CMFRI
bulletin 44
Part One

JUNE 1989

# NATIONAL SYMPOSIUM ON RESEARCH AND DEVELOPMENT IN MARINE FISHERIES

## MANDAPAM CAMP
**16-18 September 1987**

Papers Presented
Sessions I & II

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
(Indian Council of Agricultural Research)
P. B. No. 2704, E. R. G. Road, Cochin-682 031, India

Central Marine Fisheries Research Institute
40
YEARS
1947-1987

# PROBLEMS OF IDENTIFICATION AMONG SPECIES OF *SARDINELLA*

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## ABSTRACT

In spite of several recent studies, confusion still surrounds on the identification of few Indian clupeoids such as *Sardinella, Ilisha* and *Thryssa* because of their morphological similarity between species, which has severely restricted the useful biological studies (Babu Rao, 1962; Whitehead, 1973; Ramaiyan and Whitehead, 1975; and Wongratana, 1983).

Of all the clupeids, the identification of the species of *Sardinella* by various authors based on meristic and morphometric characters is often confusing. The identity of *S. longiceps, S clupeoids, S. feiogaster, S. sirm* based on few meristic and morphometric characters is relatively easy however, the same characters are not satisfactory for *S. albelia, S. brachysoma, S. dayi, S. fimbriata, S. gibbose, S. melenura* and *S. sindensis*.

The present study demonstrating the unsuitability of meristic and morphometric characters for the identification of the species of *Sardinella* cautions the possibility of mixed material in future biological investigations on *Sardinella*.

## INTRODUCTION

Clupeoid fishes particularly sardines, herrings and shads although comparatively smaller in size, occur in large shoals contributing to important fisheries of the world such as the British herrings, pilchards, Peruvian anchoveta, Pacific sardines and lesser sardines and Indian oil sardine to Indian fisheries. Knowledge on the systematics, fishery and biology of the clupeoid resources is an important prerequisite for their proper understanding and rational exploitation. In India, the clupeoid fishes including the lesser sardines in general and particularly the oil sardine *Sardinella longiceps* contribute much to Indian pelagic fisheries.

In spite of several recent studies (wongratana, 1983; Talwar and Kacker, 1984 and Whitehead, 1985) confusion still surrounds on the identification of species of Indian clupeoid fishes such as *Sardinella ilisha* and *Thryssa*, because of their morphological similarity between species which has severely restricted the useful biological investigations.

The identification of the species of *Sardinella* by various authors, based on many characters is often conflicting and totally confusing. Hence, the present paper, while demonstrating the unsuitability of the maristic and morphometric characters for the identification of *S. gibbosa, S fimbriata, S. brachysoma, S. sindensis, S. albella* based on material collected from parangipettai, suggests means to overcome this difficulty.

## MATERIAL AND METHODS

The material for the present study consisting of specimens of oil sardine (*Sardinella longiceps*) and lesser sardines (*S. dayi, S. albella, S. brachysoma, S. fimbriata, S. sindensis, S gibbosa* and *S. melanura)* were collected from parangipettai fish landing centre. The specimens were obtained thrice a week from the commercial catches operated by gillnets for a period of 5 months from April to August 1986. Only standard morphometric measurements (total length, standard length, head length and body depth) and meristic counts (lower gill rakers on first arm and abdominal scutes) were made on all the specimens obtained. The size range of the specimen varied from 60 mm-135 mm in S.L. The morphometric measurement were made of the left side of the specimen.

TABLE - 1.

*Ranges of morphometric and meristics of various species of* Sardinella *as recorded by various authors.*

| Name of the species | Authors Name | Number of Gill rakers on lower limb of first gill arch. | Number of belly scutes | Depth of body (% of S. L.) |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| 1. *Sardinella albella* | Whitehead and Wongratana (1983) | 41-68 | 30-32 | 25-40 |
| | Talwar and Kacher (1984) | 40-67 | 31-32 | 24-39 |
| | Whitehead (1985) | 41-68 | 29-33 | 25-40 |
| | Present Study | 44-61 | 29-33 | 25-36 |
| 2. *Sardinella brachysoma* | Whitehead and Wongratana (1983) | — | — | — |
| | Talwar and Kacker (1984) | 49-65 | 29-32 | 28-40 |
| | Whitehead (1985) | 48-67 | 29-32 | 30-39 |
| | Present study | 50-65 | 29-32 | 30-38 |
| 3. *Sardinella dayi* | Whitehead and Wongratana (1983) | 88-132 | 31-32 | 34-38 |
| | Talwar and Kacker (1984) | 80-132 | 31-32 | 34-38 |
| | Whitehead (1985) | 88-126 | 30-32 | — |
| | Present Study | — | — | — |
| 4. *Sardinella fimbriata* | Whitehead and Wongratana (1983) | 54-89 | 29-32 | 25-35 |
| | Talwar and Kacker (1984) | 53-82 | 29-32 | 25-35 |
| | Whitehead (1985) | 54-82 | 29-33 | 25-34 |
| | Present Study | 56-82 | 29-32 | 26-34 |
| 5. *Sardinella gibbosa* | Whitehead and Wongratana (1983) | 40-68 | 32-34 | 22-32 |
| | Talwar and Kacker (1984) | 38-65 | 31-35 | 22-31 |
| | Whitehead (1985) | 45-59 | 32-34 | 24-30 |
| | Present Study | 40-64 | 31-34 | 24-31 |
| 6. *Sardinella melanura* | Whitehead and Wongratana (1983) | 38-74 | 28-30 | 30 |
| | Talwar and Kacker (1984) | 38-74 | 28-30 | 25-30 |
| | Whitehead (1985) | 38-74 | 28-30 | 27-30 |
| | Present study | 39-72 | 28-30 | 27-30 |
| 7. *Sardinella sindensis* | Whitehead and Wongratana (1983) | 38-77 | 31-34 | 21-35 |
| | Talwar and Kacker (1984) | — | — | — |
| | Whitehead (1985) | 38-77 | 31-34 | 21-35 |
| | Present Study | 39-72 | 31-33 | 21-23 |
| 8. *Sardinella jussuie* | Whitehead and Wongratana (1983) | 88-101 | 30-34 | 28-37 |
| | Talwar and Kacker (1984) | — | — | — |
| | Whitehead (1985) | 88-126 | 31-32 | 28-37 |
| | Present Study | — | — | — |

## OBSERVATION AND DISCUSSION

The ranges of the morphometric and meristic data of the Sardines studied presently are provided in Table 1 along with the ranges observed by earlier authors. The objective of the present study is to highlight the unsuitability of the morphometric and meristic data alone for the proper identification of the species of *Sardinella* because of their morphological similarity between species. Of the species of *Sardinella* studied *S. longiceps* could easily be identified based on its longer head length (29-35% S. L.). Similarly, the jet black caudal fin tips distinguish *S. melanura* from all other species of *Sardinella*, however the identity of other species based on morphometric and meristic charactors is not always easy.

The meristic counts (abdominal scutes and lower gillrakers) of *S. dayi*, overlap with that of *jessieui*, though reported to occur along western coasts of India from Bombay to Srilanka though not recorded from parangipettai coast. However, Wongratana (1983) has separated the two species based on abdominal scutes, but his range of scute count overlap. Further, there is no siginificant variation either in body depth or in lower gillraker counts between these two species.

The abdominal scutes range from 29-34 in the various species of *Sardinella* (*S. albella*, 29-33, *S. brachysoma*, 29-32, *S. fimbriata*, 29-33, *S. gibbosa*, 31-35 and *S. sindensis* 31-34) as reported by wongratana (1983), Talwar and Kacker (1984) and Whitehead (1985), however the separation of species based on abdominal scutes is definitely not easy in routine analysis.

The variation in the range of lower gillrakers is often employed for the identification of the above mentioned species. The lower gillrakers range from 38-68 in various species of *Sardinella* excepting *S. dayi* (80-132) and *S. jussieni* (88-126), however, the range of lower gillrakers in *S. albella* (40-68), *S. brachysoma* (48-67) *S. fimbriata* (53-89), *S. gibbosa* (33-68), *S. sindensis* (38-77) overlap with each other indicating their unreliability in separating the species. Depth in percentage of standard length has often been employed for separating the species which is not always easy. Perhaps it could be successfully used to separate the species if the non-overlapping nature is established employing ontogenetic series of specimens as suggested by Whitehead (1985).

The nature of the pattern of the striae on scales has been attempted by earlier authors (Whitehead, 1985) to separate the morphologically similar species of *Sardinella*, however, due to lack of consistency in the pattern, this too can not be successfully employed for the separation of species. As far as the vertical striae on scales are concerned *S. brachysoma* is distinct in which the striae are continuous at the centre whereas in *S. albella*, *S. fimbriata* *S. gibbosa* and *S. sindensis* the striae pattern is almost exactly similar.

Because of the overlapping nature of the morphometric and meristic characters of sardines between species it is suggested that future investigations on the biology of any particular species of sardine should be carefully planned because of the possibility of mixed material. Thus the problem of identification of morphologically similar species such as sardines is very acute and this may perhaps be solved to some extend either by employing ontogenetic series of specimens of the species concerned as suggested by Whitehead (Per com.) or by developing suitable methods to rear the marine fish larvae as suggested by Kuronuma and Fukuso (1987).

## ACKNOWLEDGEMENT

The authors wish to thank Prof. V. K. Venugopalan, Director, C A S in Marine Biology, for providing the facilities. The first and second authors are grateful to the UGC for financial assistance.

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