



**EXPLORATION OF SCIENTIFIC FACTS ON CRAB (CRUSTACEAN)
WITH SPECIAL REFERENCE TO TAMIL LITERATURE**

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ABSTRACT

Traditional knowledge of our ancestors has been the inspirational source for the development of science and technology as they led their lives blended with nature for their food and survival. Crabs are the amazing animals that caught the attention of our ancestors due to their morphology (headless), behaviour (hiding in the pit and walking lateral side) and moulting. Our ancestors had made an attempt to tame it like other animals such as dogs, horses, cats, and goats for their food, survival, and entertainment. They recorded the information about this organism either as non-written documents (proverbs and riddles) or written documents (palm manuscripts). Exploring the scientific facts about this animal is of greater importance because it would aid in the discovery of new technological tools for the benefit of future generations.

Keywords: Crab, arthropod, headless animal, hide, proverb.

INTRODUCTION

Indian literature has been the potential knowledge based source for the development of science and technology as our ancestor's custom, behaviour, culture and belief are closely associated with their social life. It has been interestingly evident that our ancestors had curiously recorded

the amazing behaviour of animals and made several attempts to have them live with them, culture them practised them for the benefits of the human beings in terms of food, medicines, travel and even to tame them for their happiness. The deep understanding of the knowledge on the

behaviour of animals paved way for many discoveries and innovation for the development of science and technology. Many examples can be given from biology for one's understanding that the rearing of honeybees for obtaining honey from honey comb, planting of bee pasturage for honeybees, in turn, promoting crosspollination for better yielding, drawing large quantity of milk from cows, producing a large number of eggs from hens and meat from goat. The development of Science and Technology is not a single step but it is a slow and gradual process which bounds cultural, social and scientific impact.

As per the available literature, our ancestors had closely associated with a number of living creatures. One such amazing creature is a crab which was highly focussed by our ancestors for their food and entertainment. Though it's amazing behaviour had been explored by various authors in stories, art, music, dance, ritual and mythology but its scientific importance is not given elaborately. Hence, in the present study, the scientific facts on "crabs" encoded as "cryptic message" in non-written document (proverbs) and written documents (literature) have been explored. This article may be helpful to lay the

foundation of invention or discoveries in the years to come.

IN TAXONOMICAL STUDIES

Crabs, the amazing decapods (having 10 legged), shelled creature belong to the Phylum Arthropoda, Order: Decapoda are inhabiting in all kinds of ecosystems freshwater (நன்னீர் நண்டு), marine water (கடல்நண்டு) and estuaries (கழிநண்டு). It is distributed in Western Atlantic Ocean, in Pacific region of Central America, Gulf of Mexico, Balk Strait and in Indian coastal waters. This amazing creature has been described in Tamil Literature as "அலவன்," (walked irregularly) "களவன்," 'தலையிலி (head fused with thorax regions known as cephalothorax)," and " சிரமலி(headless)." In Taxonomical studies, these kind of characteristic features are taken as key characters for identification and placed in the correct order Decapoda due to the presence of 10 legs. This species was described with several names in Sangailakkiam literature as in the following verses.

"பல்கால்அலவன் கொண்டகோள் கூர்ந்து"
(நற்றிணை:35)

"களவன் மண்ணனைச் செறிய"
(அகம்:235:11)

"தாழைவேரனை வீழ்துணைக் கிடுஉம்
ஆலவற' காட்டிநற்பாற் நிதுவென்"
"திணிமணல் அடைகரை அலவன்ஆட்டி
ஆசையினள் இருந்த ஆய்தொடிக் குறுமகள்"
(அகம் 280:3-4)

The presence of compound eyes is the characteristic feature of the members of the Phylum Arthropoda. The long stalk like eye consists of thousands of individual light detectors having the lens and camera. This structure looks like the inflorescence of neem flowers as it has long panicle and each inflorescence bears 150-200 flowers. This peculiar feature is also described by our ancestors in the following verse which is the supportive evidence for nomenclature science.

வேப்புநனை அன்னநெடுங் கண் கள்வன்
(ஐங்குறுநூறு – 30:1)

Crabs have hard exoskeleton which is made up of calcium carbonate, protects them from predators and ensuring to hide in rocky shore areas. Remarkably, the first pair of legs are in large size having harp claws at the end which is used as a tool to hold and capture food, whereas the rest four pairs of legs for walking. So that, crabs can walk on sandy shore areas, rocky shore areas and muddy areas. This is considered as a kind of adaptation to live in any kind of habitats. This feature was also highlighted in Tamil literature,

“மருங்கிற் போகிய மாக்கவை மருப்பின்
இருஞ்சேற்றீரளை அலவன்”
(அகம் 350:4)

(மாக்கவைமருப்பின்- இடுக்கி அல்லது குறடு
போன்ற கொடுக்கினை உடையகால்கள்
(pincer like or scissors like structure)

“களவன் மண்ணனைச் செறிய” (அகம். 235:11)

IN DIVERSITY OF CRAB

Diversity refers to a variety of species living in a natural habitat. It helps to study the wide range of distribution of organisms and to study the healthy status of the organism in relation to its habitats/environment. The biggest ocean crab is the Japanese Spider crabs which live in the Pacific Ocean. The biggest land crab is the Coconut crab which lives in the island of Pacific ocean. Blue legged crab (நீலக்கால் நண்டு) is commonly distributed and highly dominant in Western Atlantic Ocean, Pacific region of Central America, Gulf of Mexica and Balk strait. In India, rich diversity of crabs is recorded in Kerala, Andhra Pradesh and Tamilnadu.

Our ancestors recorded a variety of crab species through their careful observation in various habitats. They were amazed on the remarkable features of the crabs and gave names in accordance with its colour, shape, size and habitats likely Red Crab (செக்கர் நண்டு) Dotted crab (புள்ளிநண்டு), Hermit crab (குறவி நண்டு), a Legged crab (ஒருகால் நண்டு), Sea crab (கடல் நண்டு), fresh water crab (வயல் நண்டு/கழனிநண்டு), King crab (பெருநண்டு) Coconut crab (தேங்காய் நண்டு), the biggest land crab (soft crab வெள்ளை நண்டு/ பால்நண்டு, Pond Crab (குளநண்டு), பீநண்டு, (common crab found in the holes),

கடுக்காய் நண்டு, சூக்காய்நண்டு, ஓடைநண்டு Horse shoe crab (குதிரைலாட நண்டு) (living fossil). Some of the following tamil poems are also supportive evidence for the diversity and distribution of crabs in various habitats during the past

செக்கர் ரெண்டின் குண்டளை கெண்டி

.....
வெண்டலைப் புணரி ஆயமொடாடி

“இ.து ஒத்தன்!

(அகம் 20: 4-8)

புள்ளிக் களவன் புனல் சேர்மா ஒதுக்கம் போல்
வள்கிர் போழ்ந்தனவும் வாள் எயிறு உற்றனவும்
ஒள் இதழ் சோர்ந்தநின் கண்ணியும் நல்லார்”

(கலித்தொகை : மருதநிலமங்கை,151)

“புடையினாற் புள்ளிகால் பொருந்திய

மடையினால் மணிநீர் நெல்வாயிலார்”

“அள்ளல் ஆடிய புள்ளிக்களவன்”

(ஐங்குறுநூறு – 22:1)

“பயல் புறந்தற்ற புன்றறுவளா

பைங்காயவயலைச் செங்கொடிகளவன்”

(ஐங்குறுநூறு – 25:1-2)

From the above evidences, it concludes that the availability, distribution and dominance of dotted crabs and red crabs were common in most places.

IN BEHAVIOURAL STUDIES

Moulting (தோலுரித்தல்), shedding of outer hard exoskeleton is the characteristic feature exhibited by some members of the Phylum Arthropoda. Like other arthropods, the hard exoskeleton of the crabs cannot expand as they grow, so crabs periodically remove their outer hard exoskeleton from their body for developing a new and bigger shell. For that, the crabs have to be hidden in the pit of the sand to discard the old and small

shell. Moreover, their soft shells which are more vulnerable to predators and pathogens have to be hidden. After removing the shell and grown in the pit, it returns to the water surface during high tide. One can easily locate the empty shells lying in the mouth of the pit which indicates the moulted carapace. Most of the people do not know this fact that the complex, behavioural and physiological phenomena during the growth of the crabs. This complex behavioural aspect was explored by our Tamil people in the following simple proverb

நண்டுகொழுத்தால் வளையில் தங்காது”

Another one interesting feature of the crab is irregular walking movement of the crabs. The majority of the folk songs and proverbs describe this amazing feature and it is compared with the poor hand writing as

“நண்டு எழுத்துக் கண்டு எழுதலாமா?”

“நண்டு எழுத்துப் போல”

Not all the crabs move sideways. Some crabs can walk forwards (Example *Libinia marginata*). Crab's legs are attached with the body on its lateral side. Each leg has seven joints and locates in a longitudinal position. The scientific reason is that the size of the shell is correlated with the shape of the shell. The forward moving crabs have shells that are wider than they are long. It is a kind of

adaptation for their survival. By moving sideways, crabs avoid exposing their defenceless organs such as compound eyes and antenna.

One such amazing behaviour is well illustrated in the following verse ancestor on reproductive behaviour of crabs.

தாய்சாப' பிறக்கும் புள்ளிக் கள்வனொடு
பிள்ளை தின்னும் முதலைத்து அவனார்
எய்தினன் அகின்று கொல்லோ மகிழ்நன்
பொல்ந்தொடி தெளிர்ப்ப முயங்கியவர்
நலங்கொண்டுதுறப்பது எவன்கொல் அன்னாய்
(ஐங்குநாறு.24,ர.வ1&2,ப.73)

Our ancestors also described the same event and recorded as non-written document in the form of the proverb

“நண்டு கர்ப்பம் தானே சாகத்தான்”

The above fact is not true. This is a kind of amazing behaviour exhibited by the female crabs as “Parental care”. After mating, the male crab dies. But the female crabs take care of their young ones. Female releases 50,000 to 10 million eggs. The egg laying capacity depends on the types of crab species. The females carry their juveniles on their abdomen for about 17 days and ensure them to get proper oxygen, protect them from their predators, and provide provision for calcium availability. This parental care lasts for till the young ones gain their nutritional independence.

IN TECHNOLOGY

Traditional knowledge is essential for the development of science and technology for the benefits of the people worldwide. Crabs are known for their delicious muscle, amazing behaviour and remarkable morphology. Generally, fish and fishery products are excellent for their protein content, easily digestibility and balanced amino acid profile. The highly nutritious attribute makes the Crab in demand in national and international markets. Crabs are highly nutritious due to their rich content of essential amino acids, proteins, unsaturated fatty acids and minerals (Kuey et al., 2007 and Adeyeye., 2008). Our ancestors had preferred the crabs for their taste attribute. This attribute was highlighted in the following proverbs

“நண்டு ருசிகண்டவனும் உண்டு
ருசிகண்டவனும் அடங்கமாட்டான்”

“ஞாயிற்றுக் கிழமைஒருபொழுது
நண்டு வேண்டாம், சாறுவிடு”

“நண்டுக்கு புளியங்காய் இட்டு நறுக்கினாற் போல”
“சுட்ட நண்டுக்கு வேலிகட்டின சுகாட்டுப்பள்ளி”

As per the available report of Krishnakumar (2013), protein is found to be higher in both hard and soft shelled crabs of *Scylla serrata*. This crab contains a maximum of 20 aminoacids in the muscle of crabs. He also reported that crab tissue has good amount of essential

aminoacids such as glutamic acid, arginine, glycine, histidine, aspartic acid etc. Moreover, 52.52% of amino acids was recorded in the body tissues of live and hard shelled mud crabs. Besides, the crab meat is high in vitamin B12 and other essential minerals.

Crabs alone make up 20% of all marine crustaceans caught, farmed and consumed worldwide. In India, the soft shelled crabs are discarded at landing centre itself. To avoid such a kind of activity, studies are going on to export the soft crabs “as such” or as “value added products” using standard technologies. There is a need for awareness on use of soft shelled crabs after proper treatment and assessment of microbial load.

Crabs are not only used as food, but also used to cure various kinds of diseases. One amazing behaviour of village folk is that the collected water from the pit of freshwater crabs (common crab – வயல் நண்டு, குழிநண்டு) is used to treat allergy like diseases. After collecting the water, it has to be filtered using muslin cloth, stored in glass like bowl and kept under sunlight for about 3 hours. They reported that this water can be used to stop continuous vomiting, unstopping hiccups, unquenching thirst and cure body burns and allergy. Regarding this, an extensive survey and research is needed in medical

aspects to find the reason and solution for some diseases.

Crab fishing or crabbing is the most popular recreational fisheries from ancient period to till now. Though it lives in the hole of the shore, it is not an easy to grab the crab. Our ancestors highlighted the simple technique for crab fishing in the following Tamil song.

“கீரி கீரி நண்டு பிடி
வாய்க்கால் கீரி நண்டு பிடி
வயலுக் கீரி நண்டு பிடி”

The same technique was also adopted by the womenfolk as a kind of “sport activity”. It was represented as “ஓரைவிளையாட்டு” (a kind of sport activity during Sangakalam period) in Tamil Literature

“ஓரைஆயத்துஓண்தொடிமகளிர்”

(புறம்-176)

“ஓரை மகளிர் ஓராங்குஆட்ட”

(குறுந்-316)

விளையாட்டு ஆயமொழு ஓரையாடாது
இளையோர் இல்லிடத்து இற்செறித்திருத்தல்
(நற்.68:1-3)

அறனும் அன்றே ஆக்கமு தேய்ம்
நன்னாமலை நெருநை நின்னொடு
சில விலங்கு எல்வளை நெகிழ
அலவன் ஆட்டுவேள் சிலம்பு நெடுமிர்ந்து எனவே
நற்.363:8-10)

“----- கடலாடியும்
மாசு போக புனல் படிந்தும்
அலவன் ஆட்டியும்”

—பட்டினப்பாலை -99-100

காலை வருந்தும் கையாறோம் பென
ஓரையாயம் கூறக் கேட்டும் “
(குறுந்- 48)

From the above folk song, we could conclude that, crabs live in pit or hole like structure. It was a great task or challenging

for the womenfolk particularly for the fisherwomen. Its presence or absence in the pit was confirmed by tugging with a stick like structure as it makes a kind of sound. The fishermen need not have a lot of special equipment to catch the crabs. This is the simplest way to catch the crab using a stick/ fishing line with bait end. With the use of fishing line, just tug in the hole or simply on the body of crabs. If it is tough or harder to pull the fishing line outside, it means that the crab tightly held the fishing line by its forelegs. If any no sign, it indicates, the crabs might have left their shell after moulting. Today, many kinds of crab traps are used to grab the crab efficiently, including crab rings, pyramid traps, Standard Square style trap etc. As already described previously, the crabs always prefers to live in hole structure, one can easily find its place where to live in. Freshwater crabs like Fiddler and red crabs are best fished in shallow water. Rocky reefs are another popular habitat.

CONCLUSION

Traditional sources/ techniques are very much important to the modern science and technological development. This article explored two points of view on the crab. Firstly, explored the need of value added products from soft shelled crabs and simple tool(s) for catching the

crabs in an easy manner. Secondly, Some of the scientific facts are “misunderstood” by the people without knowing the scientific facts. The truths remain as “cryptic message” and deciphering from generation to generation. They have to be cracked for better understanding of the younger generation. It would lay the foundation for the development of science and technology.

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