

# Earthworm (Clitellata, Megadrili) fauna of Kuttanad wetland, southern part of Vembanad-Kol Ramsar site, India

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**Abstract.** The earthworm fauna of the wetlands of India is highly undocumented. We have carried out a survey of earthworms in the Kuttanad wetland, an integral part of the Vembanad-Kol Ramsar Site, India's largest wetland of international importance. Current investigation has documented 17 species belonging to 7 families. *Megascolex travancorensis pentagonalis* Stephenson, 1916 and *Glyphidrilus fluviatilis* Rao, 1922 were reported for the first time since their original descriptions. Based on the current study, *M. t. pentagonalis* is raised to species rank as *M. pentagonalis* from the subspecies status. *G. fluviatilis* and *Lenogaster chittagongensis* (Stephenson, 1917) are new records for the state of Kerala. Present results provide a more complete picture of the earthworm fauna of Kuttanad wetland.

**Keywords.** *Drawida*, Megascolecidae, *Megascolex*, Moniligastridae, Kerala.

## INTRODUCTION

The earthworm fauna of India is highly diverse and is well reported as compared to other Asian countries (Julka *et al.* 2009) with around 451 species (Narayanan *et al.* 2020a, 2021, Tiwari *et al.* 2021). The Indian state of Kerala is a small and narrow strip of land spreading over an area of 38,863 km along the southwest corner of the Indian subcontinent and the earthworm fauna of the state is very rich and fairly well documented compared to other states of India. Various workers have documented the earthworm fauna of the

state since the end of 19<sup>th</sup> century (Fedarb 1898, Michaelsen 1910, Cognetti 1911, Stephenson 1915, Aiyer 1929 *etc.*). About 80% of the currently known species were recorded in the early part of the last century (Narayanan *et al.* 2016a). At present, 120 species of earthworms representing 31 genera in 9 families are recorded from Kerala state (Narayanan *et al.* 2016a, b, c, 2017, 2019a, b, c, 2020b, 2021, 2022, Anuja *et al.* 2020, Lone *et al.* 2022). Wetlands are often termed as 'biological supermarkets' because of the extensive food chains and rich biodiversity they support, providing unique habitats for a wide

range of flora and fauna (Mitsch & Gosselink 2000). The earthworm fauna of Ramsar wetlands of India is not well documented (Chandra *et al.* 2021), except Renuka wetland, Pong Dam and Chander Lake (Julka & Paliwal 2000, Paliwal & Julka 2009, Paliwal 2018). Kuttanad wetland is one of the best-known backwater ecosystems of India and an integral part of India's largest wetland of international importance, the Vembanad-Kol Ramsar site (Narayanan *et al.* 2011). A recent study by the Zoological Survey of India did not report any earthworm species from this wetland (Anon. 2009). Albeit, eight species of earthworms were randomly reported from the various regions of this wetland (Michaelsen 1910, Aiyer 1929, Narayanan *et al.* 2015, 2016d, Anuja *et al.* 2020, 2023). They are *Drawida impertusa* Stephenson, 1920, *Pontoscolex corethrurus* (Müller, 1857), *Argilophilus variabilis* (Aiyer, 1929), *Eukerria kuekenthali* (Michaelsen, 1908), *Lampito mauritii* Kinberg, 1867, *Metaphire houlleti* (Perrier, 1872), *Megascolex insignis* Michaelsen, 1910 and *M. konkanensis* Fedarb, 1898. Among these seven were reported before independence. Here we provide new earthworm records from the Kuttanad wetland, based on collections carried out between 2010 and 2022.

## MATERIALS AND METHODS

Kuttanad is a highly complex wetland ecosystem, primarily a deltaic formation of four-river systems, namely, Achencovil, Pamba, Manimala and Meenachil, located in the fertile low-lying areas of Vembanad estuarine system in the Kerala state of southwest India (Fig. 1) (John *et al.* 2009). This region lies between 9°8' – 9°52'N and 76°9' – 76°44'E, with a geographical area of 1,100 km<sup>2</sup> which spreads over Alappuzha, Kottayam and Pathanamthitta districts and separated from the Arabian Sea by a narrow strip of land (Shari & Chitra 2005, John *et al.* 2009, Narayanan *et al.* 2011). Kuttanad wetlands has many characteristic features compared to the other wetlands of the world, one distinct feature is that it lies 0.6 to 2.5 m below mean sea level, receives nearly 3,200

mm of annual rainfall through two monsoon seasons, with uniform high air and water temperature (22–35°C), having humidity ranges between 70–80% throughout the year (John *et al.* 2009).

The area comprises flood plains, coastal alluvial belt, river networks, numerous canals, large paddy fields, lakes, and remains water-logged almost throughout the year, subjected to continued flood submergence during monsoon and saline water ingress during the summer months (John *et al.* 2009, Narayanan *et al.* 2011). Kuttanad wetland has 53,639 ha of paddy fields and is known as the 'rice bowl of Kerala'. Most of these paddy fields remain submerged in water during the non-crop season and water has to be pumped out to the backwaters before the commencement of the cultivating season (Sashikumar & Palot 1996). Based on the soil, pH, geomorphology and salinity intrusion, Kuttanad is subdivided into six agro-ecological zones *viz.*, Vaikom Kari, North Kuttanad, Kayal lands, Lower Kuttanad, Upper Kuttanad, and Purakkad Kari (Indo-Dutch Mission 1989).

Earthworms were collected primarily by digging and hand sorting method (Julka 1990) from various habitats, such as dykes, home surroundings, paddy fields, recently reclaimed wetlands by filling the lateritic soils from the midland hills, grassy patches, wooded areas, in detritus and other natural substrates, also handpicked from soils under logs, branches, rocks, stones *etc.* Collected live specimens were placed in small plastic bags along with the substrate. Later collected specimens were washed and preserved in 5% formalin, if possible in the field itself. All anatomical observations were made by dorsal dissection under binocular stereomicroscope (Nikon SMZ800 N). Specimens were identified following standard literatures (Stephenson 1923, Aiyer 1929, Gates 1972, Julka 1988, Blakemore 2012, Chanabun *et al.* 2013). Identified specimens were deposited in the earthworm laboratory of the Advanced Centre of Environmental Studies and Sustainable Development (ACCESSD), Mahatma Gandhi University, Kerala, India.

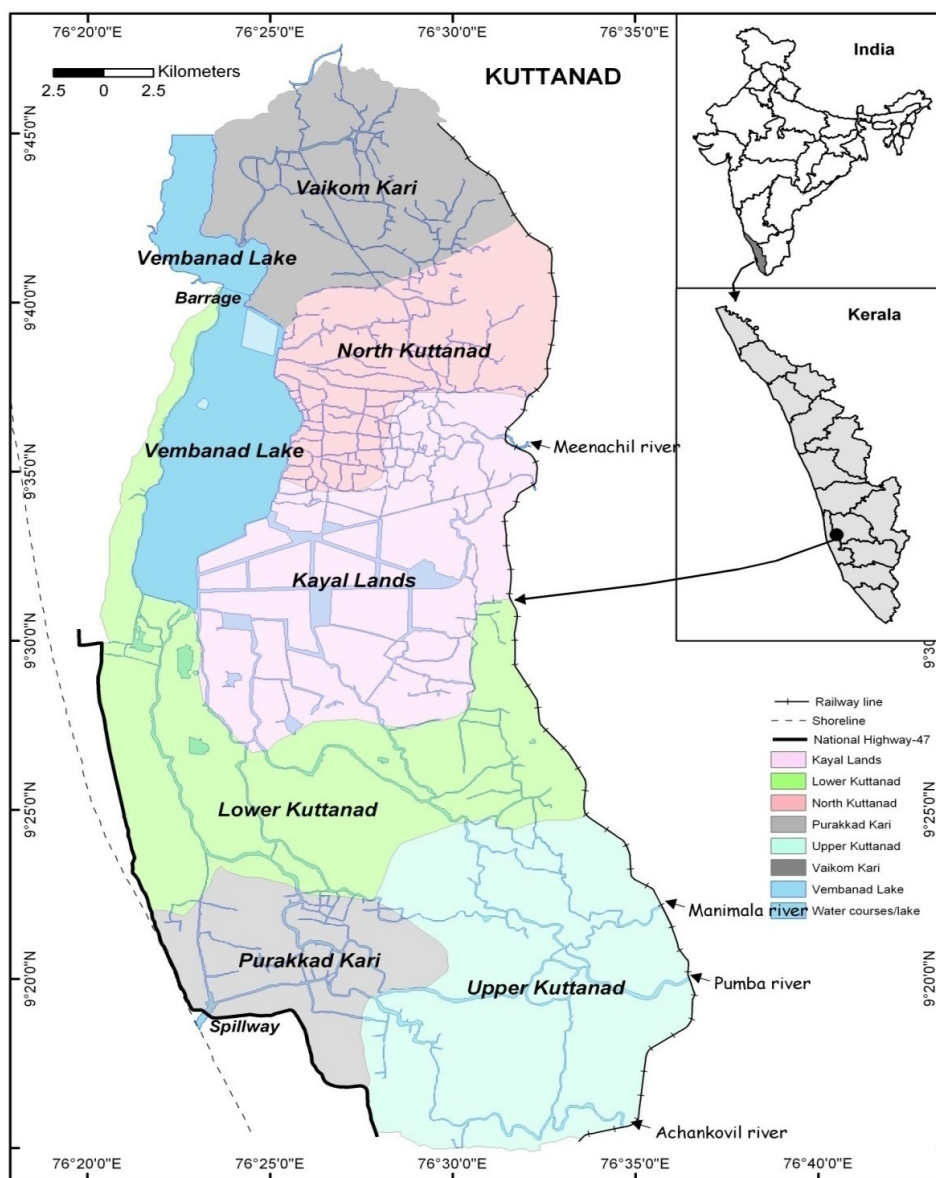


Figure 1. Location of the Kuttanad wetland in southwest India

## TAXONOMY

**Family Moniligastridae Claus, 1880**

***Drawida ghatensis* Michaelsen, 1910**

*Drawida ghatensis* Michaelsen, 1910: 52.

*Material examined.* 1 a clitellate (ACCESSD/EW/1030), Aymanam, Kottayam Dist., Kerala, home garden, 03.01.2018, leg. G. Sreekumar; 1

a clitellate (ACCESSD/EW/1072), Kumarakom (9.6175°N 76.4301°E), Kottayam Dist., Kerala, near pond, 07.03.2019, leg. G. Sreekumar; 2 juveniles, 9 a clitellates, 1 clitellate (ACCESSD/EW/1520), Vadayar (9°45'29"N 76°26'50"E), Kottayam Dist., Kerala, edge of paddy field, 12.10.2022, leg. S.P. Narayanan, V.T. Kurien.

*Distribution in Kerala.* Aymanam, Kumarakom, Vadayar (new records), Anikadu, Aruva-

pulam, Athirampuzha, Bonacaud, Charupara, Kadakkal, Kakkara, Kalleli, Karimbinthodu, Kavalai in Forest Tramway, Kottayam, Kulathupuzha, Kurichi, Maddathoray, Marangatupally, Mukkunn Reserve Forest, Munnilavu, Nedumkunnam, Neyyar Wildlife Sanctuary, Njaloor, Orekar, Pinangathodu, Plassinal, Ponthenpuzha, Ponmudi, Pulpally, Puthuvely, Road to Valiyaparathodu (Silent Valley National Park), Thenmala, Thiruvalla (Michaelsen 1910, 1913, Stephenson 1915, Aiyer 1929, Julka & Chandra 1986, Narayanan et al. 2014, 2016a, Nair et al. 2015, Stahrumithra et al. 2018, John et al. 2019, Thakur et al. 2021, Anuja et al. 2023).

*Remarks.* Endemic to India. Thakur et al. (2021), reported *D. ghatensis* from Neyyar Wildlife Sanctuary of Kerala and as per the description provided, prostate is ovoid or thickly pear-shaped, as stated by Stephenson (1923). But later Julka & Chandra (1986) described the prostate as shortly stalked and ovoidal that means ‘mushroom-shaped’ with a figure. In Thakur et al.’s figure (4C) *vas deferens* joins the prostate at its lateral side. But in Stephenson (1915) *vas deferens* joins the prostate at its anterior face. Therefore, this record needs further corroboration. *D. ghatensis* is a species complex, shows great variation with respect to the shape of the spermathecal atrium (Stephenson 1915, 1923; Aiyer, 1929; Julka & Chandra, 1986). But Thakur et al. (2021) present initiation of the DNA barcode signatures (COI) of this group will be helpful in future to resolve taxonomical problems in this species complex.

#### ***Drawida impertusa* Stephenson, 1920**

*Drawida barwelli* var. *impertusus* Stephenson, 1920: 200.

*Drawida barwelli* var. *impertusa*: Stephenson 1923: 134.

*Drawida impertusa* (Stephenson): Gates 1965: 87.

*Material examined.* 1 juvenile, 6 clitellates (ACESSD/EW/1094), Perumthuruthu (9°41'22.7"N 76°27'49.5"E), Kottayam Dist., Kerala, paddy field, 21.12.2018, leg. R. Anuja; 2 a clitellates, 2 clitellates (ACESSD/EW/1482), Illichira (9°20'23"N 76°23'7"E), Alappuzha Dist., Kerala, dyke

with grass patch close to *Pandanus* stand, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 2 juveniles, 7 a clitellates (ACESSD/EW/1487), Edathua (9°21'47"N 76°28'52"E), Alappuzha Dist., Kerala, home surrounding, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 1 juvenile, 2 a clitellates, 2 clitellates (ACESSD/EW/1488), Mepral (9°21'47" N 76°28'52" E), Pathanamthitta Dist., Kerala, home surroundings in paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 7 a clitellates, 10 clitellates (ACESSD/EW/1491), Karumadi (9°22'48"N 76°23'12"E), Alappuzha Dist., Kerala, open grassy (*Axonopus compressus*) area in a dyke, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 2 a clitellates (ACESSD/EW/1502), Chennithala (9°16'43"N 76°30'10" E), Alappuzha Dist., Kerala, home surrounding in a reclaimed land within paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 3 clitellates (ACESSD/EW/1524), Pattassery near Neelamperoor (9°31'3"N 76°30'32"E), Kottayam Dist., Kerala, home surroundings within paddy field, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien; 2 a clitellates (ACESSD/EW/1526), Kainady (9°30'4"N 76°28'28"E), Alappuzha Dist., Kerala, bund between paddy field and lake, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien; 2 juveniles, 1 clitellate (ACESSD/EW/1529), Paral (9°26'57"N 76°31'32"E), Kottayam Dist., Kerala, reclaimed land in wetland, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien; 4 a clitellates (ACESSD/EW/1537), Kainakari (9°29'4"N 76°23'3"E), Alappuzha Dist., Kerala, bund with tree near river, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien; 1 a clitellate, 1 clitellates (ACESSD/EW/1562), Cheepungal (9°38'26.2"N 76°25'16.9"E), Kottayam Dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V.T. Kurien.

*Distribution in Kerala.* Cheepungal, Chennithala, Edathua, Illichira, Kainady, Kainakari, Karumadi, Mepral, Paral, Pattassery near Neelamperoor, Perumthuruthu (new records), Anikadu, Kanjikode, Kanjirapally, Karimbinthodu, Kerumaadi (Karumady, Karumadi), Marangatupally, Monipally, Munnilavu, Pallikathodu, Peppara Wildlife Sanctuary, Perumthuruthu, Thiruvella (Thiruvalla), Vandiperiyar (Michaelsen 1910,

Aiyer 1929, Gates 1965, Kathireswari et al. 2005, Thakur et al. 2021, Anuja et al. 2023).

*Remarks.* Native peregrine (Narayanan et al. 2016a). Thakur et al. (2021) records from Peppara Wildlife Sanctuary of Kerala state needs further corroboration. Since, certain key characters given and the figures provided are not matching. Genital markings are very rare in *Drawida* (Gates 1972), Thakur et al. (2021) themselves stated same in paper (Thakur et al. 2021: 123). Hence, the presence of genital marking is of great importance in species level identification of *Drawida*. In *D. impertusa* genital markings are always present (Gates 1965), as a pair of fairly large, oval whitish papillae on segment 10 in front of the male pores (Stephenson 1923, Aiyer 1929, Gates 1965, Blakemore 2012). Thakur et al. mentioned the presence of whitish papillae in front of the male pores, but such papillae are not shown in the figure of the species provided. Thakur et al. described the prostate as spherical or sometimes pear-shaped, glandular, duct (*vas deferens*?) joins at the anterior end. But as per Stephenson (1923), Aiyer (1929) and Blakemore (2012) and our personal observations, prostates are glandular, sessile and circular (spheroidal), and the vas deferens joins the prostate at its antereo-median side (Aiyer 1929, Gates 1965).

#### ***Drawida travancorensis* Michaelsen, 1910**

*Drawida travancorensis* Michaelsen, 1910: 46.

*Material examined.* 2 a clitellates (ACCESSD/EW/1376), Neelamperoor (9°29'48"N 76°30'21"E), Alappuzha Dist., Kerala, home surroundings in lateritic soil within Kuttanad, 08.10.2021, leg. Sreehari Mohan.

*Distribution in Kerala.* Neelamperoor (new record), Anchal, Anikadu, Chadayamangalam, Edamarug, Ezhukone, Illikalkallu, Kanjirapally, Karimbithodu, Kodanoor, Kolazhy, Kottayam, Marangatupally, Meenadam, Melukavu, Monipally, Munnilavu, near Thangalpara - Vagamon, Nedumkunnam, Pampady, Pangada, Peppara Wildlife Sanctuary, Plassinal, Ponthenpuzha,

Poonjar, Puthuvely, Tenmalai, unspecified locality within Wayanad forest, Uzhavoor, Vattiyoor-kavu, Vembayam (Michaelsen 1910, Aiyer 1929, Nair et al. 2007, 2015, Kushwaha et al. 2015, Narayanan et al. 2016a, Athira et al. 2016, Kumari et al. 2021a, Anuja et al. 2023).

*Remarks.* Endemic to southwest India. Often misspelled as *D. travancorensis* (Thakur et al. 2021, Reynolds & Wetzel 2023).

#### **Family Acanthodrilidae Claus, 1880**

##### ***Lenogaster chittagongensis* (Stephenson, 1917)**

*Eudichogaster chittagongensis* Stephenson, 1917: 411.  
*Lenogaster chittagongensis* (Stephenson): Gates 1940: 192.

*Material examined.* 5 clitellates (ACCESSD/EW/1076), Ramankary (9°25'27"N, 76°27'55"E), Alappuzha Dist., Kerala, homestead, 11.08.2019, leg. S.P. Narayanan.

*Distribution in Kerala.* Ramankary (new record for the state).

*Remarks.* Subendemic species. As of now it is known only from this site in the state.

#### **Family Almidiae Duboscq, 1902**

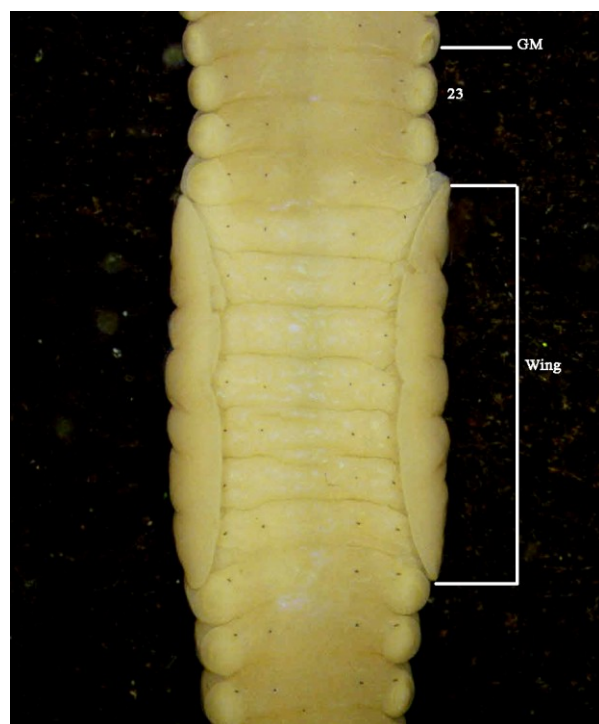
##### ***Glyphidrilus annandalei* Michaelsen, 1910**

(Figure 2)

*Glyphidrilus annandalei* Michaelsen, 1910: 101.  
*Glyphidrilus achencoili* Cognetti, 1911: 506 (*lapsus*).  
*Glyphidrilus rarus* Rao, 1922: 64.  
*Glyphidrilus safforensis* Rao, 1922: 66.

*Material examined.* 1 juvenile (ACCESSD/EW/861), Neendoor (9°41'33.8"N 76°29'29.2"E), Kottayam Dist., Kerala, paddy field, 12.12.2018, leg. R. Anuja, S. Sathrumithra, V. T. Kurien; 1 juvenile, 1 clitellate (Fig. 2) (ACCESSD/EW/1525), Kainady (9°30'4"N 76°28'28"E), Alappuzha Dist., Kerala, paddy field, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien.





**Figure 2.** *Glyphidrilus annandalei* Michaelsen, 1910, wings – ventral view. GM = genital marking.

*Distribution in Kerala.* Kainady (new record), Achencoil (Achankovil) River banks, Calicut (Kozhikode), Chathannoor, Chavara, Jaithy Field (Jagathy?), Karunagapally, Kottiyam, Kurichi, Madathoray (Madathara), Malabar, Malapuram (Malappuram), Neendoor, Neyyantinkara, Periya, Quilon (Kollam), Tiruvallur, Trivandrum (Thiruvananthapuram), Vatakara, Vellany (Vellayani) (Michaelsen 1910, 1913, Cognetti 1911, Stephenson 1916, ElAmmari *et al.* 2015; Nair *et al.* 2015, Narayanan *et al.* 2016a, Deepthi & Kathireswari 2016, George *et al.* 2017, Sathrumithra *et al.* 2018, Anuja *et al.* 2023).

*Remarks.* Endemic to India.

### ***Glyphidrilus fluviatilis* Rao, 1922**

(Figure 3)

*Glyphidrilus fluviatilis* Rao, 1922: 53.  
*Glyphidrilus annandalei* (Rao): Stephenson 1922: 387.  
*Glyphidrilus fluviatilis*: Chanabun *et al.* 2013: 27.

*Material examined.* 4 juveniles, 1 clitellate (ACCESSD/EW/1494), Mukkada (9°20'29"N 76°25'5"E), Alappuzha Dist., Kerala, paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien.

*Description.* Dimension: Clitellate – length 173 mm, width 3.5 mm (at segment 25), segment number 332. Setae lumbricine, body cylindrical in the anterior region, quadrangular behind clitellum. Clitellum annular in segments 13–38; ventrolateral clitellar wing (Fig. 3A) is in segments 25–31. Dorsal pores absent, male pores, female pores, spermathecal pores invisible. Genital markings present (Fig. 3B), in segments 13–24, 33, 34, 35 paired on *bc* setal lines; median single one on segments 12–22, 37–39 on *aa* setal lines.

*Distribution in Kerala.* Mukkada (new record).

*Remarks.* Endemic to India. New addition to the Kerala state, previously it was known only from Madapur (= Madapura), Fraserpett (Kushalnagar), Shimoga (Shivamogga) of Karnataka state and Narayan of Vordevia Dicu (Karnataka state?) (Rao 1922, Chanabun *et al.* 2013).

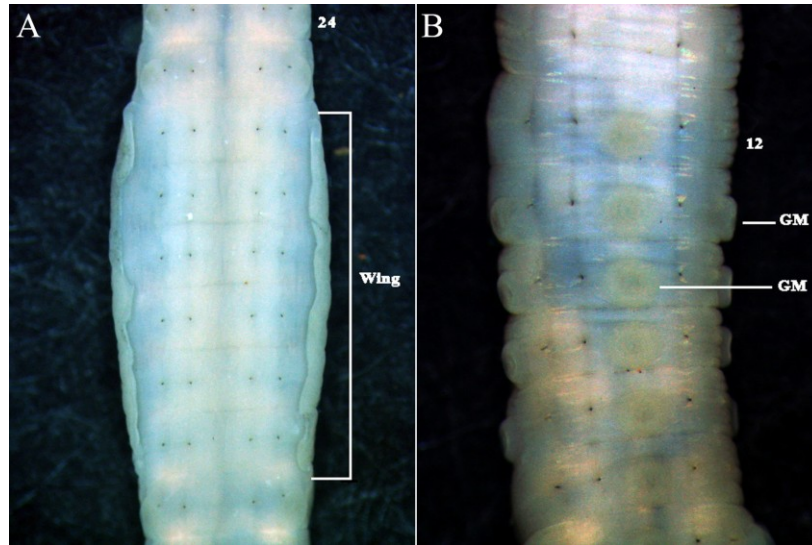
### **Family Benhamiidae Michaelsen, 1897**

#### ***Dichogaster bolau* (Michaelsen, 1890)**

*Benhamia bolavi* (corr. *bolau*) Michaelsen, 1891: 9.  
*Dichogaster* (*Diplotheodrilus*) *bolau*: Csuzdi 2010: 102 (for complete synonymy).

*Material examined.* 1 juvenile, 1 acitellate, 13 clitellates (ACCESSD/EW/9), Ramankary (9°25'27"N 76°27'55"E), Alappuzha Dist., Kerala, roof top of house, 30.12.2010, leg. S.P. Narayanan; 2 clitellates (ACCESSD/EW/9), Ramankary (9°25'27"N 76°27'55"E), homestead, 08.06.2016, leg. S.P. Narayanan; 18 clitellates (ACCESSD/EW/1319), Ramankary (9°25'27"N 76°27'55"E), from decaying leaf litter on roof top, 19.09.2021, leg. S.P. Narayanan.

*Distribution in Kerala.* Ramankary (new record), Athirampuzha, Ernakulam, Kanjikode, Kottikal, Monipally, Neyyattinkara, Periya, Trivand



**Figure 3.** *Glyphidrilus fluviatilis* Rao, 1922: A = Ventral view of wings; B = Ventral view of anterior portion. GM = genital marking.

rum (Thiruvananthapuram), Vatakara (Michaelsen 1910; Stephenson 1916; Kathireswari *et al.* 2005b, Narayanan *et al.* 2014a, Deepthi & Kathireswari 2016, George *et al.* 2017, Anuja *et al.* 2023).

*Remarks.* Exotic species. One of the most widespread peregrine earthworm species in the world (Csuzdi *et al.* 2008).

#### **Family Megascolecidae Rosa, 1891**

#### ***Amyntas alexandri* Beddard, 1901**

*Amyntas alexandri* Beddard, 1901: 999.

*Amyntas alexandri*: Blakemore 2012: 331 (for complete synonymy).

*Material examined.* 1 juvenile (ACCESSD/EW/1122), Ramankary (9°25'27"N 76°27'55" E), Alappuzha Dist., Kerala, road side, 11.08.20 19, leg. S.P. Narayanan; 4 clitellates (ACCESSD/EW/1517), Neendoor (9°41'33"N 76°29'29"E), Kottayam Dist., Kerala, roadside in paddy field, 12.10.2022, leg. S.P. Narayanan, V.T. Kurien; 1 clitellate (ACCESSD/EW/1533), Veliyanadu (9°26'43"N 76°27'49"E), Alappuzha Dist., Kerala, reclaimed land in wetland, beneath decaying tree

trunk, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien.

*Distribution in Kerala.* Neendoor, Ramankary, Veliyanadu (new records), Adakasthala, Changuvetty, Chempala, Devi Estate Pettickal (Attappady), Kaniyambatta, Kooriyad, Manjeswaram, Nellikkuzhy, Ponpally, Pulpally, Thazhesambarkode - Attappady, Vallikadavu, Vazhakkulam (Narayanan *et al.* 2016b; Sathrumithra *et al.* 2018; John *et al.* 2019)

*Remarks.* Exotic species, widely distributed in the world (Blakemore 2012). Narayanan *et al.* (2016b) reported this species for the first time from the state. Now its range is expanding within the state.

#### ***Lampito mauritii* Kinberg, 1857**

*Lampito mauritii* Kinberg, 1867: 103; Blakemore 2012: 331 (for complete synonymy).

*Material examined.* 1 clitellate (ACCESSD/EW/866), Neendoor (9°41'33.8"N 76°29'29.2" E), Kottayam dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V.T. Kurien; 4 a clitellates, 1 clitellate (ACCESSD/

EW/870), Perumthuruthu (9°41'22.7"N 76°27'49.5"E), Kottayam dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V. T. Kurien; 1 juvenile, 6 clitellates (ACCESSD/EW/1095), Perumthuruthu (9°41'22.7"N 76°27'49.5"E), Kottayam dist., Kerala, paddy field, 21.12.2018, leg. R. Anuja; 2 clitellate (ACCESSD/EW/1480), Illichira (9°20'23"N 76°23'7"E), Alappuzha Dist., Kerala, dyke with grass patch close to *Pandanus* stand, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 1 juvenile (ACCESSD/EW/1492), Karumadi (9°22'48"N 76°23'12"E), Alappuzha Dist., Kerala, open grassy (*Axonopus compressus*) area in a dyke, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 5 clitellates (ACCESSD/EW/1532), Veliyanadu (9°26'43"N 76°27'49"E), Alappuzha Dist., Kerala, reclaimed land in wetland, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien.

*Distribution in Kerala.* Illichira, Karumadi, Veliyanadu (new records), Chittur, Ernakulam, Kanjikode, Kerumaadi (Karumady), Killipalam, Kolazhy, Murukunpuzha, Neduvathoor, Neendoor, Oachira, Ollur, Palakkad town, Pallode, Paravoor, Peringandoor, Perumthuruthu, Shasthancottah (Sathamkotta), Shertalay (Cherthala), Trichur (Thrissur), Trivandrum (Thiruvananthapuram), Vanchiyoor, Vatakara, Vazhote, Vazhuthakaud (Michaelsen 1910, 1913, Cognetti 1911; Kathireswari et al. 2005, Nair et al. 2007, 2015, Manazhy et al. 2013, ElAmmari et al. 2015, Athira et al. 2016, Deepthi & Kathireswari 2016, Jacob et al. 2017, Sreelekshmi et al. 2017, Anuja et al. 2023).

*Remarks.* Native peregrine species (Narayanan et al. 2016a). Acquired wide global distribution (Blakemore 2012).

#### ***Megascolex konkanensis* Fedarb, 1898**

*Megascolex konkanensis* Fedarb, 1898: 434.

*Material examined.* 1 clitellate (ACCESSD/EW/867), Perumthuruthu (9°41'22.7"N 76°27'49.5"E), Kottayam dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V.T.

Kurien; 3 clitellates (ACCESSD/EW/1073), Kumarakom (9.6175°N 76.4301°E), near pond, 07.03.2019, leg. Sidharth Mohan; 1 juvenile, 1 a clitellate, 1 clitellate (ACCESSD/EW/557), Ramankary (9°25'27"N 76°27'55"E), Alappuzha Dist., Kerala, homestead, 18.01.2016, leg. S.P. Narayanan; 3 juveniles (ACCESSD/EW/1377), Neelamperoor (9°29'48N 76°30'21"E), home surroundings in lateritic soil within Kuttanad, 08.10.2021, leg. Sreehari Mohan; 1 clitellate (ACCESSD/EW/1483), Eramathoor (9°18'27"N 76°31'27"E), Alappuzha Dist., Kerala, homestead near paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 1 juvenile, 1 clitellate (ACCESSD/EW/1515), Neendoor (9°41'33"N 76°29'29"E), Kottayam Dist., Kerala, roadside in paddy field, 12.10.2022, leg. S.P. Narayanan, V.T. Kurien; 1 clitellate (ACCESSD/EW/1530), Paral (9°26'57"N 76°31'32"E), Kottayam Dist., Kerala, reclaimed land in wetland, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien.

*Distribution.* Eramathoor, Kumarakom, Neelamperoor, Neendoor, Paral, Ramankary (new records), Amalagiri, Aryankavu, Athirampuzha, Calicut (Kozhikode), Chempala, Chennithala, Chittur, Elavathur, Engandiyur, Ernakulam, Kadakkal, Kalady, Kalleli, Kaniyambatta, Kanjikode, Karimbithodu, Kavalai, Kerumaadi (Karumadi), Kokkathodumoozhy, Kottayam, Kulattupuzha (Kulathupuzha), Kummanoor, Maddathoray (Madathara), Manalithara, Maneera, Meenadam, Mlappara in Periyar National Park, Monipally, Muthalamada, Palghat (Palakkad), Pangada, Parambikulam road – Muthalamada, Pathanapuram, Peechi, Perumthuruthu, Pinanganthodu, Pulpally, Puthuvely, Quilon (Kollam), Shasthancottah (Sathamkotta), Thenmala Reservoir – Shendurney Wildlife Sanctuary, Thiruvanjoor, Tirur, Tiruvallur, Travancore, Trivandrum (Thiruvananthapuram), Vettoor (Fedarb 1898, Michaelsen 1910, Stephenson 1916, 1925b, Kathireswari et al. 2005, Narayanan et al. 2014, 2016a, 2019b, Balachandran et al. 2015, El Ammari et al. 2015, Nair et al. 2015, Athira et al. 2016, Jacob et al. 2017, Sreelekshmi et al. 2017, Sathrumithra et al. 2018, John et al. 2019, Chandini et al. 2021, Lone et al. 2022, Anuja et al. 2023).



*Remarks.* Endemic to India. Intestine origin is of species specific importance in the identification of *Megascolex* species. In this species the intestine begins in segment 16 (Fedarb 1898, Stephenson 1923), whereas in Lone *et al.* (2022) specimens it starts from segment 18. Moreover Lone *et al.* (2022) figures (5a and 5b) depicting the genital region and spermathecae of *M. konkanensis* is not corresponding with the actual description of *M. konkanensis*. The provided genital region figure is matching with the description of *M. cochinesis* Stephenson, 1915 and not with *M. konkanensis*. Hence due to Lone *et al.* (2022) contradicting anatomical features and figures provided, the identity of the species from Parambikulam road – Muthalamada, Thenmala Reservoir – Shendurney Wildlife Sanctuary, Mlappara in Periyar National Park needs further corroboration.

***Megascolex pentagonalis* Stephenson, 1916  
stat. rev.**

(Figure 4)

*Megascolex pentagonalis* Stephenson, 1916: 331.

*Megascolex travancorensis* var. *pentagonalis* Stephenson: Stephenson 1923: 278.

*Megascolex travancorensis pentagonalis* Stephenson: Blakemore 2007: 37.

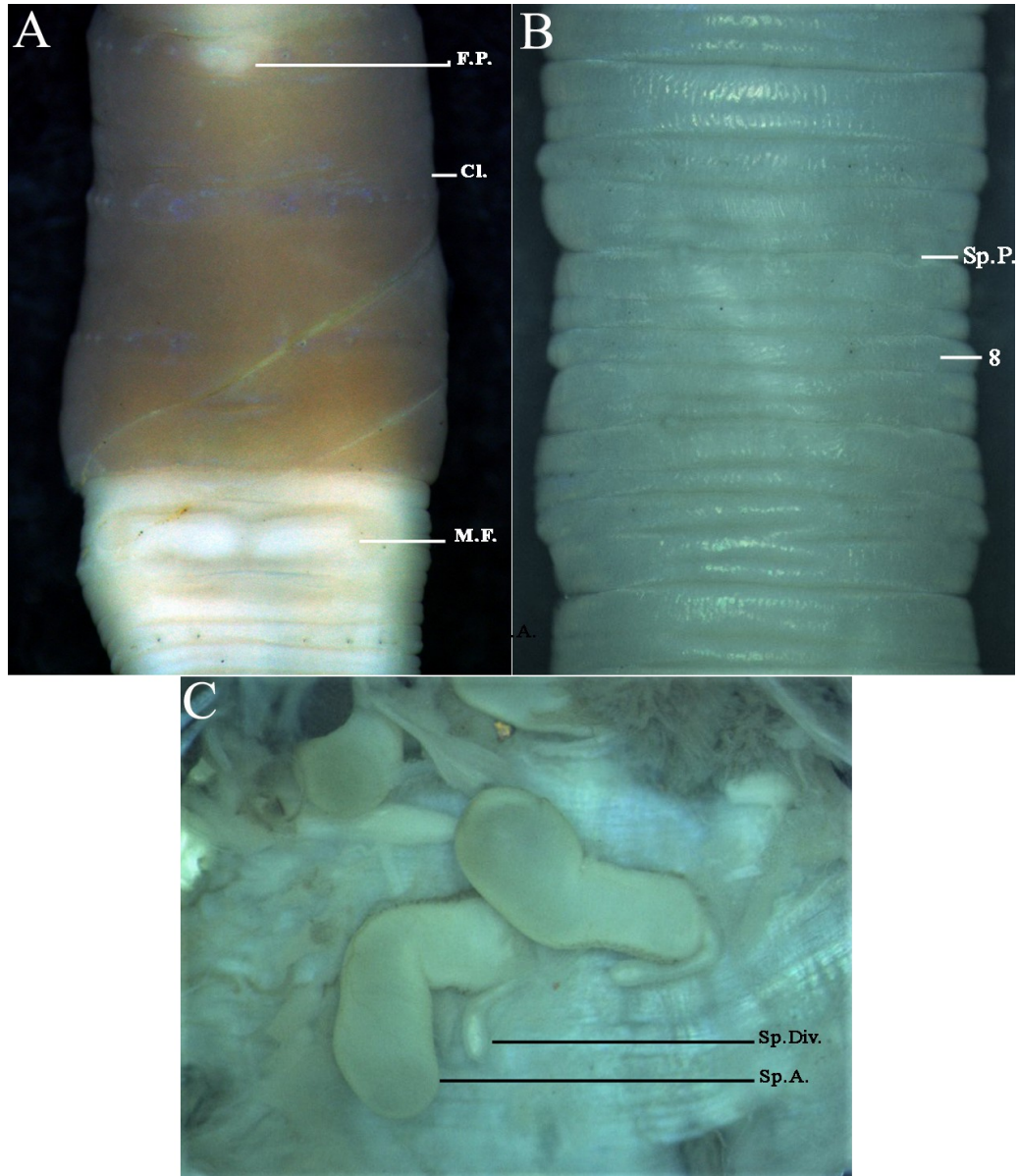
*Material examined.* 7 clitellates and 2 juveniles, (ACCESSD/EW/1501), Chennithala (9°16'43"N 76°30'10"E), Alappuzha Dist., Kerala, home surrounding in a reclaimed land within paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 1 juvenile, 1 clitellate (ACCESSD/EW/1504), Eramathoor (9°18'27"N 76°31'27"E), Alappuzha Dist., Kerala, homestead close to paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien.

*Description.* Dimension: clitellate – length 274 mm, width 6 mm, segments 331, and juvenile – length 272 mm, width 5.5 mm, segments 417. Colour a uniform medium grey. Secondary annulations present in segments 7–9. Anterior end truncated. Setae enlarged at the anterior portions. Prostomium combined pro-epilobic. First dorsal pore in intersegmental furrow 5/6, indication

present in furrow 4/5. Ventral setae in regular longitudinal lines, dorsal setae are not. Clitellum light pinkish cream colour (in life), in segments 14–17 (3¼). Male field on segment 18, pentagonal in shape, with the base forwards, the whole occupying the anterior 2/3<sup>rd</sup> of segment; lateral area to outwards, the whole area surrounded by a groove and marked by an inverted T-shaped depression (Fig. 4A). Spermathecal pores small, in intersegmental furrows 7/8/9, in line with *b* (Fig. 4B). Septa 6/7–10/11 thickened, following septa are moderately thickened, gradually thinner as far as 16/17. Gizzard barrel-shaped, in segment 5. Last heart in segment 13. Holandric, testes and funnels free in segment 10 and 11, seminal vesicles in segments 11, and 12. Intestine begins in segment 16. Prostates racemose, large, elongated band-like or irregularly rectangular, incised, in segments 17–20; prostatic duct muscular, shiny, ectal end thicker, transversely placed, gradually thinner at ental end, sinuous, with a bent and twisted before entering the gland. Spermathecal ampulla large, sausage-shaped, bent, ental end slightly dilated (Fig. 4C); duct short, half as thick as ampulla; spermathecal diverticulum arising from the ental end of the duct, more than half as long as ampulla, tubular, thin, with a slight dilatation at ental end.

*Distribution in Kerala.* Chennithala, Eramathoor (new records), Trivandrum (Thiruvananthapuram) (Stephenson 1916).

*Remarks.* Endemic (Narayanan *et al.* 2016a). Earlier it was known only from the type locality. One clitellate and 1 juvenile worms are in full length the rest lost posterior portion while collecting. *M. pentagonalis* initially described at species rank by Stephenson (1916), but later he treated it as a subspecies of *M. travancorensis* Michaelsen, 1910 (Stephenson 1923). There are considerable differences in the male field, dimensions and shape of spermathecae in all the five subspecies of *M. travancorensis*. Due to these facts and based on the present study, *M. t. pentagonalis* is elevated to species rank as *M. pentagonalis* Stephenson, 1916.



**Figure 4.** *Megascolex pentagonalis* Stephenson, 1916: A = Male field; B = Spermathecal pore region; C = Spermathecae of the right hand side. *Cl.* = clitellum, *F.P.* = female pore, *M.F.* = male field, *Sp.A.* = spermathecal ampulla, *Sp.Div.* = spermathecal diverticulum, *Sp.P.* = spermathecal pore.

***Metaphire houlleti* (Perrier, 1872)**

*Perichaeta houlleti* Perrier, 1872: 99.

*Metaphire houlleti*: Blakemore 2012: 478 (for complete synonymy).

*Material examined.* 2 clitellates (ACESSD/EW/70), Ramankary (9°25'27"N 76° 27'55"E), Alappuzha Dist., Kerala, home surroundings,

12.10.2012, leg. S.P. Narayanan; 1 clitellate (ACESSD/EW/868), Perumthuruthu (9°41'22.7" N 76°27'49.5"E), Kottayam dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V. T. Kurien; 13 clitellate (ACESSD/EW/1485), Eramathoor (9°18'27"N 76°31'27"E), Alappuzha Dist., Kerala, homestead near paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 4 clitellate (ACESSD/EW/1486), Edathua (9°21'

47°N 76°28'52"E), Alappuzha Dist., Kerala, home surrounding, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 6 clitellates (ACCESSD/EW/1489), Mepral (9°21'47"N 76°28'52"E), Pathanamthitta Dist., Kerala, home surroundings in paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 3 clitellates (ACCESSD/EW/1516), Neendoor (9°41'33" N 76°29'29" E), Kottayam Dist., Kerala, roadside in paddy field, 12.10.2022, leg. S.P. Narayanan, V.T. Kurien; 1 clitellate (ACCESSD/EW/1531), Veliyanadu (9°26'43" N 76°27'49" E), Alappuzha Dist., Kerala, reclaimed land in wetland, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien.

*Distribution in Kerala.* Edathua, Eramathoor, Mepral, Neendoor, Veliyanadu (new records), Athirampuzha, Changanacherry, Changuvetty, Chathurangappara, Chelamattom, Chempakathozhukudy, Chennithala, Chevayur near Calicut (Kozhikode), Chorayankundu, Edakadathy, East Okkal, Ethanur, Jellippara, Kadambupara, Kalady, Kallar, Karicode, Karippanthodu, Koratty, Kuttamathu temple - Cheruvathoor, Manjery, Manjeshwar, Marottikkadavu, Moovattupuzha, Muthalamada, Paloor streamside – Muthoor, Parapuram, Pattal, Perumthuruthu, Ponpally, Pozhuthana, Pulpally, Puthuppady, Ramankary, Sivajipuram, Thiruvengappura, Travancore, Trichur (Thrissur), Trivandrum (Thiruvananthapuram), Vandiperiyar, Vazhichal, Vengoor, Virakuthodu – Chimmony Wildlife Sanctuary, Vythiri (Fedarb 1898, Michaelsen 1910, Stephenson 1916, Gates, 1934, 1937, Narayanan et al. 2014a, 2015, 2019b, Balachandran et al. 2015, Sathrumithra et al. 2018, John et al. 2019, Chandini et al. 2021, Anuja et al. 2023).

*Remarks.* Exotic species (Narayanan et al. 2016a) with cosmopolitan distribution (Blakemore 2012).

### ***Perionyx ceylanensis* Michaelsen, 1903**

*Perionyx ceylanensis* Michaelsen, 1903: 6.

*Material examined.* 1 acitellate, 1 clitellate (ACCESSD/EW/719), Kidangara, paddy field, 28.12.2016, leg. S.S. Nair.

*Distribution in Kerala.* Kidangara (new record), Pozhuthana, Pulpally, Silent Valley National Park, Wayanad Wildlife Sanctuary (Mohan et al. 2011, John et al. 2019).

*Remarks.* Subendemic species (Narayanan et al. 2016a), outside India it is known only from Sri Lanka.

### ***Perionyx excavatus* Perrier, 1872**

*Perionyx excavatus* Perrier, 1872: 126; Blakemore 2012: 283 (for complete synonymy).

*Material examined.* 2 clitellates (ACCESSD/EW/588), Ramankary (9°25'27"N 76°27'55"E), Alappuzha Dist., Kerala, homestead, 08.06.2016, leg. S.P. Narayanan; 1 clitellate (ACCESSD/EW/1268), Ramankary (9°25'27"N 76°27'55"E), Alappuzha Dist., Kerala, from bathroom wall, 16.01.2021, leg. S.P. Narayanan; 1 clitellate (ACCESSD/EW/1305), Ramankary (9°25'27"N 76°27'55"E), alt. 0 m asl, 18.07.2021, leg. S.P. Narayanan; 2 juveniles, 3 clitellates (ACCESSD/EW/1534), Veliyanadu (9°26'43"N 76°27'49"E), Alappuzha Dist., Kerala, reclaimed land in wetland, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien.

*Distribution in Kerala.* Ramankary, Veliyanadu (new records), Athirampuzha, Kalady, Kalleli, Karumam, Monipally, Muthalamada, Orekar, Periya, Thalamanan, Vellayambalam, Vettoor (Nair et al. 2007, Manazhy et al. 2013, Narayanan et al. 2014a, Balachandran et al. 2015, George et al. 2017, Sathrumithra et al. 2018, Chandini et al. 2021, Anuja et al. 2023).

*Remarks.* Native peregrine species (Narayanan et al. 2016b), it acquired wide global distribution.

### **Family Ocnerodrilidae Beddard, 1891**

#### ***Eukerria kuekenthali* (Michaelsen, 1908)**

*Kerria kuekenthali* Michaelsen, 1908: 24.

*Eukerria kuekenthali*: Blakemore 2012: 182 (for complete synonymy).

*Material examined.* 16 clitellates, 184 a clitellates (ACCESSD/EW/872), Cheepunkal (9°38'26.2"N 76°25'16.9"E), Kottayam Dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V.T. Kurien; 1 clitellate (ACCESSD/EW/1479), Illichira (9°20'23"N 76°23'7"E), Alappuzha Dist., Kerala, dyke with grass patch close to *Pandanus* stand, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien.

*Distribution in Kerala.* Illichira (new record), Cheepunkal (Anuja et al. 2020, 2023).

*Remarks.* Exotic species. As of now in Kerala, it is known only from the Kuttanad wetlands.

### ***Ocnerodrilus occidentalis* Eisen, 1878**

*Ocnerodrilus occidentalis* Eisen, 1878:10.

*Ocnerodrilus occidentalis*: Blakemore 2012: 195 (for complete synonymy).

*Material examined.* 6 clitellates (ACCESSD/EW/592), Ramankary (9°25'27"N 76°27'55"E), Alappuzha Dist., Kerala, homestead, 29.06.2016, leg. S.P. Narayanan.

*Distribution in Kerala.* Ramankary (new record), Athirampuzha, Chengannur, Nedumangad, Trivandrum (Thiruvananthapuram) (Michaelsen 1910, Aiyer 1929, Narayanan et al. 2014a).

*Remarks.* Exotic species (Narayanan et al. 2016a).

### **Family Rhinodrilidae Benham, 1890**

#### ***Pontoscolex corethrurus* (Müller, 1857)**

*Lumbricus corethrurus* Müller, 1857: 113.

*Pontoscolex corethrurus*: Blakemore 2012: 554 (for complete synonymy).

*Material examined.* 1 juvenile, 2 clitellates (ACCESSD/EW/24), Ramankary (9°25'27"N 76°27'55"E), Alappuzha Dist., Kerala, homestead, 20.12.2010, leg. S.P. Narayanan; 3 a clitellates, 5 clitellates (ACCESSD/EW/864), Mannanam (9°38'37.66"N 76°30'42.19"E), Kottayam Dist.,

Kerala, 2 m asl, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V.T. Kurien; 9 clitellates (ACCESSD/EW/865), Neendoor (9°41'33.8"N 76°29'29.2"E), Kottayam Dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V.T. Kurien; 9 clitellates (ACCESSD/EW/869), Perumthuruthu (9°41'22.7"N 76°27'49.5"E), Kottayam Dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V.T. Kurien; 1 clitellate (ACCESSD/EW/871), Cheepunkal (9°38'26.2"N 76°25'16.9"E), Kottayam Dist., Kerala, paddy field, 11.12.2017, leg. R. Anuja, S. Sathrumithra, V.T. Kurien; 1 juvenile, 1 clitellate (ACCESSD/EW/1097), Cheepunkal (9°38'26.2"N 76°25'16.9"E), Kottayam Dist., Kerala, paddy field, 21.12.2018, leg. R. Anuja; 1 juvenile ACCESSD/EW/1375, Neelamperoor (9°29'48"N 76°30'21"E), Alappuzha Dist., Kerala, home surroundings in lateritic soil within Kuttanad, 08.10.2021, leg. Sreehari Mohan; 1 clitellate (ACCESSD/EW/1481), Illichira (9°20'23"N 76°23'7"E), Alappuzha Dist., Kerala, dyke with grass patch close to *Pandanus* stand, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 1 juvenile, 1 clitellate (ACCESSD/EW/1484), Eramathoor (9°18'27"N 76°31'27"E), Alappuzha Dist., Kerala, homestead near paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 1 juvenile (ACCESSD/EW/1493), Karumadi (9°22'48"N 76°23'12"E), Alappuzha Dist., Kerala, Open grassy (*Axonopus compressus*) area in a dyke, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 2 juveniles, 1 a clitellate, 2 clitellates (ACCESSD/EW/1495), Mukkada (9°20'29"N 76°25'5"E), Alappuzha Dist., Kerala, dyke in paddy field, 15.08.2022, leg. S.P. Narayanan, V.T. Kurien; 1 juvenile, 2 clitellates (ACCESSD/EW/1503), Chennithala (9°16'43"N 76°30'10"E), Alappuzha Dist., Kerala, home surrounding in a reclaimed land within paddy field, 1.08.2022, leg. S.P. Narayanan, V.T. Kurien; 3 juveniles (ACCESSD/EW/1518), Neendoor (9°41'33"N 76°29'29"E), Kottayam Dist., Kerala, roadside in paddy field, 12.10.2022, leg. S.P. Narayanan, V.T. Kurien; 3 juveniles (ACCESSD/EW/1519), Vadayar (9°45'29"N 76°26'50"E), Kottayam Dist., Kerala, edge of paddy field, 12.10.2022, leg. S.P. Narayanan, V.T. Kurien; 1 clitellate (ACCESSD/EW/1527), Kainady

(9°30'4" N 76°28'28" E), Alappuzha Dist., Kerala, bund between paddy field and lake, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien; 1 clitellate (ACESSD/EW/1528), Paral (9°26'57" N 76°31'32" E), Kottayam Dist., Kerala, reclaimed land in wetland, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien; 3 juveniles, 1 clitellate, 1 post-clitellate (ACESSD/EW/1535), Veliyanadu (9°26'43"N 76°27'49"E), Alappuzha Dist., Kerala, reclaimed land in wetland, beneath decaying tree trunk, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien; 2 clitellates (ACESSD/EW/1536), Kainakari (9°29'4"N 76°23'3"E), Alappuzha Dist., Kerala, bund with tree near river, 07.12.2022, leg. S.P. Narayanan, V.T. Kurien; 1 juvenile, 2 clitellates (ACESSD/EW/1572), Pathiramanal Island (9°37'6" N 76°23'9" E), Alappuzha Dist., Kerala, wooded island, near canal, 21.12.2022, leg. S.P. Narayanan, V.T. Kurien.

*Distribution in Kerala.* Eramathoor, Illichira, Kainady, Kainakari, Karumadi, Mukkada, Neelamperoor, Paral, Perumthuruthu, Vadayar, Veliyanadu (new records), widespread in Kerala (Michaelsen 1910, 1913, Cognetti 1911, Stephenson 1916, Gates 1973, Mohan *et al.* 2011, Kathireswari *et al.* 2005, Nair *et al.* 2007, Narayanan *et al.* 2014a, 2016a, c, 2019b, Balachandran *et al.* 2015, ElAmmari *et al.* 2015, Nair *et al.* 2015, Deepthi & Kathireswari, 2016, Athira *et al.* 2016, George *et al.* 2017, Sathrumithra *et al.* 2018, John *et al.* 2019, Anuja *et al.* 2023).

*Remarks.* Invasive exotic species, wide spread within India. Most widely distributed earthworm species (Gates 1972) in tropical and sub-tropical regions of the world (Taheri *et al.* 2018).

## DISCUSSION

This study enhanced the knowledge available on the megadrile fauna of Kuttanad wetland. Current investigation has documented 17 species, before only 8 species of earthworms were known from this wetland. Species such as *Drawida ghatensis*, *D. travancorensis*, *Glyphidrilus annandalei*, *G. fluviatilis*, *Ocnodrilus occidentalis*, *Dichogaster bolau*, *Lenngaster chittagongensis*,

*Amyntas alexandri*, *Megascolex pentagonalis*, *Perionyx ceylanensis*, *Perionyx excavatus* were recorded for the first time from Kuttanad wetland. The study also noticed the absence of two species, *Argilophilus variabilis* (from North Kuttanad zone) and *Megascolex insignis* (Upper Kuttanad zone) which were previously recorded from this place (Michaelsen 1910, Aiyer 1929). Now, altogether 19 species of earthworms are known to inhabit this ecosystem. Among the earthworm species recorded, native peregrine and exotic species together forms the major portion (52.94%) of the earthworm fauna of this wetland.

In a broadly generalized approach, Kerala can be divided into three distinct physiographic regions, namely the coastal lowlands (< 75 m a.s.l.), midlands (75 – 500 m a.s.l.), and high ranges (500 – 2000 m a.s.l.) (Iype *et al.* 1991). *D. ghatensis* is mainly a species of the midlands and high ranges of the state (Narayanan, unpublished observations), but it has been recorded from Aymanam, Kumarakom and Vadayar, of this wetland. Among these, Aymanam is located in the eastern boundary, where Kuttanad wetland meets the midland areas of the Kerala state. However, it would have been introduced to the other two localities, as part of the wetland reclamation activities.

Exotic, invasive *Pontoscolex corethrurus* is the most widespread species followed by the native peregrine *D. impertusa*. Among the various agro-ecological zones maximum species number were recorded from the Lower Kuttanad (10 species), followed by Upper Kuttanad and North Kuttanad (9 species each), whereas Vaikom Kari has the lowest species diversity (2 species) (Table 1). This difference is mainly due to the differential exploration frequency.

*Megascolex pentagonalis* was previously known only from the type locality Trivandrum (Thiruvananthapuram) (Stephenson 1916). In the present study, collections from two more additional sites (Chennithala and Eramathoor) indicated the expansion of its range to further north.



**Table 1.** Earthworm species recorded from various agro-ecological zones of Kuttanad wetland during the present study

	Vaikom Kari	North Kuttanad	Kayal lands	Lower Kuttanad	Upper Kuttanad	Purakkad Kari
<b>Moniligastridae</b>						
<i>Drawida ghatensis</i>	+	+				
<i>Drawida impertusa</i>		+	+	+	+	+
<i>Drawida travancorensis</i>			+			
<b>Acanthodrilidae</b>						
<i>Lenogaster chittagongensis</i>				+		
<b>Almidae</b>						
<i>Glyphidrilus annandalei</i>		+	+			
<i>Glyphidrilus fluviatilis</i>					+	
<b>Benhamiidae</b>						
<i>Dichogaster bolau</i>				+		
<b>Megascolecidae</b>						
<i>Amyntas alexandri</i>		+		+		
<i>Lampito mauritii</i>		+		+	+	+
<i>Megascolex konkanensis</i>		+	+	+	+	
<i>Megascolex pentagonalis</i>					+	
<i>Metaphire houlleti</i>		+		+	+	
<i>Perionyx ceylanensis</i>				+		
<i>Perionyx excavatus</i>				+	+	
<b>Ocnerodrilidae</b>						
<i>Eukerria kuekenthali</i>						
<i>Ocnerodrilus occidentalis</i>		+			+	
<b>Rhinodrilidae</b>						
<i>Pontoscolex corethrurus</i>	+	+	+	+	+	+

Previously, *Glyphidrilus fluviatilis* was considered endemic to 4 locations, Madapur (= Madapura), Fraserpett (Kushalnagar), Shimoga (Shivamogga) in Karnataka state and Narayan of Vordeviu Dicu (Karnataka state?) (Rao 1922, Chanabun *et al.* 2013). Present record of *G. fluviatilis* from Kerala state is the first record after its original collection.

Ramsar sites like Renuka wetland and Pong Dam have 11 species each. Thus the Kuttanad wetland with its 19 species recorded proved to be earthworm rich among the wetlands of India. This is mainly due to geographical location of this wetland. Further investigation may add more species into the faunal list.

**Acknowledgements** – We would also like to thank Dr. Abin Varghese, Dr. R. Satheesh Centre for Remote Sensing and GIS, Mahatma Gandhi University, Kottayam, India for providing the figure of Kuttanad wetland.

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