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### NOTE

**ARE EXOTICS *AMYNTHAS ALEXANDRI* (BEDDARD, 1900) AND *METAPHIRE PEGUANA* (ROSA, 1890) (CLITELLATA: OLIGOCHAETA: MEGASCOLECIDAE) A THREAT TO NATIVE EARTHWORMS IN KERALA, INDIA?**

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G. Christopher, A.P. Thomas & J.M. Julka

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Kerala State lies on the southwestern coast of the Indian subcontinent. The Western Ghats and western coastal plains are recognized as the regions with the highest level of earthworm species richness in India (Julka & Paliwal 2005). Taxonomic studies of earthworms in Kerala started with Bourne (1894), Michaelsen (1910), Cognetti (1911), Stephenson (1923), Aiyer (1929) and Gates (1940). Subsequently, Julka & Chandra (1986), Julka (1988), Julka et al. (1997) etc., have contributed to the taxonomical studies of the earthworm fauna of the state. A survey of the earthworms of Kerala has revealed the occurrence of two exotic peregrine species, namely *Amyntas alexandri* (Beddard, 1900) and *Metaphire peguana* (Rosa, 1890). These species have not been reported earlier from Kerala. Hence this is the first record from the state. Diagnosis of both the species and their ecological observations follow.

#### Materials and Methods

Since 2010, as part of the ongoing taxonomical study on the earthworms of Kerala, we have collected earthworm samples from all the fourteen districts, from various habitats like agricultural fields, various types of natural forests, plantations, homestead, grasslands etc. Samplings were done by digging and hand sorting method as proposed by Senapati & Sahu (1993). Soil lumps were broken and the soil was sifted between fingers to sort out the worms. Collected specimens

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were preserved in 5% formalin. Anatomical details were examined under a dissection binocular microscope. Specimens collected were identified and deposited in the earthworm systematic laboratory of the Advanced Centre of Environmental Studies and Sustainable Development, Mahatma Gandhi University, Kottayam District.

#### Results

During the collection trips to various parts of the state, we collected 19 clitellate and five acitellate specimens of *Amyntas alexandri* from 10 sites which spread over Kasaragode, Malappuram, Palakkad, Ernakulam and Kottayam districts and nine clitellate

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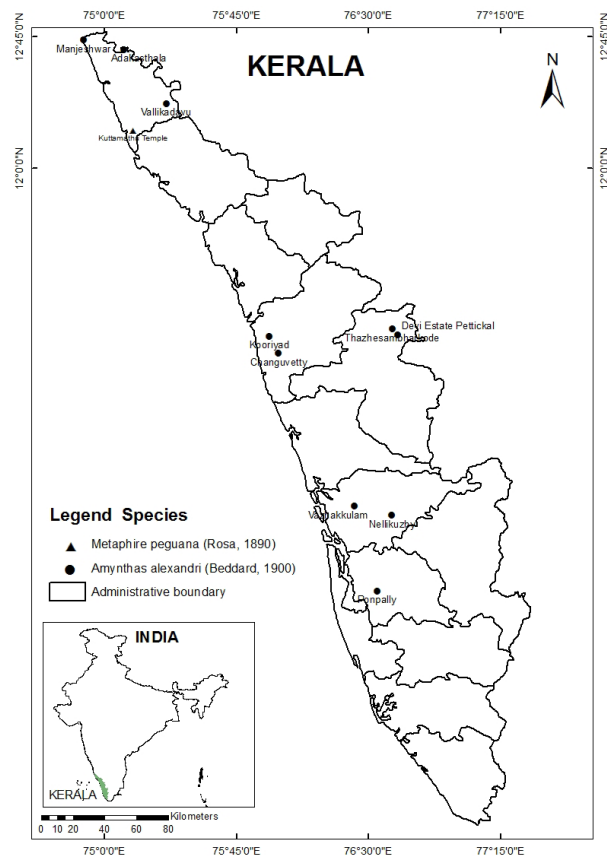
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specimens of *Metaphire peguana* from a single locality of Kasaragode District.

### *Amyntas alexandri* (Beddard, 1900) (Image 1)

**Diagnosis:** Octothecal, pores minute, superficial, more than 1/3C apart, at 5/6-8/9. Male pores, in xviii, minute, superficial, each in a rather circular area (often slightly depressed) between arms of a U-shaped ridge that is open mesially. Female pore, median. Genital markings, none. Clitellum, setae unrecognizable externally, xiv-xvi, occasionally reaching into xvii. Setae perichaetine. First dorsal pore, at 12/13. Prostomium, rudimentary. Septa, 8/9-9/10 aborted, 6/7-7/8 (and sometimes 5/6) much thickened, 10/11-11/12 less so. Pigment, in circular muscle layer, reddish brown. Intestinal origin, in xv. Caeca, simple, in xxvii-xx. Typhlosole, lamelliform, ending in region of xc. Hearts, in viii unaborted dorsal portions to gizzard, in ix (left or right) lateral, in xi-xiii latero-esophageal. Blood glands, in v, also in a low and lobed oesophageal collar. Holandric. Testis sacs, paired and vertical or unpaired and horseshoe-shaped, hearts of x-xi and vesicles of xi included. Seminal vesicles, large, especially the posterior pair, in xi, xii. Prostates, large, in xvi-xxii, duct muscular and variously looped or coiled. Spermathecae, rather small, duct markedly narrowed in the parietes, diverticulum from median face of duct at parietes, longer than main axis, with slender stalk and a variously looped wider portion entally.

Material examined: ACESSD/EW/52, 21.vii.2011, 1 clitellate, Irula Tribal hamlet Thazhesambarkode at Attappady, Palakkad District, Kerala (11°06'2.3"N & 76°39'26.7"E), elevation 514m, road side in a dry dusty area without vegetation, coll. S.P. Narayanan; ACESSD/EW/53, 21.vii.2011, 5 aclitellate, 5 clitellate, Devi Estate Pettickal at Attappady, Palakkad District, Kerala (11°03'13.4"N & 76°40'0.1"E), elevation 792 m, open grass covered area within coffee plantation, coll. T. Augustine, S.P. Narayanan & G. Christopher; ACESSD/EW/14, 20.ix.2012, 1 clitellate, Kooriyad, Malappuram District, Kerala (11°2'49"N & 75°56'21.6"E), elevation 28m, vegetated area close to agriculture field, coll. S.P. Narayanan, S. Sathrumithra & J.M. Julka; ACESSD/EW/75, 18.x.2012, 1 clitellate, Manjeshwar (Manjeswaram), Kasaragode District, Kerala (12°43'41.8"N & 74°53'6.9"E), elevation 8m, garden land covered with bushes and trees close to a wetland, coll. S.P. Narayanan, S. Sathrumithra & M. Ramesan; ACESSD/EW/76, 18.x.2012, 4 clitellate, Adakasthala, Kasaragode District, Kerala (12°40'29.6"N & 75°06'54.3"E), elevation 77m, near a river ridge, coll. S.P. Narayanan, S. Sathrumithra & M. Ramesan; ACESSD/EW/81, 20.x.2012, 1 clitellate, Vallikadavu Forest Office



**Figure 1. Records of *Amyntas alexandri* (Beddard, 1900) and *Metaphire peguana* (Rosa, 1890) in Kerala**

premises, Kasaragode District, Kerala (12°22'2"N & 75°21'18"E), elevation 98m, office premises with *Areca catechu*, *Cocos nucifera* and *Hevea brasiliensis* plantations, coll. T. Augustine & S.P. Narayanan; ACESSD/EW/207, 14.vii.2013, 1 clitellate, Vazhakkulam, Ernakulam District, Kerala (10°5'3.3"N & 76°25'6.71"E), elevation 17m, garden land, coll. Krishnendhu & S.S. Kumar; ACESSD/EW/235, 14.viii.2013, 1 clitellate, Nellikuzhy, Ernakulam District, Kerala (10°4'23.22"N & 76°35'30.73"E), elevation 58m, coll. N. Jayan & Selvan; ACESSD/EW/469, 27.x.2014, 3 clitellate, Changuvetty, Malappuram District, Kerala (10°59'52"N & 75°59'54.3"E), elevation 50m, homestead, coll. S.P. Narayanan, S. Sathrumithra & M.A. Shukkur; ACESSD/EW/439, 6.x.2014, 1 clitellate, Ponpally, Kottayam District, Kerala (9°36'11.16"N & 76°32'59.02"E), elevation 24m, home garden, coll. L. Soman (Fig. 1).

**Distribution:** India: Kerala (present record - Nellikuzhy, Vazhakkulam in Ernakulam District, Adakasthala, Manjeswaram, Vallikadavu Forest Office premises in Kasaragode District, Ponpally in Kottayam District, Changuvetty, Kooriyad in Malappuram District,



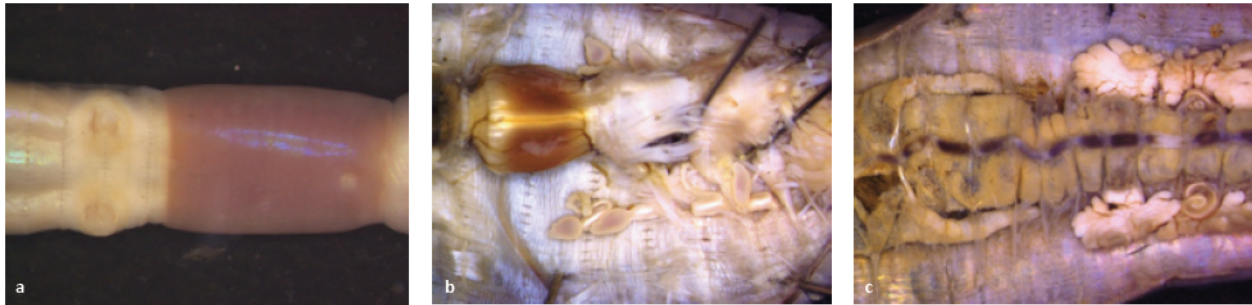


Image 1. *Amyntas alexandri*: a - Clitellar region - clitellum, female and male pores; b - Gizzard and spermatheca; c - Prostates and caeca

Devi Estate Pettickal (Attappady), Thazhesambarkode (Attappady) in Palakkad District, Andaman and Nicobar Islands, Assam, Tripura, Himachal Pradesh, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal; China, Indonesia, Malaysia, Myanmar, Singapore, Thailand and Vietnam.

Remarks: Relatively large sized, very agile worm with serpentine movement. When handled, one specimen exuded sticky coelomic fluid. It was found in association with other exotic species of earthworms and in one locality it also occurred with a native species.

#### *Metaphire peguana* (Rosa, 1890) (Image 2)

**Diagnosis:** Sexthecal, pores minute, superficial, at 6/7-8/9. Male pores, in xviii, minute, each in a circular porophore on posterior wall near roof of a deep vertical parietal invagination with transversely slit-like lumen and aperture, the latter at the segmental equator. Female pore, median. Genital markings, transversely elliptical, with firm glistening surface and obvious central aperture, two pairs, across 17/18, 18/19. Clitellum, setae unrecognizable externally, xiv-xvi. First dorsal pore, at 12/13. Prostomium, epilobous, tongue open. Septa, 8/9-10/11 aborted, 11/12-12/13 muscular. Pigment, reddish, in circular muscle layer. Intestinal origin, in xv. Caeca, simple, in xxvii-xxii. Typhlosole, rather small, to rudimentary, ending in region of 59th-86th segments. Hearts, in viii unaborted dorsal portions to gizzard, in ix (usually on one side only) lateral, in x esophageal, in xi-xiii latero-esophageal. Blood glands, in v. Lymph glands, in intestinal segments. Holandric. Testis sacs, paired and ventral. Seminal vesicles, large of xi reaching forward alongside gizzard, of xii smaller, each with a large primary ampulla distinctly demarcated though not protuberant from the main mass. Pseudo vesicles, rudimentary, in xiii. Prostates, in xvi-xxi, ducts 3-5 mm. long. Spermathecae, small to medium-sized, duct shorter than ampulla, with thick wall and narrow lumen, much narrowed in the parietes, diverticulum

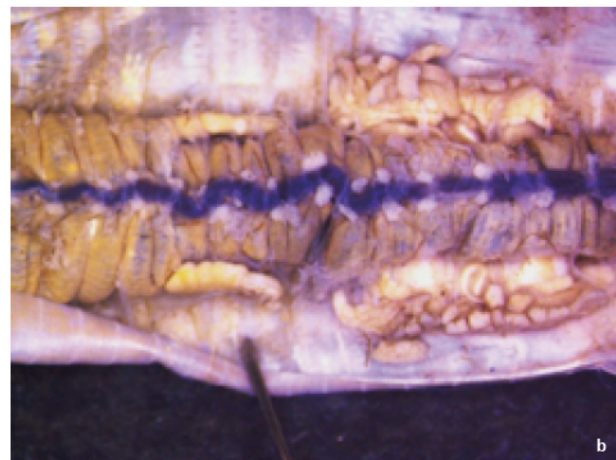


Image 2. *Metaphire peguana*: a - Clitellar region - clitellum, male pores and GM glands; b - Prostates and caeca

from anterior face of duct at parietes, longer than main axis, with slender stalk, longer and thicker mid-portion irregularly looped, terminal seminal chamber spheroidal to ovoidal. GM glands, nearly spheroidal, with thick muscular wall and small lumen, slightly protuberant into coelom.

Materials examined: ACESSD/EW/158, 21.x.2012, 9 clitellate, Kuttamathu Sree Poomala Bhagavathi Temple, Cheruvathoor, Kasaragode District, Kerala (12°12'50.4"N & 75°9'50.4"E), elevation 1m, sacred grove, coll. S.P.

Narayanan, T. Augustine, M. Ramesan & S. Sathrumithra (Fig. 1).

Distribution: India: Kerala (present record - Kuttamathu Sree Poomala Bhagavathi Temple - Cheruvathoor in Kasaragode District), Andaman & Nicobar Islands, Tamil Nadu, Tripura, West Bengal. Indonesia, Malaysia, Myanmar, Singapore, Thailand, Vietnam.

Remarks: It was collected mainly from the leaf litter. The sacred grove is located in the coastal zone, so the soil of this place is very sandy.

### Discussion and Conclusion

The effects and implications of invasive species below ground terrestrial ecosystems are not well known as compared to above ground terrestrial and marine ecosystems (Gonzalez et al. 2006). The entire diversity and distribution pattern of alien earthworm species of the state is still not fully understood. *Eisenia fetida* (Savigny, 1826), *Pontodrilus litoralis* (Grube, 1855), *Pontoscolex corethrurus* (Müller, 1857), *Eudrilus eugeniae* (Kinberg, 1867), *Nematogenia panamaensis* (Eisen, 1900), *Metaphire houlleti* (Perrier, 1872), *Polypheretima elongata* (Perrier, 1872), *Polypheretima taprobanae* (Beddard, 1892), *Ocnerodrilus occidentalis* (Eisen, 1878), *Dichogaster annae* (Horst, 1893), *Dichogaster affinis* (Michaelsen, 1890), *Dichogaster bolau* (Michaelsen, 1891), *Gordiodrilus elegans* (Beddard, 1892) and *Pithemera bicincta* (Perrier, 1875) are the exotic earthworm species that have so far been reported from the state (Michaelsen 1910; Stephenson 1923; Aiyer 1929; Julka & Paliwal 1990; Kathireswari et al. 2005; Narayanan et al. 2012). Two more exotic species, *A. alexandri* and *M. peguana*, have now been collected for the first time and it is in fact the first report for these exotic earthworm species from the state. Besides Kerala, *A. alexandri* has been recorded from 10 states/union territories of India (Gates 1972; Julka 1982; Soota & Halder 1980; Kaushal & Bisht 1994; Halder 1999; Batish & Dhiman 2002; Paliwal & Julka 2005; Mandal et al. 2011) and seven Southeast Asian countries (Gates 1972). Though type specimen observed by Beddard had its origin in the neighborhood of Kolkata (Beddard 1900), its original home is believed to be Southeast Asia (Gates 1972). During the present study 19 clitellate and five acitellate specimens of *A. alexandri* have been collected from 10 sites, from Kasaragode, Malappuram, Palakkad, Ernakulam and Kottayam districts. So far no individuals of this species have been collected from other districts between Kasaragode and Kottayam, such as Kannur, Kozhikode, Wayanad and Thrissur. Being

large and fast moving peregrine species, this also may spread into the above mentioned districts in the near future. In India, *M. peguana* was first reported from West Bengal (Halder & Julka 1967) and later from the Andaman and Nicobar Islands, Tamil Nadu and Tripura (Soota & Halder 1989; Halder 1999; Mandal et al. 2011; Chaudhuri et al. 2012). Its original home is the southeastern portion of the Asian continent beyond Myanmar (Halder & Julka 1967; Gates 1972). So far, *M. peguana* has been reported from Indonesia, Malaysia, Myanmar, Singapore, Thailand, Vietnam (Gates 1972; Halder 1999). Occurrence of nine clitellate specimens of *M. peguana* at only one location in the present study may be indicative of its recent introduction in the area. It was noted that in most of the sites from where *A. alexandri* and *M. peguana* were collected, other exotic species such as *Pontoscolex corethrurus* (Müller, 1857) and *Metaphire houlleti* (Perrier, 1872) were also found. Native species were found to be very scarce, except one native species belonging to the Octochaetidae family from a single site at Manjeshwar. The presence of these exotic species may be interpreted as the reason for the depletion of native earthworms. Hence detailed studies are needed to know the effect of exotic earthworms on the distribution of native forms.

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