Comparative study on the behaviours of *Sepiella inermis* and *Sepioteuthis lessoniana*
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**Introduction**

Cephalopods are found in different sizes and shapes from the Artic to the Antarctic and from the surface to the bottom of the oceans. They are found in a wide range of habitats from the shallow inter-tidal waters till even the thermal vents (Tunnicliffe, 1988). The cephalopods have evolved accordingly to adapt to the different habitats and they have been highly successful as their evolution pattern suggests. The cephalopod brain is relatively enormous by invertebrate standards and large compared with fishes and reptiles (Hanlon and Messenger, 1996). All the evidence is that these are advanced invertebrates (Wells, 1978) and it is not surprising that they can show complex behaviour more reminiscent of fishes than of their molluscan relatives (Packard, 1972). Nabhitabhata (1996) called the cephalopods as "climax of invertebrate evolution".

Cephalopods resemble the modern teleosts to some extent in their morphology, physiology, ecology and behaviour. Packard (1972) pointed out that ‘cephalopods functionally are fish’ which is agreed by most of the people interested in the cephalopod behaviour. He further suggested that the evolution of coleoids has been influenced strongly by competition and predation pressures from fishes and marine reptiles from the Mesozoic onwards.
Cephalopods show a wide array of behavioural patterns during their life cycle of which some are understood and some are left unnoticed. Studies on cephalopod behaviour from the Indian waters are scanty apart from a handful of scientists such as Samuel (2003) and Sivalingam (1993; 1999). A classical study on the cephalopod behaviour was published by Hanlon and Messenger (1996). In the present study, the various behavioural patterns shown by the spineless cuttlefish Sepiella inermis and the big fin squid Sepioteuthis lessoniana are observed and noted. The knowledge of the various behaviours exhibited by the cephalopods is a shot in the arm during their maintenance in laboratory or commercial grow outs.

Materials and methods

Observations were made from the days of incubation till the completion of the culture period. Notes on the behavioural patterns were taken down and illustrated in the forms of photographs and hand drawn diagrams. All the observations were made from the laboratory reared animals.

Observations

Hatching and Hatchlings

The hatchlings of both Sepiella inermis and Sepioteuthis lessoniana were found to squeeze out of the egg capsule during the time of hatching. The hatched
out egg capsules of *S. inermis* were found to bear a tiny hole through which the hatchling squeeze out. The tamarind shaped egg capsule of *S. lessoniana*, normally consisted of 4-5 hatchlings, each one in individual compartments. Each individual compartment was observed to have a hole through which the hatchlings squeezed out of the egg capsule during hatching. The embryos inside the egg capsules were observed to be capable of detecting any mechanical shocks or disturbances in the environment. A slight stimulus which could be a mechanical shock or the water current created while cleaning the rearing system could trigger out hatching of the hatchling. Otherwise, normally hatching (Fig 1) took place during night times.

Soon after hatching, the hatchlings in both the studied cephalopods remained for about 5 minutes above the egg capsules and later swam out into the water column through the perforations in the incubation basket. The swimming was observed to be erratic in *S. inermis* and the newly hatched hatchling often dashed onto the tank walls frequently. This happened for almost an hour. But for the hatchlings of *S. lessoniana* erratic swimming was observed only for a couple of minutes.

**Fig 1: Hatching of paralarvae in *S. inermis* and *S. lessoniana* eggs**
Feeding behaviour

Both *S. inermis* and *S. lessoniana* were observed to hunt their prey. The method of feeding was similar among both paralarvae and the adults. Feeding involved three steps namely, 'locating' the prey, 'positioning' and 'striking'. *S. inermis* and *S. lessoniana* were having very good visual capacity and they visually located the prey in their environment almost instantly, the prey was introduced into the tank. The second step is to get the animal into position for striking. If the prey were abundant in the tank the animals seldom spend energy in chasing the prey for long distances. But if only one shrimp was introduced and there were more than one cephalopod competing for it, long chases after the shrimp were observed. The third step was striking. After reaching a comfortable distance, the tentacles were stretched out and the prey was seized. But in the case of *S. lessoniana* paralarvae, striking the prey using tentacles was rarely seen. The animal swam fast chasing the prey and captured it using its arms. Occasionally two cephalopods targeted the same prey and there were often tussles between the two for getting the prey, which finally resulted in favour of the strong one and a lot of inking in the water. Normally, the prey captured was smaller or equal to the size of both *S. inermis* and *S. lessoniana*. After striking the prey struggled to free itself from the predator and this caused in twisting and turning of both prey and predator. Occasional inking was also witnessed during this reaction between the
prey and predator. During the whole duration of prey capture and feeding, the chromatophores in the head region, arms and mantle kept on flashing brightly.

**Cannibalism**

Cannibalism was observed among the juveniles of *S. inermis* (Fig 2) when ever there was inadequate supply of feed. The larger animals suddenly struck unsuspecting smaller animals and consumed them. Cannibalism was normally visualized in the night times and early morning hours in *S. inermis*. When *S. inermis* approached sexual maturity, there were occasional incidents of smaller males being attacked, killed and consumed by larger females. In the first instance where cannibalism occurs due to lack of sufficient feed, no inking takes place. But, in the later case where the smaller males are attacked by larger females, profuse inking happens and the water in the tank turns dark.

![Fig 2: Cannibalism in S. inermis](image-url)
Cannibalism was comparatively lesser among the squid *S. lessoniana*. The cannibalism occurred only during the paralarval stages where weak and moribund hatchlings were consumed by the fellow inmates. As they grew into juveniles and adults, cannibalistic instances were reduced. After attaining sexual maturity mock battles between males occurred where the larger males attacked the smaller ones but they were never cannibalistic. But the conflicts often resulted in the dashing on to the walls or leaping out of the tank by the smaller squid leading to death.

**Body pattern and camouflage**

*S. inermis* normally is having a brownish coloured body (Fig 3). But when disturbed it inflates its body and the body becomes highly pigmented (Fig 4). Likewise when any new substance is introduced into the tank, *S. inermis* came near to it with its first pair of arms pointed upwards (Fig 5). It slowly swam around the object and continued its inspection for considerable time. The animal later rested under the new object (Fig 6). In the laboratory conditions, *S. inermis* also exhibited camouflage to a little extent. A perfect blending of the body colour with that of the tank bottom where it was maintained was observed (Figs 7 and 8).

The normal body color of *S. lessoniana* is translucent (Fig 9) which makes it difficult to detect in the pelagic water column of the oceans. *S. lessoniana* displayed a variety of body colourations and patterns during their tenure in the laboratory. Intermittent black and white stripes were displayed particularly by the
males (Fig 10). Another kind of behaviour observed was the ‘deimatic display behaviour’ (Edmunds, 1974), where the body was inflated flamboyantly and the arms were spread wide (Fig 11). A ‘passing cloud display’ (Packard and Sanders, 1969), where dark waves pass rapidly across the body due to the action of the chromatophore pigments, was also observed in association to the deimatic display.

A different kind of behaviour was observed among _S. lessoniana_ juveniles. When disturbed they all gathered into the corner of the tank with their body highly pigmented (Fig 12). They were noticed to arrange themselves in an unsystematic manner to various directions, but stayed close together.

**Fig 3: S. inermis** normal appearance

**Fig 4: Highly pigmented S. inermis**

**Fig 5. Curious S. inermis** with first pair of arms raised

**Fig 6. S. inermis** resting under newly immersed object
Fig 7 and 8: *S. inermis* matching the background colouration

Fig 9: Translucent *S. lessoniana*

Fig 10: Black and white striped appearance in *S. lessoniana*

Fig 11: Deimatic display in *S. lessoniana*

Fig 12: Unsystematic orientation of *S. lessoniana* squids
Inking

*S. inermis* and *S. lessoniana* inked profusely (Fig 13) when disturbed. In *S. inermis* mainly two types of inking was observed. One was a ‘pseudomorph’ kind of inking where dense blobs of ink approximately the size of the animal was squirited. Second kind of inking was ‘smoke screen’ type where the whole area was inked with thick clouds of ink which totally hide the animal from view. Pseudomorph was squirited during quick escape from any predator or as an immediate response to sudden mechanical shock before escaping into an area where fewer disturbances are there. Smoke screens or ink clouds were squirited during the struggle after the prey-predator confrontation. This kind of dense ink screens were also produced during cannibalism incidents where larger females preyed on smaller males. Battles between the males for possession of females also sometimes resulted in the squirting of the dense ink clouds in *S. inermis*.

In *S. lessoniana* inking was mainly of the pseudomorph kind. Ink clouds were very rarely noticed. Soon after the pseudomorph squirting, the animal was noted to flee from the site to a safer place. Sometimes 2 to 3 continuous pseudomorphs were produced and the animal hide behind the dense ink blobs (Fig 14).
The pseudomorphs were observed to be more mucoid in nature and took longer time to disperse in water when compared to the smoke screens. The smoke screens were more watery in nature and dispersed quickly in the water turning the colour of water into black. This was a regular event during the reproductive season in the *S. inermis* culture tanks.

**Courtship behaviour and mating**

Courtship behaviour was exhibited by *S. inermis* and *S. lessoniana* in different ways. This is a prelude to mating and reproduction. In *S. inermis*, the courtship started with the caressing behaviour (Fig 15). The female rested on the bottom of the tank and the male slowly mounted on the female. His arms were folded downwards and slowly started caressing the head-mantle joint of the female from sides. Later the caressing was along the fins, mantle, head and the eyes. The
females did not react and remained still on the tank bottom throughout the entire process. Several such pairs were witnessed in the tank at the same time. The animals did not show any interest in feeding during the caressing process. It occurred for 3-4 hours a day. Both the animals were highly pigmented during the entire process. The caressing behaviour slowly gave way to parallel swimming of the males and females (Fig 16). The males always extended its fourth arm in the direction of the female while the female never extended her fourth arm. Males brushed their arms over the females softly while the females never reacted. 7-9 bright white spots were displayed on either side of the fins of the males while the female remained thickly pigmented.

Mating in *S. inermis* occurred usually in the evening and night hours. The female swam on the water surface while the male came from the bottom and caught hold of the female in the mantle-head joint. He later slid to the mouth region and both the animals mated in a head-to-head position (Fig 17). The arms were tangled and the males transferred the spermatophores using the hectocotylized arm. The head-to-head mating took place for around 5 minutes. The animals were brownish in colour with the males having iridescent white spots, 7-9 in number along the periphery of the mantle. The body of both male and female *S. inermis* were narrowed down and pointed during the time of mating.
In *S. lessoniana*, the courtship was marked with a vivid ‘mutual rocking’ movement (Fig 18). The males and females swam parallel to each other to and fro, continuously. Flashing of pigments were rapid and a myriad of chromatophore patterns could be observed during the courtship behaviour of *S. lessoniana*. On the approach of a male near to the female, the female exhibited heavy pigmentation on the side where the male was as if to repel it. But by the end of the courting behaviour a male successfully segregates a female and mating takes place. In *S. lessoniana* mating was observed to be in ‘male-parallel’ position where the male suddenly came underneath the female and transferred his spermatophores into the mantle cavity of the female (Fig 19). The mating occurred very fast and lasted only for 2-3 seconds.

Fig 15: Caressing in *S. inermis*  
Fig 16: Parallel swimming in *S. inermis*
Spawning behaviour

In *S. inermis* spawning occurred in small groups with 2-3 females laying eggs at the same time and site. They followed an order and waited for their turn to lay their eggs on the substratum. Branches of sea-fans were tied as egg laying
substrates which were utilized by the adult *S. inermis*. The males accompanied the females during the egg laying (Fig 20) and often chased away other males from the area. The males had 7-9 iridescent spots on the periphery of the mantle whereas the females had white and black intermittent bands on the edge of the mantle. Males occasionally came and felt the eggs with their arms and blew water onto it. The time gap between laying consecutive eggs were 50 -120 seconds. The egg laying generally started during early morning hours and continued till evenings.

Fig 20: Egg laying in *S. inermis* with male accompanying female
Branches of sea-fans were also tied in the tanks of the big fin squid *S. lessoniana*. Here also the animals were also found to lay eggs in groups. The involvement of the males was limited to chasing off other males from the vicinity. The females tied the long egg strands onto the substratum (Fig 21) with 4-6 minutes time gap. The spawnings were observed from early morning till afternoon.

![Female S. lessoniana laying eggs onto the substratum](image)

**Fig 21: Female *S. lessoniana* laying eggs onto the substratum**

In both the cultured animals, the males and females were found to be in an exhausted stage after the spawning. The feed intake reduced considerably and both the males and females died within 48 hours.
Induced spawning

*S. lessoniana* could be easily induced to spawn by providing visual stimulation. Eggs collected from elsewhere were immersed into the culture tanks where the adult animals were reared. Both the males and females came and constantly touched the immersed eggs with their stretched arms. The females were found to start laying eggs within 24 hours after the immersion of the eggs from external source. The eggs were laid on the same sea-fan branch on which the eggs from the external source were tied onto (Fig 22).

![Image of *S. lessoniana* eggs laid adjacent to eggs from wild (long strands)](image)

Fig 22: *S. lessoniana* eggs laid adjacent to eggs from wild (long strands)

Similar studies on *S. inermis* could not be carried out due to the unavailability of the eggs of the same species from other sources. But, eggs of
S. pharaonis were introduced into the tanks with S. inermis adults to find out whether the presence of pharaoh's cuttlefish eggs could visually stimulate the spineless cuttlefish to lay eggs. But it was noted that this did not induce the S. inermis adults to spawn.

**Hierarchy**

As the animals attained maturity, in both S. inermis and S. lessoniana, the males started to exhibit certain body postures such as flattened and expanded body, wide open eyes and straightly spread arms. The dominant males chased off the lesser males from their vicinity. In S. inermis, often battles used to occur resulting in copious amount of ink secretion and sometimes death of one competitor. In S. lessoniana the battle becomes so fierce that sometimes the weaker males leap out of the tank to escape from the dominant male. Sometimes they dash onto the tank walls which consequently damage their thin epithelium, leading to secondary infection and mortality.

**Social recognition**

Both S. inermis and S. lessoniana reared in the laboratory did not show any peculiar behaviour when an animal of the same species and the same size was introduced into the tank. But when an animal of the same species but much smaller size was introduced S. inermis showed cannibalistic behaviour. On one
occasion, the eggs of *S. lessoniana* and *Sepia pharaonis* were made to hatch out in the same tank to find out any hostile reaction between the two hatchlings. They were reared together for forty days before shifting into individual tanks and no hostility was noticed between the two cephalopods.

**Behaviour of physically weak animals**

Animals were observed to be physically weak when there was deviation from the optimal water quality parameters, or after mating and spawning. In *S. inermis* the animals were found to swim erratically and often collide onto the tank walls. The pigmentation was irregular and the two tentacles which are normally drawn in, falls outside (Fig 23). Copious amount of ink was squirted out frequently without any stimulation. In the case of *S. lessoniana* also erratic swimming (Fig 24) was noted along with collisions onto the tank walls. The individuals swam in a circular way with their head dragging along the tank bottom and mantle along the water column. Within 2-3 hours after these symptoms were exhibited the animals of both the species died.
Discussion

The hatchlings of *S. inermis* and *S. lessoniana* are pelagic and free swimming in nature. In the present study, it was noted that the hatching of the eggs in both *S. inermis* and *S. lessoniana* occurred after the onset of dark. This observation was in line with that of Paulij *et al.* (1990) who noted similar observations in *Loligo vulgaris* and *Loligo forbesi*. However, a definite reason about the photosensory system which is responsible for the perception of the Light-Dark rhythm in cephalopod eggs is lacking. Similarly, as the eggs neared the end of their incubation it was noted that a slight mechanical shock or vibration was sufficient to trigger out hatching. An earlier report states that premature hatching tends to be naturally impeded by a tranquillizer effect of the perivitelline fluid bathing the animal (Marthy *et al.*, 1976). But it is unknown how the tranquillizer
effect of the perivitelline fluid is finally overcome when hatching takes place after the incubation period (Ikeda et al., 1999b).

Cephalopods can sense prey by sight, by scent, by ‘distant touch’ via the lateral line analogue, possibly by hearing or by any combination of these (Hanlon and Messenger, 1996). Feeding was noted to be a three stepped process involving ‘location’ of the prey, ‘positioning’ and ‘striking’. In most cases, the location of prey was observed to be by visual means. Many cephalopods search and find prey using their eyes, with motion as a key stimulus for the initiation and maintenance of the attack (Hanlon and Messenger, 1996). Capture of the prey by using the tentacles is very rapid. Messenger (1968) measured the tentacle ejection speed of Sepia officinalis at 25°C to be less than 15 milliseconds. The ability to catch fast-moving prey depends, to a large extent, on the stage of development of the prehensile organs (Boletzky, 2003). During the present study, S. lessoniana paralarvae were observed to use their arms in catching prey instead of the tentacles. This finding is in line with the results of the experiment of Kier (1996) where, using high speed videoscopy the predatory behaviour in younger and older S. lessoniana were noted. In young ones, it was a very rapid forward swimming motion where the prey is captured with the arms, while the older individuals (having developed the fast-contracting muscle cells in the tentacle shaft) swim forward to a much lesser extent but very rapidly extend the tentacles to seize the
prey. But in the case of *S. inermis* the prey was caught by means of the outstretched tentacles.

Occasional inking was observed during the prey-predator reaction. The ink of cephalopods is reported to have some deterrent chemical compounds which could be confusing and noxious to predators (Bush, 2003). MacGinitie and MacGinitie (1968) reported that moray eels which attacked octopuses showed a troubled reaction when confronted with the octopus ink. Similar reactions were shown by teleost fishes which attacked young cuttlefishes and reef squids (Moynihan and Rodaniche, 1982; Hanlon and Messenger, 1988). In the present study, it was observed during feeding that the cephalopods squirited ink to paralyse or temporarily immobilize the prey.

Cannibalism was observed in *S. inermis* and *S. lessoniana* to varying degrees during the culture in the laboratory. Hanlon and Messenger (1996) had recognized two types of cannibalism in cephalopods viz., intracohort and intercohort. Intracohort is the kind of cannibalism occurring between cephalopod juveniles of same age and size while intracohort cannibalism is the larger animals consuming smaller and younger individuals. In *S. inermis* intercohort cannibalism was higher during feed shortage. However, after reaching sexual maturity the larger females occasionally killed and consumed smaller males of the same batch.
Segawa (1993) observed that cannibalism in lab reared *S. lessoniana* was limited to injured and weak animals which were easily preyed upon by healthier animals. In the present study cannibalism in *S. lessoniana* was limited only to the moribund animals. Lee *et al.*, (1994) had suggested that mortality due to cannibalism in *S. lessoniana* might be due to an initial cause such as an injury which weakens the animal.

Communication in cephalopods is mainly by visual signals and the chromatic components of body patterns takes care of passing the information to other animals, both intra and interspecifically (Hanlon and Messenger, 1996). The animals studied in the present experiment, *S. inermis* and *S. lessoniana*, showed a myriad of different body patterns and pigmentations by re-adjusting their body appearance and by flashing their chromatophore pigments. In *S. inermis*, perfect blending of the body colour with that of the background was observed. It is assumed that the iridophores, otherwise known as the reflecting cells found between the chromatophores in the skin enable the animal to take the colour of the background. The translucent appearance of the squid body wall could be obtained by the compression of the chromatophores. This could be an adaptation to the squid to avoid notice of the potential predators.
Deimatic display behaviour was observed clearly in *S. lessoniana*. Hanlon and Messenger (1996) stated that the deimatic display is typically shown after the animal has been discovered by a predator. Moynihan and Rodaniche (1982) had reported flamboyant behaviour and deimatic behaviour in the Caribbean reef squid *Sepioteuthis sepioidea*. *Sepia officinalis* has been observed to show the passing cloud behaviour as a threatening posture or bluffing posture against non-predatory fishes (Hanlon and Messenger, 1988). Longitudinal and intermittent black and white stripes were observed in *S. lessoniana* during the present study. A similar observation has been made in *Octopus vulgaris* and the Caribbean reef squid *Sepioteuthis sepioidea* previously (Cowdry, 1911; Moynihan and Rodaniche, 1982). This is described to be a defense mechanism where the reef squid and the octopus appear like a stripped parrot fish with similar appearance. The highly pigmented and tight schooling behaviour or ‘balling up behaviour’ could be an escape mechanism from the predators where the target is seen to be bigger and threatening.

High concentration mucus containing ‘pseudomorphs’ were squirted by both the cephalopods studied. The pseudomorph ink was approximately in the size and shape of the animal. ‘Pseudomorphs’ were sometimes encountered where ink is squirted out by the juvenile resembling it unless closely noticed in *Sepia officinalis* (Nixon and Mangold, 1998). The pseudomorph is meant to resemble the
animal and function as a decoy as the individual escapes the scene (Moynihan and Rodaniche, 1982). ‘Smoke screen’ kind of inking was also noticed in *S. inermis* while it was rarely noted in *S. lessoniana*. The smoke screen like ink squirting is presumable to block the animal from view (Moynihan, 1985).

The caressing behaviour in *S. inermis* during the courtship is not reported else where. This later developed into parallel swimming and mating. Conflicts and sexual dominance was observed in *S. inermis* during the reproductive season. Male-male contests in *S. officinalis* have been reported to involve highly conspicuous visual displays that could attract many predators in the wild (Boal, 1996). Parallel swimming was noted in *S. inermis* during the study. This kind of behaviour has been reported in *Sepia latimanus* (Corner and Moore, 1980). Mangold (1987) stated that during the courtship in Sepioidea, the male extends its fourth arm when a potential partner is seen approaching. In *Sepioteuthis sepioidea* ‘mutual rocking behaviour’ is reported between males and females during the reproductive prelude (Hanlon and Messenger, 1996). This behaviour was also noticed in *S. lessoniana* in the present study.

In *S. inermis* the mating was noted to be in a head-to-head position which is described as the normal mating position in Sepioidea (Mangold, 1987). But in *S. lessoniana* the mating was noted to be of ‘male-parallel’ type. The whole process
of mating lasted only for a few seconds. The male-parallel kind of mating could occur for multiple times till the spermatophores are successfully attached anywhere near the arms or the head region. Hanlon and Messenger (1996) observed male-parallel kind of mating in the Caribbean reef squid *Sepioteuthis sepioidea*. The fertilization is external in *S. inermis* and *S. lessoniana*.

The eggs of *S. inermis* are coated with black ink in order to make it not easily recognizable and to avoid predation. Similarly *Sepia officinalis* eggs are also coated with black ink which obscures the developing embryo and reduce predation (Hanlon and Messenger, 1996). *Sepia esculenta* lays eggs with a sticky surface with accumulate sand to provide cryptic colouration (Natsukari and Tashiro, 1991). However, no such care was found in the eggs of *S. lessoniana*.

In the wild, the eggs are laid on to diverse substrata such as seaweeds, net pieces, stag-horn corals, sea-fans and even anchor ropes. Hence, in the present study, sea-fan branches were provided in the tanks as egg laying structures and both *S. inermis* and *S. lessoniana*.

In loliginid squids and cuttlefishes, egg laying can be triggered by certain visual stimuli, especially by natural or artificial egg masses placed in the aquarium (Arnold, 1962). In the present study, it was noted that the presence of egg capsules
of the same species collected from the wild triggered spawning in the *S. lessoniana* adults. The unavailability of wild eggs of *S. inermis* prevented similar experiments with the animal. However, introduction of *Sepia pharaonis* eggs into the adult *S. inermis* tanks failed to induce spawning. But, in the laboratory it was observed that the sight of one *S. inermis* female laying eggs stimulated other females to follow suit. It is thus possible that *S. inermis* require eggs of their own species to get induced. This indicates that mass spawning may not be prevalent in *S. inermis* as it is in the case of *S. lessoniana*. In cuttlefish, the egg capsules have been reported to release a pheromonal peptide acting on sexually mature females as a specific spawning stimulator (*Zatylny et al.*, 2000).

Eggs of some cuttlefishes and squids such as *Sepioteuthis lessoniana* may be collected by placing tree branches on spawning grounds to which females attached their eggs (*Mangold-Wirz*, 1963; *Choe*, 1966). In Southeast coast of India, tree branches tied with Styrofoam pieces are introduced into the sea in order to attract matured cuttlefishes and squids for egg laying. The fishermen catch these cephalopods which assemble for spawning. *Watanuki et al.*, (2000) reported that in *Sepia esculenta* the stronger attraction effect of spawning substrate with eggs is due to its higher visual density compared to substrate without eggs. The Styrofoam pieces tied to the branches gives the appearance of embedded egg capsules which in turn stimulate the mature females to spawn. The mixing of shapes in artificial
spawning substrates, especially the ropes with different colours attracted females to lay eggs (Blanc and Daguzan, 2002).

Both *S. inermis* and *S. lessoniana* did not show any social recognition when animals of same species from different batches were introduced to each other. But cannibalism was observed when the introduced animal was smaller in size or physically weaker. Boal (1996) observed that there was no evidence of indiscrimination of familiar from unfamiliar individuals either in males or females, in *Sepia officinalis*.

During the study period there were occasional incidents where the animals turned weak and died, apart from the post spawning mortality. The simplicity of the cephalopod immune system predisposes the animals to higher risk of morbidity and mortality from diseases (Oestmann et al., 1997). The irregular flashing of chromatophores, the erratic swimming and the falling out of the tentacles suggests that somehow the central nervous system is affected. But further studies are required to find out the exact reason and the mechanism of the infection.

Cephalopods are animals which are reported to show a wide array of behaviours. But the behavioural studies are carried out only on limited cephalopod
species which are commonly available and easy to maintain under captive conditions and these studies are from different countries in different geographical regions. In the present study, attempts were made to throw light on the various behaviours exhibited by *S. inermis* and *S. lessoniana*. This will be added scientific information in the field of cephalopod behaviour, which could be much useful in aquaculture.