



INDONESIA DISSERTATION/THESIS PROJECT

IN39 Behavioural adaptations of dwarf cuttlefish (*Sepia bandensis*)

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The cephalopods are a diverse group with many new species being discovered each year. Between 1987 and 2004, one hundred and fifty new species were described from the western Indo-Pacific alone. All members of the group are predators on benthic crustaceans, thereby shaping the biodiversity and density of prey populations. Many species are an economically important part of the local fishery across Southeast Asia. In spite of their ecological and economic importance little is known about behavioral adaptations of many cephalopods. Most contemporary literature has focused on life history, or growth, and development under varying environmental conditions, relatively few studies have examined behavioral adaptations and the role they play in daily activities such as social interactions, feeding and shelter modification, or reproduction.

Dwarf cuttlefish (*Sepia bandensis*), and pygmy squid (*Idiosepius pygmaeus*) are common to mangrove (mangal) habitats in the Wakatobi National Park. Both species are abundant and can be captured and successfully held in the laboratory environment. In the case of the dwarf cuttlefish, animals can be maintained for relatively long times under laboratory conditions, where they will readily eat, mate and produce eggs. Pygmy squid have a different response to captivity, however. These cephalopods will survive for 7 to 10 days in captivity, during which they mate, lay eggs and then enter into a state of senescence where they stop eating and ultimately die. Both dwarf cuttlefish and pygmy squid offer the opportunity to learn more about the purpose and importance of various cephalopod life events, and the role behavioral plays in their successful execution.

Students working with dwarf cuttlefish or pygmy squid should consider incorporating a field element into their study so that they can observe the molluscs in their natural surroundings, or at the very least can supply a detailed description of the study site where the animals were captured. Field data can be an important contribution to a study by providing an ecological context in which to couch the laboratory results. Additionally, an understanding of field conditions can improve husbandry protocols and may be the raw material used to development laboratory treatment regimens. The relative dearth of information on cephalopod behavioral modification with changing environmental conditions, leaves open many possibilities for developing dissertation research projects. Projects may range from nonintrusive observations and comparisons of species behavior in the laboratory and/or in their natural habitat. Alternatively, students may consider quantifying and comparing differences in behavioral at different water temperature or light conditions. The outcome of these studies not only describe and quantify behavioral used by shallow-water cephalopods, but may also provide important insights into key life history events, distribution, and movement patterns of these ecologically and economically important animals.

Recommended Reading

- Jastrebsky RA, Bartol IK, Krueger PS (2016) Turning performance in squid and cuttlefish: unique dual-mode, muscular hydrostatic systems. *Journal of Experimental Biology* 219(9): 1317-1326
- Lewis AR, Choat JH (1993) Spawning mode and reproductive output of the tropical cephalopod *Idiosepius pygmaeus*. *Canadian Journal of Fisheries and Aquatic Sciences* 50(1): 20-28
- Moynihan M (1983) Notes on the behavior of *Idiosepius pygmaeus* (Cephalopoda; Idiosepiidae). *Behaviour* 85(1): 42-57.
- Natsukari Y (1970) Egg-laying behavior, embryonic development and hatched larva of the pygmy cuttlefish, *Idiosepius pygmaeus paradoxus* Ortmann. *Bull Fac Fish Nagasaki Univ* 30: 15-29
- Semmens JM, Moltschanivskyj NA, Alexander CG (1995) Effect of feeding on the structure of the digestive gland of the tropical sepioid *Idiosepius pygmaeus*. *Journal of the Marine Biological Association of the United Kingdom* 75(04): 885-897
- Warnke KM, Kaiser R, Hasselmann M (2012) First observations of a snail-like body pattern in juvenile *Sepia bandensis* (Cephalopoda: Sepiidae). *Neues Jahrbuch für Geologie und Paläontologie-Abhandlungen* 266(1): 51-57