

The occurrence of *Cistopus taiwanicus* in Sri Lankan waters

D.R. Herath*, D.N.A. Ranmadugala and A.A.D.G.U. Amarakoon

Marine Biological Resources Division, National Aquatic Resources Research and Development Agency (NARA), Crow Island, Colombo 15, Sri Lanka

Abstract

Cephalopods include a diverse collection of more than 650 species of octopus, cuttlefish, squid and nautilus. Several of these species are commercially important in Sri Lanka. As morphological identification is sometimes difficult, molecular techniques were used to confirm the species of cuttlefish, squid and octopus species found in Sri Lankan waters. Cephalopod samples were collected from Chilaw, Negombo, Beruwela and Kalpitiya. The mitochondrial COI region was amplified and sequenced. The sequences were matched with universal databases to identify each species. The cuttlefish species *Sepia aculeata*, *Sepiella inermis*, *Sepia pharaonis* and *Sepioteuthis lessoniana*, the squid species, *Loligo singhalensis* and *Loligo (Uroteuthis) duvacelli* were identified by this barcoding technique. Two species of octopus, *Cistopus taiwanicus* and *Octopus vulgaris* were also identified. A significant finding in this study was that two separate octopus specimens collected from Negombo and Kalpitiya were identified as *Cistopus taiwanicus*. Four species of *Cistopus*, namely, *C. indicus*, *C. chinensis*, *C. taiwanicus* and *C. platinoidus* have been recorded in the world. Out of these four species, only *C. indicus* has been reported from Sri Lanka. Therefore, the species list for Cephalopod species present in Sri Lanka could be updated to include the species *Cistopus taiwanicus*. Further research is needed to confirm whether *C. indicus* and *C. taiwanicus* are both present in Sri Lankan waters or whether *C. taiwanicus* has thus far been misidentified as *C. indicus*.

Keywords: Cephalopods, octopus, *Cistopus taiwanicus*

*Corresponding author: deishini.herath@yahoo.com

Introduction

Cephalopods are an ancient molluscan class of animals that include a diverse collection of more than 650 species of octopus, cuttlefish, squid and nautilus. Several of these species are commercially important in Sri Lanka. Morphological identification is sometimes difficult in cephalopods as morphological characters employed for cephalopod identification are influenced by sex, age, growth, sexual maturity and the environment, while some important features appear only in the mature male. Therefore, the availability of methods using molecular techniques would be very useful for the identification of these cephalopod species. In addition, it would help in the accurate identification of these species in sea food products.

Materials and Methods

Cuttlefish, Squid and Octopus samples were collected from Chilaw, Negombo, Beruwela and Kalpitiya fish landing sites from January 2015 to November 2015. The morphological features of the specimens were noted. Samples for DNA analysis were stored in alcohol and transported to the laboratory. The samples were subject to a standard DNA extraction protocol (Sambrook *et al.* 1992) and the quality and quantity of DNA was determined by agarose gel electrophoresis. Mitochondrial COI PCR reactions were carried out for the extracted DNA and

the purified PCR products were sequenced in an Applied Biosystems automated DNA sequencer. The sequences were analyzed using Bioedit and identified using the Barcode of Life database (BOLD) and the NCBI blast facility.

Results

The cuttlefish species identified were *Sepia aculeata*, *Sepiella inermis*, *Sepia pharaonis*, and *Sepioteuthis lessoniana* and the Squid species identified were *Loligo singhalensis* and *Loligo (Uroteuthis) duvacelli*. Two species of octopus *Cistopus taiwanicus* and *Octopus vulgaris* were identified using these databases. The significant finding in this study was the identification of a specimen collected from Negombo and another specimen collected from Kalpitiya identified as *Cistopus taiwanicus* with 99.53% similarity. Both these specimens were identified as *C. indicus* considering their external morphological appearances (Fig. 1).



Fig. 1: Octopus species identified as *Cistopus taiwanicus*

Discussion

Until 2009, the only described species of *Cistopus* has been *C. indicus*. By 2012, two more species had been described; *C. taiwanicus* (Liao and Lu, 2009) and *C. chinensis* (Zheng *et al.* 2012). In 2015, a new species, *C. platinooidus*, has been described from India (Sreeja *et al.* 2015). Out of these *Cistopus* species, only *C. indicus* has been recorded from Sri Lanka (Bambaradeniya, 2006). The 2 specimens identified as *C. indicus* collected from Negombo and Kalpitiya using the external morphological features, were identified as *C. taiwanicus* by DNA bar-coding. Therefore, this has proved that molecular identification techniques are very useful in identifying species that are difficult to distinguish morphologically.

Conclusion

The species *Cistopus taiwanicus* could be added to the list of Octopus species found in Sri Lankan waters. Further research needs to be done to confirm whether *C. taiwanicus* has been misidentified as *C. indicus* or whether both species are present in Sri Lanka.

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