



Rec. zool. Surv. India : 106(Part-2) : 67-78, 2006

DIVERSITY OF ROTIFERS OF TAMILNADU

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INTRODUCTION

Rotifers, commonly known as 'wheel animalcules' are one of the major constituents of freshwater zooplankton. These animals could be readily recognized by their small size (0.4 mm to 3.0 mm) and by the presence of ciliated wheel like rotating structure at the anterior end. They are regarded as one of the valuable indicator organisms in biological monitoring studies.

Though this group attracted the attention of scientists worldwide (Jennings, 1900; Yamamata, 1960; Sudzuki, 1964, 1967; Chengalnath and Fernando, 1973; Dumont and De Ridder, 1987; De Peggi, 1990; Sharma and Michael, 1980; Sharma, 1991; Dhanapathi, 2000), the studies on Indian Rotifera are scanty (Sharma, 1998). In Tamilnadu the studies are very limited when compared to other states of India. Edmondson and Hutchinson (1934) reported 8 species of rotifers belonging to 5 genera including *Keratella quadrata* (O.F. Muller) from Ootacamund, Nilgiris, forms the first report of rotifers from Tamilnadu. Subsequently Hauer (1937) recorded 3 species of 3 genera and a form of *Brachionus angularis* from Almati and Sholavaram lakes of the then Madras Presidency, now in Tamilnadu. This was followed by the report of Ahlstrom (1940) who has dealt with a new variety, *Keratella quadrata edmondsoni* from Ootacamund which was later, made as a new combination, *Keratella edmondsoni* (Nayar, 1965). Later Brehm (1951) described a species *Brachionus donneri* from Almati reservoirs of Madras and Donner (1953) referred to the collections of Brehm and described *Trichocerca (Diurella) ruttneri*. During the development of fishery ponds in Kodaikanal, Chacko (1951) recorded 5 species of rotifers, though the validity of those species is yet to be ascertained. The decade between 1961–1970 registered more works on taxonomy from Tamilnadu. Pasha (1961) reported the occurrence of 6 Lecanid rotifers from freshwater tanks and the Cooum river of Madras. Hutchinson (1964) resurrected *Filinia pejleri* from the figure reported earlier by Edmondson and Hutchinson (1934). Michael (1966) described a colonial rotifer, *Conochilus madurai*, while Wycliffe and Michael (1968) dealt with a new species, *Pseudoembata acutipoda*, an epizoic bdelloid from the gill chambers of *Caridina* sp. In addition Rajendran (1971)

described *Conochilus arboreus*, a new species from Madurai. Michael (1973) provided an important contribution by reporting 12 species of rotifers belonging to 4 genera and 4 families, along with the key to the genera, a treatise for Tamilnadu rotifer workers.

Sampath *et al.*, (1974) inventorised 45 species of rotifers under 32 genera from the Tamilnadu part of river Cauvery and studied their role as biological indicators. Kannan and Govindasamy (1991) reported 45 species of brackish water rotifers from Portonovo, Tamilnadu. Sampathkumar (1991) reported the distribution of 7 species of *Brachionus* rotifers from the fishponds and later (1992) he has reported 8 species of rotifers belonging to 7 genera and 7 families from the fishponds of Tuticorin. Patil (2000) dealt with 7 species of rotifers under 5 genera and 4 families from the Tamilnadu part of Nilgiri Biosphere Reserve. Daisy (2001) documented 93 species belonging to 16 families under 41 genera from Tirunelveli district and Sivakumar and Altaff (2001) inventorised 26 species under 13 genera from Dharmapuri district. Francis *et al.*, (2003) reported the rotifer diversity of fishponds manured with livestock wastes by recording 33 species belonging to 12 genera under 7 families. Besides, there are many studies on plankton ecology, which comprised part of rotifer taxonomy and ecology (Prabavathy and Sreenivasan, 1977; Raghunathan, 1985, 1990; Mary bai, 1993; Shahul Hameed *et al.*, 1995).

In the present study an inventory of the rotifers of Tamilnadu has been made and the list contains 158 species belonging to 53 genera under 22 families and 3 orders. The systematic list of the same has been given below.

SYSTEMATIC LIST

Phylum ROTIFERA

Subclass EUROTATORIA, Bartos

Superorder MONOGONONTA, Wesenberg-Lund

Order PLOIMIDA Delage

Family BRACHIONIDAE Wesenberg-Lund

1. *Anuraeopsis fissa* (Gosse)
2. *Brachionus angularis* (Gosse)
3. *Brachionus angularis angularis* Gosse
4. *Brachionus angularis bidens* Plate
5. *Brachionus angularis v. chelonis* Ahlstrom
6. *Brachionus bidentatus* Anderson
7. *Brachionus budapestinensis* (Daday)
8. *Brachionus calyciflorus* Pallas
9. *Brachionus calyciflorus f. amphiceros* Ehrenberg

10. *Brachionus calyciflorus f. borgerti* Apstein
11. *Brachionus calyciflorus f. dorcas* (Gosse)
12. *Brachionus calyciflorus v. anuaeriformes* Brehm
13. *Brachionus caudatus* Barrois & Daday
14. *Brachionus caudatus apsteini* (Fadeev)
15. *Brachionus caudatus personatus* (Ahlstrom)
16. *Brachionus caudatus v. aculeatus* Hauer
17. *Brachionus diversicornis* (Daday)
18. *Brachionus donneri* Brehm
19. *Brachionus falcatus* Zacharias
20. *Brachionus falcatus v. lyratus* Lemmerman
21. *Brachionus forficula* Wierzejski
22. *Brachionus forficula forficula* Wierzejski
23. *Brachionus havanensis* Rousselet
24. *Brachionus leydigi* (Cohn)
25. *Brachionus patulus* (O.F. Muller)
26. *Brachionus patulus patulus* (O.F. Muller)
27. *Brachionus plicatilis* Muller
28. *Brachionus quadridentatus* Hermann
29. *Brachionus quadridentatus v. rhenanus* Lauterborn
30. *Brachionus quadridentatus f. cluniorbicularis* (Skorikov)
31. *Brachionus quadridentatus v. brevispinus* (Ehrenberg)
32. *Brachionus rubens* Ehrenberg
33. *Brachionus urceolaris* O.F. Muller
34. *Brachionus urceolaris v. urwaensis* Sudzuki
35. *Keralella cochlearis* Gosse
36. *Keralella edmondsoni* Nayar
37. *Keralella procurva* (Thorpe)
38. *Keralella quadrata* (O.F. Muller)
39. *Keralella ticinensis* (Carlin)
40. *Keralella tropica* (Apstein)
41. *Keralella valga* (Ehrenberg)
42. *Notholca scaphula* (O.F. Muller)
43. *Platyas patulus* (O.F. Muller)
44. *Platyas quadricornis* Ehrenberg
45. *Wolga spinifera* (Skorikov)
46. *Lophocharis* sp.

Family EIPHANIDAE

47. *Epiphanes clavulata* (Ehrenberg)
48. *Epiphanes macroura* (Barrais and Daday)
49. *Epiphanes senta* (Muller)
50. *Epiphanes brachionus spinosus* (Rousselet)

Family MYTILINIDAE

51. *Mytilina ventralis* Ehrenberg
52. *Mytilina shape*

Family EUCHLANIDAE Bartos

53. *Diplois devieseeae* Gosse
54. *Dipleuchlanis propatula* Gosse
55. *Euchlanis alata* Voronkov
56. *Euchlanis dilatata* Ehrenberg
57. *Euchlanis oropha* Gosse
58. *Tripleuchlanis plicata* (Levander)
59. *Euchlanis* sp.
60. *Pseudoeuchlanis* sp.
61. *Dipleuchlanis* sp.
62. *Tripleuchlanis* sp.

Family TRICHOTRIDAE Bartos

63. *Trichotria tetractis* Ehrenberg
64. *Macrochaetus* sp.

Family COLURELLIDAE Bartos

65. *Colurella adriatica* (Ehrenberg)
66. *Colurella bicuspidata* (Ehrenberg)
67. *Colurella obstusa* (Gosse)
68. *Lepadella (Lepadella) acuminata* (Ehrenberg)
69. *Lepadella (Lepadella) minuta* (Montet)
70. *Lepadella (Lepadella) rhomboides* (Gosse)
71. *Lepadella (Lepadella) triptera* Ehrenberg
72. *Lepadella cristata* (Rousellet)
73. *Lepadella ovalis* (O.F. Muller)
74. *Lepadella patella* (O.F. Muller)
75. *Squatinella* sp.

Family LECANIDAE Bartos

76. *Lecane brauhmi* (Koste)
77. *Lecane depressa* (Bryce)
78. *Lecane elasma* (Harring & Myers)
79. *Lecane (Lecane) crepida* Harring
80. *Lecane (Lecane) curvicornis curvicornis* (Murray)
81. *Lecane (Lecane) flexilis* (Gosse)
82. *Lecane (Lecane) harnemanni* (Ehrenberg)
83. *Lecane (Lecane) inopinata* (Harring & Myers)
84. *Lecane (Lecane) leontine* (Turner)
85. *Lecane (Lecane) luna* (O.F. Muller)
86. *Lecane (Lecane) luna luna* (Muller)
87. *Lecane (Lecane) obtusa* (Murray)
88. *Lecane (Lecane) ohioensis* (Voigt)
89. *Lecane (Lecane) papuana* (Murray)
90. *Lecane (Lecane) simonneae* Segers
91. *Lecane (Lecane) sola* Hauer⁺
92. *Lecane (Lecane) ungulata* (Gosse)
93. *Lecane (Monostyla) bulla* (Gosse)
94. *Lecane (Monostyla) bulla f. diabolica* Hauer
95. *Lecane (Monostyla) closterocerca* (Schmarda)
96. *Lecane (Monostyla) conspicua* Hauer
97. *Lecane (Monostyla) decipiens* (Murray)
98. *Lecane (Monostyla) hamata* (Stokes)
99. *Lecane (Monostyla) lunaris crenata* (Harris)
100. *Lecane (Monostyla) quadridentata* (Ehrenberg)
101. *Lecane (Monostyla) stenroosi* (Meissner)
102. *Lecane (Monostyla) thalera* (Harring & Myers)
103. *Lecane (Monostyla) unguitata* (Fadeev)
104. *Cathypna amban*

Family PROALIDAE

105. *Wulfertia ornata* Donner

Family NOTOMMATIDAE Remane

106. *Cephalodella auriculata* (Muller)
107. *Cephalodelta gibba* Ehrenberg

108. *Eosphora anthadis* (Marring & Myers)
 109. *Eosphora najas* Ehrenberg
 110. *Itura aurita* (Ehrenberg)

Family DICRANOPHORIDAE

111. *Encentrum felis* (O.F. Muller)
 112. *Wierzajskiella racinae* (Wierzejski)

Family TRICHOCERCIDAE Remane

113. *Trichocerca flagellata* Hauer
 114. *Trichocerca porcellus* Gosse
 115. *Trichocerca (Diurella) ruttneri* Donner
 116. *Trichocerca (Diurella) similis* (Wierzejski)
 117. *Trichocerca (Trichocerca) rattus* (Muller)
 118. *Trichocerca (Trichocerca) tortuosa* (Myers)
 119. *Trichocerca (Trichocerca) tropis* Hauer⁺
 120. *Mastigocera* sp.

Family GASTROPODIDAE Remane

121. *Gastropus hyptopus* (Ehrenberg)

Family ASPLANCHNIDAE

122. *Asplanchna brighlwelli* Gosse
 123. *Asplanchna herricki* de Guerne
 124. *Asplanchna intermedia* Hudson
 125. *Asplanchna priodonta* (Gosse)
 126. *Asplanchna bhimavaramensis* Dhanapathi

Family SYNCHAETIDAE Remane

127. *Harringia rousselet* de Beauchamp
 128. *Ploesoma lenticulare* (Herrick)
 129. *Polyarthra multiappendiculata* (Arora)
 130. *Synchaeta pectinata* Ehrenberg
 131. *Polyarthra vulgaris* (Carlin)
 132. *Ploesoma* sp.
 133. *Polyarthra* sp.
 134. *Polyarthra* sp. (apterous form)

Order GNESIOTROCHA De Beauchamp

Suborder FLOSCULARIACEA Remane

Family CONOCHILIDAE Bartos

135. *Conochilus arboreus* Rajendran⁺
 136. *Conochilus madurai* Michael⁺
 137. *Conochilus* sp.
 138. *Conochiloides* sp.

Family HEXARTHRIDAE Bartos

139. *Hexarthra intermedia* (Wizneiwskei)
 140. *Hexarthra mira* (Hudson)

Family TESTUDINELLIDAE Bartos

141. *Testudinella parva* (Ternetz)
 142. *Testudinella patina* (Hermann)

Family FILINIDAE Bartos

143. *Filinia longiseta* (Ehrenberg)
 144. *Filinia opoliensis* (Zacharias)
 145. *Filinia pejleri* (Hutchinson)
 146. *Filinia terminalis* (Plate)

Family FLOSCULARIDAE

147. *Lacinularia* sp.

Family COLLOTHECIDAE

148. *Collotheca ornata* (Ehrenberg)
 149. *Cupelopagis vorax* (Leidy)

Family TROCHOSPHERIDAE

150. *Horaella brehmi* (Donner)

Subclass BDELLOIDEA

Order BDELLOIDA

Family HABROTRACHIDAE

151. *Habrotracha* sp.

Family PHILODINIDAE

152. *Macrotrachela quadricornifera* (Milne)
153. *Philodina citrina* (Ehrenberg)
154. *Philodina roseola* (Ehrenberg)
155. *Pseudoembata acutipoda* Wycliffe & Michael⁺
156. *Rotaria citrinus* Weber
157. *Rotaria rotatoria* (Pallas)
158. *Rotifer tridentatus*

(⁺Endemic to Tamilnadu)

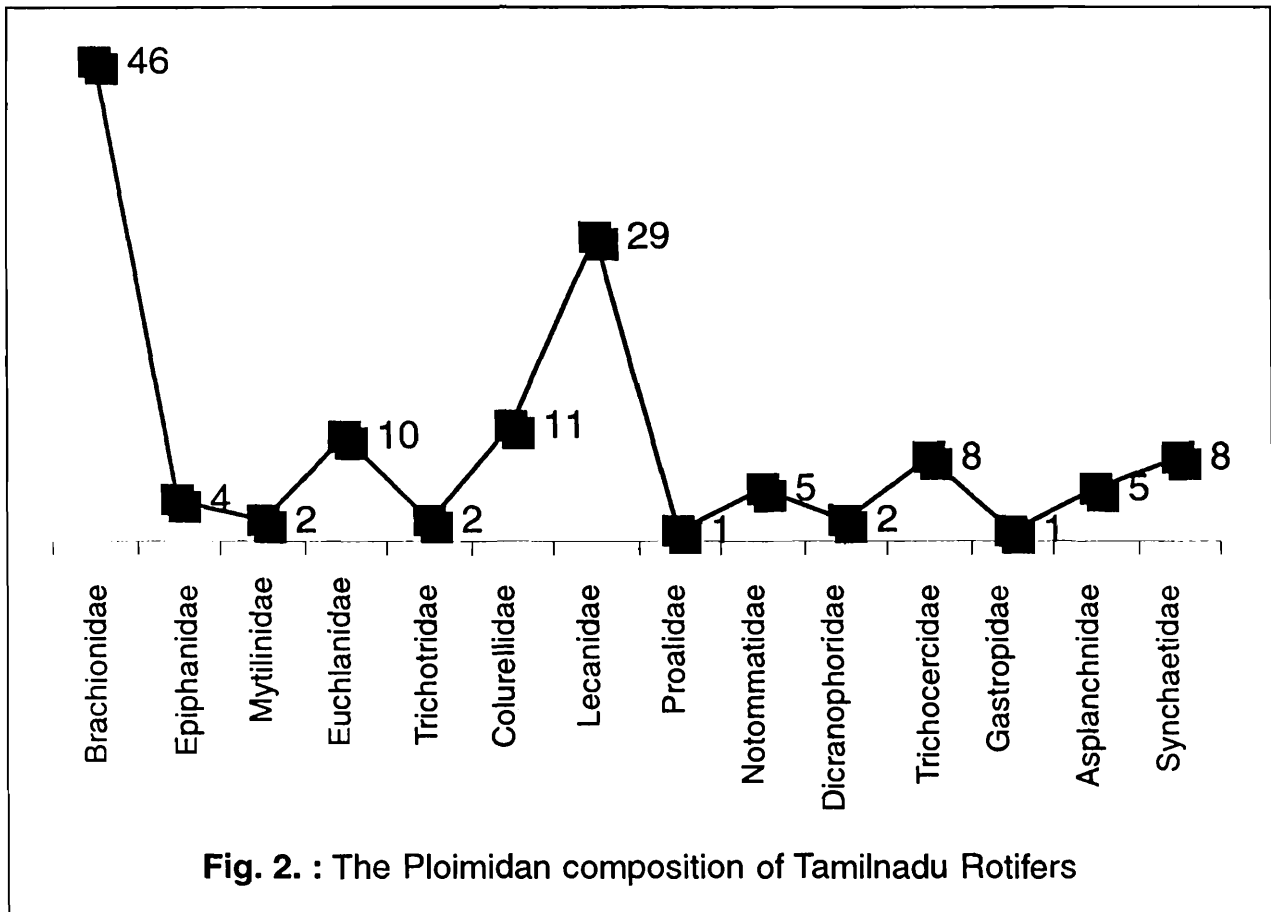
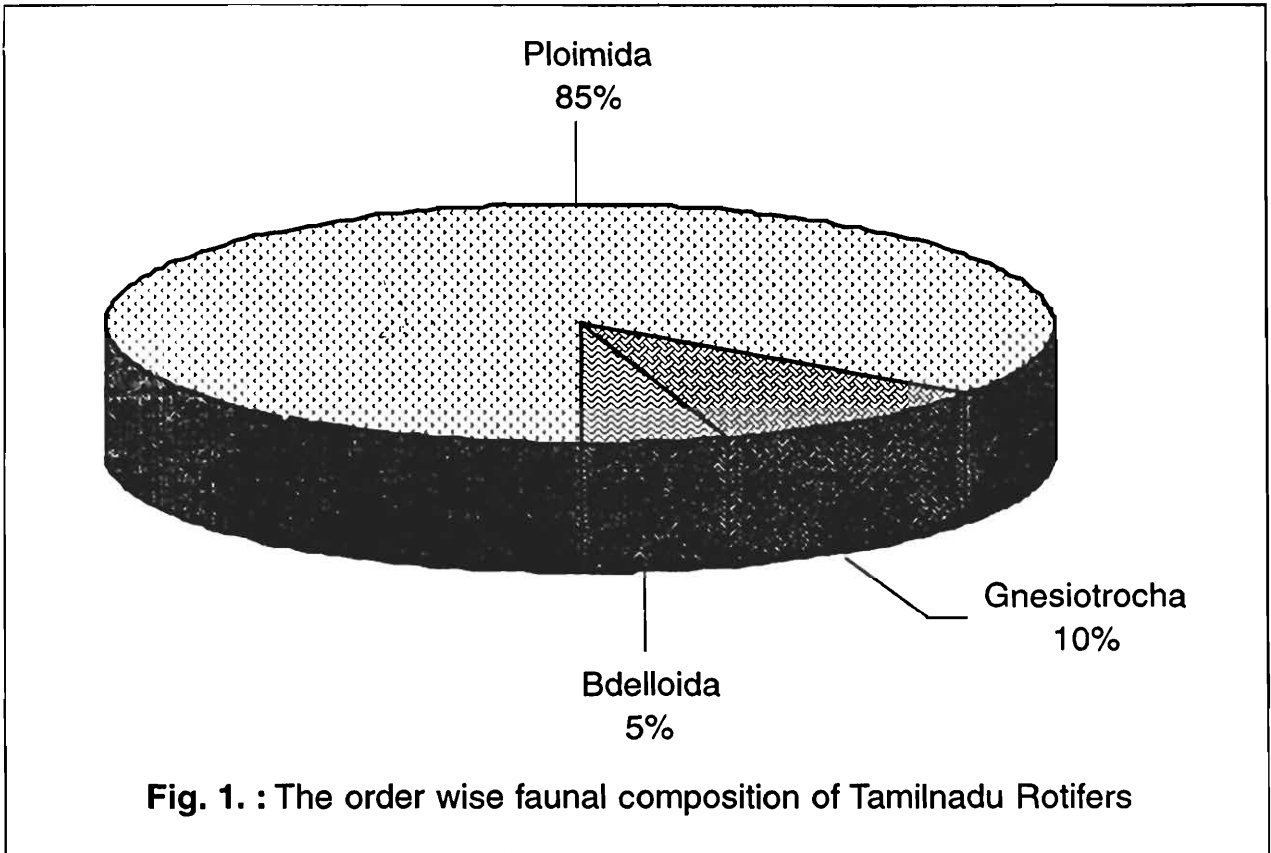
DISCUSSION

The present list, based on the publications, revealed 158 species of freshwater rotifers belonging to 53 genera and 23 families, which is 49% of the Indian rotifer fauna (325 species). Sharma (1983) has indicated the presence of 8 species of *Brachionus* in Tamilnadu but it is interesting to note that 16 species of *Brachionus* has been reported from Tamilnadu in this inventory. The genus *Brachionus* is entirely absent in arctic regions (Pejler, 1977), whereas it is significantly increased in equatorial and tropical regions. This concept correlates well with the fauna of Tamilnadu rotifers. It is also interesting to note that *B. donneri*, which is a cosmopolitan species, has not been recorded from Tamilnadu after the first report of Brehm (1951).

The representation of the major taxa in Tamilnadu is in the following order : *Brachionus* (33), *Lecane* (28), *Keratella*, *Lepadella* and *Trichocerca* (7 each), *Asplanchna* (5 each), *Epiphanes*, *Euchlanis*, *Polyarthra*, *Filinia* (4 each), *Colurella* and *Conochilus* (3 each). The following genera are represented by 2 species each : *Platyas*, *Dipleuchlanis*, *Tripleuchlanis*, *Cephalodella*, *Eosphora*, *Ploesoma*, *Hexarthra*, *Testudinella*, *Philodina*, *Rotaria* and the rest of the genera are one each. The order wise faunal composition of the Tamilnadu rotifers is given in fig. 1 and the genera wise representation of the Ploimidan fauna is given in fig. 2.

The study reveals that the Monogonont taxa of Tamilnadu are dominant (150 species under 43 genera) when compared to the Digonont taxa (8 species belonging to 6 genera). This pattern corresponds well with the species diversity of Indian rotifer fauna (296 species of Monogonont taxa and 29 species of Digonont taxa). The limited diversity of Digonont taxa does not mean their absence in Tamilnadu waters but inadequate analysis of the collections. The species richness of *Brachionus* and *Lecane* is attributed to the general tropical character. 5% (5 species) of the Tamilnadu rotifers are pantropical, which is 16% of the Indian pantropic taxa (32 species).

Species recorded from Tamilnadu can be ecologically categorized into many types such as, warm stenothermal, viz., *Brachionus falcatus*, *Brachionus forficula*, *Keratella tropica*, *Trichocerca flagellata*; Eurythermal, viz., *Brachionus angularis*, *Brachionus calyciflorus*, *Brachionus rubens*,



Lecane hamata, *Polyarthra vulgaris* and *Testudinella patina*. The Temperate water species are *Brachionus diversicornis*, *Brachionus quadridentatus* and *Trichocerca similis* and the acidophilic species is *Lepadella triptera*. *Brachionus plicatilis* and *Brachionus urceolaris* are the mixohaline species and *Brachionus angularis*, *Brachionus caudatus*, *Brachionus rubens*, *Brachionus calyciflorus*, *Brachionus falcatus*, *Keratella tropica*, *Asplanchna brightwelli*, *Polyarthra vulgaris* and *Filinia longiseta* are representing the alkaline species. Most of the species represented in the genus *Brachionus* are bio-indicators.

The cosmopolitan species recorded are *B. angularis*, *B. calyciflorus*, *B. caudatus* and *B. quadridentata*. The species indicating the eutrophic tendencies are *B. angularis*, *B. calyciflorus* and *B. rubens* and the pollution indicator is *B. plicatilis*.

The current knowledge of Tamilnadu rotifer is yet incomplete, as revealed by the fauna of Gnesiotrocha and Bdelloida, which may be due to the inadequate analysis of collections. Most of the studies are confined to Madurai, Tiruchi, Tirunelveli and Cuddalore (Portonovo) districts and no such detailed studies are available from other districts especially from the northern districts of Tamilnadu, which may enhance the number of rotifers reported from this state. The proper collections and the identification may enrich the rotifer fauna of Tamilnadu over 250 species.

ACKNOWLEDGMENTS

The authors are thankful to the Director, Zoological Survey of India, Kolkata and to the Officer-in-charge, Southern Regional Station, Zoological Survey of India, Chennai for their help and encouragement. We are also thankful to Dr. (Ms) Rosalind Daisy Rani for providing literatures related to this work.

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