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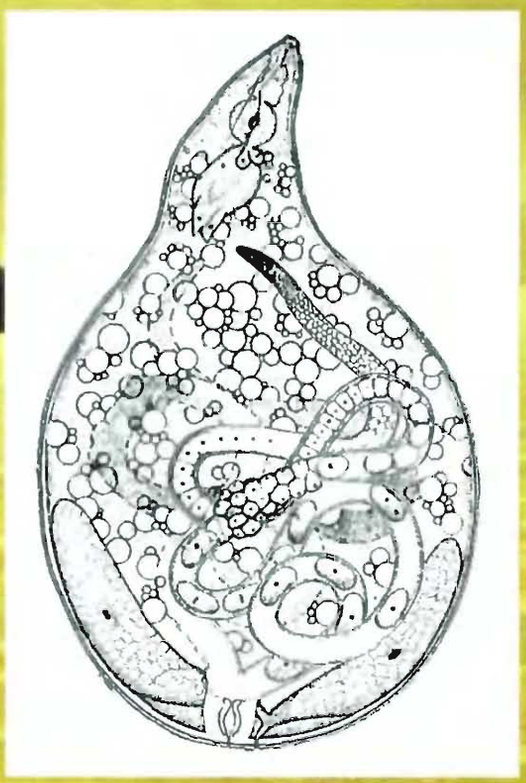

Padma Bohra
Razia Sultana

ZOOLOGICAL SURVEY OF INDIA

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RECORDS OF THE ZOOLOGICAL SURVEY OF INDIA

Nematodes of Thar Desert, Rajasthan

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PREFACE

The Desert Regional Centre has been recognized as one of the centre of All India Coordinated Project on Nematode Taxonomy (Capacity Building) at Jodhpur financed by MoEF, New Delhi. The main objective of the project is to improve training to research students at DRC, Jodhpur. Since 2000 significant work has been carried out under this project mainly on survey, distribution, identification and preparation of database of plant and soil nematodes of Rajasthan and Gujarat. The Present study provides an account of taxonomy of plant parasitic and free-living nematodes of Thar Desert area of Rajasthan. The random surveys were conducted in districts namely Barmer, Bikaner, Churu, Dholpur, Hanumangarh, Jaisalmer, Jalore, Jhunjhunu, Jodhpur, Pali, SriGanganagar and Sikar (See Map). Soil samples were collected during these surveys with all the relevant information regarding host, locality etc. brought to laboratory and were processed.

The present book provides the distribution of terrestrial nematode from the Thar desrt of Rajasthan. The first chapter gives a detail account of methodology used to extract soil nematodes for taxonomical study. All other chapters provide the diagnostic characters of different orders, suborders, families and subfamilies with their keys according to the systematic of nematodes species reported from Thar Desert of Rajasthan. From the taxonomical point of view, line diagram of anterior end (Fig. 1) and different type of female and male reproductive organs (Fig. 2) of nematodes of each suborederes are provided. Few habitats photograph have also been enclosed in the end of the book.

Padma Bohra

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INTRODUCTION

The nematodes are the most speciose phylum after the arthropods, they occur in nearly every habitat including as parasites in all sorts of plants and animals. The species *Turbatrix aceti* can live even in old vinegar. However, the nematodes have gone unnoticed because of their concealed habitats, smaller body size, difficulties in their identification and lack of experts.

In soil, the nematodes dominate in numbers as well as in species over all other soil inhabiting animals. According to their feeding habits, several groups of nematodes inhabit soil such as plant parasitic nematodes, bacterivores, fungivores, predaceous and ominivores. Tylenchids constitute economically most the important group of plant parasitic nematodes. The latter threaten the agricultural crops throughout the world, particularly in the tropics and subtropics. The degree of damage is influenced by the crops, nematode species and level of infestation. The nematode symptoms may be observed on shoots and / or roots of plants. Dorylaims occur more frequently in soil. They are somewhat larger in size and show almost all types of feeding habits. Mononchids are robust predaceous nematodes. Rhabditids, Monhysterids, Araeolaimids, Chromadorids and Enoplids are smaller in size. They inhabit moist soil and show microphagous nature.

Nematodes are, by nature, aquatic organisms. It is estimated that about 50% of nematode species inhabit marine environments, although many of these have yet to be described and characterized. The remainder of the species inhabit soil and fresh water. In soil, their aquatic requirements are satisfied by inhabiting the water films around soil particles. Parasitic nematodes are biologically active when bathed in moisture films supplied by water in the tissue or body fluids of the host.

NEMATODES

Nematodes are pseudocoelomate, bilaterally symmetrical having appendageless and unsegmented body, generally cylindrical in shape with defined tail, but females in some groups may become swollen pouch-like, lemon or pear or kidney- shaped. They are characterized by having four longitudinal hypo-dermal chords and a strong protective cuticle and hypodermis maintaining a high turgor pressure. Sense organs are including lip sensilla and somatic sensilla. In several groups, numerous additional setae may be found. Amphids are bilaterally symmetrical structures and can be spiral, circular or cyathiform in fresh water forms demonstrating great taxonomic value. The stoma of a nematode is often referred to as the mouth cavity, buccal capsule, buccal cavity or stoma. The buccal cavity or stoma shows

great diversity in form and structure, reflecting different feeding habits of these nematodes. The pharynx is accordingly modified and may be cylindrical or with one or two muscular expansion/s. The intestine is usually a simple straight tube not dissimilar to their terrestrial counterparts and is generally taxonomically unimportant. The pseudocoelomic fluid balances the absence of circulatory and respiratory systems. The excretory system is primitive, made of renette cells or tubular excretory canals while reproductive system represents tubular gonads with gonoducts. Sexes are usually separate and females generally oviparous or ovoviviparous. Female reproductive system composed of one or two ovaries, oviduct and uterus. The male nematodes may posses one or two testes. Taxonomically important organs in male nematodes are cuticularised spicules, gubernaculum, number and the arrangement of genital papillae. Tail shape is also a taxonomic character.

CLASSIFICATION

Order TYLENCHIDA Thorne, 1949

Suborder TYLENCHINA CHITWOOD IN CHITWOOD AND CHITWOOD, 1950

Superfamily TYLENCHOIDEA ÖRLEY, 1880 (CHITWOOD IN CHITWOOD, 1937)

Family TYLENCHIDAE ÖRLEY, 1880

Subfamily TYLENCHINAE ÖRLEY, 1880

1. *Filenchus filifornis* (Brzeski, 1963) Lownsbery and Lownsbery, 1985
2. *Tylenchus madarpurensis* Sultan et al, 1991

Subfamily BOLEODORINAE KHAN, 1964

3. *Basiria berylla* (Khan and Khan, 1975) Bajaj and Bhatti, 1979
4. *Boleodorus brevistylus* (Khera, 1970) Ebsary, 1991

Subfamily DUOSULCIINAE SIDDIQI, 1979

5. *Ottolenchus equisetus* (Husain and Khan, 1967) Wu, 1970

Infraorder ANGUINATA

Superfamily ANGUINOIDEA NICOLL, 1935 (1926)

Family ANGUINIDAE NICOLL, 1935 (1926)

Subfamily ANGUININAE NICOLL, 1935 (1926)

6. *Ditylenchus triformis* Hirschmann and Sasser, 1955

Suborder HOPLOLAIMINA CHIZHOV AND BEREZINA, 1988

Superfamily HOPLOLAIMOIDEA FILIPJEV, 1934 (PARAMONOV, 1967)

Family HOPLOLAIMIDAE FILIPJEV, 1934 (WIESER, 1953)

Subfamily HOPLOLAIMINAE FILIPJEV, 1934

7. *Hoplolaimus indicus* Sher, 1963

Subfamily ROTYLENCHOIDINAE WHITEHEAD, 1958

8. *Helicotylenchus abunaamai* Siddiqi, 1972
9. *Helicotylenchus crenacauda* Sher, 1966
10. *Helicotylenchus curvatus* Roman, 1965
11. *Helicotylenchus digitatus* Siddiqi and Husain, 1964
12. *Helicotylenchus digonicus* Perry in Perry, Darling and Thorne, 1959
13. *Helicotylenchus dihystera* (Cobb, 1893) Sher, 1961
14. *Helicotylenchus dihysteroides* Siddiqi, 1972
15. *Helicotylenchus exallus* Sher, 1966
16. *Helicotylenchus goodi* Tikyani, Khera and Bhatnagar, 1969
17. *Helicotylenchus indicus* Siddiqi and Husain, 1964
18. *Helicotylenchus martini* Sher, 1960
19. *Helicotylenchus microdorus* Prasad, Khan and Chawla, 1965
20. *Helicotylenchus multicinctus* (Cobb, 1893) Golden, 1956

Family ROTYLENCHULIDAE HUSAIN AND KHAN, 1967 (HUSAIN, 1976)

Subfamily ROTYLENCHULINAE HUSAIN AND KHAN, 1967

21. *Rotylenchulus reniformis* Linford and Oliveira, 1940

Family PRATYLENCHIDAE THORNE, 1949 (SIDDIQI, 1963)

Subfamily PRATYLENCHINAE THORNE, 1949

22. *Pratylenchus coffeae* (Zimmermann, 1898) Filipjev, Schuurmans and Stekhoven
23. *Pratylenchus goodeyi* Sher and Allen, 1953
24. *Pratylenchus mulchandi* Kumar and Khera, 1970
25. *Pratylenchus pseudopratensis* Seinhorst, 1968
26. *Pratylenchus subpenetrans* Taylor and Jenkins, 1957
27. *Pratylenchus thornei* Sher and Allen, 1953

Subfamily HIRSCHMANNIELLINAE FOTEDAR AND HANDOO, 1978

28. *Hirschmanniella oryzae* (van Brede de Hann, 1902) Luc and Goodey, 1964

Family MELOIDOGYNIDAE SKARBILOVICH, 1959 (WOUTS, 1973)

Subfamily MELOIDOGYNINAE SKARBILOVICH, 1959

29. *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949
30. *Meloidogyne javanica* (Treub, 1885) Chitwood, 1949

Family TELOTYLENCHIDAE SIDDIQI, 1960

Subfamily TELOTYLENCHINAE SIDDIQI, 1960

31. *Telotylenchus areolatus* Tikyani and Khera, 1970
32. *Telotylenchus indicus* Siddiqi, 1960
33. *Tylenchorhynchus mashhoodi* Siddiqi and Basir, 1959
34. *Bitylenchus goffarti* (Sturhan, 1966) Jairajpuri, 1982
35. *Neodolichorhynchus (M.) phaseoli* (Sethi and Swarup, 1968) Talavera and Tobar, 1997

Subfamily MERLINIINAE SIDDIQI, 1971

36. *Merlinius brevidens* (Allen, 1955) Siddiqi, 1970

Order APHELENCHIDA Siddiqi, 1980

Superfamily APHELENCHOIDEA FUCHS, 1937 (THORNE, 1949)

Family APHELENCHIDAE FUCHS, 1937 (THORNE, 1949)

37. *Aphelenchus avenae* Bastian, 1865

Order DORYLAIMIDA Pearse, 1936

Suborder DORYLAIMINA PEARSE, 1936

Superfamily DORYLAIMOIDEA DE MAN, 1876

Family DORYLAIMIDAE DE MAN, 1876

Subfamily DORYLAIMINAE DE MAN, 1876

38. *Dorylaimus murlii* Bohra and Sultana, 2008
39. *Dorylaimis stagnalis* Dujardin, 1835

Subfamily LAIMYDORINAE ANDRÁSSY, 1969

40. *Mesodorylaimus margeritus* Basson and Heyns, 1974
41. *Laimydorus baldus* Baqri and Jana, 1982
42. *Laimydorus kherai* Baqri, 1985
43. *Laimydorus serpentines* (Thorne and Swanger, 1936) Siddiqi, 1969

Subfamily THORNENEMATINAE ANDRASSY, 1969

44. *Sicaguttur sartum* Siddiqi, 1971
45. *Thornenema mauritianum* (Williams, 1959) Baqri and Jairajpuri, 1969
46. *Prothornenema capitatum* Baqri and Bohra, 2003

Family APORCELAIMIDAE HEYNS, 1965

Subfamily APORCELAIMINAE HEYNS, 1965

47. *Aporcelaimellus heynsi* Baqri and Jairajpuri, 1968
48. *Aporcelaimellus obscurus* (Thorne and Swanger, 1936) Heyns, 1965
49. *Tubixaba parva* Pretorius, Kruger and Heyns, 1987

Family QUDSINEMATIDAE JAIRAJPURI, 1965

Subfamily DISCOLAIMINAE SIDDIQI, 1969

50. *Discolaimus agricolus* Sauer and Annells, 1986
51. *Discolaimus major* Thorne, 1939
52. *Discolaimus paramajor* Coomans, 1966
53. *Discolaimus perplexans* Siddiqi, 1964
54. *Discolaimus silvicolus* Sauer and Annells, 1986
55. *Discolaimus similis* Thorne, 1939
56. *Discolaimus rotundicaudatus* Khan and Laha, 1982
57. *Discolaimus tenax* Siddiqi, 1965
58. *Discolaimus texanus* Cobb, 1913
59. *Discolaimium simplex* Siddiqi, 1965
60. *Discolaimium mucrobanum* (Loof, 1964) Andrássy, 1990
61. *Discolaimium dubium* Das, Khan and Loof, 1969
62. *Discolaimoides arcuicaudatus* (Furstenberg and Heyns, 1965) Das, Khan and Loof, 1969
63. *Discolaimoides bulbiferus* (Cobb, 1906) Heyns, 1963
64. *Discolaimoides symmetricus* Das, Khan and Loof, 1969
65. *Discolaimoides saptilamium* Khan and Laha, 1982
66. *Latocephalus conicaudatus* Baqri and Bohra, 2003
67. *Latocephalus gracile* Patil and Khan, 1982
68. *Latocephalus laetans* Siddiqi, 2003

69. *Latocephalus lotus* Siddiqi, 2003
70. *Latocephalus smithi* (Heyns, 1963) Patil and Khan, 1982

Subfamily QUDSIANEMATINAE JAIRAJPURI, 1965

71. *Ecumenicus monhystera* (De Man, 1880) Thorne, 197
72. *Eudorylaimus chauhani* (Baqri and Khera, 1975) Andrássy, 1986
73. *Labronema confuses* (Jana and Baqri, 1983) Andrássy, 1991
74. *Labronema chilemse* Andrássy, 1967
75. *Labronema vigor* Monterio, 1970
76. *Torumanawa shinensis* Bohra and Sultana, 2008

Subfamily LORDELLONEMATINAE SIDDIQI, 1969

77. *Moshajia cultristyla* Siddiqi, 1982
78. *Moshajia idiofora* Siddiqi, 1982

Family NORDIIDAE JAIRAJPURI AND A.H.SIDDIQI, 1964

Subfamily NORDIINAE SIDDIQI, 1969

79. *Kochinema caudatum* Baqri and Bohra, 2001
80. *Kochinema farodai* Baqri and Bohra, 2001

Superfamily ACTINOLAIMOIDEA THORNE, 1939

Family CARCHAROLAIMIDAE THORNE, 1967

Subfamily CARCHAROLAIMINAE THORNE, 1967

81. *Carcharolaimus masoodi* Jairajpuri, 1968

Family ACTINOLAIMIDAE THORNE, 1939

Subfamily NEOACTINOLAIMINAE THORNE, 1967

82. *Neoactinolaimus rajasthanenesis* Bohra and Sultana, 2008

Superfamily LONGIDOROIDEA THORNE, 1935

Family LONGIDORIDAE THORNE, 1935

Subfamily LONGIDORIDAE THORNE, 1935

83. *Longidorus elongatus* (de Man, 1876) Micoletzky, 1922
84. *Longidorus globulicauda* Dalmasso, 1969

85. *Paralongidorus citri* (Siddiqi, 1969) Siddiqi, Hooper and Khan, 1963
86. *Paralongidorus major* Verma, 1973
87. *Paralongidorus microlaimus* Siddiqi, 1964

Family XIPHINEMATIDAE DALMASSO, 1969

Subfamily XIPHINEMATINAE DALMASSO, 1969

88. *Xiphinema americanum* Cobb, 1913
89. *Xiphinema radicicola* Goodey, 1963
90. *Xiphinema basiri* Siddiqi, 1959
91. *Xiphinema insigne* Loos, 1949

Superfamily BELONDIROIDEA THORNE, 1939

Family BELONDIRIDAE THORNE, 1939

Subfamily BELONDIRINAE THORNE, 1939

92. *Belondira aquaticus* Ferris, Ferris and Goseco, 1983
93. *Belodira microdora* Ahmad, Dhanachand and Jairajpuri, 1982

Subfamily DORYLAIMELLINAE JAIRAJPURI, 1964

94. *Dorylaimellus (B.) discocephalus* Siddiqi, 1964
95. *Dorylaimellus directus* Heyns, 1963
96. *Dorylaimellus demani* Goodey, 1963
97. *Dorylaimellus indicus* Siddiqi, 1964
98. *Dorylaimellus (Mesodorylaimellus) deviatus* Baqri and Jairajpuri, 1969
99. *Dorylaimellus (Mesodorylaimellus) jacobi* Jairajpuri and Ahmad, 1969

Superfamily TYLENCHOLAIMOIDEA FILIPJEV, 1934

Family TYLENCHOLAIMIDAE FILIPJEV, 1934

100. *Tylencholaimus pusillus* Loof and Jairajpuri, 1968
101. *Tylencholaimus nanus* Thorne, 1939
102. *Tylencholaimus notrus* Jairajpuri and Ahmad, 1990
103. *Tylencholaimus minutus* Vinciguera, 1986
104. *Tylencholaimus annulatus* Baqri and Bohra, 2001
105. *Tylencholaimus gertii* Kurger, 1965
106. *Tylencholaimus innebus* Ahmad and Jairajpuri, 1980

107. *Tylencholaimus mongolicus* Andrássy, 1967
108. *Tylencholaimus proximus* Thorne, 1939

Family LEPTONCHIDAE THORNE, 1935
Subfamily LEPTONCHINAE THORNE, 1935

109. *Leptonchus granulosus* Cobb, 1920

Superfamily NYGOLAIMOIDEA THORNE, 1935
Family NYGOLAIMIDAE THORNE, 1935
Subfamily NYGOLAIMINAE THORNE, 1935

110. *Nygolaimus anneckei* Heyns, 1969
111. *Nygolaimus harishi* Ahmad and Jairajpuri, 1980
112. *Nygolaimus hyans* Thorne, 1974
113. *Nygolaimus shamimi* Bohra and Sultana, 2008
114. *Aquatides thornei* (Schneider, 1937) Ahmad and Jairajpuri, 1982
115. *Aquatides aquaticus* (Thorne, 1930) Thorne, 1930

Order TRIPLONCHIDA Cobb, 1920
Superfamily TRICHODOROIDEA THORNE, 1935 (SIDDIQI, 1974)
Family TRIPLAONCHIDAE THORNE, 1935 (SIDDIQI, 1961)

116. *Paratrichodorus (A.) minor* (Colbran, 1956) Siddiqi, 1974
117. *Paratrichodorus (A.) porosus* (Allen, 1957) Siddiqi, 1974

Order MONONCHIDA Jairajpuri, 1969
Superfamily MONONCHOIDEA CHITWOOD, 1937
Family MONONCHIDAE CHITWOOD, 1937
Subfamily MONONCHINAE CHITWOOD, 1937

118. *Mononchus aquaticus* Coetzee, 1968

Family MYLONCHULIDAE JAIRAJPURI, 1969
Subfamily MYLONCHULINAE JAIRAJPURI, 1969

119. *Mylonchulus amurus* Khan and Jairajpuri, 1979
120. *Mylonchulus hawaiiensis* (Cassidy, 1931) Andrássy, 1958
121. *Mylonchulus minor* (Cobb, 1893) Andrássy, 1958
122. *Mylonchulus lacustris* (N.A. Cobb in M. V. Cobb, 1915) Andrássy, 1958

Suborder BATHYODONTINA COOMANS AND LOOF, 1970

Superfamily BATHYODONTOIDEA CLARK, 1961

Family BATHYODONTIDAE CLARK, 1961

123. *Bathyodontus cylindricus* Fielding, 1950

Superfamily MONONCHULOIDEA DE CONINCK, 1965

Family MONONCHULIDAE DE CONINCK, 1965

124. *Oionchus obtusus* Cobb, 1913

Order RHABDITIDA Chitwood, 1933

Suborder RHABDITINA CHITWOOD, 1933

Superfamily RHABDITOIDEA ÖRLEY, 1880

Family RHABDITIDAE ÖRLEY, 1880

Subfamily PROTORHABDITINAE DOUGHERTY, 1955

125. *Protorhabditis tristis* (Hirschmann, 1952) Dougherty, 1955

Subfamily MESORHABDITINAE ANDRÁSSY, 1976

126. *Mesorhabditis miotki* (Sudhaus, 1978) Andrássy, 1983

127. *Mesorhabditis anisomorpha* (Sudhaus, 1978) Andrássy, 1983

128. *Distolabrellus veechi* Anderson, 1983

Subfamily DIPLOSCAPTERINAE MICOLETZKY, 1922

129. *Diploscapter cylindricus* Rahm, 1929

130. *Diploscapter coronatus* (Cobb, 1893) Cobb, 1913

Suborder CEPHALOBINA ANDRÁSSY, 1974

Superfamily CEPHALOBOIDEA FILIPJEV, 1934

Family CEPHALOBIDAE FILIPJEV, 1934

Subfamily CEPHALOBINAE FILIPJEV, 1934

131. *Cephalobus bodenheimeri* (Stainer, 1936) Andrássy, 1984

132. *Cephalobus cubaensis* Steiner, 1935

133. *Cephalobus litoralis* (Akhtar, 1962) Andrássy, 1984

134. *Cephalobus parvus* Thorne, 1937

135. *Cephalobus pinguimucronatus* Andrássy, 1968.

136. *Cephalobus quadrilineatus* Eroshenko, 1968
137. *Cephalobus quinilineatus* (Shavrov, 1968) Anderson and Hooper, 1970
138. *Eucephalobus hooperi* Marinari-Palmisano, 1967
139. *Heterocephalobus bisimilis* (Thorne, 1925) Andrássy, 1967

Subfamily ACROBELINAE THORNE, 1937

140. *Acrobeles complexus* Thorne, 1925
141. *Acrobeles cylindricus* Loof, 1964
142. *Acrobeles dimorphus* Heyns and Hogewind, 1969
143. *Acrobeles ensicaudatus* Thorne and Allen, 1965
144. *Acrobeles kotingotingus* Yeates, 1967
145. *Acrobeles marianne* (Andrássy, 1968) Andrássy, 1985
146. *Acrobeles oasiensis* Boström, 1985
147. *Acrobeles sheasbyi* Heyns and Hogewind, 1969
148. *Acrobeles timmi* Chaturvedi and Khera, 1979
149. *Acrobeles welwitschiae* (Rashid, Heyns and Coomans, 1990) Shahina and De Ley, 1997
150. *Acrobeloides enoplus* Steiner, 1938
151. *Acrobeloides tricornis* (Thorne, 1925) Thorne, 1937
152. *Cervidellus serricephalus* (Thorne, 1925) Thorne, 1937
153. *Chiloplacus jodhpurensis* Rathore and Nama, 1992
154. *Chiloplacus kralli* Bagaturija, 1973
155. *Chiloplacus magnus* Rashid and Heyns, 1990
156. *Chiloplacus obtusus* Baranovskaja and Haque, 1968
157. *Chiloplacus quadricarinatus* (Thorne, 1925) Thorne, 1937
158. *Chiloplacus scelerovaginatus* Sumenkova and Razzhivln, 1968
159. *Chiloplacus trilineatus* Steiner, 1940
160. *Stegellata georgica* Bagaturija, 1973
161. *Stegellata ophioglossa* Andrássy, 1967
162. *Zeldia acuta* Allen and Noffsinger, 1972
163. *Zeldia feria* Allan and Noffsinger, 1972
164. *Zeldia minor* Allen and Noffsinger, 1972
165. *Zeldia puntata* (Thorne, 1925) Thorne, 1937

Superfamily PANAGROLAIMOIDEA THORNE, 1937

Family PANAGROLAIMIDAE THORNE, 1937

Subfamily PANAGROLAIMINAE THORNE, 1937

166. *Panagrolaimus chaleographi* Fuchs, 1930
167. *Panagrolaimus dendroctoni* (Fuchs, 1932) Rühm, 1956
168. *Panagrolaimus hygrophilus* Bassen, 1940
169. *Panagrolaimus multidentatus* (Ivanova, 1958) Goodey, 1963
170. *Panagrolaimus obesus* Thorne, 1937
171. *Panagrolaimus paradoxus* (Kreis, 1963) Andrássy, 1984
172. *Procephalobus brunettiae* Marinari, 1957
173. *Procephalobus halophilus* (Meyl, 1954) Andrássy, 1984

Subfamily TRICEPHALOBINAE ANDRÁSSY, 1976

174. *Tricephalobus steineri* (Andrássy, 1952) Rühm, 1956

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Superfamily DIPLOGASTROIDEA MICOLETZKY, 1922

Family DIPLOGASTRIDAE MICOLETZKY, 1922

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175. *Butlerius okai* Rahm, 1938
176. *Diplogasteritus nudicapitatus* (Steiner, 1914) Paramonov, 1952

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Subfamily NEODIPLOGASTRINAE PARAMONOV, 1952

177. *Mononchoides longicaudatus* (Khera, 1965) Andrássy, 1984

Order MONHYSTERIDA De Coninck and Schuurmans Stekhoven, 1933

Suborder MONHYSTERINA DE CONINCK AND SCHUURMANS STEKHOVEN, 1933

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Family MONHYSTERIDAE DE MAN, 1876

Subfamily MONHYSTERINAE DE MAN, 1876

178. *Monhystera Africana* Andrássy, 1964

Order ARAEOLAIMIDA De Coninck and Schuurmans Stekhoven, 1933

Suborder ARAEOLAIMINA DE CONINCK AND SCHUURMANS STEKHOVEN, 1933

Superfamily PLECTOIDEA ÖRLEY, 1880

Family PLECTIDAE ÖRLEY, 1880

Subfamily PLECTINAE ÖRLEY, 1880

179. *Plectus parvus* Bastian, 1865
180. *Plectus minimus* Cobb, 1893

Superfamily ARAEOLAIMOIDEA DE CONINCK AND SCHUURMANS STEKHOVEN, 1933

Family CYLINDROLAIMIDAE MICOLETZKY, 1922

Subfamily CYLINDROLAIMINAE MICOLETZKY, 1922

181. *Cylindrolaimus monhystera* Schneider, 1937
182. *Cylindrolaimus obtusus* Cobb, 1916

Superfamily LEPTOLAIMOIDEA ÖRLEY, 1880

Family LEPTOLAIMIDAE ÖRLEY, 1880

Subfamily LEPTOLAIMINAE ÖRLEY, 1880

183. *Chronogaster brasiliensis* Meyl, 1957
184. *Chronogaster daoi* Loof, 1964
185. *Chronogaster typica* (De Man, 1921) De Coninck, 1935

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Family RHABDOLAIMIDAE CHITWOOD, 1951

Subfamily RHABDOLAIMINAE CHITWOOD, 1951

186. *Rhabdolaimus terristris* De Man, 1880
187. *Rhabdolaimus aquaticus* De Man, 1880
188. *Rhabdolaimus brachyuris* Meyl, 1954

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Suborder CYATHOLAIMINA DE CONINCK, 1965

Superfamily CYATHOLAIMOIDEA FILIPJEV, 1918

Family CYATHOLAIMIDAE FILIPJEV, 1918

Subfamily CYATHOLAIMINAE FILIPJEV, 1918

189. *Achromadora micoletzkyi* (Stefanski, 1915) Van Der Linde, 1938
190. *Achromadora ruricola* (De Man, 1880) Micoletzky, 1925

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Family PRISMATOLAIMIDAE MICOLETZKY, 1922
Subfamily PRISMATOLAIMINAE MICOLETZKY, 1922

191. *Prismatolaimus parvus* Milne, 1963
192. *Prismatolaimus leptolaimus* Andrássy, 1969

Family TRIPYLIDAE DE MAN, 1876
Subfamily TRISCHISTOMATINAE ANDRÁSSY, 2007
Family TRIPYLIDAE ÖRLEY, 1880

193. *Trischistoma pellucidum* Cobb, 1913

Subfamily TOBRILIINAE ANDRÁSSY, 2007

194. *Tobrilus longus* (Leidy, 1852) Andrássy, 1959
195. *Tobrilus stefanskii* Micoletzky, 1922
196. *Tobrilus paludicola* (Micoletzky, 1925) Andrássy, 1959

LIST OF HOSTS SURVEYED DURING THE STUDY

Sl. No.	Host	Botanical Name
1.	Anar	*Punica granatum*
2.	Arvi	*Colacasia sp.*
3.	Banana	*Musa paradisica*
4.	Barseen	*Medicago sativa*
5.	Brinjal	*Solanum melongona*
6.	Cabbage	*Brassica oleracea*
7.	Carrot	*Daucas carota*
8.	Castor	*Ricinus communis*
9.	Cauliflower	*Brassica oleracea*

Sl. No.	Host	Botanical Name
10.	Cotton	*Gossypium spp.*
11.	Cucurbit	*Cucurbita sp.*
12.	Gram	*Phaseolus sp.*
13.	Green Chilli	*Capsium annuum*
14.	Groundnut	*Archis hypogea*
15.	Guar	*Cyamopis tetrogondoba*
16.	Jawar	*Sorghum vulgare*
17.	Laidy's finger	*Abelmoschus esculentus*
18.	Lemon	*Citrus limon*
19.	Methi	*Trigonella toenum graceus*
20.	Moong	*Vigna radiata*
21.	Moth	*Cicer arictinum*
22.	Onion	*Allium cepa*
23.	Paddy	*Oryza sativa*
24.	Palak	*Spinacia oleracea*
25.	Papaya	*Carica papaya*
26.	Pearl-Millet	*Pannisetum americanum*
27.	Pigeon pea	*Cajanus cajan*
28.	Potato	*Solanum tuberosum*
29.	Sarson	*Brassica compestris*
30.	Sesame	*Sesamum indicum*
31.	Soya	*Glycine max*
32.	Sugarcane	*Sacchharum officinarum*
33.	Tomato	*Lycopersicon esculentum*
34.	Wheat	*Triticum aestivum*

TOPOGRAPHY OF THAR DESERT AREA OF RAJASTHAN

The Thar Desert, also known as the Great Indian Desert, is a large arid region in the northwestern part of the Indian subcontinent. It is the world's 9th largest subtropical desert. The Thar desert is unique because of its location at the crossing where Palaearctic, Oriental and Saharan elements of biodiversity are found. It lies mostly in Rajasthan state and extends into the southern portion of Haryana and Punjab states and into northern Gujarat state. In India, the thar desert extends from the Sutlej River, surrounded by the Aravalli Range on the east, on the south by the salt marsh known as the Rann of Kutch and on the west by the Indus River; lying between 22°30'N and 32°05'N latitude and 68°05'E to 75°45'E longitude. The entire desert in the subcontinent (India and Pakistan) covers an area of about half of the Arabian desert and 1/7th of the Sahara desert. In India, the Thar desert covers about 2,78,330 sq km area which comes to about 8.46% of the total area of the country (Table.1). The Indian desert may be divided into the following four types of landscapes: hills, plains with hills, marshes and plains with sand dunes. The region covered by sand dunes is most spectacular which comes to about 1,00,000sq km in India. The soil of the Arid Zone in this desert is usually sandy to sandy-loam in texture. The low-lying loams are heavier and have clay, calcium carbonate and gypsum. The Thar desert in India mainly consists of the wind-blown sand and the area is covered not only by sheet of sand but also by the rocky projections of low elevations. Water is scarse in the desert and is found only from 30 to 120 m below the ground level.

Table 1. Area of the Indian Thar occupied in various districts and states

State	Area in sq km	Concerned districts
Gujarat	62,180	Entire: Kutchch Part: Banaskantha, Mahesana, Ahmedabad, Surendranagar, Rajkot, Jamanagar and Junagarh
Rajasthan	1,96,150	Entire: Ganganagar, Hanumangarh, Bikaner, Jaisalmer, Barmer, Jodhpur and Churu Part: Nagaur, Ajmer, Pali, Jalore, Jhunjhunu and Sikar
Haryana	11,000	Entire: Sirsa and Bhivani Part: Hisar and Mahindragarh
Punjab	9,000	Entire: Ferozpur, Bhatinda and Faridkot
TOTAL	**2,78, 330**	**Entire: 13 districts** **Part: 15 districts**

The plant species found in this desert occur in small clumps. All the plants are well adapted to xeric environment. Bajra, moong, moth, til, maize, jowar, guar, groundnut, wheat, barely, mustard, etc., are the main crops. The Thar desert is now facing a challenge from the fast changing land use pattern, specially in the 100-250 mm rainfall zone in the north-west Rajasthan, mainly because of the Indira Gandhi Nahar Pariyojana (IGNP). The IGNP has brought about 11% area under irrigation in the Thar region of Rajasthan state. Though the IGNP has brought a good quality of water to the desert, the grasslands are being brought under cropland area. Since the new crops like vegetables, zera, spices, isabgol, rice, cotton, etc., are now extensively cultivated, new agricultural insect pests have also been observed (Vyas, 1996). Similarly, the recent reports on the occurrence of rice root nematode species *(Hirschmaniella oryzae, H. gracilis* and *H. mucronata*) from Haryana and Gujarat arid districts (Bajaj and Bhatti, 1982; Patel *et.al.*, 1999) may be correlated with the introduction of rice crop in the Thar. Hence, it is felt necessary to have the database on the distribution of plant and soil nematodes in the Thar desert at the earliest.

The first plant parasitic nematode *(Meloidogyne, sp.)* from the Thar was reported by Arya (1957) from Jodhpur, exactly after 57 years of the first record of plant nematode from India in 1901. The taxonomical studies in the Thar Desert in a systematic manner could only be initiated after Dr. S. Khera joined the department of Zoology, Jodhpur University in 1965. Khera and his associates identified and reported a significant number of species, including many new to science, from Jodhpur, Pali, Bikaner and Jaisalmer districts of Rajasthan (Khera, 1967-1972; Tikyani and Khera, 1968-1970; Tikyani and Bhatnagar, 1969; Nandkumar and Khera, 1969-1970). Meanwhile, Sethi and Swarup (1968a and b); Soni and Nama (1981); Lal et al., (1990); Rathore and Nama (1991a and b); Bajaj and Jairajpuri (1979); Bajaj and Bhatti (1979-1983); Bajaj (1988); Sultan, Singh and Sakhuja (1988); Baqri (1994, 1996, 1999, 2000); Baqri and Bohra (2001); Bohra and Baqri (2000, 2002-2005); and a few others have made important contributions by adding new species and new records. Bohra and Sultana (2007, 2008, 2009, 2010, 2011) published several new species from Thar desert.

COLLECTION AND PRESERVATION

Soil sampling

Soil samples are collected from around roots of host plants with the help of shovel from the depth of 5-15 cms in moist soil fields. If the field was arid or semi-arid, the depth is increased. For making a bulk soil sample, 4-5 sub-samples are collected from the fields. The soil is collected in a polythene bag and brought to laboratory. A label bearing information regarding host, locality, district, date, etc. is tied at the neck of polythene bag with the help of rubber band. In order to avoid evaporation of moisture from soil sample they are stored in a refrigerator at 10-15°c temperature and processed as soon as possible.

Processing

Soil/sediment samples are processed in laboratory by Cobb's (1918) sieving and decantation technique (350 mesh sieve or 53 µm pore size). Soil samples are placed in a bucket (A) of 15 ltrs. Capacity and filled to 1/3rd of its volume with water. The soil and water are thoroughly mixed by hand to make a homogenous suspension. The bucket is left undisturbed for 20-30 seconds so as to allow the heavy particles of soil to settle down at the bottom. This suspension is then filtered through a 25-mesh sieve to get rid of debris and is collected in a bucket (B). The same process is repeated with 300-mesh sieve. The aliquot from 300 mesh sieve is collected in a beaker and is poured gently on moist double tissue paper placed on a small supporting coarse sieve with 2 mm pores. Care was taken to prevent air bubbles between the tissue paper because they check the filtration of nematodes. The supporting sieve is placed into a shallow petri dish filled with water touching the bottom of coarse sieve and left undisturbed for 24 hours. After 24 hours the nematodes are collected in a test tube with the help of the dropper.

Killing and fixation

The suspension containing the nematodes is placed in a test tube for 20-30 minutes so that nematodes may settle down at the bottom. Most of the water is discarded carefully from the test tube with the help of dropper. The nematodes are fixed in hot 4% formalin.

Permanent slides

The nematodes are transferred from fixative to a solution of 5 parts of glycerin and 95 parts of alcohol in a cavity block. The cavity block having the nematodes is placed in desiccators for slow dehydration of nematodes at room temperature for 2-3 weeks. The nematodes are finally mounted in a glass/metal slide in pure anhydrous glycerin. Ordinary nail polish is used as a sealing material. All measurements were made on specimens mounted in anhydrous glycerin with the help of ocular micrometer. De Man's (1884) formula for denoting body dimensions of nematodes was used.

ACHIEVEMENTS

The analysis of material yielded wide variety of nematodes. A total of 196 species were identified belonging to 79 genera of 38 families under the orders Tylenchida (36spp.), Aphlenchida (1sp.), Dorylaimida (78spp.), Mononchida (7spp.), Triplonchida (2spp.), Rhabditida (53spp.), Mohysterida (1sp.), Araeolaimida (10spp.), Chromadorida (2spp.) and Enoplida (6spp.).

The species identified during the period under report are listed below chapterwise according to their systematic position.

Order TYLENCHIDA Thorne, 1949

Diagnosis : Stoma armed with a protrusible knobbed axial stylet. Transverse body annulations generally interrupted by longitudinal incisures. Pharynx composed of a procorpus, metacarpus and a glandular postcorpus with an intervening isthmus between metacorpus and glandular region; dorsal pharyngeal gland orifice opens in the anterior procorpus. Metacorpus generally with valve. Female with one or two genital branches. Males generally have bursa and paired spicules. Derids present or absent. Phasmids present or absent.

Type suborder : Tylenchina Chitwood in Chitwood and Chitwood, 1950

Key to suborders of TYLENCHIDA Thorne, 1949

1. Median pharyngeal bulb absent ..... **Hexatylina**

— Median pharyngeal bulb present 2

2. Female reproductive system monodelphic with no postvulval uterine sac; phasmids or prophasmids absent; spermatheca ventral to gonad axis, hypoptygma single; male pharynx degenerate ..... **Criconematina**

— Female reproductive system didelphic, if monodelphic the usually with a postvulval uterine sac; phasmids or prophasmids present; spermatheca not ventral to gonad axis, hypoptygma double; male pharynx rarely degenerate 3

3. Female reproductive system didelphic; phasmids present ..... **Hoplolaimina**

— Female reproductive system monodelphic; phasmids absent ..... **Tylenchina**

Suborder TYLENCHINA Chitwood in Chitwood and Chitwood, 1950

Diagnosis : Stoma armed with a protrusible knobbed axial stylet. Annulations never retorse. Cuticle without distinct outer and inner layers. Female monodelphic with a post uterine sac. Phasmids absent. Tail similar in both sexes.

Type and only superfamily Tylenchoidea Örley, 1880 (Chitwood in Chitwood, 1937)

Superfamily TYLENCHOIDEA Örley, 1880 (Chitwood in Chitwood, 1937)

Diagnosis : Sexual dimorphism in the anterior region very rare. Deirids present or absent. Phasmids present. Cuticular annules never retorse or with scales or spines. Stylet variable in length. Pharyngeal glands forming a basal bulb or extending over intestine. Females vermiform may become spherical kidney or lemon- shaped in some sedentary forms. Gonad monodelphic or amphidelphic.

Type family : Tylenchidae Örley, 1880

Key to families of TYLENCHOIDEA Örley, 1880 (Chitwood in Chitwood, 1937)

1. Cephalic setae present ..... **Atylenchidae**

— Cephalic setae absent 2

2. Stylet over 24 μm long, if shorter then about as long as precorpus, with tubular protractors ..... **Tylodoridae**

— Stylet under 24μm (generally 8-16μm) long, not as long as precorpus, generally with divergent protractors 3

3. Body extremely attenuated (a=50-150), appearing glass fibre-like, bursa often lobed ..... **Ecphyadophoridae**

— Body not extremely attenuated, not appearing glass fibre-like, bursa not lobed ..... **Tylenchidae**

Family TYLENCHIDAE Örley, 1880

Diagnosis : No sexual dimorphism in the anterior region. Deirids present. Prophasmids dorsosublateral, post-median. Stylet usually weak and slender. Pharyngeal glands forming a basal bulb or extending over intestine. Gonad monodelphic, postvulval uterine sac present.

Type subfamily : Tylenchinae Örley, 1880

Key to subfamily of TYLENCHIDAE Örley, 1880

1. Corpus short and broad, about as long as basal bulb ..... **Tanzaniinae**

— Corpus elongate-slender, longer than basal bulb 2

2. Amphidial apertures prominent, posterior to level of cephalic papillae, partially covered by a cuticular flap ..... **Boleodorinae**

— Amphidial apertures rarely prominent, anterior to cephalic papillae, not covered by a cuticular flap 3

3. Lateral field narrow, with a single ridge ..... **Duosulciinae**

— Lateral field broad, with two or three ridges 4

4. Spermatheca axial, tails short conoid to subcylindroid ..... **Thadinae**

— Spermatheca offset; tail elongate, usually filiform ..... **Tylenchinae**

Subfamily TYLENCHINAE Örley, 1880

1. ***Filenchus filifornis*** (Brzeski, 1963) Lownsbery and Lownsbery, 1985

Material Examined : 2 females.

Host : Til, Wheat.

Locality : Kanaur, Hanumangarh.

Distribution : Rajasthan.

2. ***Tylenchus madarpurensis*** Sultan et al, 1991

Material Examined : 3 females.

Host : Groundnut, Bajra.

Locality : Sutharwala, Jaisalmer.

Distribution : Rajasthan.

Remarks : New record from the state.

Subfamily BOLEODORINAE Khan, 1964

3. ***Basiria berylla*** (Khan and Khan, 1975) Bajaj and Bhatti, 1979

Material Examined : 3 females.

Host : Bajra, cauliflower.

Locality : Airforce Colony, Jodhpur; Mohangarh, Jaisalmer; Pali.

Distribution : Rajasthan.

4. ***Boleodorus brevistylus*** (Khera, 1970) Ebsary, 1991

Material Examined : 4 females.

Host : Groundnut, gram.

Locality : Airforce Colony, Jodhpur; Sanu, Jaisalmer.

Distribution : Rajasthan.

Subfamily DUOSULCIINAE Siddiqi, 1979

5. ***Ottolenchus equisetus*** (Husain and Khan, 1967) Wu, 1970

Material Examined : 2 females.

Host : Banana, wheat.

Locality : Mohangarh, Jaisalmer; Mathania, Jodhpur.

Distribution : Rajasthan.

Infraorder ANGUINATA

Diagnosis : Cuticle smooth or finely striated. Cephalic region, low, cap-like. Stylet small with small rounded knobs. Cardia absent; two anteriormost intestinal cells often acting as a valve. Female gonad single, outstreached, spermathca axial, elongated, sac-like. Phasmids absent. Male with robust spicules, anteriorly expanded. Tail similar in sexes.

Superfamily ANGUINOIDEA Nicoll, 1935 (1926)

Traditionally *Anguina* and *Ditylenchus* have been classified in the Tylenchidae, but they differ from the members of this family in their different origin and evolution from fungal-feeding forms and in having two anterior most cells of the intestine modified to act as a valve (a tricellular cardia is absent in this group), a prominent crustaformeria and large-sized sperm with a prominent cytoplasmic vesicle.

Type family : Anguinidae Nicoll, 1935 (1926)

Key to families of ANGUINOIDEA Nicoll, 1935 (1926)

1. Female tail cylindroids or subcylindroid, dissimilar to that of male; bursa eveloping tail terminus; associates of insects ..... **Sychnotylenchidae**

2. Female tail conoid to filiform, rarely subcylindroid, similar to that of male; bursa not enveloping tail terminus; very rarely associates of insects ..... **Anguinidae**

Family ANGUINIDAE Nicoll, 1935 (1926)

Diagnosis : Adults slender or obese. Cephalic region low, smooth. Median bulb present or absent. Basal pharyngeal bulb offset from intestine. Dorsal gland may become enlarged and extend over intestine as a lobe. Post vulval sac present or rarely absent. Tail similar between sexes. Bursa never enclosing tail tip.

Type subfamily : Anguininae Nicoll, 1935 (1926).

Key to subfamilies of ANGUINIDAE Nicoll, 1935 (1926)

1. Excretory duct widened, sclerotized; exclusively marine, parasitic on sea algae forming galls ..... **Halenchinae**

— Excretory duct not widened or sclerotized; not marine, not parasitic on sea algae ..... **Anguininae**

Subfamily ANGUININAE Nicoll, 1935 (1926)

6. ***Ditylenchus triformis*** Hirshmann and Sasser, 1955

Material Examined : 5 females.

Host : Brinjal, kakri.

Locality : Patodi, Barmer.

Distribution : Rajasthan.

Suborder HOPLOLAIMINA Chizhov and Berezina, 1988

Diagnosis : Cuticle with distinct outer and inner layers. Cephalic framework usually with high arches. Stylet well develop, basal knobs prominent. Females amphidelphic. Phasmids present in or near tail region. Prophasmids absent.

Type superfamily : Hoplolaimoidea Filipjev, 1934 (Paramonov, 1967)

Key to superfamilies of HOPLOLAIMINA Chizhov and Berezina, 1988

1. Subventral pharyngeal glands enlarged, usually extending past the dorsal gland; sexual dimorphism in anterior region manifested ..... **Hoplolaimoidea**

— Subventral pharyngeal glands not enlarged, not extending past the dorsal gland; sexual dimorphism in anterior region not manifest ..... **Dolichodoroidea**

Superfamily HOPLOLAIMOIDEA Filipjev, 1934 (Paramonov, 1967)

Diagnosis : Cephalic sensilla not on surface. First cephalic annule generally divided into six sectors which may be modified. Pharyngeal glands lobed, overlapping intestine. Subventral glands enlarged, equal to or usually larger than dorsal gland; nuclei of one or both subventral glands lying posterior to that of the dorsal gland. Cellular cardia absent. Male tail with a distinct hyaline terminal portion.

Type family : Hoplolaimidae Filipjev, 1934 (Wieser, 1953)

Key to families of HOPLOLAIMOIDEA Filipjev, 1934 (Paramonov, 1967)

1. Mature female round, lemon-shape behind neck, with anus terminal or near so; male with stylet larger than that of female and tail very short or absent 2

— Mature female not round or lemon-shape, with anus not terminal; male with stylet equal to or smaller than that of female and tail not very short 3

2. Excretory pore in mature female opposite or anterior to middle bulb; female labial disc dorsventrally elongated; male with large lip cap and large transverse slit-like amphidial apertures; gall-inciting ..... **Meloidogynidae**

— Excretory pore in mature female behind middle bulb; female labial disc rounded; male with small lip cap and small oval to round amphidial apertures; not gall-inciting ..... **Heteroderidae**

3. Juveniles and females with low arched cephalic framework, generally endoparasites of roots ..... **Pratylenchidae**

4. Juveniles and females with high arched cephalic framework, generally ectoparasites of roots 4

5. Mature female swollen, sedentary ..... **Rotylenchulidae**

— Mature female not swollen, migratory ..... **Hoplolaimidae**

Family HOPLOLAIMIDAE Filipjev, 1934 (Wieser, 1953)

Diagnosis : Pharyngeal glands lobed, overlapping intestine. Deirids absent. Phasmids either small, with pore-like apertures near or a little anterior to anus or large scutellum-like. near anus or much anterior to it.Bursa large, enveloping tail.

Type subfamily : Hoplolaiminae Filipjev, 1934

Key to subfamilies of HOPLOLAIMIDAE Filipjev, 1934 (Wieser, 1953)

1 Phasmids present 2

— Phasmids absent ..... **Aphasmatylenchinae**

2. Phasmids large, scutellum-like ..... **Hoplolaiminae**

— Phasmids small, pore-like ..... **Rotylenchoidinae**

Subfamily HOPLOLAIMINAE Filipjev, 1934

7. ***Hoplolaimus indicus*** Sher, 1963

Material Examined 5 females, 3 males.

Host : Wheat, Bajra, Carrot.

Locality : Sanu, Jaisalmer; Shiv, Barmer; Suratgarh, Sriganganagar.

Distribution : Bihar, Delhi, Himachal Pradesh, Haryana, Punjab, Rajasthan, Sikkim, Uttar Pradesh.

Remarks : This species is widely distributed in the state.

Subfamily ROTYLENCHOIDINAE Whitehead, 1958

8. ***Helicotylenchus abunaamai*** Siddiqi, 1972

Material Examined : 3 females.

Host : Millet, soyabean.

Locality : Sutharwala, Jaisalmer; Munda, Hanumangarh.

Distribution : Rajasthan.

9. ***Helicotylenchus crenacauda*** Sher, 1966

Material Examined : 2 females.

Host : Jawar, Cotton, Guar.

Locality : 1385RD, Jaisalmer; Muna, Hanumangarh.

Distribution : Rajasthan.

10. ***Helicotylenchus curvatus*** Roman, 1965

Material Examined : 5 females.

Host : Brinjal, coriandom.

Locality : 1385RD, Jaisalmer; Kanaur, Hanumangarh; Pali.

Distribution : Rajasthan.

11 ***Helicotylenchus digitatus*** Siddiqi and Husain, 1964

Material Examined : 2 females.

Host : Onion, wheat.

Locality : Munda, Hanumangarh, Manaklaw, Jodhpur.

Distribution : Rajasthan.

12. ***Helicotylenchus digonicus*** Perry in Perry, Darling and Thorne, 1959

Material Examined : 4 females.

Host : Maize, wheat.

Locality : Mohangarh, Jaisalmer; Churu.

Distribution : Rajasthan.

13. ***Helicotylenchus dihystera*** (Cobb, 1893) Sher, 1961

Material Examined : 5 females.

Host : Cauliflower, unidentified grass.

Locality : Tibi, Hanumangarh; Mohangarh, Jaisalmer.

Distribution : Rajasthan.

14. ***Helicotylenchus dihysteroides*** Siddiqi, 1972

Material Examined : 2 females.

Host : Kejri, Brinjal.

Locality : Birmala, Sriganganagar.

Distribution : Rajasthan.

15. ***Helicotylenchus exallus*** Sher, 1966

Material Examined : 4 females.

Host : Gram, wheat.

Locality : Jhujhunu; Manaksar, Srigangànagar.

Distribution : Rajasthan, Sikkim.

16. ***Helicotylenchus goodi*** Tikyani, Khera and Bhatnagar, 1969

Material Examined : 4 female.

Host : Banana, chilli.

Locality : Sundra, Barmer; Jhunjhunu.

Distribution : Rajasthan, Uttar Pradesh.

Distribution : Rajasthan.

17. ***Helicotylenchus indicus*** Siddiqi and Husain, 1964

Material Examined : 5 females.

Host : millet.

Locality : Tibi, Hanumangarh; Sutharwala, Jaisalmer.

Distribution : Rajasthan.

18. ***Helicotylenchus martini*** Sher, 1960

Material Examined : 3 females.

Host : Groundnut; whaet.

Locality : Kishangarh, Jaisalmer; Sundra, Barmer.

Distribution : Rajasthan.

19. ***Helicotylenchus microdorus*** Prasad, Khan and Chawla, 1965

Material Examined : 2 females.

Host : Brinjal, groundnut.

Locality : Kanaur, Hanumangarh.

Distribution : Rajasthan.

20. ***Helicotylenchus multicinctus*** (Cobb, 1893) Golden, 1956

Material Examined : 3 females.

Host : Cauliflower, lobia.

Locality : Kavas, Barmer; Manai, Jodhpur.

Distribution : Orissa, Rajasthan, West Bengal.

Family ROTYLENCHULIDAE Husain and Khan, 1967 (Husain, 1976)

Diagnosis : Small sized-body, with marked sexual dimorphism in adult body shape and in anterior region. Mature female swollen. Cephalic region in female high, rounded to truncate. Phasmids pore-like, on tail near anus. Male vermiform, with reduced cephalic sclerotization, stylet and pharynx.

Type subfamily : Rotylenchulinae Husain and Khan, 1967 (Husain, 1976)

Key to subfamilies of ROTYLENCHULIDAE Husain and Khan, 1967 (Husain, 1976)

1. Female and male with distinct tails, young vermiform migratory female stage present; bursa present 2

— Female and male with very reduced tails, young vermiform migratory female stage absent; bursa absent ..... ***Verutinae***

2. Pharyngeal glands mostly dorsal to intestine; one functional ovary; male head inflated; juveniles almost straight on death ..... ***Acontylinae***

— Pharyngeal glands mostly ventral to intestine; one functional ovaries; male head not inflated; juveniles curved on death ..... ***Rotylenchulinae***

Subfamily ROTYLENCHULINAE Husain and Khan, 1967

21. ***Rotylenchulus reniformis*** Linford and Oliveira, 1940

Material Examined : 3 females.

Host : Maize, Bajra.

Locality : Bay tu, Barmer; Sewa, Jaisalmer.

Remarks : This species is sedentary and semi-endoparasitic attacking several crops and fruit trees in India.

Family PRATYLENCHIDAE Thorne, 1949 (Siddiqi, 1963)

Diagnosis : Vermiform nematodes. Cephalic region low. Stylet strong, length not exceeding three cephalic region widths. Pharyngeal gland extending over intestine. Tail twice or more anal body width long. Phasmids pore-like, on tail well behind anus.

Type subfamily : Pratylenchinae Thorne, 1949

Key to subfamilies of PRATYLENCHIDAE Thorne, 1949 (Siddiqi, 1963)

1. Pharyngeal glands extending over intestine mostly ventrally and ventrolaterally; no marked sexual dimorphism in anterior region 2

— Pharyngeal glands extending over intestine mostly dorsally and dorsolaterally; with marked sexual dimorphism in anterior region 3

2. Tails similar between sexes; phasmids near terminus ..... **Hirschmanniellinae**

— Tails dissimilar between sexes; phasmids not near terminus ..... **Pratylenchinae**

3. Mature female spindle-shaped or batatiform, with numerous eggs within body, gall inciting ..... **Nacobbinae**

— Mature female not spindle-shaped or batatiform, not with numerous eggs within body, not-gall inciting ..... **Radopholinae**

Subfamily PRATYLENCHINAE Thorne, 1949

22. ***Pratylenchus coffeae*** (Zimmermann, 1898) Filipjev, Schuurmans and Stekhoven

Material Examined : 3 females.

Host : Papaya, cauliflower.

Locality : Sadhan, Jaisalmer; Manai, Jodhpur.

Distribution : Rajasthan, Uttarakhand.

23. ***Pratylenchus goodeyi*** Sher and Allen, 1953

Material Examined : 2 females, 1 male.

Host : Bajra, soyabean.

Locality : Sam, Jaisalmer; Mathania, Jodhpur.

Distribution : Rajasthan.

24. ***Pratylenchus mulchandi*** Kumar and Khera, 1970

Material Examined : 3 females.

Host : Banana, jawar.

Locality : Churu; Nokha, Bikaner.

Distribution : Rajasthan.

25. ***Pratylenchus pseudopratenis*** Seinhorst, 1968

Material Examined : 4 females.

Host : Gram, bean, pumpkin.

Locality : Manaksar, Sriganganagar; Manai, Jodhpur; Munda, Hanumangarh.

Distribution Rajasthan.

26. ***Pratylenchus subpenetrans*** Taylor and Jenkins, 1957

Material Examined : 2 females.

Host : Papaya, richka.

Locality : Patodi, Barmer; Mathania, Jodhpur.

Distribution : Rajasthan.

27. ***Pratylenchus thornei*** Sher and Allen, 1953

Material Examined : 5 females.

Host : Bajra, Oat.

Locality : Ramgarh, Jaisalmer; Deshnok, Bikaner.

Distribution : Rajasthan, Uttar Pradesh.

Subfamily HIRSCHMANNIELLINAE Fotedar and Handoo, 1978

28. ***Hirschmanniella oryzae*** (van Brede de Hann, 1902) Luc and Goodey, 1964

Material Examined : 2 females.

Host : Brinjal, papaya, wheat.

Locality : Sutharwala, Jaiselmer; Lalgarh, Bikaner.

Distribution : Rajasthan.

Family MELOIDOGYNIDAE Skarbilovich, 1959 (Wouts, 1973)

Diagnosis : Cephalic region low, with one to four annules. Male stylet longer and more robust than that of female. Mature female swollen, sedentary, round with a projecting neck. Vulva sub terminal or terminal. Didelphic-prodelphic; ovaries coiled. Male vermiform, migratory.

Type subfamily : Meloidogyninae Skarbilovich, 1959

Key to family MELOIDOGYNIDAE Skarbilovich, 1959 (Wouts, 1973)

1. Preadult female and female juveniles of third and fourth stage saccate; mature female with anus at base of dorsal lip of vulva; male tail hemispherical..... **Meloidogyninae**

— Preadult female and female juveniles of third and fourth stage vermiform; mature female with anus at some distance from base of dorsal lip of vulva; male tail conoid-rounded ..... **Nacobboderinae**

Subfamily Meloidogyninae Skarbilovich, 1959

29. ***Meloidogyne incognita*** (Kofoid and White, 1919) Chitwood, 1949

Material Examined : 6 females.

Host : Papaya, kakri.

Locality : Patodi, Barmer; Pali.

Distribution : Rajasthan.

30. ***Meloidogyne javanica*** (Treub, 1885) Chitwood, 1949

Material Examined : 2 females.

Host : Groundnut, brinjal.

Locality : 1305 RD, Jaisalmer; Suratgarh, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

Family TELOTYLENCHIDAE Siddiqi, 1960

Diagnosis : Cephalic region annulated; labial disc indistinct and not marked off from cephalic annules. Lateral fields each with three to six incisures. Stylet under 45 μm long. Deirids absent except Merliniinae. Females didelphic. Vagina not sclerotized. Male tail elongate-conoid, enveloped by a simple bursa. Spicules with large distal flanges, tip pointed.

Type subfamily : Telotylenchinae Siddiqi, 1960

Key to subfamily TELOTYLENCHIDAE Siddiqi, 1960

1 Deirids present (except in *Scutylenchus*), lateral fields with six incisures; male with hypoptygma; spicules cylindrical, not flanged ..... **Merliniinae**

— Deirids absent, lateral fields with two to five incisures; male without hypoptygma; spicules flanged 2

2. Amphidial apertures conspicuous, postlabial; stylet over 80μm long ..... **Macrotrophurinae**

— Amphidial apertures inconspicuous, labial; stylet under 50μm long 3

3. Male tail conspicuously shorter than that of female; bursa trilobed ..... **Meiodorinae**

— Male tail not conspicuously shorter than that of female; bursa simple ..... **Telotylenchinae**

Subfamily TELOTYLENCHINAE Siddiqi, 1960

31. ***Telotylenchus areolatus*** Tikyani and Khera, 1970

Material Examined : 2 females.

Host : Til, wheat.

Locality : 1305RD, Jaisalmer.

Distribution : Rajasthan.

32. ***Telotylenchus indicus*** Siddiqi, 1960

Material Examined : 4 females.

Host : Gram, bean, pumpkin.

Locality : Manaksar, Sriganganagar; Manai, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh, Uttarakhand.

33. ***Tylenchorhynchus mashhoodi*** Siddiqi and Basir, 1959

Material Examined : 4 females, 3 males.

Host : Lobia, Soya.

Locality : Manaksar, ShriGanagar; Kotwala, Jaisalmer.

Distribution : Bihar, Delhi, Himachal Pradesh, Haryana, Orissa, Rajasthan, West Bengal.

34. ***Bitylenchus goffarti*** (Sturhan, 1966) Jairajpuri, 1982

Material Examined : 2 females.

Host : Castor, wheat.

Locality : Rampura, Hanumangarh; Jhunjhunu.

Distribution : Rajasthan, Uttar Pradesh.

35. ***Neodolichorhynchus (M.) phaseoli*** (Sethi and Swarup, 1968) Talavera and Tobar, 1997

Material Examined : 2 females.

Host : Wheat.

Locality : Tibi, Hanumangarh; Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Subfamily MERLINIINAE Siddiqi, 1971

36. ***Merlinius brevidens*** (Allen, 1955) Siddiqi, 1970

Material Examined : 2 females.

Host : Jawar.

Locality : Lalgarh, Bikaner.

Distribution : Rajasthan, Uttar Pradesh.

Order APHELENCHIDA Siddiqi, 1980

Diagnosis : Body small to long. Cuticle thin. Cephalic region low, rounded. Basal knob of stylet weakly developed or entirely absent. Pharynx with strongly developed, offset, ovoid to rounded rectangular median bulb with valve plates and well developed pharyngeal glands forming a dorsal overlapping lobe. Female reproductive system monoprodelphic, usually outstreached. Male with single testis. Bursa usually absent.

Type and only suborder : Aphelenchina Geraert, 1966

Key to superfamilies of APHELENCHINA Geraert, 1966

1. Spicules slender, cephalated. Gubernaculum well developed. Lateral fields with six or more incisures. Pharynx with distinct isthmus and nerve ring circumpharyngeal ..... **Aphelenchoidea**

— Spicules robust. Gubernaculum absent, if present then reduced. Lateral fields usually with four or fewer incisures, exceptionally six. Pharynx with indistinct isthmus and nerve ring circumintestinal ..... **Aphelenchoidoidea**

Superfamily APHELENCHOIDEA Fuchs, 1937 (Thorne, 1949)

Diagnosis : Lateral field with six or more incisures. Pharynx with a distinct isthmus. Nerve ring circum-pharyngeal. Vulva a transverse slit. Female tail short, sub-cylindrical to conoid and with a broadly rounded terminus which may be mucronate. Spicules slender, ventrally arcuate; cephalated. Gubernaculum well developed, elongate. Bursa present or absent.

Type family : Aphelenchidae Fuchs, 1937

1. Male with prominent peloderan bursa. Female vulval aperture in the form of an oval pore. Pharyngeal glands forming a long dorsally overlapping lobe..... **Aphelenchidae**

— Male lacking a bursa. Vulva in the form of a transverse slit. Pharyngeal glands small, retained within a non-overlapping basal bulb ..... **Paraphelenchidae**

Family APHELENCHIDAE Fuchs, 1937(Thorne, 1949)

Diagnosis : More than six lateral lines Pharyngeal glands free, forming a dorsally overlapping lobe. Female tail short, cylindroids with rounded tip. Male bursa well-developed, peloderan.

Type and only subfamily : Aphelenchinae Fuchs, 1937

37. ***Aphelenchus avenae*** Bastian, 1865

Material Examined : 5 females, 3 males.

Host : Wheat, maize, bajra, soya.

Locality : Kanaur, Hanumangarh; Mohangarh, Jaisalmer.

Distribution : Rajasthan.

Remarks : This is a commonly found species.

Order DORYLAIMIDA Pearse, 1936

Diagnosis : Feeding apparatus consisting of vestibulum, guiding apparatus with protrusible odontostyle or mural tooth. Vestibulum walls may be provided with denticles or onchia. Amphids cyathiform, stirrup-shaped or saccate with pore or slit-like aperture.Pharynx composed of anterior slender part and a posterior expanded part. Female reproductive system monodelphic (mono-prodelphic or mono-opisthodelphic) or amphidelphic with reflexed ovary (ies). Males with pair of opposed testes, paired spicules, lateral guiding pieces and sometimes a gubernaculum.

Type suborder : Dorylaimina Pearse, 1936

Key to suborderds of DORYLAIMIDA Pearse, 1936

1. Feeding apparatus provided with odontostyle ..... **Dorylaimina**

— Feeding apparatus provided with mural tooth 2

2. Mural tooth located on sub-dorsal wall of pharyngeal cavity; basal part of pharynx small, with a strongly developed triquetrous chamber..... **Campydorina**

— Mural tooth located on sub-ventral wall of pharyngeal cavity; basal expanded part of pharynx fairly long and without triquetrous chamber..... **Nygolaimina**

Suborder DORYLAIMINA Pearse, 1936

Diagnosis : Feeding apparatus provided with axial odontostyle of varying thickness and size. Guiding ring single or double. Odontophore rod-like, arcuate, sometimes basally with knobs or flanges. Expanded part of pharynx occupying about one-third to one-half of total

pharyngeal length, sometimes a pyriform basal bulb with vulvular chamber. Female reproductive system monodelphic or amphidelphic. Males with paired testis and spicules.

Type superfamily : Dorylaimoidea De Man, 1876

Key to superfamilies of DORYLAIMINA Pearse, 1936

1. Cheilostom strongly sclerotised, provided with plate- or basket-like structures, frequently accompanied by large onchia with or without denticles .... **Actinolaimoidea**

— Cheilostom usually thin-walled, without onchia or denticles 2

2. Odontostyle long and attenuated; pharyx with only three glands ..... **Longidoroidea**

— Odontostyle comparatively much smaller; pharynx with five glands 3

3. Expanded part of pharynx enclosed in spiral muscular sheath ..... **Belondoroidea**

— Expanded part of pharynx not enclosed in spiral muscular sheath 4

4. Sub-cuticle coarsely striated, provided with abundant radial striae; expanded part of pharynx usually a small basal bulb ..... **Tylencholaimoidea**

— Sub-cuticle not striated, radial striae few; if present; expanded part of pharynx usually about one-half total pharyngeal length ..... **Dorylaimoidea**

Superfamily DORYLAIMOIDEA De Man, 1876

Diagnosis : Vestibule straight, tubular. Odontostyle hollow. Amphids usually stirrup-shaped. Odontophore rod-like, rarely with knobs or flanges at base. Expanded part of pharynx occupying about one-third to one-half of total pharyngeal length. Female reproductive system monodelphic or amphidelphic. Males with paired testis and spicules. Prerectum distinct. Tail similar or dissimilar in sexes.

Type family : Dorylaimidae De Man, 1876

Key to families of DORYLAIMOIDEA De Man, 1876

1. Odotostyle with wide aperture occupying usually more than one-half its length; guiding ring not sclerotised, plicated ..... **Aporcelaimidae**

— Odotostyle with smaller aperture, usually one-third or less its length; guiding ring sclerotised 2

2. Odontostyle attenuated, usually longer than width of lip region ..... **Nordiidae**

— Odontostyle not attenuated and usually about as long as width of lip region.....3

3. Large and stout nematodes; usually with long filiform tail exhibiting sexual dimorphism ..... **Dorylaimidae**

— Medium-sized nematodes, with short tail similar in sexes ..... **Qudsianematidae**

Family DORYLAIMIDAE De Man, 1876

Diagnosis : Odontostyle with wide lumen and aperture. Odontophore rod-like, lacking basal knobs or flanges. Guiding ring single or double. Expanded part of pharynx occupying about one-third to one-half of total pharyngeal length. Female reproductive system monodelphic or amphidelphic. Males with paired testis and spicules. Ventromedian supplements few to numerous, spaced or contiguous or grouped. Prerectum distinct. Tail similar or dissimilar in sexes.

Type subfamily : Dorylaiminae de Man, 1876

Key to subfamilies of DORYLAIMIDAE De Man, 1876

1. Cuticle with longitudinal ridges 2
— Cuticle without longitudinal ridges 3
2. Tail similar in sexes, elongate-conoid ..... **Arctidorylaiminae**
— Tail dissimilar in sexes, elongate-conoid to filiform in females and short, bluntly conoid in males ..... **Dorylaiminae**
3. Vestibule provided with minute to strongly developed sclerotised plates; S2N located much anterior to pharyngeal base ..... **Thornenematinae**
— Vestibule not provided with sclerotised plates; S2N towards pharyngeal base+ ..... **Laimydorinae**

Subfamily DORYLAIMINAE de Man, 1876

38. ***Dorylaimus murlii*** Bohra and Sultana, 2008

Material Examined : 2 females.

Host : Wheat.

Other locality : Ramgarh, Jaisalmer.

Distribution : Rajasthan.

Remarks : Bohra and Sultana (2008) described this species from soil around roots of Jowar (*Sorghum vulgare*) at district Alwar, Rajasthan, India.

39. ***Dorylaimis stagnalis*** Dujardin, 1835

Material Examined : 4 females.

Host : Jawar, wheat, rizhka.

Locality : Kolayat, Bikaner.

Distribution : Gujarat, Rajasthan.

Remarks : It is comanly found species in the state.

Subfamily LAIMYDORINAE Andrássy, 1969

40. ***Mesodorylaimus margeritus*** Basson and Heyns, 1974

Material Examined : 2 females.

Host : Groundnut, wheat.

Localities : Churu; Rajakheda, Dholpur.

Distribution : Gujarat, Rajasthan, Uttar Pradesh.

41. ***Laimydorus baldus*** Baqri and Jana, 1982

Material Examined : 3 females.

Host : Millet, Onion.

Locality : Mathania, Jodhpur.

Distribution : Rajasthan, West Bengal.

42. ***Laimydorus kherai*** Baqri, 1985

Material Examined : 4 females.

Host : Wheat.

Locality : Ghumti, Pali.

Distribution : Rajasthan.

43. ***Laimydorus serpentines*** (Thorne and Swanger, 1936) Siddiqi, 1969

Material Examined : 2 females.

Host : Bajra, Carrot.

Locality : Sermathura, Dholpur.

Distribution : Rajasthan.

Subfamily THORNENEMATINAE Andrássy, 1969

44. ***Sicaguttur sartum*** Siddiqi, 1971

Material Examined : 2 females.

Host : Ground nut, maize.

Locality : Nachna, Jaisalmer.

Distribution : Gujarat, Maharashtra, Rajasthan, West Bengal.

45. ***Thornenema mauritianum*** (Williams, 1959) Baqri and Jairajpuri, 1969

Material Examined : 4 females, 3 males.

Host : Barley, Groundnut, Chilli, Cauliflower.

Localities : Airforce colony, Jodhpur; Sewa, Jaisalmer; Utari, Barmer.

Distribution : Delhi, Gujarat, Rajasthan, Uttar Pradesh, West Bengal.

Remarks : This is commonly found species in tha state.

46. ***Prothornenema capitatum*** Baqri and Bohra, 2003

Material Examined : 2 females.

Host : Sugarcane, Sesame.

Locality : Suratgarh, Sriganganagar.

Remarks : Baqri and Bohra (2003) described new genus and new species from the state of Rajasthan and Gujarat.

Family APORCELAIMIDAE Heyns, 1965

Diagnosis : Cuticle often with criss-cross lines or punctuations and usually with numerous body pores. Odontostyle either axial with wide aperture. Guiding sheath without sclerotised fixed ring. Basal expanded part of pharynx highly muscular, usually with prominent glandular tubules, obscuring gland nuclei. Female reproductive system amphidelphic. Male with spaced ventromedian supplements. Tail short, conoid (long filiform in *Aporcedorus*); similar in sexes.

Type subfamily : Aporcelaiminae Heyns, 1965

Key to subfamilies of APORCELAIMIDAE Heyns, 1965

1. Body sharply tapering towards anterior end ..... **Paraxonchiinae**

— Body normal, ot sharply tapering towards anterior end 2

2. Odontostyle axial, with wide aperture ..... **Aporcelaiminae**

— Odontostyle a mural tooth ..... **Sectonematiae**

Subfamily APORCELAIMINAE Heyns, 1965

47. ***Aporcelaimellus heynsi*** Baqri and Jairajpuri, 1968

Material Examined : 5 females.

Host : Bajra, coriandam, brinjal, wheat.

Localities : Mohangarh, Jaisalmer; Mathania, Jodhpur.

Distribution : Gujarat, Rajasthan, Uttar Pradesh, West Bengal.

Remarks : Widely distributed species.

48. ***Aporcelaimellus obscurus*** (Thorne and Swanger, 1936) Heyns, 1965

Material Examined : 3 females.

Host : Rijka, cauliflower.

Localities : Barmer; Manaklaw, Jodhpur.

Distribution : Gujarat, rajasthan.

49. ***Tubixaba parva*** Pretorius, Kruger and Heyns, 1987

Material Examined : 8 females.

Host : Carrot, groundnut, brinjal, onion, millet and wheat.

Localities : Ramgarh; Jaisalmer; Barmer; Jodhpur.

Distribution : Gujarat, Rajasthan.

Remarks : Widely distributed species.

Family QUDSINEMATIDAE Jairajpuri, 1965

Diagnosis : Lateral hypodermal chords may be provided with distinct glandular bodies. Odontostyle cylindrical, dorylaimoid, with distinct lumen and aperture. Odontophore rod-like or with sclerotised basal flanges or knobs. Female reproductive system mno-opisthodelphic or amphidelphic. Males with dorylaimoid or non-dorylaimoid spicules. Ventromedian supplements few to numerous, spaced or contiguous. Tail short, hemispheroid to elongate-conoid; similar in sexes.

Type subfamily : Qudsianematinae Jairajpuri, 1965

Key to subfamilies of QUDSIANEMATIDAE Jairajpuri, 1965

1 Cuticle with coarse transverse striations 2

— Cuticle with fine transverse striations 3

2. Body slender; body pores indistinct; odontostyle attenuated ..... **Crateronematinae**

— Body not slender; body pores distinct; odontostyle not attenuated ..... **Lordellonematinae**

3. Lip region discoid; well developed hypodermal glands present ..... **Discolaiminae**

— Lip region not discoid; hypodermal glands usually absent or porly developed 4

4. Lip region continuous; lips amalgamated 5

— Lip region set off, lips usually separated 6

5. Tail short, hemispheroid in both sexes; only adanal pair of supplements present (rarely a single ventromedian) ..... **Thorniinae**

— Tail elongate-conoid in both sexes; in addition to adanal pair, a series of ventromedian supplements present ..... **Chrysonematinae**

6. Dorsal pharyngeal gland nucleus near beginning of pharyngeal enlargement; female tail short, hemispherical to elongate-conoid ..... **Qudsianematinae**

— Dorsal pharyngeal gland nucleus two or more body widths posterior to beginning of pharyngeal enlargement; female tail long, filiform ..... **Hulqinae**

Subfamily DISCOLAIMINAE Siddiqi, 1969

50. ***Discolaimus agricolus*** Sauer and Annells, 1986

Material Examined : 2 females.

Host : Groundnut, Millet.

Localities : Churu, Jodhpur.

Distribution : Gujarat, Rajasthan.

51. ***Discolaimus major*** Thorne, 1939

Material Examined : 4 females.

Host : Cauliflower, onion, wheat.

Localities : Barmer, Hanumangarh, Jhunjhunu.

Distribution : Gujarat, Rajasthan, Uttar Pradesh, West Bengal.

52. ***Discolaimus paramajor*** Coomans, 1966

Material Examined : 2 female.

Host : Carrot, millet.

Localities : 1385Rd, Jaisalmer; Bay l.c Tu, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

53. ***Discolaimus perplexans*** Siddiqi, 1964

Material Examined : 6 females, 2 males.

Host : Sugarcane, Wheat.

Localities : Sewa, Jaisalmer; Manaklaw, Jodhpur.

Distribution : Gujarat, Rajasthan.

54. ***Discolaimus silvicolus*** Sauer and Allen, 1986

Material Examined : 3 females.

Host : Wheat, jawar, water body.

Localities : Munda, Hanumangarh; Jodhpur; Sriganganagar.

Distribution : Rajasthan.

55. ***Discolaimus similis*** Thorne, 1939

Material Examined : 6 females.

Host : Brinjal, wheat.

Localities : Manaksar, Sri Ganganagar; Manaklaw, Jodhpur.

Distribution : Rajasthan, Uttarakhand.

56. ***Discolaimus rotundicaudatus*** Khan and Laha, 1982

Material Examined : 2 females.

Host : Banana, millet.

Localities : Sutharwala, Jaisalmer; Manaklaw, Jodhpur.

Distribution : Rajasthan.

57. ***Discolaimus tenax*** Siddiqi, 1965

Material Examined : 4 females.

Host : Coriandom, millet.

Locality : Mathania, Jodhpur; Sriganganagar.

Distribution : Delhi, Rajasthan, Uttar Pradesh.

58. ***Discolaimus texanus*** Cobb, 1913

Material Examined : 4 females.

Host : Coriandum, millet.

Localities : 1385Rd, Jaisalmer; Patodi, Barmer.

Distribution : Gujarat, Rajasthan.

59. ***Discolaimium simplex*** Siddiqi, 1965

Material Examined : 3 females.

Host : Jawar, millet, papaya.

Localities : Gudamalani, Kalyanpur, Barmer; Roopsi, Jaisalmer.

Distribution : Rajasthan.

60. ***Discolaimium mucrobanum*** (Loof, 1964) Andrássy, 1990

Material Examined 1 female.

Host : Sugarcane.

Locality : Nachna, Jaisalmer.

Distribution : Rajasthan.

61. ***Discolaimium dubium*** Das, Khan and Loof, 1969

Material Examined : 3 females.

Host : Soya, wheat.

Localities : Ranasar, Barmer; Manai, Jodhpur.

Distribution : Rajasthan.

62. ***Discolaimoides arcuicaudatus*** (Furstenberg and Heyns, 1965) Das, Khan and Loof, 1969

Material Examined : 2 females.

Host : Onion, chilli.

Localities : Munda, Hanumangarh, Nachna, Jaisalmer.

Distribution : Rajasthan.

63. ***Discolaimoides bulbiferus*** (Cobb, 1906) Heyns, 1963

Material Examined : 4 females, 2 males.

Host : unidentified grass, millet.

Localities Gudamalani, Barmer, Mohangarh, Jaisalmer.

Distribution : Gujarat, Maharashtra, Rajasthan, West Bengal.

Remarks : It is commonly found species in the state.

64. ***Discolaimoides symmetricus*** Das, Khan and Loof, 1969

Material Examined : 3 female.

Host : Millet, onion, sugarcane.

Locality : Nachna, Jaisalmer.

Distribution : Rajasthan.

65. ***Discolaimoides saptilabmium*** Khan and Laha, 1982

Material Examined : 4 females.

Host : Millet.

Localities : 1385Rd, Jaisalmer; Patodi, Barmer.

Distribution : Rajasthan.

66. ***Latocephalus conicaudatus*** Baqri and Bohra, 2003

Material Examined : 3 females.

Host : Millet, wheat.

Locality : Nachna, Jaisalmer.

Distribution : Rajasthan.

Remarks : Baqri and Bohra (2003) described this new species from Ranthambore National Park, Sawai Madhopur, Rajasthan.

67. ***Latocephalus gracile*** Patil and Khan, 1982

Material Examined : 4 females.

Host : Bajra, carrot, wheat.

Localities : Jhunjhunu, Sriganganagar.

Distribution : Gujarat, Maharashtra, Rajasthan.

68. ***Latocephalus laetans*** Siddiqi, 2003

Material Examined : 2 females.

Host : Chilli, wheat.

Locality : Sundra, Barmer.

Distribution : Rajasthan.

69. ***Latocephalus lotus*** Siddiqi, 2003

Material Examined : 2 females.

Host : Millet, bajra.

Locality : Gudamalani, Barmer.

Rajasthan : Rajasthan.

70. ***Latocephalus smithi*** (Heyns, 1963) Patil and Khan, 1982

Material Examined : 3 females.

Host : Brinjal, tomato.

Localities : Sundra, Barmer; Hanumangarh.

Distribution : Gujarat, Rajasthan.

Subfamily QUDSIANEMATINAE Jairajpuri, 1965

71. ***Ecumenicus monhystera*** (De Man, 1880) Thorne, 1974

Material Examined : 11 females.

Host : Brinjal, roundnut, Lobia, Maize.

Localities : Birmala, Sriganganagar; Manaklaw, Jodhpur; Ramgarh, Jaisalmer.

Distribution : Gujarat, Rajasthan, West Bengal.

Remarks : Widely distributed species in the state.

72. ***Eudorylaimus chauhani*** (Baqri and Khera, 1975) Andrássy, 1986

Material Examined : 3 females, 2 males.

Host : Guar, groundnut, millet.

Localities : 1305RD, Jaisalmer; Manai, Jodhpur.

Distribution : Gujarat, Rajasthan, West Bengal.

73. ***Labronema confuses*** (Jana and Baqri, 1983) Andrássy, 1991

Material Examined : 10 females.

Host : Lobiya, brinjal, wheat.

Localities : Barmer, Jaisalmer, Churu, Jhunjhunu, Pali.

Distribution : Gujarat, Rajasthan, West Bengal.

Remarks : Abundantly found species in the state.

74. ***Labronema chilemse*** Andrássy, 1967

Material Examined : 3 females.

Host : Groundnut.

Localities : Birmala, Barmer; Kavas, Barmer.

Distribution : Rajasthan.

75. ***Labronema vigor*** Monterio, 1970

Material Examined : 2 females.

Host : Bajra, cauliflower.

Localities : Jaisalmer; Jodhpur; Rawatsar, Hanumangarh.

Distribution : Rajasthan.

76. ***Torumanawa shinensis*** Bohra and Sultana, 2008

Material Examined : 2 females.

Host : Chilli.

Other locality : Manaksar, Sriganganagar.

Distribution : Rajasthan.

Remarks : Bohra and Sultana (2008) described new species from Bharatpur, Rajasthan.

Subfamily LORDELLONEMATINAE Siddiqi, 1969

77. ***Moshajia cultristyla*** Siddiqi, 1982

Material Examined : 3 females.

Host : Groundnut, wheat.

Localities : Manai, Jodhpur; Roopsi, Jaisalmer.

Distribution : Gujarat, Punjab, Rajasthan.

78. ***Moshajia idiofora*** Siddiqi, 1982

Material Examined : 2 females, 1 male.

Host : Arvi, chilli, millet.

Localities : Kanaur, Hanumangarh; Balasar, Barmer.

Distribution : Gujarat, Punjab, Rajasthan.

Family NORDIIDAE Jairajpuri and Siddiqi, 1964

Diagnosis : Odontostyle slender, attenuated, long, with narrow lumen and aperture. Guiding ring single or double. Odontophore elongate, rod-like or with basal swellings or flanges. Pharynx muscular, expanded posterior to mid-length. Female reproductive system mono-opisthodelphic or amphidelphic. Tail similar in sexes; hemispherical to long, filiform.

Type subfamily : Pungentinae Siddiqi, 1969

Key to subfamilies of NORDIIDAE Jairajpuri and Siddiqi, 1964

1. Labial papillae enlarged, rising significantly above lip contour.....2

— Labial papillae not enlarged 3

2. Cuticle with longitudinal and transverse groove-like striatios forming lamelliform pattern on body ..... **Helmabiinae**

— Cuticle smooth, groove-like striations absent ..... **Cephalodorylaiminae**

3. Odontostyle usually flanged ..... **Pungentinae**

— Odontophore not flanged **4**

4. Body usually robust; odontostyle three-five lip region widths long ..... **Nordiinae**

— Body usually slender; odontostyle generally not more than two lip region widths long ..... **Actinolaimoidinae**

Subfamily PUNGENTINAE Siddiqi, 1969

79. ***Kochinema caudatum*** Baqri and Bohra, 2001

Material Examined : 5 females.

Host : Groundnut, onion.

Localities : Manaksar, Sriganganagar; Kalyanpur, Barmer; Jodhpur.

Distribution : Gujarat, Rajasthan.

Remarks : Baqri and Bohra (2001) described it as new species from Nagaur, Rajasthan.

80. ***Kochinema farodai*** Baqri and Bohra, 2001

Material Examined : 7 females.

Host : Bajra, cauliflower, brinjal, millet, wheat.

Localities : Barmer; Churu; Jaisalmer.

Distribution : Gujarat, Rajasthan.

Remarks : Baqri and Bohra (2001) described it as new species from Udaipur, Rajasthan.

Superfamily ACTINOLAIMOIDEA Thorne, 1939

Diagnosis : Lip region with sclerotised pharyngeal walls varying from simple plates to strong refractive basket-like or ribbed structure, frequently accompanied by four large onchia which may be fused into a spear guide or accompanied by muscular other mural denticles. Strong basal shield present at base of pharynx. Female reproductive system

amphidelphic very rarely mono-opisthodelphic. Tail short, conoid to long, filiform; similar or dissimilar in sexes.

Type family : Actinolaimidae Thorne, 1939

Key to families of ACTINOLAIMOIDEA Thorne, 1939

1. Female tail shorter than two anal body widths, conical or rounded; vestibule with basket-like structures ..... **Carcharolaimidae**

— Female tail at least four anal body widths long, no basket-like structures present in vestibule 2

2. Vestibule with four massive onchia with or without denticles ..... **Actinolaimidae**

— Vestibule without onchia but with corrugated ring and several transverse rows of mural denticles ..... **Trachypleurosidae**

Family CARCHAROLAIMIDAE Thorne, 1967

Diagnosis : Vestibule with massive , sclerotised basket-like framework, which may sometimes be reduced to lamilliform elements. Anterior part of pharynx a hyaline slender tube, posterior part broad and muscular, with strong radial musculature and dense glandular tissue obscuring details of pharyngeal gland nuclei. Basal shield often present. Female reproductive system amphidelphic. Tail bluntly conoid, arcuate, similar in sexes.

Type subfamily : Carcharolaiminae Thorne, 1967

Key to subfamilies of CARCHAROLAIMIDAE Thorne, 1967

1. Stoma narrowing behind guiding ring ..... **Carcharolaiminae**

— Stoma not narrowing behind guiding ring ..... **Caribenematinae**

Subfamily CARCHAROLAIMINAE Thorne, 1967

81. ***Carcharolaimus masoodi*** Jairajpuri, 1968

Material Examined : 5 females.

Host : Methi, coriander, millet.

Locality : Tibi, Hanumangarh; Sutharwala, Jaisalmer.

Distribution : Gujarat, Rajasthan, Uttar Pradesh.

Family ACTINOLAIMIDAE Thorne, 1939

Diagnosis : Vestibule with four massive onchia with or without denticles. Odontostyle dorylaimoid. Expanded part of pharynx about one-half pharyngeal length. Strong basal

shield present at base of pharynx. Female reproductive system amphidelphic or mono-opisthodelphic. Male with supplements arranged in a series or grouped in two or three fascicles. Tail short, conoid to long, filiform; similar or dissimilar in sexes.

Type subfamily : Actinolaimidae Thorne, 1939

Key to subfamilies of ACTINOLAIMIDAE Thorne, 1939

1. Cuticle with longitudinal striations 2

— Cuticle without longitudinal striations 3

2. Odontostyle massive, robust aperture about one-half its length ..... **Actiolaiminae**

— Odontostyle slender, two-three lip region widths long, aperture one-third or less its length ..... **Brittonematinae**

3. Vestibule bearing minute rasp-like denticles ..... **Paractinolaiinae**

— Vestibule without rasp-like denticles ..... **Neoactinolaiminae**

Subfamily NEOACTINOLAIMINAE Thorne, 1967

82. ***Neoactinolaimus rajasthanenesis*** Bohra and Sultana, 2008

Material Examined 2 females.

Host : Brinjal, onion.

Locality : 1385RD, Jaisalmer.

Distribution : Rajasthan.

Remarks : Bohra and Sultana (2008) described new species from flooded area of village Kawas, Barmer, Rajasthan.

Superfamily LONGIDOROIDEA Thorne, 1935

Diagnosis : Odontostyle long and attenuated, with fine lumen and aperture. Odontophore simple, rod-like or with basal flanges. Junction between odontostyle and odontophore simple or complex. Slender part of pharynx set off from posterior expanded part. Female reproductive system monodelphic or amphidelphic. Spicules arcuate, lateral guiding pieces and ventromedian supplements present. Tail similar in sexes.

Type family : Longidoridae Thorne, 1935

Key to families of LONGIDOROIDEA Thorne, 1935

1. Guiding ring double; odontophore flanged ..... **Xiphinematidae**

— Guiding ring single; odontophore not flanged ..... **Longidoridae**

Family LONGIDORIDAE Thorne, 1935

Diagnosis : Lip region continuous or offset by constriction. Guiding ring single. Junction between odontostyle and odontophore simple. Female reproductive system amphidelphic. Tail short, conoid; similar in sexes.

Type and only subfamily : Longidorinae Thorne, 1935

Subfamily LONGIDORINIAE Thorne, 1935

83. ***Longidorus elongatus*** (de Man, 1876) Micoletzky, 1922

Material Examined : 4 females.

Host : Brinjal.

Locality : Ramgarh, Jaisalmer.

Distribution : Gujarat, Rajasthan.

84. ***Longidorus globulicauda*** Dalmasso, 1969

Material Examined : 2 females.

Host : Chilli, onion, maize.

Locality : Manaksar, ShriGanganar.

Distribution : Gujarat, Rajasthan.

Remarks : New record from the state.

85. ***Paralongidorus citri*** (Siddiqi, 1969) Siddiqi, Hooper and Khan, 1963

Material Examined : 4 females.

Host : Maize, wheat.

Localities : Mohangarh, Jaisalmer; Amarpura, Hanumangarh.

Distribution : Gujarat, Rajasthan.

86. ***Paralongidorus major*** Verma, 1973

Material Examined : 3 females.

Host : Millet, wheat.

Localities : Choliwala, Hanumangarh; Nachna, Jaisalmer.

Distribution : Rajasthan.

87. ***Paralongidorus microlaimus*** Siddiqi, 1964

Material Examined : 2 females.

Host : Groundnut.

Localities : Manai, Jodhpur; Churu.

Distribution : Gujarat, Rajasthan.

Family XIPHINEMATIDAE Dalmasso, 1969

Diagnosis : Guiding ring double, located at base of odontostyle. Odontostyle forked at junction with odontophore. Odontophore with moderate to well-developed basal flanges. Female reproductive system monodelphic or amphidelphic. Tail variable in shape and size; similar in sexes.

Type subfamily : Xiphinematinae Dalmasso, 1969

Key to subfamilies of XIPHINEMATIDAE Dalmasso, 1969

1 Amphids stirrup-shaped with slit-like apertures; DN at same level as DO.....Xiphinematinae

— Amphids pouch-like with pore-like apertures; DN far behind DO.....Xiphidorinae

Subfamily XIPHINEMATINAE Dalmasso, 1969

88. ***Xiphinema americanum*** Cobb, 1913

Material Examined : 4 females.

Host : Wheat.

Localities : Jaisalmer; Hanumangarh; Pali; Sikar.

Distribution Gujarat, Punjab, Rajasthan, Uttar Pradesh, West Bengal.

89. ***Xiphinema radicicola*** Goodey, 1963

Material Examined : 2 females, 1 male.

Host : Coriander, soya, millet.

Localities : Gudamalani, Barmer; Birmala, Sriganganagar; Sikar.

Distribution : Gujarat, Rajasthan, Uttar Pradesh.

90. ***Xiphinema basiri*** Siddiqi, 1959

Material Examined : 6 female.

Host Cauliflower, onion.

Localities : Sewa, Jaisalmer; Pilibanga, Hanumangarh.

Distribution : Gujarat, Rajasthan, Uttar Pradesh.

91. ***Xiphinema insigne*** Loos, 1949

Material Examined : 3 females.

Host : Carrot, oat.

Localities : Dodu, Barmer; Kannor, Hanumangarh.

Distribution : Gujarat, Punjab, Rajasthan, Sikkim, Uttar Pradesh, West Bengal.

Superfamily BELONDIROIDEA Thorne, 1939

Diagnosis : Lip region narrow; lips small, angular or rounded. Odontostyle usually small, odontophore rod-like, rarely flanged. Basal expanded part of pharynx enveloped by thick sheath of muscles, generally with spiral, rarely with longitudinal bands. Female reproductive system monodelphic or amphidelphic. Ventromedian supplements few to numerous. Tail variable in shape; similar or dissimilar in sexes.

Type and only family : Belondiridae Thorne, 1939

Family BELONDIRIDAE Thorne, 1939

Diagnosis : Odontostyle small, linear or fusiform, with narrow or wide aperture. Odontophore rod-like or flanged. Anterior narrow and posterior expanded part of pharynx separated by distinct isthmus-like constriction. Cardia short, conoid to elongate. Female reproductive system monodelphic or amphidelphic. Ventromedian supplements few to numerous. Tail variable in shape; similar or dissimilar in sexes.

Type subfamily : Belondirinae Thorne, 1939

Key to subfamilies of BELONDIRIDAE Thorne, 1939

1 Cuticularised pieces present around oral aperture; odontophore flanged ..... **Dorylaimellinae**

— Cuticularised pieces not present around oral aperture; odontophore rod-like 2

2. Female tail short, digitate, conoid or rounded ..... **Belondirinae**

— Female tail long, filiform ..... **Swangeriinae**

Subfamily BELONDIRINAE Thorne, 1939

92. ***Belondira aquatica*** Ferris, Ferris and Goseco, 1983

Material Examined : 4 females.

Host : Millet, wheat.

Localities : Barmer; Jaisalmer; Sriganganagar.

Distribution : Andman and Nicobar; Gujarat; Rajasthan; Uttar Pradesh.

93. ***Belodira microdora*** Ahmad, Dhanachand and Jairajpuri, 1982

Material Examined : 2 females.

Host : Carrot, millet.

Localities : Sriganganagar; Mathania, Jodhpur.

Distribution : Gujarat, Rajasthan, Uttar Pradesh.

Subfamily DORYLAIMELLINAE Jairajpuri, 1964

94. ***Dorylaimellus (B.) discocephalus*** Siddiqi, 1964

Material Examined : 4 females.

Host : Gram, bean, pumpkin.

Localities : Manaksar Sriganganagar; Manai, Jodhpur.

Distribution : Gujarat, Rajasthan, Uttar Pradesh, West Bengal.

Remarks : Commonly found species in the state.

95. ***Dorylaimellus directus*** Heyns, 1963

Material Examined : 4 females.

Host : Carrot, gram.

Locality : Utari, Barmer.

Distribution : Gujarat, Rajasthan.

96. ***Dorylaimellus (D.) demani*** Goodey, 1963

Material Examined : 2 females.

Host : Millet, wheat.

Locality : Pokaran, Jaisalmer; Sriganganagar.

Distribution : Rajasthan.

97. ***Dorylaimellus (D.) indicus*** Siddiqi, 1964

Material Examined : 4 females.

Host : Carrot, groundnut.

Localities : Utari, Barmer; mathania, Jodhpur.

Distribution : Rajasthan.

98. ***Dorylaimellus (Mesodorylaimellus) deviatus*** Baqri and Jairajpuri, 1969

Material Examined : 4 females.

Host : Wheat.

Locality : Jhunjhunu; Pali.

Distribution : Gujarat, Rajasthan, Uttar Pradesh.

99. ***Dorylaimellus (Mesodorylaimellus) jacobi*** Jairajpuri and Ahmad, 1969

Material Examined : 2 females.

Host : Bajra.

Locality : Jaisalmer, Jodhpur.

Distribution : Gujarat, Rajasthan.

Superfamily TYLENCHOLAIMOIDEA Filipjev, 1934

Diagnosis : Lip region may bear labial disc or inner liplets around oral aperture. Odontostyle rod-like or arcuate, with or without basal knobs or flanges. Pharynx terminating in small pyriform or cylindroids basal bulb, or large dorylaimoid type. Female reproductive system monodelphic or amphidelphic. Males with arcuate spicules, lateral guiding pieces and generally a few spaced ventromedian supplements. Tail greatly variable in shape and size; similar in sexes.

Type family : Tylencholaimidae Filipjev, 1934

Key to families of TYLENCHOLAIMOIDEA Filipjev, 1934

1. Pharynx consisting of three sections ..... **Aulolaimoididiae**

— Pharynx consisting of two sections 2

2. Odontostyle usually well developed; expanded part of pharynx about one-half pharyngeal length ..... **Tylenchqlaimidae**

— Odontostyle usually slender; expanded part of pharynx short, cylindrical or pyriform bulb 3

3. Odontostyle asymmetrical with distinct aperture; pharyngeal bulb cylindroids ..... **Mydonomidae**

— Odontostyle symmetrical, attenuated, often solid, needle-like; pharyngeal bulb usually pyriform ..... **Leptonchidae**

Family TYLENCHOLAIMIDAE Filipjev, 1934

Diagnosis : Cuticle loose, with radial striations and fixations. Lip region cap-like. Labial disc may be present around oral aperture. Amphids with slit or pore-like apertures. Odontostyle symmetrical or asymmetrical. Odontophore rod-like, with or without basal

knobs or flanges. Basal expanded part of pharynx with thickened inner lining. Female reproductive system monodelphic or amphidelphic. Males with well-developed spicules, lateral guiding pieces and generally a few spaced ventromedian supplements. Tail greatly variable in shape and size; similar in sexes.

Type subfamily : Tylencholaiminae Filipjev, 1934

Key to subfamilies of TYLENCHOLAIMIDAE Filipjev, 1934

1. Amphids small, pouch-shaped, with oval aperture; odontostyle asymmetrical ..... **Mumtaziinae**

— Amphids stirrup-shaped, with slit-like aperture; odontostyle symmetrical 2

2. Odontostyle massive, with very thick walls ..... **Vanderlindiinae**

— Odontostyle not massive, walls not thick 3

3. Odontostyle long, attenuated, with fine lumen and aperture; odontophore usually flanged ..... **Xiphinemellinae**

— Odontostyle generally small, attenuated, with fine lumen and aperture; odontophore usually knobbed ..... **Tylencholaiminae**

100. ***Tylencholaimus pusillus*** Loof and Jairajpuri, 1968

Material Examined : 3 females.

Host : Cauliflower.

Locality : Gudamalani, Barmer.

Distribution : Gujarat, Rajasthan.

101. ***Tylencholaimus nanus*** Thorne, 1939

Material Examined : 5 females.

Host : Millet, sugarcane, wheat.

Localities : Borana, Jaisalmer; Manai, Jodhpur.

Distribution : Gujarat, Rajasthan.

102. **Tylencholaimus notrus** Jairajpuri and Ahmad, 1990

Material Examined : 2 females.

Host : Chilli, millet.

Locality : Sewa, Jaisalmer; Jasana, Hanumangarh.

Distribution : Gujarat, Rajasthan.

103. ***Tylencholaimus minutus*** Vinciguera, 1986

Material Examined : 3 females.

Host : Cauliflower.

Localities : Gudamalani, Barmer.

Distribution : Gujarat, Rajasthan.

104. ***Tylencholaimus annulatus*** Baqri and Bohra, 2001

Material Examined : 5 females, 2 males.

Host : Onion, millet.

Localities : Nachna, Jaisalmer; Kanaur, Hanumangarh; Gudamalani, Barmer.

Distribution : Gujarat, Rajasthan.

105. ***Tylencholaimus gertii*** Kurger, 1965

Material Examined : 6 females.

Host : Papaya, kakri.

Localities : Patodi, Barmer; Sadhan, Jaisalmer.

Distribution : Gujarat, Rajasthan.

106. ***Tylencholaimus innebus*** Ahmad and Jairajpuri, 1980

Material Examined : 5 females.

Host : Methi, coriander, millet.

Localities : Tibi, Hanumangarh; Sutharwala, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh, Uttarakhand.

107. ***Tylencholaimus mongolicus*** Andrássy, 1967

Material Examined : 2 females.

Host : Carrot, groundnut, brinjal, onion, millet, wheat.

Localities : Ramgarh, Jaisalmer; Barmer; Jodhpur.

Distribution : Rajasthan.

108. ***Tylencholaimus proximus*** Thorne, 1939

Material Examined : 5 females.

Host : Wheat, maize, bajra, soya.

Locality : Kanaur, Hanumangarh; Mohangarh, Jaisalmer.

Distribution : Rajasthan.

Family LEPTONCHIDAE Thorne, 1935

Diagnosis : Cuticle with refractive elements and radial striae. Lateral pores usually arranged in two rows. Odontostyle slender, attenuated, often solid, needle-like. Odontophore rod-like, arcuate, or provided with basal flanges. Female reproductive system monodelphic or amphidelphic. Male with a few spaced ventromedian supplements. Tail rounded or long, filiform; similar in sexes.

Type subfamily : Leptonchinae Thorne, 1935

Key to subfamilies of LEPTONCHIDAE Thorne, 1935

1 Cuticle heavily annulated and with longitudinal striations forming lamelliform pattern; cephalic setae present ..... **Encholaiminae**

— Cuticle finely striated, longitudinal striations and cephalic setae absent 2

2. Odontostyle asymmetrical; amphids strongly sclerotised ..... **Athernematinae**

— Odontostyle symmetrical; amphids not sclerotised 3

3. Odontostyle solid; needle-like, without distinct lumen ..... **Belonenchinae**

— Odontostyle neither solid nor needle-like, withdistinct lumen 4

4. Odontophore with distinct knobs or flanges ..... **Tylencholaimellinae**

— Odotophore without knobs, very rarely flanged 5

5. Odontostyle slender; inner cuticular lining of pharyngeal bulb not prominently thickened ..... **Leptonchinae**

— Odontostyle robust; inner cuticular lining of pharyngeal bulb prominently thickened ..... **Tyleptinae**

Subfamily LEPTONCHINAE Thorne, 1935

109. ***Leptonchus granulosus*** Cobb, 1920

Material Examined : 2 females, 2 males.

Host : Carrot, bean, guar.

Localities : Ramgarh, Jaisalmer; Manaklaw, Jodhpur.

Distribution : Gujarat, Rajasthan, Uttar Pradesh.

Superfamily NYGOLAIMOIDEA Thorne, 1935

Diagnosis : Mural tooth on left sub-ventral wall of pharynx. Pharynx in three sections. Three cardiac glands or cardiac disc present at junction of pharynx and intestine. Female reproductive system amphidelphic, rarely mono-opisthodelphic. Males generally with massive spicules, lateral guiding pieces and ventromedian supplements. Gubernaculum present or absent.

Type family : Nygolaimidae Thorne, 1935

Key to families of NYGOLAIMOIDEA Thorne, 1935

1. Basal expanded part of pharynx enclosed in thick sheath of spiral muscles; female reproductive system mono-opisthodelphic ..... **Nygellidae**

— Basal expanded part of pharynx not enclosed in muscular sheath; female reproductive system amphidelphic 2

2. Stoma sclerotised ..... **Aetholaimidae**

— Stoma not sclerotised 3

3. Basal expanded part of pharynx about one-half pharyngeal length; cardiac glands present ..... **Nygolaimidae**

— Basal expanded part of pharynx about two-third pharyngeal length, bibulbar; cardiac disc present ..... **Nygolaimellidae**

Family NYGOLAIMIDAE Thorne, 1935

Diagnosis : Lips usually closely amalgamated. Mural tooth variable in shape and size. Pharynx in three section. Three well developed cardiac glands present at junction of pharynx and intestine. Female reproductive system amphidelphic. Males generally with massive spicules, lateral guiding pieces and ventromedian supplements. Gubernaculum present or absent.

Type subfamily : Nygolaiminae Thorne, 1935

Key to subfamilies of NYGOLAIMIDAE Thorne, 1935

1 Mural tooth deltoid to linear or dorylaimoid ..... **Nygolaiminae**

— Mural tooth solididentoid or acicular ..... **Solididentinae**

Subfamily NYGOLAIMINAE Thorne, 1935

110. *Nygolaimus anneckei* Heyns, 1969

Material Examined : 8 females, 3 males.

Host : Millet, gram, sesame, wheat.

Localities : Bagtawar, Sriganganagar; Gudamalani, Barmer.

Distribution : Andaman and Nicobar, Gujarat, Rajasthan.

111. ***Nygolaimus harishi*** Ahmad and Jairajpuri, 1980

Material Examined : 5 females, 2 males.

Host : Onion, Millet.

Localities : Nachna, Jaisalmer; Kanaur, Hanumangarh; Gudamalani, Barmer.

Distribution : Gujarat, Haryana, Himachal Pradesh, Punjab, Rajasthan.

112. ***Nygolaimus hyans*** Thorne, 1974

Material Examined : 6 females.

Host : Lobiya, brinjal, wheat.

Localities Barmer, Churu, Jhunjhunu.

Distribution : Rajasthan.

113. ***Nygolaimus shamimi*** Bohra and Sultana, 2008

Material Examined : 2 females.

Host : Carrot, millet.

Type habitat and locality : Chikani, Alwar.

Other locality : Mathania, Jodhpur.

Distribution : Rajasthan.

114. ***Aquatides thornei*** (Schneider, 1937) Ahmad and Jairajpuri, 1982

Material Examined : 4 females.

Host : Cauliflower, onion, wheat.

Localities : Barmer, Hanumangarh, Jhunjhunu.

Distribution : Andaman and Nicobar, Bihar, Gujarat, Rajasthan.

115. ***Aquatides aquaticus*** (Thorne, 1930) Thorne, 1930

Material Examined : 2 females.

Host : Carrot, Millet.

Localities : Sriganganagar; Mathania, Jodhpur.

Distribution : Gujarat, Rajasthan, Uttar Pradesh.

Order TRIPLONCHIDA Cobb, 1920

Diagnosis : Body short and obese. Amphids post-labial with large fovea. Buccal cavity tubular, weakly cuticularised; spear complex and asymmetrical. Pharynx slender anteriorly, swelling posteriorly to form pyriform to elongate bulb. Prerectum absent. Female reproductive system amphidelphic, rarely mono-prodelphic; ovaries reflexed. Males with single testis and gubernaculums, no adanal pair of supplements. Spicules paired; lateral guiding pieces absent. Tail short, similar in sexes.

Type and only suborder : Diphtherophorina Coomans and Loof, 1970

Key to superfamilies of DIPHTHEROPHORINA Coomans and Loof, 1970

1 Spear short, vestibule with irregular sclerotised pieces ..... **Diphtherophoroidea**

— Spear long and very slender, vestibule without sclerotised pieces..... **Trichodoroidea**

Superfamily TRICHODOROIDEA Thorne, 1935 (Siddiqi, 1974)

Diagnosis : Body plump. Onchiostyle distally solid, dorsally convex, attached to dorsal wall of pharynx. Pharynx consisting of a narrow anterior part and a posterior pyroiform bulb containing five glands. Distinct excretory pore present. Prerectum absent. Female reproductive system monodelphic or amphidelphic. Male with single testis. Gubernaculum well-developed. Caudal alae present or absent.

Type and only family : Trichodoroidae Thorne, 1935 (Siddiqi, 1974)

Family TRIPLAONCHIDAE Thorne, 1935 (Siddiqi, 1961)

116. ***Paratrichodorus (A.) minor*** (Colbran, 1956) Siddiqi, 1974

Material Examined : 3 females.

Host : Onion, bean.

Localities : Tibi, Hanumangarh; Mathania, Jodhpur.

Distribution : Gujarat, Rajasthan.

117. ***Paratrichodorus (A.) porosus*** (Allen, 1957) Siddiqi, 1974

Material Examined : 2 females.

Host : Cauliflower, onion.

Locality : 1385 RD, Jaisalmer.

Distribution : Tropical and subtropical regions.

Order MONONCHIDA Jairajpuri, 1969

Diagnosis : Body large and stout, cuticle thick. Lip region expanded. Buccal cavity strongly sclerotized, provided with tooth or teeth, with or without longitudinal ventral ridges. Subventral walls with or without denticles. Pharyngo-intestinal junction tuberculate or non-tuberculate. Female reproductive system amphidelphic, mono-prodelphic or mono-opisthodelphic. Males with a series of ventromedians.

Type suborder : Mononchina Kirjanova and Krall, 1969

Key to suborders of MONONCHIDA Jairajpuri, 1969

1. Stoma heavily sclerotised, barrel or cup-shaped, armed with a large dorsal tooth ..... **Mononchina**

— Stoma moderately sclerotised, elongate or narrow, armed with subventral tooth ..... **Bathyodontina**

Suborders MONONCHINA Kirjanova and Krall, 1969

Diagnosis : Body large and stout, cuticle thick. Lip region expanded. Buccal cavity large and wide. Dorsal tooth prominent, ventral ridges and subventral teeth may or may not be present. Ventral ridges with or without denticles; subventral teeth may be as large as dorsal tooth and/or in the form of denticles.

Type suborder : Mononchoidea Chitwood, 1937

Key to superfamilies of MONONCHOIDEA Jairajpuri, 1969

1 Pharyngeo-intestinal junction non tuberculate; buccal cavity tapering at base ..... **Mononchoidea**

— Pharyngeo-intestinal junction tuberculate; buccal cavity broad and flat at base ..... **Anatonchoidea**

Superfamily MONONCHOIDEA Chitwood, 1937

Diagnosis : Buccal cavity thick-walled, tapering at base, dorsal tooth medium to large. Ventral longitudinal ridges, if present, with or without denticles. Pharyngo-intestinal junction non-tuberculate.

Type family : Mononchidae Chitwood, 1937

Key to families of MONONCHOIDEA Chitwood, 1937

1 Subventral and dorsal teeth nearly similar in shape and size ..... **Cobbonchidae**

— Subventral teeth if present, much smaller *2*

2.. Denticles either absent or arranged along a longitudinal rib ..... **Mononchidae**

— Denticles arranged in transverse rows or scattered or both ..... **Mylonchulidae**

Family MONONCHIDAE Chitwood, 1937

Diagnosis : Dorsal tooth usually large, pointing forward. Caudal glands and spinneret present or absent.

Type subfamily : Mononchinae Chitwood, 1937

Key to subfamilies of MONONCHIDAE Chitwood, 1937

1. Lips and labial papillae poorly developed; tail elongate cylindroids, caudal glands and spinneret well developed ..... **Mononchinae**

— Lips and labial papillae well developed; tail generally short conoid, caudal glands and spinneret absent or poorly developed ..... **Prionchulinae**

Subfamily MONONCHINAE Chitwood, 1937

118. ***Mononchus aquaticus*** Coetzee, 1968

Material Examined : 4 females.

Host : Carrot, Oat.

Locality : Sewa, Jaisalmer; Manaklaw, Jodhpur.

Distribution : Gujarat, Rajasthan, West Bengal.

Family MYLONCHULIDAE Jairajpuri, 1969

Diagnosis : Dorsal tooth opposed by several rows of denticles, arranged in transverse rows or scattered or both. Tail generally short, conoid and arcuate; caudal glands and spinneret usually well developed, rarely absent.

Type subfamily : Mylonchulinae Jairajpuri, 1969

Key to subfamilies of MYLONCHULIDAE Jairajpuri, 1969

1. Denticles arranged in transverse row(s)..... **Mylonchulinae**

— Denticles scattered irregularly ..... **Sporonchulinae**

Subfamily MYLONCHULINAE Jairajpuri, 1969

119. ***Mylonchulus amurus*** Khan and Jairajpuri, 1979

Material Examined : 3 females.

Host : Jawar, wheat.

Localities Kanaur, Hanumangarh; Sutharwala, Jaisalmer.

Distribution Rajasthan.

Remarks : New record from the state.

120. ***Mylonchulus hawaiiensis*** (Cassidy, 1931) Andrássy, 1958

Material Examined : 2 females.

Host Millet, soya.

Localities : Ramgarh, Jaisalmer; Utari, Barmer.

Distribution : Andman and Nicobar, Himachal Pradesh, Jammu, Sikkim, Rajasthan, Uttar Pradesh.

121. ***Mylonchulus minor*** (cob, 1893) Andrássy, 1958

Material Examined : 1 female.

Host Onion, bean.

Localities : Balasar, Barmer; Tibi, Hanumangarh.

Distribution Gujarat, Rajasthan.

122. ***Mylonchulus lacustris*** (N.A. Cobb in M. V. Cobb, 1915) Andrássy, 1958

Material Examined : 2 females.

Host Chilli, jawar.

Localities : Manai, Jodhpur; Dabri, Jaisalmer.

Distribution : Gujarat, Rajasthan, Uttarakhand.

Suborder BATHYODONTINA Coomans and Loof, 1970

Diagnosis Stoma narrow, weakly or strongly sclerotized. A distinct tooth present, with or without denticles. Dorsal pharyngeal gland nucleus far behind dorsal pharyngeal orifice.

Type superfamily : Bathyodontoidea Clark, 1961

Key to superfamilies of BATHYODONTINA Coomans and Loof, 1970

1 Stoma thin and narrow, tooth very small; polymyarian ..... **Bathyodontoidea**

— Stoma comparatively thick, tooth grooved and large; meromyarian ..... **Mononchulaoidea**

Superfamily BATHYODONTOIDEA Clark, 1961

Diagnosis : Stoma elongate, tooth very small. Denticles may be present in anterior part of stoma. Second sub-ventral gland nuclei far behind second subventral gland opening.

Type and only family : Bathyodontidae Clark, 1961

Family BATHYODONTIDAE Clark, 1961

123. ***Bathyodontus cylindricus*** Fielding, 1950

Material Examined : 12 females.

Host : Chilli, wheat.

Localities : Suratgarh, Sriganganagar, Ranasar, Barmer.

Distribution : Rajasthan, Uttarakhand.

Superfamily MONONCHULOIDEA De Coninck, 1965

Diagnosis : Stoma strongly sclerotized, tooth large, denticles in several rows. Dorsal pharyngeal gland nucleus at level of first subventral pharyngeal gland nuclei. Second subventral gland nuclei at about same level as secnd subventral gland opening.

Type and only family : Mononchulidae De Coninck, 1965

Family MONONCHULIDAE De Coninck, 1965

Diagnosis : Stoma long and deep with thick walls. Tooth large, denticles present. Tail short, hemispheroidal with well developed caudal glands and spinneret.

124. ***Oionchus obtusus*** Cobb, 1913

Material Examined : 6 females.

Host : Papaya, kakri.

Localities : Patodi, Barmer, Nachna, Jaisalmer.

Distribution : Gujarat, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand.

Order RHABDITIDA Chitwood, 1933

Diagnosis : Cuticle smooth or annulated. Lips mostly three or six, rarely four. Stoma generally prismatic/ tubular, longer than wide, fixed, non-protrusible; composed of cheilostom, gymnostom and stegostom. Pharynx composed of corpus, metacorpus, isthmus and basal bulb. Valve plates present in median or terminal bulb. Female reproductive system didelphic, amphidelphic or monodelphic, prodelphic. Vulva median or far posterior near anus. Males with single testis. Bursa present or absent, if present, always bearing paired genital papillae. Spicules free, occasionally fused distally. Gubernaculum simple or provided with sleeves. Phasmids distinct, often tubular.

Type suborder : Rhabditina Chitwood, 1933

Key to suborders of RHABDITIDA (Örley, 1880) Chitwood, 1933

1 Stoma well developed, either long, tubular or wide, spacious; pharynx usually with a median bulb or swelling, female gonad generally didelphic, bursa present or secondarily reduced 2

— Stoma small mostly quite narrow, pharynx without a median bulb or swelling, female gonad generally monodelphic, prodelphic; bursa primarily lacking 3

2. Pharynx usually with a valvate, muscular median bulb and a valveless terminal one; stoma often wide with usually large conspicuous teeth; bursa reduced in most cases ..... **Diplogasterina**

— Pharynx with a valvate terminal bulb; stoma usually tubular with small or minute denticles; bursa well-developed, only occasionally reduced ..... **Rhabditina**

3. Head margins strongly cuticularized and notched; amphids post-labial, mostly well discernible; female gonad amphidelphic or monodelphic ..... **Teratocephalina**

— Head margins not cuticularized, rarely notched, amphids on lips exceptionally post-labial; female reproductive system always monodelphic, prodelphic ..... **Cephalobina**

Suborder RHABDITINA Chitwood, 1933

Diagnosis : Cuticle usually striated. Lips three or six, rarely four. Labial sensilla papilliform or setose. Cheilostom generally not cuticularized; gymnostom and stegostom fused to form stomal tube. Stegostom surrounded by a thin pharyngeal collar. Metastegostom usually with three swellings each bearing 1-3 or more small teeth or denticles. Telostegostom short, continuing into pharyngeal lumen. Pharynx with three distinct parts: corpus, isthmus and basal bulb. Female reproductive system mostly didelphic, amphidelphic, rarely monodelphic, prodelphic. Vulva equatorial or post-equatorial. Ovary / ies reflexed. Spicules separate or fused distally; gubernaculum present. Bursa usually well- developed: peloderan, pseudopeloderan or leptoderan, rarely reduced; with seven to nine pairs of tubular genital papillae. Bursal edges open or closed anteriorly. Tails of both sexes similar or female tail longer.

Type superfamily : Rhabditoidea Örley, 1880

Key to superfamilies of RHABDITINA Chitwood, 1933

1. Stoma Panagrolaimus-type i.e. short and wide, weakly cuticularized; bursa absent ..... **Alloinematoidea**

— Stoma Rhabditis-type i.e., narrow and tubular, well cuticularized; bursa present 2

2. Body distinctly asymmetrical: left side with longitudinal ridges, right side with various

ornamentations (network, tubercles, warts, fins etc.) ..... **Bunonematoidea**

— Body symmetrical bilaterally, without such ornamentations ..... **Rhabditoidea**

Superfamily RHABDITOIDEA Örley, 1880

Diagnosis : Lips usually six. Stoma tubular or prismatic, longer than wide. Metastegostom with three swellings with each bearing small warts or denticles; telostegostom short. Pharyngeal corpus often swollen proximally. Female reproductive system didelphic, amphidelphic or monodelphic, prodelphic. Spicules separate or fused distally. Bursa present, generally well-developed, rarely reduced.

Type family: Rhabditidae Örley, 1880

Key to families of RHABDITOIDEA Örley, 1880

1 Dorsal and ventral lips transformed into hook-like structures ..... **Diploscapteridae**

— Lips normal, not hook-like 2

2. Anterior part of stegostom with a large, transverse dorsal tooth .... **Odontorhabditidae**

— Stoma without tooth, its walls parallel 3

3. Stoma short, about twice as long as wide; pharyngeal corpus cylindrical; bursa absent ..... **Rhabditonematidae**

— Stoma usually more than three times longer than wide; pharyngeal corpus mostly swollen; bursa well-developed, rarely rudimentary ..... **Rhabditidae**

Family RHABDITIDAE Örley, 1880

Diagnosis: Lip region generally with six distinct lips, rarely three lips in doublets. Stoma tubular or prismatic, usually three times longer than wide. Metastegostom with three swellings bearing warts or denticles. Female reproductive system didelphic, amphidelphic or monodelphic, prodelphic. Spicules separate or fused distally. Bursa mostly well-developed, peloderan or leptoderan, rarely rudimentary. Genital papillae generally seven to nine pairs. Tails of both sexes similar or male tail shorter.

Type subfamily: Rhabditinae Örley, 1880

Key to subfamilies of RHABDITIDAE Örley, 1880

1 Anterior intestinal region with stomach-like folds; bursa absent ..... **Stomachorhabditinae**

— Anterior intestinal region without folds; bursa present 2

2. Amphids large, conspicuous, at anterior level of stoma ..... **Amphidirabditinae**

— Amphids mostly very small, inconspicuous, on lateral lips 3

3. Stoma having distinct metastegostomal swellings with denticles 4

— Stoma lack distinct metastegostomal swellings with denticles ..... **Protorhabditinae**

4. Female reproductive system prodelphic; vulva far posterior; lips prominent, separate, mostly with setose papillae ..... **Mesorhabditinae**

— Female reproductive system didelphic; lips rarely separate, without setose papillae .. 5

5. Bursa peloderan, encircling tail tip ..... **Peloderinae**

— Bursa leptoderan, leaving tail tip free 6

6. Lips with fine ciliae or setose projections; pharyngeal collar longer than half stomal length ..... **Ablechroiulinae**

— without ciliae; pharyngeal collar usually shorter than half stomal length ..... **Rhabditinae**

Subfamily PROTORHABDITINAE Dougherty, 1955

125. ***Protorhabditis tristis*** (Hirschmann, 1952) Dougherty, 1955

Material Examined : 8 females.

Host : Sewage drain.

Locality : Pokaran, Jaisalmer; Air force colony, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : This species is new record from the state.

Subfamily MESORHABDITINAE Andrássy, 1976

126. ***Mesorhabditis miotki*** (Sudhaus, 1978) Andrássy, 1983

Material Examined : 6 females.

Host : Chilli, onion, jawar, millet, wheat.

Locality : Sanu, Jaisalmer, Manaklaw, Jodhpur, Bhakra, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

127. ***Mesorhabditis anisomorpha*** (Sudhaus, 1978) Andrássy, 1983

Material Examined : 3 females.

Host : Sewage drain.

Locality : Airforce Colony, Jodhpur; Mohangarh, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

128. ***Distolabrellus veechi*** Anderson, 1983

Material Examined : 4 females, 2males.

Host : Sewage drain.

Locality : Airforce Colony, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : This species is new record form the state.

Subfamily DIPLOSCAPTERINAE Micoletzky, 1922

129. ***Diploscapter cylindricus*** Rahm, 1929

Material Examined : 4 females.

Host : Sewage drain.

Locality : Nachna, Jaisalmer; Air force colony, Jodhpur.

Distribution : Rajasthan.

Remarks : This species is first time record from the state.

130. ***Diploscapter coronatus*** (Cobb, 1893) Cobb, 1913

Material Examined : 2 females.

Host : Brinjal.

Locality : Sewa, Jaisalmer.

Distribution : Rajasthan.

Remarks : New record from the state.

Suborder CEPHALOBINA Andrássy, 1974

Diagnosis : Lip margins smooth or notched, with or without complex processes. Stoma narrow, with distinct cheilostom, gymnostom and stegostom. Pharynx tripartite; corpus cylindrical, isthmus thin, basal bulb rounded with distinct valve plate. Female reproductive system monodelphic, prodelphic with offset spermatheca. Ovary reflexed directed posterior with or without double flexure near germinal zone. Males monarchic, without bursa.

Type superfamily : Cephaloboidea Filipjev, 1934

Key for superfamily of CEPHALOBINA Andrássy, 1974

1. Pharynx simple, cylindrical, corpus, isthmus and bulb not distinct ... **Drilonematoidea**

— Pharynx tripartite, with distinct corpus, isthmus and basal bulb 2

2. Stoma narrow, ovary reflexed with 1-2 flexure posterior to vulva ..... **Cephaloboidea**

— Stoma at least in anterior part spacious, post vulval part of ovary attenuated and double reflexed 3

3. Labial region bordered laterally by membranous fins/flap ..... **Elaphonematoidea**

— Body without probolae, fins / flap 4

4. Bursa present, with large bursal papillae, spicules absent ..... **Myolaimoide**

— Bursa absent, male with small bursal papillae, spicules always persent ..... **Panagrolaimoidea**

Superfamily CEPHALOBOIDEA Filipjev, 1934

Diagnosis : Cuticle distinctly annulated. Lip region with complex processes. Stoma narrow, with distinct rhabdions. Pharynx tripartite; corpus cylindrical to fusiform without median bulb, isthmus thin, basal bulb rounded valvate. Female reproductive system monodelphic, prodelphic with offset spermatheca, ovary reflexed directed posteriorly and having double flexure near germinal zone. Males monarchic, without bursa.

Type family : Cephalobidae Filipjev, 1934

Key for family of CEPHALOBOIDEA Filipjev, 1934

1 Vulva posteriorly situated, very close to anal opening, post vulval sac absent ..... **Metacrobiladae**

— Vulva not closed with anal opening, mostly at two third of body length, post vulval sac absent ..... **Cephalobidae**

Family CEPHALOBIDAE Filipjev, 1934

Diagnosis : Cuticle single or double, distinctly annulated. Lips six in duplex or amalgamated, with or without probolae. Stoma with distinct rhabdions. Pharynx cylindrical anteriorly, with valvated terminal bulb. Female reproductive system prodelphic, ovary reflexed, with or without flexure posterior to vulva. Post-vulval uterine sac more or less developed. Males with single testis, separate spicules and small cuticularised gubernaculum. Bursa absent. Genital papillae about eight pairs typically arranged.

Type subfamily Cephalobinae Filipjev, 1934

Key for subfamily of CEPHALOBIDAE Filipjev, 1934

1 Lip region notched, with labial and cephalic probolae 2

— Lip region smooth, without probolae 3

2. Lip region with large cephalic and insignificant labial probolae ..... **Kirjanoviinae**

— Cephalic probolae small, always shorter than labial probolae ..... **Acrobelinae**

3. Cheilostom and promesostom broader than stegostom part of stoma ..... **Panagrocephalinae**

— Only cheilostom broader than remaining part of stoma ..... **Cephalobinae**

Subfamily CEPHALOBINAE Filipjev, 1934

131. ***Cephalobus bodenheimeri*** (Stainer, 1936) Andrássy, 1984

Material Examined : 3 females, 2 males.

Host : Onion, millet, soya.

Locality : Sutharwala, Jaisalmer, Munda, Hanumangarh.

Distribution : Rajasthan, Uttar Pradesh.

132. ***Cephalobus cubaensis*** Steiner, 1935

Material Examined : 2 females.

Host : Gram.

Locality : Manaksar, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

133. ***Cephalobus litoralis*** (Akhtar, 1962) Andrássy, 1984

Material Examined : 4 females, 3 males.

Host : Groundnut,oat, jawar.

Locality : Nachna, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

134. ***Cephalobus parvus*** Thorne, 1937

Material Examined : 4 females.

Host : Brinjal, papaya.

Locality : 1385RD, Jaisalmer, Kanaur, Hanumangarh.

Distribution : Rajasthan, Uttar Pradesh.

135. ***Cephalobus pinguimucronatus*** Andrássy, 1968

Material Examined :2 females.

Host : Chilli, onion.

Locality : Sundra, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

136. ***Cephalobus quadrilineatus*** Eroshenko, 1968

Material Examined : 4 females.

Host : Millet, unidentified grass.

Locality : Sutharwala, Jaisalmer, Birmala, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

137. ***Cephalobus quinilineatus*** (Shavrov, 1968) Anderson and Hooper, 1970

Material Examined :2 females.

Host : Onion.

Locality : Dabri, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the State.

138. ***Eucephalobus hooperi*** Marinari-Palmisano, 1967

Material Examined : 4 females.

Host : Cauliflower, bajra.

Locality Kavas, Barmer.

Distribution : Rajasthan.

Remarks : New Record from the State.

139. ***Heterocephalobus bisimilis*** (Thorne, 1925) Andrássy, 1967

Material Examined : 2 females.

Host : Groundnut.

Locality : Kishangarh, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Subfamily ACROBELINAE Thorne, 1937

140. ***Acrobeles complexus*** Thorne, 1925

Material Examined : 3 females, 2 males.

Host : Carrot, millet, oat, soya.

Locality : Ranasar, Barmer, Mohangarh, Jaisalmer.

Distribution : Rajasthan.

Remarks : New record from the state.

141. ***Acrobeles cylindricus*** Loof, 1964

Material Examined : 5 females.

Host : Brinjal, coriander, groundnut.

Locality : Kanaur, Hanumangarh, Manaklaw, Jodhpur.

Distribution : Rajasthan.

Remark : First time reported from India.

142. ***Acrobeles dimorphus*** Heyns and Hogewind, 1969

Material Examined : 6 females, 5 males.

Host : Chilli, onion, papaya, wheat.

Locality : Sutharwala, Mohangarh, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

143. ***Acrobeles ensicaudatus*** Thorne and Allen, 1965

Material Examined : 2 females.

Host : Groundnut.

Locality : Dabri, Jaisalmer.

Distribution : Rajasthan.

Remarks : New record from the India.

144. ***Acrobeles kotingotingus*** Yeates, 1967

Material Examined : 2 females.

Host : Cauliflower.

Locality : Kavas, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : First time reported from India.

145. ***Acrobeles marianne*** (Andrássy, 1968) Andrássy, 1985

Material Examined : 3 females.

Host : Brinjal, banana.

Locality : 1305RD, Nachna, Jaisalmer.

Distribution : Rajasthan.

Remarks : New record from India.

146. ***Acrobeles oasiensis*** Boström, 1985

Material Examined : 2 females.

Host : Papaya, brinjal.

Locality : Suratgarh, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

147. ***Acrobeles sheasbyi*** Heyns and Hogewind, 1969

Material Examined : 1 female.

Host : Brinjal.

Locality : Rampura, Hanumangarh.

Distribution : Rajasthan.

Remarks : New record from the state.

148. ***Acrobeles timmi*** Chaturvedi and Khera, 1979

Material Examined : 2 females, 1 male.

Host : Onion, soya.

Locality : Sam, Jaisalmer, Manai, Jodhpur.

Distribution : Rajasthan.

149. ***Acrobeles welwitschiae*** (Rashid, Heyns and Coomans, 1990) Shahina and De Ley, 1997

Material Examined : 1 female.

Host : Wheat.

Locality : Pokaran, Jaisalmer.

Distribution : Rajasthan.

Remark : First time recorded from India.

150. ***Acrobeloides enoplus*** Steiner, 1938

Material Examined : 2 females.

Host : Brinjal.

Locality : Kolayat, Bikaner.

Distribution : Rajasthan, Uttar Pradesh.

151. ***Acrobeloides tricornis*** (Thorne, 1925) Thorne, 1937

Material Examined : 5 females.

Host : Banana, oat, groundnut.

Locality : 1305RD, Jaisalmer, Birmala, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

152. ***Cervidellus serricephalus*** (Thorne, 1925) Thorne, 1937

Material Examined : 3 females.

Host : Banana, jawar.

Locality : Munda, Hanumangarh, Nokhra, Bikaner.

Distribution : Rajasthan.

Remarks : New record from the state.

153. ***Chiloplacus jodhpurensis*** Rathore and Nama, 1992

Material Examined : 8 females, 6 males.

Host : Carrot, groundnut, onion, jawar, millet.

Locality : Mohangarh, Jaisalmer, Balasar, Barmer, Manaklaw, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh.

154. ***Chiloplacus kralli*** Bagaturija, 1973

Material Examined : 3 females.

Host : Oat, millet.

Locality : Ramgarh, Jaisalmer, Deshnok, Bikaner.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

155. ***Chiloplacus magnus*** Rashid and Heyns, 1990

Material Examined : 4 females.

Host : Carrot, gram.

Locality : Utari, Barmer.

Distribution : Rajasthan.

Remarks : New record from India.

156. ***Chiloplacus obtusus*** Baranovskaja and Haque, 1968

Material Examined : 2 females, 1 male.

Host : Jawar, millet.

Locality : Kavas, Barmer.

Distribution : Rajasthan.

Remarks : First time reported from the state.

157. ***Chiloplacus quadricarinatus*** (Thorne, 1925) Thorne, 1937

Material Examined : 2 females.

Host : Onion.

Locality : Sutharwala, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

158. ***Chiloplacus scelerovaginatus*** Sumenkova and Razzhivln, 1968

Material Examined : 3 females, 4 males.

Host : Brinjal, papaya, wheat.

Locality : Sutharwala, Jaisalmer, Lalgarh, Bikaner, Manaklaw, Jodhpur.

Distribution : Rajasthan.

Remarks : First time reported from the state.

159. ***Chiloplacus trilineatus*** Steiner, 1940

Material Examined : 3 females.

Host : Soya, jowar.

Locality : Manaksar, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

160. ***Stegellata georgica*** Bagaturija, 1973

Material Examined : 4 females.

Host : Til.

Locality : 1305RD, Jaisalmer.

Distribution : Rajasthan.

Remarks : New record from India.

161. ***Stegellata ophioglossa*** Andrássy, 1967

Material Examined : 4 females.

Host : Brinjal.

Locality : Ramgarh, Jaisalmer.

Distribution : Rajasthan.

Remarks : New record from the state.

162. ***Zeldia acuta*** Allen and Noffsinger, 1972

Material Examined : 2 females, 1 male.

Host : Brinjal.

Locality : Munda, Hanumangarh.

Distribution : Rajasthan.

Remarks : First time reported from India.

163. ***Zeldia feria*** Allen and Noffsinger, 1972

Material Examined : 4 females, 2 males.

Host : Carrot, gram.

Locality : Gudamalani, Barmer, Manai, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

164. ***Zeldia minor*** Allen and Noffsinger, 1972

Material Examined : 3 females, 2 males.

Host : Sesame, wheat.

Locality : Birmala, Sriganganagar, Mohangarh, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

165. ***Zeldia punctata*** (Thorne, 1925) Thorne, 1937

Material Examined : 8 females, 3 males.

Host : Carrot, groundnut, onion, chilli, jawar, wheat.

Locality : Suratgarh, Sriganganagar, Tibi, Hanumangarh, Sewa, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Superfamily PANAGROLAIMOIDEA Thorne, 1937

Diagnosis : Labial margins smooth. Lips simple without probolae; labial papillae minute. Anterior part of stoma wider than posterior one. Female reproductive system monodelphic, prodelphic. Post vulvar part of ovary straight rarely flexured. Bursa absent.

Type family : Panagrolaimidae Thorne, 1937

Key to families of PANAGROLAIMOIDEA Thorne, 1937

1 Stoma tubular, its cuticularised part twice as long as wide 2

— Stoma not tubular, its cuticularized part about as long as wide ..... **Panagrolaimidae**

2. Stoma very long and narrow. Vulva in middle of body. Ovary reflexed posterior to vulva; post-uterine sac present ..... **Alirhabditidae**

— Stoma short, moderately expanded; vulva near to anus; post-uterine present ..... **Brevibuccidae**

Family PANAGROLAIMIDAE Thorne, 1937

Diagnosis : Stomal components well conspicuous; gymnostom strongly cuticularized than rest of stomal components. Pharyngeal corpus usually swollen. Vulva at 2/3rd of body length. Ovary posterior to vulva with flexures. Post- uterine sac present.

Type subfamily : Panagrolaiminae Thorne, 1937

Key to subfamilies of PANAGROLAIMOIDEA Thorne, 1937

1 Pharynx with bulb-like median swelling, metastegostom long ..... **Tricephalobinae**

— Pharynx without bulb-like median swelling, metastegostom short 2

2. Gymnostom very minute, anterior end of spicules hooked ..... **Panagrellinae**

— Gymnostom well developed, rod-like; anterior end of spicules not hooked 3

3. Spicules S-shaped, curved, slender ..... Turbatricinae

— Spicules not S-shaped, plump ..... Panagrolaiminae

Subfamily: PANAGROLAIMINAE Thorne, 1937

166. ***Panagrolaimus chaleographi*** Fuchs, 1930

Material Examined : 2 females.

Host : Banana.

Locality : Jasana, Hanumangarh.

Distribution : Rajasthan.

Remarks : New record form the state.

167. ***Panagrolaimus dendroctoni*** (Fuchs, 1932) Rühm, 1956

Material Examined : 1 female.

Host : Wheat.

Locality : Tibi, Hanumangarh.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

168. ***Panagrolaimus hygrophilus*** Bassen, 1940

Material Examined : 4 females.

Host : Brinjal, onion.

Locality : 1385RD, Jaisalmer, Air force colony, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh.

169. ***Panagrolaimus multidentatus*** (Ivanova, 1958) Goodey, 1963

Material Examined : 2 females.

Host : Papaya.

Locality : Shiv, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : First time reported from the state.

170. ***Panagrolaimus obesus*** Thorne, 1937

Material Examined : 2 females.

Habitat : Sewage drain.

Locality : Nachna, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

171 ***Panagrolaimus paradoxus*** (Kreis, 1963) Andrássy, 1984

Material Examined : 3 females.

Host : Jowar, wheat.

Locality : Manaklaw, Jodhpur, Lalgarh, Bikaner.

Distribution : Rajasthan, Uttar Pradesh.

172. ***Procephalobus brunettiae*** Marinari, 1957

Material Examined : 1 female.

Host: Groundnut.

Locality : Manaksar, Sriganganagar, Kalyanpur, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

173. ***Procephalobus halophilus*** (Meyl, 1954) Andrássy, 1984

Material Examined : 5 females.

Host : Onion, millet, wheat.

Locality : Sanu, Jaisalmer, Birmala, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

Subfamily TRICEPHALOBINAE Andrássy, 1976

174. ***Tricephalobus steineri*** (Andrássy, 1952) Rühm, 1956

Material Examined : 5 females.

Host : Jawar, wheat.

Locality : Mohangarh, Jaisalmer, Deshnok, Bikaner.

Distribution : Rajasthan, Uttar Pradesh.

Suborder DIPLOGASTRINA Micoletzky, 1922

Diagnosis : Body smooth. Lips six, labial sensilla papilliform; cephalic sensilla usually setose in male. Stoma tubular or wide. Stegostom usually asymmetrical: dorsal metastegostomal plate mostly stronger and differently structured than the subventrals and often with large movable claw-like tooth. Pharynx divisible into anterior muscular procorpus

continuing into strongly swollen median bulb with valve plates and posterior part with isthmus and glandular terminal bulb. Female reproductive system mostly didelphic, amphidelphic, rarely monodelphic. Spicules free, rarely fused. Bursa rudimentary or completely absent. Tail in both sexes long, usually filiform.

Type superfamily : Diplogastroidea Micoletzky, 1922

Key to the superfamilies of DIPLOGASTRINA Micoletzky, 1922

1. Pharynx with prominent valvated median bulb ..... **Diplogastroidea**

— Pharynx without distinct median bulb 2

2. Stoma extraordinarily long, narrow, thin, about 1/4th of entire pharyngeal length or longer, without distinct tooth ..... **Cylindrocorporoidea**

— Stoma small, wide, with distinct tooth ..... **Odontopharyngoidea**

Superfamily DIPLOGASTROIDEA Micoletzky, 1922

Diagnosis : Lips six. Amphidial opening either small or indistinct on lips or large and post labial. Cheilostomal mostly cuticularised. Metastegostom armed with tooth. Pharynx always with valvate median bulb and a distinguishable terminal bulb. Female reproductive system amphidelphic, rarely monodelphic. Bursa reduced, rudimentary or absent.

Type family : Diplogastridae Micoletzky, 1922

Key to the families of DIPLOGASTROIDEA Micoletzky, 1922

1. Body asymmetrical; left side marked with warts, right side showing longitudinal ridges; medial bulb unusually strong; spicules usually long ..... **Hetropleuronematidae**

— Body symmetrical; median bulb normal; spicules short 2

2. Both anterior and posterior pharyngeal parts well built, terminal bulb with a grinder ..... **Pseudodiplogastroididae**

— Anterior part of pharynx muscular, posterior part with weak terminal bulb without a grinder 3

3. Cheilostom simple, without ribs/ rugae Telostegostom unusually long, tubular, with three conical tubercles at base ..... **Tylopharyngidae**

— Cheilostom with ribs/ rugae. Telostegostom only rarely long, without conical tubercles 4

4. Stoma distinctly longer than wide; cheilostom weakly or not cuticularised, metastegostom with small tooth; amphids similar in both sexes ..... **Diplogastroididae**

— Stoma usually wide, exceptionally longer; cheilostom cuticularised; metastegostom with strong tooth 5

5. Stoma asymmetrical with right subventral metastegostom having one large claw-like tooth, left side with either smooth or with a denticulate plate; telostegostom tubular ..... **Neodiplogastridae**

— Dorsal tooth immovable; stoma symmetrical with identical subventral metastegostomal plates; telostegostom insignificant ..... **Diplogastridae**

Family DIPLOGASTRIDAE Micoletzky, 1922

Diagnosis : Cuticle finely striated, often provided with longitudinal striations. Amphids small, anteriorly located, occasionally wide and posteriorly located. Cheilostom cuticularised often divided into rods. Gymnostom rarely tubular with cuticularised walls. Stegostomal walls with prominent conspicuous teeth. Dorsal tooth immovable, always stronger than subventrals. Pharynx with well developed median and terminal bulb. Female reproductive system amphidelphic. Bursa always rudimentary. Spicules free. Caudal papillae 7-10 pairs.

Type subfamily : Diplogastrinae Micoletzky, 1922

Key to the subfamilies of DIPLOGASTRIDAE Micoletzky, 1922

1 Median bulb long; double so longer than wide; dorsal tooth plate-like, not fixed ..... **Demaniellinae**

— Medium bulb round; dorsal tooth claw-like, movable 2

2. Cheilostom smooth, rarely weakly striated; each subventral metastegostomal swelling with a small comma-like tooth ..... **Diplogastrinae**

— Cheilostom longitudinally striated; subventral metastegostomal swelling either smooth, unarmed or notched ..... **Paroigolaimellinae**

Subfamily DIPLOGASTRINAE Micoletzky, 1922

175. ***Butlerius okai*** Rahm, 1938

Material Examined : 5 females, 3 males.

Host : Sewage drain.

Locality : Jaisalmer, Jodhpur, Rawatsar, Hanumangarh.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

176. ***Diplogasteritus nudicapitatus*** (Steiner, 1914) Paramonov, 1952

Material Examined : 4 females, 3 males.

Host : Sewage drain.

Locality : Airforce colony, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh.

Family NEODIPLOGASTRIDAE (Paramonov, 1952) Andrássy, 1984

Diagnosis : Cheilostom and gymnos-promesostegostom with similar length. Metastegostom asymmetrical, dorsal with movable claw-like tooth, at right subventral usually equally formed but weakly cuticularised claw-like tooth, while left sub-ventral either smooth or with a denticulate plate. Female reproductive system amphidelphic. Males without bursa.

Type subfamily : Neodiplogastrinae Paramonov, 1952

Key to the subfamilies of NEODIPLOGASTRIDAE Paramonov, 1952

1. Dorsal and right subventral metastegostomal swelling each with one large claw- shaped tooth ..... **Neodiplogastrinae**

— Metastegostomal swelling with one large claw-like tooth; subventral tooth either very small or absent ..... **Glauxinematinae**

Subfamily NEODIPLOGASTRINAE Paramonov, 1952

177. ***Mononchoides longicaudatus*** (Khera, 1965) Andrássy, 1984

Material Examined : 4 females, 2 males.

Host : Sewage drain.

Locality : Air force Colony, Jodhpur, Nokhra, Bikaner.

Distribution : Rajasthan, Uttar Pradesh.

Order MONHYSTERIDA De Coninck and Schuurmans Stekhoven, 1933

Diagnosis : Cuticle smooth or finely striated, without punctations. Body usually with small sub median somatic setae. Amphidial apertures circular or sub spiral, exceptionally spiral. Stoma generally small, unarmed or spacious and armed. Pharynx cylindroid with expanded base, rarely with bulb-like terminal swelling. Female reproductive system monodelphic, prodelphic. Ovary single, outstretched. Vulva post-equatorial. Testis single, outstretched. Male pre cloacal supplements usually lacking, if present simple type. Spicules slender. Gubernaculum often with a caudal apophysis. Tail long, narrowing down to

terminus. Three caudal glands arranged linearly, opening through terminal pore or spinneret. Males usually rare.

Type suborder : Monhysterina De Coninck and Schuurmans Stekhoven, 1933

Key to suborders of MONHYSTERIDA De Coninck and Schuurmans Stekhoven, 1933

1. Amphids circular 2
— Amphids spiral ..... **Meyliina**
2. Ovary single; pharynx cylindroid, rarely with bulb-like swelling ..... **Monhysterina**
— Ovaries paired; pharynx with a terminal bulb-like swelling ..... **Linhomoeina**

Suborder MONHYSTERINA De Coninck and Schuurmans Stekhoven, 1933

Diagnosis : Labial sensilla in two circlets; inner sensilla mostly papilliform, outer labial and cephalic ones setose. Amphidial apertures circular, rarely spiral (sub spiral), at anterior or posterior level of stoma or still beyond it. Stoma small, funnel-shaped, rarely armed with denticles. Female gonad unpaired, and mostly outstretched. Males generally without pre anal supplements. Gubernaculum with caudal apophysis.

Type superfamily : Monhysteroidea de Man, 1876.

Key to superfamilies MONHYSTERINA De Coninck and Schuurmans Stekhoven, 1933

i. Stoma in one part 2
— Stoma in two parts: an anterior atrium and posterior globular chamber bearing one or two small denticles ..... **Diplolaimelloidoidea**
2. Stoma narrow, funnel-shaped, with or without cuticularisation, vestibule smooth ..... **Monhysteroidea**
— Stoma relatively wide and spacious, cuticularised, vestibule longitudinally striated ..... **Sphaerolaimoidea**

Superfamily MONHYSTEROIDEA de Man, 1876

Diagnosis : Amphidial apertures circular, mostly simple, rarely double-walled. Stoma funnel-shaped, narrow, armed with tooth, vestibule smooth. Pharynx slightly expanded at base. Female gonad unpaired, ovary anteriorly outstretched, rarely reflexed. Males with single or double testes.

Type family : Monhysteridae de Man, 1876

Key to families of Superfamily: MONHYSTEROIDEA de Man, 1876

1. Cuticle smooth, rarely finely striated; testis single; testis and ovary located at right side of intestine ..... **Monhysteridae**

— Cuticle distinctly striated; testes double; testes and ovary located at left side of intestine ..... **Xyalidae**

Family MONHYSTERIDAE de Man, 1876

Diagnosis : Inner labial sensilla mostly papilliform; outer labial and cephalic sensilla setose with cephalics longer than outer labials. Amphidial aperture circular, round or slightly oval, at different distances from anterior end. Pharynx cylindroid with expanded base. Female gonad with single outstretched ovary, located at right side of intestine. Males with single outstretched testis. Spicules slender; pre cloacal papillae absent; gubernaculum mostly with a caudal apophysis. Tail long conoid or filiform, with terminal duct not elongated or sclerotised. Males usually rare.

Type and only subfamily : Monhysterinae de Man, 1876

Subfamily MONHYSTERINAE de Man, 1876

178. ***Monhystera Africana*** Andrássy, 1964

Material Examined : 2 females.

Host : water body.

Locality : Ramgarh, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Order ARAEOLAIMIDA De Coninck and Schuurmans Stekhoven, 1933

Diagnosis : Cuticle annulated without punctations. Cephalic setae 4. Amphids simple circular or open spiral i.c., hook-like. Somatic setae sparse, fine thin. Stoma narrow, anteriorly widened, rarely with denticles. Pharynx bearing terminal bulb or bulb-like swelling. Cardia muscular. Female reproductive system mostly paired. Male papillae tubular, cuticularized, only rarely papillae form.

Type and only suborder : Araeolaimina De Coninck and Schuurmans Stekhoven, 1933.

Key to suborders of ARAEOLAIMIDA De Coninck and Schuurmans Stekhoven, 1933

1. Stoma narrow, tubular, simple; pharynx swollen proximally; head with 4 setae or setae absent ..... **Araeolaimina**

Suborder ARAEOLAIMINA De Coninck and Schuurmans Stekhoven, 1933

Diagnosis : Cephalic papillae minute, setae 4 or absent. Stoma narrow, tubular. Pharynx with proximal swelling. Annules broken through by ring-like pores.

Type superfamily : Araeolaimoidea De Coninck and Schuurmans Stekhoven, 1933

Key to superfamilies of ARAEOLAIMINA De Coninck and Schuurmans Stekhoven, 1933

1. Pharyngeal bulb provided with well-developed valve plates ..... **Plectoidea**

— Pharyngeal bulb absent or without valve plates 2

2. Pre anal supplements of males cuticularized, tubular or cup-shaped, often reaching up to pharynx ..... **Leptolaimoidea**

— Pre-anal supplements of males, if present not cuticularized, papilliform 3

3. Stoma with three teeth. Terminal pharyngeal bulb muscular ..... **Haliplectoidea**

— Stoma without teeth. Terminal pharyngeal bulb less muscular ..... **Araeolaimoidea**

Superfamily PLECTOIDEA Örley, 1880

Diagnosis : Cephalic setae present. Stoma without teeth. Pharynx with well-developed terminal bulb having valve plates. Female genital organ amphidelphic. Male genital papillae tubular, cuticularized and protruded, rarely papilliform.

Type and only family : Plectidae Örley, 1880

Family PLECTIDAE Örley, 1880

Diagnosis : Cephalic setae four, prominent. Amphids either round or oval, often questionmark-like. Stoma tube-like without teeth. Pharyngeal bulb strongly valvate. Female reproductive system paired; ovaries reflexed. Males with pre anal supplements or tubular papillae. Tail with terminal spinneret.

Type subfamily : Plectinae Örley, 1880

Key to subfamilies of PLECTIDAE Örley, 1880

1. Cervical region with ventral and dorsal ear-like cervical expansion. Lip region having associated cornua ..... **Wilsonematinae**

— Cervical region without ear-like cervical expansion. Lip region without cornua ..... **Plectinae**

Subfamily PLECTINAE Örley, 1880

179. ***Plectus parvus*** Bastian, 1865

Material Examined : 3 females.

Host : Groundnut, jowar, wheat.

Locality : Sutharwala, Jaisalmer, Manaklaw, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh.

180. ***Plectus minimus*** Cobb, 1893

Material Examined : 4 females.

Host : Chilli, onion.

Locality : Manaksar, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

Superfamily ARAEOLAIMOIDEA De Coninck and Schuurmans Stekhoven, 1933

Diagnosis : Cephalic setae 4, present. Stoma prismatic, without teeth. Pharynx posteriorly not swollen. Precloacal supplements of males papilliform.

Type and only family : Cylindrolaimidae Micoletzky, 1922

Family CYLINDROLAIMIDAE Micoletzky, 1922

Diagnosis : Cuticle finely annulated. Cephalic setae 4. Stoma cylindrical, cuticularized. Amphids round or oval in shape. Pharynx cylindrical, without swollen basal bulb. Female reproductive system amphidelphic, rarely prodelphic. Males with few precloacal papillae. Tail with terminal mucro.

Type and only subfamily : Cylindrolaiminae Micoletzky, 1922

Subfamily CYLINDROLAIMINAE Micoletzky, 1922

181. ***Cylindrolaimus monhystera*** Schneider, 1937

Material Examined : 3 females.

Host : Water body.

Locality : Birmala, Barmer, Kavas, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

182. ***Cylindrolaimus obtusus*** Cobb, 1916

Material Examined : 2 female.

Host : Water body.

Locality : 1385Rd, Jaisalmer, Bay Tu, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

Superfamily LEPTOLAIMOIDEA Örley, 1880

Diagnosis : Amphids spiral, mostly big. Female reproductive system amphidelphic. Pre anal organ tubular.

Type family : Leptolaimidae Örley, 1880

Key to families of LEPTOLAIMOIDEA Örley, 1880

1. Stoma long, tubular. Pharynx with basal bulb, with muscular cardia .... **Leptolaimidae**

— Stoma small, prismatic. Pharynx without basal bulb ans muscular cardia..... **Halaphanolaimidae**

Family LEPTOLAIMIDAE Örley, 1880

Diagnosis : Cuticle finely striated. Cephalic setae 4. Amphids spiral, small. Stoma tubular, cuticularised. Pharynx with swollen basal bulb and large muscular cardia. Female reproductive system amphidelphic or monoprodelphic.

Type and only subfamily : Leptolaiminae Örley, 1880

Subfamily LEPTOLAIMINAE Örley, 1880

183. ***Chronogaster brasiliensis*** Meyl, 1957

Material Examined : 1 female.

Host : Papaya.

Locality : Tibi, Hanumangarh.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from state.

184. ***Chronogaster daoi*** Loof, 1964

Material Examined : 6 females.

Host Brinjal, wheat, water body.

Locality : Manaksar, Sri Ganganagar, Manaklaw, Jodhpur.

Distribution : Rajasthan.

Remarks : New record from India.

185. ***Chronogaster typica*** *(De Man, 1921)* De Coninck, 1935

Material Examined : 3 females.

Host : Millet, water body.

Locality : Kanaur, Hanumangarh, Sutharwala, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Superfamily HALIPLECTOIDEA Chitwood, 1951

Diagnosis : Cephalic setae present or absent. Stoma very narrow with fine tooth/teeth. Pharyngeal bulb present. Female gonad usually didelphic-amphidelphic, rarely monodelphic. Males usually with small, papilliform pre cloacal supplements. Tail with terminal spinneret.

Type subfamily : Rhabdolaimidae Chitwood, 1951

Key to superfamily of HALIPLECTOIDEA Chitwood, 1951

1. Amphids conspicuous, circular, tooth absent in stoma ..... **Haliplectidae**

— Amphids inconspicuous, oval, 3 small teeth present in stoma ..... **Rhabdolaimidae**

Family RHABDOLAIMIDAE Chitwood, 1951

Diagnosis : Cephalic setae present or absent. Amphids small, rounded. Stoma long and narrow with three small anteriorly-located teeth. Female reproductive system mostly paired with ovary/ies outstretched or reflexed. Males without pre cloacal supplements. Tail with terminal spinneret.

Type subfamily : Rhabdolaiminae Chitwood, 1951

Key to subfamilies of Rhabdolaimidae Chitwood, 1951

1. Cheilostom with twelve longitudinal rugae, stoma with three denticles, arranged in two separate groups; female reproductive system mono-prodelphic. **Monochromadorinae**

2. Stoma with three denticles arranged in one group, female reproductive system didelphic ..... **Rhabdolaiminae**

Subfamily RHABDOLAIMINAE Chitwood, 1951

186. ***Rhabdolaimus terristris*** De Man, 1880

Material Examined : 3 females.

Host : Wheat, jawar, water body.

Locality : Munda, Hanumangarh, Jaisalmer, Jodhpur, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

187. ***Rhabdolaimus aquaticus*** De Man, 1880

Material Examined : 4 females.

Host : Onion, chilli, water body.

Locality : Mohangarh, Jaisalmer, Shiv, Barmer, Tibi, Hanumangarh.

Distribution : Rajasthan, Uttar Pradesh.

188. ***Rhabdolaimus brachyuris*** Meyl, 1954

Material Examined : 2 females.

Host : Wheat, water body.

Locality : 1305RD, Jaisalmer, Manaksar, Sriganganagar.

Distribution : Rajasthan, Uttar Pradesh.

Order CHROMADORIDA Chitwood, 1933

Diagnosis : Cephalic setae 4, 4+6 or more. Cuticle with fine punctation or ornamentation. Amphids mostly spirally coiled, rounded, rarely slit like. Stoma funnel-shaped always possessing denticles: one dorsal tooth and two subventral teeth. Pharynx muscular, cylindrical or with prominent posterior swelling. Female reproductive system didelphic, ovaries reflexed. Pre anal copulatory organs, whenever present, small, cuticularized, knob-like. Caudal glands and spinneret present.

Type suborder : Chromadorina Chitwood and Chitwood, 1937

Key to suborders of CHROMADORIDA Chitwood, 1933

1 Amphids slit-like, often indistinct; pharyngeal bulb robust ..... **Chromadorina**

— Amphids spiral, prominent; pharyngeal bulb absent 2

2. Cuticle with ornamentation. Amphids mostly spiral with narrow coils ..**Cyatholamina**

— Cuticle without ornamentation. Amphids spiral widely coiled ..... **Desmodorina**

Suborder CYATHOLAIMINA De Coninck, 1965

Diagnosis : Cuticle annulated only rarely smooth, mostly with transverse rows of punctation. Lips provided with 4, 4+6 or more sensilla. Amphids mostly spiral, well conspicuous. Stoma with three teeth. Pharynx with or without bulb.

Only superfamily : Cyatholaimoidea Filipjev, 1918

Superfamily CYATHOLAIMOIDEA Filipjev. 1918

Diagnosis : Cuticle transversely striated, mostly punctated. Cephalic setae usually longer than labials. Amphids spiral, conspicuous. Stoma with three equal teeth or with one powerful dorsal tooth and two smaller subventral teeth. Pharynx with or without bulb.

Type family : Cyatholaimidae Filipjev, 1918

Key to families of CYATHOLAIMOIDEA Filipjev, 1918

1. Stoma cylindrical, surrounded by separate pharyngeal swelling. Tooth prominently large ..... **Ethmolaimidae**

— Stoma funnel-shaped without separate pharyngeal swelling. Dorsal tooth powerful than two subventral teeth ..... **Cyatholaimidae**

Family CYATHOLAIMIDAE Filipjev, 1918

Diagnosis : Lips with 4+6 sensilla. Cuticular annules with fine punctations. Amphids spiral-shaped, at middle or base of stoma. Stoma funnel-shaped with one large dorsal tooth and two smaller subventral teeth. Pharynx not noticeably swollen in stomal region, with or without bulb. Female reproductive system didelphic, amphidelphic ovaries reflexed. Spicules relatively shorter. Pre-anal supplements when present, small, cuticularized. Tail with long spinneret.

Type subfamily : Cyatholaiminae Filipjev, 1918

Key to subfamilies of CYATHOLAIMIDAE Filipjev, 1918

1. Pharyngeal bulb present. Males with insignificant pre anal organ..... **Cyatholaiminae**

— Pharyngeal bulb absent, female with bristle like pre anal organ ..... **Paracanthochinae**

Subfamily CYATHOLAIMINAE Filipjev, 1918

189. ***Achromadora micoletzkyi*** (Stefanski, 1915) Van Der Linde, 1938

Material Examined : 3 females.

Host : Soya, wheat.

Locality : Ranasar, Barmer, Manai, Jodhpur.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

190. ***Achromadora ruricola*** (De Man, 1880) Micoletzky, 1925

Material Examined : 5 females.

Host : Banana, wheat.

Locality : Sutharwala, Jaisalmer, Manaklaw, Jodhpur.

Remarks : New record from the state.

Order ENOPLIDA Chitwood, 1933

Diagnosis : Cuticle mostly smooth or weakly striated. Lip sensilla representing 6+6+4 setae in two or three circles; the setae can be jointed. Amphidial aperature non-spiral, mostly slit-like with amphidial fovea pocket-like, rarely spiral. Stoma varying in form mostly provided with teeth/denticles. Pharynx cylindrical, often with wider base, rarely with bulb-like swelling. Female reproductive system typically didelphic, amphidelphic rarely monodelphic, prodelphic; ovaries antidromously reflexed. Male reproductive system diorchic with opposed testis, pre cloacal supplements papilloid or cuticularised. Caudal glands and spinneret usually present.

Type suborder : Enoplina Chitwood, 1933

Key to suborders of ENOPLIDA Chitwood, 1933

1. Stoma spacious, with one large dorsal and two or more subventral teeth; pharyngeal tissue surrounds proximal end of stoma ..... **Oncholaimina**

— Stoma narrower, with weakly cuticularised walls, different arrangement of teeth, pharyngeal tissue surrounds distal end of stoma 2

2. Cuticle at lip region double; stoma complicated; pre cloacal supplements cuticularised, tubular ..... **Enoplina**

— Cuticle at lip region single; stoma simple, supplements papilloid or setose .. **Tripylina**

Suborder TRIPYLINA Andrássy, 1974

Diagnosis : Cuticle smooth rarely annulated, weakly thickened on lip region. Cephalic setae short papilloid or lacking. Amphidial aperture small, slit-like. Stoma simple, funnel-shaped, cylindrical or quite narrow, mostly bearing denticles, Pharynx cylindroid or gradual

widening posteriad. Males with gubernaculum and papilliform or setose pre cloacal supplements, the latter often very large, vesiculate.

Type superfamily : Tripyloidea de Man, 1876

Key to superfamilies of TRIPYLINA Andrássy, 1974

1. Stoma practically absent; amphids often enlarged longitudinally; Body slende ..... **Oxystominoidea**

— Stoma present exceptionally narrow; amphids narrow; body stouter 2

2. Stoma tubular, long, with parallel walls, teeth when present, lying at proximal or distal end of stoma ..... **Ironoidea**

— Stoma funnel- or barrel-shaped, teeth arising from walls of stoma ..... **Tripyloidea**

Superfamily TRIPYLOIDEA de Man, 1876

Diagnosis : Lips separate; amphidial aperture slit-like. Stoma barrel-shaped, with or without teeth. Supplements in males either papilloid or setose, vestibulate.

Type family : Tripylidae de Man, 1876

Key to families of TRIPYLOIDEA de Man, 1876

1. Female genital duct opening in to cloaca or lying quite near to it .... **Laurtonematidae**

— Female genital opening well separated from anus 2

2. Stoma large barrel-shaped or prismatic, pharyngeal tissue areolated ..... **Prismatolaimidae**

— Stoma narrow, funnel-shaped or quite straight; pharyngeal tissue more or less homogeneous ..... **Tripylidae**

Family PRISMATOLAIMIDAE Micoletzky, 1922

Diagnosis : Cuticle finely annulated with scattered setae. Six longer outer labials and four shorter cephalic setae, either located one or two circlets. Buccal cavity spacious with sclerotised walls, armed with one or three teeth. Pharynx transversely areolated, cylindrical. Cardia multinucleate, surrounded by coelomocytes. Behind cardia, organellum dorsale may be present. Female genital system amphi- or mono-prodelphic. Males rare. Spicules simple with anterior sheath; precloacal supplements small, extending occasionally up to pharyngeal region. Tail in both sexes similar, long and finely attenuated.

Type subfamily : Prismatolaiminae Micoletzky, 1922

Key to subfamilies PRISMATOLAIMIDAE Micoletzky, 1922

1. Cephalic setae in two circlets; 4 shorter cephalic setae located behind 6 longer labial ones; stoma with large teeth ..... **Onchulinae**

— Cephalic setae in one circle; stoma with small denticles at base ..... **Prismatolaiminae**

Subfamily PRISMATOLAIMINAE Micoletzky, 1922

191. ***Prismatolaimus parvus*** Milne, 1963

Material Examined : 4 females.

Host : Water body.

Locality : 1385Rd, Jaisalmer, Patodi, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

192. ***Prismatolaimus leptolaimus*** Andrássy, 1969

Material Examined : 1 female.

Host : Brinjal, sewage drain.

Locality : Sewa, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Family TRIPYLIDAE de Man, 1876

Diagnosis : Body length ranging from 0.4-3.4mm. Cuticle striated or smooth under LM.Crystalloids present all over body. Lip region continous. Lip three with small inner labial sensilla. Sensilla of outer periphery comprising of 6+4 setae, arranged in one or two circles; six outer labials usually longer than cephalics. Amphids cup-shaped, at level of stoma. Stoma quite narrow, non sclerotized with three small teeth at its base, rarely at middle. Pharynx cylindrical without terminal bulb. Cardiac glands three. Female reproductive system didelphic, amphidelphic or monodelphic, prodelphic, ovaries reflexed. Testis diorchic. Spicules more or less enclosed in a muscular pouch. Ventromedian supplements papilloid generally extending to pharyngeal region. Caudal glands and terminal spinneret usually well developed.

Type subfamily : Tripylinae de Man, 1876

Key to subfamilies of TRIPYLIDAE de Man, 1876

1 Cephalic setae present; stoma narrow, teeth at its base; spicules surrounded by muscular pouch; supplements generally extending to pharyngeal region..... **Tripylinae**

2. **Cephalic and cervical setae present; stoma narrow, teeth at its base; spicules not surrounded by muscular pouch; precloacal supplements not extending to anterior half of body ..... Trischistomatinae**

3. **Cephalic setae absent; stoma spacious, teeth in middle of stoma; spicules in muscular pouch; supplements extending to pharyngeal region ..... Tobriliinae**

Subfamily Trischistomatinae Andrássy, 2007

Family TRIPYLIDAE Örley, 1880

193. ***Trischistoma pellucidum*** Cobb, 1913

Material Examined : 12 females.

Host : Jawar, millet, papaya.

Locality : Gudamalani, Kalyanpur, Barmer, Roopsi, Jaisalmer.

Remarks : New record from the state.

Subfamily TOBRILIINAE Andrássy, 2007

194. ***Tobrilus longus*** (Leidy, 1852) Andrássy, 1959

Material Examined : 2 females.

Host : Pond (water body), sewage drain.

Locality : Dabri, Jaisalmer, Manai, Jodhpur, Sundra, Barmer.

Distribution : Rajasthan, Uttar Pradesh.

195. ***Tobrilus stefanskii*** Micoletzky, 1922

Material Examined : 3 females.

Host : Wheat, pond (water body).

Locality : Balasar, Barmer, Tibi, Hanumangarh.

Remarks : New record from the state.

196. ***Tobrilus paludicola*** (Micoletzky, 1925) Andrássy, 1959

Material Examined : 1 female.

Host : Sugarcane, pond (water body).

Locality : Nachna, Jaisalmer.

Distribution : Rajasthan, Uttar Pradesh.

Remarks : New record from the state.

Table 2 : Known Diversity of Plant and Soil Nematodes in Thar Desert

Orders	Families	Genera	Species
Tylenchida	7	17	36
Aphelenchida	1	1	1
Dorylaimida	12	29	79
Triplonchida	1	1	2
Mononchida	4	4	7
Araeolaimida	4	4	10
Monhysterida	1	1	1
Enoplida	3	3	6
Rhabditida	4	18	53
Chromodorida	1	1	2
TOTAL	**38**	**79**	**197**

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Plate 1

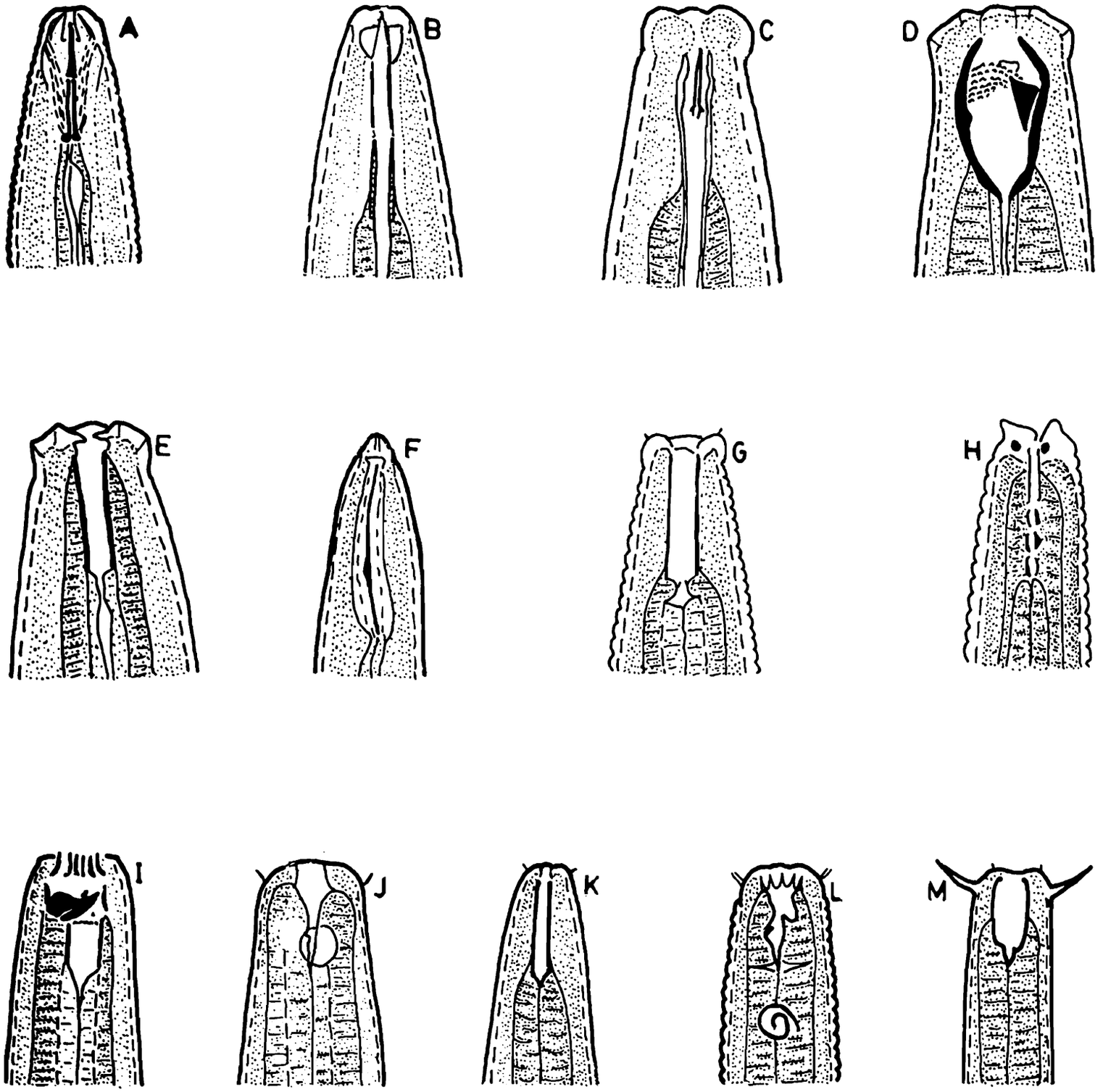


Fig. 1. Anterior end of Nematodes: **A.** Tylenchina-Tylenchus; **B.** Dorylaimina-Dorylaimus; **C.** Nygolaimina-Nygolaimus; **D.** Mononchina-Mylonchulus; **E.** Bathyodontina-Bathyodontus; **F.** Triplonchina-Paratrichodorus; **G.** Rhabditina-Mesorhabditis; **H.** Cephalobina-Chiloplacus; **I.** Diplogastrina-Mononchoides; **J.** Monhysterina-Monhystera; **K.** Araeolaimina-Cylindrolaimus; **L.** Chromadorina-Achromadorina; **M.** Enoplida-Prismatolaimus.

Plate 2

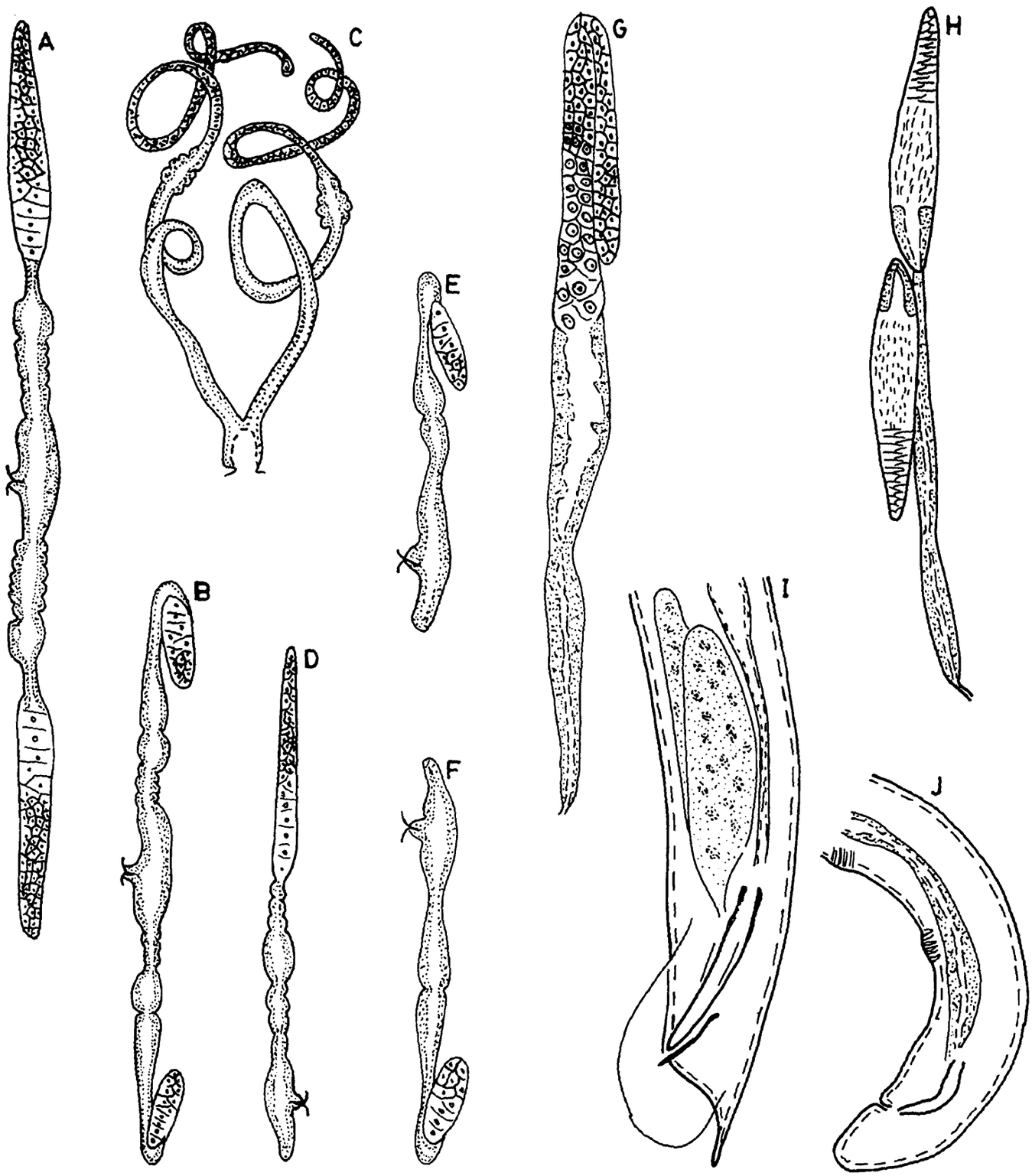


Fig. 2. (A-F). Female reproductive system in nematodes **A.** Didelphic-out streached; **B.** Didelphic-reflexed; **C.** Didelphic-coiled; **D.** Monoprodelphic-streached; **E.** Monoprodelphic-reflexed; **F.** Opisthodelphic-reflexed; (G-J). Male reproductive system and accessory structure. **G.** Monorchic; **H.** Diorchic; **I.** Posterior region showing bursa, spicule and ejaculatory glands; **J.** Posterior region showing spicule, fascicles and ejaculatory glands.

Plate 3

Fig. The diversity in plants and soil Nematodes reported under different orders from the Thar Desert

(Total number of species = 197)

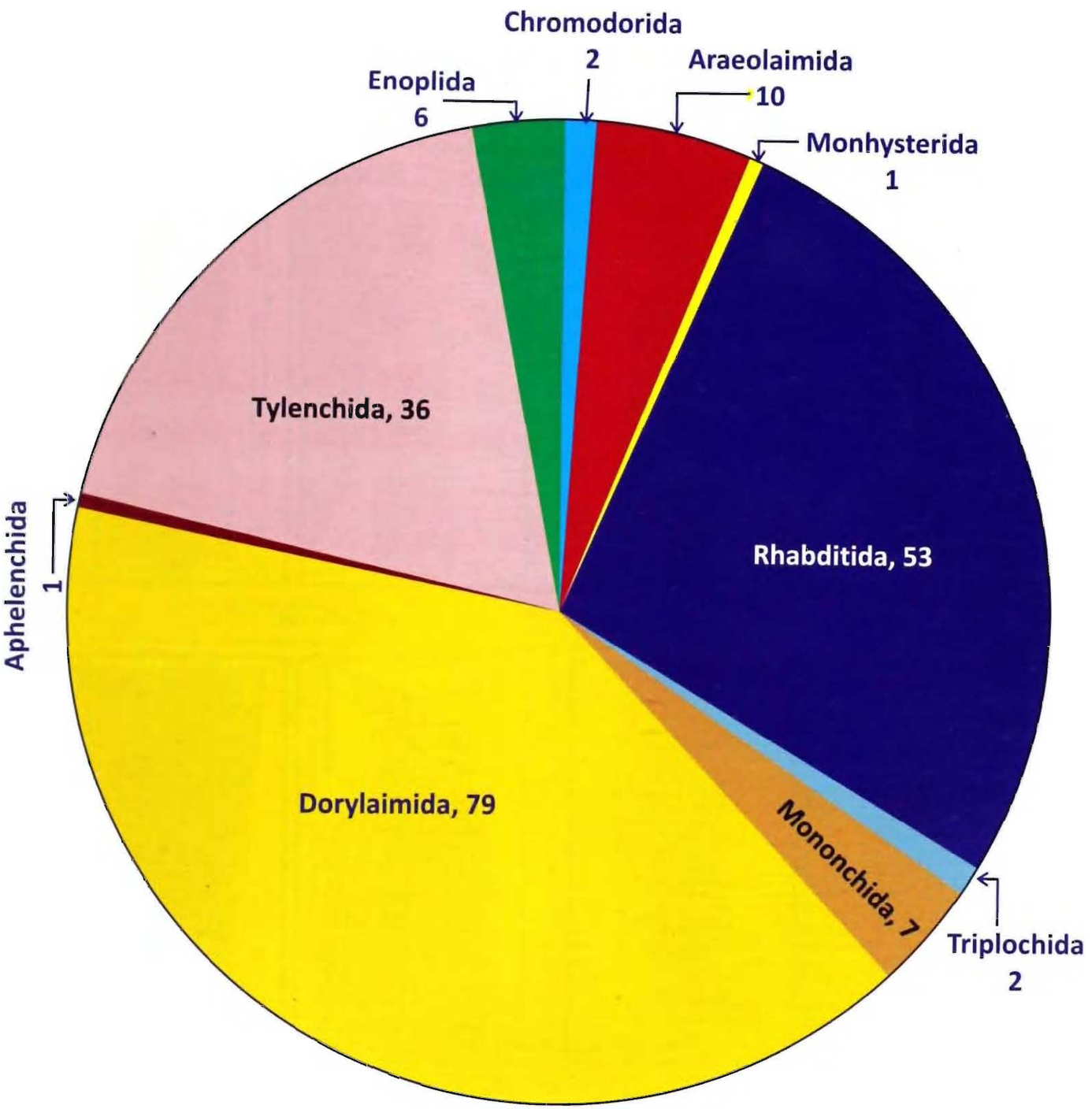
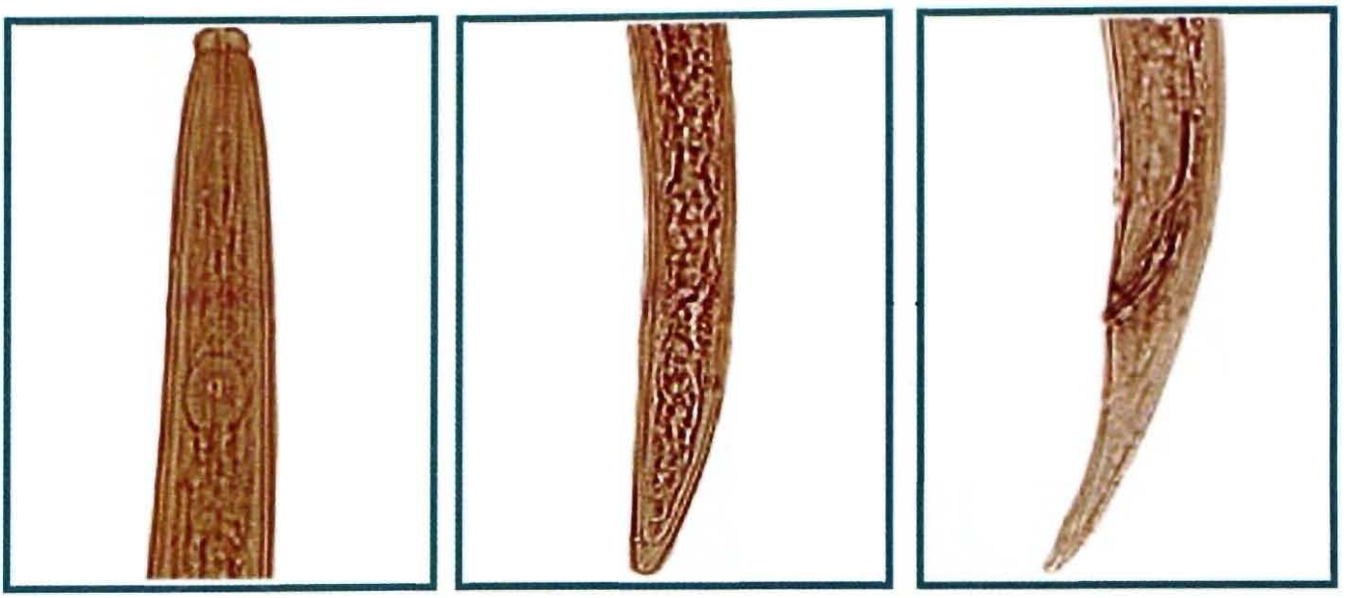
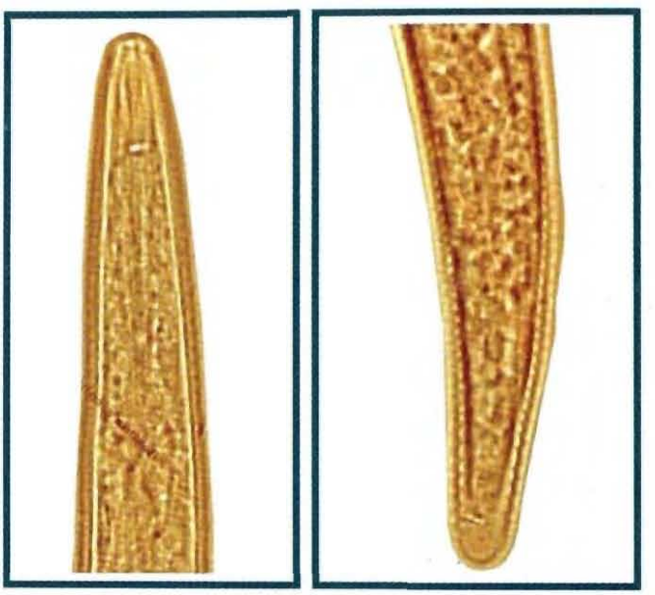


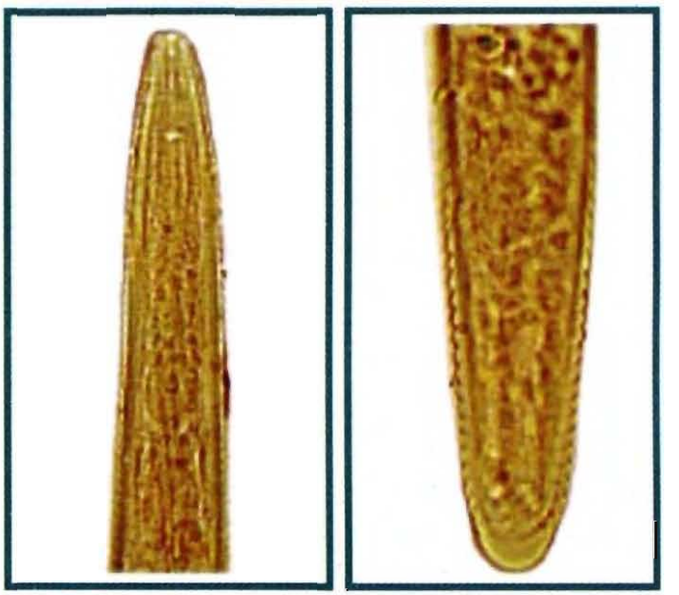
Plate 4



Tylenchorhynchus clarus

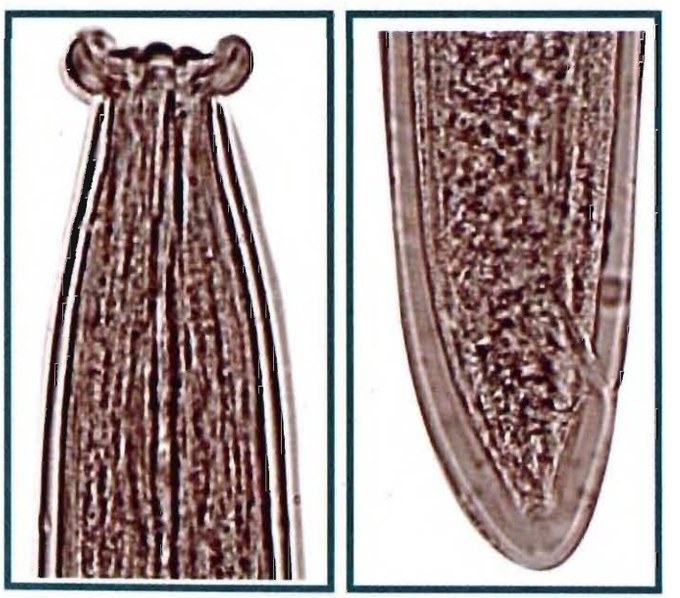


Tylenchorhynchus mashoodi



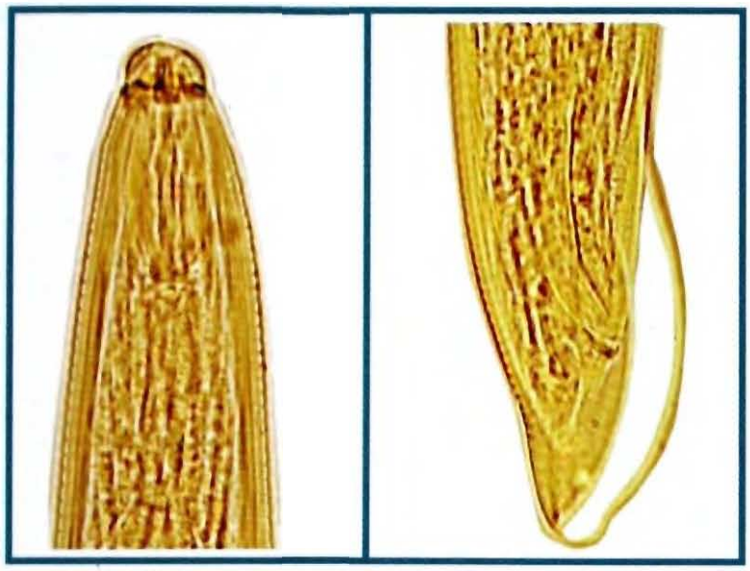
Merlinius breveidense

Latocephalus lotus



Discolaimus tenax

Plate 5

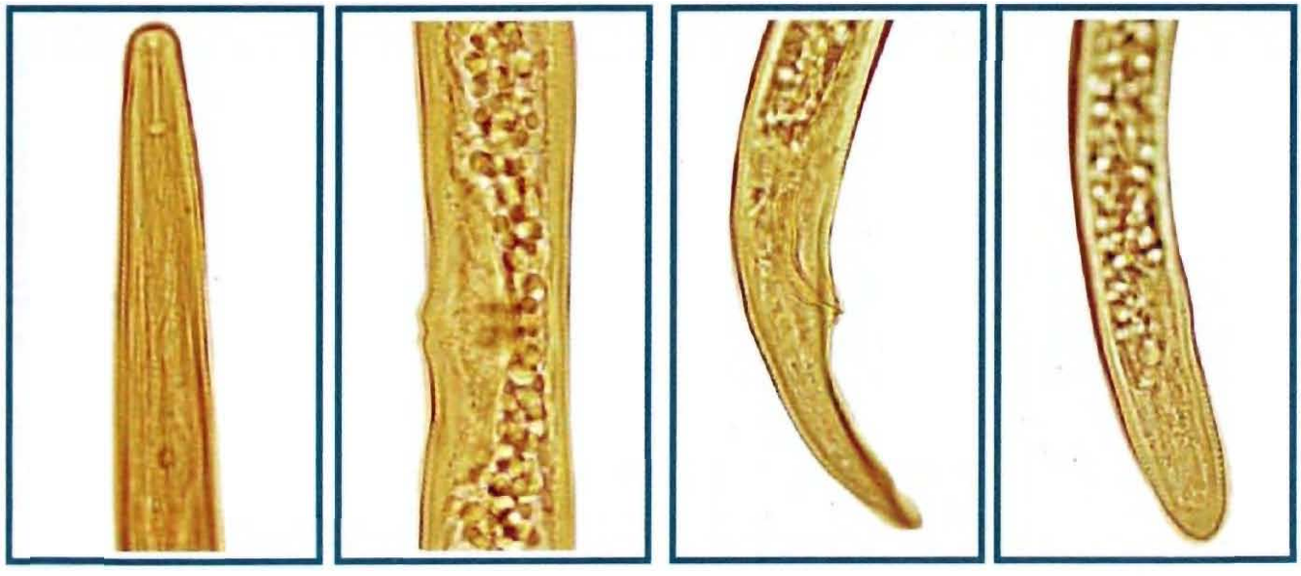


Hopolaimus indicus

H. conicephalus

Pratylenchus loosi

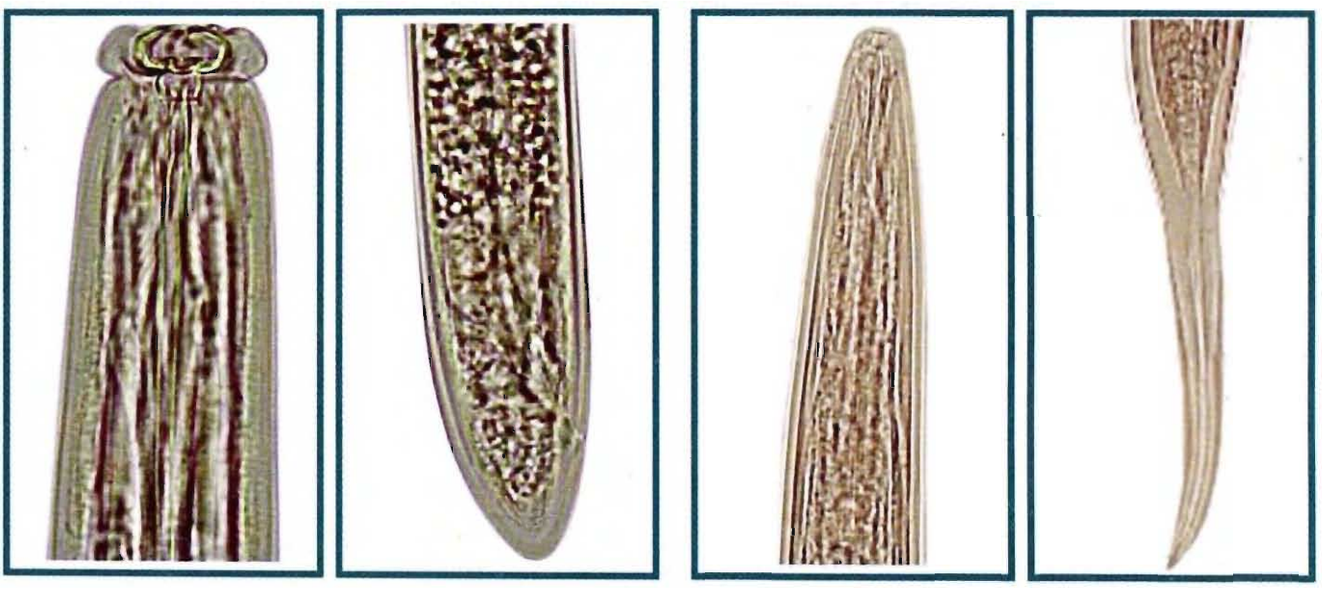
Pratylenchus goodeyi



Hirschmanniella oryzae

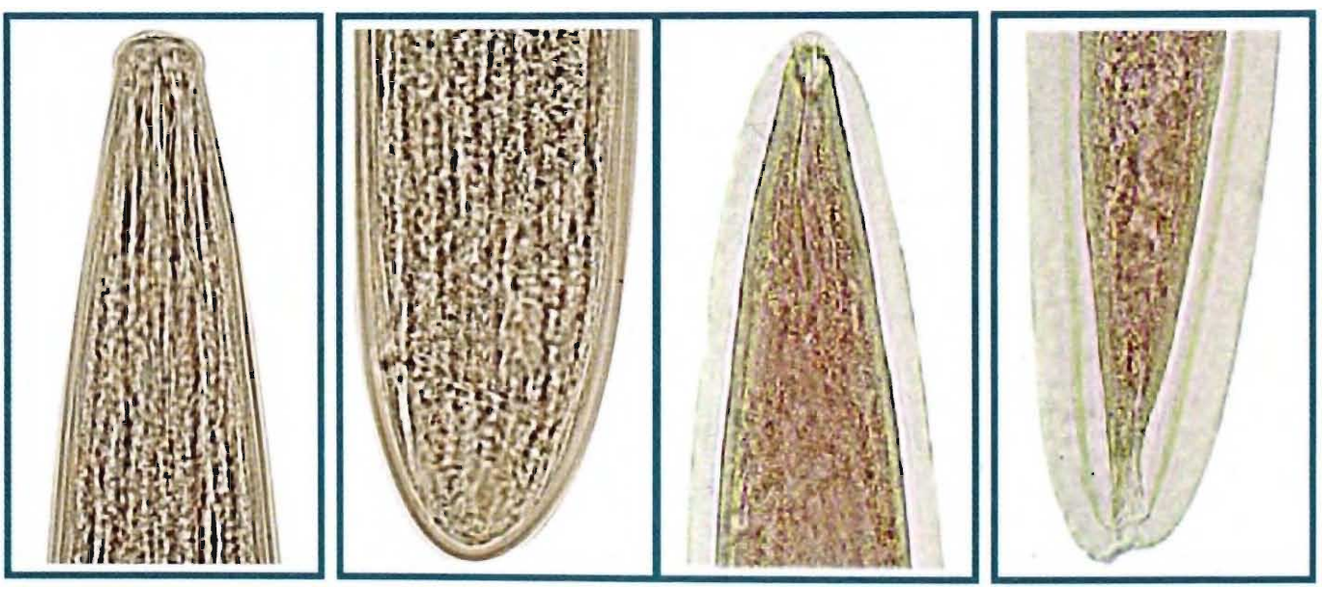
Plate 6

Neoactinolaimus rajasthanensis



Carcharolaimus masoodi

Dorylaimoides (D.) micoletkyi



Aquatides thornei

Paratrichodorus porosus

Plate 7

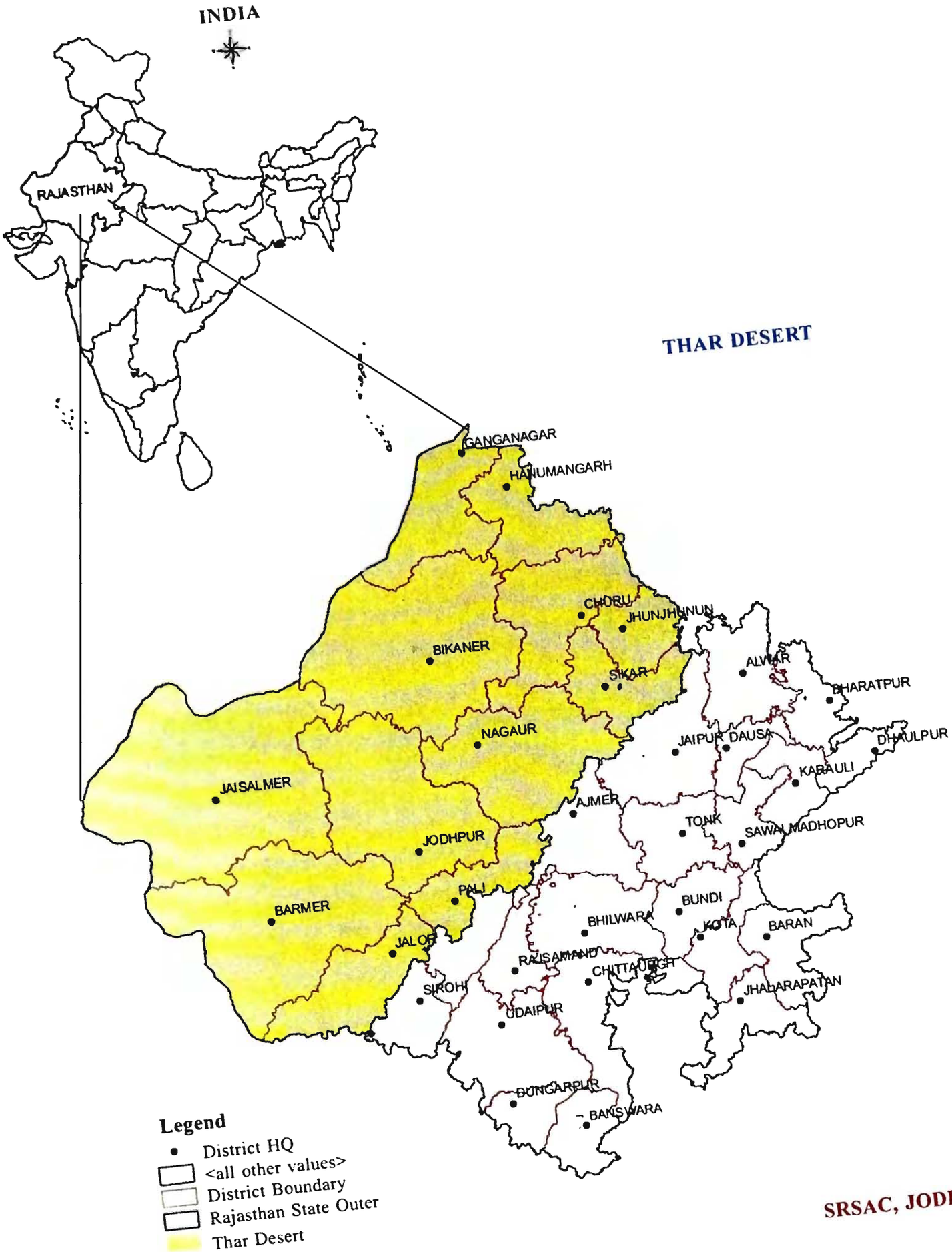
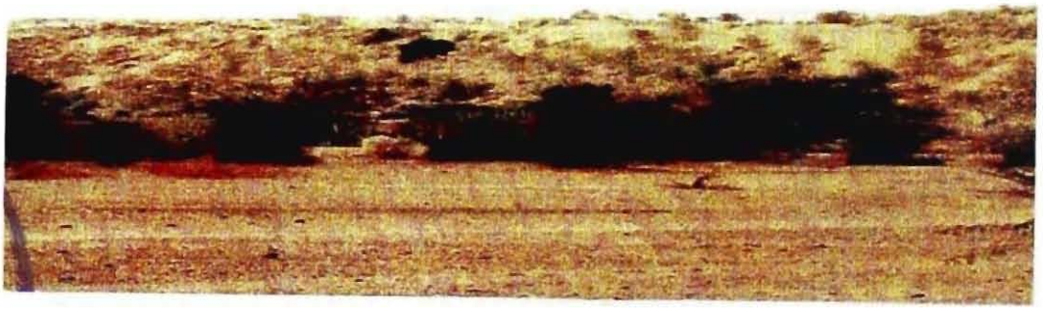

INDIA
RAJASTHAN
THAR DESERT
GANGANAGAR
HANUMANGARH
CHURU
JHUNJHUNUN
BIKANER
ALWAR
SIKAR
BHARATPUR
NAGAUR
JAIPUR
DAUSA
DHAULPUR
KARAULI
JAISALMER
AJMER
TONK
SAWAI MADHOPUR
JODHPUR
PALI
BUNDI
BARMER
BHILWARA
KOTA
BARAN
JALOR
RAJSAMAND
CHITTAURGH
SIROHI
JHALARAPATAN
UDAIPUR
DUNGARPUR
BANSWARA
Legend
District HQ
<all other values>
District Boundary
Rajasthan State Outer
Thar Desert
SRSAC, JODHPUR

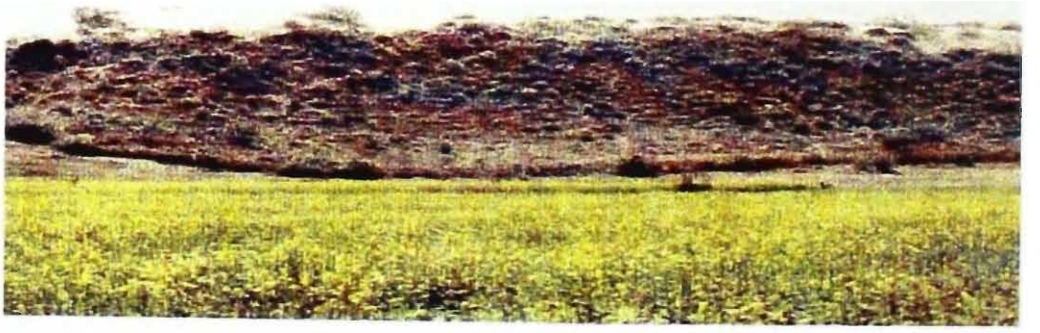
Plate 8

Desert



Stabilized Sand Dunes

Indira Gandhi Nahar



Crop Field (Ecological Transformation)