

PROBABLE ROLE OF CEREBRAL GANGLIA IN RESPIRATION OF THE FRESHWATER MUSSEL, *LAMELLIDENS CORRIANUS*.

Dr. SANGEETA B. DONGRE

ASSISTANT PROFESSOR, DEPARTMENT OF ZOOLOGY, GOVERNMENT COLLEGE OF ARTS AND SCIENCE, AURANGABAD-431001, MAHARASHTRA INDIA.

Abstract:

The adult mollusc, *Lamellidens corrianus*, of 95-110mm shell length were subjected to (a) control (b) the one-sided cerebral electomized (c) the respectively cerebral electomized. The rate of oxygen utilization in bivalves from the entire three groups was measured after 24h and 7day compared to control. The rate appeared critical increment in cerbralectomized as compare to control after 24h and 7day. The results are talked about within the light of conceivable association of endogenous controlling variables in bivalve mollusc

Key Words: *Lamellidens corrianus*, cerbralectomize, Oxygen utilization and season.

Introduction:

Bivalves have been misused around the world for nourishment, ornamentation and pearls through, out human history. Freshwater mussels are disseminated around the world in lotic and lentic territories. As channel feeders, freshwater mussels are environmentally vital; they control seston, reuse supplements and give a trophic interface between essential maker and predators. (Lewandowski, and Gardner and Malczyk, 1991).

Oxygen utilization reflects the metabolic movement of an life form and is corresponding to its momentary ATP request. The synthesized ATP is utilized in different forms, counting particle pump action, strong movement, neural movement, development, and gametogenesis and catabolize excretion. (Bayne & Newell 1983 and, Clarke (1991).

Metabolic activity is influenced by ambient temperature Clarke (1991). An creature does not exist separated from its environment, the comparative physiology recognizes this affiliation and endeavored to depict and clarify the changed instrument by which creatures compensate for all sorts of natural modification and push. Numerous exogenous calculate such temperature, pH, saltiness, light, etc. (Bayne 1976, Rao 1988, Vedpathak, (2011), Dongre 2012). The other imperative figure which directs the physiology, digestion system and development in bivalves is the endogenous calculate is the neuro-endocrine directing center. In bivalves the respiratory rate information of creatures reflects their common metabolic rate. Comparatively exceptionally small work has been done on neuro-endocrine centers in respiratory digestion system, especially from freshwater bivalves. In spineless creatures numerous laborer worked on shellfish within the field of neuro-endocrine control on oxygen utilization as detailed by (Nagabhusanam and Kulkarni, 1979, Hanumante et al 1980). The presence of neuro-endocrine balance of metabolic rate will be the versatile importances for the freshwater bivalves, which have live in ever fluctuating situations. Comparatively exceptionally small consideration has been given on the part of neuro-endocrine direction in bivalve shell angles conjointly exceptionally less consideration has been given on the part of neuroendocrine centers in respiratory digestion system, especially from freshwater bivalve's mollusc. The role of cerebral ganglia and visceral ganglia in the respiration metabolism has been reported by Mane et al., 1990, Vedpathak et al., 2011, Dongre 2012. Many authors from Indian waters states that the freshwater bivalves, *P. caeruleus*, showed a interrelationship between neuro-secretions and reproductive cycle. (Khatib, 1975, Godbole 1977). Audit of writing appears that, exceptionally small data is known on neuro-endocrine control on respiratory digestion system of freshwater bivalves. Since numerous highlights of oxygen consuming digestion system can be examined, specifically by estimation of the rate, of oxygen utilization by intaglio creatures. A few reports are accessible from overseas Kennedy et al., (1972), McMoham, (1979), and Vahe (1972) thus considering the lack of data on endogenous direction within the respiratory digestion system the show ponder has been embraced on freshwater bivalve, *Lamellidens corrianus*, from Nandrabad pond at Khultabad near Aurangabad.

MATERIALS AND METHODS:

The grown-up freshwater bivalve mollusc, *Lamellidens corrianus* 95 -110 mm in shell length were collected and were the supplied in supplies water in research facility for almost 2-3 h, and instantly after bringing the creatures to research facility, the shells were brushed to expei the fouling algal mass the mud and other squander fabric. The bivalves were acclimatized in research facility conditions and ensuing experimentation without nourishment. After 24h acclimatization the creatures were organized in three bunches, each gather containing 10L of circulated air through stores water. The primary bunch was served as (a) control with intaglio ganglia and other two were exploratory i.e (b) one-sided cerebral ectomized gather and (c) respective cerbralectomized

Copyrights @ Kalaham Journals



International Journal of Mechanical Engineering
Govt. College of Arts & Science
Aurangabad

Vol. 7 (Special Issue2, Jan.-Feb. 2022)

gather. The evacuation of cerebral ganglia was performed by keeping a wedge 4-5mm thickness, between two valves of the shell with the assistance of fine sterilized forceps the ganglion is expelled singularly and respectively, with least damage inside 30seconds.

Results:

The comes about of the tests were appeared in Fig. 1. The physico-chemical parameters of the water utilized within the tests amid summer season were temperature 33°C; pH 7.7; hardness 240mg/L and oxygen substance 4.40mg/L/h. Amid winter season Physico-chemical parameters were temperature 22°C; pH 7.6; hardness 100mg/L and oxygen substance 9.67mg/L/h. The temperature, pH, and the hardness substance was altogether diminished in winter but the oxygen substance. As compared to control, the rate of oxygen utilization was essentially expanded 0.11 ± 0.009 ± 3, 72.79%, p < 0.01 and 0.15 ± 0.003, 28.27%, p < 0.01 and 0.15 ± 0.01, 25.2, p < 0.05 in cerebralectomized gather creature after 24h. Essentially on 7th day, the rate of oxygen utilization moreover appeared a noteworthy increment 0.13 ± 0.01, 36.67%, p < 0.001 and 0.122 ± 0.0139, 11.41%, p < 0.05 in one-sided cerebralectomized and two-sided cerebralectomized bunch bivalves when compared to control bunch 0.10 ± 0.007, 72.04%, p < 0.01 bivalves respectively.

Oxygen Content in *Lamellidens corrianus* in summer and winter season a comparative study

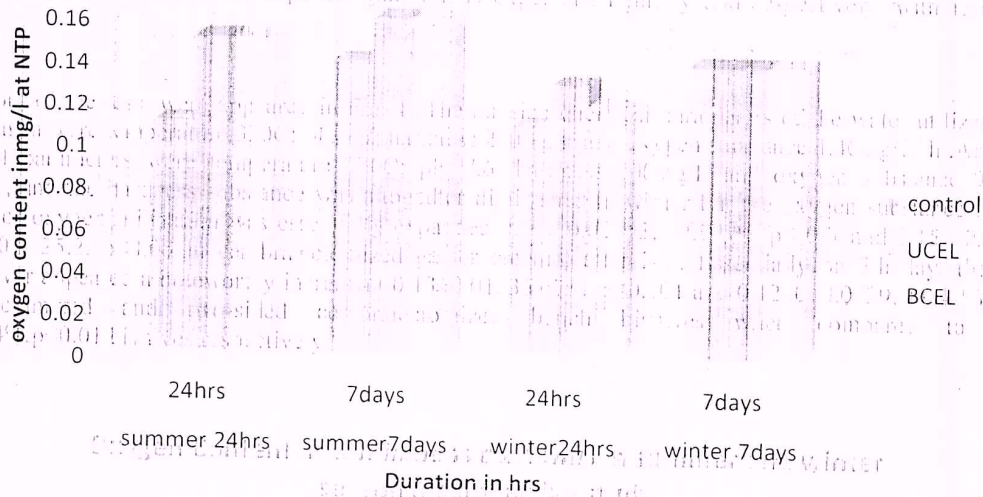


Fig.1 Rate of respiration in *Lamellidens corrianus* during Summer and Winter Season.

Discussion: The display ponder on *Lamellidens corrianus* appeared that, evacuation of cerebral ganglion singularly and reciprocally causes a critical increment within the rate of oxygen utilization after 24h and on 7th day compared to control creatures. The rate of oxygen utilization in control appeared critical diminishes after 24h and on 7th day, compared to Cerebralectomized bunch bivalves. A critical increment within the rate of oxygen utilization in bivalves after cerebralectomy after 24h and on 7th day once more the rate of oxygen utilization appeared an increment in test bunch bivalve propose the plausibility of criticism component in directions of oxygen consumption (Table.No.1). From the out comes about of the try, it can be proposed that cerebral ganglia must have the hormonal calculate which is capable for control of oxygen utilization. Subsequently, it is concluded that, cerebral ganglia must have oxygen utilization controlling figure and which is neurosecretory. The keenness this pack Starvation usually results in a decline in the metabolic rate to a basal level (Bayne, 1973; Bayne et al. 1976). Bayne and Thomson (1970) and Bayne (1973) found that the respiratory rate in *Mytilus edulis* was higher in late winter during active gametogenesis and lower during the gonad resting stage in late summer. In *C. meridionalis*, however, gametogenesis is almost continuous with extended spawning peaks in summer and winter (Griffiths, 1977) and unlikely to produce seasonal change in respiratory rate. Metabolic rates decreased in both Gulf of Gdansk (GD), (b) Lake Veere, (LV), in summer, by which time many individuals had probably already spawned Katarzy na et al., 2009 and Dongre S.B., et al 2012

It has been shown that, in invertebrate in other animals like in earthworm, *Perionyx excavates*, the rate of oxygen consumption be under the influence of neurosecretory release of one or more hormonal agents from central nervous system (Nagabhusanam and Hanumante, (1977) In crab *Uca pugnator*, two free actuating hormones, directs the oxygen utilization i.e eyestalk directing hormone and the part of shedding repressing hormone which upgrading oxygen utilization (Silverthorn, 1975). Similar results have been shown by Vedpathak et al, 2009 and 2011, in freshwater bivalves molluscs in *Lamellidens corrianus* and *Lamellidens marginalis* from Godavari River near Aurangabad, which support the present investigation.



Hence it can be concluded that the neurohormones of cerebral ganglia in bivalves molluscs controls the oxygen utilization may be probably recommended that assist investigate ought to be carried out for the physiological parts of neurohormones within the metabolic economy in case of the freshwater bivalve shellfishes.

ACKNOWLEDGMENT:

The author is thankful to the Principal, Vice- Principal and all teaching faculty and friends for their constant support and guidance.

References:

- Bayne, B.L. (1973). Physiological changes in *Mytilus edulis* L. induced by temperature and nutritive stress. *J. mar. biol. ASS. U.K.* 53: 39-58
- Bayne, B.L., Thompson, R.J. (1970). Some physiological consequences of keeping *Mytilus edulis* in the laboratory. *Helgolander wiss. Meeresunters.* 20: 526-552
- Bayne, B.L., Thompson, R.J., Widdows, J. (1976). Physiology. In: Bayne, B.L. (ed.) *Marine mussels, their ecology and physiology*. Cambridge University Press, Cambridge. pp.121-206
- Bayne, B.L. 1976. In *Marine water Mussels: Their ecology and Physiology*. International Biological Programme-10. Cambridge University Press Cambridge. London. New York. London. New York. Melbourne. pp. 1-495.
- Bayne B. L., Newell R.C., 1983. Physiological energetics of marine mollusks. [in:] *The Mollusca*. Vol. 4. Physiology. Part I. A. S.M. Saleudin & K. M. Wilbur (eds.), Acad. Press, New York, 407-515.
- Angeeta, B Dongre, DI. Sonawane, CR Dode, RW Garad : 2012 Role of cerebral ganglia in regulation of oxygen consumption of freshwater bivalve mollusc, *lamellidens corrianus*, from nandrabad pond during monsoon, *Journal The Ecocean Volume 1* Pages 361-364
- Dowswell, W. H. 1957. *Practical Animal Ecology*. Methun and co. Ltd. London.
- Clarke A., 1991. What is cold adaptation and how should we measure it? *Am. Zool.*, 31 (1), 81-92.
- Fingerman, M.; Julian, W.E.; Sprites, M. A., and Kostrezeros, R. M. 1974. The presence of 5-HT in the eyestalks of brain of the fiddler crab, *Uca pugilator*, its quantitative modification by pharmacological agents and the possible role as a neuro-transmitter in controlling the release of red pigment dispersing hormone. *Comp. Gen. Pharmacol.* 5:299-303.
- Katarzyna Tarnowska, Maciej Wolowicz, Anne Chenuil, Jean-Pierre F'eral (2009) Comparative studies on the morphometry and physiology of European populations of the lagoon specialist *Cerastoderma glaucum* (Bivalvia) **OCEANOLOGIA*, 51 (3), 2009, pp. 437-458.
- Gaikwad, D. M. 2008. Reproduction physiology of some aquaculture importance *Lamellidens* molluscs, from Godavari river at Kaigaon: as a function of the effect of neuroendocrine manipulation. Ph. D. Thesis, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. pp.1-324.
- Olderman, H.L., Clymo, R.S and Ohnstand, M.A. M., 1978. *Physical and chemical analysis of freshwater*. IBL, Handbook No-8. Blackwell Scientific Publication, Oxford, London, Edinburgh, Melbourne, 2nd Ed. Pp. 172-178.
- Hanumante, M. M., Deshpande, U.D. and Nagabhushanam, R. 1980. Involvement of neurohormones in regulation of oxygen consumption in marine gastropod, *Onchidium verruculatum*. *Hydrobiol.* 74: 29-32.
- Kale, R. D. and Rao, K.P. 1973. Studies on the neurohormonal induction of compensatory mechanism in thermal acclimation of poikilotherms. *J. Expt. Biol.* 59: 655-664.
- Kennedy, V.S., and Mihurshy, J.A. (1972); Effect of temperature on respiratory metabolism of three Chesapeake Bay bivalve. *Chesapeake Sci.*, 13:1-22.
- Mane, U., H., Rao, K. R., Muley, S.D. and Vedpathak, A. N. 1990. Probable role of nerve ganglia in Respiration of the estuarine clam, *Katelysia opima*. *Indian J. comp. Anim. Physiol.* 8:21-27.
- McMohan, R. F., 1979. Response to temperature and hypoxia in the oxygen consumption of the introduced Asiatic freshwater clam, *Corbicula fluminea* (Miller) *Comp Biochem Physiol.* 63A: 383-388.
- Nagabhushanam, R., and Kulkarni G. K. 1979. Hormonal involvement in regulation of a penaeid prawn *Parapenaeopsis hardwickii* (Miers). (Crustacea: Decapod). *Rev. Brasil Biol.* 39(4) 769-772.
- Nagabhushanam, R., and Mane U. H. 1973. Neurosecretion in the clam *Katelysia opima*. *Marathwada University, Aurangabad, J. Sci.* 12: pp.193-203.



Sangam with special reference to neuroendocrine manipulation . Ph. D. Thesis, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. pp.1-308.

Salaki, J. and Lukacsovic, F. 1967. Filtration and oxygen consumption related to periodic activity of freshwater mussel. (*Anodonta cygnea*) Ann. Inst. Biol. (Tihany) Hung. Acad. Sci. 34: 85-98.

Samant, S. and Agrawal, R. A. 1978. Effect of some Environmental factors on survival and activity of freshwater bivalve *Lamellidens corrianus* . Indian. J. Expt. Biol. 16: 26-28.

Shinde, N. G. 2007. Induction of breeding by neuro-endocrine manipulation in some commercially important bivalve molluscs from Jayakwadi backwater. Ph. D. Thesis, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. pp.1-306.

Silverthorn, S. U. 1975. Hormonal involvement in thermal acclimation in fiddler crab *uca pugilator* (BOSC). In effect of eyestalk extract on whole animal respiration. IBID, 50A 281-283.

Vahl, O. 1972: Parasity of the gills , oxygen consumption and pumping rate in *Cardium edule* (L.) Bivalvia. Ophalia. 10. 109-110.

Vedpathak, A. N. and Wagh, D. T. 2009. Effect of cerebral ganglion and injections of their extract on the rate of oxygen consumption in freshwater bivalve, *Lamellidens marginalis* during monsoon .AQUACULT. 10(2): 285-291.

Vedpathak, A.N., Jadhav, M.R. and Misal, P. J.2011. Role of cerebral ganglia in regulation of oxygen consumption of freshwater bivalve molluscs, *Indonaia caeruleus* (Prasad 1918) From Godavari River during summer. The Bioscan. 6(4):609-611.

Wagh, D. T. 2008. Reproduction, physiology of some *Lamellidens* molluscs, from Pravara. Ph. D. Thesis, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. pp.1-308.

Salaki, J. and Lukacsovic, F. 1967. Filtration and oxygen consumption related to periodic activity of freshwater mussel (*Anodonta cygnea*) Ann. Inst. Biol. (Tihany) Hung. Acad. Sci. 34: 85-98.

Samant, S. and Agrawal, R. A. 1978. Effect of some Environmental factors on survival and activity of freshwater bivalve *Lamellidens corrianus* . Indian. J. Expt. Biol. 16: 26-28.

Shinde, N. G. 2007. Induction of breeding by neuro-endocrine manipulation in some commercially important bivalve molluscs from Jayakwadi backwater. Ph. D. Thesis, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. pp.1-306.

Silverthorn, S. U. 1975. Hormonal involvement in thermal acclimation in fiddler crab *uca pugilator* (BOSC). In effect of eyestalk extract on whole animal respiration. IBID, 50A 281-283.

Vahl, O. 1972: Parasity of the gills , oxygen consumption and pumping rate in *Cardium edule* (L.) Bivalvia. Ophalia. 10. 109-110.

Vedpathak, A. N. and Wagh, D. T. 2009. Effect of cerebral ganglion and injections of their extract on the rate of oxygen consumption in freshwater bivalve, *Lamellidens marginalis* during monsoon .AQUACULT. 10(2): 285-291.

Vedpathak, A.N., Jadhav, M.R. and Misal, P. J.2011. Role of cerebral ganglia in regulation of oxygen consumption of freshwater bivalve molluscs, *Indonaia caeruleus* (Prasad 1918) From Godavari River during summer. The Bioscan. 6(4):609-611.

Wagh, D. T. 2008. Reproduction, physiology of some *Lamellidens* molluscs, from Pravara. Ph. D. Thesis, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. pp.1-308.



(Handwritten signature)

PRINCIPAL
Govt. College of Arts & Science
Aurangabad