

**CISTOPUS INDICUS (ORBIGNY): A COMMON  
INDO-MALAYAN SPECIES OF OCTOPUS\***

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ABSTRACT

*Cistopus indicus* (Orbigny) is one of the most common species of octopus that is caught in the kelongs of Singapore and sold in the fish markets. It is, nevertheless, poorly known, primarily because of the confusion between this species and *Octopus macropus* Risso. Both are large species in which the first arms are longest. The taxonomic status of *C. indicus* will be reviewed.

INTRODUCTION

*CISTOPUS INDICUS* (Orbigny) was redescribed by Robson (1929) on the basis of a comparatively small number of specimens. Nevertheless, it is one of the commonest species of octopus that is caught in the kelongs and sold in the Joo Chiat Fish Market in Singapore. More than a hundred specimens are now in the Peabody Museum of Yale University. They were collected in 1951 when the author was a guest of the Danish Deep-Sea (Galathea) Expedition and are, in part, on loan from the Zoological Museum in Copenhagen.

Circumstances have delayed the completion of a still unfinished memoir on the littoral Octopodinae of Southeast Asia, but many preliminary taxonomic problems were resolved in a study of specimens in the Raffles Museum at Singapore, and in the British Museum. It is the purpose of the present contribution to clarify the status of *Cistopus indicus* which, as it turned out, has frequently been confused with two other well characterized Indo-Pacific species in which the first arms are similarly the longest. In addition, at least four other species with this characteristic have been described, for the most part on juvenile specimens whose status remains unresolved. These are: *O. taprobanensis* Robson, *O. teuthoides* Robson, *O. fusiformis* Brock, and *O. machikii* Brock. Several investigators (Massy, 1916; Robson, 1929; Adam, 1945, 1959) have considered the likelihood that one or other of these enigmatic species might be juveniles of *C. indicus* or *O. macropus* but, at the present time, no decisive evidence is available. In this contribution we shall be concerned primarily with the status of *C. indicus* in relation to the two well-defined species with which it has been confused: *O. macropus* Risso and *O. microphthalmus* Goodrich.

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#### STATUS OF *CISTOPUS INDICUS* (ORBIGNY)

*C. indicus* is a moderate to large-sized species with a mantle length of up to 109 mm, according to presently available information. Robson (1929) mentions that the dorsal surface, in one of the specimens that he examined, is rugose with fine low and widely spaced warts. However, in freshly caught specimens the skin is usually smooth. The dorsal surface is dark red brown in colour. The first and/or second arms are longest and the arm-length index ranges from 80 to 87% of the mantle length. The E sector of the web is usually the shallowest, although there is considerable variation. The suckers are of normal size with a sucker-diameter index that is rarely less than 10%, except in some juvenile specimens. Males often have abruptly enlarged suckers on the first and second arms. In adults there are 9-11 gill filaments per demibranch, but some juveniles may have only 8. The ligula of the hectocotylus is minute and was described and figured by Robson (1929). The spermatophores, not previously described, have a number of spiral turns to the horn. In females the mature eggs are of small size, 4-5mm in length. The radula is said to be characteristic and was described by Robson (1929) who states: 'The median tooth is of a simple tricuspid type without seriation.'

There is no difficulty in separating *C. indicus* from *O. microphthalmus*, a species that occurs less commonly in the Singapore area. *O. microphthalmus* is a smaller species, with a mantle length up to 50 mm, and the arm-length index barely approaches the minimum recorded for *C. indicus* (one specimen in the Raffles Museum has an index of 77%). The colour of freshly caught specimens is a pale red brown and the skin is smooth. The mantle opening is somewhat narrowed (Robson's type B). The eyes are small, hence the name. The suckers are relatively small; Robson (1929) states that the sucker-diameter index scarcely exceeds 6% but some undescribed specimens examined by the author encroach, in this respect, on the higher range reported for *C. indicus*, with an index of up to 10%. No males of *O. microphthalmus* have as yet been described. Adult females have large eggs, 8-10 mm in length.

For practical purposes, the most readily observed characters that can be used to separate *C. indicus* from *O. microphthalmus* are the presence, in the latter species, of small eyes, smaller suckers, a narrower mantle opening, and (in females) the large size of the eggs. The same features also distinguish *O. macropus* from *O. microphthalmus*. Nevertheless, two specimens in the collections of the British Museum have been misidentified as *O. macropus*: BM 1860.6.2.86, a female of *O. microphthalmus* from Penang, identified by Robson (1929) as *O. macropus*; and BM 1847.5.13.8, a female of *O. microphthalmus* from Java with an unpublished identification label '*O. macropus* var.' In addition, two specimens now in the Raffles Museum were identified as

*O. macropus* (? var.) by Robson (1932): both are juveniles with small eyes and other characters of *O. microphthalmus*.

The distinction between *C. indicus* and *O. macropus* would seem, on first consideration, to be unmistakable. However, in practice, there are difficulties. The water pores, characteristic of the genus *Cistopus*, are often difficult or even impossible to see on preserved specimens. When visible, as minute openings on the oral face of the web at the level of the third pair of suckers, identification is certain. But an apparent absence of water pores, and the thin-walled pouches with which they communicate, is not decisive, especially in badly preserved and contracted specimens. Other characters must be explored. In adult males the ligula is minute but, unfortunately, this character can, and seemingly has been mistaken for arm-tip regeneration after mutilation (see below). The ligula of *O. macropus* is well developed and characteristic, though it may be relatively small in immature males. In well-preserved specimens the spermatophores should also be examined: in *C. indicus* the horn is coiled, in *O. macropus* it is not. Males of *C. indicus* sometimes have abruptly enlarged suckers on the first and second arms, although this is not always true; males of *O. macropus* have large suckers on these arms, but not the abruptly enlarged special suckers that are so often present in other species. When these characters are taken together, it is clear that males of *C. indicus* can be identified with a high degree of certainty. The problem is more difficult with females and juveniles in which, if water pores cannot be seen, one must depend on general features and the simple form of the radula.

The above account is based, in part, on the re-examination of 8 specimens in the British Museum and 8 in the Raffles Museum. Some notes regarding these specimens follow:

#### *British Museum*

BM 1927.11.19.1. A male from 'India', described and identified as *C. indicus* by Robson (1929).

BM 1927.11.19.2. A male from 'China', similarly identified by Robson (1929).

BM 1897.9.28.17. A male from North Borneo, collected by D. Cator and labelled '*Octopus* sp.' Robson (1929) listed this specimen under *O. macropus* (? loc.) and refers to it by his own number (C 343) on p. 105 in connection with the supposed peculiarities of the hectocotylus in oriental specimens of *O. macropus*. Water pores can be seen and the ligula is minute, permitting decisive identification as *C. indicus*.

BM 1947.4.16.3-4. A male and female from the Fish Market, Singapore, 12-14.VIII.1929. These two specimens were retained from a group of eight, of which six were returned to the Raffles Museum. Water pores can be seen in both specimens and the male has a minute ligula, characteristic of *C. indicus*.

BM 1928.3.18.2-3. Correctly labelled, presumably by Robson, as *Cistopus indicus*, but not listed in his monograph or in subsequent publications. There are two specimens, a male and a female. The label reads: 'Siam, presented by H.R.H. the Prince of Chumpon, June, 1920, C 256-257.' Water pores are visible in both specimens and the identification is certain.

BM 1829.4.1.1. Identified by Robson (1929) as *Octopus macropus* and listed by him as BM 1928.4.1.1. A gravid female with small eggs, from Selangor. The old label reads: 'Original colours dark and whitish, av. size and wt., 3 ft long and 8 lbs wt' and 'Intern. Fisheries Exhibition.' This large specimen has a mantle length of 109 mm; the second left arm is longest, but the first right arm is regenerating. However, unpublished observations on *C. indicus* show that the first and second arms may be subequal, so this is no stumbling block for identification. Unfortunately, in spite of the most careful inspection, it was impossible to find water pores on the oral face of the web. Time did not permit an examination of the radula but, nevertheless, there seems little doubt that this specimen should be re-identified as *Cistopus indicus*. It was evidently sent to London as an example of the local food species of octopus which, as we know from Singapore, is *C. indicus* not *O. macropus*.

#### Raffles Museum

Fish Market, Singapore, 14.VIII.1929. one female incorrectly identified by Robson (1932) as *O. macropus*. Water pores are visible and identification with *C. indicus* is certain.

Fish Market, Singapore, 12-14.VIII.1929. Five specimens that were incorrectly identified by Robson (1932) as *O. macropus* var. Of these, two are referable to *O. microphthalmus*. The remaining three, two females and a male, are undoubtedly *C. indicus*. Water pores can be seen, with difficulty, and the male has a minute ligula. The horn of the well-preserved spermatophores is coiled. This association of characters precludes identification with *O. macropus*. The male, however, lacks abruptly enlarged suckers, described by Robson (1929) in other males of *C. indicus*.

Fish Market, Singapore, 29.I.1934. An immature male with water pores that can only be seen with difficulty. Undoubtedly a young *C. indicus*.

Fish Market, Singapore, 8.II.1934. A male with the characteristic minute ligula of *C. indicus*. Water pores could only be seen with difficulty, and abruptly enlarged suckers are lacking. The spermatophores are in poor condition and were removed in broken fragments; the character of the horn was not determined.

Fish Market, Singapore, 21.I.1935. A young female of *C. indicus* in which the water pores are clearly visible.

Siglap, Singapore, 9.V.1935. This is probably an immature female of *C. indicus*, although water pores could not be seen and time did not permit an examination of the radula. The eyes are of normal size and the sucker-diameter index is 11% of the mantle length (30 mm). It cannot be referred to *O. microphthalmus* and identification with *O. macropus* is unlikely since there are no valid records of this species in the Singapore area.

As stated above, no specimens of *O. macropus* have been correctly and unequivocally identified from Singapore harbour and adjacent waters. Among more than a hundred specimens of *C. indicus* from Singapore, examined but not yet described, the author has never encountered *O. macropus*. The only specimens occurring in these collections that could, on superficial inspection, have been confused with

*C. indicus* proved to be referable to *O. microphthalmus*. Two specimens identified by Robson (1929) as *O. macropus* proved on re-examination to be misnamed: *O. microphthalmus* from Penang, and *C. indicus* from Selangor, as reported in a preceding paragraph.

Nevertheless, *O. macropus* is a species of world-wide distribution that undoubtedly occurs in the Indian Ocean, although well authenticated records are scarce. Robson (1929) lists specimens in Paris and Berlin, including the presumed type of '*O. lehenaultii*' from Pondicherry, that should be re-examined. Adam (1939) examined specimens of '*O. macropus*' in the Indian Museum described previously by Massy (1916), and also some unidentified specimens. One male from 'Indian Seas' (M 603/1) has a rather small hectocotylus (ligula-length index 4.8); but this organ is not rudimentary and presumably the animal was immature. It is almost certainly not referable to *C. indicus*. A poorly preserved specimen from the Persian Gulf (M 8220/1) is also probably referable to *O. macropus*. The same is not true of two males from the Hooghly River in which the hectocotylus is said to be mutilated. These specimens had abruptly enlarged suckers, as recorded by Robson (1929) for *C. indicus* and of doubtful occurrence in *O. macropus*. It is likely that these males, with 'mutilated' hectocotylus, and the female that accompanied them, should be referred to *C. indicus*. Another female, from the Gulf of Siam (M 10309/1) should probably be reidentified as *C. indicus*. Adam (1939) described and figured the radula and notes that it is 'characterized by the absence of entocones in most of the rhachidian teeth'. This feature precludes identification with *O. macropus* in which Adam (1941, 1959) has emphasized the highly complicated seriation of the radula.

The wider distribution of *O. macropus*, in adjacent seas, is well documented. There are a number of records from the Red Sea and Adam (1959) has described a male which has a rather short ligula although identification, from the character of the radula, appears certain. *O. macropus* is not uncommon in Indonesian waters. Adam (1954), in his Siboga Report, records numerous specimens. Ten of these are males with a well developed hectocotylus.

Four species of doubtful status, in which the body is slender and the first arms longest, were noted in the introduction. All occur in the Indian Ocean, or in adjacent Indonesian waters. Specimens which Adam (1934, 1938, 1939) tentatively referred to *O. teuthoides*, *O. taprobanensis* and *O. fusiformis* were shown to have entocones on the rhachidian tooth but the radula has not been described in the types of these species. An examination, without dissection, of the types of *O. taprobanensis* and *O. teuthoides*, which are in the British Museum, failed to reveal the presence of water pores and confusion with *C. indicus*, although not excluded, seems unlikely. Both appear to be juvenile females. The type of *O. fusiformis* is a male that was redescribed by Robson (1929); it has a minute ligula and the possibility that it is referable to *C. indicus* was discussed by Massy (1916). *O. machikii*, only known from the type specimen, a female from Amboina, remains enigmatical.

Despite uncertainties of identification, reviewed above, it is evident that *C. indicus* occurs widely in Indo-Malayan and adjacent seas. Robson (1929) identified a specimen from 'China', and the presumed type is from the Celebes. *C. indicus* undoubtedly occurs in the Gulf of Siam: in addition to the specimens identified by Robson (BM 1928.3.18.2-3), noted above, the author has identified five undescribed specimens on loan from the Fisheries Department in Bangkok, from Phuket and the mouth of the Chaopha Menam River. At present we do not know the extent to which this species may occur in the western part of the Indian Ocean,

nor its southern limits. Robson (1929) records a male from Bombay which he identified (M.H.N., Paris) but specimens from South Africa and Mozambique, which he reports from the literature, require confirmation.

In conclusion, the author hopes that the publication of this brief report will stimulate further research by resident scientists in the Indo-Malayan area who have access to living and/or well preserved specimens. As at Singapore, profitable studies can be made in local fisheries and fish markets, a meaningful area of research. Some taxonomic problems can only be clarified by the detailed re-examination of museum specimens, but interest, at this time, centers on zoogeographical and ecological investigations. It is possible that *O. macropus* is not an inshore species like *C. indicus*, but an inhabitant of more open waters. Robson (1929) cites Jatta, and others, to the effect that in the Mediterranean *O. macropus* prefers a rocky bottom, in contrast to *O. vulgaris*. However, in Bermuda *O. macropus* is known as the 'grass scuttle' and *O. vulgaris* as the 'rock scuttle'; such information, from local fishermen, can be most valuable. The large size of the eggs in *O. microphthalmus*, and the reduced mantle aperture, strongly suggest that it is a bottom living form, and perhaps an inshore species, in which there is no planktonic larval stage (cf. the Californian sibling species, *O. bimaculatus* and *O. bimaculoides*, which differ primarily in egg size with implicit ecological differences, Pickford and McConnaughey, 1949). Larval stages, if present, should be described from newly hatched eggs of *C. indicus* and *O. microphthalmus*, and a careful examination of juveniles of both species would permit their separation from each other and, presumably, from the 'alderii' stage of *O. macropus*. The status of enigmatical juveniles assigned to *O. taprobanensis*, *O. teuthoides*, *O. fusiformis* and *O. machikii* can only be resolved along these lines. In addition, large collections should be made from restricted localities. One of the troubles in octopodan taxonomy has been that too many species have been described on single specimens, or on a few from widely separated localities.

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