FAUNA OF
ANDHRA PRADESH

PART - 4
Invertebrates

ZOOLOGICAL SURVEY OF INDIA
FAUNA OF ANDHRA PRADESH

Invertebrates

(PART–4)

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FAUNA OF ANDHRA PRADESH
Invertebrates

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INTRODUCTION

Andhra Pradesh is the fifth largest state in terms of geographical dimension. It lies between 12°50' and 19°54' N and longitudes 76°50' and 86°50' E. It lies on the Eastern sea-board of the peninsula and has a coast line of 982 Kms and total land area is 2,76,814 sq.kms. The state is bounded on the north by Madhya Pradesh and Orissa, on the east by the Bay of Bengal, on the South by Tamilnadu and on the West by Maharashtra and Karnataka. It has 23 districts and Hyderabad is the state capital. Two major river systems namely Godavari & Krishna alongwith their several tributaries drain the state. Evergreen, semi-evergreen and moist deciduous forests are found in the state.

About work so far done

Most of the works has been done by R. Madhavi and Hanumantha Rao on trematodes of fishes and reptiles. However, a good number of trematode parasites from reptilian hosts has been described by S.S. Simha. A perusal of the literature shows that a considerable number of trematode fauna of fish, amphibia and reptilia have been found. In the present work 154 species of 108 genera under 26 families have been described. The report is based upon partly on the specimens already present in the Zoological Survey of India and mostly on the species reported in different literatures. It has been our endeavour to include all the trematode species of fish, amphibia and reptilian hosts so far reported. The report provides workable keys for the future workers in this group. This is a comprehensive account and prime introduction of the group reported from Andhra Pradesh.

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SYSTEMATIC ACCOUNT

I. Family LEPOCREADIIDAE (Odhner, 1905) Nicoll, 1935

Key to the subfamilies of LEPOCREADIIDAE

1. Prostatic complex poorly developed, enclosed in cirrus pouch .................................. OPISTHOGONOPORINAE
CHAKRABARTI and GHOSH: Trematodes of Fishes, Amphibia & Reptilia

1. Testes symmetrical, cirrus pouch pre-acetabular. \textit{Lepocreadioides}
   - Testes diagonal, cirrus pouch post acetabular Cirrus and metraterm aspinose. 2
2. Vitelline follicles small. \textit{Preptetos}
   - Vitelline follicles comparatively smaller. 3
3. Genital pore more or less submedian, between acetabulum and intestinal bifurcation. \textit{Pseudocreadium}
4. Genital pore anterolateral to acetabulum. \textit{Opechona}

1. Genus \textit{Pseudocreadium} Layman, 1930

1. \textit{Pseudocreadium indicum} Madhavi, 1972


\textit{Material}: 39 exs.

\textit{Host}: \textit{Monacanthus chirocephalus}; Loc: Int.

\textit{Locality}: Waltair Coast., Andhra Pradesh, India

\textit{Distribution}: India: Andhra Pradesh.
2. Genus *Opechona* Looss, 1907

**Key to the species of Opechona**

- Sucker ratio 1 : 1–1.3 ................................................................. *O. waltairensis*
- Sucker ratio 1 : 1–1.5 ................................................................. *O. bacillaris*

2. *Opechona bacillaris* Molin, 1859


*Materials*: 4 numerous exs.

*Host*: *Rostrelliger canagurta*.

*Location*: Int.

*Locality*: Wailtair Coast, Andhra Pradesh.

*Distribution*: India, Andhra Pradesh.

*Elsewhere*: Batavii Mediterranean, Atlantic, N. America, Russia.


*Material*: 4 exs.

*Host*: *Rastrelliger canagurta*.

*Location*: Int.

*Locality*: Waltair Coast, Andhra Pradesh.

*Distribution*: India : Andhra Pradesh.

3. Genus *Preptetos* Pritchard, 1960


*Material*: 8 exs.

*Host*: *Chaetodon pictus*.

*Location*: Int.

*Locality*: Waltair Coast, Andhra Pradesh.

*Distribution*: India : Andhra Pradesh.
4. Genus *Lepocreadioides* Yamaguti, 1936

5. *Lepocreadioides indicum* Srivastava, 1941


*Material*: 12 exs.

*Host*: *Cynoglossus lida*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

ii. Subfamily *OPISTHOGONOPORINAE* (Yamaguti, 1937) Yamaguti, 1958

5. Genus *Opisthogonoporidae* Madhavi, 1972


*Materials*: 1 ex.

*Host*: *Siganus oramin*.

*Locality*: Waltair Coast, Andhra Pradesh.

*Distribution*: India: Andhra Pradesh.

iii. Subfamily *ACANTHOCOLOPIDINAE* Yamaguti, 1972


7. *Echenidocoelium indicum* Simha et Pershad, 1964


*Materials*: 1 exs.

*Host*: *Echeneis naucrates*.

*Locality*: Waltair Coast, Andhra Pradesh.

*Distribution*: India: Andhra Pradesh.

iv. Subfamily *AEPHNIDIOGENINAE* (Yamaguti, 1934) Dollfus, 1946

7. Genus *Aephnidiogenus* Nicoll, 1915

8. *Aephnidiogenus senegalensis* Dollfus et Caprawn, 1958


*Material*: 9 exs.
Host: *Pomadasys maculatus*.

Locality: Waltair Coast, Andhra Pradesh.

Distribution: India: Andhra Pradesh.

Elsewhere: Senegal.

v. Subfamily PHYLLOTREMATINAE Yamaguti, 1954

8. Genus *Phyllotrema* Yamaguti, 1954


1986. *P. tetracaudum* Hussain *et al.* Revista Iber. de. Parasit. 46(2) : 137-139

Material: Host: *Uroconger lepturus*.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.


Material: 3 exs.

Host: *Sufflamen capistratus, Hemibalistes chrysoptera*.

Location: Intestine.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

vi. Subfamily FOLIORCHIINAE Yamaguti, 1958

10. Genus *Multitestis* Manter, 1931


Material: 13 exs.; Host: *Platax teira*; Location: Intestine

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.


Material: 18 exs.
Host: Triacanthus brevirostris.
Location: Intestine.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.

vii. Subfamily DIPLOPROCTODAEINAE Park, 1939

12. Genus Bianium Stunkard, 1930

13. Bianium plictum (Linton, 1928)

Material: 76 exs.;
Host: Gastrophysus lunaris.
Location: Intestine.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.


14. Cotylocreadium triacanthi Hafeezullah, 1970

Material: 21 exs.
Host: Triacanthus strigilifer.
Location: Intestine.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.

II. Family BUCEPHALIDAE Poche, 1907

Key to the subfamilies of BUCEPHALIDAE

1. Rhynchus sucker-like or somewhat plug-shaped, ovary usually pre-testicular may be inter-testicular.................................................................PROSORHYNCHINAE

2. Rhynchus wedge or crown shaped, with tentacular appendages, pentagonal cap-like expansion or crown of spines, ovary pre-testicular .........................BUCEPHALINAE
i. Subfamily BUCEPHALINAE Nicoll, 1914

**Key to the genera of Bucephalinae**

1. Rhynchus inverted conical, with triple crown of spines, exeretory vesicle long ........
   .......................................................................................................................
   **Dollfusotrema**
   - Excretory vesicle variable in length ........................................................................ 2
2. Rhynchus sucker like, usually with seven tentacular appendages, exeretory vesicle variable
   in length ........................................................................................................... **Bucephalus**
   - Rhynchus otherwise ............................................................................................. 3
3. Rhynchus wedge-shaped with seven tentacular appendages, excretory vesicle long ....
   ......................................................................................................................... **Alcicornis**
4. Rhynchus crown-shaped, with large bowl shaped depression ventroposteriorly. Excretory
   vesicle rather short ............................................................................................. **Rhipidocotyle**

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14. Genus **Bucephalus** Baer, 1826

**Key the species of Bucephalus**

1. Host: *Satophagus argus*; Distribution: Bay of Bengal ...................... **B. barbariana**
   Distribution otherwise ......................................................................................... 2
2. Distribution: Japan; 4.86 x 0.45 ........................................................................ **B. uranoscopi**
3. 0.89–1.46 x 0.127–0.285 ................................................................................... **B. varicus**

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15. **Bucephalus uranoscopi** Yamaguti, 1934.


*Material*: 19 exs.

*Host*: *Uronoscopus guttatus*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Japan.

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16. **Bucephalus barina** Srivastava, 1936

1936. *B. barina* Srivastava

*Material*: 2 exs.;

*Host*: *Jonius belengeri*. 

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Locality: Waltair Coast; Date: 2.7.1969.

Distribution: India: Andhra Pradesh.

17. *Bucephalus varicus* Manter, 1940


Material: 8 exs.;

Host: *Caranx sexfaciatus, Decapterus russelli, Carangoides malabaricus, Carangoides chrysophrys, Polynemus plebeius*.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

Elsewhere: Atlantic, Pacific, Red sea, Galapagos

15. Genus *Alcicorllis* MaCullam, 1917

**Key to the species of *Alciconuis***

1. Tentacles 15 ........................................................................................................ A. *multidactylus*

2. Tentacles less than 15, cirrus sac extending upto level of Ovary ............. A. *carangis*

18. *Alcicornis carangis* MaCullam, 1917

1917. *A. carangis* MaCullam, Zoopathologica 1 : 43-75

Material: 4 exs.;

Host: *Carangoides malabaricus*;

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh

Elsewhere: Florida, Cuba, Curacao

19. *Alcicornis multidactylus* Madhavi, 1974


Material: Host: *Caesia caeruleaureus*;

Location: Int.;

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.
16. Genus *Dollfustrema* Eckmann, 1934

20. *Dollfustrema bengalense* Madhavi, 1974


*Material*: Host: *Gymnothorax undulatus*;
*Location*: Int.
*Locality*: Waltair Coast.
*Distribution*: India: Andhra Pradesh.

17. Genus *Rhipidocotyle* Deising, 1858


*Material*: 6 exs.
*Host*: *Psettodes creelii*;
*Locality*: Waltair Coast.
*Distribution*: India: Andhra Pradesh.
*Elsewhere*: Ghana

22. *Rhipidocotyle pentagonum* (Ozaki, 1924) Eckmann, 1932

1924. *Distomum pentagonum* Ozaki *Zool. Mag.* 36(4-6) : 173-201

1934. *R. pentagonum* Eckmann *Z. Par.* 5 (1) : 94-111

*Material*: 11 exs.,
*Host*: *Thynnus thunniue, Auxis thozard, Euthyrus affinis*.
*Location*: Int.;
*Locality*: Waltair Coast, Andhra Pradesh.
*Distribution*: India: Andhra Pradesh.
*Elsewhere*: Pacific, Red Sea, Mediterranean

23. *Rhipidocotyle khalili* Nagaty, 1937

*Material*: 12 exs.,
*Host*: *Sphyraena obtusata*.
*Locality*: Waltair Coast, Andhra Pradesh.
Distribution: India: Andhra Pradesh.
Elsewhere: Red Sea, Macassar Celebes

24. *Rhipidocotyle sphyraenae* Yamaguti, 1959


Material: Host: *Sphyrena obtusata*.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.
Elsewhere: Japan

Subfamily PROSORHYNCHIINAE Nicoll, 1940

18. Genus *Prosorhynchus* Odhner, 1905

25. *Prosorhynchus manteri* Srivastava, 1938


Material: 6 exs.;
Host: *Trichurus haumela*.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh, Orissa.

26. *Prosorhynchus chorinemi* Yamaguti, 1952


Material: 7 exs.;
Host: *Chorinemus sp.*;
Locality: Hyderabad.
Distribution: India: Andhra Pradesh.
Elsewhere: Macassar

27. *Prosorhynchus pacificus* Manter, 1940


Material: 3 exs.
Host: *Epinephelus taubina*.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.

Elsewhere: Galapagos, Cuba, Bimini (Brit.West Indies), Mexico

28. Prosorhynchus indicus Madhavi, 1974


Material: Host: Caesia caerulaureus; Loc.: Int.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.

19. Genus Bucephalopsis (Dies, 1855)

29. Bucephalopsis microcerrus Chauhan, 1943


Material: 1 ex.;
Host: Cybium guttatus, Indocybium guttatum.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh, Maharashtra.

III. Family FELLODISTOMIDAE Nicoll, 1958

Key to subfamilies of FELLODISTOMIDAE

1. Ovary post testicular, acetabulum in anterior half of body, testes median to ceca in post acetabular zone. Ovary well apart from acetabulum ........................................ BACCIGERINAE
   - Ceca not united posteriorly, testes more or less separated from posterior extremity by uterus ........................................................................................................ 2.

2. Acetabulum discoid, usually large ........................................ DISCOGASTEROIDINAE
   - Acetabulum of usual type ........................................................................................................... 3

3. Vitellaria largely or entirely pre acetabular, excretory vesicle 'I' shaped ....................
   .................................................................................................................................................. PARANTORCHIIINAE
   - Body without a series of sub-lateral lobes, excretory vesicle 'V' shaped, Vitellaria forming branch like clusters in post-testicular lateral fields .................................................................. LINTONIINAE

   i. Subfamily BACCIGERINAE Yamaguti, 1958

   Key to the genera of Baccigerinae

   - Vitellaria consisting of symmetrical reniform compact masses; Ovary well apart from testes .................................................................................................................. Pseudopentagramma
- Cirrus pouch poorly developed or practically absent, seminal vesicle bi-partite, vitelline follicles closely massed together .......................................................... *Pseudobacciger*

20. Genus *Pseudopentagramma* Yamaguti, 1958

30. *Pseudopentagramma petrowi* (Laymann, 1930) Yamaguti, 1971


1971. *P. petrowi* Yamaguti, *Keijaku pub., Tokyo*

*Material*: Numerous exs.

*Host*: *Sardinella fimbriata, S. gibbosa,*

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Peter the Great Bay, Lavrentia Bay


*Material*: 7 exs.;

*Host*: *Sardinella fimbriata; S.gibbosa, Loc.:Int.*

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.


1938. *Bacciger harengulae* Yamaguti Published by Author.


*Material*: *Host*: *Sardinella fimbriata, Sardinella gibbosa, Loc.: Int.*

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Japan, N. Bimini.

ii. Subfamily DISCOGASTEROIDINAE Srivastava, 1939


33. *Odontotrema arabi* Hafeezullah et. Siddiqi, 1970

Material: 6 exs.
Host: Drepane punctata.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh, Kerala.

23. Genus Pseudogasteroides Gupta, 1955

34. Pseudogasteroides indicum (Srivastava, 1939) Gupta, 1955


Material: Host: Triacanthus brevirostris.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh, Orissa.

iii. Subfamily LINTONIINAE Yamaguti, 1970


Key to the species of Lintonium
1. Sucker ratio 1:2 3-2.7 & eggs 43-47 x 32.................................L. pulchrun

35. Lintonium pulchrum (Jhonston, 1913) Skrjabin et. Koval, 1957


Material: 12 exs.
Host: Tetradon lunaris, Gastrophysus lunaris;
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.
Elsewhere: Queensland.

36. Lintonium pseudovibex Madhavi, 1975


Material: 3 exs.
Host: Monacanthus chirocephalus.
iv. Subfamily PARANTORCHIINAE Yamaguti, 1958

25. Genus *Parantorchis* Yamaguti, 1934


*Material*: 2 exs.

*Host*: Chaetodon pictus.

*Locality*: Waltair Coast.

*Distribution*: India : Andhra Pradesh.


*Material*: Pomacanthus annularis.

*Location*: Int.

*Locality*: Waltair Coast.

*Distribution*: India : Andhra Pradesh.

IV. Family OPECOELIDAE Ozaki, 1925

**Key to the subfamilies of OPECOELIDAE**

- Cirrus pouch more or less well-developed, anus absent, vitellaria extensive .......... ................................................................. PLAGIOPORINAE

- Cirrus pouch generally weakly developed, rudimentary or lacking, anus often present, vitellaria usually extensive but usually confined to hind body......... OPECOELINAE

i. Subfamily OPECOELINAE Stunkard, 1931

**Key to the genera of Opecoelinae**

1. Neck region expanded laterally and provided with accessory sucker ........... *Anisoporus*

- Neck region without accessory sucker ................................................................. 2

2. Acetabular tentacles complex, on anterior or posterior borders; Cirrus pouch present ........................................................................................................*Paropecoelus*
– Cirrus pouch smaller ............................................................... 3
3. Prostate cells outside cirrus pouch, seminal receptacle absent .................. Opeaster
– Cirrus pouch short, plump, enclosing bipartite seminal vesicle ...................... 4
4. Prostate complex enclosed in small cirrus pouch, genital pore sub-marginal, post bifurcal

Horatrema
– Seminal receptacle absent, genital pore to left of pharynx or oesophagus............. Pseudopecoelus

26. Genus Horatrema Srivastava, 1942

39. Horatrema pristipomatis Srivastava, 1942

1942. H. pristipomatis Srivastava Parassit. 34(1) : 128-132

Material : 4 exs.

Host : Leiognathus bindus

Locality : Waltair Coast.

Distribution : India : Andhra Pradesh.

27. Genus Pseudopecoelus Von Wicklen, 1946

40. Pseudopecoelus scomberi (Hafeezullah, 1971) Madhavi, 1975


Material : 12 exs.

Host : Scomberoides tala; Loc: Intestine.

Locality : Waltair Coast.

Distribution : India : Andhra Pradesh.

28. Genus Anisoporus Ozaki, 1928

41. Anisoporus orientalis Madhavi, 1975


Material : 8 exs.

Host : Dactyloptera orientalis; Loc.: Intestine.

Locality : Waltair Coast.

Distribution : India : Andhra Pradesh.
29. Genus *Paropecoelus* Pritchard, 1966

42. *Paropecoelus indicus* Madhavi, 1975


*Material*: 5 exs.;

*Host*: *Upineus sulphurius*; *Loc.*: Intestine;

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

30. Genus *Opegaster* Ozaki, 1928

43. *Opegaster ditrematis* Yamaguti, 1942


*Material*: 1 ex.;

*Host*: *Pseudorhombus micrognathus; Dasyatis imbricatus* *Loc.*: Intestine.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

ii. Subfamily *PLAGIOPORINAEE* Manter 1947

**Key to the genera of Plagioporinae**

1. Acetabulum pedunculate .................................................. *Podocotyloides*
   - Acetabulum sessile ........................................................................................................ 2
2. Genital pore prebifurcal .................................................. *Plagioporius*
   - Genital pore otherwise .................................................................................................... 3
3. Genital pore post bifurcal, eggs non filamented ....................... *Humacreadium*.
   - Eggs otherwise ............................................................................................................... 4
4. Eggs filamented, vitellaria more or less extensive, genital pore median ................
   ........................................................................................................................................*Helicometrina*
   - Extension of vitellaria otherwise ................................................................................ 5
5. Vitellaria extending from level of pharynx to posterior extremity, ceca united posteriorly
   ........................................................................................................................................*Helicometra*
   - Ceca ending blindly ....................................................................................................... *Allopodocotyle*
31. Genus *Helicometra* Odhner, 1902

**Key to the species of *Helicometra***

1. Ovary submedian, 4 lobed ................................................. *H. filamentosa*
   - Ovary otherwise, egg size is different, 50 – 58 x 23 – 27 ................. *H. fasciata*

44. *Helicometra fasciata* (Rud. 1819) Odhner, 1902


*Material*: 1 ex.;

*Host*: *Scorpaenopsis cirrhosus*; *Loc*: Int.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.


45. *Helicometra filamentosa* Madhavi, 1975


*Distribution*: India: Andhra Pradesh.

32. Genus *Helicometrina* Linton, 1910

46. *Helicometrina nimia* Linton, 1910


*Material*: 1 ex.

*Host*: *Jonius sina*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Florida, Atlantic, Pacific, Panama.

33. Genus *Podocotyloides* Yamaguti, 1934

47. *Podocotyloides parupenei* (Manter, 1963)


*Material*: 2 exs.;
Host: Therapon jarbua.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

34. Genus Hamacreadium Linton, 1910

48. Hamacreadium mutabile Linton, 1910


Material: 3 exs.

Host: Lutianus fulviflamma, L. rivulatus.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

Elsewhere: Atlantic, Galapagos, Australia, New Caledonia, Red Sea.

35. Genus Plagioporus Stafford, 1904

49. Plagioporus cynoglossi Madhavi, 1975


Material: 3 exs;

Host: Cynoglossus lida,

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

36. Genus Allopodocotyle Pritchard, 1966

50. Allopodocotyle pritcharae Madhavi, 1975


Material: Host: Lutzanus lunulatus.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

51. Allopodocotyle argyropsi Madhavi, 1975


Material: Host: Argyrops spinifer.
Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

V. Family DIDYMOZOIDAE Poche, 1970

Key to the subfamilies of DIDYMOZOIDAE

1. Body filiform, cylindrical, encysted or not ......................................... GONAPODASMIINAE
   - Shape of the body otherwise .................................................................................................................. 2
2. Encysted or free in tissue, never fused ........................................... NEMATOBOTHRINAE
   - Encysted form otherwise ............................................................................................................................ 3
3. Encysted, strongly entangled and massed together to form a globular cyst, vitellaria profuse ......................................................... GLOMERITREMATINAE
   - Vitellaria otherwise .................................................................................................................................... 4
4. Vitellaria single, undivided, body undivided ..................................... SKRJABINOZOINAE
   - Shape of the body otherwise .......................................................................................................................... 5
5. Body distinctly divided into two parts, hind body not lobed .............. DIDYMOZOIDAE
   - Hind body otherwise ...................................................................................................................................... 6
6. Hind body consisting of multilobulated central and peripheral portions, with well-developed inter-lobular vascular septa of Host ........................................................ METADIDYMOZOIDAE
7. Fore body attached with fore body, hind body smooth without vascular septa ..................................... PSEUDOCOLOSYNCHOTREMATINAE

i. Subfamily NEMATOBOTHRINAE Ishii, 1935

Key to the genera of Nematobothrinae

1. Testes juxtaposed ...................................................................................... Angionematobothrium
   - Testes otherwise .............................................................................................................................................. 2
2. Testes juxtaposed anteriorly but obliquely tandem posteriorly, uterus descending ........ Metanematobothroides
   - Uterus otherwise ............................................................................................................................................. 3
3. Uterus first ascending forming two loops, pharynx and acetabulum present ...................... Nematobothrium
4. Uterus first descending, forming single loop, pharynx absent........... Allonematobothrium
37. Genus *Angionematobothrium* Yamaguti, 1970

52. *Angionematobothrium epinepheli* Yamaguti, 1965


*Material*: 1 ex.

*Host*: *Epinephelus tauvina*

*Locality*: Waltair Coast; Coll. : R. Madhavi.

*Distribution*: India : Andhra Pradesh.

38. Genus *Allonematobothrium* Yamaguti, 1965


*Location*: Tissue of the dorsal fin.

*Locality*: Vishakhapatnam.

*Distribution*: India : Andhra Pradesh.


*Material*: 1 ex.

*Host*: *Epinephelus tauvina*.

*Location*: Opercular Muscle.

*Locality*: Vishakhapatnam.

*Distribution*: India : Andhra Pradesh.

*Elsewhere*: Hawaii.

39. Genus *Nematobothrium* Van Benedeu, 1858

55. *Nematobothrium megalaspium* Murugesh *et al*., 1992


*Material*: 6 exs.;

*Host*: *Megalaspis cordyla*.

*Location*: Free in body Cavity and viscera.

*Locality*: Vishakhapatnam.

*Distribution*: India : Andhra Pradesh.
40. Genus *Metanematobothroroides* Yamaguti, 1965

56. *Metanematobothroroides branchialis* Madhavi, 1982


*Material*: Host: *Pristipomoides typicus*.

*Location*: Branchial region.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

ii. Subfamily PSEUDOCOLOCYNTOTREMATINAE Yamaguti, 1970

41. Genus *Pseudocolocyntotrema* Yamaguti, 1970

57. *Pseudocolocyntotrema yaito* Yamaguti, 1970


*Material*: 3 exs.

*Host*: *Euthynnus affinis*

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

iii. Subfamily DIDYMOZINAE (Ishii, 1935)

**Key to the genera of Didymozinae**

1. Hind body spirally twisted, ovary and vitellaria with several branches................................................................. *Allodidymozoon*

   – Hind body otherwise .................................................................................................................................................. 2

2. Hind body not spirally twisted, ovary confined to anterior part of hind body ............................................................ *Didymozoon*

   – Position of ovary otherwise ..................................................................................................................................... 3

3. Ovary and vitelline glands extending throughout length of hind body, hind body not lobed ................................................................. *Nematodidymozoon*

   – Hind body two lobed anteriorly, with median ventral longitudinal furrow ................................................................. *Didymocystis*

42. Genus *Didymocystis* Ariola, 1902

58. *Didymocystis wedli* Ariola, 1902

1902. *D. wedli* Ariola *Arch. Par.* 6 (1) : 1-11
CHAKRABARTI and GHOSH: *Trematodes of Fishes, Amphibia & Reptilia*

*Material*: 1 ex.

*Host*: *Auseis thazara*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.


43. Genus *Allodidymozoon* Yamaguti, 1959

59. *Allodidymozoon opercularare* Madhavi, 1982


*Material*: 6 exs.

*Host*: *Sphyraena obtusata*

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

60. *Allodidymozoon cylindricum* Madhavi, 1982


*Material*: 6 exs.

*Host*: *Sphyraena obtusata*

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

44. Genus *Neometadidymozoon*, Yamaguti, 1972


*Material*: 4 exs.

*Host*: *Priacanthus harmur*.

*Location*: Operculum.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.
45. Genus *Didymozoon* Taschenberg, 1878


*Material:* Host: *Euthynnus affinis.*

*Locality:* Waltair Coast.

*Distribution:* India: Andhra Pradesh.

46. Genus *Indodidymozoon* Madhavi, 1982

63. *Indodidymozoon platycephali* Madhavi, 1982


*Material:* *Platycephalus scaber;*

*Location:* Opercular muscles.

*Locality:* Waltair Coast.

*Distribution:* India: Andhra Pradesh.

47. Genus *Renodidymocystis* Madhavi, 1982

64. *Renodidymocystis yamaguti* Madhavi, 1982


*Material:* *Rastrelliger kanagurta.*

*Location:* Kidney.

*Locality:* Waltair Coast.

*Distribution:* India: Andhra Pradesh.

48. Genus *Coelididymocystis* Yamaguti, 1970

65. *Coelididymocystis kamagaii* Yamaguti, 1970


*Material:* Host: *Katsuwonus pelamys.*

*Location:* Pyloric ceaca;

*Locality:* Waltair Coast.

*Distribution:* India: Andhra Pradesh.
49. Genus *Lobatocystis* Yamaguti, 1965

66. *Lobatocystis yaito* Yamaguti, 1965


*Material*: *Eythynnus affinis*.

*Location*: Gills.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

iv. Subfamily *Metadidymozoiinae* Yamaguti, 1970

50. Genus *Metadidymozoon* Yamaguti, 1970

67. *Metadidymozoon branchiale* Yamaguti, 1970


*Material*: 1 ex.

*Host*: *Xiphias gladias*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

v. Subfamily *Gonapodasmiinae* Ishii, 1935

51. Genus *Gonapodasmus* Ishii, 1935

68. *Gonapodasmus branchialis* Yamaguti, 1970


*Material*: 13 exs.

*Host*: *Epinephelus latifasciatus*.

*Location*: Gill

*Locality*: Vishakhapatnam.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Hawaii.

69. *Gonapodaspium spilonotopteri* Yamaguti, 1970


*Material*: *Host*: *Katsunus pelamys*. 
Location: Pyloric ceca.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

vi. Subfamily SKRJABINOZOINAE Yamaguti, 1972

52. Genus Skrjabinozoum Nicolaeva et Parukhen, 1969

70. Skrabinozoum waltairensis Hussain et Shyamasundari, 1987


Material: Host: Psenes indicus.

Location: connecting tissue of the operculum and orbit.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

vii. Subfamily GLOMERITREMATAINAE Yamaguti, 1958

53. Genus Indoglomeritrema Madhavi et al., 1983

71. Indoglomeritrema epinepheli Madhavi et al. 1983


Material: 50 exs..

Host: Epinephelus taurus.

Location: Gill

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

54. Genus Oculonematobothrium Muruges et al. 1992

72. O. orbitum Muruges et al. 1992


Material: 10 exs.;

Host: Pampus argentius Loc: Post-orbital Cavity.

Locality: Vishakhapatnam.

Distribution: India: Andhra Pradesh.
VI. Family MONORCHIIDAE Odhner, 1911

Key to the subfamilies of MONORCHIIDAE

1. Testes in posterior half of body, ovary usually pretesticular; vitellaria in preacetabular and/or acetabular zone ........................................................................................................ MONORCHIINAE
   - Vitellaria otherwise ........................................................................................................ 2
2. Vitellaria not clearly divided into symmetrical groups, mostly intercaecal; Genital pore median .................................................................................................................. POSTMONORCHIIDINAE
   - Vitellaria largely or entirely pretesticular, occasionally testicular...... LASIOTOCINAE

i. Subfamily LASIOTOCINAE Yamaguti, 1958

Key to the genera of Lasiotocinae

1. Testes symmetrical at posterior extremity ......................................................... Hysterorchis
   - Testes otherwise ........................................................................................................ 2
2. Testes tandem, seminal vesicle tubular ............................................................... Timonia
   - Seminal vesicle otherwise ....................................................................................... 3
3. Seminal vesicle saccular, oral sucker with spines ............................................. Lasiotocus
   - Oral sucker provided with anterodorsally alternating transverse rows of spines..... ............................................................................................................................... Ametrodaptus

55. Genus Lasiotocus Looss, 1907

Key to species of Lasiotocus

- Ovary unlobed ......................................................................................... L. hastai
- Ovary four lobed ..................................................................................... L. maculatus

73. Lasiotocus maculatus Madhavi, 1974

1974. L. maculatus Madhavi Rivista di Parassit 35(2) : 87-98

Material : Numerous exs.

Host : Pomadasys maculatus Rhonociscus furcatus.

Locality : Waltair Coast.

Distribution : India : Andhra Pradesh.
74. *Lasiotocus hastai* Madhavi, 1974


*Material*: Numerous exs.

*Host*: *Pomadasys hastai* : *Location*: Intestine Hepatic ceca.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

56. Genus *Ametrodaptes* Bravo–Hollis, 1956

75. *Ametrodaptes secundus* Madhavi, 1977


*Material*: Numerous exs.

*Host*: *Pomadasys maculatus*.

*Location*: Intestine

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.


76. *Hysterorchis pseudovitellosus* Madhavi, 1974


*Material*: 2 exs.

*Host*: *Lutianus* sp.

*Locality*: Waltair Coast.

*Distribution*: India : Andhra Pradesh.

58. Genus *Timonia* Bartoli et. Prevot, 1966

**Key to species of *Timonia***

- Ovary 3 lobed ............................................................... *T. indica*
- Ovary otherwise, vitellaria situated at the level of acetabulum.............. *T. caballeroi*

77. *Timonia indica* Madhavi, 1977

Material: 14 exs.
Host: Polynemus indicus.
Location: Intestine.
Locality: Waltair coast.
Distribution: India: Andhra Pradesh.

78. *Timonia caballeroi* Madhavi, 1977


Material: 15 exs.
Host: Polynemus sextarius.
Location: Intestine.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.

ii. Subfamily *POSTMONORCHIIDINAE* Yamaguti, 1958

59. Genus *Hurleytrematoides* Yamaguti, 1954

79. *Hurleytrematoides filiformes* Madhavi, 1974


Material: 13 exs.;
Host: Chaetodon pictus.
Locality: Waltair coast.
Distribution: India: Andhra Pradesh.

iii. Subfamily *MONORCHIINAE* (Odhner, 1911) Nicoll, 1915

60. Genus *Monorchis* (Monticelli, 1893) Looss, 1902


Material: Numerous exs.
Host: Pomadasys maculatus.
Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

61. Genus *Opisthodiplomonorchis* Madhavi, 1974

81. *Opisthodiplomonorchia elongates* Madhavi, 1974


Material: 5 exs.

Host: *Psettodes erumei, Polynemus sextarius.*

Location: Intestine.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.


82. *Pseudopisthomonorchis carangi* Madhavi, 1974


Material: 6 exs.

Host: *Carungoides malabaricus, Loc: Intestine.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

63. Genus *Retractomonorchis* Madhavi, 1977

83. *Retractomonorchis delicatus* Madhavi, 1977


Material: Numerous examples.

Host: *Pampus chinensis P. argentius.*

Location: Intestine.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

64. Genus *Caballerotrematoides* Madhavi, 1977

84. *Caballerotrematoides leiognathi* Madhavi, 1977

Material: 9 exs.

Host Leiognathus daura.

Location: Intestine.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

VII. Family CRYPTOGONIMIDAE (Ward, 1917) Cirurea, 1933

Key to the subfamilies of CRYPTOGONIMIDAE

1. Ovary compact, lobed or divided into numerous follicles ............... NEOCHASMINAE
   - Ovary otherwise ........................................................................................................ 2

2. Ovary follicular, body cylindrical ............................. CRYPTOCOLLARITREMATINAE
   - Body otherwise .................................................................................................. 3

3. Body ovoid, vitellaria in bifurcovanian or pharyngacetabular zone.... METADENINAE
   - Vitellaria limited within acetabulovarian zone ................................ SIPHODERINAE

i. Subfamily NEOCHASMINAE Van Cleave et Mueller, 1932

65. Genus Paracryptogonimus Yamaguti, 1934

Key to the species of Paracryptogonimus

1. 70-72 spines on oral sucker .................................................. P. ovatus
   - 84-90 spines on oral sucker .................................................. P. herastricllus.

85. Paracryptogonimus ovatus Yamaguti, 1952


Material: 1 ex.

Host: Pomadasys hasta.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh

86. Paracryptogonimus herastricllus Manter, 1963

1963. P. herastricllus Manter J. Par. 49(3): 443-450
Material: Host: Lutjanus malabaricus.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

ii. Subfamily METADENINAE Yamaguti, 1953

66. Genus Allometadena Madhavi, 1974

87. Allometadena rotundum Madhavi, 1974


Material: Host: Lutjanus malabaricus.

Location: Intestine.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

iii. Subfamily SIPHODERINAE Manter, 1934

67. Genus Acanthosiphodora Madhavi, 1974

88. Acanthosiphodora bengalense Madhavi, 1974


Material: Host: Lutjanus malabaricus.

Location: Intestine.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

iv. Subfamily CRYPTOCOLLARITREMATINAE Srivastava, 1982

68. Genus Cryptocollaritrema Madhavi, 1974

89. Cryptocollaritrema proveniculatum Madhavi, 1974


Location: Stomach, hepatic caeca;

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.
VIII. Family ACANTHOCOLPIDAE Luhe, 1909

Key to the subfamilies of ACANTHOCOLPIDAE

Vitellaria confined to middle region of body ......................... STEPHANOSTOMINAE
Vitellaria in greater part of body ................................................ ACANTHOCOLPINAE

i. Subfamily STEPHANOSTOMINAE

69. Genus *Stephanostomum* Looss, 1899

Key to the species of *Stephanostomum*

1. Sucker ratio 1:1.6–2.0 and egg size of 62 × 39–41 ........................................... *S. casum*
   - Sucker ratio otherwise ......................................................................................... 2
2. Sucker ratio 1:1.8–2.8 and egg size of 62 × 42–45, with having 30 collar spines....
   ............................................................................................................................. *S. ditrematis*
   - No. of collar spines otherwise ................................................................................ 3
3. No. of collar spines 32, metraterm armed ....................................................... *S. orientalis*
   - Metraterm armed .................................................................................................. 4
4. Metraterm spined having a sperm reservoir in the course of vas deferens ............
   ................................................................................................................................. *S. triacanthi*
   - Metraterm unspined, posterior vitellaria not extending to the level of acetabulum ......
     ............................................................................................................................... *S. polymeni*
   - Posterior vitellaria extending to the level of acetabulum, longer forebody ...........
     ............................................................................................................................... *S. microsomum*
5. Smaller forebody, 2 pairs of spines on the midventral side are much smaller than that of
   remaining spines ........................................................................................................... *S. pseudoditrematis*
   - Having 36 spines in two rows by the loss of 1 circlet of spines...... *S. merospinosum.*

90. *Stephanostomum orientalis* Srivastava 1939


Material : 11 exs.

Host : *Caranx sexfasciatus, Carangoides malabaricus, Caranx chrysophrys.*

Location : Intestine.

Locality : Waltair Coast.

Distribution : India : Andhra Pradesh.
91. *Stephanostomum adinterruptum* Hafeezullah, 1971

1971. *S. adinterruptum* Hafeezullah *J. Helm* 45 : 73-78

*Material*: Numerous examples.

*Host*: *Fistularia villosa*.

*Location*: Intestine.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

92. *Stephanostomum casum* (Linton, 1910) McFarlane, 1934


*Material*: 3 exs.

*Host*: *Lutianus malabaricus*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Florida, Puerto Rico, Gulf of Manaar, Mexico, Curaco, Jamaica, Phillipines, Bahamas, British Colombia.

93. *Stephanostomum ditrematis* (Yamaguti, 1939) Manter, 1947


*Material*: 5 exs.

*Host*: *Megalaspis cordyla*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.


94. *Stephanostomum psudoditrematis* Madhavi, 1976


*Material*: 30 exs.

*Host*: *Rachycentron canadus*. 
CHAKRABARTI and GHOSH: *Trematodes of Fishes, Amphibia & Reptilia*

**Locality:** Waltair Coast.

**Distribution:** India: Andhra Pradesh.

95. *Stephanostomum triacanthi* Madhavi, 1976


**Material:** 1 ex.

**Host:** *Triacanthus striligifer*.

**Location:** Intestine.

**Locality:** Waltair Coast.

**Distribution:** India: Andhra Pradesh.

96. *Stephanostomum polynemi* Madhavi, 1976


**Material:** Host: *Polynemus indicus*.

**Location:** Intestine.

**Locality:** Waltair Coast.

**Distribution:** India: Andhra Pradesh.

97. *Stephanostomum microsomum* Madhavi, 1976


**Material:** Host: *Rachycentron canadus*.

**Location:** Intestine.

**Locality:** Waltair Coast.

**Distribution:** India: Andhra Pradesh.

98. *Stephanostomum mesospinosum* Madhavi, 1976


**Material:** 12 exs.

**Host:** *Carangoides malabaricus*.

**Location:** Intestine.

**Locality:** Waltair Coast.

**Distribution:** India: Andhra Pradesh
ii. Subfamily ACANTHOCOLPINAE Luhe, 1906

Key to the genera of Acanthocolpinae

Body unspined, not eye spotted, ovary and testes contiguous ............... *Acanthocopus*

Body spined, eye spotted, ovary and testes separate ................................ *Tormopsolus*

70. Genus *Acanthocopus* Luhe, 1906


*Material*: Host: *Chirocentrus dorab*.

*Locality*: Waltair Cost.

*Distribution*: India: Andhra Pradesh.

100. *Acanthocopus tenuis* Manter, 1963

1963. *A. tenuis* Manter J. Par 49(3) : 443-450

*Material*: Host: *Chirocentrus dorab*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

71. Genus *Tormopsolus* Poche, 1928

101. *Tormopsolus filiformis* Sogandares et Hutton, 1959


*Material*: Host: *Rachycentron canadus*.

*Locality*: Waltair Coast.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Florida.

IX. Family ALLOCREADIIDAE (Looss, 1902) Stossich, 1903

Subfamily ALLOCREADIINAE Looss, 1902

72. Genus *Allocreadium* Looss, 1900

102. *Allocreadium fasciatus* Kakaji, 1969


*Material*: 6 exs.
Host: Aptochiitus melastigma.

Location: Stomach.

Locality: Stream of Waltair Coast.

Distribution: India: Andhra Pradesh.

103. Allocrediun Izalldiai Pande, 1937


Material: Channa punctatus, Clarias batrachus.

Locality: Waltair Coast.

Distribution: India: Andhra Pradesh.

X. Family HEMIURIDAE Luhe, 1901

Key to sub families of HEMIURIDAE

1. Testes and ovary closely massed together in anterior fourth of body..............................

2. Testes and ovary not confined to anterior fourth of body ............................................ 2

3. Seminal vesicle in hind body, vitelline lobes usually long and narrow ... DINURINAE

4. Harmaphroditic duct present ........................................................................................... 3

5. Harmaphroditic pouch may be absent; pars prostatica free in parenchyma; genital atrium strongly developed ................................................................. HEMIURINAE

6. Harmaphroditic vesicle not differentiated; vitellaria divided into seven tubular lobes

7. Vitellaria at posterior extremity ....................................................................................... 5

8. Ovary and vitellaria post testicular; vitellaria anterior to testes...LECITHASTERINAE

9. Vitellaria posterior to testes ......................................................................................... PULMOVERMINAE

i. Subfamily STOMACHICOLINAE Yamaguti, 1958

Key to the genera of Stomachicolinae

1. Seminal vesicle pre acetabular, pars prestatica balbous, Seminal receptacle inconspicuous

2. Seminal vesicle post acetabular, pars prostatica narrow, Seminal receptacle very large

3. Harmaphroditic vesicle not differentiated; vitellaria divided into seven tubular lobes

4. Vitellaria at posterior extremity ....................................................................................... 5

5. Ovary and vitellaria post testicular; vitellaria anterior to testes...LECITHASTERINAE

6. Vitellaria posterior to testes ......................................................................................... PULMOVERMINAE

7. Harmaphroditic pouch may be absent; pars prostatica free in parenchyma; genital atrium strongly developed ................................................................. HEMIURINAE

8. Harmaphroditic vesicle not differentiated; vitellaria divided into seven tubular lobes

9. Vitellaria at posterior extremity ....................................................................................... 5

10. Ovary and vitellaria post testicular; vitellaria anterior to testes...LECITHASTERINAE

11. Vitellaria posterior to testes ......................................................................................... PULMOVERMINAE
73. Genus *Stomachicola* Yamaguti, 1934

104. *Stomachicola muraenesosis* Yamaguti, 1934


*Material*: 1 ex.

*Host*: *Muraenosox talabourides*.

*Location*: Stomach.

*Locality*: Machhilipatnam.

*Distribution*: India: Andhra Pradesh.

74. Genus *Allostomachicola* Yamaguti, 1958

105. *Allostomachicola secundus* (Srivastava, 1939) Yamaguti, 1958


106. *Halipegus mehriensis* Srivastava, 1933


*Material*: *Ptyas (Zamensis) mocosus*.

*Location*: Intestine.

*Locality*: Hyderabad.

*Distribution*: India: Andhra Pradesh.

107. *Halipegus ovocandatum* (Vulpian, 1859) Looss, 1899


111. *Subfamily LECITHASTERINAE* Odhner, 1905

**Key to the genera of Lecithasterinae**

1. Vitellaria single compact ............................................................................................... *Aphanurus*
   - Pars prostatica small .................................................................................................. 2
2. Pars prostatica not long, ovary lobed .............................................................................. *Lecithaster*
76. Genus *Lecithaster* Luhe, 1901

108. *Lecithaster indicum* Srivastava, 1935


*Material*: 1 ex.

*Host*: Unidentified fish.

*Location*: Stomach.

*Locality*: Machhilipatnam; Collector: Dr. M. Hafeezullah; Date of Collection: 24.01.1975

*Distribution*: India: Andhra Pradesh.

77. Genus *Aphanurus* Looss, 1907

109. *Aphanurus dussumieri* Hussain et al. 1984


*Material*: 4 exs.

*Host*: *Dussumieria hasselli*.

*Location*: Intestine.

*Locality*: Waltair Coast; Collector: Hussain, Rao & Shyamasundari

*Distribution*: India: Andhra Pradesh.

iv. Subfamily DINURINAE Looss, 1907


*Material*: 3 exs.

*Host*: *Chorinemus lyson*.

*Location*: Stomach.

*Locality*: Vishakhapatnam; Collector: M. Hafeezullah; Date of Collection: 17.10.1964.

*Distribution*: India: Andhra Pradesh.

v. Subfamily HEMIURINAE Looss, 1899

79. Genus *Parahemiurus* Vaz et. Pereira, 1930

111. *Parahemiurus engraulisi* Gupta et Jahan, 1977

1977. *P. engraulisi* Gupta et Jahan
Material: 4 exs.

Host: Ilisha filigera.

Location: Intestine.

Locality: Vishakhapatnam; Collector: M. Hafeezullah; Date of collection: 30.9.1969.

Distribution: India: Andhra Pradesh.

vi. Subfamily HYSTROLECITHINAE Yamaguti, 1958

80. Genus Aponurus waltairensis Hussain et al., 1987

112. Aponurus waltairensis Hussain et al., 1987


Material: Host: Acanthurus bleekeri.

Locality: Waltair Coast; Collector: Hussain, Rao et Shyamasundari.

Distribution: India: Andhra Pradesh.

vii. Subfamily PULMOVERMINAE Sandars, 1961

81. Genus Hydrophitrema Sandars, 1960

113. Hydrophitrema giganticum Sandars, 1960


Material: Enhydrina valakadyen, Microcephalus gracilis.

Location: Lung.

Locality: Waltair Coast; Collector: R. Madhavi.

Distribution: India: Andhra Pradesh.

XI. Family LECITHODENDRIIDAE Odhner, 1911

Key to the subfamilies of LECITHODENDRIIDAE

1. Body oval to lunguiform, spinulate ..................................................... GANEONINAE
   - Shape of the body otherwise ............................................................................. 2

2. Body sub-globular to elliptical, oesophagus stout, occasionally moderately long ....
   ......................................................................................................................... PLEUROGENINAE
   - Oesophagus moderate in length .......................................................................... 3

3. Testes symmetrical in extracaecal shoulder region ................................ PROSTOCINAE
- Testes in post acetabular extracaecal region .......................................................... 4

4. Body tongue-shaped, spinose ............................................................. ANCHITREMATINAE

- Body fusiform, oval to linguiform ................................................... LECITHODENDRIINAE

i. Subfamily GANEONINAE Yamaguti, 1958

82. Genus *Ganeo* Klein, 1905

114. *Ganeo tigrinum* Mehra et. Negi, 1928


*Material* : 1 ex.

*Host* : *Therapon jarbua*

*Location* : Intestine.

*Locality* : Machilipatnam, Andhra Pradesh

*Distribution* : India : Andhra Pradesh, Meghalaya, Nagaland, West Bengal.

*Elsewhere* : Burma, China, Ceylon

ii. Subfamily PLEUROGENINAE Looss, 1899

83. Genus *Pleurogenoides* Travassos, 1921

115. *Pleurogenoides gastroporus* Luhe, 1901


*Material* : *Host* : Chameleon.


*Distribution* : India : Andhra Pradesh.


*Distribution* : India : Andhra Pradesh

117. *Pleurogenoides sitapurii* Srivastava, 1934


*Material* : *Host* : *Rana cyanophlyctis*. 
Locality: Hyderabad; Coll.: R. Rao.

Distribution: India: Andhra Pradesh.

iii. Subfamily PROSTOCINAE Yamaguti, 1958

84. Genus *Mehrarchis* Simha, 1934

118. *Mehrarchis chamaeleonis* Simha, 1958


Material: Host *Chamaeleon zeylanicus*.

Location: Gall bladder.

Locality: Hyderabad; Collector: S.S. Simha.

Distribution: India: Andhra Pradesh.

Elsewhere: Burma, Ceylon.

iv. Subfamily ANCHITREMATINAE Mehra, 1935

85. Genus *Anchitrema* Looss, 1899

119. *Anchitrema sanguineum* (Sonsino, 1894) Looss, 1899


Material: Host: *Chamaeleon zeylanicus*.

Location: Stomach & Intestine.

Locality: Hyderabad; Coll.: S.S. Simha.

Distribution: India: Andhra Pradesh.

v. Subfamily LECITHODENDRINAE Looss, 1902

86. Genus *Prosthodendrium* Dollfus, 1931

Key to the species of *Prosthodendrium*

– Ovary on left side of the acetabulum............................................................... *P. ovatum*
– Ovary post-testicular .......................................................................................... *P. dollfusi*

120. *Prosthodendrium ovatum* Simha, 1958


Material: Host: *Calotes nemoricola*.
**Location**: Intestine.

**Locality**: Hyderabad, Coll.: S.S. Simha.

**Distribution**: India: Andhra Pradesh.

121. *Prosthodendrium dollfusi* Simha, 1958


**Material**: Host: *Calotes versicolor*.

**Location**: Intestine.

**Locality**: Hyderabad; Collector: S.S. Simha.

**Distribution**: India: Andhra Pradesh

XII. Family PLAGIORCHIIDAE (Luhe, 1901) Ward, 1917

**Key to the subfamilies of PLAGIORCHIIDAE**

1. Parasitic of fishes ............................................................... **ANCHITREMATINAE**
   - Parasitic of snakes .................................................................................................. 2

2. Testes diagonal or tandem ....................................................... **ENCYCLOMETRINAE**
   - Testes almost symmetrical ................................................................................. 3

3. Acetabulum large, at anterior third of body .................................. **PLAGIORCHIIDAE**
   - Acetabulum rather small, pre-equatorial ......................................................... **LEPTOPHALLINAE**

Subfamily PLAGIORCHIINAE Pratt, 1902

**Key to the genera of Plagiorchiinae**

1. Testes usually diagonal, ovary posterolateral or posterior to acetabulum.... *Plagiorchis*
   ovary a little behind acetabulum, sub-median or median ....................... *Xenopharynx*

87. Genus *Xenopharynx* Nicoll, 1912

**Key to the species of Xenopharynx**

1. Parasitic in *Tropidonotus piscator* ...................................................... *X. heterovitellatus*
   - Parasitic in otherwise ......................................................................................... 2

2. Parasitic in *Ptyas mucosa*; 2.733 – 3.96 x 1.287 – 1.921 ......................... *X. pyriformes*
   - 5.3 x 1.9 .............................................................................................................. *X. solus*
122. *Xenopharynx heterovitellatus* Simha, 1958


*Material*: 4 exs.

*Host*: Water snake (*Tropidonotus piscator*).

*Location*: Gall bladder.

*Locality*: Hyderabad; Coll. : S.S. Simha.

*Distribution*: India : Andhra Pradesh

123. *Xenopharynx pyriformes* Simha, 1958


*Material*: 4 exs.

*Host*: Rat snake. *Ptyas mucosa*.

*Location*: Intestine.

*Locality*: Hyderabad; Coll. : S.S. Simha.

*Distribution*: India : Andhra Pradesh.

124. *Xenopharynx solus* Nicoll, 1912


*Material*: *Host*: *Naja haja*.

*Locality*: Hyderabad; Coll. : S.S. Simha.

*Distribution*: India : Andhra Pradesh.

*Elsewhere*: South Africa

88. Genus *Plagiorchis* Luhe, 1899

125. *Plagiorchis himalayai* Jordon 1964


*Material*: 11 exs.

*Host Chamaeleon zeylanicus*.

*Location*: Intestine.

*Locality*: Hyderabad; Coll. : S.S. Simha.

*Distribution*: India : Andhra Pradesh.
ii. Subfamily ASTIOTREMATINAE Baer, 1924

89. Genus Astiotrema Looss, 1900

**Key to the species of Astiotrema**

- Parasitic in *Kachuga dhongoka*, 3.5–.81 × .36–2.17 ........................................... *A. loossi*
- Parasitic in *Lissennys punctata*, 2.8–4.17 × 0.93–1.2 ........................................... *A. rami*

126. **Astiotrema rami** Bhalerao, 1936


*Material*: 13 exs.
*Host*: Turtle.
*Location*: Intestine.
*Distribution*: India : Andhra Pradesh.

127. **Astiotrema loossi** Mehra, 1931

1931. *A. loossi* Mehra Parasit. 23 : 170-190

*Material*: 1 ex.;
*Host*: Turtle.
*Location*: Intestine;
*Locality*: Hyderabad; Coll. S.S. Simha
*Distribution*: India : Andhra Pradesh.

iii. Subfamily LEPTOPHALLINAE Dayal, 1938

90. Genus Neoganada Dayal, 1938

128. **Neoganada aspinosa** Simha, 1958


*Material*: *Host* Chamaeleon zeylanicus.
*Location*: Intestine.
*Locality*: Hyderabad; Coll. : S.S. Simha.
*Distribution*: India : Andhra Pradesh.
iv. Subfamily ENCYCLOMETRINAE (Mehra, 1937)

91. Genus Encyclometra Baylis et. Cannon, 1924

129. Encyclometra colubrimurorum Dollfus, 1931


*Material*: 45 exs.

*Host*: Water snake, Grass snake.

*Location*: Oesophagus.

*Locality*: Hyderabad; Coll.: S.S. Simha.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Ceylon, Burma, Phillipines, Europe, N. Bornes

XIII. Family ACANTHOSTOMIDAE Poche, 1926

Subfamily ACANTHOSTOMINAE Nicoll, 1914

**Key to the genera of Acanthostominae**

- Ceca not united posteriorly, usually opening outside ...................... *Haplocaecum*
- Ceca asymmetrical, one ceca may be completely reduced ..................... *Atrophocaecum*

92. Genus *Atrophocaecum* Bhalero, 1940

130. *Atrophocaecum indicum* Simha, 1958


*Material*: *Host*: *Tropidonotus piscator*.

*Location*: Intestine.

*Locality*: Hyderabad; Coll.: S.S. Simha.

*Distribution*: India: Andhra Pradesh.

93. Genus *Haplocaecum* Simha, 1958

131. *Haplocaecum assymetricum* Simha, 1958


*Material*: *Host*: *Dryophis myctirizus*.

*Location*: Intestine.
Locality: Hyderabad; Coll.: S.S. Simha.

Distribution: India: Andhra Pradesh.

XIV. Family HETEROPHYIDAE (Leiper, 1909) Odhner, 1914

Key to the subfamilies of HETEROPHYIDAE

1. Testes tandem, somewhat diagonal in posterior half of body ...... GALACTOSOMINAE
2. Testes single, near posterior extremity ................................................ HAPLORCHIINAE

i. Subfamily GALASTOSOMINAE Cuirea, 1933

94. Genus Galactosomum Looss, 1899

132. Galactosomum ussuriense Oshmarin, 1963


Material: 1 ex.

Host Therapon jarbua.

Locality: Waltair Coast; Coll.: R. Madhavi.

Distribution: India: Andhra Pradesh.

ii. Subfamily HAPLORCHIINAE Looss, 1899

95. Genus Haplorchis Looss, 1899

133. Haplorchis solus Simha, 1964


Material: Green tree snake, Dryophis necterizans.

Location: Instestine.

Locality: Hyderabad.

Distribution: India: Andhra Pradesh.

XV. Family HAPLOSPLANCHNIDAE Poche, 1926

Subfamily Schikhobalotrematinae Skrjabin et Guschchanskja, 1955

96. Genus Schikhobalotrema Skrjabin et Guschanskja, 1955

134. Schikhobalotrema acutum (Linton, 1910) Skrjabin et Guschanskja, 1955

Material: 6 exs.
Host: Tylosorus crocodiles.

Locality: Waltair Coast; Coll.: R. Madhavi.

Distribution: India: Andhra Pradesh.

XVI. Family PLEORCHIIDAE (Poche, 1926)

97. Genus Pleorchis Railliet, 1896

135. Pleorchis sciaenae Yamaguti, 1938


Material: 2 exs.

Host Pomadasys hasta.


Distribution: India: Andhra Pradesh.

Elsewhere: East China.

XVII. Family DICROCOELIIDAE Odhner, 1910

Subfamily DICROCOELIINAE Looss, 1899.

98. Genus Paradistomoides Travassos, 1944

Key to the species of Paradistomoides

1. Vitellaria lie mostly in the anterior half of the body ...................... P. spatulatus
   – Vitellaria extend equally into the anterior and posterior half .......... P. orientalis
   – Vitellaria consist mostly of irregularly shaped follicles ............... 2

2. Body elongate, sucker equal on sub equal and very close ............... P. intestinalis
   – Body lancoelate, ventral sucker smaller than oral sucker ............. P. spatutatus

136. Paradistomoides intestinalis Simha, 1958


Material: Host: Ptyas (Zamenis) mucosus; Calotes nemicola.

Location: Rectum.

Locality: Hyderabad; Coll.: S.S. Simha

Distribution: India: Andhra Pradesh.
137. *Paradistomoides lancoelatus* Simha, 1958


*Material*: Host: *Chamaeleon zeylènicus*.

*Location*: Intestine.

*Locality*: Hyderabad; Coll.: S.S. Simha.

*Distribution*: India: Andhra Pradesh


139. *Paradistomoides orientalis* (Narain et Das, 1929) Travassos, 1944


*Material*: Host: *Calotes versicolor, Hemidactylus flaviviridis, H. Maculatus*.

*Location*: Gall bladder.

*Locality*: Hyderabad; Coll.: S.S. Simha.

*Distribution*: India: Andhra Pradesh.

*Elsewhere*: Singapore.

XVIII. Family OMMATOBREPHIDAE Poche, 1926

Subfamily Ommatobrephinae Dubois et. Molin, 1959

99. Genus *Ommatobrephus* Nicoll, 1914

**Key to the species of Ommatobrephus**

1. Caeca long, acetabulum small, ............................................................................... *O. lobatum*

2. Acetabulum large; caeca short .................................................................................. *O. megacetabulus*

140. *Ommatobrephus megacetabulus* Simha, 1958


*Material*: 1ex.

*Host*: Water snake (*Tropidonotus piscator*)

*Locality*: Hyderabad; Coll.: S.S. Simha.

*Distribution*: India: Andhra Pradesh.
141. *Ommatobrephus lobatum* Mehra, 1928

1928. *O. lobatum* Mehra *Proc. 18th Ind. Sci. Congr.* 199

*Material:* Host: *Tropidonotus piscator.*

*Locality:* Hyderabad; Coll. : S.S. Simha.

*Distribution:* India : Andhra Pradesh.

XIX. Family MONASCIDAE Dolffus, 1952

142. *Monascus typicus* (Odhner, 1911) Yamaguti, 1954


*Material:* Host *Pampus argenteus.*

*Locality:* Waltair Coast.

*Distribution:* India : Andhra Pradesh.

XX. Family MONODHELMINTHIDAE Dollfus, 1937

Subfamily PROSOGONARIINAE Mehra, 1963

101. Genus *Prosogonarius* Yamaguti, 1952

143. *Prosogonarius plotosi* Madhavi, 1975

*Material:* 5 exs.;

*Host:* *Plutosus orientalis.*

*Locality:* Waltair Coast; Coll. : R. Madhavi.

*Distribution:* India : Andhra Pradesh.

XXI. Family SPIRORCHIDAE Stunkard, 1921

Subfamily HAPLOTREMANAE Stunkard, 1921

102. Genus *Hepatohaemotrema* Simha, 1958

144. *Hepatohaemotrema hepaticum* Simha, 1958


*Material:* Host : *Kachuga kachuga.*
Location: Liver.

Locality: Hyderabad; Coll.: S.S. Simha.

Distribution: India: Andhra Pradesh.

XXII. Family BIVESICULIDAE (Yamaguti, 1934) Yamaguti, 1939
Subfamily PAUCIVITELLASINAE Yamaguti, 1965

103. Genus Paucivitellosus Coil, Reid et Kuntz, 1965

145. Paucivitellosus hanumanthai Mani, 1990


Material: Host: Mugil cephalus.

Location: intestine.

Locality: Vishakhapatnam; Coll.: G.G. Mani.

Distribution: India: Andhra Pradesh.

XXIII Family SCLERODISTOMATIDAE Dollfus, 1930

104. Genus Isoparorchis Southwell, 1913

146. Isoparorchis hypselobagri (Billet, 1898) Odhner, 1927

1898. Distomum hypselobagre Billet Bull. Sci France Belgique 28 : 283


Material: Host: Kachuga kachuga.

Location: Body Cavity.

Locality: Hyderabad, A.P.

Distribution: India: Andhra Pradesh, West Bengal, Assam.

Elsewhere: China, Japan, Australia, Siberia

XXIV. Family ECHINOSTOMATIDAE (Looss, 1902), Dietz, 1909
Subfamily ECHINOSTOMATINAE (Looss, 1899) Faust, 1929

105. Genus Singhiatrema Simha, 1954

Key to the species of Singhiatrema

- Testes lobed ..................................................................................................................... 1
- Testes smooth.............................................................................................................. S. hyderabadensis
147. *Singhiatrema singhia* Simha, 1954


*Material*: Host: *Ptyas (Zamenis) mucosus*.

*Location*: Rectum.

*Locality*: Hyderabad.

*Distribution*: India: Andhra Pradesh.

148. *Singhiatrema longifurca* Simha, 1958


*Material*: Host: *Tropidonotus piscator*.

*Location*: Rectum.

*Locality*: Hyderabad.

*Distribution*: India: Andhra Pradesh.

149. *Singhiatrema hyderabadensis* Simha, 1954

1954. *S. hyderabadensis* Simha Z. F. Parasitkunde Bd. 18, S : 161-218

*Material*: Host: Reptiles.

*Location*: Rectum & Intestine.

*Locality*: Hyderabad.

*Distribution*: India: Andhra Pradesh.

150. *Singhiatrema najia* Chattopadhyaya, 1967


*Material*: Host: *Naja naja*.

*Location*: Cloaca.

*Locality*: Hyderabad; Collector: Chattopadhyaya D.R.

*Distribution*: India: Andhra Pradesh.

151. *Singhiatrema tropidonoti* Simha et Kundu, 1970


*Material*: Host: *Tropidonotus piscator*.
Location: Intestine.
Locality: Hyderabad.
Distribution: India: Andhra Pradesh.

Subfamily ECHINOCHASMINAE Odhner, 1910
106. Genus Echinochasmus Dietz 1909
152. Echinochasmus bagulai Verma, 1935

Material: Host: Alocinna travacorica.
Locality: Waltair Coast.
Distribution: India: Andhra Pradesh.

XXV. Family PROTERODIPLOSTOMIDAE Dubois, 1936
Subfamily OPHIODIPLOSTOMINAE Dubois, 1936
107. Genus Proalaroides Yamaguti, 1933
153. Proalaroides tropidonotus Vidyarthi, 1937

1937. P. tropidonotus Vidyarthi J. Helm 11, 163-168
Material: Host: Tropidonotus piscator.
Location: Intestine.
Locality: Hyderabad.
Distribution: India: Andhra Pradesh.

XXVI. Family CYATHOCOTYLIDAE Poche, 1925
Subfamily GOGATINAE Dubois et Mehra, 1935
108. Genus Gogatea Gogate, 1935
154. Gogatea serpentum (Gogate, 1932) Lutz. 1935

1932. Prohemistomum serpentum Gogate Parassit 24(3) : 318-320
Material: Host: Tropidonotus piscator.
Location: Intestine.
Locality: Hyderabad.
Distribution: India: Andhra Pradesh.
### HOST PARASITE RELATIONSHIP

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<thead>
<tr>
<th>Sl. No.</th>
<th>Parasite</th>
<th>Family</th>
<th>Host</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Pseudocreadiulm indicum</em></td>
<td>Lepocreadiidae</td>
<td><em>Monacanthus chirocephalus</em></td>
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<td></td>
<td>Madhavi, 1972</td>
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<tr>
<td>2.</td>
<td><em>Opechona bacillaris</em></td>
<td>-do-</td>
<td><em>Rostrelliger canagurta</em></td>
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<td></td>
<td>Molin, 1859</td>
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<td>3.</td>
<td><em>Opechona waltairensis</em></td>
<td>-do-</td>
<td>-do-</td>
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<td>Madhavi, 1972</td>
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<td>4.</td>
<td><em>Preptetos chaetodoni</em></td>
<td>-do-</td>
<td><em>Chaetodon pictus</em></td>
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<td></td>
<td>Madhavi, 1972</td>
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<td>5.</td>
<td><em>Lepocreadioides indicum</em></td>
<td>-do-</td>
<td><em>Cynoglossus lida</em></td>
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<td>Srivastava, 1941</td>
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<td>6.</td>
<td><em>Opisthogonoporoides</em></td>
<td>-do-</td>
<td><em>Ciganus oranin</em></td>
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<td></td>
<td><em>hanumanthai</em> Madhavi,1972</td>
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<td>7.</td>
<td><em>Echeneidocoelum indicum</em></td>
<td>-do-</td>
<td><em>Echeneis naucrates</em></td>
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<td></td>
<td>Simha et Parshad, 1964</td>
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<td>8.</td>
<td><em>Aephinidiogenus senegalensis</em></td>
<td>-do-</td>
<td><em>Pomadasys maculates</em></td>
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<td>Dollfus et Caprawn, 1915</td>
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<td>9.</td>
<td><em>Phyllotrema tetracaudatum</em></td>
<td>-do-</td>
<td><em>Uroconger lepturus</em></td>
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<td></td>
<td>Hussain, et al. 1986</td>
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<td>10.</td>
<td><em>Lobatocreadiulm manteri</em></td>
<td>-do-</td>
<td><em>Sufflamen capistratus</em></td>
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<td>11.</td>
<td><em>Multitestis bengalensis</em></td>
<td>-do-</td>
<td><em>Platax teira</em></td>
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<td>Madhavi, 1972</td>
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<td>12.</td>
<td><em>Transversocreadiulm cablei</em></td>
<td>-do-</td>
<td><em>Triacanthus breviostris</em></td>
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<td></td>
<td>Hafeezullah, 1970</td>
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<td>13.</td>
<td><em>Bianium plictum</em> (Linton,1928)</td>
<td>-do-</td>
<td><em>Gastrophysus lunaris</em></td>
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<td>14.</td>
<td><em>Cotylocreadiulm triacanthi</em></td>
<td>-do-</td>
<td><em>Triacanthus striligifer</em></td>
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<td>Hafeezullah, 1970</td>
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<td>15.</td>
<td><em>Bucephalus uranoscopi</em></td>
<td>Bucephalidae</td>
<td><em>Uranoscopus guttatus</em></td>
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<td></td>
<td>Yamaguti, 1934</td>
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<td>16.</td>
<td><em>Bucephalus barina</em></td>
<td>-do-</td>
<td><em>Jonius belengeri</em></td>
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<td></td>
<td>Srivastava, 1936</td>
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<td>Bucephalus varicus</td>
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<td>Caranx sexfaciatus</td>
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<td>Manter, 1940</td>
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<td>18</td>
<td>Alcicornis carangis</td>
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<td>Carangoides malabaricus</td>
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<td>McCallum, 1917</td>
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<td>Alcicornis multidactylus</td>
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<td>Caesia caerulaureus</td>
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<td>Madhavi, 1974</td>
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<td>Dollfusstrema bengalense</td>
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<td>Madhavi, 1974</td>
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<td>Rhipidocotyle ghanensis</td>
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<td>Psettodes cremnei</td>
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<td>Fischthal et Thomas, 1968</td>
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<td>Rhipidocotyle pentagonum</td>
<td>-do-</td>
<td>Thynnus thunniue</td>
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<td>(Ozaki, 1924) Eckmann, 1932</td>
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<td>Rhipidocotyle khalili</td>
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<td>Sphyraena obtusata</td>
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<td>Nagaty, 1937</td>
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<td>Rhipidocotyle sphyraenae</td>
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<td>Yamaguti, 1959</td>
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<td>25</td>
<td>Prosorhynchus menteri</td>
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<td>Trichurus haumela</td>
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<td>Srivastava, 1938</td>
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<td>Prosorhynchus chorinemi</td>
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<td>Chorinemenus sp.</td>
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<td>Yamaguti, 1952</td>
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<td>27</td>
<td>Prosorhynchus pacificus</td>
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<td>28</td>
<td>Prosorhynchus indicus</td>
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<td>Caesia caerulaureus</td>
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<td></td>
<td>Madhavi, 1974</td>
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<td>29</td>
<td>Bucephalopsis microcerrus</td>
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<td>Cybium guttatus</td>
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<td></td>
<td>Chauhan, 1943</td>
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<td>30</td>
<td>Psudopentagramma petrowi</td>
<td>Fellodistomidae</td>
<td>Sardinella fimbriata</td>
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<td></td>
<td>(Laymann, 1930)</td>
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<td></td>
<td>Yamaguti, 1971</td>
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<td>31</td>
<td>Pseudobacciger cablei</td>
<td>-do-</td>
<td>-do-</td>
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<td></td>
<td>Madhavi, 1975</td>
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<td>32</td>
<td>Pseudobacciger harengulae</td>
<td>-do-</td>
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<td></td>
<td>(Yamaguti, 1938) Nahhas et. Cable,1964</td>
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<td><em>Odontotrema arabi</em></td>
<td>-do-</td>
<td>Drepane punctata</td>
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<td></td>
<td>Hafeezullah et. Siddiqi, 1970</td>
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<td>34.</td>
<td><em>Pseudodiscogasteriodes indicum</em></td>
<td>-do-</td>
<td>Triacanthus brevirostris</td>
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<td>(Srivastava, 1939) Gupta 1955</td>
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<td>35.</td>
<td><em>Lintonium pulchrum</em></td>
<td>-do-</td>
<td>Gastrophysus lunaris</td>
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<td>(Jhonston, 1913) Skrijabin et. Koval, 1957</td>
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<td>36.</td>
<td><em>Lintonium pseudovibex</em></td>
<td>Fellodistomidae</td>
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<td>Madhavi, 1975</td>
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<td>37.</td>
<td><em>Parantorchiis intermedius</em></td>
<td>-do-</td>
<td>Chaetodon pictus</td>
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<td>Madhavi, 1975</td>
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<td><em>Parantorchiis pomacanthi</em></td>
<td>-do-</td>
<td>Pomacanthus annularis</td>
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<tr>
<td></td>
<td>(Hafeezullah et. Siddiqi, 1970) Madhavi, 1975</td>
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<td>39.</td>
<td><em>Horatrema pristipomatis</em></td>
<td>Opecoelidae</td>
<td>Leiognathus bindus</td>
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<td>Srivastava, 1942</td>
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<td><em>Pseudopocoelus scomberi</em></td>
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<td>Scomberoides tala</td>
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<td>Hafeezullah, 1971</td>
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<td>41.</td>
<td><em>Anisporus orientalis</em></td>
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<td>Dactyloptera orientalis</td>
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<td>42.</td>
<td><em>Paropocoelus indicus</em></td>
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<td>Upineus sulphurius</td>
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<td>43.</td>
<td><em>Opegaster ditrematis</em></td>
<td>-do-</td>
<td>Pseudorhombus micrognathus</td>
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<td>Yamaguti, 1942</td>
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<td>44.</td>
<td><em>Helicometra fasciata</em></td>
<td>-do-</td>
<td>Scorpaenopsis cirrhosum</td>
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<td>(Rud.1819) Odhner, 1902</td>
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<td>45.</td>
<td><em>Helicometra filamentosa</em></td>
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<td><em>Podocotyloides parupenei</em></td>
<td>-do-</td>
<td>Therapon jarbua</td>
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<td>(Manter, 1963)</td>
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<td>48.</td>
<td><em>Hamacreadium mutabile</em></td>
<td>-do-</td>
<td>Lutianus fulviflamma, L. rivulatus</td>
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<td></td>
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<td>50.</td>
<td><em>Allopodocotyle pritcharae</em> Madhavi, 1975</td>
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<td>Lutjanus lunulatus</td>
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<td>51.</td>
<td><em>Allopodocotyle argyropsi</em> Madhavi, 1975</td>
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<td><em>Angionematobothrium epinepheli</em> Yamaguti, 1965</td>
<td>Didymozoidae</td>
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<td>54.</td>
<td><em>Allonematobothrium epinepheli</em> Yamaguti, 1965</td>
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<td>Epinephelus tauvina</td>
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<td>55.</td>
<td><em>Nematobothrium megalaspium</em> Muregsh et al. 1992</td>
<td>-do-</td>
<td>Megalaspis cordyla</td>
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<td>56.</td>
<td><em>Metanematodirodes branchialis</em> Madhavi, 1982</td>
<td>-do-</td>
<td>Pristipomoides typicus</td>
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<td><em>Pseudocolocyntotrema yaito</em> Yamaguti, 1970</td>
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<td><em>Didymocystis wedli</em> Ariola, 1902</td>
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<td><em>Allodidymozoon cylindricum</em> Madhavi, 1982</td>
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<td><em>Indodidymozoon platycephali</em> Madhavi, 1982</td>
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<td><em>Renodidymocystis yamagutii</em> Madhavi, 1982</td>
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<td>Coelididymocystis kamagaii</td>
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<td>Katsuwonus pelamys</td>
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<td>Yamaguti, 1970</td>
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<td>Madhavi, 1974</td>
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<td><em>Acanthosiphodora bengalense</em> Madhavi, 1974</td>
<td>-do-</td>
<td>-do-</td>
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<td>89.</td>
<td><em>Cryptocallritebra provesculatum</em> Madhavi, 1974</td>
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<td>Lutjanus sp.</td>
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<td>90.</td>
<td><em>Stephanostomum orientalis</em> Srivastava, 1989</td>
<td>Acanthocolpidae</td>
<td>Caranx sexfasciatus Carangoides malabaricus</td>
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<td>Acanthocolpidae</td>
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<td>92.</td>
<td><em>Stephanostomum casum</em> Linton, 1910 (McFarlane,1934)</td>
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<td>Lutjanus malabaricus</td>
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<td><em>Stephanostomum triacanthi</em> Madhavi, 1976</td>
<td>-do-</td>
<td>Triacanthus strigilifer</td>
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| 98.    | *Stephanostomum mesospinosum*  
<pre><code>     |           | -do-         | *Carangoides malabaricus*                 |
</code></pre>
<p>| 99.    | <em>Acanthocolpus lidiodes</em>       | -do-         | <em>Chirocentrus dorab</em>                      |
| 100.   | <em>Acanthocolpus tenuis</em>         | -do-         | -do-                                      |
| 101.   | <em>Tormopsolus filiformis</em>       | -do-         | <em>Rachycentron canadus</em>                    |
| 102.   | <em>Allocreadium fasciatus</em>        | Allocreadiidae | <em>Aptochiitus melastigma</em>                  |
| 103.   | <em>Allocreadium handiai</em>         | -do-         | <em>Channa punctatus</em>                        |
|        |          |              | <em>Clarias batrachus</em>                       |
| 104.   | <em>Stomachicola muraenesosis</em>    | Hemiuridae   | <em>Muraenosox talabourides</em>                 |
| 105.   | <em>Allostomachicola secundus</em>    | -do-         | —                                         |
|        | (Srivastava, 1939) <em>Yamaguti, 1958</em> |      |                                            |
| 106.   | <em>Halipegus mehransis</em>          | -do-         | <em>Ptyas (Zamenis) mucus</em>                   |
|        | Srivastava, 1933               |              |                                            |
| 107.   | <em>Halipegus ovocauda GUID</em>      | -do-         | —                                         |
|        | (Vulpain, 1858) <em>Looss, 1899</em>  |              |                                            |
| 108.   | <em>Lecithaster indicum</em>          | -do-         | <em>Unidentified fish</em>                       |
|        | Srivastava, 1935               |              |                                            |
| 109.   | <em>Aphanurus dussumieri</em>         | -do-         | <em>Dussumieria hasseltii</em>                   |
|        | Hussain et al., 1984           |              |                                            |
| 110.   | <em>Uterovesiculus lameriensis</em>   | -do-         | <em>Chironemus lyson</em>                        |
|        | (Tubangui et. Musilungan, 1935)|              |                                            |
| 111.   | <em>Parahemiurus engraulisi</em>      | -do-         | <em>Ilisha filigera</em>                         |
|        | Gupta et. Jahan, 1977          |              |                                            |
| 112.   | <em>Aponurus waltairensis</em>        | -do-         | <em>Acanthurus bleekeri</em>                     |
|        | Hussain et al. 1987            |              |                                            |
| 113.   | <em>Hydrophitrema giganticum</em>     | -do-         | <em>Enhydrina valakad yen</em>                   |
|        | Sandars, 1960                  |              | <em>Microcephalus gracilis</em>                  |</p>
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<th>Family</th>
<th>Host</th>
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<td>114.</td>
<td><em>Galleo tigrinum</em>&lt;br&gt;Mehra et Negi, 1928</td>
<td>Lecithodendriidae</td>
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<td>115.</td>
<td><em>Pleurogenoides gastroporus</em>&lt;br&gt;Luhe, 1901</td>
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<td><em>Pleurogenoides sitapurii</em>&lt;br&gt;Srivastava, 1934</td>
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<td><em>Rana cyanophlyctis</em></td>
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<td>118.</td>
<td><em>Mehrarchis chamaeleonis</em>&lt;br&gt;Simha, 1958</td>
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<td><em>Chamaeleon zeylanicus</em></td>
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<td><em>Anchitrema sanguineum</em>&lt;br&gt;(Sonsino, 1894) Looss, 1899</td>
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<td>122.</td>
<td><em>Xenopharynx heterovitellatus</em>&lt;br&gt;Simha, 1958</td>
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<td>123.</td>
<td><em>Xenopharynx pyriformes</em>&lt;br&gt;Simha, 1958</td>
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<td>124.</td>
<td><em>Xenopharynx solus</em>&lt;br&gt;Nicoll, 1912</td>
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<td>125.</td>
<td><em>Plagiorchis himalayai</em>&lt;br&gt;Luhe, 1899</td>
<td>-do-</td>
<td><em>Chamaeleon zeylanicus</em></td>
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<td>127.</td>
<td><em>Astiotrema loossi</em>&lt;br&gt;Mehra, 1931</td>
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<td>-do-</td>
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<td>128.</td>
<td><em>Neoganada aspinosa</em>&lt;br&gt;Simha, 1958</td>
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<td><em>Chamaeleon zeylanicus</em></td>
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<td><em>Encyclometra colubrimurorum</em>&lt;br&gt;Dollfus, 1931</td>
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<td><em>Water snake, Grass snake</em></td>
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<td>130.</td>
<td><em>Atrophoecaem indicum</em>&lt;br&gt;Simha, 1958</td>
<td>Acanthostomidae</td>
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<td><em>Dryophis nictirizans</em></td>
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<td><em>Galactostomum ussuriense</em> Oshmarin, 1963</td>
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<td>133.</td>
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<td><em>Dryophis nicterizans</em></td>
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<td>134.</td>
<td><em>Schikholobalotrema acutum</em> (Linton, 1910) Skrjabin et. Guschanskja, 1953</td>
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<td>138.</td>
<td><em>Paradismoides spatulatus</em> Simha, 1958</td>
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<td><em>Chamaeleon zeylanicus</em></td>
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<td><em>Ommatobrephus megacetalculus</em> Simha, 1958</td>
<td>Ommatobrephidae</td>
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<td>142.</td>
<td><em>Monascus typicus</em> (Odhner, 1911) Yamaguti, 1954</td>
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<td><em>Isoparorchis hypselobagri</em> (Billet, 1898)</td>
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<td><em>Kachuga kachuga</em></td>
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<td>(Odhner, 1927)</td>
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<td>149.</td>
<td><em>Singhiatrema hyderabadensis</em> Simha, 1954.</td>
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<td><em>Rat Snake</em></td>
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<td><em>Singhiatrema najia</em> Chattopadhyay, 1964</td>
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<td><em>Singhiatrema tropidonoti</em> Simha et. Kundu</td>
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<td><em>Tropidonotus piscator</em></td>
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<td><em>Gogatea serpentum</em> (Gogate,1932) Lutz, 1935.</td>
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</table>

**SUMMARY**

The present work is an account of all the species of Digenetic trematodes of Fishes, Amphibia and Reptilia, recorded and studied so far from Andhra Pradesh; Keys for the families and genera, dealt in the present work are mainly for easy identification. Geographical Distribution of all the species recorded from Andhra Pradesh have been furnished.

In all 154 species under 108 Genera and 26 families have been included in the present work mostly of which have cited from the literature (earlier work from the Scientists of this group).

**ACKNOWLEDGEMENT**

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MacCallum, 1917. Some new forms of parasitic worms Zoopathologica 1 : 43-75


*Not consulted in original*
INTRODUCTION

The state of Andhra Pradesh lies on the southern side of India. Geographically, it is located within the sub tropics extending from 12°40' to 19°50' North latitude and 76°45' to 84°40' East longitude. It is the fifth largest state of India in terms of geographical dimension and population. It covers an area of 2,75,280 square kilometres bounded by Orissa and Madhya Pradesh on the North side, by Maharashtra and Karnataka on the West, by Tamil Nadu on the south and on the East side by Bay of Bengal. In Andhra Pradesh there are two major river systems, Godavari and Krishna; covers about 1500 kilometres area of the state. Both the rivers are originated from Western Ghats and meet the Bay of Bengal on east side. The state has a coast line of about 1100 kilometres; lakes and tanks cover the area of about 8,00,000 hectares. About 24% land area of the state is covered by forest in which evergreen, semi evergreen and moist deciduous forest are also found. The Kolleru Lake (C. 250 sq. km.), which partially situated in the two coastal districts, Krishna and Godavari is regarded as one of the largest wetland in India.

The state can be broadly divided into three physiographic divisions:

1. The mountainous region consisting of Nallamalai and Erramalai hills of Rayalseema and Eastern Ghats.

2. Platean or elevated plains having an altitude of 92–722 meters covering the entire Telengana and a part of Rayalseema.

3. The delta areas among which the Godavari, the Krishna and the Pennar are important.

As because the state is situated within the tropics, the climate is hot almost all round the year. The summer season is from February to May, which is very hot and dry. The atmospheric temperature often rises upto 45°C during this season. The winter season is only for two months, December and January. The temperature may fall only upto 18–19°C during that period. The rainy season is from June to October. The annual rainfall varies from 510–1025 mm. The rains occur mainly due to the South West monsoon.
Map showing district-wise collection localities


During the period of April 1998–December 2002, seven faunistic field surveys were conducted in Andhra Pradesh, covering 18 districts out of 22 (Map–1). Adilabad, Nizamabad, Karimnagar and Sriukulam have not been covered. The work comprises of 30 species under 14 genera and 6 families. Out of 30 species 18 species have been collected by the first author from the above districts involving in the various survey parties of Zoological Survey of India, which are also new record form the state. Twelve species, already recorded by different scientists from the state at different times have also been incorporated. One new species and two new subgenera have been described and illustrated. Diagnostic characters of all the species alongwith the keys for easy identification of families and genera, have been provided. The figures of all the species have also been furnished to get a comprehensive totality of the scenario. In the present work a trial has been taken to make a consolidated account of nematode parasites of arthropods in Andhra Pradesh so far available.

Amongst the arthropods Diplopoda; the insects of the families Blattidae, Gryllidae, Scarabidae, Passalidae and Hydrophilidae are recorded as important hosts which harbour the nematode parasites. In the present study the parasites were collected from millipedes (Spirobolus sp.) and the insects of the families Blattidae, Gryllidae and Scarabidae. Among these hosts, particularly the millipedes and the insects of the family Blattidae, the infection was found to be almost total. The location of the parasites was found to be invariably in the hind gut of the hosts. Though this is an interesting phenomenon i.e. the occurrence of severe parasitic infection in any particular taxonomic group, where as in other group the infection become rare; but hopelessly much work has not been done to establish the real reasons behind this.

In the invertebrate hosts, it is a common experience that single host is being infested by more than one parasitic species. In such a situation, confusion may arise about the corresponding male or female, as the case may be. If there is sexual dimorphism in the parasites, the difficulty is further enhanced. It is common practice that, if males and females having the similar features, are considered to belong to the same species. Even then it is fairly difficult
to identify them as is evident by the examples of certain species where they were identified on the basis of only males or females; and for some of them even till the day, their counter parts remain unidentified.

**MATERIALS AND METHODS**

The hosts were first made inactive by very little amount of chloroform. Then they were dissected and the gut was separated. The alimentary canal was opened in a petri dish with normal saline by means of needles and then was observed under a binocular microscope in lower magnification. The parasites were collected by means of a fine pippet into cavity block. The specimens were fixed in hot (about 60°C) 70% alcohol. After fixation they were preserved under 70% alcohol, containing 5% glycerine. Then the nematodes became ready for study. Rarely a few drops of lactophenol were used for clearing; as because, in case of invertebrate parasitic nematodes the cuticle is very thin and the lactophenol was found to clear not only the body wall but also the internal organs.

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SYSTEMATIC ACCOUNT

Class NEMATODA

Order I OXYURIDA

Key to the super-families

1. Male with one spicule, gubernaculum absent. Female with 8 head papillae ..................
   .......................................................................................................................... TELASTOMATOIDEA
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Superfamily I THELASTOMATOIDEA

Family I THELASTOMATIDAE Travassos, 1929

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1. Corpus of pharynx with distinct metacorpus ................................................................. HAMMERSCHMIDTIELLINAE, Chitwood, 1932
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Subfamily I HAMMERSCHMIDTIELLINAE Chitwood, 1932

Genus 1 *Hammerschmidtella* Chitwood, 1932

**Key to he available Species**

1. Slender female body; oesophagus long with long pseudobulb, short isthmus..............

   .............................................................................................................. *H. diesingi* (Hammerschmidt, 1838), Chitwood, 1932

2. Stouter female body; oesophagus short with distinctly small pseudobulb, long isthmus

   .............................................................................................................. *H. singhi*, Rao & Rao, 1965

1. *Hammerschmidtella diesingi* (Hammerschmidt, 1838) Chitwood, 1932

   (Fig. 1)


*Material* : ♂ 7; Host : *Blatta orientalis*, Hab : Rectum; Loc. : Anantapur, Anantapur, Andhra Pradesh; Coll. V. V. Gantait.

*Diagnosis* :


*Distribution* : India : Andhra Pradesh, Anantapur; North India.

*Elsewhere* : Europe, North America, South America and Russia.

*Remarks* : Measurements on the basis of present collection; illustrations: after Chitwood, 1932.

Fig. 1. *Hammerschmidtella diesingi*:
Female entire.

(Fig. 2 : A-C)


**Material** : ♀ 1, ♂ 1 Host: *Corydia* sp.; Hab: Intestine; Loc: Secunderabad, Rangareddy, Andhra Pradesh; Coll: V. V. Gantait.

**Diagnosis** : Female: Body 1.87 mm in length and 0.168 mm in width. Mouth surrounded by 8 labio-papillae. Corpus measures 0.096 mm long by 0.018 mm wide which expands into a pseudobulb measuring 0.048 mm wide and 0.072 mm long. Isthmus 0.038 mm in length and 0.016 mm width, with a slight bulge in the middle. Vulva 0.484 mm from anterior extremity. Tail 0.659 mm in length.

*Male*: 0.86 mm in length and 0.048 mm in maximum width. Oesophagus 0.114 mm in length; corpus 0.056 mm long by 0.014 mm, isthmus 0.039 by 0.009 mm and vulvulated bulb 0.023 mm in diameter. Tail set off from the rest of the body, 0.14 mm long. Caudal papillae

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Fig. 2. *Hammerschmidtella singhi*: A. Female, anterior extremity; B. Female, tail end; C. Male entire.
comprises of two pairs of preanals, a pair of adanal and an unpaired medium post-anal papillae. Spicule single, 0.03 mm long.

*Distribution*: India: Andhra Pradesh, Rangareddy.

*Remarks*: Measurements on the basis of present collection; illustrations; after Rao and Rao, 1965. Secunderabad was under Hyderabad District previously, now it is under Rangareddy District.

Sub-family II CAMERONIINAE Kloss, 1959

Genus 2 *Cameronia* Basir, 1948

3. *Cameronia biovata* Basir, 1948
   (Fig. 3)


*Material*: 911; Host: Gryllotalpa africana; Hab: Rectum; Loc: Vishakhapatnam, Vishakhapatnam, Andhra Pradesh; Coll: V. V. Gantait.

*Diagnosis*: Length 3.268–3.489 mm; width 0.354–0.366 mm; buccal cavity 0.019 mm × 0.02 mm; oesophagus 0.432–0.459 mm; corpus 0.329–0.36 × 0.036–0.038 mm; isthmus 0.012–0.019 mm × 0.034–0.038 mm; bulb 0.096–0.105 × 0.095–0.101 mm; nerve ring 0.196–0.208 mm from head end; vulva 2.36–2.49 mm from anterior extremity; anus 0.159–0.178 mm from tail end; eggs 0.013–0.134 × 0.044–0.046 mm.

*Distribution*: India: Andhra Pradesh, Vishakhapatnam, Aligarh.


Sub-family III BLATTICOLINAe Chitwood, 1932

**Key to Genera**

1. Vulva in posterior fourth of the body; tail of female cone-shaped. .................................................. *Blatticola* Schwenk, 1926

2. Vulva in middle third of the body; tail of female spicate or thread-like ........................................... *Johnstonia* Basir, 1956
Genus 3 *Blatticola* Schwenk, 1926

**Key to Species**

1. Distance between vulva and anus equal to tail length, oesophagus long occupies 1/6th of body length, eggs large in size; spicule long .......................... *Blatticola supellaimae* Rao & Rao, 1965

2. Distance between vulva and anus more than double of tail length, oesophagus short occupies 1/12th of body length, eggs small in size; spicule short.......................... *Blatticola blattae* (Graeffe, 1860) Chitwood, 1932


(Fig. 4: A-B)


*Material*: ♀2, ♂2; *Host*: *Supellaima* sp.; *Hab*: Rectum; *Loc*: Hyderabad, Rangareddy, Andhra Pradesh; *Coll*: Rao & Rao.

*Diagnosis*: Female: Body 3.235 mm long and 0.301 mm wide. Oesophagus 0.415 mm in length; corpus club-shaped about 0.280 mm x 0.050 mm, isthmus 0.027 mm in length and 0.032 mm in width, vulvular bulb 0.108 mm x 0.100 mm. Nerve ring 0.195 mm from head end. Anus 0.175 mm from tail end. Vulva 0.337 mm from posterior end and 0.162 mm anterior to anus. Egg 0.162 mm x 0.072 mm, pointed at both ends.

Male: Body 0.990 mm long, 0.070 mm wide. Oesophagus 0.160 mm in length; corpus 0.105 mm x 0.015 mm, isthmus 0.025 mm long, vulvular bulb 0.030 x 0.027 mm. Nerve ring 0.042 mm from anterior end. Anus 0.050 mm from posterior end. Testis single. Spicule one, 0.025 mm in length.

*Distribution*: India: Andhra Pradesh, Rangareddy.


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**Fig. 4.** *Blatticola supellaimae*; A. Female entire, B. Male entire.
5. **Blatticola blattae** (Graeffe, 1860) Chitwood, 1932
(Fig. 5)


**Material**: ♀12; **Host**: *Blatta orientalis*; **Hab**: Rectum; **Loc**: Araku Valley, Vishakhapatnam, Andhra Pradesh; **Coll**: V. V. Gantait.

**Diagnosis**: Female: 2.2–3.1 mm long and 166–169 μm wide. Oesophagus 159–278 μm long; corpus 233–276 μm long; isthmus very short. Nerve ring 111–226 μm from anterior end. Anus 163–241 μm from posterior end. Tail conical. Vulva 1.66–2.52 mm from head end. Ovary directed anteriorly and reflexed. Eggs rectangular or oval, pointed at both ends; 122–127 μm long by 39–42 μm wide.

**Distribution**: India: Andhra Pradesh, Vishakhapatnam.

**Elsewhere**: Europe, South America and U.S.S.R.

**Remarks**: Measurements based on present collection; illustrations: after Chitwood, 1932.

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**Genus 4 Johnstonia** Basir, 1956

**Key to Sub-genus**

1. Female with short tail, about 1/6th of the body length ............... *Johnstonia* Rao, 1970

2. Female with long tail, about 1/3rd of the body length .................. *Paronai* Rao, 1970

**Sungenus 1 Johnstonia** Rao, 1970


**Material**: ♀17; **Host**: *Spirobolus* sp.; **Hab**: Rectum; **Loc**: Vijianagram, Vijianagram, Andhra Pradesh; **Coll**: V. V. Gantait.
Diagnosis: Female: Body 3.24–3.62 mm in length and 0.37–0.44 mm in width. Buccal cavity 0.012–0.015 mm deep and 0.007–0.01 mm wide; a small conical tooth at the base. Corpus 0.34–0.36 mm in length and 0.038–0.04 mm in width, isthmus 0.032–0.037 mm in length and 0.031–0.036 mm in width and posterior valvular bulb 0.12–0.13 mm in diameter. Nerve ring 0.17–0.18 mm from anterior end. Vulva at about 1.65–1.72 mm from anterior extremity. Eggs measure 0.07–0.072 mm x 0.05–0.053 mm. Tail filiform, short, 0.66–0.72 mm in length.

Distribution: India: Andhra Pradesh, Vijianagram.


Subgenus 2 Paronai Rao, 1970

Key to the available species

1. Female tail about 1/3rd of the body length ......................... \( J.(P.)\) indica Kumari, 1957
2. Female tail about 1/4th of the body length ......................... \( J.(P.)\) dollfusi Rao, 1970

7. Johnstonia (Paronai) indica Kumari, 1967

(Fig. 7)


Fig. 6. Johnstonia (Johnstonia) basiri; Female entire.

Fig. 7. Johnstonia (Paronai) indica; Female entire.
Material: ♀ 17; Host: Spirostreptus sp.; Hab: Intestine; Loc: Khammam, Khammam, Andhra Pradesh; Coll: V. V. Gantait.

Diagnosis: Female: Body 2.24–2.28 mm in length 0.25–0.29 mm in width. Oesophagus 0.41–0.44 mm in length. Nerve ring 0.14–0.17 mm from anterior end. Excretory pore 0.32–0.35 mm from head end. Vulva 1.11–1.14 mm from anterior extremity. Anus 0.82–0.86 mm from tail tip. Egg measures 0.11 × 0.07 mm–0.13 × 0.09 mm.

Distribution: India: Andhra Pradesh, Khammam.


8. Johnstonia (Paronai) dollfusi Rao, 1970
(Fig. 8)


Material: ♀ 11; Host: Spirobolus sp. Hab: Rectum; Loc: Nalgonda, Nalgonda, Andhra Pradesh; Coll: V. V. Gantait.

Diagnosis: Female: Body length 3.26–3.79 mm and width 0.37–0.48 mm. Oesophagus 0.76–0.81 mm long; corpus 0.62–0.64 mm × 0.03–0.04 mm, isthmus 0.03–0.04 mm × 0.02–0.03 mm, valvular bulb 0.12–0.14 mm in diameter. Nerve ring 0.25–0.27 mm and excretory pore 0.58–0.62 mm from anterior end. Vulva 1.66–1.98 mm from head end. Anus about 1.06–1.13 mm from posterior end. Egg measures 0.11–0.12 mm × 0.07–0.08 mm.

Distribution: India: Andhra Pradesh, Nalgonda.


Subfamily IV THELASTOMATINAE Travassos, 1929

Key to Genus

1. Anterior portion of female intestine with diverticulum ....... Leidynema Schwenk, 1929
   – Anterior portion of female intestine without diverticulum ........................................... 2

2. Eggs laid in a chain, enclosed in a mucous tube ................. Gryllophila Basir, 1942
   – Egg laid singly ................................................................................................................. 3

3. Excretory pore posterior to base of oesophagus, tail of female about 1/3rd or less of body length ................................................................. Schwenkiella Basir, 1956
   – Excretory pore anterior to base of oesophagus, tail of female more than 1/3rd of body length ........................................................................ Thelastoma Leidy, 1849
Genus 5 *Leidynema* Schwenk (Travassos, 1929)

Subgenus 3 *Leidynema* Farooqui, 1967


(Fig. 9)


*Material*: ♀9; *Host*: Corydia sp.; *Hab*: Intestine; *Loc*: Nalgonda, Nalgonda, Andhra Pradesh; *Coll*: V. V. Gantait.

*Diagnosis*: Body 2.72–3.8 mm in length and 0.38–0.47 mm in width. Buccal cavity oblong shaped, 0.014–0.02 mm deep and 0.011–0.15 mm wide. Oesophagus 0.36–0.51 mm in length. Corpus measures 0.23–0.37 mm in length, width of narrow region 0.02–0.03 mm and broader region 0.05–0.06 mm. Isthmus 0.02–0.03 mm in length and 0.02–0.04 mm in width. Spherical valvular bulb 0.08–0.09 mm in diameter. Intestine much broad in the beginning with a flask-shaped diverticulum, measures 0.36–0.61 mm in length. Vulva 1.24–1.82 mm from head tip. Anus 0.52–0.63 mm from tail end. Eggs measure 0.08–0.11 mm × 0.03–0.04 mm.
Distribution: India: Andhra Pradesh, Nalgonda.


Genus 6 *Gryllophila* Basir, 1942

**Key to the available species**

1. Egg shell with spine-like outgrowths ......... *G. skrjabini* (Sergiev, 1923) Basir, 1956
2. Egg shell without spine-like outgrowths ......... *G. basiri* Parveen & Jairajpuri, 1981

10. *Gryllophila skrjabini* (Sergiev, 1923) Basir, 1956
   (Fig. 10)


Material: 913: Host: *Gryllotalpa africana*; Hab: Rectum; Loc: Kakinada, East Godavari, Andhra Pradesh; Coll: V. V. Gantait.


Distribution: India: Andhra Pradesh, East Godavari, North India.


Fig. 10. *Gryllophila skrjabini*: Female entire
(Fig. 11)


**Material:** 97 ♂; **Host:** *Gryllotalpa africana*; **Hab:** Rectum; **Loc:** Gudur, Nellore, Andhra Pradesh; **Coll:** V. V. Gantait.

**Diagnosis:** **Male:** Body 0.88–0.91 mm long and 0.11–0.12 mm wide. Buccal cavity 20–22 \( \mu m \times 7–8 \mu m \). Nerve ring 0.11 mm from anterior end. Oesophagus 0.17–0.18 mm; corpus 0.105–0.107 mm \( \times 0.017–0.019 \) mm. Anus 0.117–0.118 mm from tail tip. Spicule single, 51–52 \( \mu m \) long.

**Female:** Body 1.45–1.68 mm in length and 0.164–0.165 mm width. Buccal cavity 15.1–16.2 \( \mu m \) long and 12–13.4 \( \mu m \) wide. Oesophagus 0.36–0.38 mm long; corpus 0.24–0.26 mm \( \times 0.028–0.029 \) mm, isthmus 0.041–0.044 mm \( \times 0.024–0.027 \) mm, bulb 0.084–0.086 mm \( \times 0.081–0.083 \) mm. Nerve ring 0.196–0.22 mm from anterior end. Excretory pore 0.65–0.71 mm from head tip. Vulva 1.06–1.24 mm from anterior extremity. Anus 0.177–0.18 mm from tail end. Eggs measure 51–64 \( \mu m \) \( \times 28.4–42.8 \mu m \).

**Distribution:** India: Andhra Pradesh, Nellore.

**Remarks:** Measurements provided on the basis of present collection; illustrations: after Parveen and Jairajpuri, 1981.

**Fig. 11.** *Gryllophila basiri*; A. Male entire. B. Female entire

Genus 7 *Schwenkiella* Basir, 1956

**Key to the available Species**

1. Female tail \( \frac{1}{3} \)rd of the body length ........................................................................................................... 2  
   - Female tail \( \frac{1}{4} \)th of the body length ............................................................................................... 3  
2. Vulva at the middle of the body .......... *S. periplaneticola* Parveen & Jairajpuri, 1981  
   - Valva at the body anterior to the middle of the body .................................................................

.......................................................................................................................... *S. atheri* Parveen & Jairajpuri, 1983
3. Female body more than 2.5 mm in length ........... S. basiri Parveen & Jairajpuri, 1980
   – Female body less than 2.4 mm in length......................... S. indica Rao & Rao, 1966

   (Fig. 12 : A–C)

1981. Schwenkiella periplaneticola Parveen & Jairajpuri; Rivista Di Parassitologia, XLII(2) : 261–266.

Material : ♀4; Host : Periplaneta americana; Hab : Rectum; Loc : Rajamundry, East Godavari, Andhra Pradesh; Coll : V. V. Gantait.

Diagnosis : Female : Body 2.5–3.2 mm long, 0.17–0.2 mm wide. Oesophagus 0.42–0.51 mm long; corpus 0.31–0.35 mm by 0.03–0.04 mm, isthmus 0.03–0.04 mm long and 0.04 mm wide, bulb 0.08–0.1 mm × 0.07–0.09 mm. Nerve ring 0.17–0.21 mm from anterior end of the body. Excretory pore 0.48 – 0.55 mm from head tip. vulva equatorial in position, 1.2–1.6 mm from anterior extremity. Ovaries divergent. Tail long, filiform, about 1/3rd of the body length, 0.85–0.93 mm in length. Eggs spherical or oval, 51–84 μm × 49–58 μm.

![Fig. 12. Schwenkiella periplaneticola; A. Female anterior end, B. Vulval region, C. Female tail.](image-url)

Distribution : India : Andhra Pradesh, East Godavari; Aligarh.

Remarks : Measurements provided on the basis of present collections; illustrations : after Parveen and Jairajpuri, 1981.
(Fig. 13)


*Material*: ♀17; *Host*: *Periplaneta americana*; *Hab*: Rectum; *Loc*: Bakherpet, Chittoor, Andhra Pradesh; *Coll*: V. V. Gantait.

*Diagnosis*: Body 2.7 mm–2.9 mm long and 0.21–0.23 mm wide. Buccal cavity 13–14 μm long and 13 μm wide. Oesophagus 0.42–0.43 mm long; corpus 0.29–0.31 mm in length and 0.03–0.04 mm in width, isthmus 0.03–0.04 mm × 0.03 mm, bulb 0.07–0.09 mm × 0.07–0.08 mm. Nerve ring 0.18–0.19 mm from anterior end. Excretory pore post-oesophageal, 0.45–0.48 mm from head tip. Vulva slightly anterior to middle of the body. Tail about 1/3rd of the body length, 0.58–0.62 mm. Eggs oval, 83–85 μm × 56–63 μm.

*Distribution*: India: Andhra Pradesh, Chittoor, Aligarh.

(Fig. 14)


Material : ♀12; Host: Periplaneta americana; Hab: Rectum; Loc: Guntur, Guntur, Andhra Pradesh; Coll : V. V. Gantait.

Diagnosis: Female: Body 2.56–3.24 mm long, 0.21–0.24 mm wide. Oesophagus 0.44–0.49 mm long; corpus 0.32–0.37 mm long, 0.03–0.06 mm wide, isthmus 0.03–0.04 mm long and 0.033–0.036 mm wide, bulb 0.11–0.13 mm x 0.11–0.12 mm. Nerve ring 0.23–0.26 mm from head tip. Excretory pore 0.54–0.58 mm from anterior end. Vulva 1.3–1.7 from head end. Tail about 1/4th of the body length, 0.68–0.72 mm in length. Eggs 0.07–0.09 mm x 0.05–0.06 mm.

Distribution: India: Andhra Pradesh, Guntur, North India.


(Fig. 15: A-B)


Diagnosis: Female: 2.33 mm in length and 0.235 mm in maximum width. Buccal cavity 0.009 mm wide and 0.012 mm deep. Oesophagus 0.406 mm in length; corpus 0.29 mm in length with uniform thickness 0.023 mm; isthmus 0.027 mm x 0.03 mm, bulb 0.086 mm in diameter. Nerve ring 0.195 mm from anterior end. Anus 0.588 mm from posterior end, tail about 1/4th of the total length. Vulva 1.19 mm from head tip. Eggs measure 0.081 mm by 0.065 mm.

Male: Measures 1.11 mm long and 0.12 mm wide. Buccal cavity 0.009 mm wide and 0.006 mm deep. Oesophagus 0.198 mm in length; corpus 0.136 mm long 0.025 mm wide, isthmus 0.015 mm in length and 0.012 mm in width, bulb 0.046 mm by 0.035 mm. Testis single. Spicule absent. Caudal papillae three pairs.

Distribution: India: Andhra Pradesh, Rangareddy.


Fig. 15. Schwenkiella indica: A. Female entire. B. Male entire.
Genus 8 Thelastoma Leidy, 1849

Key to the available Species

1. Female body more than 3.5 mm in length .................... T. guptai Duggal & Aulakh, 1989
   – Female body less than 3 mm in length .................................................. 2
2. Female tail less than 0.7 mm in length ...................... T. pterygoton Poinar Jr. 1973
   – Female tail more than 0.8 mm in length ........................................... 3
   – Spicule absent ........................................................ T. atheri Rizvi & Jairajpuri, 1995

16. Thelastoma guptai Duggal & Aulakh, 1989

(Fig. 16)


Material : ♀ 11; Host : Periplaneta americana; Hab : Rectum; Loc : Medak, Medak, Andhra Pradesh; Coll: V. V. Gantait.


Distribution : India : Andhra Pradesh, Medak; Delhi.


17. Thelastoma pterygoton Poinar Jr., 1973

(Fig. 17)


Material : ♀ 4; Host : Scarabaeid beetle (Hydrophilus sp); Hab : Intestine; Loc : Cuddaph, Cuddaph, Andhra Pradesh; Coll. V. V. Gantait.

Diagnosis : Female : Body 1.42–2.90 mm in length and 0.12–0.26 mm in width. Buccal cavity 0.011–0.012 mm long and 0.009–0.010 mm wide. Nerve ring 0.18–0.20 mm from anterior extremity. Excretory pore 0.37–0.52 mm from head tip. Vulva (51–54) from anterior end. Tail 0.31–0.59 mm in length.

Distribution : India : Andhra Pradesh, Cuddaph.
Elsewhere: Abidjan, Ivory Coast, West Africa.

Remarks: Measurements on the basis of present collection, illustration: after Poinar Jr., 1973. This has been recorded first time from India.

18. Thelastoma kherai Duggal & Aulakh, 1989
(Fig. 18: A–B)

1989. Thelastoma kherai Duggal & Aulakh; Research Bulletin (Science) of the Punjab University, 40: 95–98.

Material: 97 ± 1; Host: Periplaneta americana; Hab: Rectum; Loc: Nandyal, Karnool, Andhra Pradesh; Coll: V. V. Gantait.

Male: 1.06 mm long and 83 μm wide. Oesophagus 231 μm long; Corpus 182 x 24 μm, bulb 47 x 34 μm. Spicule 62 μm. Tail 321 μm in length.

**Distribution**: India: Andhra Pradesh, Karnool; Delhi.


![Fig. 18. Thelastoma kherai; A. Female entire, B. Male entire](image)

![Fig. 19. Thelastoma atheri; A. Female entire, B. Male entire](image)

19. **Thelastoma atheri** (Parveen & Jairajpuri, 1983) Rizvi & Jairajpuri, 1995 (Fig. 19: A–B)


**Material**: ♀8 ♂2; Host: *Periplaneta* americana; Hab: Rectum; Loc: Tirupati-Tirumala, Chittoor, Andhra Pradesh; Coll: V. V. Gantait.

**Diagnosis**: Female: Body 2.52–3.02 mm in length and 0.16–0.20 mm in width. Buccal cavity 13–14 μm in diameter. Oesophagus 0. 41–0.42 mm long. Nerve ring 0.17–0.19 mm
from anterior end. Excretory pore 0.47–0.51 mm from head tip. Vulva 1.19–1.32 mm from anterior extremity. Tail 0.72–0.91 mm in length. Eggs measure 73–75 μm × 51–54 μm.

**Male**: Body 1.20–1.24 mm long and 0.081–0.083 mm wide. Buccal cavity 12–14 μm long, 3.8 μm wide. Oesophagus 0.181–0.186 mm long. Nerve ring and excretory pore 0.092–0.098 mm and 0.27–0.29 mm from anterior extremity. Tail 0.35–0.38 mm long. Testis single, spicule absent.

**Distribution**: India: Andhra Pradesh, Chittoor; Aligarh.


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**Superfamily II RHIGONEMATOIDEA**

**Key to the families**

1. Specules two, equal in size; gubernaculum present ...... CARNOYIDAE Filipjev, 1934
   – Spicules one or two, gubernaculum rudimentary or absent .......... BLATTOPHILIDAE

   **Family II CARNOYIDAE Filipjev, 1934**
   **Sub-family V CARNOYINAE Filipjev, 1934**
   **Genus 9 Rondonema Artigas, 1926**

   
   (Fig. 20 : A–B)


**Diagnosis**: **Female**: Body 2.609–2.955 mm in length and 0.258–0.344 mm in width. Buccal cavity 0.062–0.068 mm. Corpus 0.129–0.146 mm × 0.026–0.041 mm, isthmus 0.068–0.077 mm × 0.022–0.024 mm and bulb 0.086 mm in diameter. Anus 0.817–0.910 mm from tail tip. Vulva 1.255–1.496 mm from head end. Eggs large in size, measure 0.142–0.160 mm × 0.077–0.090 mm.

**Male**: 1.885–2.064 mm in length and 0.132–0.172 mm in width. Vestibule 0.030–0.032 mm in length and 0.026–0.030 mm in width. Corpus 0.319–0.430 mm × 0.038–0.042 mm, isthmus 0.059–0.072 mm × 0.020–0.026 mm and bulb 0.069–0.074 mm × 0.070 mm. Spicule sword-like, two in number, measure 0.140–0.152 mm. Gubernaculum 0.066–0.074 mm. Tail 0.187–0.223 mm.

**Distribution**: India: Andhra Pradesh, Rangareddy.

Family III BLATTOPHILIDAE

Genus 10 **Blattophila** Cobb, 1920

(Fig. 21 : A-B)


*Material*: ♀3 ♂1; *Host*: *Corydia* sp.; *Hab*: Rectum; *Loc*: Hyderabad, Rangareddy, Andhra Pradesh; *Coll*: Rao and Rao.

*Diagnosis*: Female: Body 1.94–1.97 mm in length and 0.23–0.25 mm in width. Nerve ring 0.2–0.208 mm from anterior extremity. Buccal cavity 10 μm deep by 8 μm wide. Oesophagus 0.38–0.40 mm; Corpus 0.24–0.25 mm long by 0.015 mm wide, posterior enlargement 0.039 mm x 0.033 mm. Isthmus 0.039 mm long, bulb 70 μm in diameter. Tail 0.352–0.39 mm long. Vulva 0.87 mm, about 46% from anterior extremity. Egg ellipsoidal, measures 65 x 42 μm.

Male: Measures 1.016 mm long, 0.092 mm wide. Oesophagus 0.18 from anterior end.
Corpus 0.122 mm × 0.014 mm, isthmus 0.021 X 0.012 mm, bulb 0.038 mm in diameter. Tail terminates abruptly with a spike, 20 μm long. Spicule single, 25 μm long.

**Distribution**: India: Andhra Pradesh, Rangareddy, Hyderabad.


Order II RHABDITIDA

Family IV CEPHALOBIDAE Artigas, 1929

Genus 11 *Cephalobium* Cobb, 1920

**Key to sub-genus (n. sub. gen.)**

1. Presence of buccal teeth in both sexes, preanal papilla absent in male ....................... .......................................................... *Denticum* Sub-gen. n.
   - Absence of buccal teeth in both sexes, presence of a pair of preanal papillae in male ........................................................................................................ *Adenticum* sub-gen. n.

Sub-genus 3 *Denticum* sub-gen. n.

**Key to the available Species**

1. Spicules long with short gubernaculum (about 0.114 mm and 0.020 mm respectively) .......................................................................................................................... *C. (D.) microvata* Rao & Rao, 1965
   - Spicules short; with long gubernaculum (about 0.103 mm and 0.025–0.031 mm respectively) .......................................................................................... *C. (D.) Gryllodes* Rao, 1980

   (Fig. 22 : A – B)


**Material**: Host: *Gryllus* sp.; Hab: Rectum; Loc: Hyderabad, Rangareddy, Andhra Pradesh; Coll: P. N. Rao and V. J. Rao.

**Diagnosis**: Female: Body 4.29–4.45 mm in length and 0.164–0.187 mm in width. Oesophagus 0.397–0.400 mm in length. Corpus 0.252–0.260 mm long by 0.027 mm, isthmus 0.034–0.043 mm in diameter and bulb 0.097–0.105 mm. Anus 0.363–0.375 mm from posterior extremity. Vulva 2.028–2.200 mm from anterior end. Eggs measure 0.050–0.055 by 0.030–0.035 mm.

**Male**: 2.80–2.98 mm in length and 0.117–0.122 mm in width. Oesophagus 0.298 mm in length; corpus 0.17 mm × 0.02 mm, bulb 0.32 mm in diameter and the post bulbal portion 0.093 mm. Tail 0.298 mm in length. Two equal curved spicules, measure 0.114 mm long, gubernaculum 0.020 mm long.
Fig. 22. Cephalobium (Denticum) microvata; A. Female entire, B. Male entire

Fig. 23. Cephalobium (Denticum) gryllodes; A. Female entire

Distribution: India: Andhra Pradesh, Rangareddy.


23. Cephalobium (Denticum) gryllodes Rao, 1980
(Fig. 23)


Diagnosis: Female: 2.43–5.25 mm in length and 0.131–0.164 mm in width. Oesophagus 0.317–0.466 mm in length. Corpus measure 0.216–0.324 mm by 0.029–0.031 mm, median bulb 0.037–0.052 mm by 0.024–0.045 mm and cylindrical post bulbal portion 0.074–0.111 mm by 0.016–0.020 mm. Anus 0.305–0.570 mm from tail tip. Ovaries two. Vulva 1.15–2.248 mm from anterior end. Eggs oval in shape, measure 0.059–0.067 mm by 0.043–0.048 mm.
Male: Body 1.5–2.69 mm in length and 0.069–0.117 mm in width. Oesophagus 0.235–0.317 mm long. Corpus 0.137–0.182 mm by 0.012 mm, median bulb 0.03–0.034 mm by 0.025–0.03 mm and post bulbal portion 0.068–0.1 mm by 0.01 mm. Tail 0.208–0.224 mm in length. Spicules two, equal in shape, measure 0.091–0.103 mm in length by 0.01 mm in width at broader end. Gubernaculum 0.022–0.031 mm by 0.007 mm. Eight pairs postanal papillae, no preanal papilla.

Distribution: India: Andhra Pradesh, Nizamabad.


Subgenus 4. Adenticum sub-gen. n.

Key to the available Species

1. On fixation, male tail curves into one circle. ....................... C. (A.) aodus Rao, 1982
   - On fixation, male tail curves into two and half circles .......... C. (A.) candatum sp.n.

   (Fig. 24: A–B)

1982. Cephalobium (Adenticum) aodus Rao; India J. Nematol, 12(1) 185–188.

Material: ♀20 ♂8; Host: Gryllus sp.; Hab: Intestine; Loc: Medak, Medak, Andhra Pradesh; Coll: V. J. Rao.

Diagnosis: All the measurements are given in millimetres.

Female: Length 3.169–3.69; width 0.133–0.146. Buccal cavity 0.025–0.031 × 0.007–0.008. Oesophagus 0.362–0.383; corpus 0.235–0.248 × 0.022–0.027; bulb 0.042–0.046 × 0.039–0.046, post bulbal portion 0.085 – 0.039. Vulva 1.75–1.89 from anterior end. Anus 0.325–0.345 from tail tip. Eggs measure 0.054–0.070 × 0.036–0.050.

Male: Length 2.86–3.2; width 0.117–0.125. Buccal cavity 0.025–0.031 × 0.012–0.018. Oesophagus 0.313–0.364; corpus 0.199–0.218 × 0.015, bulb 0.034–0.047 × 0.034–0.038, post bulbal portion 0.081–0.099. Anus 0.294–0.314 from the posterior end. Spicule 0.124–0.133; gubernaculum 0.025–0.05 × 0.008–0.01.

Fig. 24. Cephalobium (Adenticum) aodus:
A. Female entire, B. Make entire
Distribution: India: Andhra Pradesh, Medak.


25. Cephalobium (Adenticum) caudatum sp.n.
(Fig. 25: A–D)

Material: ♀ 13 ♂ 9; Host: Gryllotalpa africana; Hab: Rectum; Loc: Garden of Dakili Forest Rest House, Dakili, Nellore, Andhra Pradesh; Coll: V. V. Gantait; Date of Collection: 2nd December 1999.

Measurements: All are given in millimetre.

Male Holotype: Body length = 2.85; Width = 0.096; Oesophageal length = 0.54; Tail length = 0.20; Length of spicule = 0.144.

Male Paratype: Length = 2.64–2.97; width = 0.072–0.106; Oesophageal length = 0.512–0.568; Tail = 0.192–0.227; Spicule length = 0.133–0.152.

Female Allotype: Length = 2.88–3.23; Width = 0.08–0.112; Oesophageal length = 0.560–0.584; Tail = 0.34–0.40; Eggs = 0.064 × 0.032–0.072 × 0.032.

Description: Male: Cylindrical body, gradually tapering towards both the extremities. Cuticle smooth, without striations. Mouth surrounded by six papillae and opens into the buccal cavity which is divided into two parts, measuring together 0.032 mm in depth (0.03–0.04 mm). The buccal cavity has no teeth. Oesophagus long, divided into three parts. The anterior corpus measures 0.4 mm in length and 0.02 mm in width (0.04 × 0.02 mm–0.41 ×
0.03 mm), median bulb 0.05 x 0.05 mm (0.04 x 0.02 mm–0.06–0.03 mm) and post bulbal portion is 0.09 x 0.03 mm (0.08 x 0.02 mm–0.11 x 0.03 mm). Nerve ring is at about 0.21 mm (0.18–0.22 mm) from the anterior end. Anus is situated at the distance of about 0.2 mm from the posterior extremity. On fixation, tail forms two and half circles. Spicules two in number and equal in size. Gubernaculum oblong-shaped, 0.03 mm in length. Caudal papillae nine pairs, one preanal and eight post anal.

Female: Body smooth, cylindrical, tapering twoards both the ends. Mouth surrounded by six labio-papillae. Buccal teeth absent. Buccal cavity divided into two parts, measuring together 0.03–0.04 mm in depth. Oesophagus divided into anterior cylindrical corpus (0.41 x 0.02 mm –0.43 x 0.02 mm), the median non-valvular bulb (0.05 x 0.03 mm–0.06 x 0.04 mm) and post cylindrical bulbal portion (0.08 x 0.02 mm–0.09 x 0.02 mm). Nerve ring at a distance of about 0.20–0.22 mm from the anterior end. Anus 0.34–0.40 mm from the tail tip. Ovary didelphic and reflexed. Vulva situated at about 1.44–1.61 mm from the posterior extremity. Eggs few in number, oval in shape and spitted.

Discussion: The proposed new form differs conspicuously from all the known species of the genus *Cephalobia* except only *C. aodus* Rao, 1982; in not having the prominent tooth at the base of the buccal cavity in both the sexes. Further, the collected male nemas show resemblances with *C. aodus* in having a pair preanal papillae which is absent in other known species of the genus; they possess only eight pairs of post anal papillae. On closer study, it reveals that the new forms differ significantly from the aforesaid one. On fixation, the mail tail of the present nemas always curves into two and half circles, whereas in *C. aodus* the tail forms only one circle.

Etymology: The species is named as such, depending upon the tail-shape and number of caudal papillae in case of male.

Order III TYLENCHIDA

Key to families

1. Median pharyngeal bulb absent or if present, not containing outlet of dorsal pharyngeal gland ................................................................. ALANTONEMATIDAE Poinar Jr. 1975

Family V ALANTONEMATIDAE Poinar Jr., 1975

Key to Genus

1. Free-living males apparently lacking stylet. .... *Howardula* Cobb, 1972 (Goodey, 1930)
2. Free-living males possessing stylet ........................................ *Heterotylenchus* Bovein, 1937
Genus 12 *Howardula* (Goodey, 1930) Cobb, 1921

**Key to Species**


2. Ovoviviparous in nature ........................................ *Howardula mutilatus* Devi et al., 1991


(Fig. 26: A–C)


**Materials:** Host: *Copromyza marginatis* (Diptera: Sphaeroceridae); Location: Hemocoel; Locality: Dairies in the outskirts of Hyderabad city and in the surrounding villages of Hyderabad district (Rangareddy district at present) on dung heaps; Collector: Reddy & Rao.

**Fig. 26. Howardula marginatis;** A. Infective stage female, B. Free living male, C. Adult parasitic female.

**Diagnosis:** Infective stage free living female: Body slightly curved and finely striated. Anterior end broadly rounded and tapers posteriorly from the level of ovary. Tail tapers with a rounded tip. Stylet well developed, robust without basal knobs. Three oesophageal glands are well developed, extended beyond the middle of the body, occupy more than three fourths of the body length. The nuclei are not visible. Dorsal oesophageal gland duct with swollen
ampulla filled with fine granular secretions open within the oesophageal lumen slightly behind the base of stylet. Ovary is behind the ventral oesophageal glands with few cells, a narrow oviduct, a slightly swollen uterus and small receptaculum seminis.

Free living males: The posterior extremity is ventrally curved. The body is finely striated. The head is rounded and fused with the body. Mouth leads into a wide buccal cavity, without a stylet. The oesophageal glands are not differentiated into three. Excretory pore opening is behind the nerve ring. Testis prodelpic, occupies about half of the body length. Spicules paired, equal, sickle shaped.

Adult parasitic female: Body white in colour, spirally coiled and finely striated. Hypodermis thick with prominent nuclei. Lips and stoma are not visible. Stylet is retained but oesophagus and its glands and excretory pore are degenerated. Ovary single having two flextures with numerous hexagonal oogonia arranged on a central rachis, which fills major part of the body. Uterus with two flextures, filled with many eggs. Vagina has thick walls surrounded by Perivaginal cells; - spindle shaped gland cells. Vulva without any external vulval lips. Oviparous in nature. Anal opening situated posteriorly, tail looks like a small protuberance at the posterior extremity.

**Measurements**: Infective stage female ( \( n = 30 \)): \( L = 302 \text{ \mu m} \text{ (278–321 \text{ \mu m})} \); \( W = 16 \text{ \mu m} \text{ (14–17 \text{ \mu m})} \); \( a = 18.8 \text{ (17–20.8 \text{ \mu m})} \); \( b = 4.6 \text{ (4–5.3 \text{ \mu m})} \); \( b_1 = 1.7 \text{ (1.4–1.8 \text{ \mu m})} \); \( c = 7.9 \text{ (6.5–8.3 \text{ \mu m})} \); \( G_1 = 12.5\% \text{ (12–17.9\%)} \); \( V = 81.1\% \text{ (78.6–81.8\%)} \); stylet \( = 11 \text{ \mu m} \text{ (10–13 \text{ \mu m})} \); Excretory pore \( = 64 \text{ \mu m} \text{ (62–66 \text{ \mu m})} \); Hemizonid \( = 60 \text{ \mu m} \text{ (58–64 \text{ \mu m})} \); TL \( = 30 \text{ \mu m} \text{ (35–44 \text{ \mu m})} \); striae \( = 0.8 \text{ \mu m} \text{ (0.8–1 \text{ \mu m})} \).

Free living males (\( n = 30 \)): \( L = 285 \text{ \mu m} \text{ (230–300 \text{ \mu m})} \); \( W = 12 \text{ \mu m} \text{ (12–14 \text{ \mu m})} \); \( a = 23.2 \text{ (18.2–24.5 \text{ \mu m})} \); \( b = 4.5 \text{ (4.4–5.2 \text{ \mu m})} \); \( b_1 = 2.7 \text{ (2–2.7 \text{ \mu m})} \); \( c = 7.2 \text{ (7–9.3 \text{ \mu m})} \); excretory pore \( = 60 \text{ \mu m} \text{ (58–65 \text{ \mu m})} \); Hemizonid \( = 56 \text{ \mu m} \text{ (53–57 \text{ \mu m})} \); spicule \( = 8.8 \text{ \mu m} \text{ (8.5–10.6 \text{ \mu m})} \); TL \( = 31.8 \text{ \mu m} \text{ (24.8–32 \text{ \mu m})} \); striae \( = 0.5 \text{ \mu m} \text{ (0.4–0.5 \text{ \mu m})} \).

Adult parasitic female (\( n = 30 \)): \( L = 2.460 \text{ mm} \text{ (1.42–2.29 \text{ mm})} \); \( W = 210 \text{ \mu m} \text{ (164–215 \text{ \mu m})} \); \( a = 11.7 \text{ (9.2–12 \text{ \mu m})} \); \( c = 24.6 \text{ (23–28 \text{ \mu m})} \); stylet \( = 9 \text{ \mu m} \text{ (8–11 \text{ \mu m})} \); V \( = 94.3\% \text{ (92–96.8\%)} \); Perivaginal gland cells, \( L \times W = 69 \times 37 \text{ \mu m} \text{ (58 × 70 \text{ \mu m} – 36 × 44 \text{ \mu m})} \); Egg \( L \times W = 35–40 \text{ \mu m} \times 20–27 \text{ \mu m} \text{ (35–42 \text{ \mu m} × 20–27 \text{ \mu m})} \); TL \( = 69.1 \text{ \mu m} \text{ (60–72 \text{ \mu m})} \); striae \( = 1.7 \text{ (1.6–1.8 \text{ \mu m})} \).

**Distribution**: India: Andhra Pradesh, Rangareddy.


27. *Howardula mutilatus* Devi et al. 1991
(Fig. 27 : A–C)


**Materials**: Host: *Carpophilous mutilatus* (Coleoptera: Nitidulidae); Location: Hemocoel;
Locality: Maize, Research Station, Amberpet, Hyderabad, (Rangareddy at present), Andhra Pradesh, India; Collector: Devi et al.

**Diagnosis**: Forth stage infective inseminated free living female: Stylet long, robust, tylenchoid with well developed basal oesophagus chitinised lumen. Oesophageal glands filled with gland secretions. Ovary six celled. Tail round with a mucronated tip.

**Measurements**: All are given in micrometers.

Fourth stage infective inseminated free living female \((n = 38)\): \(L = 398–417 \ (405 \pm 8.4)\) 404; \(W = 24–26.9 \ (25 \pm 0.9)\) 24; \(a = 16–19.1 \ (17.8 \pm 1.1)\) 16.8; \(b = 3.7–4.7(4 \pm 0.3)\) 4.7; \(b_1 = 0.4–1.8 \ (1.5 \pm 0.8)\) 1.8; \(c = 9–12 \ (10.1 \pm 1.2)\) 11.5; \(G_1 = 25–32.2 \ (27 \pm 4.19)\) 32.2; \(V = 82–95.5 \ (88.75 \pm 5.196)\) 89.

Free living male \((n = 38)\): \(L = 422–480 \ (429 \pm 9.2)\) 479, \(W = 24–27.5 \ (25.6 \pm 0.6)\) 27.5; \(a = 16–18 \ (17.2 \pm 0.4)\) 17.4; \(b = 4.8–5.3 \ (5.2 \pm 0.14)\) 5.02; \(b_1 = 3.7–4.3 \ (4.1 \pm 0.17)\) 4.3; \(C = 33–37 \ (35.2 \pm 1.1)\) 36; Spicule = 14.2–14.3 \((14.25 \pm 0.05)\) 14.2; Gubernaculum = 5 \((5 \pm 0.1)\) 5; Testes = 56–68 \((60.9 \pm 65.3)\) 61.
Gravid Parasitic female \((n = 38)\) : \(L = 2051-2342\) (2256 ± 86) 2256; \(W = 180 - 249.1\) (211 ± 28.6) 212; \(a = 9.35 - 11.39\) (10.6 ± 0.87) 10.6; \(c = 56 - 59.1\) (57 ± 1.8) 59.1; \(V = 95-96\) (95.8 ± 0.8) 95.8; stylet = 9.6 – 10.2 (9.8 ± 0.3) 9.6; Intrauterine egg length = \(L \times W = 30 \times 32\).

**Distribution** : India : Andhra Pradesh; Rangareddy; Amberpet, Hyderabad and Secunderabad.


Genus 13 *Heterotylenchus* Boeijn, 1937

**Key to Species**

1. Male and infective stage female large in size; caudal alae and spicule large in length

   – Male and infective stage female small in size; caudal alae and spicule small in length
   .............................................................................................................. *Heterotylenchus xanthomelas* Reddy & Rao, 1987

   (Fig. 28 : A–D)


**Materials** : Host : *Musca crassirostris* Stein and *Stomyxis calcitrana* L. (Diptera : Muscidae); Location : Hemocoel and ovary; Locality : Upperpally, Rangareddy, Andhra Pradesh; Collector : Yatham and Rao.

**Diagnosis** : Infective stage female : Straight or slightly curved; head set off, body finely striated. Stylet well developed without basal knobs; oesophageal glands large and extend beyond middle of the body. Dorsal oesophageal gland duct with ampulla overlapping the oesophagus. Excretory pore sclerotized. Hemizonid anterior to excretory pore. Vulva inconspicuous without vulval lips. Anal opening not prominent. Tail long, ending with an obtuse tip.

Male : Body ‘L’ shaped with a rounded head. Head not set off. Stylet poorly developed without basal knobs. Oesophagus and oesophageal glands less developed. Excretory duct sclerotized. Hemizonid anterior to excretory pore. Spicules paired with a long shaft and a prominent apex. Adanal caudal alae with conspicuous striations. Tail tapers behind the cloaca, ending with a pointed tip.

Adult parthenogenetic female: Body slightly curved with broad anterior end, gradually attenuating posteriorly. Two small cuticular lobes on the head. Stylet without basal knobs. Ovary single, prodelphic, extending over the stylet. Uterus long, thin walled, containing 3–4 eggs at a time. Vulva posterior with protruded vulval lips. Tail with rounded tip.

Measurements: Infective stage female (n = 30): L = 856 µm (850–954 µm); a = 29.3 (29–36); b = 6 (6–7); b₁ = 1.7 (1.3–1.7); c = 7.4 (6.2–7.5); G₁ = 19.2 (18–19.6); V = 76 (74–86.6); stylet = 20 µm (18–22 µm).

Males (n = 30): L = 625 µm (607–717) µm; a = 23 (23–28); b = 6.7 (6.5–7.2; b₁ = 4.8 (4–6); c = 9 (8–9); T = 69 (63–80); Stylet = 5 µm (4–6 µm); spicule = 43 µm 40–45 µm).

Adult gamogenetic female (n = 30): L = 2.87 mm (1.49–4.5 mm); a = 13 (12–25); c = 9.7 (7–12); G₁ = 46 (45–69); V = 82 (82–85); stylet = 21 µm (18–22 µm): egg, L x W = 119 x 50 µm.

Adult parthenogenetic female (n = 30): L = 817 µm (683–923 µm); a = 8 (7–9.8); c = 12.8 (11–13); V = 86 (75–93); stylet = 10 µm (10–13 µm); egg, L x W = 67 µm (65–83 µm) x 33 µm (27–34 µm).

Distribution: India: Andhra Pradesh; Rangareddy; Hyderabad, Bhongir, Ghatkesar and Vikarabad.
Remarks: These parasites damage the ovaries of the host and can be used for biological control of insect pests (Nickle, 1967b). Measurements and illustrations made after Reddy and Rao, 1981.

(Fig. 29 : A–C)


Materials: Host: *Musca xanthomelas* Wiedemann (Muscidae; Diptera); Location: Haemocoel; Locality: Ghatkesar, Rangareddy, Andhra Pradesh; Collector: Reddy & Rao.

Diagnosis: Infective stage female: Body finely striated, head offset. Stylet without basal knobs. Hemizonid just anterior to excretory pore at 83–106 μm from anterior end. Dorsal oesophageal gland orifice opens into the oesophageal lumen at two stylet lengths from anterior end. Median gland orifice one and half stylet lengths behind dorsal gland opening; oesophageal glands extend more than half of its body length. Ovary 4–5 celled, vulva faintly marked. Tail attenuated ending in a rounded tip.

Heterosexual Male: Stylet smaller as in the infective stage female. Excretory pore just below the hemizonid, 101–117 μm from anterior end. Oesophagus and oesophageal glands not well developed. Two unequal spicules with scoop like apex. Tail with a small adanal caudal alae ending in a rounded tip.

Fig. 29. *Heterotylenchus xanthomelas*: A. Gamogenetic entire adult female. B. Adult parthenogenetic entire female. C. Male entire.
Gamogenetic gravid female: Body finely striated and spirally coiled. Head obtusely rounded. Stylet longer than the infective stage female. Excretory pore, oesophageal glands and its ampulla not visible. Ovary prodelphic, uterus containing one to two eggs at a time. Tail with fine mucro at the tip.

Adult Parthenogenetic female: Body ‘C’ shaped, attenuated at both ends. Stylet small without basal knobs. Ovary single, prodelphic, uterus with 6 to 13 embryonated eggs at a time. Vulva slit like without lips. Tail tapering, ending into a rounded tip.

**Measurements**: (Given in microns and in Deman’s Ratio)

Male (n = 36): \( L = 530 \mu m \ (502-566); \ a = 28 \ (25-33); \ b = 7.3 \ (6-7.4); \ c = 7.2 \ (7-8); \ T = 67\% \ (66-75\%); \) Stylet = 11 (9-12); Spicule left = 23 (23-26); Spicule right = 20 (19-23).

Infective stage female (n = 35): \( L = 527-617; \ a = 35-47; \ b = 7.8; \ b_1 = 1.6-1.9; \ c = 6-8; \ G_1 = 15-17\%; \) V = 75-82\%; Stylet = 11-15.

Gamogenetic gravid female (n = 35): \( L = 2280-6200; \ a = 21-33; \ c = 16-22; \ G_1 = 14-18\%; \) Stylet = 17-20; Egg \( L \times W = 96-107 \times 43-23. \)

Parthenogenetic gravid female (n = 35): \( L = 1120-1520; \ a = 10-13; \ c = 16-21; \ V = 79-93\%; \) Stylet = 9-11; Egg \( L \times W = 33-41 \times 23-28. \)

**Distribution**: India: Andhra Pradesh; Rangareddy; Attapur, Vikarabad and Bhongir.

**Remarks**: According to author’s view, this entomophilic nematodes damage the germarium layer of the ovarioles of the female host and could be used for biological control of the pest insect, which feeds on cattle blood and lacrimal secretions and acts as a vector for transmitting bacterial and viral diseases. Measurements and illustrations made after Reddy and Rao, 1987.

Family VI ENTAPHELENCHIDAE Poinar Jr., 1975

Genus 14 **Schistonchus** Cobb, 1927

30. **Schistonchus racemosa** Reddy & Rao, 1986
(Fig. 30: A-B)


**Materials**: Host: *Ceratosolen* sp. (pilinating wasp) L.; Location: Abdominal folds; Locality: Garden of Osmania University campus, Hyderabad, Rangareddy, Andhra Pradesh; Collector: Reddy and Rao.

**Diagnosis**: Female: Body ventrally arcuate ‘C’ shaped, finely striated, head offset. Stylet long, robust with well developed basal knobs. Anterior two-thirds of the spear surrounded by a fusiform capsule. Ovary few celled, monodelphic outstretched or slightly reflexed. Spermatheca spheroid, filled with flagellated spermatozoa and followed by a bunch of post-
uterine glands. Uterus with a post-uterine sac. Vulva located in the two-thirds of the body length from anterior end. Tail attenuated with mucronated tip.

Male: Body finely striated 'C' shaped, ventrally arcuate. Head Offset. Testis monoarchic, outstretched or slightly reflexed. Spicules paired with wide elongated apex, dorsally hooked, articulated with gubernaculum. Tail strongly arcuate with two pairs of submedian caudal papillae with attenuated and mucronated tip.

**Fig. 30. Schistonchus racemosa; A. Female entire, B. Male entire**

**Measurements**: Female (n = 36) : L = 730 μm (600-800 μm), a = 17.2 (14-21), b = 5.8 (5.2-6.2), c = 21.6 (18-22), V = 75 (60-76), G₁ = 19 (18 – 29), Stylet = 23 μm (21-24 μm), Median bulb L x W = 16 μm (13-17 μm) × 13 μm (12–15 μm).

Male (n = 35) : L = 653 μm (500-660 μm), a = 26(24-26), b = 5.4 (5.2–6.2), c = 28 (22 – 28), T = 31 (30 – 48), Stylet = 23 μm (21 – 24 μm), Sp = 18 μm (18-21 μm), G = 5 μm (4–5 μm); Median bulb L x W = 17 μm (13-17 μm) × 13 μm (10–13 μm).

**Distribution**: India : Andhra Pradesh, Rangareddy.


**SUMMARY**

The present work deals with an account of all the parasitic nematodes of arthropods, recorded and studied so far from Andhra Pradesh. Thirty species under five sub-genera, fourteen genera, five sub-families, six families and two super-families have been discussed.
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<td><em>Corydia</em> sp.</td>
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<td>Secunderabad</td>
<td>Rangareddy</td>
<td>-do-</td>
</tr>
<tr>
<td>3</td>
<td><em>Cameronia bivata</em></td>
<td><em>Gryllotalpa africana</em></td>
<td>Rectum</td>
<td>Vishakhapatnam</td>
<td>Vishakhapatnam</td>
<td>-do-</td>
</tr>
<tr>
<td>4</td>
<td><em>Blatticola supellaimae</em></td>
<td><em>Supellaima</em> sp.</td>
<td>-do-</td>
<td>Hyderabad</td>
<td>Rangareddy</td>
<td>Rao &amp; Rao</td>
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<td>5</td>
<td><em>B. blatta</em></td>
<td><em>Blatta orientalis</em></td>
<td>-do-</td>
<td>Araku Valley</td>
<td>Vishakhapatnam</td>
<td>V. V. Gantait</td>
</tr>
<tr>
<td>6</td>
<td><em>Johnstonea (Johnstonea) basiri</em></td>
<td><em>Spirobolus</em> sp.</td>
<td>-do-</td>
<td>Vijianagram</td>
<td>Vijianagram</td>
<td>-do-</td>
</tr>
<tr>
<td>7</td>
<td><em>J.(Paronai) indica</em></td>
<td><em>Spirostreptus</em> sp.</td>
<td>Intestine</td>
<td>Khammam</td>
<td>Khammam</td>
<td>-do-</td>
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<tr>
<td>8</td>
<td><em>J.( P.) dollfusi</em></td>
<td><em>Spirobolus</em> sp.</td>
<td>Rectum</td>
<td>Nalgonda</td>
<td>Nalgonda</td>
<td>-do-</td>
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<tr>
<td>9</td>
<td><em>Leidyema (Leidyema) corydium</em></td>
<td><em>Corydia</em> sp.</td>
<td>Intestine</td>
<td>-do-</td>
<td>-do-</td>
<td>-do-</td>
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<tr>
<td>10</td>
<td><em>Gryllophila skrjabini</em></td>
<td><em>Gryllotalpa africana</em></td>
<td>Rectum</td>
<td>Kakinada</td>
<td>East Godavari</td>
<td>-do-</td>
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<tr>
<td>11</td>
<td><em>G. basiri</em></td>
<td>-do-</td>
<td>-do-</td>
<td>Gudur</td>
<td>Nellore</td>
<td>-do-</td>
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<td>12</td>
<td><em>Schwenkiella periplaneticola</em></td>
<td><em>Periplaneta americana</em></td>
<td>-do-</td>
<td>Rajamundry</td>
<td>East Godavari</td>
<td>-do-</td>
</tr>
<tr>
<td>13</td>
<td><em>S. atheri</em></td>
<td>-do-</td>
<td>-do-</td>
<td>Bakherpet</td>
<td>Chittor</td>
<td>-do-</td>
</tr>
<tr>
<td>14</td>
<td><em>S. basiri</em></td>
<td>-do-</td>
<td>-do-</td>
<td>Guntur</td>
<td>Guntur</td>
<td>-do-</td>
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<tr>
<td>15</td>
<td><em>S. indica</em></td>
<td><em>Corydia</em> sp.</td>
<td>Intestine</td>
<td>Osmania</td>
<td>Rangareddy</td>
<td>Rao &amp; Rao</td>
</tr>
<tr>
<td>16</td>
<td><em>Thelastoma guptai</em></td>
<td><em>Periplaneta americana</em></td>
<td>-do-</td>
<td>Medak</td>
<td>Medak</td>
<td>V. V. Gantait</td>
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<tr>
<td>17</td>
<td><em>T. pterygoton</em></td>
<td><em>Hydrophilus</em> sp</td>
<td>-do-</td>
<td>Cuddaph</td>
<td>Cuddaph</td>
<td>-do-</td>
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**Distribution list of Species Contd.**

<table>
<thead>
<tr>
<th>Sl. No/</th>
<th>Species</th>
<th>Host</th>
<th>Habitat/Location</th>
<th>Locality</th>
<th>District</th>
<th>Collector</th>
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<td>Index No.</td>
<td></td>
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<td></td>
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<tr>
<td>18</td>
<td><em>T. kherai</em></td>
<td><em>Periplaneta americana</em></td>
<td>Rectum</td>
<td>Nandyal</td>
<td>Karnool</td>
<td>-do-</td>
</tr>
<tr>
<td>19</td>
<td><em>T.atheri</em></td>
<td>-do-</td>
<td>-do-</td>
<td>Tirupati-Tirumala</td>
<td>Chittor</td>
<td>-do-</td>
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<tr>
<td>20</td>
<td><em>Rondonema spirostreptum</em></td>
<td><em>Spirostreptus</em> sp.</td>
<td>Intestine</td>
<td>Hyderabad</td>
<td>Rangareddy</td>
<td>Rao &amp; Kumari</td>
</tr>
<tr>
<td>21</td>
<td><em>Blattophila indica</em></td>
<td><em>Corydia</em> sp.</td>
<td>Rectum</td>
<td>Hyderabad</td>
<td>Rangareddy</td>
<td>Rao &amp; Rao</td>
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<tr>
<td>22</td>
<td><em>Cephalobium (Denticum) microvata</em></td>
<td><em>Gryllus</em> sp.</td>
<td>-do-</td>
<td>-do-</td>
<td>-do-</td>
<td>-do-</td>
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<tr>
<td>23</td>
<td><em>C.(D.) gryllodes</em></td>
<td><em>Gryllodes</em> sp.</td>
<td>Intestine</td>
<td>Nizamabad</td>
<td>Nizamabad</td>
<td>V. J. Rao</td>
</tr>
<tr>
<td>24</td>
<td><em>C. (Adenticum) aodus</em></td>
<td><em>Gryllus</em> sp.</td>
<td>Intestine</td>
<td>Medak</td>
<td>Medak</td>
<td>V. J. Rao</td>
</tr>
<tr>
<td>25</td>
<td><em>C.(A.) caudatum</em></td>
<td><em>Gryllotalpa africana</em></td>
<td>Rectum</td>
<td>Garden of Dakili Forest; Rest House, Dakili</td>
<td>Nellore</td>
<td>V. V. Gantait</td>
</tr>
<tr>
<td>26</td>
<td><em>Howardula marginatis</em></td>
<td><em>Copromyza marginatis</em></td>
<td>Hemocoel</td>
<td>Hyderabad</td>
<td>Rangareddy</td>
<td>Y. N. Reddy &amp; R. N. Rao</td>
</tr>
<tr>
<td>28</td>
<td><em>Heterotylenchus crassirotis</em></td>
<td><em>Musca crassirotis</em></td>
<td>-do-</td>
<td>Upperpally</td>
<td>-do-</td>
<td>Y. N. Reddy &amp; P. N. Rao</td>
</tr>
<tr>
<td>29</td>
<td><em>H. xanthomelas</em></td>
<td><em>Musca xanthomelas</em></td>
<td>-do-</td>
<td>Ghatkeswar</td>
<td>-do-</td>
<td>-do-</td>
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<tr>
<td>30</td>
<td><em>Schistonchus racemosa</em></td>
<td><em>Ceratosolen</em> sp.</td>
<td>Abdominal folds</td>
<td>Garden of Osmania University Campus</td>
<td>-do-</td>
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</table>

**The distribution of the species are shown in the map in accordance with the Index No.**
in this paper. Amongst 30 species, 21 belong to the order Oxyurida, 4 under the order Rhabditida and the rest 5 species belong to the order Tylenchida. Diagnostic characters of all the species, keys to the super-families, families, sub-families, genera and species are incorporated in this work. The two new sub-genera 'Adenticul' and 'Denticum' and their keys have also been furnished. The description of a new species Cephalobium (Adenticum) caudatum is accommodated. A species has been recorded first time from India. The hosts, and the geographical distribution of the species are recorded. Diagrams of all the species have been provided in this paper. A distribution map is also included herewith.

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Reddy, Y. N. & Rao P. N. 1986. *Schistonchus racemosa* sp. n., a nematode parasite of wasp (Cerotosolen sp.) associated with the fig., *Ficus racemosa* L. *Indian J. Nematol; 16*(1) : 135–137


INTRODUCTION

According to Siddiqi (1986) there can be no sufficient reason to doubt that Tylenchida arose on land, but the statement that the Tylenchida originated in the Devonian period is mere conjecture. The time of the origin of Tylenchida is assumed to be about the middle of the Palaeozoic era as because nematodes have a very long history of about 600 million years (Siddiqi, 1986).

The members of the order Tylenchida and some of the order Dorylaimida are plant parasitic in nature. They feed upon the sap of plant body mainly through the tender feeder root system causing significant damage of the agricultural crops. Important crop plants are infested by these microscopic organisms that feed on the roots, buds, stem, crown, leaves and on developing seeds. Thus the tylenchs constitute economically most important group of plant parasitic nematodes. Many important soil borne viral diseases of plants are also transmitted by nematodes. The average annual yield loss is around 10% world wide or even more which is considered very significant by all standards (Ahmad, 1996).

The phytonematodes not only attack the roots of plants in the ectoparasitic forms, they also exist in the aerial portion like seeds (Anguina tritici). They may also be endoparasitic, semi-endoparasitic and migratory root endoparasitic in nature. Some of the tylenchids have been proved to be virulent to agricultural crops. These are Ditylenchus, Anguina, Globodera, Meloidogyne, Radopholus, etc. which cause Ufra disease in rice, ear-cockles in wheat, damage entire potato cultivation of a large area, incite galls in plant roots and drastically reduce the coconut and banana production respectively.

In India near about 600 species of tylenchids under 70 genera have been recorded (Ahmad, 1996). In the present report, regarding the tylenchid fauna of Andhra Pradesh 51 species under 25 genera have been recorded. Besides taxonomy, many workers studied the occurrence and distribution of different phytonematodes in Andhra Pradesh. Plant parasites associated
Map of Andhra Pradesh showing distribution of Genera/Species
with groundnut and their distribution have been worked out by Maharaju and Das (1984), Mani and Ratna Kumar (1990). Parasitic nematodes of horticultural crops in South India and those associated with citrus in Andhra Pradesh have been recorded by Singh, Rao and Reddy (1979) and by Krishnamurthy, Rao and Thammi Raju (1975) respectively. Occurrence of *Meloidogyne javanica* on citrus, *Heterodera sorgii* on sorghum, distribution of *Tylenchulus semipenetrans* and *Meloidogyne javanica* in commercial citrus nurseries have been studied by Mani (1986), Sharma and Sharma (1988), Mani, Dakshinamurti and Reddy (1988) respectively. Besides these, morphology and taxonomy of Tylenchida of Andhra Pradesh have been studied by Das (1960), Singh (1971), Das and Shivaswami (1977), Sultana (1979), Das and Sultana (1979, 1980), Sultana (1980), Maharaju (1981), Maharaju and Das (1981, 1982), Quraishi (1982), Muthukrishnan and Shariff (1985), Muthukrishnan (1987) and so on. It is worthy to mention that the classification proposed by Maggenti et al. (1987) has been followed to arrange the genera and species available from Andhra Pradesh.

**MATERIAL AND METHODS**

During survey tours, collections were procured and processed through a series of procedures, a short account of which are given below:

**Sampling** – Samples of soils about 500 cc (in volume) each time, were collected from rhizosphere of different plants and crop, usually up to a depth of about 20 cm. from surface. The samples were taken in polythene bags, tied and labelled with name of collector, date of collection, name of the locality and record of host plants.

**Processing** – In the process of extraction and isolation of nematodes from soils, only one sample was taken in a plastic bucket, then the soil was mixed with water (about 7 litres) to prepare a uniform suspension. The soil water suspension was thoroughly shaked and was put to rest (undisturbed) for about 20 seconds to allow the bigger stones, sands, other heavier material to settle down as sediment. The upper suspension was quickly passed through a coarse sieve to remove the floating debries etc. The filtrate then again was passed through a set of sieves of 100, 200, 300 mesh-size. The residue from each of the three sieves were taken into a beaker in fresh water.

The aliquot collected in the above manner was subjected to modified Bearmnn’s funnel method (That is aliquot of each sample was put on tissue paper on a aluminium net suspended for 48 hours). Then the debries and sediments on the tissue paper were rejected and the clear water together with nematodes were taken in watch glass, and were examined under a low power binocular microscope and all the nematodes were picked up one by one with the help of a very fine needle, and were transferred to a second watch glass.
Killing fixation and dehydration – The nematodes thus collected, were killed by pouring hot water on them. Excess of water was again drawn out with the help of a fine dropper, and the nematodes were fixed in FAA solution. (Formalin (4%) 30 ml., glacial acetic acid 5 ml. absolute alcohol 100 ml. and distilled water 200 ml). The fixed nematodes (at least after 24 hours) were processed by slow glycerine method of dehydration. The nematodes were transferred to 1% glycerine (ethanol 20 parts glycerine 1 part distilled water 79 parts). For quicker dehydration the watch glass with 1% glycerine were placed in a BOD incubator, where temperature were kept at 40°C. After about 7 days these were passed through 5% glycerine (ethanol 95 parts glycerine 5 parts). The nematodes were kept in the glycerine solution till the other component evaporated, and only the glycerine was left. The nematodes were finally taken into pure and dehydrated glycerine.

Mounting, Sealing – Four to eight nematodes were mounted in a drop of pure and dehydrated glycerine on glass slides. Glass-wool supports of the same seize as that of nematodes were always used under the cover slips to prevent any pressure on the specimens. The cover slips were sealed with nail posish or adhesive.

Measurements – The measurements were taken under stereoscopic microscope with the help of stage and oculo-micrometer. De Man’s formulas were used for denoting the dimensions of nematodes. The indices viz. L, a, b, b’ etc. were adopted from standard works on different group of nematodes.

**SYSTEMATIC LIST OF THE GENUS / SPECIES AVAILABLE**
(Classification modified after Maggenti et al., 1987)

- Suborder TYLENCHINA Throne, 1949
- Superfamily TYLENCHOIDEA Orley, 1880
  - Family TYLENCHIDAE Orley, 1880
  - Subfamily TYLENCHINAE Orley, 1880
    - Genus *Tylenchus* Bastian, 1865
    - Genus *Filenchus* Andrassy, 1959
    - Genus *Malenchus* Andrassy, 1968
    - Genus *Ottolenchus* Hussain and Khan, 1967
  - Subfamily ECPHYADOPHORINAE Skarbilovich, 1959
    - Genus *Ecphyadophora* de Man, 1921
    - Genus *Tenunemellus* Siddiqi, 1986
  - Subfamily ATYLENCHINAE Skarbilovich, 1959
    - Genus *Aglenchus* Andrassy, 1954
SEN and CHATTERJEE: Phytophagous Nematodes

Subfamily BOLEODORINAE Khan, 1964

Genus *Basiria* Siddiqi, 1959

   Syn. *Basiroides binarius* Sultana, 1980
   Syn. *Basiroides brevius* Sultana, 1980
   Syn. *Basiroides macrostriatus* Sultana, 1980
   Syn. *Basiroides siddiqi* Sultana, 1980
5. *Basiria raskiensis* Das & Sultana, 1980
6. *Basiria similai* Das & Sultana, 1980

Family ANGUINIDAE Nicoll, 1935

Genus *Ditylenchus* Filipjev, 1936

Family BELONOLAIMIDAE Whitehead, 1960

Subfamily TELOTYLENCHINAE Siddiqi, 1960

Genus *Tylenchorhynchus* Cobb, 1913

7. *Tylenchorhynchus varicaudatus* Singh, 1971
8. *T. mashhoodi* Siddiqi & Basir, 1959
   Syn. *T. digitatus* Das, 1960
   *T. dactylurus* Das, 1960
   *T. Zeae* Sethi & Swarup, 1968
9. *T. curvus* Williams, 1960

Genus *Trichotylenchus* Whitehead, 1960


   Family PRATYLENCHIDAE Thorne, 1949

   Subfamily PRATYLENCHINAE Thorne, 1949

   Genus *Pratylenchus* Filipjev, 1936

15. *P. indicus* Das, 1960
   *P. hyderabadensis* Das & Sultana, 1979.


23. *P. thornei* Sher & Allen, 1953.


   **Genus Hirschmanniella** Luc & Goodey, 1964


26. *H. indica* Ahmad, 1974


   **Family HOPLOLAIMIDAE** Filipjev, 1934.
   **Subfamily HOPLOLAIMINAE** Filipjev, 1934.

   **Genus Hoplolaimus** Daday, 1905.


   **Genus Helicotylenchus** steiner, 1945


Subfamily ROTYLENCHULINAE Hussain & Khan, 1967
Genus Rotylenchulus Linford & Oliveira, 1940
38. Rotylenchulus reniformis Linford & Oliveira, 1940.

Family HETERODERIDAE Filipjev & Schuurmans Stekhoven, 1941
Subfamily HETERODERINAE Filipjev & Schuurmans Stekhoven, 1941
Genus Heterodera Schmidt, 1871
Subfamily MELOIDOGYNNAE Skarbilovich, 1959
Genus Meloidogyne Goeldi, 1982

Superfamily CRICONEMATOIDEA Taylor, 1936
Family CRICONEMATIDAE Taylor, 1936
Subfamily CRICONEMATINAE Taylor, 1936
Genus Criconema Hofmanner & Menzel, 1914
Genus Hemicriconemoides Chitwood & Brichfield, 1957

Subfamily HEMICYCLIOPHORINAE Skarbilovich, 1959
Genus Hemicycliophora de Man, 1921
Family TYLENCHULIDAE Skarvilovich, 1947
Subfamily TYLENCHULINAE Skarvilovich, 1947
Genus Tylenchulus Cobb, 1913
47. T. semipenetrans Cobb, 1913
Genus TrophoTylenchulus Raski, 1957
48. T. andhraensis Muthukrishnan & Shariff, 1985
Subfamily PARATYLENCHINAE Thorne, 1949

Genus *Paratylenchus* Micoletzky, 1922

**Key to the suborders of order TYLENCHIDA**

1. Parasites of coelome or coelomic tissues of annelida, amphibia; terminal excretory duct and pore sucker like ................................................................. MYENCHINA
   - Free living or parasites of plants and arthropods; terminal excretory duct and pore not sucker-like ........................................................................................................ 2

2. Mycetophagus or non-root phyto-parasitic; arthropod-parasitic cycle present; oesophagus intestinal junction at or anterior to nerve ring, if posterior to it, then either oesophageal base with a prominent stem-like extension or two anterior most cells of intestine modified to act as valve. Phasmid absent ............................................................... HEXATYLINA
   - Fungus feeding absent, arthropod-parasitic cycle absent, single generation cycle, nonmycetophagus or root-parasitic forms; oesophago-intestinal junction well behind nerve ring, phasmid may be present or absent ................................................. TYLENCHINA

**Key to Superfamilies of suborder TYLENCHINA**

1. Oral aperture round or oval, post corpus not massive and not amalgamated, cuticle never retrorse or with scales, spines, appendages or a double cuticle, phasmids or phasmid-like structure present ........................................................................... TYLENCHOIDEA
   - Oral aperture dorsoventrally or slit like or 'I' shaped, post cropus massive and amalgamated with pre-corpus. Cuticle either thin and finely annulated or thick or coarsely annulated with retrose annules, scales, spines or an extra cuticular body sheath; Phasmids absent ..................................................................................................... CRICONEMATOIDEA

**Key to the available families of the superfamily TYLENCHOIDEA**

1. Small to medium sized (0.3–1.5 mm) nematodes; lateral fields with 2–6 incisures; ecto- or endoparasites of plants ........................................................................................................ 2
   Small to large sized nematodes; Mature females obese or globose; sedentary root parasites ......................................................................................................................... 4

2. Lateral fields with 2–6 incisures; Phasmid-like structure small rounded, covered by cuticle near lateral field or rarely pore-like on tail .................................................. TYLENCHIDAE
   - Lateral filed with 4–6 incisures; Phasmid either small with pore-like apertures near tail or large scutellum-like near anus ........................................................................ 3

3. Lateral fields typically with 4 lines; Phasmids pore like near or little anterior to anus or large scutellum-like near anus or much anterior to it anywhere on body behind oesophageal region; Ectoparasites ................................................................. HOPLOLAIMIDAE
Lateral fields each with 4–6 incisures; Phasmids pore like always on tail; obligate migratory root endoparasites ................................................................. PRATYLENCHIDAE

4. Mature female obese without forming cyst; No marked sexual dimorphism in the anterior region; gonad single ............................................................... ANGUINIDAE

Mature female globose, rarely sausage shaped with cyst formation; marked sexual dimorphism; two genital branches-amphidelphic or prodelphic .... HETERODERIDAE

### Key to the available subfamilies of family TYLENCHIDAE

1. Small to medium sized nematodes; stylet very small to medium or delicate; stylet with or without knobs ................................................................. 2

   - Small sized nematodes (under 1 mm), extremely slender, attenuated and appearing glass-fibre like; stylet short but needle-like and appearing solid tip .......................................................... ECPHYADOPHORINAЕ

2. Cuticle finely to coarsely striated; stylet small to very small, usually with knobs ....

   - Cuticle finely or distinctly annulated; stylet medium to delicate with or without knobs ................................................................. TYLENCHINAE

3. Cuticle distinctly annulated; stylet medium sized with prominent knobs ........

   - Cuticle finely striated; stylet delicate, small knobs often flange-like or sometimes without knobs ................................................................. BOLEODORINAЕ

Superfamily TYLENCHOIDEA Orley, 1880

Family TYLENCHIDAE Orley, 1880

Syn. ATYLENCHIDAE Skarbilovich, 1959

ECPHYADOPHORIDAE Skarbilovich, 1959

BOLEODORIDAE Khan, 1964

TYLODORIDAE Paramonov, 1967

**Diagnosis**: Tylenchoidea. Small to medium sized (0.3–1.3 mm), slender, rarely longer, vermiciform in shape. Lateral fields each with 2–6 incisures. Lip region usually elevated, rounded, annulated, rarely smooth. Labial framework delicate, weakly developed. Stylet usually small (3–20 mm), delicate with distinct basal knobs, rarely without knobs. Stylet may be very long in few species. Oral disc or plate sometimes distinctly elevated, rounded. Deirids present or absent. Phasmid-like structures present in some species, usually advulvar and dorsal near
lateral field, not an aperture, rarely pore-like on tail. Procorpus elongate, median bulb slender, apparently non-muscular. Isthmus long slender, oesophageal gland symmetrically arranged, pyriform. Female reproductive system mono-prodelphic, rarely amphidelphic. Spicules slender in male. Bursa usually adanal never extending to terminus. Tail elongate-conoid, mostly narrowing to long slender, filiform, similar in both sexes.

Subfamily TYLENCHINAE

Diagnosis: Body about 0.3–1.3 mm long. cuticle finely to coarsely striated. Lateral field each with 2, 3 or 4 incisures. Lip region continuous or offset, usually without a distinct oral disc. Stylet small to very small, usually with knobs. Female genital tract short. Tail elongated, tip variously modified.

Key to the available genera of Tylenchinae

1. Lateral fields with single ridge ................................................................. 2
   - Lateral fields with two ridge ................................................................. 3

2. Cephalic region elevated; body behind vulva markedly tapering so as to become about half as wide at anus as at vulva ................................................................. Malenchus
   - Cephalic region low. Body behind vulva not markedly tapering; post vulval uterine sac present ................................................................. Ottolellchus

3. Stylet with conus equal to the shaft; tail ventrally arcuate or hook-like ...... Tylenchus
   - Stylet with conus distinctly shorter than shaft; Tail not ventrally arcuate or hook-like ................................................................. Filellchus

Tylenchus Bastian, 1865


Female: Body small to medium sized (0.4–1.33 mm), ventrally curved upon relaxation. Cuticle moderately thick (1–2 μm), distinctly annulated. Lateral field each with four incisures. Phasmids dorso-sublateral, postmedian, just behind vulva. Cephalic region continuous, annulated. Stylet 8-21 μm. long with posteriorly slopping basal knobs. Median oesophageal bulb oval, muscular. Basal bulb pyriform. Cardia distinct excretory pore usually opposite to basal bulb. Vulva is transverse slit-like, usually 60–70% of body length, lips not modified, epitygma and lateral membrane absent. Vagina generally at right angle to body axis. Post vulval uterine sac about a body width or less long. Ovary outstretched. Tail ventrally arcuate, often hooked, regularly tapering to a pointed or minutely rounded terminus.

Male: Not found.
Habitat and distribution: Soil associated with groundnut in Telengana region of Andhra Pradesh.

Remark: This genus has been reported by Singh (1971) from Andhra Pradesh.

Filenchus sp. Andrassy, 1959


Female: Body small to medium (0.3–1.3 mm), straight to arcuate when relaxed. Cuticle with fine to moderately coarse annulation. Lateral fields each with 4 incisures. Deirids present. Cephalic region broadly rounded or conoid-rounded, rarely truncate, continuous or slightly offset, finely annulated. Labial disc inconspicuous. Stylet feeble or moderately developed, generally 7-15 μm long, conus sharply pointed, about one-third of total stylet length, knobs distinct, rounded. Median bulb oval to rounded, muscular, valvate. Basal bulb offset from intestine, generally pyriform. Cardia distinct. Vulva at about 55-70%, lips not modified, lateral membranes absent. Vagina directed inward. spermatheca offset. Ovary outstretched. Tails generally filiform and straight, may be elongate conoid but never ventrally curved or hooked.

Male: Not found.

Habitat and distribution: Rhizospheric soil of groundnut in Chittoor and Nellore District of Andhra Pradesh.

Remarks: This genus has been reported by Mani & Ratnakumar (1990) from Andhra Pradesh.

Malenchus sp. Andrassy, 1968


Female: Body elongate-fusiform, with strong and regular tapering behind vulva so that, width at anus becomes about half as that at vulva. Annules prominent. Single ridge in lateral field, marked by numerous fine longitudinal lines. Cephalic region flattened dorsoventrally, elevated with 4 or more fine annules. Amphidial slits curved ventrally. Precorpus equal to or shorter than isthmus, post corpus is a muscular bulb with refractive valve plates. Basal bulb pyriform with flat to indented base. Vulva located in a body cavity. Spermatheca elongate, oval or bilobed, offset, directed forward. Vagina straight, directed inward. Post vulval uterine sac present. Phasmids dorso-sublateral about one body width anterior to vulva. Tail elongate-conoid to a pointed or hooked tip.

Male: Not found.

Habitat and distribution: Rhizospheric soil of groundnut in Nellore and Chittoor District of Andhra Pradesh.
Remarks: The genus has been reported by Mani & Ratnakumar (1990) from Andhra Pradesh.

**Ottolenchus** sp. Hussain & Khan, 1967.


Male: Not found.

Habitat and distribution: Soils associated with groundnut in Chittoor and Nellore District.

Remarks: This genus has been reported by Mani & Ratnakumar (1990) from Andhra Pradesh.

Subfamily ECPHYADOPHORINAE Skarbilovich, 1959

**Diagnosis**: Small sized nematodes (under 1 mm), extremely slender, attenuated and appearing glass fibre-like. Lateral field each with 2-4 incisures or obscure. Lip region with fine annuli present up to labial plate. Phasmids postmedian, dorso-sublateral, in females just anterior to vulva. Stylet short, attenuated, basal knobs round. Corpus cylindroid, non-muscular, lacking a post-corporal bulb. Basal bulb present but dorsal gland may extend as lobe over intestine. Vulva transverse, may be covered with anterior lip flap. Vagina directed inward or forward. Post-vulval uterine sac present. Spermatheca offset. Males with adanal lobed bursa, projecting outward or backward. Spicules needle-like. Gubernaculum fixed. Cloacal lips form a penial tube. Tail long, filiform, markedly narrowing after cloacal opening.

**Key to the available genera of Ecphyadophorinae**

1. Cephalic region not dorso-ventrally flattened; Body abruptly narrowed behind vulva. .................................................................................................................................................. *Ecphyadophora*

= Cephalic region strongly dorso-ventrally flattened; Body not abruptly narrowed behind vulva. ............................................................................................................................................... *Tenunemellus*

**Ecphyadophora** sp. de Man, 1921


Female: Body small (under 1 mm), very slender, attenuated and appearing glass fibre-like, abruptly narrowed behind vulva. Cuticle appearing smooth but marked with transverse
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**Male:** Not found.

**Habitat and distribution:** Soil associated with groundnut and guava in Nellore and Chittoor Districts in Andhra Pradesh.

**Remarks:** This genus has been reported by Mani & Ratnakumar (1990) from Andhra Pradesh.

**Tenunemellus** sp. Siddiqi, 1986


**Female:** Body small (under 1 mm), extremely slender, attenuated and glass fibre-like. Body not abruptly narrowed behind vulva. Cuticle without longitudinal lines. Lateral field obscure. Cephalic region strongly dorso-ventrally flattened. Labial disc absent. Stylet about 10 μm long with small knobs. Corpus cylindroid, isthmus slender. Basal bulb enclosing oesophageal glands. Deirids little behind excretory pore. Vulva transverse, flush with body contour with or without lateral membranes. Tail very long and pointed.

**Male:** Not found.

**Habitat and distribution:** Rhizospheric soil of coconut, groundnut and other leguminose crops in Nellore and Chittoor districts in Andhra Pradesh.

**Remarks:** This genus has been reported by Mani & Ratnakumar (1990) from Andhra Pradesh.

**Subfamily ATIYLENCHINAE** Skarbilovich, 1959

**Diagnosis:** Body small to medium size (0.33–1.29 mm). Cuticle distinctly annulated. Lateral fields each with 2-6 incisures. Lip region continuous or slightly offset. Stylet medium. Conus slightly small or about equal to shaft. Median bulb well developed. Basal bulb short rounded or elongate. Female reproductive system amphidelphic or mono-prodelphic; post-vulval uterine sac present or absent. Spermatheca usually offset. Tail long, attenuated, tip setose, acute or finely rounded.

**Aglenchus** sp. Andrassy, 1954


**Female:** Body small (0.35–0.77 mm.), straight to slightly arcuate, cuticle coarsely annulated. Lateral fields each with two prominently raised ridges. Stylet less than 15 μm.

**Male** : Not found.

**Habitat and distribution** : Rhizospheric soils of vegetables and groundnut in East and West Godavari, Nellore and Chittoor districts of Andhra Pradesh.

Subfamily BOLEODORINAE Khan, 1964

**Diagnosis** : Small to medium sized. Cuticle finely striated. Oral aperture surrounded by six papillae; a second circle of four papillae on the edges of anterior surface. Stylet delicate. Conus about half of the shaft, knobs small often flanged, sometimes may be absent. Female reproductive system amphidelphic or mono-prodelphic. Males with small, adanal bursa. Tail elongated, often rounded or clavate at the end, seldom spicate.

Genus **Basiria** Siddiqi, 1959

**Basiria binaria** (Sultana, 1980) Hashim, 1985

Syn. **Basiroides binarius** Sultana, 1980.


Female : Slender and small in size (0.37–0.42 mm.). Body slightly ventrally curved on fixation. Cuticle finely striated. Lateral field with four incisures. Head region slightly offset and flattened. Stylet small and slender with rounded basal knobs. Hemizonid large. Basal bulb pyriform. Vulva transverse slit-like, reproductive system mono-prodelphic, ovary outstretched. Tail long, filiform with a bluntly rounded terminus.

**Dimensions** : L = 0.37–0.42 mm, a = 31–36, b = 4.6–5.4, c = 5.4–6.5, V = 63–70%, stylet = 6.42–7.49 μm.

**Male** : Not known.

**Habitat and distribution** : Rhizospheric soil of tomato, okra around Begumpet, Secunderabad of Andhra Pradesh.

**Basiria brevia** (Sultana, 1980) Hashim, 1985

Syn. **Basiroides brevius** Sultana, 1980


Female :. Body slender and small (0.39–0.42 mm). Almost straight on fixation. Cuticle
finely striated, lateral field with four incisures. Head continuous with body and flattened. Stylet slender, small (7.4–8.5 μm) with rounded knobs. Basal oesophageal bulb pyriform. Cardia present. Vulva transverse, slit-like, reproductive system mono-prodelphic, ovary outstretched. Spermatheca small. Post uterine vulval sac very small. Tail is about 7-9 times of anal body width, filiform with a minutely rounded terminus.

*Dimensions:* \( L = 0.39-0.42 \text{ mm}; a = 33-36; b = 4.8-5.4; c = 5.1-5.9; V = 65-67\%; \) Stylet = 7.4–8.5 μm.

Male: Not found.

*Habitat and distribution:* Soil associated with ladies finger, bringal in Hyderabad and Secunderabad districts of Andhra Pradesh.

*Basiria macrostriata* (Sultana, 1980) Hashim, 1985
Syn. *Basiroides macrostriatus* Sultana, 1980


*Female:* Medium sized nematodes (0.43–0.67 mm). Cuticle coarsely striated. Lateral field with four crenate incisures. Head almost continuous, round and slightly sclerotised. Stylet slender, small (9–11 μm) with flanged knobs. Oesophagus with more or less pyriform posterior bulb ovate median bulb with valve. Hemizonid large. Cardia small and discoid. Vulva transverse, slit-like. Reproductive system mono-prodelphic, ovary single and outstretched. Post uterine vulval sac measures half of the body diameter at vulval region. Tail long, filiform 8-10 anal body width long, regularly tapering to a pointed terminus.

*Dimensions:* \( L = 0.43-0.67 \text{ mm}; a = 25-35; b = 5.3-6.3; c = 4.6-7.4; V = 62-66\%; \) stylet = 9–11 μm.

Male: Not found.

*Habitat and distribution:* Soil around bean, drum-stick, cucurbit plants of Secunderabad.

*Basiria siddiqi* (Sultana, 1980) Hashim, 1985
Syn. *Basiroides siddiqi* Sultana, 1980


*Female:* Body slender and small sized (0.38–0.45 mm). Body slightly curved ventrally upon fixation. Cuticle coarsely striated. Lateral field with two crenate incisures. Head continuous and flattened, unsclerotised. Stylet slender and 7.4–8.6 μm long with rounded basal knobs. Oesophagus with more or less pyriform posterior bulb. Cardia small and discoid. Hemizonid large, just above the excretory pore. Reproductive system mono-prodelphic, ovary outstretched.
Post-uterine vulval sac measures half to one body diameter at the vulval body region. Tail long, slender, filiform with uniformly tapering to a minutely rounded terminus.

*Dimension*: \( L = 0.38-0.46 \text{ mm} \); \( a = 32-39; b = 4.9-5.9, c = 5.1-5.9; V = 65-68\%; \) stylet = 7.49–8.56 \( \mu \text{m} \).

*Habitat and distribution*: soil around tomato and bean of Secunderabad, A.P.

*Remark*: All the above species under the genus *Basiria* have been reported by Sultana (1980) from Andhra Pradesh. Besides these, Das and Sultana (1980) reported *Basiria similai* and *B. raskiensis* from Hyderabad, Andhra Pradesh.

**Family ANGUINIDAE** Nicoll, 1945

*Diagnosis*: Small to large sized, vermiform nematodes, mature females may be obese or sedentary. Lateral fields plain or with 4, 6 or more incisures. Deirids and phasmids generally absent. Stylet thin and short (under 15 \( \mu \text{m} \) with small rounded knobs. Oesophageal glands short, pyriform, not overlapping intestine or longer, stopping short of intestine or overlapping it for a short or a long distance. gonad single, anteriorly outstretched, may be reflexed or coiled in swollen adults. Post-vulval uterine sac may be present. Spicules robust, anteriorly expanded, tip furcate or broadly rounded. Tail elongate conoid, similar in sexes.

**Genus Ditylenchus** sp. Filipjev, 1936


*Female*: Body usually under 1.5 mm long, slightly ventrally curved upon fixation. Lateral field with 4 or 6 incisures. Cephalic region low flattened. Stylet small and delicate with small rounded knobs. Median bulb with or without valve plates. Glandular bulb short or long, may overlap intestine. Ovary outstretched with one or two rows of oocytes. Post-vulval uterine sac present or absent. Tail elongate-conoid to sub-cylindrical or filiform. Several species are the parasites of aerial parts of plants.

*Male*: Not found.

*Habitat and distribution*: Soils associated with groundnut of Guntur, Krishna, Nellore and Chittoor district.

**Family BELONOLAIMIDAE** Whitehead, 1960

**Subfamily TELOTYLENCHINAE** Siddiqi, 1960

*Diagnosis*: Cuticle prominently annulated, longitudinal striae or groove may be present. Lateral fields each with 3, 4, 5 or 6 incisures. Labial region never bulbous. Stylet 15–40 \( \mu \text{m} \) long with equally long conus and shaft. Oesophageal glands enclosed in a basal bulb. Intestinal fasciculi and post-rectal sac present or absent.
Key to the available genera of Telotylenchinae

1. Lateral fields with four incisures; stylet well developed with prominent knobs ..........

.........................................................................................................................\textit{Tylenchorhynchus}

- Lateral fields with three incisures; stylet extremely attenuated and slender with
  minute knobs........................................................................................................\textit{Trichotylenchus}

\textbf{Genus }\textit{Tylenchorhynchus} Cobb, 1913

\textit{Tylenchorhynchus varicaudatus} Singh, 1971


\textit{Female} : Body ventrally arcuate upon fixation. Lateral fields with four incisures, outer
ones are crenate in appearance. Labial region continuous with two distinct annules. Stylet 17–
18 \(\mu \text{m}\) long with well developed anteriorly directed knobs. Median bulb with well developed
valvular apparatus, Basal oesophageal bulb large, set off from intestine. Cardia well developed.
Vulva a transverse slit, vagina at right angle to body axis. Ovaries paired, spermathecae
absent. Tail uniformly tapering, 2.3–2.8 anal body diameter long with bluntly conical tip.
Phasmids slightly anterior to middle of tail.

Dimensions : \(L = 0.50–0.56 \text{ mm}; a = 28–33; b = 4.3–5.2; c = 16.6–18.6; V = 57–59\%, \)
stylet \(= 17–18 \mu \text{m}\).

\textit{Habitat and distribution} : Soil associated with ferns, fruit trees, paddy in Nalgonda,
Hyderabad districts of Andhra Pradesh.

\textit{Tylenchorhynchus mashhoodi} Siddiqi & Basir, 1959

\textit{Syn.} \textit{T. digitatus} Das, 1960


\textit{T. zeae} Sethi & Swarup, 1968


\textit{Female} : Body 0.44–0.68 mm. cylindrical, cuticle with transverse striae. Lateral field with
four incisures. Lip region continuous with 4 annules. Stylet 16–18 \(\mu \text{m}\) long with anteriorly
directed basal knobs. Corpus spherical, valvate. Basal bulb elongate, set off from intestine.
Cardia hemispherical. Valva transverse, slit-like, ovaries paired, spermathecae absent. Phasmids
in the anterior half of tail. Tail 3–4 anal diameter long with bluntly rounded, smooth tail tip.
Dimensions : $L = 0.44-0.68$ mm; $a = 27-33$; $b = 3.7-5.4$; $c = 12-14$; Stylet = 15–19 μm.
Male : Not found.

Habitat and distribution : Soil associated with paddy in Medak & Hyderabad of Andhra Pradesh.

Remark : Singh (1971), Mani and Ratnakumar (1990) reported *Tylenchorhynchus curvus* Williams, 1960 from Hyderabad and *T. elegans* Siddiqi, 1961 from Nellore and Chittoor districts respectively.

Genus *Trichotylenchus* Whitehead, 1960

*Trichotylenchus trilokiae* Singh 1971


Dimensions : $L = 0.52 - 0.68$ mm; $a = 26-33$; $b = 4.7-5.0$; $c = 11.8-16.5$; $V = 53-57%$; stylet = 24–26 μm.
Male : Not found.

Habitat and distribution : Soil around fern in Hyderabad district.

Remark : Singh (1971) reported the above species from Andhra Pradesh.

Family PRATYLENCHIDAE Thorne, 1949
Subfamily PRATYLENCHINAE Thorne, 1949

Diagnosis : Body remains vermiform in both sexes. Tail elongated, 2–4 anal body diameter (except Pratylenchoides). Phasmids located well behind anal or cloacal level (Except Hoplotylus).

Key to the available genera of Pratylenchinae

1. Stylet medium (20μm or less) one functional ovary; bursa terminal ....... *Pratylenchus*
   - Stylet reduced or massive; two functional ovaries; bursa subterminal or terminal ..... 2
2. Stylet massive (15–46 μm); two functional ovaries; bursa subterminal...........................
   ........................................................................................................................................... *Hirschmanniella*
Stylet markedly reduced; ovaries paired; bursa subterminal or terminal. **Radopholus**

*Pratylenchus brachyurus* (Godfrey, 1929), Filipjev and Schuurmans Stekhoven, 1941


**Female**: Lip region angular in shape marked with two distinct annules and set off from body. Stylet knobs large and round. Lateral field with four incisures. Vulva posterior in position. Ovary with single row of oocytes. Posterior uterine branch short, about one vulval body width in length. Tail subcylindrical with round smooth tail terminus.

**Dimensions**: $L = 0.39–0.75$ mm.; $a = 15–29$, $b = 5.0–10.0$; $c = 13–28$; $V = 82–89\%$; stylet $= 17.0–22.0$ μm.

**Habitat and distribution**: Soils associated with groundnut in Nellore and Chittoor districts.

**Remark**: Mani & Ratnakumar (1990) reported the species from Andhra Pradesh.

*Pratylenchus barkati* Das and Sultana, 1979


**Female**: Head flat, bearing three annules. Stylet knobs anteriorly directed. Lateral field 1/3rd of body width with four crenate incisures. Ovary reflexed, oocytes in a single row. Spermathecae small, oval in shape. Posterior uterine branch one vulval body width in length. Tail conoid, two and half anal body width long. Tail terminus blunt and annulated. Phasmids in middle of the tail.

**Dimension**: $L = 0.49–0.55$ mm; $a = 25–29$; $b = 8.3–9.6$; $c = 17–21$; $V = 74–79$; stylet $= 18.0–19.0$ μm.

**Habitat and distribution**: Soils associated with groundnut, corn in Hyderabad, Nellore and Chittoor districts.

*Pratylenchus indicus* Das, 1960


[Description and measurements given after Singh (1971)]

**Female**: Cuticle striated. Lateral fields with 4 incisures of which outer one is crenate. Lip region continuous with body, composed of 3 annules. Stylet with massive basal knobs.


Dimensions: Female: L = 0.4–0.47 mm; a = 26–30; b = 5.8–6.5; c = 13.3–15.8; V = 70.7–74.7%; stylet = 13.8–15 µm.

Male: L = 0.42 mm; a = 27, b = 5.2; c = 19; stylet = 12.6 µm.

Habitat and distribution: Rhizomes of ginger in Hyderabad.

Remarks: Das (1960) & Singh (1971) reported the species from Andhra Pradesh.

Pratylenchus Crassi Das and Sultana, 1979


[Description & dimensions after Das and Sultana, 1979]

Female: Lip region low and flat, with two annules. Stylet knobs cup-shaped, directed anteriorly. Lateral field with four crenate incisures, occupying less than one third of body width. Ovary single, prodelphic, outstretched. Spermathecae oval, filled with sperm. Posterior uterine branch very small (less than one body width in length). Tail cylindrical, with 12–15 annules and about two anal body diameter in length. Tail terminus rounded and smooth. Phasmids in centre of tail.

Dimensions: L = 0.41–0.45 mm; a = 20–26; b = 7.7–8.8; c = 18–24; V = 72–77; stylet = 17.0–18.0 µm.

Male: Not recorded.

Habitat and distribution: Vegetable crops in and around Hyderabad, Andhra Pradesh.

Pratylenchus dasi Fortun. 1985

Syn. *P. capitatus* Das & Sultana, 1979

*P. hyderabadensis* Das & Sultana, 1979


Female: Lip region rounded with three annules. Stylet knobs rounded. Lateral field marked with four incisures. Ovary outstretched, oocytes in single row. Posterior uterine branch one to one and half of vulval body diameter in length. Tail cylindrical, conoid and
more than two anal body width in length. Tail terminus smooth and bluntly ended. Phasmids in centre of tail.

**Dimensions** : L = 0.45–0.56 mm; a = 23–31; b = 7.6–9.5; c = 14–21; V = 72–78; stylet = 18.0–19.0 μm.

**Male** : Not recorded.

**Habitat and distribution** : Soils associated with vegetable crops in Hyderabad, Andhra Pradesh.

**Remarks** : Das and Sultana (1979) described two new species as *P. capitatus* and *P. hyderabadensis* from Hyderabad, Andhra Pradesh, both of which were synonymized under *P. dasi* by Fortunar (1985).

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**Pratylenchus delattrei** Luc, 1958

Syn. *P. singhi* Das & Sultana, 1979


**Dimensions** : (After Das & Sultana, 1979) : L = 0.44–0.49 mm; a = 20–25; b = 8.1–8.8; c = 18–23; V = 75–77; stylet = 17.0–18.0 μm.

**Male** : Not recorded.

**Habitat and distribution** : Soil associated with vegetable crops in Hyderabad, A.P.

**Remarks** : Das and Sultana (1979) recorded *P. singhi* as a new species from Hyderabad, Andhra Pradesh, which has been synonymized with *P. delattrei* Luc, 1958.

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**Pratylenchus exilis** Das & Sultana, 1979


**Dimensions** : Female : L = 0.49–0.56 mm; a = 30–35; b = 8.6–9.2, c = 15–20; V = 73–76; stylet = 17–18 μm.
**Pratylenchus nizamabedensis** Maharaju & Das, 1981.


**Female** : Lip region flat with four annules. Stylet knobs round, slightly anteriorly projected. Lateral field ¼th of body width marked by four crenate incisures. Ovary outstretched, oocytes in single row. Spermatheca absent. Posterior uterine branch less than one vulval body width in length. Tail with 15–24 annules, two to two and half times of anal body width in length. Tail terminus crenate. Phasmids in anterior half of tail.

**Dimensions** : (After Maharaju and Das, 1981) L = 0.41–0.52 mm; a = 23.4–27; b = 8.5–9.7; c = 17–27; T/ABW = 1.8–2.5; V = 67–78.7%, stylet = 17.5–18.7 μm.

**Male** : Not recorded.

**Habitat and distribution** : Soil around roots of groundnut at Nizamabad district, Andhra Pradesh.

**Pratylenchus flakkensis** Seinhorst, 1968


**Female** : Head with two annules. Spear knobs anteriorly directed. Lateral field with four incisures, band between inner lines plain and outer incisures areolated on posterior third of tail. Ovary outstretched, spermatheca round to angular. Posterior uterine branch extends up to 25–30% distance between vulva and anus and more than one vulval-body width in length. Tail conical with 18–24 annules, tail tip annulated, rounded, truncate or irregularly crenate.

**Dimensions** : (After Seinhorst, 1968).

**Female** : L = 0.42–0.57 mm; a = 20–17; b = 5.2–7.1; c = 12–18; V = 73–77%; stylet = 17.0 μm.

**Male** : L = 0.42–0.49 mm; a = 27–33; b = 5.1–6.5; c = 18–21; stylet = 16.0 μm; spicules–15.0 μm.

**Habitat and distribution** : Maharaju and Das (1984) reported *P. flakkensis* from soils around groundnut in Telengana region of A.P.

**Pratylenchus manohari** Quraishi, 1982


**Female** : Head offset with three distinct annules. Stylet knobs slightly anteriorly directed.
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Lateral field covering ¼th body width, marked by four incisures, outer being crenate. Ovary outstrctched, oocytes in single row. Spermatheca without sperm. Posterior uterine branch about one to one and half times of vulval body width long. Tail bearing 13 – 15 annules and about one and half anal-body width in length. Tail tip rounded and smooth. Phasmids inconspicuous and in posterior half of tail.

Dimensions : (After Quraishi, 1982).

L = 0.42–0.51 mm; a = 17–25; b = 5.0–6.0; b = 3.8–4.0; c = 18–20; V = 78–80%; stylet = 15.0–18.0 μm.

Male : Not recorded.

Habitat and distribution: Quraishi (1982) reported the occurance of P. manohari from grape vine yard of Hyderabad City, A. P.

Pratylenchus thornei Sher and Allen, 1953.


Female : Body open ‘C’–shaped on fixation which is unique feature of this species. Lip region continuous, conical, high, marked with three annules. Stylet knobs broadly rounded. Lateral field with four incisures, outer one being smooth or weakly crenate extending beyond phasmids. Oocytes arranged in single row but multiple rows near anterior end. Spermatheca absent. Posterior uterine branch more than one and half body diameter at vulva. Phasmids in posterior half of tail. Tail bluntly rounded with smooth terminus.

Dimensions : (After Sher and Allen, 1953).

Female : L = 0.41–0.77 mm; a = 25–36; b = 5.4–8.3; c = 18–25; V = 73–80%; stylet = 15.0–19.0 μm.

Male : L = 0.48–0.49 mm; a = 29–32; b = 5.6–6.2; c = 20; T = 30; stylet–16.0 μm.

Habitat and distribution: Soil around roots of corn (Zea mays L.) in and around Hyderabad, A.P.

Remarks : Singh (1971) reported the species from Andhra Pradesh.

Pratylenchus Zeae Graham, 1951


Female : Lip region continuous, rounded, marked with three annules. Stylet knobs broadly flattened. Lateral field with four incisures. Ovary not extending upto oesophagus. Oocytes in two rows. Spermatheca absent. Posterior uterine branch about one vulval body width in length. Tail tapering into a pointed smooth terminus.
Dimensions: Female: \( L = 0.36-0.58 \) mm; \( a = 25-30; b = 5.4-8.0; c = 17-21; V = 68-76\% \), stylet = 15.0-17.0 \( \mu \)m.

Male: Not found.

Habitat and distribution: Rhizospheric soils of corn (Zea mays) and groundnut in Chittoor and Nellore districts of Andhra Pradesh.

Remarks: Das (1960) recorded Pratylenchus brevicercus and \( P. \) indicus from Andhra Pradesh but both the species have been placed under species enquirendae.

Genus Hirschmanniella Luc & Goodey, 1964

\( H. \) mucronata (Das, 1960) Luc & Goodey, 1964

Syn. \( H. \) mangalorensis Mathur & Prasad, 1971

\( H. \) indica Ahmad, 1974


1964. \( H. \) mucronata Luc, M. & Goodey.


Dimensions: \( L = 1.67-2.22 \) mm; \( a = 57-60; b = 11-14; b' = 4.6-5.2; c = 18-20; c' = 4.1 = 5.1; V = 49-53\%; stylet = 24-29 \( \mu \)m, spicules = 29-36 \( \mu \)m; gubernaculum = 9-14 \( \mu \)m.

Remarks: Das (1960) reported \( H. \) mucronata from Hyderabad. Maharaju and Das (1984) reported this parasite from groundnut in Telengana region of A.P.

\( H. \) oryzae (van Breda de Hann, 1902), Luc & Goodey, 1964

1902. Tylenchus oryzae van Breda de Hann.


Female: Lateral field marked with four incisures, outer one crenate, some times incomplete areolation may occur on tail. Lip region continuous; low flattened with rounded edges, marked by \( 3-4 \) annules. Stylet robust with rounded basal knobs. Spermatheca with sperm. Intestine not overlapping rectum. Tail elongate-conoid with mucronate terminus.

Dimensions: Female: \( L = 1.4-1.63 \) mm; \( a = 50-67; b = 8.8-12.1; b' = 4.5-7.2; c = 15-19; c' = 4.3-5.5; V = 50-55\%; stylet = 16-19 \( \mu \)m.
Male: L = 1.01–1.40 mm; a = 52–61; b = 9.1–11.3; b = 4.6–5.7; c = 16–18; spicules = 18–28 μm; gubernaculum = 7–9 μm.

Habitat and distribution: Soil around paddy in most of the coastal districts of Andhra Pradesh. Mani and Ratnakumar (1990) reported the parasite from the soils associated with groundnut in Chittoor and Nellore districts.

Remarks: The species is widely distributed all over India and considered a key pest of paddy.

Hirschmanniella orycrella Sultana, 1979


Female: Body striae 3 μm apart on mid body. Lateral field with 4 crenate incisures. Lip region hemispherical with 3 distinct annules. Dorsal oesophageal gland orifice 4-5 μm behind the spear base. Spermatheca small, oval, filled with sperms. Tail 3-4 anal-body width long, conoid, with a bluntly pointed terminus. Tail tip ending in a fine mucro measuring 3 μm in length.

Dimension: L = 1.50–1.72 mm; a = 63–84; b = 11–15; c = 13–19; c' = 3.0–4.0; V = 51–56; stylet 22–24 μm; spicules = 26–30 μm, gubernaculum = 5–11 μm.

Remarks: H. orycrela has been reported from rhizospheric soil of Mentha arvensis by Sultana (1979) from Hyderabad, Andhra Pradesh.

H. telanganensis Maharaju, 1981


Dimensions: (After Maharaju, 1981)

Female: L= 1.43–1.95 mm; a = 40.7–59.8; b = 16.3–22; b' = 3–5.9; c = 15.2–20.8; c' = 3.5–5; V = 44.8–61%; stylet = 23.4–25.7 μm.

Male: L = 1.39–1.67 mm; a = 45–56; b = 14.3–18.2; b' = 3.8–6.6; c = 16–22.8; c' = 3.6–5; stylet = 23–25.7 μm; spicules = 31–32.7; Gubernaculum = 8–11.7 μm.

Remark: H. telanganensis has been reported by Maharaju (1981) from the soil around the roots of groundnut from Khammam district, Andhra Pradesh.
Genus *Radopholus* Thorne, 1949

*R. similis* (Cobb, 1893) Thorne, 1949


*Female*: Lip region hemispherical, slightly set off or continuous. Six similar lips. Stylet knobs rounded to slightly projected anteriorly. Spermatheca with rod-like sperms. Lateral field with four incisures, sometimes incompletely areolated on tail. Tail tapering, rounded with variable terminus.

*Dimensions*: Female: $L = 0.52–0.88$ mm; $a = 22–30$; $b = 4.7–7.4$; $b' = 3.5–5.1$; $c = 8–13$; $c' = 2.9–4.0$; $pV = 55–61\%$; stylet = 17–20 μm.

Male: $L = 0.59–0.67$ mm; $a = 31–44$; $b = 6.1–6.6$; $b' = 4.1–4.9$; $c = 8–10$; $c' = 5.1–6.7$; stylet = 12–17 μm; spicules = 19–22 μm; gubernaculum = 8–12 μm.

*Habitat and distribution*: Rhizospheric soil of banana with wide distribution in different districts of Andhra Pradesh.

Remarks: Singh, Rao & Reddy (1979) reported the species from A. P.

Family *Hoplolaimidae* Filipjev, 1934

*Diagnosis*: Small to moderately large (usually 0.5–1.5 mm). Female vermiform to kidney shaped. Lateral fields typically with four lines. Deirids absent. Phasmids either small pore-like or large scutellum-like. Lip region elevated, high arched. Stylet strong, knobs large, rounded or indented. Oesophageal glands generally overlapping the anterior intestine. Female reproductive system amphidelphic, rarely mono-prodelphic. Epiptygma and vulval flaps generally present but sometimes inconspicuous. Males with large bursa, enveloping the tail. Spicules robust or slender. Tail typically short, rarely longer.

Key to the available subfamilies of family *Hoplolaimidae*

1. Adult female vermiform; Phasmids small or enlarged (scutellum); lip region elevated, high arched ................................................................. **Hoplolaiminae**

2. Mature female swollen or kidney-shaped; Phasmid always pore-like; lip region high but not much .............................................................. **Rotylenchulinae**

Key to the available genera of Hoplolaiminae

1. Phasmids scutellum-like; lip region set off from body. Oesophageal gland overlaps intestine dorsally and laterally .................................................... *Hoplolaimus*

2. Phasmids small; lip region continuous; Oesophageal glands overlap intestine ventrally .......................................................................................... *Helicotylenchus*
Genus *Hoplolaimus* Daday, 1905

*Hoplolaimus indicus* Sher, 1963


**Female** : Body ventrally curved on fixation. Lip region set off. Stylet knobs anteriorly, usually with one to three inconspicuous protruberances. Stylet robust. Median oesophageal bulb spheroid. Oesophageal gland overlapping intestine dorsally or laterally, with six nuclei. Gonad amphidelphic. Tail round with 8–13 annules.

**Dimensions** : Female : L = 0.95–1.4 mm; a = 26–36; b = 9.1–12.6; b' = 7–9.1; c = 45–74; v = 50–59%; stylet = 33–40 μm.

Male : L = 0.9–1.3 mm; a = 26–33; b = 9.4–12; b' = 6.2–9; c = 32–38; stylet = 33–37 μm; spicules = 37–42 μm; Gubernaculum = 16–20 μm.

**Habitat and distribution** : Soil around roots of groundnut in Mehaboobnagar district, Andhra Pradesh.

**Remark** : Maharaju & Das (1982) reported *H. arachidis* as a new species from Andhra Pradesh which has been synonimized with *H. indicus* Sher, 1963.

*Hoplolaimus seinhorstri* Luc, 1958


**Female** : Lip region slightly set off, usually with four circular rings. Stylet knobs anteriorly directed usually with two tapering protrusions, sometimes with two or three smaller ‘denticles’ between them. Oesophageal glands with six nuclei. Excretory pore usually at level of isthmus of oesophagus. Epitygma usually unpaired and anteriorly or posteriorly adjacent to vulva. Spermatheca absent. Lateral field reduced, represented by incisures, often poorly defined. Tail terminally rounded with 10–15 cuticular rings on ventral side.

**Dimensions** : L = 1.06-1.56 mm; a = 25–34; b = 8.8–10.1; b' = 6.0–10.1; c = 38–74; V = 52–60%; stylet = 40–49 μm.

**Male** : Not detected.

**Habitat and distribution** : Singh (1971) recorded the species from the soil around the roots of cauliflower and mango from Andhra Pradesh.

*Hoplolaimus singhi* Das & Shivaswami, 1976

**Dimensions**: $L = 1.4-2.1 \text{ mm};$ stylet = 43–56 $\mu \text{m};$ spicules = 52 $\mu \text{m};$ Number of oesophageal nuclei three, number of labial annules four; excretory pore anterior to hemizonid, number of tail annules = 7.

**Distribution**: Das and Shivaswamy (1976) reported *H. singhi* from A. P.

**Genus Helicotylenchus** steiner, 1945

*Helicotylenchus abunnamai* Siddiqi, 1972


**Female**: Body spirally curved; Lip region hemispherical, continuous width 4 (rarely 3 and 5) distinct annules. Lateral fields with smooth incisures, about $\frac{2}{3}$th from anterior end. Basal knobs of spear about 4 $\mu \text{m}$ across and by 2 $\mu \text{m}$ high, with flattened to slightly concave anterior surfaces. Median oesophageal bulb rounded to distinctly oval. Oocytes in a single file. Spermathecae empty, dorsally off set. Intestine not extending over rectum. Tail tapers regularly up to distal third, then becomes ventrally convex and dorsally concave with a narrow hemispheroidal terminus.

**Dimensions**: $L = 0.52-0.63 \text{ mm};$ a = 25–29; b = 5.5–6.7; $b' = 4.5-5.1; c = 33–44; c' = 1.10–1.42; V = 59–65;$ spear $= 21/22 \mu \text{m}.$

**Habitat and distribution**: Soil around groundnut of Nellore and Chittoor districts of Andhra Pradesh.

**Remarks**: Mani & Ratnakumar (1990) reported the species from Andhra Pradesh.

*Helicotylenchus indicus* Siddiqi, 1963

Syn. *H. microdorus* Prasad et al., 1965


**Female**: Body spirally on relaxation. Lip region high, usually anteriorly blunt with 4–5 annules. Stylet knobs rounded, with backwardly directed anterior margin. Metacarpus ovoid, one-half width of body cavity. Subventral oesophageal gland elongated, ventrally overlap the commencement of intestine. Vulva in form of transverse slit. Both uteri with separate spermatheca at distal ends. Ovaries paired, straight. Tail in form of asymmetrical blunt cone, dorsally arcuate, ventrally almost straight, terminus rounded or with negligible outgrowth.

**Dimensions**: $L = 0.45–0.63 \text{ mm};$ a = 23–32; b = 5.5–64; c = 33–47; V = 60–65%; stylet $= 21–23 \mu \text{m}.$

**Habitat and distribution**: Soil around the roots of groundnut in Nellore, Chittoor district and Telengana region of Andhra Pradesh.

**Remarks**: Mani & Ratnakumar (1990) reported the species from Andhra Pradesh.
Helicotylenchus pteraceracus singh, 1971


Dimensions: Female: \( L = 0.62-0.73 \) mm; \( a = 25-29; b = 5.3-6.6; b' = 4.5-5.3; c = 41-68; c' = 0.60-1.08; V = 57.1-65\%; \) stylet = 23.5 to 25.2 \( \mu \)m.

Male: Not known.

Habitat and distribution: Soil around root of paddy in Hyderabad district. A. P.

Helicotylenchus retusus Siddiqi & Brown, 1964

Syn. H. impar Prasad et al., 1965

Female: Body in form of simple spiral on relaxation. Lateral fields with four incisures, areolated only in anterior part. Lip region continuous, high coned. Stylet well developed, knobs taper anteriorly. Procorpus cylindrical, metacorpus spherical, isthmus slender, vulva in form of transverse slit with two lateral membrane. Ovaries paired, straight. Tail with 9–13 annules, terminus obtusely rounded.

Dimensions: \( L = 0.73-0.77 \) mm; \( a = 33-36; b = 5.7-6.0; c = 48-53; V = 61-64; \) stylet = 26-27 \( \mu \)m.

Male: Not known.

Habitat and distribution: Mani and Ratna Kumar (1990) reported this species from soil around the roots of groundnut in Nellore and Chittoor district of A. P.

Subfamily ROTYLENCHULINAE Husain & Khan, 1967

Diagnosis: Small sized (0.5 mm or less). Body of mature female swollen or kidney shaped. Lateral field with four lines. Phasmids always pore like near anus or on tail. Stylet
and median oesophageal bulb well developed in females and juveniles. Male stylet weak. Young female and male tails similar in being elongated and having a long hyaline terminal portion, tail persists in mature swollen female.

Genus *Rotylenchulus* Llford and Oliveria, 1940

*Rotylenchulus reniformis* Linford & Oliveira, 1940


*Dimensions*: Mature female: *L* = 0.38–0.52 mm; *a* = 4–5; *V* = 68–73; Body width at vulva = 100–140 μm.

Male: *L* = 0.38–0.43 mm, *a* = 24–29; *b*' = 2.8–4.8; *c* = 12–17; *T* = 35–45; stylet = 12–15 μm. spicules = 19–23 μm, gubernaculum = 7–9 μm.

*Habitat and distribution*: Rhizospheric soil of groundnut in Nellore and Chittoor districts. Singh (1971) reported this species from grape plants in grape orchards in Khammam district in A.P.

Family HETERODERIDAE Filipjev & Schuurmans. Stekhoven, 1941

**Key to the subfamilies of the family Heteroderidae**

1. Mature female oval, lemon-shaped or spheroidal with a short neck; may or may not form cyst; tail absent ................................................................. HETERODERINAE

− Mature female round, oval to pear-shaped with a projecting neck; No cyst stage; tail rudimentary or absent ................................................................. MELOIDOGYNINAE

Subfamily HETERODERINAE Filipjev & Sch. Stekhoven, 1941

Genus *Heterodera* Schmidt, 1971

*H. sorghi* Jain, Sethi, Swarup & Srivastava, 1982


*Female*: Cysts are dark brown and black. Adults are lemon shaped with neck. Cysts with posterior protuberance. Stylet length 20–23 μm. with anteriorly directed basal knobs second stage larva. The number of lateral lines three in 2nd stage juvenile.
**Dimensions** : Cysts: Cyst length = 470–990 μm; cyst width = 350–600 μm; cyst $l/w = 1.2–1.9$; vulval slit length = 28–51 μm; Fenestral length = 32–65; Fenestral width = 27–56; under bridge length = 100–150 μm; Under bridge with = 28–52 μm; under bridge depth = 24–54 μm; vulval bridge = 4–9 μm.

2nd stage juveniles : $L = 400–525 \mu m$; $a = 20–28$; $b = 3.8–6.2$; $b' = 2.5 = 3.9$; $c = 7.5–9.9$; $c' = 3.1–5.9$; stylet = 20–23 μm; Tail length = 42–60 μm.

**Habitat and distribution** : Roots of groundnut in some districts of Rayalaseema, coastal regions and in Prakasam district.

**Remarks** : Sharma & Sharma (1988) reported the species from A. P.

Subfamily MELOIDOGYNINAE Skarbilovich, 1959

Genus *Meloidogyne* Goeldi, 1892

**Key to available species of Meloidogyne**

1. Lateral field with 2 incisures fairly wide in perineal pattern; inter phasmidial distance 25–27 μm; vulval width 24–27 μm ................................................................. *M. javanica*

- Perineal pattern with dorsal arch very high and with irregular striae but without lateral line........................................................................................................... *M. incognita*

*Meloidogyne incognita* (Kofoid & white, 1919) Chitwood, 1949


**Female** : Body spherical with projecting neck, lip region with 2–3 μm behind lip cap. Cuticle thickens abruptly at base of stylet. Stylet knobs rounded. Perineal pattern high variable, typical “incognita type” with striae closely spaced very wavy to zig zag, specially dorsally and laterally. Lateral field not clear, sometimes marked by breaks in striae. Dorsal arch variable. Striae often forked along a lateral line.


**Dimensions** : Female : $L = 500–723 \mu m$; width = 331–520 μm; stylet = 13–16 μm; width of stylet base = 3–5 μm.

Male : $L = 1.11–195 \text{ mm}$; $a = 31–35$; stylet = 23–33 μm; width of stylet base = 4.7–6.8 μm; spicules = 29–40 μm; gubernaculum = 9.14 μm.
2nd Stage Larva: $L = 0.34-0.40$ mm; $a = 25-32; b = 2.0-2.1; b' = 6.4-8.84$; tail length = $38-55$ μm; stylet = $9.6-11.7$ μm.

_Habitat and distribution:_ Mani & Sri Hari (1989) reported this species from the roots of turmeric in Chittoor and Cuddapah districts, A. P.

*M. javanica* (Treub, 1885) Chitwood, 1949

1885. *Heterodera javanica* Treub.

1901. *Anguillula javanica* Lavergne.


_Female:_ Adult body almost spherical with a beak-like neck, posteriorly round. Lip region slightly wider, one annule behind head cap. Spear slender dorsally curved with rounded basal knobs. Perineal pattern oval, striae smooth to wavy with two lateral incisures.

_Male:_ Lip region rounded, not demarcated. Amphid distinct. Lateral field with four incisures. Tail bluntly rounded ventrally. Phasmids at cloacal level. Spicules curved slightly.

_Dimensions:_ *Female*: $L = 0.35-0.80$ mm; width = $3.1-5.0$ mm; stylet = $13-17$ μm; knobs = $2-4$ μm.

_Male_: $L = 0.74-1.1$ mm; $a = 14.3-16.9$; stylet = $18-22$ μm; spicules = $20-30$ μm.

_Habitat and distribution:_ Mani (1986) reported the occurrence of *M. javanica* in citrus roots. Mani, Dakshinamurti and Reddy (1988) recorded the species from commercial citrus nurseries located at Kadium, Kodur, Palacole, Panyam and Tirupati.

Superfamily CRICONEMATOIDEA Taylor, 1936

**Key to the families of super family CRICONEMATOIDEA**

1. All stages vermiform, small to large nematodes; Body sausage-shaped to cylindrical; Body annuli either retrorse, provided or not with lobation, crenation, scales or spines .......................................................................................................................... CRICONEMATIDAE

   - Body slender, swollen or globose, usually small nematodes; cuticle thin except in some swollen or globose forms, without ornamentations or with fine punctuations or minute spines .......................................................................................................................... TYLENCULIDAE

**Key to the subfamilies of the family CRICONEMATIDAE**

1. Mostly small, stout nematodes upto 0.86 mm; annulation strongly developed with smooth or slightly crenate cuticle, or various scales and spine-like projections of posterior margins of annuli, ruffled or platelet-like extracuticular coverings .......... CRICONEMATINAE
SEN and CHATTERJEE: Phytophagous Nematodes

- Moderate to large sized (0.60–1.7 mm) nematodes with cylindrical body. Cuticle with round, coarse, nonretrose annules, devoid of lobes, spines, scales but sometimes provided with superficial ornamentation. ............................................. HEMICYCLIOPHORINAE

Key to the available genus of Criconematinae

1. Body small to large (0.24–0.74 mm), body annules 24–134; cuticle smooth or variously ornamented with scale like projection, irregular plate-like covering or ruffled or ribbon-like ornamentation. ................................................................................................. Criconema

- Body small to medium sized (0.29–0.67 mm), body annules 51–164; Annules round and flat or rarely retrorse, lacking scales, spines or other appendages ........................................................................................................... Hemicriconemoides

Genus Criconema Hofmanner & Menzel, 1914

Criconema lamellatum (Raski & Golden, 1965) Raski and Luc, 1984


Dimensions: Female: L = 0.27–0.41 mm; a = 10.2–11.3; b = 3.3–4.1; c = 40.0–53.0; V = 91.8–92.5%; VB = 1.0; VL/Vst = 0.4–0.5; Oes = 56.2–58.2; R = 56, Rst = 9–11; Rex = 17–23; Rv = 4, Ran = 1–2; Rvn = 1–2; Stylet = 57 μm.

Male: Not known.

Habitat and distribution: Muthukrishnan (1987) reported the species from the soil associated with citrus in Guntur district, Andhra Pradesh.

Genus Hemicriconemoides Chitwood & Birchfield, 1957

H. brachyurus (Loos, 1949) Chitwood & Birchfield, 1957


Dimensions: Female: L = 0.30–0.54 mm; a = 13–17; b = 3.0–5.2; c = 16–30; V = 93–95; VL/VB = 1.0–1.4; R = 98–119; Rv = 7–10; Ran = 6–7; Rst = 10–16; Roes = 19–25; Rex = 21–27; stylet = 48–64 μm.

Stylet knob anchor shaped. Tail shape hemispherical or bluntly conoid.

Male: Not known.

Habitat and distribution: Soil around the roots of groundnut in Telengana region, from coconut palm in Bapatla, Guntur District, Andhra Pradesh.

Remarks: Muthukrishnan (1987) reported the species from Andhra Pradesh.
**Hemicriconemoides mehdi** Suriyawanshi, 1971


**Female** : Circular sheath attached to body at anterior end and at vulva, not well separated on posterior part of tail. Lip region with three annules, first annule being angular, anteriorly concave. Labial disc not prominent. Spear knobs about 7.5 µ wide. Excretory pore 36-40 annules behind the anterior end and 8-9 annules behind the oesophago-intestinal junction. Anus indistinct. Tail conical with rounded terminus, narrowing abruptly in posterior part which consists of 4-5 annules. Vulval sheath small. Gonad monodelphic, outstretched. Spermatheca oval.

*Dimension*: L = 0.41-0.54 mm; a = 13-17; b = 4.2-5.9; V = 91-92%; V' = 35-46; VL/VB = 1.5-2.0; R = 130-150; RV = 12-14; Ran = 10-13; Spear = 48-59 µ; Rex = 36-40.

**Male** : Not known.

**Habitat & Distribution** : Soil around groundnut in Telengana region and citrus and turmeric in Guntur District, Andhra Pradesh.

**Remark** : Muthukrishnan (1987) reported the species from Andhra Pradesh.

**Hemicriconemoides cocophilus** (Loos, 1949) Chitwood & Brichfield, 1957


*Dimensions* : Female : L = 0.35-0.50; a = 11-16; b = 4.1-5.4; c = 11 = 30; V = 90-94; R = 95-130; Rv = 8-11; Ran = 6-8; Rst = 13-19; Roes = 20-33, Rex = 25-36; Stylet = 49-58 µm.

Stylet knob anchor shaped.

**Habitat and Distribution** : Soil around the roots of papaya and groundnut in Telengana region, Andhra Pradesh.

Subfamily HEMICYCLIOPHORINAE Skarbilovich, 1959

Genus *Hemicycliphora* De Man, 1921

*Diagnosis* : Female 0.42-2.0 mm in length, covered with an extra cuticular sheath. Body annules coarse, rounded not retrorse. Labial annules two (exceptionally three) not modified or separated. Vulva in form of a transverse slit. Vagina straight or curved but not sigmoid. In males, spicule arcuate, semi circular, ‘U’ or hook-shaped. Bursa covering less than one third of the tail. Tail longer than that of female.

**Habitat and distribution** : Mani and Ratnakumar (1990) reported the presence of this genus in the soil around the roots of groundnut in Nellore and Chittoor districts.
Remarks: Das and Shivaswami (1977) described *Hemicycliophora osmani* from Andhra Pradesh.

Family TYLENCHULIDAE Skarbilovich, 1947

Key to the available subfamilies of the Family Tylenchulidae

1. Females obese; stylet short; Males vermiform, with stylet degenerate or absent. ............................................................ TYLENCHULINAE

- Females small & slender; stylet length variable (12–119 μm); Males with degenerate or weakly developed stylet. .............................................................. PARATYLENCHINAE

Key to the available genera of subfamily Tylenchulinae

1. Adult female elongate obese, post-vulval part elongate tapering; Tail tapering, tip rounded or with a peg. ............................................................ *Tylenchulus*

- Female elongate-saccate, post-vulval body region slender; Tail in all stages elongate to a rounded terminus. .............................. *Trophotylenchulus*

Subfamily TYLENCHULINAE Skarbilovich, 1947

Genus *Tylenchulus* Cobb, 1913

*T. semipenetrans* Cobb, 1913


Female: Body translucent, white, 60–70% of body variably saccate, widest at excretory pore, narrowing abruptly at vulva and ending in a digitate terminus. Lip region hemispherical, smooth; labial sclerotization inconspicuous. Stylet knobs rounded. Precorpus cylindroid; metacorpus oval and basal bulb elongate-saccate. Excretory pore located at 78–84% from anterior end. Gonad convoluted, extending anteriorly to basal bulb. Anus and rectum invisible.

Dimensions: Mature Female: L = 0.31–0.46 mm; width = 66–114 μm; a = 3.5–6.4; b = 2.4–4.3; V = 88–93; stylet = 11–12 μm; Body width at vulva = 21–31 μm, oesophageal length = 104–159 μm; dorsal oesophageal gland orifice = 4–6 μm.

Males: L = 0.34–0.38 mm; a = 28–35; b = 2.9–3.7; c = 7.7–10.1; T = 25–36, stylet = 9–10 μm; oesophageal length = 97–131 μm; spicules = 15–18 μm; gubernaculum = 3–4 μm; tail = 35–45 μm.

Habitat and distribution: Roots of citrus plants in different places of Andhra Pradesh. Mani and Ratnakumar (1990) reported the association of this species with roots of groundnut in Chittoor and Nellore districts of Andhra Pradesh.
Remark: The females of *T. semipenetrans* are obligate parasites on the roots of various species of citrus.

Genus *Trophotylenchulus* Raski, 1957

*T. andhraensis* Muthukrishnan & Shariff, 1985


*Mature Female*: Body considerably enlarged, often tightly coiled, cuticle thick, annulations not distinct. Cephalic region with distinct circum-oral elevation, cephalic frame work slightly sclerotized. Stylet with rounded basal knobs. Precorpus comparatively long and amalgamated posteriorly with ovate median oesophageal bulb; crescentic valve distinct, basal bulb pyriform, rectum and anus not noticable. Ovary single, prodelphic, reflexed twice, oocytes in single column. Spermatheca distinct. Tail elongate conoid with bluntly rounded terminus.

*Dimensions*: Mature Female: L = 0.28–0.35 mm; a = 6–12; b = 3.8–5.9; c = 10.9–21.2; V – 74–86%; stylet = 9–13 μm; excretory pore = 31–53%.

*Young Female*: L = 0.29 mm; a = 22, b = 3.0; c = 11.8; V = 81%, stylet = 11 μm; excretory pore = 51%.

Male: Not known.

*Habitat and distribution*: Reported from rhizosphere of acid lime in Guntur district, Andhra Pradesh by Muthukrishnan and Shariff (1985).

*Remark*: *T. andhraensis* is unique among the species of the genus, where in young and mature females have been encountered freely (without cases) from soil whereas young freely occurring females are unknown for other species (Ahmad, 1996).

Subfamily PARATYLENCHINAE Thorne, 1949

Genus *Paratylenchus* Micoletzky 1922


*Diagnosis*: Body short (under 0.50 mm), vermiform, elongate, cylindrical, not abnormally swollen. Cuticle finely striated. Labial frame work weakly sclerotized. Stylet small to medium size (12–40 μm), not flexible. Body elongated behind vulva. Males slender, stylet and bursa absent.

*Habitat and distribution*: Rhizospheric soil of citrus and groundnut in Nellore and Chittoor districts of A. P.

*Remarks*: Mani and Ratnakumar (1990) reported the genus from Andhra Pradesh.
Distribution list of Genera / Species available in Andhra Pradesh

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SEN and CHATTERJEE: Phytophagous Nematodes

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**SUMMARY**

Citrus, groundnut, different types of oilseeds and paddy are some of the most important crops of Andhra Pradesh. Different nematologists worked on the nematode problems in Andhra Pradesh to evaluate the major pests. Singh, Rao & Reddy (1979) reported the parasites associated with horticultural plants. Mani (1986, 1995) and Mani et al. (1988) showed the occurrence of *Meloidogyne javanica* and *Tylenchulus semipenetrans* in commercial citrus nurseries and their distribution. Krishnamurthy Rao and Thammi Raju (1975) also surveyed the phytoparasites of citrus. Sharma and Sharma (1988) recorded the occurrence of *Heterodera sorghi* in Andhra Pradesh. Maharaju and Das (1984) surveyed and concluded that the species of *Rotylenchus* spp., *Helicotylenchus* spp. and *Hirschmaniella* spp. as the most prominent and widespread parasites in the groundnut fields. Mani and Rainakumar (1990) also reported *Pratylenchus* spp., *Ditylenchus* spp., *Helicotylenchus* spp. and *Tylenchorhynchus* spp. as the most predominant parasitic nematode genera in groundnut. According to them, *Rotylenchulus reniformis*, *Hemicriconemoides* spp., *Paratylenchus* spp., *hirschmaniella oryzae* and
Meloidogyne spp. were the frequently occurring phytoparasites of groundnut in Andhra Pradesh which badly affect the agricultural production in the state.

**ACKNOWLEDGEMENT**

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**REFERENCES**


INDRODUCTION

Nematodes are one of the most important groups of multicellular invertebrate animals, which are commonly known as “round worms”. They occur in all kinds of habitat such as bottoms of lakes, rivers, at enormous depth of oceans and in all kinds of soil. Some species of nematodes can survive in temperature below freezing point while others can survive in the rocky soil during hot summers. Even some nematodes can withstand in water of “hot springs. Some nematodes are free-living while some are fungal feeders in soil, salt and fresh water while others live as parasites of plants. Both free-living and plant parasite nematodes are generally microscopic or very small in size ranging between 0.3 to 12 mm in length except Paralongidorus maximus, a dorylaim nematode measuring about 1 cm in length.

In soil, the nematodes dominate in numbers as well as in species over most of the soil inhabiting animals collectively. The members of the order Dorylaimida are commonly known as Dorylaims. The Dorylaims are found round the world, in all types of soils, in every conceivable type of habitats and usually dominate both in numbers and in species over all other soil inhabiting nematodes. It is not unusual to find five or six, sometimes more. Dorylaim species representing as many genera in a single soil sample. These nematodes are easily recognised at lower magnifications by their apparently smooth cuticle, usually “dagger shaped” feeding apparatus, bottle shaped oesophagus and the absence of a bursa in the males. These nematodes possess highly diversified types of feeding apparatus and their feeding behaviour is also diversified.

It was probably, Borellus who for the first time found the free-living vinegar eelworm in middle of 17th century. Owing to the magnitude of contribution made to the field of nematology by Bastain (1865), he is known as the father of nematology. He presented for the first time the possibility of obtaining nematodes form soil and plant tissues. In 1873, Butschli, for the first time, included drawing of soil nematodes and worked out keys for identification of nematodes, the principles of which are still used in diagnosis. Micoletzky (1883-1921) wrote a monograph on free living soil nematodes. Goodey (1885-1953) made significant contribution
Distribution of species are shown in the map in accordance with the index number of species in preceding page.

The state of Andhra Pradesh with an area of 7,500 sq. kms. is located within the tropics extending from 12°40' to 19°50' North latitude and 76°45' to 84°40' East longitude. It lies on the south Eastern side of India and is the 5th largest state of India. It is bounded on the North by Madhya Pradesh and Orissa, on the West by Maharashtra and Karnataka, on the South and East by Tamil Nadu and Bay of Bengal respectively. It has a coast line of 1000 kilometers. The lakes and tanks cover an area of 8,00,000 hectors and the river system of the state is more than 1,500 kilometers. There are two major rivers i.e. Godavari and Krishna, both have originated from the Western Ghat and flow ultimately to meet the Bay of Bengal.

The state of Andhra Pradesh can be broadly divided into three physiographic divisions viz. the mountainous region consisting of Nallamalai and Erramalai hills of Rayalseema and Eastern Ghats; Plateau or elevated plains having an altitude 92 to 722 meters covering the entire Telengana and a part of Royalseema, the delta areas among which the Godavari, the Krishna and the Pennar are important.

Generally, alluvial or sandy soil are found in the coastal region, marshy at the deltaic zones of Krishna and Godavari rivers. Mostly red lateritic and black soils mixed with pebbles are found in Royalseema and Telengana. Evergreen, semi-evergreen and moist deciduous forest are found in the state and occupy about 23.8% of the total area of the state.

There has been more emphasis on the study of phyto-parasitic nematodes belonging to the order Tylenchida while the nematodes belonging to the order Dorylaimida have been neglected, although some Dorylaimid nematodes are very important ectoparasites of agricultural as well as horticultural plants. The dorylaimid nematodes inhibits the root growth, plant growth and are responsible for yield losses. Very recently Siddiqi, Jairajpuri, Khan, Baqri and Jairajpuri, Baqri and Khera, Baqri and Jana and few others have made significant contribution in the filed of dorylaim taxonomy. In the recent years, little advancement has been made on the study of dorylaimid fauna of Andhra Pradesh. There is very little information available on the plant and soil nematodes and their distribution in the soil of Andhra Pradesh state. Considering the little knowledge on the dorylaimid group as well recognizing the importance, the dorylaimid nematode fauna of Andhra Pradesh, the present research work has been taken up. The present study may serve as a preliminary account of the Dorylaimid nematode fauna of Andhra Pradesh.
MORPHOLOGY AND TERMINOLOGY

In general, the nematodes are vermiform circular in transverse section, bilaterally symmetrical with external cuticle and pseudocoel. They have longitudinal muscles for locomotion. The intestine is a simple tube lacking muscular wall. Circulatory and respiratory system are both wanting. The excretory system with a single duct and renette cell and consists mainly of the circumenteric nerve ring. They are phasmidian but also may not have phasmids. The reproductive system consists of one or two tubular gonads, opening separately through a ventrally located vulva in female while in the male the gonads empty into cloaca where copulatory structures known as spicules are situated. The life cycle consists of egg laid by the female followed usually by four larval stages prior to attaining the adult stage.

BODY WALL AND CUTICLE

The body wall consists of external cuticle, hypodermis and somatic muscle layer. The cuticle is the exoskeleton of nematodes. It is non-cellular proteinaceous secretion of the hypodermis. In most of the nematodes, the body is transversely striated. The striations may be prominent or faint. The portion between two consecutive striae is called body annules. The size, shape and number of body annules has great significance in nematode taxonomy. The space between the internal organs and body wall is known as the pseudocoel and is filled with fluid. The cavity is called the pseudocoel because it is not lined by mesoderm.

HEAD

Typical nematode head has hexaradiate symmetry, with the head, centrally located stoma – the mouth opening is bounded by a pair each of subdorsal, lateral and subventral lips. These lips are distinct, distributed in the head region. They are usually labial and cervical papillae which are considered by some to be tactile in function.

ALIMENTARY CANAL

The oral opening is bounded usually by six lips. The lips lead to buccal cavity or the stoma which is highly variable in its morphology, the stoma is divided into three major regions i.e. cheilostome, the anterior region followed by protostome, the central and the posterior region, telostome which joins with the oesophagus. In plant parasitic nematodes, the stoma is modified into a spear like structure known as stylet. In many plant parasitic forms the entire stoma is modified into a spear known as stomato-stylet which is characteristic of the order Tylenchida. Among the members of the super-family Dorylaimoidea, the spear is formed by one of the teeth-like projections of the rhabdion lining somewhat hollow stoma. Such a spear is known as odontostylet.

The buccal cavity leads into the oesophagus, the structure of which is of taxonomic significance. The lumen of the oesophagus is triradiatic and lined by cuticle. It is composed
of glandular and muscular tissue and primarily aids in pumping food ingested from mouth to intestine. The oesophagus consists of corpus, isthmus and basal bulb.

The glandular tissue of the oesophagus consists of three gland cells, one dorsal and two subventral in position. The dorsal gland opens into the base of the stoma while the subventral glands open into the lumen of the corpus. The glands are variable in shape, size and arrangements. There are different types of oesophagus. The most common types are Rhabditoid, Dorylaimoid, Diplogasteroid, Tylenchoid and Aphelenchoid. The Dorylaimoid type of oesophagus is completely muscular and bottle shaped, posterior enlarged portion bears all the oesophageal glands opening into the lumen of the same.

The basal bulb of the oesophagus is connected with the intestine by a region known as cardia, one cell thick and muscular in function preventing regurgitation of food from intestine. The intestine is an elongated tube comprised of a single layer of cells. The cells of the intestine store food such as glycogen, fats and proteins. The posterior end of the intestine forms the rectum. In male ejaculatory duct opens into the rectum giving rise to cloaca and the opening towards the outside is termed as cloacal opening. The cloaca is a narrow tubular structure serving as the terminal duct for the digestive as well as reproductive organs. The dorsal wall of the cloaca forms invaginations to accommodate the copulatory apparatus. In female the rectum ends in an opening called anus.

**EXCRETORY SYSTEM**

An excretory system in dorylaims is usually lacking but, if present, rather inconspicuous. In some dorylaims, a faint excretory pore and an excretory duct were found.

**NERVOUS SYSTEM**

The nervous system is complex, consisting of a nerve ring associated with ganglia, nerve chord, somatic nerves etc. only the nerve ring and ganglia are usually visible under a light microscope. The nerve ring encircles the anterior slender part of the oesophagus; at about mid length, the latter slightly narrowing in this region. Only one nerve ring is found in the dorylaim nematodes. There are a variety of sense organs:

**AMPHIDS**

These are laterally placed at the anterior end and they are two in number. On the surface they may have circular, spiral, slit like or pore like openings which lead into pouches placed inside known as the amphidial pouches. These structures are known to be chemoreceptive in function. They are of taxonomic importance.
GERITAL PAPILLAE

These occur in proximity to the genital organs and are considered to be sensitive to copulatory action. They vary in number and in forms.

LABIAL PAPILLA

There are two rows of these organs located on the lips and they are said to be tactile in function. Cervical papillae of similar function also occur.

PHASMIDS

These are attached to nerve ganglia and are also said to be chemoreceptive, laterally placed usually towards the posterior end, two in number. They are of taxonomic importance. Based on their presence or absence the nematodes are divided into two classes Secernentea and Adenophorea.

REPRODUCTIVE SYSTEM

The dorylaims are generally dioecious or amphigonus with separate female and male reproductive organs. The males are usually more slender and smaller than the females. There are many records (Jairajpuri et al., 1979) of intersexes in dorylaims. These intersexes are generally well-developed females possessing a functional female reproductive system and the rudiments of male secondary sexual characters are evident towards their posterior extremity. Till now, no male intersex has been found in this group. The primary sex organs, ovary and testis are simple, tubular and in continuity with their gonoducts. Fertilization is internal; the female is oviparous and the eggs develop outside its body. The gonads in both sexes are of the telogonic type with new germ cells originating at the blind end.

FEMALE REPRODUCTIVE SYSTEM

The female reproductive system consists either of two sets of reproductive organs, didelphic or only one set called monodelphic. In the former condition the vulva is equatorial in position, one set lying anterior end and the other posterior to it (amphidelphic). In monodelphic females the sexual branch is either anterior (Prodelphic) or posterior to the vulva (opisthodelphic). In the monoprodelphic condition the vulva is situated post-equatorial while in the mono opisthodelphic condition it lies pre-equatorially. These three conditions are taxonomically important.

Each sexual branch consists of an ovary, oviduct and uterus; the vagina is common and opens exteriorly through the vulva. The female gonad consists of an ovary with developing eggs and a tubular portion generally differentiated into oviduct and uterus. The latter is somewhat large and connected with the narrow vagina which opens on the ventral surface of the uterus forming the vulva.
OVARY

The ovary is reflected at its junction with the oviduct, its tip pointing towards the vulva. The ovary is enveloped in a sac consisting of a single layer of flattened, elongated and fusiform cells. The sac is extremely thin towards the tip of the ovary and hence rather difficult to discern while its proximal end is much thicker and distinctly visible.

OVIDUCT

The oviduct is sub-terminally connected to the ovary and serves as a constriction between the ovary and the uterus. It consists of two regions – a long narrow distal part and a short saccate proximal part. The narrow part occupies two-thirds to three-fourth of the total length of the oviduct and is composed of a single row of disc like cells without a distinct lumen.

SPHINCTER

This organ is located at the junction of the oviduct (Pars dilatata) with the uterus, is surrounded by circular muscles (Sphincter) and partly embedded in the pars dilatata. The size and the development of the sphincter (poorly, moderately or well developed) differ from species to species.

UTERUS

The structure of the ovary and the oviduct is fairly consistent in dorylaims, the uterus is greatly variable in size and differentiation. The uterus has well-developed muscular walls with circular and oblique fibres. The median part of the uterus has a narrow lumen, thick walls and well developed circular muscles. The proximal part of the uterus has a wide lumen and its walls are usually without distinct musculature. The length and nature of this part are greatly variable in different species and genera and it can serve as a good taxonomic importance. In many species the last part of the uterus is greatly enlarged and forms an ovjector with the corresponding region of the other uterus.

VAGINA

The vagina is a small, highly muscular structure with thick walls, surrounded by a sphincter muscle. In many species of dorylaims, the vagina is selerotised at its junction with the vulva. In a lateral view this shows up as selerotised pieces of varying size and shape. the presence or absence of selerotisations and the size and shape of the pieces in a lateral view are useful taxonomic characters. The length of the vagina in relation to corresponding body width and the exact shape of its walls are also useful in identification.
VULVA

In the majority of dorylaims, the vulva is a transverse slit but in some genera it is a longitudinal slit, whereas in some species of Dorylaimus, it is pore like. The vulva is situated in a depression or is flush with the body. The position of the vulva, expressed as a percentage of total body length. The ovijector, vagina and vulva are provided with highly developed specialized muscles. On the ventral side of the body, both anterior and posterior to the vulva, prominent raised structure, called the vulval papillae are sometimes present. These papillae are very rare occurrence in dorylaims.

MALE REPRODUCTIVE SYSTEM

The reproductive system of the male correspond to the general adenophorean pattern of two opposed testis which lead into a common vas deferens. The later joins the ejaculatory duct and posteriorly opens into the rectum to form the cloaca. Ejaculatory glands may also be present at the terminal region of the vas deferens. When gonad is single the male is said to be monorchic, when paired called diorchic. Copulatory organs called the spicules are generally present with guide piece, the gubernaculum. Special sensory papillae may occur in the tail region of male.

TESTIS

The gonad consists of a pair of testes lying opposite to each other. The anterior testis is extended, its tip directed towards the anterior body end while the apex of the posterior testis is directed towards the posterior body end. The testes are almost equally developed and resemble a thin-walled pouch covered with an epithelial layer, which is more prominent at the proximal end and extremely thin towards the distal end (tip of testes). At the tip of the testes, a number of germ cells are present. The epithelial layer of the testes may be covered with prominent oblique muscles. There is every reason to believe that these oblique muscles encircling the testes are present in all species of male dorylaims.

VAS DEFERENS

The proximal ends of the two testes meet at a point from which the vas deferens originate and runs posteriorly. The junction has no valve, sphincter etc. but the oblique muscle of the testes are very strongly developed in this area. The vas deferens is lined with epithelial cells and its walls may be highly granular.

EJACULATORY DUCT

The structure of this duct is almost similar to the vas deferens and it is difficult to differentiate one from the other. Their junction is situated a little above the level of the last
copulatory muscles. At this point the vas deferens usually narrow before leading into the ejaculatory duct. The walls of the ejaculatory duct are thick, made up of epithelial cells and packed with granules. The lumen is narrow but at the time of copulation it is filled with sperm to be transferred to the female gonoduct. The ejaculatory duct lies ventral to the intestine (Prerectum) and narrows gradually as it proceeds posteriorly to join the rectum to form the cloaca.

CLOACA

The cloaca is a narrow tubular structure serving as the terminal duct for the digestive as well as reproductive organs. The dorsal wall of the cloaca forms pouches to accommodate the copulatory apparatus. The cloaca is lined with cuticle.

COPULATORY APPARATUS

The capulatory apparatus of male dorylaims comprises a pair of spicules, lateral guiding piece, gubernaculum, copulatory muscles and capulatory or genital papillae (Supplements).

SPICULES

The spicules are loaded in spicular pouches that are actually invaginations of the dorsal wall of the cloaca. A group of cells, spicula primordia, located on the dorsal wall of the cloaca, form the spicular pouch and the spicules. The pouch is lined with cuticle that is in continuity with the cuticle of the cloaca.

The spicules have the same chemical composition as the cuticle. They are supplied with nerves and are supported by well developed musculature that aids in their movement during copulation. The spicules in dorylaims are always paired, well-built and heavily cuticularised. In a resting position the tips of the spicule protrude from their pouches through the cloacal-spicule orifice and lie very near the anal (cloacal) opening.

GUIDING PIECES

On the lateral sides of the spicule longitudinal or lateral guiding pieces are usually present. These are small, lineate, cuticularised pieces situated near the spicular tip. The presence or absence and size and shape of these pieces are important taxonomic characters.

GUBERNACULUM

The gubernaculum is only rarely present in Dorylaims. It is a thickening on the dorsal wall of the cloacal pouch and serves to guide the specules during their extrusion at the time of copulation. The gubernaculum in dorylaims is a simple plate-like structure called the corpus. The presence of a gubernaculum, its size and to some extent, its shape are useful taxonomic features.
COPULATORY PAPILLAE

The copulatory or genital papillae are called supplements. These are a series of well-developed papillae situated in the adanal or pre-cloacal region. The papillae are arranged in two groups such as an adanal pair and a series of ventromedian or ventral supplements. Usually there is a gap between the adanal pair and the ventromedians. The number of ventromedian supplements varies greatly in dorylaims from one or two to over fifty.

COPULATORY MUSCLES

A number of muscle bands run obliquely from the ventral to the laterodorsal sides. These bands are present on both sides and cover the entire area from the level of the adanal supplements to a short distance anterior to the anteriormost ventromedian supplement. The number of these muscle bands varies slightly within as well as between species and may be of some taxonomic significance.

TAIL

The tail is a unique feature of nematodes as it is not found in any other group of invertebrate animals. Although the tail is more useful in aquatic nematodes as an aid in swimming, it is well developed in dorylaims which are predominantly soil inhabitants. The dorylaim nematode exhibits a variety of tails that differ not only in size but also in shape—range from long, filiform to short. In some species, the female has a long, filiform tail while the male tail may be short and bluntly rounded. The tail serves as one of the most important diagnostic characters in the dorylaims. A number of caudal pores are present on the tail, their number and position are also useful in taxonomic studies.

MATERIAL AND METHODS

For the study of Dorylaimid fauna of Andhra Pradesh, seven faunistic field survey work were conducted during the period 1998–2003, covering about 21 districts of Andhra Pradesh. Dorylaimid nematodes associated with agricultural crops and orchards have been collected from different districts of Andhra Pradesh. The methodology comprises with:-

(i) Collection of soil samples from the host plants.
(ii) Extraction of nematodes from the soil sample.
(iii) Fixation and preservation of the nematodes.
(iv) Dehydration of the nematodes.
(v) Preparation of permanent slides of the dehydrated nematodes.
(vi) Measurements.
COLLECTION OF SOIL SAMPLES

From the rhizosphere of agricultural plants and orchards in the moist soil 5 x 5 cm area was taken up to the depth of 15 cm with the help of shovel to make one sub-sample. Five subsamples were collected from one field. These five sub-samples were mixed thoroughly to form a bulk of soil sample. From that soil sample 500 gm soil was collected from one sample.

In the dry or semidry field the sampling depths were increased up to 20 cm, because most of the nematodes migrate down to lower depths to avoid high temperature and unfavourable condition during the hot days. The soil was then collected in a polythene bag. The opening end of the polythene bag was closed properly with a rubber band inserting relevant data like host, locality, date, altitude etc. These soil samples were brought to the laboratory and stored in fridge to avoid evaporation.

EXTRACTION OF NEMATODES FROM THE SOIL SAMPLE

The method for the extraction of nematodes is based on modified Bearmann funnel technique (Christie & Perry, 1951). To extract the nematodes from the soil samples, approximately 500 gm soil is placed in a bucket (A) of 15 liters capacity of water. One third volume of the bucket is then filled with water. The soil and water are thoroughly mixed by hand to prepare a uniform or homogeneous suspension. Plant debris and large pebbles are removed from the suspension, the lumps are broken with finger tips. The bucket (A) is then left undisturbed for 20-30 seconds to allow the bigger soil particles to settle at the bottom while the nematodes are floating or moving on the upper surface of the suspension. This suspension is then filtered through a coarse sieve (2mm pore) to remove the plant debris and is collected in another bucket (B). Thus this process is repeated thrice to make the suspension dilute for passing the suspension through fine sieve of 350 mesh.

The suspension of Bucket (B) being free from stone, leaves and organic matter is also made into a homogenous solution by hand and allowed to settle for 20 – 30 seconds. Then the undisturbed homogeneous solution is passed through a fine sieve (350 mesh size). Most of the fine soil particles pass through the sieve while the larger soil particles and the nematodes are retained on this 350 mesh sieve. The entire residue from the sieve is collected in a 250 ml beaker.

The residue collected in the beaker is poured gently on moist double tissue paper placed on a small supporting coarse sieve of 2 mm pores. Air bubbles are avoided between the tissue papers to check the penetration of nematodes through tissue paper. The supporting coarse sieve with residue (aliquot) on the tissue paper is put on a petridish filled with water touching the bottom of the coarse sieve. After 24 hours all the nematodes penetrate and pass into the fresh water kept in the petridish through the tissue paper.

The slow moving nematodes penetrate very slow through the tissue paper. Hence, more than 24 hours are allowed to extract the slow moving nematodes. The residue on the tissue
paper is examined under a stereoscopic binocular for sluggish nematodes and are collected from the soil samples.

**FIXATION AND PRESERVATION OF THE NEMATODES**

The fresh water containing the nematodes was kept in a big test tube and allowed to settle down at the bottom for two hours. A portion of water from the upper level of the test tube was removed slowly by a glass dropper of suitable length so that the nematodes which settle at the test tube bottom may remain undisturbed. The nematodes were then fixed in F.A. solution (Baqri, 1990) for studying different diagnostic characters of the nematodes. The fixative was prepared as follows:

1. Formalin (40% formaldehyde) – 10 ml.
2. Glacial acetic acid – 4 ml.

For killing the nematodes, the fixative (F.A) was taken in a separate test tube of at least double volume of the nematode suspension kept in another test tube. Then the fixative was heated and the hot fixative was quickly poured into the nematode suspension tube. Thus the nematodes are fixed in their characteristic posture and safely preserved in this solution for a long period. The fixed material was transferred to a specimen tube.

**DEHYDRATION OF NEMATODES**

The nematodes are transferred from the preservative to a glycerine alcohol solution in a glass cavity block. The glycerine alcohol solution was prepared as follows:

1. 30% alcohol – 95 ml.
2. Glycerine – 5 ml.

Small amount of Locto-phenol is added in the glycerine-alcohol solution to avoid the growth of fungi. From the preserved nematodes, mature males and females were picked up under a stereoscopic binocular microscope by a fine needle made by a hair of horse neck to prevent the damage of the nematodes and transferred to the solution of glycerine – alcohol in a glass cavity block. This cavity block is placed in a dessicator at room temperature for dehydration of the nematodes. In dry season 20 days are needed and 30 days are need in monsoon period for dehydration.

**PERPARATION OF PERMANENT SLIDES**

The dehydrated nematodes are finally mounted in pure anhydrous glycerine. A small drop of anhydrous glycerine is kept on the glass slide. The dehydrated nematodes of almost same thickness and size are selected under stereoscopic binocular microscope and are transferred to the glycerine drop kept on the glass slide with the help of a hair needle. Then the
nematodes are arranged in the centre of the drop and kept according to the suitable size and
tickness of glass wool to avoid any pressure on the nematodes. After arranging the nematodes
and glass wool, a clean round glass cover slip, gently warmed over a small flame, is placed
over the glycerine drop. Finally, “Glycecl” or common nail polish is applied on the outer
gumes of the round cover slip with the help of a brush to make permanent slide for the
taxonomic studies.

MEASUREMENTS OF THE NEMATODES

De Man’s formula is followed for identification and measurements of nematodes. All the
measurements are in mm unless otherwise mentioned.

\[
\begin{align*}
L &= \text{Total body length (mm)} \\
a &= \text{Total length ÷ maximum body Width.} \\
b &= \text{Total length ÷ oesophagus length.} \\
c &= \text{Total length ÷ tail length.} \\
V &= \frac{\text{Distance of the vulva from anterior end} \times 100}{\text{Total body length}} \\
t &= \frac{\text{Distance from cloacal apertures to anterior testis} \times 100}{\text{Total body length}} \\
G_1 &= \frac{\text{Length of anterior gonad} \times 100}{\text{Total body length}} \\
G_2 &= \frac{\text{Length of posterior gonad} \times 100}{\text{Total body length}}
\end{align*}
\]

SYSTEMATIC LIST

Suborder DORYLAIMINA Pearse, 1936
Superfamily DORYLAIMOIDEA De Man, 1876
Family DORYLAIMIDAE DE MAN, 1876
Subfamily DORYLAIMINAE De Man, 1876
Genus 1. Dorylaimus Dujardin, 1845
1. D. innovatus Jana & Baqri, 1982
   Subfamily Laimydorinae. Andrassy, 1969
   Genus 2. Laimydorus Siddiqui, 1969
2. L. siddiquii Baqri & Jana, 1982
3. *L. baldus* Baqri & Jana, 1982
4. *L. minimus* Baqri, 1992

Genus 3 *Calodorylaimus* Andrassy, 1969

5. *C. indicus* Ahmad & Jairajpuri, 1982

Subfamily THORNENEMATINAE Siddiqi, 1969

Genus 4 *Thorllenelna* Andrassy, 1959

8. *T. nodicaudatum* Dey and Baqri, 1986

Genus 5 *Sicaguttur* Siddiqi, 1971

9. *S. sartum* Siddiqi, 1971

Genus 6 *Opisthodorylaimus* Ahmad & Jairajpuri, 1982


Family APORCELAIMIDAE HEYNS, 1965

Subfamily APORCELAIMINAE Heyns, 1965

Genus 7 *Aporcelainlelius* Heyns, 1965

11. *A. heynsi* Baqri and Jairajpuri, 1968
12. *A. indicus* Baqri and Jairajpuri, 1968

Family QUDSIANEMATIDAE JAIRAJPURI, 1965

Subfamily Discolaiminae Siddiqi, 1969

Genus 8 *Discolaimium* Thorne, 1939


Family NORDIIDAE JAIRAJPURI and A. H. SIDDIQI, 1964

Subfamily Cephalodorylaiminae Jairajpuri, 1967

Genus 9 *Acephalodorylaimus* Ahmad & Jairajpuri, 1983

17. *A. attenuatus* Ahmad & Jairajpuri, 1983

Family ACTINOLAIMIDAE THORNE, 1939

Subfamily NEOACTINOLAIMINAE Thorne, 1967

Genus 10 *Neoactinolaimus* Thorne, 1967

Superfamily LONGIDOROIDEA Thorne, 1935
Family XIPHINEMATIDAE DALMASSO, 1969
Subfamily XIPHINEMATINAE Dalmasso, 1969

Genus 11. *Xiphinema* Cobb, 1913

19. *X. hydrabadiensis* Quraishi & Das, 1984
20. *X. Kosaigudensis* Quraishi & Das, 1984

Superfamily BELONDIROIDEA Thorne, 1939
Family BELONDIRIDAE Thorne, 1939
Subfamily BELONDIRINAE Thorne, 1939

Genus 12. *Axonchium* Cobb, 1920


Subfamily DORYLAIMELLINAE Jairajpuri, 1964

Genus 13. *Dorylaimellus* Cobb, 1913

22. *D. indicus* Siddiqi, 1964
23. *D. parvulus* Thorne, 1939

Superfamily TYLENCHOLAIMOIDEA Filipjev, 1934
Family TYLENCHOLAIMIDAE Filipjev, 1934
Subfamily TYLENCHOLAIMINAE Filipjev, 1934

Genus 14. *Tylencholaimus* De Mann, 1876

25. *T. obscurus* Jairajpuri, 1965

Family LEPTONCHIDAE Thorne, 1935
subfamily LEPTONCHINAE Thorne, 1935


Family MYDONOMAINAE Thorne, 1964
Subfamily MYDONOMAINAE Thorne, 1964

Genus 16. *Dorylaimoides* Thorne and Swanger, 1936

27. *D. filicaudatus* Jana & Baqri, 1981
28. *D. pakistanensis* Siddiqi, 1964
29. *D. leptura* Siddiqi, 1965
Suborder NYGOLAIMITINA Ahmad & Jairajpuri, 1979
Superfamily NYGOLAIMITIDEA Thorne, 1935
Family NYGOLAIMITIDAE Thorne, 1935
Subfamily NYGOLAIMITINAE Thorne, 1935
Genus 17. Laevides Heyns, 1968

30. L. timmi (Heyns, 1968) Ahmad & Jairajpuri, 1982

SYSTEMATIC ACCOUNT

Phylum NEMATODA Rudolphi (Lankester, 1977)
Class ADENOPHORA
Order DORYLAIMIDA Pearse, 1942

Key to Suborders of order Dorylaimida

1. Feeding apparatus provided with odontostyle .................................................. DORYLAIMINA
   – Feeding apparatus provided with mural tooth .................................................... 2
2. Mural tooth located on sub-ventral wall of pharyngeal cavity; basal expanded part of oesophagus fairly long and without triquetrous chamber ...................... NYGOLAIMITINA

Suborder DORYLAIMINA Pearse, 1936

Key to Superfamilies of DORYLAIMINA

1. Cheilostome strongly sclerotised, provided with plate or basket – like structures, frequently accompanied by large onchia with or without denticles .......... ACTINOLAIMITIDEA
   – Cheilostome usually thin walled, without onchia or denticles .............................................. 2
2. Odontostyle long and attenuated; oesophagus with only three glands ............................................ LONGIDOROIDEA
   – Odontostyle comparatively much smaller; oesophagus with five glands ............................ 3
3. Expanded part of oesophagus enclosed in spiral muscular sheath ................................................. BELONDIROIDEA
   – Expanded part of oesophagus not enclosed in spiral muscular sheath .................................. 4
4. Sub-cuticle coarsely striated, provided with abundant radial striae; expanded part of oesophagus usually a small basal bulb ........................................ TYLENCHOLAIMITIDEA
   – Sub-cuticle not striated, radial striae few, if present; expanded part of oesophagus usually about one-half total oesophagus length ........................................ DORYLAIMIDEA
Superfamily DORYLAIMOIDEA De Mann, 1876

Key to families of DORYLAIMOIDEA

1. Odontostyle with wide aperture occupying usually more than one-half its length; guiding ring not sclerotised, plicated .......................................................... APORCELAIMIDAE
   - Odontostyle with smaller aperture, usually one-third or less 1/3rd 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 ........... QUDSINEMATIDAE

Family DORYLAIMIDAE De Man, 1876

Key to Subfamilies of DORYLAIMIDAE

1. Cuticle with longitudinal ridges ...................................................................................... 2
   - Cuticle without longitudinal ridges ............................................................................. 3

2. 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; S₂ N located much anterior to oesophageal base ....................................................... THORNENEMATINAE
   - Oesophageal base ........................................................................................................ THORNENEMATINAE
   - Vestibule not provided with sclerotised plates; S₂ N towards oesophageal base ........ LAIMYDORINAE

Subfamily DORYLAIMINAE De Man, 1876

Genus Dorylaimus Dujardin, 1845

1. Dorylaimus innovatus Jana & Baqri, 1982


Habitat : Soil around the roots of paddy.

Locality : Nellore, Andhra Pradesh.
Diagnosis: Male: Body ventrally curved, tapering at both ends. Cuticle finely striated transversely. Lips amalgamated, marked with a slight depression. Amphids stirrup-shaped. Odontostyle 48–50 \( \mu m \) long. Guiding ring at 24–28 \( \mu m \) from anterior end. Cardia elongated, conoid, measuring 32–36 \( \mu m \) long. Oesophago intestinal disc present. Spicules 108–109 \( \mu m \) long. Lateral guiding pieces rod-shaped, 20.6–22.5 \( \mu m \) long. 43 contiguous ventromedian supplements present. Copulatory muscles in large number, extending upto supplement region. Pre-rectum 514–517 \( \mu m \) long. Tail short, bluntly rounded, measuring 33–35 \( \mu m \) long.

Female: Not found.

Measurements: Male: \( L = 4.27 \text{ mm–}4.30 \text{ mm} \)
- \( a = 41.63–41.86 \)
- \( b = 4.67–4.73 \)
- \( c = 122–126 \)

Distribution: India: Andhra Pradesh, West Bengal.

Subfamily LAIMYDORINAE Andrassy, 1969

Key to the genera of LAIMYDORINAE

1. Guiding ring sclerotised, ‘double’; prerectum in male beginning well in front of supplements ........................................................................................................................... Laimydorus
   - Guiding ring not sclerotised, single or weakly ‘double’; prerectum in males short, usually beginning within range of supplements ................................................................................................. 2

2. Male tail with rounded terminus ventromedian supplements in two groups ........................

Genus Laimydorus Siddiqi, 1969

Key to the species of Laimydorus

1. More than 2.5 mm long nematodes; Tail length more than 340 \( \mu m \).......L. siddiquii
   - Less than 2.5 mm long nematodes; Tail length less than 250 \( \mu m \) ...................... 2

2. Body length less than 2.5 mm but not less than 2.00 mm; tail length more than 200 \( \mu m \) but less than 350 \( \mu m \). ................................................................. L. baldus

3. Body length less than 1.5 mm; Tail length less than 180 \( \mu m \) ............... L. minimus

2. Laimydorus siddiquii Baqri and Jana, 1982.


Habitat: Soil around the roots of paddy, *Oryza sativa*.

Locality: Nalgonda, Andhra Pradesh.

Diagnosis: Female: Body ventrally curved upon fixation, tapering in both ends. Cuticle transversely striated, about 2.6 \( \mu \text{m} \) thick at anterior end and 3.32 \( \mu \text{m} \) thick at tail. Lip region marked from body by a depression. Amphids stirrup-shaped. Odontostyle 27.4–29.6 \( \mu \text{m} \) long; its aperture varies from 11.6–12.5 \( \mu \text{m} \). Odontophore 31.5–33.2 \( \mu \text{m} \) long; Nerve ring at 155–158 \( \mu \text{m} \) from anterior end. Cardia tongue-shaped, measuring 23.1–28.7 \( \mu \text{m} \) long. Vulva at 1200–1240 \( \mu \text{m} \) from anterior end. Vagina 23.2–25.7 \( \mu \text{m} \) long. Female reproductive system amphidelphic, ovaries reflexed. Anterior genital branch 402–420 \( \mu \text{m} \) long and posterior branch 463–490 \( \mu \text{m} \) long. Anal body width 26.56 \( \mu \text{m} \) long. Prerectum 215–229 \( \mu \text{m} \) and rectum 34.8–37.4 \( \mu \text{m} \) long. Tail filiform measuring 340–360 \( \mu \text{m} \) long.

Male: Not found.

Measurement: Female: 
- \( L = 2.66 \text{ mm–}2.71 \text{ mm} \),
- \( a = 44.33–45.93 \), \( b = 5.32–5.42 \)
- \( c = 7.52–7.82 \), \( V = 45.11–45.75 \)
- \( G_1 = 15.11–15.78 \), \( G_1 = 17.40–18.08 \).

Distribution: India: Andhra Pradesh, West Bengal.

3. *Laimydorus baldus* Baqri and Jana 1982


Habitat: Soil around the roots of tomato plant.

Locality: Vishakhapatnam, Andhra Pradesh.

Diagnosis: Female – Large sized nematodes, body more or less straight upon fixation, tapering towards both ends. Cuticle finely striated transversely; 2–3 \( \mu \text{m} \) thick. Lip region marked by a depression, amphids stirrup-shaped, 5-6 \( \mu \text{m} \) apart from anterior end. Odontostyle 23–24 \( \mu \text{m} \) long, their aperture 9–10 \( \mu \text{m} \) long and Odontophore 29–30 \( \mu \text{m} \) long. Guiding ring at 13–14 \( \mu \text{m} \) from anterior end. Cardia elongated, rounded measuring about 18–19 \( \mu \text{m} \) long. Oesophago – intestinal disc absent. Length of oesophagus 500–510 \( \mu \text{m} \) long, maximum body width 60\( \mu \text{m} \) long. Vulva a transverse slit, situated at 890–900 \( \mu \text{m} \) long from anterior end, vagina 24–25 \( \mu \text{m} \) long. Female reproductive system amphidelphic, anterior and posterior gonads 420–425 \( \mu \text{m} \) and 440–450 \( \mu \text{m} \) long respectively. Ovary reflexed. Pre-rectum 100–105 \( \mu \text{m} \) long, Rectum 33–35 \( \mu \text{m} \) long. Tail elongated, filiform measuring about 200–205 \( \mu \text{m} \) long.

Male: Not found.
Measurements: Female: $L = 2.00-2.10$ mm  
$\text{a} = 33-33.35; \text{b} = 4-4.11$  
$c = 10-10.24; V = 42.85-44.5$  

Distribution: India, Andhra Pradesh.


Material: 2♀♂, 16.2.99 collected by S. R. Dey Sarkar & party.

Habitat: Soil around the roots of green chilli.

Locality: Dakkili, Nellore Dist., Andhra Pradesh.

Diagnosis: Female—Body ventrally curved upon fixation, tapering slightly towards both extremities. Cuticle finely striated, 3–8 $\mu$m thick (thickest near the tail). Lip region marked off by a slight depression, about 1/3rd of body-width at base of oesophagus. Amphids stirrup-shaped; their apertures 6–7 $\mu$m from anterior end, 8–10 $\mu$m wide. Odontostyle 34–39 $\mu$m long. Guiding ring 20.0–20.5 $\mu$m from anterior end. Odontophore shorter than odontostyle, 25–30 $\mu$m, Rectum 31–42 $\mu$m long. Vulva is longitudinal. Vagina thick-walled. Female reproductive system amphidelphic. The uterus and oviduct separated by sphincter. Ovaries reflexed; oocytes arranged first in a single row and in multiple rows at growth region. Tail elongate, tapering gradually with sharp acute terminus, 143-160 $\mu$m long.

Male: Not found.

Measurements: Female: $L = 1.31-1.35$ mm  
$\text{a} = 33-36; \text{b} = 3.5-3.7$  
$c = 8.43-9.16; V = 50-53.$

Distribution: India: Andhra Pradesh, Sikkim.

Genus *Calodorylaimus* Andrassy, 1969

5. *Calodorylaimus indicus* Ahmad and Jairajpuri, 1982


Habitat: Soil around the roots of Sugarcane.

Locality: East Godavari, Andhra Pradesh.

Diagnosis: Male—Body slightly curved ventrally, cuticle finely striated. Lip region more

**Female**: Not found.

**Measurements**: Male: L = 2.58 mm–2.59 mm.

\[ a = 32.58–33.03; \quad b = 4.07–4.09, \]
\[ c = 110.01–110.08; \quad T = 54.26–54.63 \]

**Distribution**: India; Andhra Pradesh, West Bengal.

**Subfamily THORNENEMATINAES Siddiqi, 1969**

**Key to the genera of THORNENEMATINAES**

1. Female reproductive system amphidelphic .............................................................. *Sicaguttur*
   – Female reproductive system monoopisthodelphic .................................................. 2
2. Odontostyle broad with wide lumen and aperture; labial sclerotisation absent .......... .......................................................... *Opisthodorylaimus*
   – Odontostyle narrow, labial sclerotisation present ........................................... *Thornenema*

**Genus Thornenema Andrassy, 1959**

1. Female reproductive system amphidelphic .................................................. *T. nodicaudatum*
   – Female reproductive system monoopisthodelphic .............................................. 2
2. Body length 1.5 mm or more; Tail filiform 204–251 µm. ..................... *T. mauritianum*
   – Body length less than 1.2 mm; Tail tip-rounded ........................................... *T. baldum*


**Material**: 2 ♀ ♂; 3 ♂ ♂.

**Habitat**: Soil around the roots of paddy.

**Locality**: Eluru, West Godavari Dist., Andhra Pradesh.
Diagnosis: Female—Body slightly curved ventrally. Cuticle finely striated transversely. Lateral chords 1/5.0–1/4. 2 of the body-width near middle. Lip region marked with a slight depression, moderately sclerotized, amalgamated, rounded. Amphids stirrup shaped, 4–5 \( \mu m \) wide and 5–6 \( \mu m \) from anterior extremity. Odontostyle 13–15 \( \mu m \) long. Odontophore 16–20 \( \mu m \) long, guiding ring 6–7 \( \mu m \) from anterior end. Vulva transverse, vagina 15–19 \( \mu m \) long, extending less than half of the corresponding body-width. Female reproductive system mono-opisthodelphic. Tail elongate-filiform with rounded terminus, 204–251 \( \mu m \) long with one to two caudal pores on either side.

Male: is similar to female in general shape and morphology except that the male genital system is more curved in the posterior region. spicules 40–45 \( \mu m \) long. Lateral guiding pieces are rod shaped. Ventromedian supplements present. Tail convex-conoid with bluntly rounded terminus, 25–30 \( \mu m \) long, with one or two caudal pores on each side.

Measurements: Female: \( L = 1.50–1.65 \) mm
- \( a = 43–47, b = 5.7–6.3, \)
- \( c = 6.5–6.8, V = 33–34. \)

Male: \( L = 1.16–1.34 \) mm
- \( a = 30–32, b = 4.9–5.6, \)
- \( c = 45–59, T = 54–64. \)

Distribution: Andhra Pradesh, West Bengal.


Habitat: Soil around the roots of millet.

Locality: Bapatla, Guntur Dist., Andhra Pradesh.

Diagnosis: Female: Body cylindroid, tapering gradually anterior to slender part of oesophagus. Cuticle smooth, thickness varies between 1–6 \( \mu m \) at various places in the body. Lip region narrow, truncated, amalgamated and strongly sclerotized. Lip offset from the body by a depression. Labial papillae visible. Amphids cup-shaped. Spear cylindrical; 11.5–13 \( \mu m \) long. Guiding ring single. Nerve ring 80–90 \( \mu m \) from anterior end. Cardia rounded and conoid. Vulva a transverse slit. Gonad mono-opisthodelphic. Ovary reflexed. Tail at first slightly convex-conoid then filiform to the terminus. Tail tip acute or finely or smoothly rounded.

Male: Not found.
**Measurements**: Female: \[ L = 1.01 \text{ mm} \]
\[ a = 30, b = 5.1 \]
\[ c = 9, V = 30 \]

**Distribution**: India : Andhra Pradesh.

8. *Thornenema nodicadatum* Dey and Baqri, 1986

1986. *Thornenema nodicadatum* Dey and Baqri, *Indian J. Helminth.* (n-s); 3(2) : 44.


**Habitat**: Soil around the roots of Sugarcane.

**Locality**: Kalwakurthy, Mehbubnagar Dist., Andhra Pradesh.

**Diagnosis**: Female: Body slightly ventrally curved when fixed, tapering gradually towards both ends. Transverse striations present in cuticle which is 2–3 \( \mu \text{m} \) thick. Lip region slightly narrower than adjoining body. Amphids stirrup shaped. Odontostyle 12–13 \( \mu \text{m} \) long and Odontophore 14–15 \( \mu \text{m} \) long. Guiding ring 5–8 \( \mu \text{m} \) apart from anterior end. Nerve ring at 84–86 \( \mu \text{m} \) from anterior end. Cardia tongue shaped measuring 13–15 \( \mu \text{m} \) long and 4–5 \( \mu \text{m} \) wide. Oesophago-intestinal disc present. Vulva a transverse slit situated at 460–470 \( \mu \text{m} \) from anterior end, length of vagina 13–16 \( \mu \text{m} \) long. Female reproductive system amphidelphic. Combined length of oviduct and uterus for both anterior and posterior gonads are 200–205 \( \mu \text{m} \) long and 220–227 \( \mu \text{m} \) long respectively. Ovaries with single flexure. Rectum 15–20 \( \mu \text{m} \) and Pre-rectum 45–50 \( \mu \text{m} \) long. Tail elongated, tapering to a narrow rounded tip, measuring about 38–40 \( \mu \text{m} \) long.

**Male**: Similar to female in general shape and morphology but it differs in tail and reproductive system.

**Measurements**: Female: \[ L = 0.85–0.87 \text{ mm} \]
\[ a = 25–25.75, b = 4.26–4.47 \]
\[ c = 21.87–22.36, V = 54.28–54.41 \]
\[ G_1 = 23.65–24.11, G_2 = 27.05–28.57 \]

**Male**: \[ L = 0.71–0.85 \text{ mm} \]
\[ a = 23.73–26.56, b = 5.27–6.07 \]
\[ c = 39.55–42.5, T = 45.88–53.37 \]

**Distribution**: India : Andhra Pradesh, West Bengal.

Genus *Sicaguttur* Siddiqi, 1971


Habitat: Soil around the roots of lemon.

Locality: Kurnool, Andhra Pradesh.

Diagnosis: Female – Body slightly curved ventrally upon fixation, tapering at both ends. Cuticle striated transversely. 1.7–2.5 μm thick at anterior end and 2.6–3.4 μm thick at tail region. Amphids stirrup-shaped. Odontostyle about 16.4–17.4 μm long, its aperture 5.8 μm long. Odontophore varies from 24–25 μm long. Guiding ring at 9 μm from anterior end. Cardia tongue-shaped. Oesophagus ranges from 285–295 μm from its length. Vulva or transverse slit, about 647–654 μm long from anterior end. Vagina 16.5–18.0 μm long. Maximum body width 52.2–53.5 μm long. Anal body width 28.2–29.1. Female reproductive system amphidelphic, anterior gonad ranges from 110–112 μm and posterior gonad 140–144 μm long. Rectum ranges from 31.5 to 32.4 μm long. Pre-rectum length varies from 57.1–58.7 μm. Tail elongated, filiform, measuring 140–156 μm long.

Male: Not found.

Measurements: Female: L = 1.74 mm–1.79 mm.

\begin{align*}
a &= 33.33–33.45, \quad b = 6.06–6.10 \\
c &= 11.47–12.42, \quad V = 36.53–37.18 \\
G_1 &= 6.25–6.32, \quad G_2 = 8.04
\end{align*}

Distribution: India, Andhra Pradesh.

Genus *Opisthodorylaimus* Ahmad & Jairajpuri 1982


Habitat: Soil around the roots of lemon

Locality: Kurnool, Andhra Pradesh.

Diagnosis: Female: Body slightly curved ventrally. Cuticle finely striated transversely. Lateral chords present. Lip region slightly marked by depression, Sclerotisation absent, amalgamated. Odontostyle broad, lumen wide, aperture also wide, 10–12 μm long. Guiding ring 6–7 μm from anterior end. Odontophore 14–17 μm long. Basal expanded part of oesophagus occupies almost 50% of the total length of oesophagus. Vulva is transverse. Vagina is 14–16 μm long. Female reproductive system is mono-opisthodelphic. Pre rectum is 2.2–3 times the anal body width. Tail is elongated, conoid with rounded terminus. There are two caudal pores on each side. Tail is 55–75 μm long.
Male: Not found.

Measurements: Female: \( L = 1.03 - 1.19 \text{ mm} \)
\[ a = 24 - 33, \ b = 3.9 - 4.4, \]
\[ c = 11.7 - 16.9, \ V = 45 - 49. \]

Distribution: Andhra Pradesh, West Bengal.

Family APOCCEAIMIDAE Heyns, 1965
Subfamily APOCEAIMINAE Heyns, 1965
Genus Aporcelaimellus Heyns, 1965

Key to the species of Aporcelaimellus

1. Body length less than 1.3 mm; \( G_2 = 7.87-8.03 \) .................................................. \( A. \) heynsi
   - Body length more than 1.3 mm; \( G_2 \) more than 10 .................................................. 2
2. Body length more than 2.3 mm; \( G_2 = 10.19 \) .................................................. \( A. \) obscurus
   - Body length less than 2 mm .......................................................................................... 3
3. Body length 1.87 mm; \( G_2 = 13.97 \) ........................................................................ \( A. \) indicus
   - Body length 1.62 - 1.78 mm .................................................................................. \( A. \) tropicus


Habitat: Soil around the roots of cotton.

Locality: Cuddapah, Andhra Pradesh.

Diagnosis: Female: Body cylindrical, gradually tapering anterior to base of oesophagus and curved in posterior half of its length upon fixation. Cuticle finely striated, its width varies from 1.7 to 2.5 \( \mu \text{m} \) (Thickest at tail). Lip region well offset from the body. Odontostyle 11.6-12.4 \( \mu \text{m} \) long, its aperture measure about 7.5-8.3 \( \mu \text{m} \). Guiding ring at 5.8-6.6 \( \mu \text{m} \) from anterior end. Oesophagus 284-288 \( \mu \text{m} \) long, Oesophago-intestinal disc present. Cardia hemispheroid. Vulva pore-like, situated at 620-660 \( \mu \text{m} \) from anterior end. Vagina 11.6-13.3 \( \mu \text{m} \) long. Female reproductive system amphidelphic; anterior and posterior genital branch 150-160 \( \mu \text{m} \) and 90-100 \( \mu \text{m} \) long respectively. Anal body width 22-28 \( \mu \text{m} \), pre rectum ranges from 56.1-64.9 \( \mu \text{m} \). Rectum 21.5-23.2 \( \mu \text{m} \) long. Tail measures 33.2-35.7 \( \mu \text{m} \), conoid, with rounded terminus.

Male: Not found.
Measurements: Female: \( L = 1.12 \text{ mm} - 1.27 \text{ mm} \)
\[
a = 26.98 - 27.82, \ b = 3.94 - 4.40
\]
\[
c = 33.73 - 35.58, \ V = 51.96 - 55.35
\]
\[
G_1 = 12.59 - 13.39, \ G_2 = 7.87 - 8.03
\]

Distribution: India: West Bengal, Uttar Pradesh, Andhra Pradesh.


Habitat: Soil around the roots of Sugarcane.

Locality: Adilabad, Andhra Pradesh.

Diagnosis: Female: Stout body, cylindroid, cuticle thick mainly towards body ends, smooth. Cuticle thickness varies between 4–7 \( \mu \text{m} \) at different places in the body, finely striated. Lip region set off by deep constriction, wider than the adjoining body. Amphids broad and shallow, their apertures 3 \( \mu \text{m} \) from anterior end. Spear 17 \( \mu \text{m} \) long, its aperture 9 \( \mu \text{m} \) long. Spear extension 35 \( \mu \text{m} \) long, simple. Guiding ring thick, 8 \( \mu \text{m} \) from anterior end. Nerve ring 145 \( \mu \text{m} \) from anterior end. Oesophagus length = 470 \( \mu \text{m} \). Oesophago-intestinal disc present. Cardia hemispheroid. Maximum body width = 47 \( \mu \text{m} \). Vulva pore like, situated at 1320 \( \mu \text{m} \) from anterior end, its vagina 25 \( \mu \text{m} \) long. Gonads amphidelpic. Combined length of oviduct and uterus 357 \( \mu \text{m} \) and 362 \( \mu \text{m} \) of the anterior and posterior gonads respectively, ovaries with single flexure. Rectum 41 \( \mu \text{m} \) long, prerectum measures 125 \( \mu \text{m} \). Tail conoid, ventrally accurate with rounded tip, 55 \( \mu \text{m} \) long. anal body width 29 \( \mu \text{m} \) long.

Male: Not found.

Measurements: \( L = 2.31 \text{ mm} \)
\[
a = 49.14, \ b = 4.9
\]
\[
c = 42, \ V = 57.14
\]
\[
G_1 = 15.45, \ G_2 = 15.67.
\]

Distribution: India, West Bengal, Andhra Pradesh.


Habitat: Soil around the roots of lemon.
Locality: Nizamabad, Andhra Pradesh.

Diagnosis: Female: Medium size with robust body, cuticle thick smooth, its thickness varies between 2–3 μm at different places of the body. Lip region set off by a deep constriction, wider than the adjoining body. Amphids broad and shallow, their apertures 4 μm apart from anterior end. Length of oesophagus 520 μm. Spear 21 μm long, its aperture 7 μm long. Spear extension 52 μm long simple. Guiding ring thick, 5 μm apart from anterior end. Nerve ring 155 μm from anterior end. Oesophago-intestinal disc present. Cardia tongue-shaped 21 μm long and 17 μm wide. Vulva pore-like, 1120 μm long from anterior end, vagina 31 μm long. Gonads amphidelphic, combined length of oviduct and uterus 244 μm and 243 μm of the anterior and posterior gonads respectively, ovaries with single flexure. Maximum body width 70 μm, Rectum 30 μm long and pre-rectum 81 μm long. Tail bluntly conoid 30 μm long.

Male: Not found.

Measurements: L = 2.30 mm
a = 32.85, b = 4.42
c = 76.66, V = 48.69
G_1 = 10.60, G_2 = 10.51

Distribution: Widely distributed in India.


Habitat: Soil around the roots of Cotton.

Locality: Bhakarapet, Chitoor Districts, Andhra Pradesh.


Male: Similar to female in general shape and morphology. Spicules 41.5–45.6 μm. Lateral guiding piece 8.3–9.9 μm long. Copulatory muscles 20–24 μm. Pre-rectum 99.6–161.8 μm long. Tail similar to that of female in shape, measuring 26.5 μm long.
Measurements: Female: \( L = 1.62 \text{ mm–}1.78 \text{ mm} \)
\[ a = 42.89–43.37, \quad b = 4.19–4.51 \]
\[ c = 69.70–71.78, \quad V = 54.93–55.05 \]
Male: \( L = 1.69 \text{ mm–}1.75 \text{ mm} \)
\[ a = 45.24–45.83, \quad b = 4.74–4.86 \]
\[ c = 63.62–65.88, \quad T = 52.68–54.43. \]

Distribution: India: West Bengal, Andhra Pradesh.

Family QUdSIANEMATIDAE Jairajpuri, 1965
Subfamily DISCOlAIMINAE Siddiqi, 1969
Genus Discolaimium Thorne, 1939

Key to the species of Discolaimium

1. Body length less than 1 mm. Pre-rectum and rectum 40–56 \( \mu \text{m} \) and 12–15 \( \mu \text{m} \) respectively

2. Body length more than 1.5 mm. Prerectum and rectum 15–20 \( \mu \text{m} \) and 20–24 \( \mu \text{m} \) respectively

15. Discolaimium mazhari Baqri and Jairajpuri, 1968


Habitat: Soil around the roots of cotton.

Locality: Eluru, West Godavari Dist., Andhra Pradesh.

Diagnosis: Female: Body cylindroid, tapering gradually anterior to slender part of oesophagus. Cuticle smooth, 2–4 \( \mu \text{m} \) thick. Lips distinctly modifying the head contour. Amphids cup-like, their apertures 4–6 \( \mu \text{m} \) from anterior end. Spear 10–12 \( \mu \text{m} \) long. Guiding ring 5–7 \( \mu \text{m} \) from anterior end. Nerve ring 80–85 \( \mu \text{m} \) from anterior end. Cardia spatulate, with two lobes at the sides. Vulva transverse. Vagina 10–14 \( \mu \text{m} \), extending to almost 1/4th of the body. Gonads amphidelphic. combined length of oviduct and uterus 65–75 \( \mu \text{m} \) of the anterior and posterior gonads respectively. Ovaries with single flexure. Pre-rectum 15–20 \( \mu \text{m} \) rectum 20–24 \( \mu \text{m} \). Tail hemispheriod and swollen. Two minute caudal pores present.

Male: Not found.
Measurements: Female : \( L = 1.87 \text{ mm} \)
\( a = 32.89, b = 4.05 \)
\( c = 62, V = 44 \)
\( G_1 = 13.70, G_2 = 13.97 \)

Distribution: India, Uttar Pradesh, Andhra Pradesh.


Habitat: Soil around the roots of cotton.

Locality: Deendarpalli, Chittoor Dist., Andhra Pradesh.

Diagnosis: Female: Body cylindroid, cuticle smooth about 1–2 \( \mu \text{m} \) thick. Head distinctly set off from the body marked by constriction. Lips conoid, modifying the head region. Amphids cup-like. Sensillar pouch 22-23 \( \mu \text{m} \) from amphidial slits. Spear 10–12 \( \mu \text{m} \) long. guiding ring 5–7 \( \mu \text{m} \) from anterior end. Basal expanded portion of oesophagus occupies 45-50% of total oesophageal length. Oesophageal glands present. Nerve ring 73–84 \( \mu \text{m} \) from anterior end. Cardia hemispheroid. Vulva or transverse slit. Vagina 7–10 \( \mu \text{m} \) in length. Gonads amphidelphic. Ovaries with single flaxure. Pre-rectum 40-56 \( \mu \text{m} \) long. Rectum 12–15 \( \mu \text{m} \) long. Tail tapers slightly to bluntly rounded terminus. Two minute caudal pores present.

Male: Not found.

Measurements: Female : \( L = 0.84 \text{ mm} \)
\( a = 38, b = 4.0, c = 44, V = 47 \)

Distribution: Uttar Pradesh, West Bengal, Andhra Pradesh.

Family NORDIIDAE Jairajpuri and A. H. Siddiqi, 1964
Subfamily CEPHALODORYLAIMINAE Jairajpuri, 1967
Genus *Acephalodorylaimus* Ahmad & Jairajpuri, 1983

17. *Acephalodorylaimus attenuatus* Ahmad & Jairajpuri, 1983


Habitat: Soil around the roots of Ladies Finger.

Locality: Gopalapuram, Cuddapah Dist. Andhra Pradesh.
Diagnosis: Female: Body ‘C’ shaped upon fixation and gradually tapers towards both extremities. Cuticle smooth, 1.5–3 μm thick at various places of the body (on tail region 3 μm thick). Lip region 6–9 μm wide and 4–5 μm high, marked with a slight constriction at the base of lip region. Amphids stirrup-shaped, 4–5 μm from anterior end, their apertures 3 μm long. Odontostyle 12–15 μm long aperture about 5 μm. Odontophore 15–16 μm long. Guiding ring single, 7 μm from anterior end. Cardia rounded. Nerve ring 75-80 μm from anterior end. Female reproductive system mono-prodelphic. Vulva a transverse slit, ovary reflexed. Tail elongated, conoid, ventrally arcuate, with finely rounded tip, 60-65 μm long.

Male: Not found.

Measurements: Female: L = 0.81 – 0.90 mm  
a = 32.5 – 34.17, b = 3.99 4.04  
c = 13.5-13.84, V = 53.01 – 56.04.

Distribution: Sikkim, Andhra Pradesh.

Superfamily ACTINOLAIMOIDEA Thorne, 1939
Family ACTINOLAIMIDAE Thorne, 1939
Subfamily NEOACTINOLAIMINAE Thorne, 1967
Genus Neoactinolaimus Thorne, 1967


Habitat: Soil around the roots of paddy.

Locality: Anantapur, Andhra Pradesh.

Diagnosis: Female: Medium sized nematodes. Body cylindroid except both ends, slightly curved ventrally, cuticle marked with minute transverse striations, 1–3 μm thick, thickest at tail region, 3 μm at tail region. Vestibule armed with four onchia, without denticles. Dorylaimoid type of odontostyle, 35 μm long, its apertures 5 μm long. Guiding ring double, 18 μm long from anterior end. Oesophagus 485–490 μm long, maximum body width 42 μm. Amphidelphic type of female reproductive system, vulva at 1125 μm long from anterior end, length of vagina 18 μm long. Female tail elongated, filiform, measuring about 185 μm long. Anal body width 24 μm long. Rectum 25 μm and pre-rectum 100 μm long.

Male: Not found.
Measurements: $L = 2.07$ mm
   $a = 49.28$ mm, $b = 4.26$
   $c = 11.18$, $V = 54.34$
   $G_1 = 17.83$, $G_2 = 18.07$

Distribution: Widely distributed in India.

SUPERFAMILY LONGIDOROIDEA Thorne, 1935
FAMILY XIPHINEMATIDAE Dalmasso, 1969
SUBFAMILY XIPHINEMATINAE Dalmasso, 1969

Genus Xiphinema Cobb, 1913

Key to the species of Xiphinema

1. Lip-region expanded, set off by a constriction at its base; fixed guiding ring 100 $\mu$m from anterior end; based oesophageal bulb about 89 $\mu$m long ................. X. hydrabadiensis
   - Lip-region semi set off; fixed guiding ring 75 $\mu$m from anterior end; basal oesophageal bulb 70 $\mu$m long ......................................................... X. kosaigudensis

19. Xiphinema hydrabadiensis Quraishi and Das, 1984


Material: 7 ♀ ♀ ,

Habitat: Soil around the roots of grape.

Locality: Hyderabad, Andhra Pradesh.

Diagnosis: Female: Body ventrally arcuate on relaxation and body tapering regularly at both ends. Cuticle thick, 4 $\mu$m, thickest in tail region. Lip region expanded, set off by a constriction at its base. Amphids stirrup-shaped. Aperture broad covering almost the entire lip width. Lateral body pores arranged serially in the neck region, the arrangement is irregular from the body region. Fixed guiding ring present 100 $\mu$m from anterior end. Odontophore with moderately developed flanges, measuring 9 $\mu$m; hemizonid absent. Basal oesophageal bulb about 89 $\mu$m long, set off from the anterior part of the oesophagus. Gonads didelphic, amphidelphic, almost equally developed. Tail dorsally convex-conoid, the terminal part of the tail is conoid, 3 pairs of caudal pores present.

Male: Not found.

Measurements: Female: $L = 1.7$–2.5 mm;
   $a = 41.5$–50; $b = 6.11$
   $c = 29.45$, $V = 33.5$–42

Distribution: Andhra Pradesh.

20. Xiphinema Kosaigudensis Quraishi and Das, 1984


Material: 5 ♀♀

Habitat: Soil around the roots of grape, Vitis vinifera.

Locality: Hyderabad, Andhra Pradesh.


Male: Not found.

Measurements: Female: L = 1.2 – 1.5 mm

\[
a = 41.52; \quad b = 6.12; \quad c = 36-40; \quad V = 39-48
\]


Distribution: Andhra Pradesh.

SUPERFAMILY BELONDIROIDEA Thorne, 1939

FAMILY BELONDIRIDAE Thorne, 1939

Key to Subfamilies of BELONDIRIDAE

1. Cuticularised species present around oral aperature; odontophore flanged..................
.................................................................................................................. DORYLAIMEILLINAE

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

2. Female tail short, digitate, conoid or rounded.............................. BELONDIRINAE

SUBFAMILY BELONDIRINAE Thorne, 1939

Genus Axonchium Cobb, 1920

21. Axonchium (Axonchium) phukani Rahaman, Jairajpuri and Ahmad, 1985


Habitat: Soil around the roots of Lemon.

Locality: Hasanabad, Karimnagar Dist., Andhra Pradesh, Collector.


Male: Not found.

Measurements: Female: \( L = 1.44–1.85 \)
\[ a = 39–46, \quad b = 2.7–3.0 \]
\[ c = 58–83, \quad V = 55–58.6 \]

Distribution: India, West Bengal, Andhra Pradesh.

Subfamily DORYLAIMELLINAE Jairajpuri, 1964
Genus Dorylaimellus Cobb, 1913

22. Dorylaimellus indicus Siddiqi, 1964


Habitat: Soil around the roots of Tomato.

Locality: Eluru, Andhra Pradesh.


Male: Not found.

Distribution: India: West Bengal, Andhra Pradesh.

Measurements: Female: \( L = 1.34–1.51 \) mm
\[ a = 42–48, \quad b = 7.1–8.13 \]
\[ c = 43.14–44.66, \quad V = 48–50. \]
23. *Dorylaimellus parvulus* Thorne, 1939


*Habitat*: Soil around the roots of Sugarcane.

*Locality*: Rajampet, Sangareddi Dist., Andhra Pradesh.


*Male*: Not found.

*Measurements*: Female: 
- \( L = 0.49 - 0.53 \text{mm} \)
- \( a = 25 - 34, b = 2.9 - 3.2 \)
- \( c = 31-32, V = 56 - 58 \).

*Distribution*: India: Andhra Pradesh, West Bengal.

Superfamily TYLENCHULAIMOIDEA Filipjev, 1934

**Key to families of TYLENCHULAIMOIDEA**

1. Oesophagus consisting of two sections, Odontostyle usually well developed; expanded part of oesophagus about one-half oesophageal length ........... **TYLENCHOLAIMIDAE**
   - Odontostyle usually slender; expanded part of oesophagus short, cylindroid or pyriform bulb.......................................................... 2

2. Odontostyle asymmetrical with distinct aperture; Oesophageal bulb cylindroid........
   .......................................................................................................................... **MYDONOMIDAE**
   - Odontostyle symmetrical, attenuated, often solid, needle-like; Oesophageal bulb usually pyriform.......................................................... **LEPTONCHIDAE**

Family TYLENCHOLAIMIDAE Filipjev, 1934

Subfamily TYLENCHOLAIMINAE Filipjev, 1934

Genus *Tylencholaimus* De Mann, 1876

**Key to the species of Tylencholaimus**

1. Body length less than 0.5 mm. Tail hemispherical .................. *T. pakistanensis*
   - Body length more than 0.7 mm. Tail with bluntly rounded terminus .......... *T. obscurus*


**Material:** 3 ♀ ♂, Coll. : S. R. Dey Sarkar & Party.

**Habitat:** Soil around the roots of paddy.

**Locality:** Nellore, Andhra Pradesh.

**Diagnosis:** Female: Body ventrally curved upon fixation, tapering slightly towards both ends. Cuticle distinctly striated, 2–3 μm in thickness. Lip region slightly offset from body. Amphids stirrup-shaped. Guiding ring 5–5.5 μm from anterior end. Odontophore with small basal knobs. Cardia rounded. Nerve ring present, 53–56 μm long from anterior end. Female reproductive system mono-opisthodelphic. Ovaries reflexed. Tail hemispherical 11–12 μm long with one caudal pore on each side.

**Measurements:** Female: L = 0.37–0.41 mm

\[
\begin{align*}
    a &= 24.66–25.62, \\
    b &= 3.77–4.14, \\
    c &= 33.63–34.16, \\
    V &= 45–47.
\end{align*}
\]

**Distribution:** India: Andhra Pradesh.


**Material:** 2 ♀ ♂, 13.12.98, Coll.: S. C. Ghosh & Party.

**Habitat:** Soil around the roots of groundnut.

**Locality:** Repalle, Guntur Dist., Andhra Pradesh.

**Diagnosis:** Female: Body ventrally curved in posterior half upon fixation, tapering towards both ends. Cuticle 2–3 μm thick. Cuticle smooth in the outer but inner layer transversely striated. Lip region offset by a constriction, its inner portion slightly projected. Amphids stirrup-shaped, their apertures 3.5 μm wide from anterior end. Odontostyle 6 μm. Guiding ring 4.5 μm from anterior end. Odontophore with basal knobs. The nerve ring about 71–85 μm from anterior end. Female reproductive system mono-prodelphic. Tail short with bluntly rounded terminus.

**Male:** Not found.

**Measurements:** L = 0.75–0.78 mm.

\[
\begin{align*}
    a &= 35–38, \\
    b &= 3.7–3.9, \\
    c &= 45.88–46.87, \\
    V &= 70–73.
\end{align*}
\]

**Distribution:** India: Andhra Pradesh, Sikkim.
Family **LEPTONCHIDAE** Thorne, 1935

**SUBFAMILY LEPTONCHINAE** Thorne, 1935

**Genus** *Proleptonchus* Lordello, 1955


**Habitat**: Soil around the roots of Orange.

**Locality**: DakkiJi, Nellore Dist., Andhra Pradesh.

**Diagnosis**: **Female**: Body slightly curved in the posterior half of its length on fixation. Cuticle 2–4 µm thick. Lip region slightly offset from body, lips amalgamated. Amphids 5 µm from anterior end and 7–8.5 µm wide. Odontostyle slender 8–9 µm long. Guiding ring 8–9 µm from anterior end. odontophore 11–12 µm long. Nerve ring 84–90 µm from anterior end. Vulva a transverse slit. Female reproductive system mono-prodelphic. Tail rounded, 12–15 µm long.

**Male**: Not found.

**Measurements**: $L = 1.25–1.39$ mm  
$a = 30.39$, $b = 6.2–7.4$  
$c = 92.66–104.16$, $V = 55–59$.

**Distribution**: India: Sikkim, Andhra Pradesh.

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Family **MYDONOMIDAE** Thorne, 1964

Subfamily **MYDONOMINAE** Thorne, 1964

**Genus** *Dorylaimoides* Thorne & Swanger, 1936

**Key to the species of** *Dorylaimoides*

1. Body length less than 1 mm. Tail elongated, conoid measuring about 50µm ..............  
   .......................................................................................................................... *D. pakistanensis*

   - Body length more than 1 mm; Tail filiform ................................................................. 2

2. Body length more than 1.7 mm. Tail extremely filiform (about 250–300 µm) with finely rounded terminus .......................................................... *D. leptura*

   - Body length more than 1 mm but less than 1.2 mm. Tail filiform (measuring about 225-230 µm) .......................................................... *D. filicaudatus*
27. *Dorylaimoides filicaudatus* Jana & Baqrı 1981


**Habitat**: Soil around the roots of paddy.

**Locality**: Mehbubnagar, Wanaparthy Dist. Andhra Pradesh.

**Diagnosis**: Female: Body ventrally curved upon fixation, tapering slightly toward both ends. Cuticle finely striated transversely, its thickness 2 μm at mid body and 3 μm at tail region. Lateral, ventral and dorsal body pores indistinct. Lip region continuous. Amphids stirrup-shaped. Odontostyle 7–8 μm long and its aperture about 2 μm long. Guiding ring 4–5 μm apart from the anterior end. Odontophore curved, 16–17 μm long. Anterior slender part of oesophagus non-muscular whereas basal expanded part of oesophagus muscular and separated from the former by a deep constriction. Oesophageal gland nuclei and their orifices are not distinct. Nerve ring 80–85 μm from anterior end. Oesophago-intestinal disc absent. Cardia rounded 7–8 μm long. Pre-rectum and rectum 140 μm and 22 μm long respectively. Vulva transverse, 470 μm long from anterior end; Vagina 13 μm long. Female reproductive system amphidelphic. Tail elongate-filiform 225–230 μm long with three caudal pores on each side.

**Male**: Not found.

**Measurements**: L = 1.10 mm

a = 40.74, b = 6.11

c = 4.88, V = 42.72

**Distribution**: India: Andhra Pradesh

28. *Dorylaimoides pakistanensis* Siddiqi, 1964


**Habitat**: Soil around the roots of paddy.

**Locality**: Bapatla, Guntur Dist., Andhra Pradesh.

**Diagnosis**: Female: Body slightly ventrally curved, 'C' shaped when fixed, tapering gradually towards both ends. Cuticle finely striated, 2–3 μm thick (thickest on tail region). Lip region rounded, slightly set off from the body by a constriction. Amphids stirrup-shaped. Odontostyle measures about 10 μm long, odontophore curve 18 μm long. Guiding ring simple, 6 μm apart from anterior end. Basal expanded part of oesophagus occupying 25% of the neck region. Nerve ring at 105 μm from anterior end. Cardia rounded. Vulva a transverse slit. Vagina 15 μm long. Female reproductive system amphidelphic, reflexed. Rectum a little
longer than anal body width, 22 µm long and pre-rectum 115 µm long. Tail elongated, conoid to rounded terminus, dorsally bent, 50 µm long.

Male: Not found.

Measurements: \( L = 0.90 \) mm
\[ a = 36, \quad b = 5.62 \]
\[ c = 18, \quad V = 40. \]

Distribution: Widely distributed in India. Also found in West Pakistan.

29. *Dorylaimoides leptura* Siddiqi, 1965


Material: 3 ♀♀, collected by S. R. Dey Sarkar & party.

Habitat: Soil associated with Paddy.

Locality: Adilabad, Andhra Pradesh.


Male: Not found.

Measurements: \( L = 1.77–1.81 \) mm
\[ a = 44–48, \quad b = 7.3–7.8 \]
\[ c = 9.83, \quad V = 37–38. \]

Distribution: Widely distributed in India.

Suborder NYGOLAIMINA Ahmad & Jairajpuri, 1979

Superfamily NYGOLAIMOIDEA Thorne, 1935

Family NYGOLAIMIDAE Thorne, 1935

Subfamily NYGOLAIMINAE Thorne, 1935

Genus *Laevides* Heyns, 1968


**Habitat**: Soil around the roots of Paddy.

**Locality**: Krishna Dist. Andhra Pradesh.

**Diagnosis**: Male: Large sized nematodes, Body ventrally curved, more curved at posterior end. Cuticle 2-4 μm thick, 3-4 μm on tail region with fine transverse striations. Lip region continuous with body contour, slightly wider than adjoining body. Amphidial apertures slit like. Tooth slender, 10-12 μm long. Nerve ring at 165-175 μm from anterior end. Cardia hemispherical. Cardiac glands are well-developed. Supplements consist of an adanal pair, 5–6 ventromedians which are irregularly spaced. Spicule massive, arcuate 62–65 μm long. Gubernaculum 10–12 μm long. pre-rectum about 130–140 μm long and rectum 40–45 μm long.

**Female**: Not found.

**Measurements**: Male: L = 3.15 – 3.75 mm
\[
a = 71.59 – 75, \quad b = 5.04 – 5.17, \\
c = 93.74 – 98.43, \quad T = 54.76 – 58.66
\]

**Distribution**: Widely distributed in India.

### The list of the species, **Distribution** and host plants

<table>
<thead>
<tr>
<th>Family</th>
<th>Index No.</th>
<th>Name of the Species</th>
<th>Host Plant</th>
<th>Distribution (District)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorylaimidae</td>
<td>1</td>
<td><em>Dorylaimus innovatus</em></td>
<td>Paddy <em>(oryza sativa)</em></td>
<td>Nellore</td>
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<td></td>
<td>2</td>
<td><em>Laimydorus siddiquii</em></td>
<td>Paddy <em>(oryza sativa)</em></td>
<td>Nalgonda</td>
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<td>3</td>
<td><em>Laimydorus baldus</em></td>
<td>Tomato Plant</td>
<td>Vishakapatnam</td>
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<td>4</td>
<td><em>Laimydorus minimus</em></td>
<td>Green Chilli</td>
<td>Nellore, Dakkili</td>
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<td>5</td>
<td><em>Calodorylaimus indicus</em></td>
<td>Sugarcane</td>
<td>East Godavari</td>
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<td>6</td>
<td><em>Thornenema mauritianum</em></td>
<td>Paddy</td>
<td>West Godavari Eluru</td>
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<td><em>Thornenema baldum</em></td>
<td>Millet</td>
<td>Guntur Bapatla</td>
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<td>8</td>
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<td>Sugarcane</td>
<td>Mehbubnagar Kalwakurthy</td>
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<td>9</td>
<td><em>Sicaguttur sartum</em></td>
<td>Lemon</td>
<td>Karnool</td>
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<td>10</td>
<td><em>Opisthodorylaimus cavalcantii</em></td>
<td>Lemon</td>
<td>Karnool</td>
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<tr>
<td>Family</td>
<td>Index No.</td>
<td>Name of the Species</td>
<td>Host Plant</td>
<td>Distribution (District)</td>
</tr>
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<td>Aporcelaimidae</td>
<td>11</td>
<td><em>Aporcelaimellus heynsi</em></td>
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<td>12</td>
<td><em>A. indicus</em></td>
<td>Sugarcane</td>
<td>Adilabad</td>
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<td>13</td>
<td><em>A. obscurus</em></td>
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<td><em>A. tropicus</em></td>
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<td>Chittoor Bhakarapet</td>
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<td>Qudsianematidae</td>
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<td><em>Discolaiminium mazhari</em></td>
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<td><em>D. upum</em></td>
<td>Cotton</td>
<td>Chittoor Deendarpalli</td>
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<td>Nordiidae</td>
<td>17</td>
<td><em>Acephalodorylaimus attenuatus</em></td>
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<td>Cuddapah Gopalapuram</td>
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<td><em>Neoactinolaimus agilis</em></td>
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<td><em>Xiphinema hydrabadiensis</em></td>
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<td>Grape</td>
<td>Hyderabad</td>
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<td>Belondiridae</td>
<td>21</td>
<td><em>Axonchium (Axonchium) Phukani</em></td>
<td>Lemon</td>
<td>Karimnagar Hasanabad</td>
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<td><em>D. parvulus</em></td>
<td>Sugarcane</td>
<td>Sangareddi Rajampet</td>
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<td>Tylencholaimidae</td>
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<td><em>Tylencholaimus pakistanensis</em></td>
<td>Paddy</td>
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<td><em>T. obscurus</em></td>
<td>Ground Nut</td>
<td>Guntur, Repalle</td>
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<td>Leptonchidae</td>
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<td><em>Proleptonchus clarus</em></td>
<td>Orange</td>
<td>Nellore, Dakkili</td>
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<tr>
<td>Mydonomidae</td>
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<td><em>Dorylaimoides filicaudatus</em></td>
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<td><em>D. pakistanensis</em></td>
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<td>Nygolaimidae</td>
<td>30</td>
<td><em>Laevides timmi</em></td>
<td>Paddy</td>
<td>Krishna Vijaywada</td>
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</tbody>
</table>

* Distribution of species are shown in the following map in accordance with the index number of the Species.
SUMMARY

The nematodes included in the present study were collected from the following districts of Andhra Pradesh, such as Nellore; Nalgonda, East Godavari, West Godavari, Guntur, Mehbubnagar, Karnool, Cuddapah, Adilabad, Nizamabad, Chittoor, Anantapur, Karimnagar, Medak, Krishna, etc. After investigation, it has been found that the order Dorylaimida is represented by nine families in the areas surveyed. Systematic studies of thirty species belonging to seventeen genera have been reported along with diagnostic characters of each species. General morphology and taxonomy, techniques of collection and preservation with key to the order, families, subfamilies, genera and species are dealt in this work. Species Distribution map of Andhra Pradesh has also been included.

ACKNOWLEDGEMENT

Authors are thankful to the Director, Zoological Survey of India, for providing all sorts of facilities during the course of our work. We are also thankful to Dr. A. K. Sanyal, Jt. Director, Z.S.I. for his constant encouragement during the investigations of the research work. We are grateful to Shri S. R. Dey Sarkar, Sri Subhojit Chakraborty, Shri Debabrata Sen and Shri V. V. Gantait for collecting study materials from the State of Andhra Pradesh and for their co-operation and constant help as and when required.

REFERENCES


Dey, S. and Baqri, Q. H. 1987. Five new species of Dorylaimoidea (Dorylaimida: nematoda) nematodes from West Bengal (India). XXI. *India J. Helminth.(n.s.)*, 3 (No.2) : 43–58.


The taxonomy of recent ostracods had its inception in 1772 with the publication by O.F. Muller entitled “Observations of some bivalve insects found in common water” Laéritiæ, who used both the carapace and the appendages, with emphasis on the latter, originally described the ostracoda in 1806. Sars (1866) divided the order into 4 suborders Myodocopa, Cladocopa, Platycopa and Podocopa- on the basis of the soft parts, especially on the structure of the second antenna.

The ostracoda are small crustaceans possessing a bivalved carapace of calcareous material living in marine, brackish and freshwater environments. Majority of them are microscopic (0.5–1.5 mm). Some freshwater and marine forms are macroscopic, free swimming (5–30 mm). The shell may be smooth or highly ornamented.

In the oceans' ostracods inhabit from the shoreline up to depths of 3000 meters or more. They extend their distribution far inland i.e. in estuaries, lagoons, backwaters and such other brackish water environments, which establish connection with sea either temporarily or permanently. Ostracod carapaces known from strata of Upper Cambrian age onwards. At present they are of very common occurrence in almost every aquatic environment. The author collected the material from the Gosthani estuary, Balacheruvu tidal stream and Vasishta Godavari estuary during 1976 to 1978, Dr. K.U. Varma and V.V. Shyam Sunder collected samples from Tekkali creek and Goguleru creek during the period from 1985 to 1989.

In this report the author presents a brief account of the study carried out in estuaries in Andhra Pradesh till the present date. The study was mainly review of the systematics of podocopan ostracods on marine and brackish water species in the coastal belt of Andhra Pradesh.

This review includes studies on ostracoda from Gosthani estuary, Balacheruvu tidal stream, Vasishta Godavari estuary, Pudimadaka stream, Tekkali creeks, Goguleru creek, and phytal fauna of coastal battery and Ramakrishna Mission beach of Visakhapatnam coast. (Fig. 1)
Fig. 1. Study Area
### SYSTEMATIC LIST

**Phylum** ARTHROPODA  
**Class** CRUSTACEA  
**Subclass** OSTRACODA  
**Order** PODOCOPIDA  
**Suborder** PLATYCPA  
**Family** CYTHERELLIDAE Sars, 1866

1. *Cytherella punctata* Brady, 1866  
2. *Cytherella pulchara* Brady, 1866  
3. *Cytherelloidea leroyi* Keij, 1964  
4. *Cytherelloidea subreticulata* Keij, 1964  
   - **Suborder** PODOCOPA  
   - **Family** BAIRDIDAE Sars, 1888

5. *Neonesidea villosa* (Brady, 1880)  
   - **Family** CYTHERIDAE Baird, 1850

7. *Hemicytheridea reticulata* (Brady, 1868)  
12. *N. jaini* Varma et al., 1993  
14. *Paijenborchella(Eopaijenborchella) keiji* Shyam Sunder et al., 1995  
15. *Neosinocythere mckenzi* (Annapurna and Rama Sarma, 1985)  
   - **Family** LEPTOCYThERIDAE Hanai 1957

16. *Callistocythere sp. aff. C. crispata* (Brady, 1868)  
17. *Tanella gracilis* Kingma 1948  
18. *T. estuarii* Annapurna and Rama Sarma, 1984  
19. *T. kingmai* Annapurna and Rama Sarma, 1984  
20. *T. vasishta* Annapurna and Rama Sarma, 1979  
Family LIMNOCYtheridae Klie, 1938
22. Limnocythere sanct-patricii Brady and Robertson, 1869
23. Pontocythere fabacea (Brady, 1868)

Family TRACHYLEBERIDIDAE Sylvester-Bradley, 1948
25. Carinocythere stimpsoni (Brady, 1868)
26. Neocytheromorpha goguleruensis Shyam Sunder et al., 1995
27. Basslerites liebauti Jain, 1978
28. Chrysocythere keiji Jain, 1978
29. Ambostracoln sp. cf. C. packardi (Brady, 1868)
30. Caudites rectangularis (Brady, 1869)

Family LOXOCONCHIDAE Sars, 1925
31. Loxoconcha sinensis Brady, 1867
32. L. sculpta Brady, 1869
33. L. liljeborgii Brady, 1868
34. L. guhai Shyam Sunder et al., 1995
35. L. tekkaliensis Varma et al., 1993
36. Loxoconchella honoluliensis Brady, 1868

Family CYTHERURIDAE G. W. Mueller, 1894
37. Paijenborchellina caudatum Annapurna and Rama Sarma, 1987
38. P. reticulatum Annapurna and Rama Sarma, 1987
39. Cytheropteron alatum Sars, 1866

Family ILYOCYPRIDIDAE Kaufmann, 1900
40. Ilyocypris gibba, (Ramdohr, 1808)

Family CYPRIDIDAE Baird, 1845
41. Phlyctenophora zealandica Brady, 1880
42. P. indica Annapurna and Rama Sarma, 1988

Family CYPRIDOPSIDAE Kaufmann, 1960
43. Cypridopsis obesa Brady and Robertson, 1889

Family NEOCYtherIDEIDAE Kaufmann, 1960
44. Copytus coramandalensis Shyam Sunder et al., 1995

Family PARADOXOSTOMATIDAE Brady and Norman, 1889
45. Paradoxostoma bhatiai Shyam Sunder et al., 1995
46. Sclerochilus contortus (Norman, 1862)
Key to the suborders

1. Inner lamella of the valves calcified only in the outermost, peripheral parts, or not Calcified at all ................................................................................................................ 3

2. Inner lamella of the valves with a more or less broad calcified zone and true marginal Pore canals ........................................................................................................................................ 4

3. True marginal pore canals missing; those occurring near the margin are false marginal Pore canals. Contact furrow of the larger valve along the complete margin continuously present .................................................................................................................. PLATYCOPA

4. The calcified zone mostly broad. Marginal pore canals frequent. Muscle scars arranged in different patterns and numbers .............................................................................................................. PODOCOPA

Key to families

1. The dorsal margins of the valves are slightly convex, and the ventral margins are Straight or slightly concave .................................................................................................................. 3, 4

2. Dorsal margin straight or weakly concave, in inner view always concave in mouth region. ........................................................................................................................................ 6

3. The muscle field is elliptical, consisting in living forms of two slightly backward curved vertical rows of scars. The number of scars is small ................................................................................................................ 7

4. Muscle field consists of at least eight scars, which are not arranged in groups, but many form a circle around a central lying one ................................................................................................................ 8

5. The central muscle field with four scars in a vertical row and a fifth V-shaped in front ........................................................................................................................................ LEPTOCYTHRIDAE

6. 6 muscle scars are present ........................................................................................................ CYPридIDAE

7. The surface is more or less sculptured and never completely smooth ........................................................................................................................................ CYTHERELLIDAE

8. Surface smooth or sculptured. Margin frequently with teeth. Hinge with or without teeth ........................................................................................................................................ 13

9. Valves often heavily calcified and ornamented, ................................................................................................................ 10, 17, 19

10. Ventrally and dorsally flattened and often with wings or caudal Process ........................................................................................................................................ CYTHERURIDAE

11. Valves are thin, carapace very much compressed (laterally) ................................................................................................................ 14

12. Valves thin and elongated ........................................................................................................................................ 25

13. Valves mostly trapezoid in outline (bairdiod type) ................................................................................................................ BAIRDIDAE
14. Pore canals on margins and surface sparse ........................................ PARADOXISOMATIDAE
15. Small cypridinae with a reniform to triangular shell ............................... 20
16. Dorsal margin mostly strongly arched. Ventral margin flat concave .......... CYPRIDOPSIDAE
17. Calcification of the inner lamella is also distinct. The fused zone is more or less broad .......................................................... 18
18. Radial pore canals mostly simple or sieve type ................................... CYTHERIDAE
19. Hinge merodont amphidont or merodont ........................................ TRACHYLEBERIDIDAE
20. Shell mostly rhomboid to sub rhomboid, rarely elongated, sometimes with a caudal Process ........................................................... LOXOCONCHIDAE
22. Shell elongated to ovate ........................................................................ 23
23. Anterior and posterior margin equally broadly rounded. Dorsal margin straight or weakly concave, in inner view always concave in mouth region ........................................ 24
24. Surface mostly pitted and with vertical folds caused by contractions of the adductor Muscle on the freshly moulted, soft carapace. Valves strongly calcified. Anterior Margin with a conspicuous list ........................................ ILYOCYPRIDIDAE
25. Marginal pore canals sparse. Vestibulum large always present at posterior end .......... NEOCYTHERIDEIDAE

Family CYTHERELLIDAE Sars, 1866
1. Carapace thick-shelled, ovate ......................................................................... 3
2. Carapace elongate-ovate ................................................................................. 4
3. Surface of carapace smooth or finely punctuate .................................. Cytherella
4. Carapace consists of strong ridges and occasionally with antero marginal denticulations ............................................................. Cytherelloidea

Genus Cytherella Jones, 1849

Key to the species
1. Carapace small, oblong, ovate in shape ...................................................... 3
2. Carapace elliptic oblong, extremities rounded ........................................... 4
3. Surface of the valve with closely spaced punctuate .................. Cytherella punctata
4. Surface smooth with white lucid spots ........................................ Cytherella pulchra
SYSTEMATIC ACCOUNT

1. *Cytherella punctata* Brady, 1866

1866. *Cytherella punctata* Brady, P. 362, pl. 57, fig. 2a, b.
1948. *Cytherella punctata* Kingma, PL VI, Fig. VI

*Diagnosis:* Carapace small, oblong, ovate in shape, surface finely punctate, straight dorsal and ventral margins. Surface of the valve with numerous closely spaced small punctate and with a shallow depression just anterior to dorsomedian region of carapace. The muscle scar pattern is normal platycopine-pinnate.

*Length:* 0.55 mm.

*Height:* 0.27 mm.

*Material examined:* 2 specimens collected from the Gosthani estuary in 1976.

*Distribution:* India: Andhra Pradesh–Gosthani estuary, east coast of India.

*Elsewhere:* Indonesia to South of Tasmania.

*Remarks:* This species is reported first time from Andhra Pradesh

2. *Cytherella pulchara* Brady, 1866


*Diagnosis:* Carapace elliptic oblong, extremities rounded, surface smooth, white lucid spots near the middle of the ventral half of the carapace consisting of about 16 linear ovate spots arranged in a pinnate manner along a central curved line, the larger spots nearest to the ventral margin, the whole group is situated in a slight depression of the valves, and is also on the inner surface.

*Length:* 0.52 mm.

*Height:* 0.27 mm

*Material examined:* Single specimen collected from the Gosthani estuary and Balacheruvu tidal strea.

*Distribution:* India: Andhra Pradesh: Visakhapatnam, Gosthani estuary and Balacheruvu tidal stream.

*Elsewhere:* Indonesia to South of Tasmania.

*Remarks:* This species is reported first time from Andhra Pradesh
Genus *Cytherelloidea* Alexander, 1969

**Key for identification of species**

1. Carapace ovate, widest posteriorly ................................................................. 2, 3
2. Ventral margin of the surface there is heavy marginal ridge ....... *Cytherelloidea leroyi*
3. Presence of marginal and horizontal ridge ........................................... *C. subreticulata*

3. *Cytherelloidea leroyi* Keij, 1964

1985. *Cytherelloidea leroyi* Zhao et al., P. 199, Fig. 11, Pl. 19, Fig. 1.

*Diagnosis*: Carapace ovate, widest posteriorly. Anterior end evenly rounded, posterior end more angular. Along the anterior and ventral margin there is heavy marginal ridge, which continues as a curved ridge separating the posterior and lateral surfaces of the valve.

*Length*: 0.57 mm.

*Height*: 0.34 mm.


*Distribution*: India: Andhra Pradesh–Gosthani estuary and Balacheruvu tidal stream, Goguleru and Tekkali creek, east coast of India.

*Elsewhere*: Brunei and Sabah.

*Remarks*: This species is reported first time from Andhra Pradesh

4. *Cytherelloidea subreticulata* Keij, 1964

1978. *Cytherelloidea subreticulata* Annapurna, Pl. 7, Fig. 3

*Diagnosis*: The ornamentation is basically similar to that of *Cytherelloidea leroyi*, with a marginal ridge and a horizontal ridge take the shape of a question mark from which 16 ridges emerge in all directions.

*Length*: 0.59 mm.

*Height*: 0.33 mm.

*Material examined*: 2 individuals reported from Gosthani estuary in 1977.

*Distribution*: India: Andhra Pradesh, Gosthani estuary, Tekkali and Goguleru creek, east coast of India.

*Elsewhere*: Borneo.

*Remarks*: This species is reported first time from Andhra Pradesh.
Suborder PODOCOPA
Family BAIRDIDAE Sars, 1888
Genus *Neonesidea* Maddocks, 1969

*Generic diagnosis*: Carapace very large, smooth or finely punctate, left valve larger than right and overlapping it dorsally and ventrally. Duplicature wide, broad vestibule present around free margin. Muscle scar pattern composed of many discrete scars arranged variously in a rosette pattern and aggregate.

5. *Neonesidea villosa* (Brady, 1880)

1978. *Neonesidea villosa* Annapurna, Pl. 3, Fig. A, Pl. 7, Fig. 5.
1880. *Bairdia villosa* Brady, pl. 3a, b, Pl. 5, Fig. 2a-g, Pl. 8, Fig. 4a-f.
1908. *Nesidea villosa* (Brady), G.W. Muller, p. 100.

*Diagnosis*: Carapace moderately large, typically, bairdian in shape. Dorsal margin very highly arched. Dorsal margin very highly arched. Dorsal margin almost straight. Surface smooth marginal area fairly broad with wide vestibule. Muscle scar pattern consists of eight large scars and one or two smaller scars arranged in a rosette near the center of the carapace. Living material with numerous coarse brown bristles.

*Distribution*: India: Gosthani estuary, Andhra Pradesh.


*Length*: 0.88 mm.

*Height*: 0.49 mm.

*Material examined*: 5 valves collected in 1976 and 1977 from the Gosthani estuary, east coast of India.

*Remarks*: This species is reported first time from Andhra Pradesh.

Family CYTHERIDAE Baird, 1850

1. Carapace with a strongly reticulate ................................................................. 2

2. Ridges in the dorsal half radiating from near the center of the dorsal margin and Longitudinal in the ventral half ................................................................. KEIJELLA

3. Carapace ornamented with dense pits ................................................................. 4

4. Medium sized ostracoda with a more heterodont than taxodont hingement ....... ................................................................. HEMICYTHERIDEA
5. The valve ornamentation may be smooth, ridged, pitted or reticulate...................... 6
6. Single stout spine occurs in the postero-ventral region of both valves ..................... NEOMONOCERATINA
7. Ovate to wedge shaped to pear shaped carapace.................................................. 8
8. Very pronounced caudal process in the ventral half of the posterior end ............... 9
10. Anterior end broadly rounded. Dorsal margin with well-marked posterior cardinal angle EOPAIJENBORCHELLA
11. Valve trapezoid to triangular in lateral view, thick shelled, posterior end triangular..... 12
12. Surface of valve with two sulci anterodorsally, reticulation, nodes and depression .... NEOSINOCYTHERE

Genus Keijella Ruggieri, 1967

Diagnosis: carapace with a strongly reticulate surface ornament. Ridges in the dorsal half radiating from near the center of the dorsal margin and longitudinal in the ventral half.

Length: 0.74 mm.
Height: 0.45 mm

6. Keijella oertlii Jain 1978


Diagnosis: Carapace large elongate greatest at the anterior cardinal angle, valves equal in size. Anterior margin well pronounced. The carapace being smooth and lack of ridges, presence of small caudal process, marginal reticulation at anterior and posterior margins, marginal pore canals being simple and straight.

Distribution: India: Gosthani estuary, Goguleru and Tekkali creek-Andhra Pradesh, Chilka lake-Orissa, east coast of India.

Material Examined: 5 valves collected from the Gosthani estuary, east coast of India in 1976.

Remarks: This species is reported first time from Andhra Pradesh.

Genus Hemicytheridea Kingma 1948

Diagnosis: Medium sized ostracoda with a more heterodont than taxodont hingement. Except for the surface ornamentation the outline of the carapace is similar to Cytheridea.
Key to the species

1. Carapace oblong and elongated ................................................................. 3,4
2. The valves are elongated and inflated carapace ........................................... 5
3. Carapace ornamented with dense pits ....................................................... Hemicytheridea andhraensis
4. Ornamentation is heavily reticulate ......................................................... H. reticulata
5. Moderately reticulate ornamentation ....................................................... H. bhatiai

7. Hemicytheridea reticulata Kingma, 1948

1948. Hemicytheridea reticulata Kingma, p. 71, Pl. 7, Fig. 7a-c.

Diagnosis: Taxodont to heterodont. The valves are nearly equal in size and rather thick. Ornamentation heavily reticulates throughout, in the ventral region the meshes arranged in rows, which run sub parallel to the ventral margin. Valves moderately heavily calcified.

Length: 0.57 mm.
Height: 0.30 mm.

Distribution: India: Andhra Pradesh: Gosthani estuary, Balacheruvu tidal stream and and Vasishta Godavari estuary, east coast of India.

Elsewhere: Indo Pacific region.

Material examined: 26 individuals collected from Gosthani estuary, 41 individuals collected from Vasishta Godavari estuary and single specimen from Balacheruvu tidal stream in 1977.

Remarks: This species is reported first time from Andhra Pradesh.

8. Hemicytheridea andhraensis (Annapurna and Rama Sarma) 1984


Diagnosis: Carapace oblong and elongate shape and densely pitted ornamentation. In the antennule each claw like seta is divided into 2.

Length: 0.57 mm; Height: 0.27 mm.

Material examined: 6 individuals collected from Gosthani estuary, 2 individuals from Balacheruvutidal stream and 6 individuals from Vasishta Godavari estuary in 1976 and 1977.

Distribution: India: Andhra Pradesh- Gosthani estuary, Balacheruvu tidal stream, Vasishta Godavari estuary and Tekkali creek, east coast of India.

Remarks: This form occurred abundantly in the coarse grained sand with high salinities. This species is named after Andhra Pradesh. This species is new to science, reported by Annapurna and Rama Sarma in 1984.

1993. *Hemicytheridea bhatiai* Varma *et al.*, Pl. 1, Figs. 1-4

*Diagnosis*: By virtue of its moderately reticulate ornamentation and its inflated carapace it is to distinguish this species from others species of *Hemicytheridea*.


*Length*: 0.57 mm.

*Height*: 0.30 mm.

*Width*: 0.23 mm.

*Distribution*: India: Andhra Pradesh Abundant and most widely distributed in Tekkali and Goguleru creek, east coast of India.

*Remarks*: The species is named in honour of Professor S.B.Bhatia, Punjab University, Chandigarh, in recognition of his pioneering work and notable contributions to the micropaleontology and stratigraphy of India. This species is new to science, reported by Varma *et al.*, in 1993.

Genus *Neomonoceratina* Kingma, 1948

**Key to identification of species**

1. Carapace sub rhomboidal in lateral view, the height generally equals more than half the Length ................................................................................................................................. 2

2. Posterior end with clear caudal process ........................................................................ 3,4,5


4. Presence of prominent spinose structures on the carapace .................................. *N. spinosa*

5. Surface ornamented with 4 to 6 faint longitudinal ribs ........................................ *N. jaini*

10. *Neomonoceratina indica* Annapurna and Rama Sarma, 1984

1984. *Neomonoceratina indica* Annapurna and Rama Sarma, Pl. 1, Fig., Pl. 2, Figs. 2, 3, Pl. 4 Fig. 1-10.

*Diagnosis*: Straight and simple marginal pore canals and presence of 2 prominent vertical ridges on the surface of the carapace.

*Type locality*: Vasishta Godavari estuary.

*Length*: 0.76 mm.

*Height*: 0.37 mm
Material examined: 6 individuals collected from Gosthani estuary, 2 from Balacheruvu tidal stream and 3 from Vasishta Godavari estuary, east coast of India in 1977.

Distribution: India, Andhra Pradesh–Vasishta Godavari estuary, Balacheruvu tidal stream and Gosthani estuary.

Remarks: This is a new species to science and reported by Annapurna and Rama Sarma in 1987. The species is named after the country where it is recorded.

11. Neomonoceratina spinosa Annapurna and Rama Sarma, 1984

Material Examined: 2 valves collected from the Gosthani estuary in 1977.


Remarks: This is a new species to science reported by Annapurna and Rama Sarma in 1984. This species is named basing on presence of spinose structures characteristically on the carapace.

12. N. jaini Varma et al., 1993


Diagnosis: Based on the shape and ornamentation of the carapace and subdorsal caudal process, the present species is assigned to genus Neomonoceratina. Surface ornamentation and pronounced overlapping.

Distribution: India: Andhra Pradesh–Tekkali creek, East coast of India. N. jaini is only of common occurrence and has limited success of adaptation in the middle segment of the Tekkali creek and Goguleru creek.

Remarks: This species is new to science. This species is named in honour of Dr. S.P. Jain, the original author of the species.

Genus Eopaijenborchella Keij, 1967

1. Ovate to wedge shaped to pear shaped carapace ........................................... 3

2. Carapace sub quadrate in shape ........................................................................ 4
3. Pronounced caudal process .......... *Paijenborchella (Eopaijenborchella) subcaudatum*

4. Short caudal process........................................... *Paijenborchella (Eopaijenborchella) keiji*


1984. *Eopaijenborchella subcaudatum* Annapurna and Rama Sarma, Pl. 1, Fig. F, Pl. 2, Figs. 6, 7.

**Diagnosis**: Ovate to wedge shaped to pear shaped carapace. There is a very pronounced caudal process in the ventral half of the posterior end. Anterior end broadly rounded. Dorsal margin with well-marked posterior cardinal angle.

**Length**: 0.52 mm.

**Height**: 0.34 mm.

**Material examined**: Two individuals encountered at Gosthani estuary in 1976

**Distribution**: India: Andhra Pradesh: Gosthani estuary.

**Remarks**: This is new species to science. Reported by Annapurna and Rama Sarma in 1984. The species is named after the pronounced caudal process.

14. *Paijenborchella (Eopaijenborchella) keiji* Shyam Sunder et al., 1995

1995. *Paijenborchella (Eopaijenborchella) keiji* Shyam Sunder, et al., Figs. 3-5

**Diagnosis**: Carapace sub quadrate in shape, posterior margin drawn out into a short caudal process, surface ornamented with coarse reticulation and four ridges, deep, vertical sulcus and typical schizodont hingement.

**Material**: Ninety seven specimens including carapaces and valves from Goguleru creek in 1985.

**Length**: 0.55 mm.

**Height**: 0.28 mm.

**Remarks**: The present species is similar in ornamentation to *Schnederina koenigswaldi* (Keij) 1954 but it differs from it in having typical schizodont hingement.

**Distribution**: India: Andhra Pradesh–Goguleru creek. This species is new to science reported by Shyam Sunder et al., 1995. The species is named in honour of Dr. A.J. Keij, for his contribution to the Indo Pacific Ostracoda.

Genus *Neosinocythere* Huang 1985

15. *Neosinocythere mckenzi* (Annapurna and Rama Sarma) 1985

ANAPURNA : Crustacea : Ostracoda

**Diagnosis** : Ovate to sub quadrate carapace with a slight upturning at posterior end; surface ornamented with ventral knobs, very limited vestibule or none, moderately wide duplicature, particularly wide in anterior; hinge holamphidont with serrate grooves.

*Length* : 0.67 mm.

*Height* : 0.30 mm.

*Material examined* : 25 specimens from Gosthani estuary, 5 from Balacheruvu tidal stream and 4 from Vasishta Godavari estuary.

*Distribution* : India; Gosthani estuary, Balacheruvu tidal stream, Vasishta Godavari Estuary, Tekkali creek and Goguleru creek.

*Remarks* : This species is new to science and named after Dr. K.G. Mckenzie.

Family LEPTOCYTHERIDAE Hanai, 1957

**Key to genera**

1. Carapace less elongate, ornamented and more heavily calcified .................................. 2
2. Anterior vestibulum poorly developed ................................................................. 3
3. Antromedian hinge element consists of single tooth and subdivided in to 2 to 3 tooth
   lets .................................................................................................................. *Callistocythere*
4. In side view the carapace has its greatest height in the middle ............................... 5
5. Dorsal and ventral margins convex, anterior and posterior ends rounded except at the
   poster cardinal angle in the left valve .............................................................. *Tanella*

16. *Callistocythere* sp. aff. *C.crispata* (Brady, 1868)

1868. *Callistocythere* sp. aff. *C. crispata* Brady. pp 72-73. pl. XIV. Fig.8a-d.

*Diagnosis* : Carapace elongated to sub quadrangular, compressed laterally. Ornamentation
strongly reticulates. Antero-ventral marginal and poster ventral denticulations clear.

*Length* : 0.51 mm.

*Height* : 0.34 mm.

*Distribution* : India : Andhra Pradesh–Gosthani estuary and Balacheruvu tidal stream, east
coast of India.

*Elsewhere* : World wide.
Material examined: 5 individuals collected from Gosthani estuary and a single individual from Balacheruvu tidal stream in 1976.

Remarks: This species is reported first time from Andhra Pradesh.

Genus *Tanella* Kingma, 1948

**Key to the species**

1. Shape of carapace elongate and narrow ................................................................. 2

2. Hexagonal network with a prominent ridge ................................................................ 5

3. Reticulated, longitudinal ridges strong and arched ................................................... 9

4. Pits separate and limited in number .......................................................................... *Tanella estuarii*

5. Pits in clusters and innumerable .............................................................................. *T. kingmaii*

6. Posterior reticulation obscure with 3 to 6 pits arranged in groups ............................. 11

7. Socket in right valve crenulate .................................................................................. 10

8. Socket in right valve smooth .................................................................................... 9, 11

9. Marginal pore canals polyfurcate ........................................................................... *T. gracilis*

10. Marginal pore canals bifurcate ............................................................................. *T. vasishta*

11. Marginal pore canals intermediate between polyfurcate and bifurcate branching ....... .................................................................................................................. *T. indica*

17. *Tanella gracilis* Kingma 1948

1948. *Tanella gracilis*, Kingma p. 88, pl. 10, fig. 7a-d.


1948. *Tanella gracilis* Kingma, p. 120

*Length*: 0.42 mm.

*Height*: 0.18 mm.

*Diagnosis*: Carapace elongate and narrow. Surface ornamented with reticulations and ridges. Radial pore canals typically proliferate.

Material examined: 3 individuals collected from Gosthani estuary and 4 from Balacheruvu tidal stream in 1976 and 1977.

Distribution: India: Gosthani estuary, Balacheruvu tidal stream, Goguleru and Tekkali creek, Andhra Pradesh, Krusadai Islands, Gulf of Mannar, Chilka lake.

Elsewhere: Indo Pacific region, Japan, Malayan region.
Remarks: This species is reported first time from Andhra Pradesh.

18. Tanella estuarii Annapurna and Rama Sarma, 1984

1984. Tanella estuarii Annapurna and Rama Sarma, 1984, plate 1, C; plate 2, C&D; plate 4, 1-10

Diagnosis: Carapace oblong and tumid in outline. Pits separate and limited in number. Sexual dimorphism is very strong.

Length: 0.33 mm.

Height: 0.17 mm.

Material examined: 320 individuals collected from Gosthani estuary 80 from Balacheruvu tidal stream and 109 from Vasishta Godavari estuary.


Remarks: This species is new to science and named after estuary

19. Tanella kingmaii Annapurna and Rama Sarma, 1984

1984. Tanella kingmaii Annapurna and Rama Sarma, plate 1, D; plate 2, E&F; plate 5, 1-9

Diagnosis: Carapace elongate and narrow. Pits in clusters and innumerable. Sexual dimorphism is clear.

Length: 0.42 mm.

Height: 0.18 mm.


Distribution: India: Andhra Pradesh–Gosthani estuary and Balacheruvu tidal stream, east coast of India.

Remarks: This species is new to science and named after Dr. J.Th. Kingma.

20. Tanella vasishta Annapurna and Rama Sarma, 1979


Diagnosis: Carapace narrow and elongate shape, hexagonal network ornamentation with a single median ridge, and bifurcate nature of marginal pore canals.

Length: 0.54 mm; Height: 0.26 mm.

Distribution: India: Andhra Pradesh–Vasishta Godavari estuary, Gosthani estuary and Balacheruvu tidal stream, east coast of India.
Material examined: 64 individuals from Gosthani estuary, 26 from Balacheru tidal stream and 8 from Vasishta Godavari estuary in 1976 and 1977.

Remarks: This species is new to science and named after Vasishta Godavari estuary.

21. Tanella indica Annapurna and Rama Sarma, 1979

1979. *Tanella indica* Annapurna and Rama Sarma, 117-118. Fig 1A-C, Fig. 2, a-j

Diagnosis: Oblong and tumid shape of carapace, strongly arched marginal ridges, pits ranging 3 to 6 arranged in groups in the obscure reticulation and intermediate condition of marginal pore canals between bifurcate and polyfurcate branching and the occurrence of additional ‘v’ shaped frontal scar.

Male: Length: 0.50 mm; Height: 0.20 mm.

Female: Length: 0.55 mm; Height: 0.25 mm.

Distribution: India: Andhra Pradesh—Gosthani estuary, Vasishta Godavari estuary and Balacheru tidal stream.

Material examined: 50 specimens collected from the Gosthani estuary, 97 from Balacheru tidal stream and 44 from Vasishta Godavari estuary.

Remarks: This species is new to science and named after country India where the species is reported first time.

Family LIMNOCYHERIDAE Klie, 1938

1. Carapace outline in lateral view elongate–subreniform; greatest height in front of middle near anterior cardinal angle .............................................................. 3

2. Carapace much elongated, both ends rounded ...................................................... 4

3. Ornamentation moderately strong reticulate pattern covering exterior surface of valve; several nodes present ........................................................................................................ Limnocythere

4. Surface ornamented with strong pits ................................................................. 5

5. Anterior marginal denticulations present ............................................................... 6

6. Marginal area with small narrow vestibules ......................................................... Pontocythere

22. Limnocythere sanct-patricii, Brady and Robertson, 1869

1869. *Limnocythere sanct-patricii* Brady and Robertson, p. 17

**Diagnosis**: Carapace outline in lateral view elongate–subreniform; greatest height in front of middle near anterior cardinal angle. Ornamentation moderately strong reticulate pattern covering exterior surface of valve; several nodes present. Two sulci present, both in anterior half.

*Length*: 0.63 mm.

*Height*: 0.28 mm.


*Elsewhere*: Sweden, British Isles, Bohemia, Hungary, Switzerland, Laguna Madre, and Copan Bay.

*Material examined*: Single specimen collected from the Gosthani estuary in 1976.

*Remarks*: This species is reported first time from Andhra Pradesh

**23. Pontocythere fabacea** (Brady, 1868)

1978. *Pontocythere fabacea* Annapurna and Rama Sarma Plate 13. Fig. B

*Diagnosis*  Carapace much elongated, both ends rounded. Surface ornamented with strong pits. Anterior marginal denticulations present. Central muscle scars in a vertical row of 4 and 1 frontal scar. Left valve larger than right, overlapping it mainly ventrally.

*Length*: 0.67 mm.

*Height*: 0.27 mm.


*Elsewhere*: World wide.


*Remarks*: This species is reported first time from Andhra Pradesh.

**Family TRACHYLEBERIDIDAE** Sylvester-Bradley, 1948

**Key to genera**

1. Carapace elongate, sub rectangular in lateral view ................................................ 7, 13
2. Carapace elongate–ovate, somewhat bean shaped in lateral view ......................... 8
3. Carapace sub quadrangular in lateral view ............................................................. 9
4. Elongate, sub triangular, laterally compressed ...................................................... 10
5. Squa quadrangular outline, highest near anterior end ......................................... 11
6. Carapace sub cylindrical in shape .......................................................... 12
7. Ornamented with four longitudinal ridges ........................................ 14
8. Valves smooth and shiny ..................................................................... 15
9. Anterior marginal ridge prominent. Surface ornamented with three longitudinal ridges ................................................................. 16
10. Ornamentation usually with ridges running mainly longitudinally ........ 17
11. Coarsely reticulate surface ................................................................ 18
12. Surfaces ornamented with transverse ribs and pits, deep dorsal anteromedian sulcus present .......................................................... Neocytheromorpha
13. Ornamented with longitudinal ribs and reticules ................................. Chrysocythere
14. Eye spot is very prominent ................................................................ Carinocythereis
15. Eye spot very faint ............................................................................. Basslerites
16. Eyespot clearly present, prominent and glassy ................................. Costa
17. Clearly glassy eye spots are present at the anterodorsal cardinal angle ... Caudites
18. Prominent eye tubercle ...................................................................... Ambostracon

Genus Costa Neviani, 1928

24. Costa quadricostatum Annapurna and Rama Sarma, 1988

1988. Costa quadricostatum Annapurna and Rama Sarma, Fig.1A

*Diagnosis*: In the general shape, arrangement of radial pore canals and muscle scars it resembles Costa species. But it differs from the other Costa species in the surface of the carapace ornamented with 4 longitudinal ridges, intercostal reticulation in between the ridges, hinge holamphidont type.

*Length*: 0.57 mm.

*Height*: 0.37 mm.

*Material Examined*: One valve encountered in Gosthani estuary and one from Balacheruvu tidal stream in 1976.

*Distribution*: India; Andhra Pradesh Gosthani estuary and Balacheruvu tidal stream, east coast of India.

*Remarks*: This species is new to science and this species is named basing on the important character of systematic importance namely surface of the carapace ornamented with 4 longitudinal ridges, intercostals reticulation in between the prominent ridge.
Genus *Carinocythereis* Ruggieri, 1956

25. *Carinocythereis stimpsoni* (Brady, 1868)

1988. *Carinocythereis stimpsoni*, Annâpurna, Fig. 1, B.

*Diagnosis*: Shell quadrangular from side some what higher in front than behind, height equal to more than half the length, anterior extremity obliquely rounded and bearing numerous small teeth, posterior end rectangular truncated, produced abruptly below the middle.

*Length*: 0.52 mm; *Height*: 0.31 mm.

*Distribution*: India; Andhra Pradesh—Gosthani estuary.

*Material Examined*: 5 individuals from Gosthani estuary in 1977.

*Remarks*: This species is reported first time from Andhra Pradesh.

Genus *Basslerites* Howe, 1937


1978. *Basslerites liebau*, Jain, Fig. 4A-3; 6L

*Diagnosis*: Lateral outline elongate to ovate, in dorsal view wedge shaped. Carapace smooth anteriorly and longitudinal ridges present towards the posterior end, pits arranged in rows in between longitudinal ridges and bifurcate branching of the marginal pore canals at the posterior end.

*Length*: 0.58 mm. *Height*: 0.25 mm.

*Distribution*: India: Andhra Pradesh—Gosthani estuary, Balacheruvu tidal stream, Goguleru and Tekkali creek, east coast of India, Gujarat: Mandavi Beach, west coast of India.

*Material examined*: 7 individuals encountered from Gosthani estuary and single specimen from Balacheruvu tidal stream 1977.

*Remarks*: This species is reported first time from Andhra Pradesh.

Genus *Chrysocythere*, Ruggieri 1961

27. *Chrysocythere keiji* Jain, 1978

1978. *Chrysocythere keiji* Jain, Fig. 3L1-2.


*Diagnosis*: An elongate sub rectangular *Chrysocythere* ornamented with longitudinal ribs and reticules. The median rib forked, another short longitudinal rib present posterior in between the forked dorsal and ventral parts of the median rib.

*Length*: 0.60 mm.
Height : 0.29 mm.


Distribution : India : Andhra Pradesh–Balacheruvu tidal stream, Goguleru and Tekkali
  creek, east coast of India, Gujarat : Mandavi Beach, west coast of India.

Remarks : This species is reported first time from Andhra Pradesh.

Genus Ambrostracon Hazel, 1962

28. Ambrostracon sp. cf. C. packardi (Brady, 1868)

1868. Ambrostracon sp.cf.C. packardi Brady, Fig. 12.
1978. Ambrostracon sp.cf.C. packardi Annapurna, Plate 15, Fig. 8.

Length : 0.39 mm.
Height : 0.18 mm.

Diagnosis : Subquadrangular outline, highest near anterior end, coarsely reticulate surface,
  prominent eye tubercle, anterior median node, oblique median longitudinal ridge that curves
  poster dorsally and continues forwards dorsally, projecting beyond dorsal margin.

Material examined : Single specimen from Gosthani estuary and single specimen from
  Balacheruvu tidal stream in 1976.

Distribution : India: Andhra Pradesh–Gosthani estuary and Balacheruvu tidal stream, east
  coast of India.

Elsewhere : Pacific coast of North and Central America.

Remarks : This species is reported first time from Andhra Pradesh.

Genus Caudites Coryell and Fields, 1937

29. Caudites rectangularis (Brady, 1869)

1869. Caudites rectangularis Brady, p. 163.
1886. Caudites rectangularis Brady, pl. 9.

Length : 0.52 mm.
Height : 0.22 mm.

Diagnosis : Carapace elongates and sub triangular, laterally compressed, anterior end
  rounded, posterior end drawn out ventrally, and cardinal angle prominent. A true caudal
  process is not present, although in lateral view posterior end is drawn out. Carapace ornamented
  with ridges longitudinally.

Material examined : 5 individuals collected from Gosthani estuary and single specimen
  from Balacheruvu tidal stream in 1977.
**Distribution**: India: Andhra Pradesh – Gosthani estuary, Balacheruvu tidal stream, Goguleru and Tekkali creek, east coast of India.

**Remarks**: This species is reported first time from Andhra Pradesh.

**Genus Neocytheromorpha** Guan Shaozeng *et al.*, 1978


**Material examined**: Two hundred and nine specimens including carapaces and valves were encountered from Goguleru creek in 1985.

**Diagnosis**: Carapace sub cylindrical in shape, surface ornamented with transverse ribs and pits, deep dorsal antero median sulcus present Sieve type normal pore canals and amphidont hinge.

*Length*: 0.56 mm.
*Height*: 0.25 mm.

**Distribution**: India: Andhra Pradesh–Goguleru creek.

**Remarks**: This is new species reported by Shyam Sunder *et al.*, and named after the type locality of the species, the Goguleru creek, east coast of India.

**Family LOXOCONCHIDAE** Sars, 1925

**Key to genera**

1. Carapace sub rhomboidal in lateral view ................................................................. 3
2. Carapace high ovate to sub rhomboidal,................................................................. 4
3. Thick shelled, it is clearly punctuate ................................................................. *Loxoconchella*
4. Surface smooth to coarsely pitted ................................................................. *Loxoconcha*

**Loxoconchella** Triebel, 1954

31. *Loxoconchella honoluliensis* (Brady, 1868)

1968. *Loxoconchella honoluliensis* Guha, p. 61, Pl. IV, fig. 4.

1999. *Loxoconchella honoluliensis* Annapurna and Rama Sarma, Fig.1

*Length*: 0.70 mm.
*Height*: 0.50 mm
Diagnosis: Sub rhomboidal in shape. The anterior end is rounded posterior end is oblique and drawn out into a blunt truncated caudal processes situated above the middle of the body. Surface of the valve faintly to strongly pitted. Marginal pore canals are typically branched and spaced more or less evenly spaced through the anterior, ventral and posterior marginal zone.


Distribution: India: Andhra Pradesh – Gosthani estuary and Vasishta Godavari estuary, east coast of India.

Elsewhere: Epinertic, warm, Pacific and Indian ocean.

Remarks: This species is reported first time from India.

Loxoconcha Sars, 1866

Key to species

1. Carapace rhomboidal, anterior end rounded, posterior end upwardly rounded ........ 5
2. Carapace ovate, anterior end rounded, posterior end upwardly rounded ..................... 6
3. Carapace sub rhomboidal, highest in the middle, maximum height at nearly 2/3 of the length ....................................................................................................................................... 8
4. Carapace Rhomboidal in shape, ovate to elongate, mostly with rather inflated valves ......................................................................................................................................... 5
5. Surface ornamented with reticulations .............................................. Loxoconcha sinensis
6. Surface ornamented with sculpta ........................................................................ L. sculpta
8. Carapace marked with large pittings arranged in concentric rows, tending to form furrows ........................................................................................................................................... L. lilligiborgii
9. Coarse and irregular reticulation, large, circular normal sieve pores, pointed ala in the ventromedian region ................................................................................................................. L. guhai
10. Surface ornamented with reticulations and pits ............................................. L. tekkaliensis

32. Loxoconcha sinensis Brady, 1867

1867. L. sinensis Brady, p. 158, pl. XVI, Fig. 17, 18.
1880. L. sinensis Brady, p. 120, pl. XXIX, fig. 2.
1999. L. sinensis Annapurna and Rama Sarma, pl. 2 figs. 1-14.

Length: 0.51 mm.
Height : 0.34 mm

Diagnosis: Carapace rhomboidal, anterior end rounded, posterior end upwardly rounded, surface ornamented with reticulations.

Material Examined: 223 specimens collected from Gosthani estuary, 37 from Balacheruvu tidal stream and 8 from Vasishta Godavari estuary.


Elsewhere: Mesohaline to littoral, world wide, shallow waters of Hong Kong, Sea of Japan.

Remarks: This species is reported first time from India

33. Loxoconcha sculpta Brady, 1869

1999. Loxoconcha sculpta Annapurna, Fig 2.

Length: 0.46 mm.

Height: 0.25 mm.

Diagnosis: Carapace ovate, anterior end rounded, posterior end upwardly rounded, surface ornamented with sculpta.

Distribution: India: Andhra Pradesh–Gosthani estuary, Balacheruvu tidal stream and Vasishta Godavari estuary, east coast of India.

Elsewhere: Booby Island, Australia.


Remarks: This species is reported first time from India.

34. Loxoconcha lilljeborgii Brady, 1868

1954. Loxoconcha lilljeborgii Brady, Keij, P. 358 Pl. 3, Fig. 4.
1968. Loxoconcha lilljeborgii Brady, Guha, P. 61, pl. 4, fig. 2.
1975. Loxoconcha lilljeborgii Brady, Grahmann; p. 29, pl. 5, figs 6-8 1975.
1988. Loxoconcha lilljeborgii Brady, Zhao et al., p. 206, pl. 20, fig. 12.
1999. Loxoconcha lilljeborgii Annapurna, Fig. 3.

Length: 0.42 mm.

Height: 0.21 mm.
Diagnosis: Carapace sub rhomboidal, highest in the middle, maximum height at nearly 2/3 of the length. Carapace marked with large pittings arranged in concentric rows, tending to form furrows.

Distribution: 2 individuals from Gosthani estuary and single from Gosthani Balacheruvu tidal stream, east coast of India.

Elsewhere: Indo-Pacific region. This species was originally found from the South China and Andaman Seas.

Material examined: 2 individuals collected from Gosthani estuary and single from Balacheruvu tidal stream in 1976.

Remarks: This species is reported first time from India

35. *L. guhai* Shayam Sunder et al., 1995


Diagnosis: Carapace subrhomboidal, coarse and irregular reticulation, large, circular normal sieve pores, pointed ala in the ventromedian region.

Length: 0.48 mm.

Height: 0.35 mm.

Material examined: Forty specimens including carapaces and valves encountered from Goguleru creek in 1988.


Remarks: This species is new to species reported by Shyam Sunder et al., 1995 in the Goguleru creek. The species is named after D.K.Guha, Deputy General Manager (SRG), ONGC, KDMIPE, and Dehradun, who did pioneering work on Neogene Ostracoda of India.

36. *L. tekkaliensis* Varma et al., 1993


Length: 0.55 mm.

Height: 0.35 mm.

Material examined: One hundred and three specimens including valves and carapaces are encountered from Tekkali creek, in 1985.

Remarks: This species is new to science and reported by Varma et al., in 1993 and named after type locality.

Distribution: India: Andhra Pradesh–Tekkali and Goguleru creek, east coast of India.
Family CYTHERURIDAE G. W. Mueller, 1894

1. Valves elongate sub triangular, somewhat tumid, dorsal margin straight ................ 3
2. In lateral view the carapace is ovate to sub rhomboidal in outline ....................... 4
3. Presence of flattish tubercle like elevation in the right valve .................. Paijenborchellina
4. The valves are more or less strongly inflated ventrolaterally and more or less welldeveloped lateral wing like expansions are generally present ............................... 5
5. The carapace ends in an obtuse caudal process at or above the middle, which is often turned upwards ................................................................. Cytheropteron

Genus Paijenborchellina Kuznetsova, 1957

Key to the species

1. Surface ornamented with reticulations pits lie between the reticulations ............... 2
2. Four hollow tubercles present pits arranged in rows at posterior margin .............. 3, 4
3. Amphidont type of hingement, median hinge element divided into short anteromedian and longer poster median elements ......................................................... P. caudatum
4. Amphidont type of hingement, all elements crenulated ............................... P. reticulatum

37. Paijenborchellina caudatum Annapurna and Rama Sarma, 1987

1987. Paijenborchellina caudatum Annapurna and Rama Sarma, 628-631 pl. 1, Fig. A, pl. 2 Figs. 1-7.

Diagnosis: Presence of hollow tubercles in the anterior 2/3rds of the body. Posterior marginal pits present in rows. Pits uncommon on the extreme part of the body.

Length: 0.49 mm.
Height: 0.25 mm.

Material examined: 33 individuals encountered from Gosthani estuary, 290 from Balacheruvu tidal stream and single individual from Vasishta Godavari estuary in 1976 and 1977.

Distribution: India: Andhra Pradesh Gosthani estuary, Balacheruvu tidal Stream, Vasishta Godavari estuary and Tekkali creek, east coast of India.

Remarks: This species is new to science reported by Annapurna and Rama Sarma and named basing on the pronounced nature of caudal process at the posterior side.

38. Paijenborchellina reticulatum Annapurna and Rama Sarma, 1987

1987. Paijenborchellina reticulatum Annapurna and Rama Sarma, 628-631, pl. 1, Fig. B, pl. 3, Figs. 1-7
Diagnosis: Ovate to wedge shaped carapace, surface of the carapace ornamented with reticulations, pits arranged between reticulations.

Length: 0.61 mm.

Height: 0.37 mm.

Material examined: 60 individuals encountered from Gosthani estuary, 159 from Balacheruvu tidal stream in 1976 and 1977.

Distribution: India: Andhra Pradesh–Gosthani estuary, Balacheruvu tidal stream and Goguleru creek, east coast of India.

Remarks: This species is new to science reported by Annapurna and Rama Sarma and naming based on the important character of systematic importance namely carapace sculptured with reticulations.

Genus Cytheropteron Sars, 1865


1866. Cytheropteron alatum G.O. Sars, pl. ClV
1912. Cytheropteron alatum G.W. Muller, 274.

Diagnosis: Carapace smooth thinly calcified, usually fragmentary, never articulated. Ventral margin gently undulatory, dorsal margin strongly arched terminating in a prominent mid posterior caudal process.

Length: 0.72 mm.

Height: 0.40 mm.


Elsewhere: Scandinavia off the British Isles, the north Atlantic and Mediterranean-worldwide.

Material examined: Single valve obtained from Gosthani estuary in 1976.

Remarks: This species is reported first time from Andhra Pradesh.

Family ILYOCYPRIDIDAE Kaufmann, 1900

Genus Ilyocypris Brady and Norman, 1889

Generic diagnosis: Valves sub quadrare, laterally compressed, dorsum straight or sulcate surface pitted, pustulous, tuberculate, or smooth.
40. *Ilyocypris gibba* (Ramdohr, 1808)

1803. *Cypris gibba* Ramdohr, p. 91.

1889. *Ilyocypris gibba* (Ramdohr), Brady and Norman, p. 107.

**Diagnosis:** Carapace sub quadrate in outline, anterior end broadly rounded. Posterior end truncate, dorsal margin straight, ventral margin concave. The prominent sulci in anterodorsal part of the shell commonly with one or more hollow tubercles.

**Length:** 0.60 mm.

**Height:** 0.32 mm.

**Distribution:** India: Andhra Pradesh: Gosthani estuary, and Vasishta Godavari estuary, east coast of India.

**Elsewhere:** World wide.

**Remarks:** This species is reported first time from Andhra Pradesh.

**Family CYPRIDIDAE** Baird, 1845

**Genus Phlyctenophora** Brady, 1880

**Diagnosis:** Carapace elongate, moderately laterally compressed. Greatest height situated in the middle and equal to less than half the length. Anterior end broadly rounded. Posterior end narrowed and ventrally sub angular. Dorsal margin arched, ventral margin somewhat sinuate the middle

**Key to the species**

1. Carapace smooth ............................................................................................................. 3

2. Carapace sculptured with a few pits and dark brown patches in live condition ....... 6

3. Antero dorsal pronounced ...................................................................................... *Phlyctenophora bhatiai*

4. Antero dorsal not pronounced ..................................................................................... 5

5. Marginal pore canals conspicuously branching .............................................. *P. zealandica*

6. Bifurcate branching in marginal pore canals ..................................................... *Phlyctenophora indica*

41. *Phlyctenophora zealandica* Brady, 1880

1880. *Phlyctenophora zealandica* Brady, p. 33, pl. III, fig.1

1988. *Phlyctenophora zealandica* Annapurna and Rama Sarma, Pl.1, fig. A Pl. 2 fig 1-8

**Diagnosis:** Carapace elongate, moderately compressed laterally. Marginal pore canals many conspicuously branched, especially anteriorly anteroventrally.
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*Fauna of Andhra Pradesh, State Fauna Series 5*

Length : 0.94 mm.

Height : 0.45 mm.


Distribution : India : Andhra Pradesh–Gosthani and Vasishta Godavari estuary, east coast of India.

Elsewhere : Indopacific and Mediterranean.

Remarks : This species is reported first time from Andhra Pradesh.

42. *Phlyctenophora indica* Annapurna and Rama Sarma 1988


Diagnosis : Carapace sculptured with a few pits and dark brown patches in live condition. Bifurcate branching in marginal pore canals.

Length : 0.67 mm.

Height : 0.64 mm.

Material Examined : 223 individuals from Gosthani and 1576 from Balacheruvu tidal stream and 33 from Vasishta Godavari estuary from 1976 and 1977.

Distribution : India : Andhra Pradesh : Gosthani estuary, Balacheruvu tidal stream, lowers reaches of Vasishta Godavari estuary, east coast of India.

Remarks : This species is new to science, reported by Annapurna Rama Sarma and named after India.

Family CYPRIDOPSIDAE Kaufmann, 1960

Genus *Cypridopsis* Brady 1867

Generic diagnosis : Valves reniform, sub triangular to subovate, strongly arched dorsum, enter concave or straight, right valve larger than the left, surface pitted, hairy or spinose. Furca reduced to a flagellum.

43. *Cypridopsis obesa* Brady and Robertson, 1889

1870. *Cypridopsis obesa* Brady and Robertson, p. 15.

Diagnosis : Carapace tumid as seen from the side sub rectangular, surface smooth, highest in the middle, greatest height equal to nearly 2/3rd of the length, extremities rounded. Shell surface closely and largely punctate.
**Distribution**: India: Andhra Pradesh—Vasishta Godavari estuary, Goguleru and Tekkali creek, east coast of India.

**Elsewhere**: Worldwide.

**Material examined**: 4 individuals encountered from Vasishta Godavari estuary in 1977.

**Remarks**: This species is reported first time from Andhra Pradesh.

Family *NEOCYTERIDEIDAE* Puri, 1957

Genus *Copytus* Skogsberg, 1939

**Diagnosis**: Carapace elongate-oblong in lateral view, sub equal in height nearly throughout. Both ends rounded and surface smooth.

44. *C. coramandalensis* Shyam Sunder *et al.*, 1995


1995. *Copytus* sp. cf. *C. rara* Shyam Sunder, Plate I, Figs. 4-6

**Diagnosis**: Narrow, elongate carapace, acuminate anterior margin, rounded posterior margin, surface ornamented ventrally with longitudinal striations.

**Length**: 0.80 mm.

**Height**: 0.22 mm.

**Material examined**: Ninety seven specimens including carapaces and valves encountered in 1988.

**Distribution**: India: Andhra Pradesh—Tekkali creek.

**Remarks**: This is new to science reported by Shyam Sunder *et al.*, 1995 and named after its occurrence along the Coromandel coast.

Family *PARADOXOSTOMATIDAE* Brady and Norman, 1889

Genus *Paradoxostoma* Fischer, 1855

**Diagnosis**: In side—view the valves are elongate—ovate, in dorsal view they are strongly compressed laterally. Anterior end acutely rounded below; posterior end with a more or less pronounced caudal process situated normally above the middle.

45. *Paradoxostoma bhatiai* Shyam Sunder *et al.*, 1995


1978. *Paradoxostoma* sp Jain, pl. 131
Diagnosis: Carapace lenticular in shape, posterior margin pointed at mid height as a short caudal process, broad vestibulum along the anterior, ventral and posterior margins.

Length: 0.55 mm.
Height: 0.22 mm.

Distribution: India: Mândvi beach, west coast of India and Goguleru creek, east coast of India.

Material examined: Two hundred and fifteen specimens including carapaces and valves encountered from Goguleru creek in 1988.

Remarks: This is new to science reported by Shyam Sunder et al., 1995 and named in honour of Prof. Bhatia.

Genus Sclerochilus Sars, 1866

Generic diagnosis: In side view typically reniform, both ends rounded, posterior end without any trace of caudal process. Dorsal margin strongly convex, ventral margin sinuous.

46. Sclerochilus contortus (Norman)

1889. Sclerochilus contortus Brady & Norman, P. 225.

Diagnosis: Viewed laterally, the shell is oblong, bean shaped, anterior extremity evenly rounded while the posterior is obtuse.

Length: 0.68.
Height: 0.28.

Material examined: 70 specimens of S. contortus, juveniles inclusive, were collected from seaweed Caulerpa racemosa from the rocky strip of Palm beach, near Visakhapatnam in 2001.

Distribution: India: Andhra Pradesh—Palm Beach (rocky coast), Visakhapatnam, east coast of India.

Elsewhere: Norwegian coast, Ireland Channel Islands, Franz Joseph Islands, spit Bergen, Holstenborg Harbor, and east coast of Davis, Skagerak.

Remarks: This species is reported first time from Andhra Pradesh.
SUMMARY AND GENERAL DISCUSSION

Al together 35 species were represented at Gosthani estuary *Cytherella pulchra, Paijenborchella (Eopaijenborchella) subcaudatum, Loxoconchella honoluiensis, Limnocythere sanctipatricii, Pontocythere fabacea, Cytheropteron alatum* were encountered exclusively at this area. Altogether 28 species were encountered at Goguleru creek. Among them *Paijenborchella (Eopaijenborchella) keij, Loxoconcha guhai, Copytus coramandalensis, Paradoxostoma bhatiai, Neocytheromorpha goguleruensis* were encountered exclusively at this area.

Altogether 28 species was encountered at Balacheruvutidal stream. Among them only two species namely *Cytherella punctata, Neomoniceratina spinosa* exclusively encountered at this area. Altogether 21 species encountered at Tekkali creek and 17 species were encountered at Vasishta Godavari estuary. None of the exclusively occurring species was found at Vasishta Godavari estuary and Tekkali creek. At Palm Beach lone species namely *Schlerochilus contortus* was encountered in large numbers.

ACKNOWLEDGEMENT

I express my deep gratitude to Dr. D.V. Rama Sarma for his valuable suggestions and constant encouragement and also to the Andhra University for the facilities provided.

REFERENCES


Fig. 1. Hemicytheridea andhraensis

Fig. 2. Hemicytheridea bhatiai

Fig. 3. Neomonoceratina indica

Fig. 4. Neomonoceratina spinosa

Fig. 5. Neomonoceratina jaini
PLATE - II

Fig. 6. Paijenborchella (E) subcaudatum

Fig. 7. Paijenborchella (E) keiji

Fig. 8. Neosinocthere mchenzii

Fig. 9. Tanella estuarii

Fig. 10. Tanella kingmai
PLATE - III

Fig. 11. Tanella indica

Fig. 12. Costa quadricostatum

Fig. 13. Neocytheromorpha goguleruensis

Fig. 14. Loxoconcha guhai

Fig. 15. Loxoconcha tekkaliensis
PLATE - IV

Fig. 16. Paijenborchellina caudatum

Fig. 17. Paijenborchellina reticulatum

Fig. 18. Phlyctenophora indica

Fig. 19. Copytus coromandalensis

Fig. 20. Paijenborchellina bhatiai
INTRODUCTION

As a part of annual plan of research work of S.R.S., ZSI., Chennai five districts i.e. Chittor, Nellore, Cuddapah, Karnool and Anantpur of the state of Andhra Pradesh (Text fig. 1&2) were surveyed by various parties in different seasons spread over in last three years between 2002-2005. These districts belonging to southern part of Andhra Pradesh and quite a good number of fresh water crabs have been collected from the districts under study.

The state of Andhra Pradesh lies between 12°37’ and 19°54’ N latitude and 76°46’ and 84°46’ E longitude. Among the district surveyed the district Chittor lies between 12°37’ and 14°08’ N latitude and 78°03’ and 79°55’ E longitude. Though there is no perennial river in the district but some minor rivers and reservoirs are flowing and passing through the broad valleys of Chandragiri hills found rich habitats for collecting crabs.

The district Nellore known for extensive paddy cultivation endowed with a large number of fresh water land crabs, lies between 13°30’ and 16°00’ N latitude and 70°05’ and 80°15’ E longitude. Pennar is the most important river in the district supporting good habitat for crabs.

Cuddapah is one of the most hilly and biggest district of Andhra Pradesh, lies between 14°27’ and 57°05’ N latitude and 78°49’ and 32°06’ E longitudes. Almost the entire district is drained by Penneru River with its numerous affluent.

Karnool district is situated between 14°54’ and 16°18’ N latitude and 76°58’ and 79°54’E longitude. The principal rivers Tungabhadra with some other important streams are flowing through the forest areas, supports availability of varieties of fresh water crabs.

Anantpur district situated southwest of Andhra Pradesh, between 13°41’ and 15°14’ N latitude and 76°47’ and 78°26’ E longitude. The Chitravati,Hagari and Papaghni are the minor rivers flow into the district. The brachyuran fauna with reference to Gecarcinucid crabs from the state is however very poorly documented. Date back to Wood-Mason (1871) and Alcock (1910) recorded one species Barytelphusa (Barytelphusa) cunicularis (Westwood) from the
state. In recent studies Deb (1998) and Ghosh et al. (2005) recorded another one species *Oziotelphusa senex senex* (Herbst).

Therefore the present work is an attempt to inventories the fresh water Crab (true brachyurans) fauna based on the collection made by the author and other members of SRS. ZSI; Chennai during the period of under study. Altogether 380 examples of fresh water crabs from different niches of these five districts of southern Andhra Pradesh have been examined and accounted four species under three genera belonging to two families which are dealt hereunder with details such as locality, date of collection, collector name, sex and number of examples. The author followed the classification of Bott (1970).

**SYSTEMATIC LIST**

<table>
<thead>
<tr>
<th>Order</th>
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<tr>
<td>Infra order</td>
<td>BRACHYURA</td>
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<tr>
<td>Family</td>
<td>GECARCINUCIDAE</td>
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<tr>
<td>1. <em>Barytelphusa (Barytelphusa) cunicularis</em> (Westwood)</td>
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<td>2. <em>Barytelphusa (Barytelphusa)guerini</em> (Milne-Edwards)</td>
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<tr>
<td>Family</td>
<td>PARATHELPHUSIDAE</td>
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<tr>
<td>3. <em>Oziotelphusa senex senex</em> (Fabricius)</td>
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<tr>
<td>4. <em>Spiralothelphusa hydrodroma</em> (Herbst)</td>
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**SYSTEMATIC ACCOUNTS**

1. *Barytelphusa (Barytelphusa) cunicularis* (Westwood)  
   (Fig. 1)


**Distribution**: India : Assam, Andhra Pradesh, Bihar (undivided), Gujarat, Karnataka, Kerala, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh (undivided) West Bengal (Bürger)

**Elsewhere**: Sri Lanka (Doflein).

**Remarks**: The species attain larger size of about 4 inches in width and 3 inches in length with dark brown colour.
2. **Barytelphusa (Barytelphusa) guerini** (Milne-Edwards)  
(Fig. 2)


**Distribution**: India: Andhra Pradesh; Karnataka; Tamil Nadu.

**Remarks**: This is the first record of occurrence from Andhra Pradesh.

3. **Oziotelphusa senex senex** (Fabricius)  
(Fig. 3)


**Distribution**: India: Andhra Pradesh, Karnataka, and Tamil Nadu.

**Elsewhere**: Sri Lanka.

**Remarks**: This species is predominantly distributed in Andhra Pradesh.

4. **Spiralothe/phusa hydrodroma** (Herbst)  
(Fig. 4)


Distribution: India: Andhra Pradesh, Kerala, Pondicherry, Tamil Nadu, Uttar Pradesh (Allahabad), and West Bengal (Kolkata).

Elsewhere: Sri Lanka.

Remarks: This is the first record of occurrence from southern Andhra Pradesh.

SUMMARY

The present study is based on the collection of Gecarcinucids crabs collected during four surveys, undertaken for southern part of Andhra Pradesh. About 380 specimens accounted for identification which comprises 4 species belonging to 3 genera, under 2 families. Barytelphusa (Barytelphusa) guirine and spiralothenphusa hydrodroma are the first record from the state of Andhra Pradesh

ACKNOWLEDGEMENTS

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REFERENCES


Map. 1: Location of Andhra Pradesh in India
Map. 2: Showing district-wise collection localities
Fig. 1. *Barytelphusa (Barytelphusa) cunicularis* (Westwood)

Fig. 2. *Barytelphusa (Barytelphusa) guerini* (Milne-Edwards)
PLATE - II

Fig. 3. Oziotelphusa senex senes (Fabricius)

Fig. 4. Spiralothenphusa hydrodroma (Herbst)