciformes
Genus: Anabas Cuvier, 1817.
Species: Testudineus Bloch of Anabas, 1792

The front of the body and head is wide while the back is compressed.Mouth is terminal or relatively broad. Jaws carry villiform teeth. Dorsal fin has 16-18 strong spines or 8-10 soft rays.Blunt or rounded are pectoral fins. The caudal fin is rounded with a spine or five soft rays. Live fish is black to caudal light greenish/yellowish; opercle margin is dark; caudal base also has a dark spot. Iris has a colour of gold reddish, while broad or ctenoid scales.

A highly efficient food convert ratio (FeR), air-breathing ability and environmental tolerance make A. Testudineus, a fine aquaculture candidate, maybe more so than any other tropical fish. But slow growth can be a market viability constraint.

Bimodal Swimming Respirometry:

Very few experiments have been carried out on air- breathing fish swimming and these used one of two approaches (Lefevreet al., 2014b).The Pacific tarpon gas bladder Megalops cyprinoides (Broussonet 1782) has been catheterized by Seymouret al. (2007) or could derive MO2 from the inpO2 decrease among breather levels, when fish were swimming against a current of varied speeds.This involves very extensive surgical manipulation of the animal and a precise calculation of the entire ABO volume.

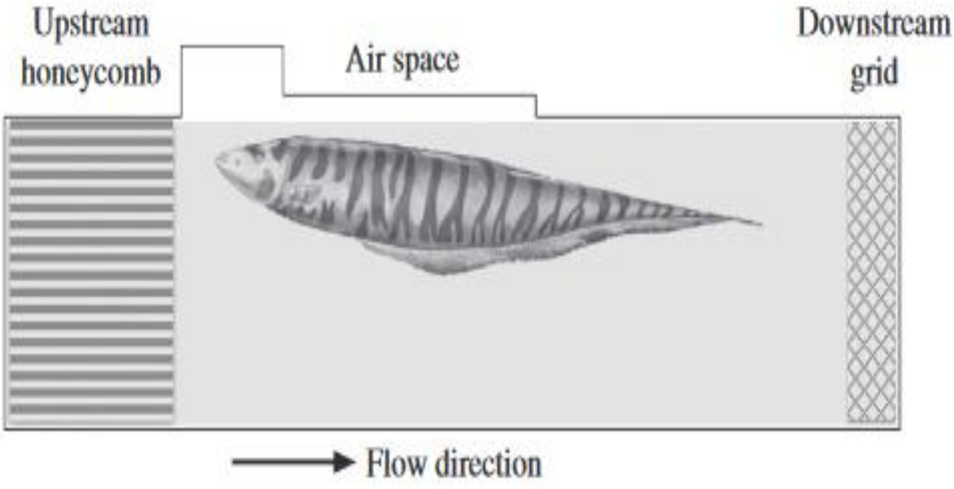

Figure 2: Illustration of a modified bimodal respirometry lateral appearance of a swim tunnel.

Discussion:

Due to modernisation of agricultural operations or consequent widespread an indiscriminate permeation of the environment with these pesticides, the issue of pesticides in the ecosystem has taken on significant proportions.Pesticides' effects on ways, as most are non-selective and have harmful and often lethal effects on non-target organisms. To establish effective safeguards on the survival of our already depleted freshwater fauna, awareness of pesticide toxicity levels, from both acute toxicity, residual and physiological studies is necessary.

Studies on pesticide sublethal effects have gained significant traction over the last decade, partly due to their practical value and in part due to academic interest. In the fisheries management, both from a biological and ecologic point of view, the quantitative evaluation of pesticide impact on fish is of prime importance.In addition, the biological and ecological sublethal are sublethal. In addition, regulatory authorities now consider the sublethal impact of toxins in the application of pollution controls.The pollution regulation is now established by using the sublethal threshold level derived by chronic bioassays for toxicity as the limiting concentration, instead of using the arbitrary “application factor” as a protection factor on the LC 50 data obtention in acute toxicity bioasays.The term “harmlessness” in the application of data from sublethal toxicity studies, among others, is described also in the administration of the International Convention on the Prevention of Marine Pollution (UK, 1972) (Waldichuk, 1979).

The studies into the impact on aquatic species, particularly fish, of pesticides or any other contaminants aim to define the effects of pollution, focus primarily on two broad scientific approaches: Laboratory or ecological surveillance studies.Ecological surveillance and thus the effectiveness of the strategy rely primarily on in situ emission impacts, which in turn are controlled by the space or the time pattern of pollutant release.In adverse deviations from the usual state of individual investigations, negative environmental effects of emissions take account primarily of the detrimental deviation from a natural condition of individuals.Such deficits can be assessed. This study's philosophy follows the second method.

Fish have been classified as highly pollutant sensitive among the different animal groups were the most common test organism since they are considered the best understood organism in the aquatic environment.Fish are one of the most important members of the aquatic food chain and can also reach people through toxicants.The choice of toxicity test organisms is based mainly on unique parameters, such as ecological status, food chain location, laboratory suitability, genetically stable and uniform populations, and adequate bottom line data on the organism organism (Buikema et al., 1982).The species chosen for this analysis are: Most of the above protocols are met by Etroplus maculates.

Generally speaking, sublethal effects cover the effects of all the concentrations that, while not lethal to individuals, increase population mortality, decrease population size or alter the composition after long exposures.Thus, sublethal effects are called a group of effects that affect growth, rates, metabolism, capacity for reproductive behaviour, or that disrupt the organism's Defence mechanism.The sublethal effects of pesticides on a certain fish have been investigated in detail in this report. The criteria used for the evaluation of sublethal effects are physiological responses, such as activations or inhibitions of certain selected enzymes, haematology disruptions and histological changes.

This research investigated separately the lethal or sublethal effects of three pesticides. The pesticides chosen are DDT (organochlorine), dimecron (organophosphate) and Gramoxone commercial formulation (paraquat dichloride).Synthetic pesticides have become increasingly important additions to chemical waste, particularly organochlorines and organophosphates, that pollute natural aquatic communities. Many of them are considered to be hazardous because of their ability to kill or immobilise organisms at extremely low concentrations.Commercial pesticide formulations are usually more harmful to the fish than the relevant active ingredient seldom present in aquatic ecosystems.

The effect of contaminants on the organism in subcellular and cellular levels is induced as a disturbance. As lysosomes are subcellular units involved for accumulation, disintegration and removal of toxicants, it is unavoidable to control the level of contamination caused by biotic or abiotic factors in the concentration of essential lysosomal marker enzymes.The first to confront contaminants is the cell membrane and the confluent endoplasmic reticule. The effects of contaminants are susceptible by binding to the membrane's lipoprotein layer or cause a shift in permissibility that disturbs the entire cellular system.A analysis of membrane enzyme activity is therefore a valuable measure of the degree to which contamination is introduced (Annie, 1988).Research on pesticides' effects on the function of two phosphomonosterases is thought to be meaningful: acid phosphatise, the cell membrane binding enzymes or the endoplasmic reticulum (Ciro et al., 1975).

Conclusion

In this analysis the lethal and sublethal effects of three pesticides were analysed individually. The pesticides selected are DDT (organochlorine), dimecron (organophosphate) and gramoxone in the commercial formulations (paraquat dichloride).Synthetic pesticides have become increasingly important additions to chemical waste, particularly organochlorines and organophosphates, that pollute natural aquatic communities. Many of them are considered to be hazardous because of their ability to kill or immobilise organisms at extremely low concentrations.Commercial pesticide formulations are usually more harmful to the fish than the relevant active ingredient seldom present in aquatic ecosystems.

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