COMMUNICATION

A CHECKLIST OF EARTHWORMS (ANNELED: OLIGOCHAETA) IN SOUTHEASTERN VIETNAM

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A checklist of earthworms (Annelida: Oligochaeta) in southeastern Vietnam

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Abstract: The earthworms of southeastern Vietnam are reported based on literature and samples collected during the period of 2012–2019. A total of 41 earthworm species of 12 genera are recorded in the southeastern part of Vietnam. Of these, Polyperetima elongata and Dichogaster affinis are recorded for the first time in the region. The dominant family is Megascolecidae with 35 species of seven genera while each of the other families is represented by only one species, except for Octochaetidae which has one genus and two species. The comprehensive checklist also provides data of each species including examined specimens, distributions and remarks. An identification key to species is compiled for southeastern Vietnam.

Keywords: Identification key, survey, Ho Chi Minh, humid, subtropical, data

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INTRODUCTION

Southeastern Vietnam has an area of 23,607.8km², located between 10.316–12.283°N & 105.800–107.583°E. This region is the territory of six provinces and city: Ho Chi Minh, Ba Ria – Vung Tau, Dong Nai, Binh Duong, Binh Phuoc, and Tay Ninh. The terrain changes from mountainous areas and midlands to coastal deltas. The region is located in a humid subtropical climate zone featured by the rainy season, which starts in May and lasts till October (average rainfall counted for 90% of the whole year), and the dry season from November to April. The region has different soil types, but mainly dominated by ferralsols and acrisols (Sterling et al. 2008).

The earthworms of Vietnam in general and of the southeastern part in particular was first reported by Perrier (1872, 1875) with descriptions of four new species. There were no reports for the southeastern part of Vietnam until 1956 when Omodeo (1956) described six new species. After that, there were no reports on earthworms in the region for approximate 60 years. Recently, Nguyen (2014) and Nguyen et al. (2015) reported list of earthworms recorded in small parts of Binh Duong Province. Nguyen et al. (2015a,b) also described four new species from Dong Nai Province. All data were synthesized into a comprehensive checklist of earthworms in Vietnam by Nguyen et al. (2016). After 2016, the earthworms of southeastern Vietnam have been intensively studied, and 14 new species were described from this region (Nguyen & Lam 2017; Nguyen et al. 2018, 2019, 2020a,b). Together with discoveries of new species, taxonomic acts have also been undertaken. Nguyen et al. (2017) and Nguyen (2020) corrected Metaphire magophila (Nguyen, 2011) as a senior synonym of M. easupana (Thai & Huynh, 1993). Samples of M. neoeusilis (Thai & Samphon, 1988) found in Binh Duong province were misidentified as Amynthas modigliani (Rosa, 1896).

This work aims to provide comprehensive information on the earthworms of southeastern Vietnam. An identification key is also provided to facilitate further studies on earthworms in this region.

MATERIAL AND METHODS

The species list was created based on literature, e.g., Perrier (1872, 1875), Omodeo (1956), Nguyen (2014), Nguyen et al. (2015), Nguyen et al. (2015a,b, 2016, 2017, 2018, 2020a,b), Nguyen & Lam (2017), and Nguyen et al. (2019, 2020). The species was also confirmed by identifying samples collected from 263 sites (Figure 1) during the rainy season (early September to late October) in 2012–2019.

Earthworms were collected by digging and hand-sorting method following Görny & Grum (1993). After collecting, specimens were cleaned by tap water, killed in 2% formalin, temporarily fixed in formalin 4% for 12 hours, then transferred to new formalin 4% for long-term preservation. All specimens were deposited in the Laboratory of Zoology, Department of Biology, Can Tho University.

The specimens were examined under a motic digital microscope (Model: DM143-FBGG-C) and dissected from the dorsal side for internal observation. Colour images were taken using a camera attached directly to the microscope, then improved and grouped into plates using Photoshop CS6.

RESULTS

Until date, a total of 41 earthworm species of 12 genera in six families (Almidae, Megascolecidae, Moniligastridae, Octochaetidae, Ocnerodrilidae, and Rhinodrilidae) have been recorded in southeastern Vietnam. All information of each species is presented in the checklist. Polypheretima elongata and Dichogaster affinis are reported for the first time in the region. Megascolecidae was the dominant family in terms of the number of species and genera (35 species of seven genera). It also corresponded to the earthworm distribution in the Oriental region (Hendrix & Bohlen 2002). Other families had only one species each except Octochaetidae which had two species in one genus. Particularly, the genus Metaphire had 20 species while Amynthas was poorly known with only seven species. Thai (2000) also indicated that Metaphire was the most diverse genus in the south of Vietnam.

In addition, 16 species were described from the southeastern part of Vietnam since 2016. Therefore, the total earthworm species of Vietnam has increased to 240 in 25 genera and eight families.

Family ALMIDAE Duboscq, 1902
Genus Glyphidrilus Horst, 1889
1. Glyphidrilus papillatus (Rosa, 1890)
(Image 1 a1, Table 1)
Examined material: 2C (CTU-EW.030.02) and 3C (CTU-EW.030.04); data for samples shown in Table 1.
Distribution: Ba Ria-Vung Tau (Dat Do); Binh Duong (Tan Uyen, Dau Tieng, Phu Giao); Ho Chi Minh City (Nha...
Figure 1. Collecting sites in southeastern Vietnam: a—southeastern Vietnam (mainland) | b—Vietnam map.
Earthworms of southeastern Vietnam
Lam et al.

Remarks: It was found in edges of water ponds or paddy fields.

Family MEGASCOLECIDAE Rosa, 1891
Genus Lampito Kinberg, 1867
2. Lampito mauritii Kinberg, 1867
(image 2 a1–a2, Table 1)
Examined material: 27C (CTU-EW.002.01), 13C (CTU-
EW.002.07), 6C (CTU–EW.002.11), 9C (CTU-EW.002.13),
18C (CTU-EW.002.22), 46C (CTU-EW.002.27), and 21C
(CTU-EW.002.32); data for samples were shown in Table
1.
Distribution: Dong Nai (Xuan Loc; Nhon Trach; Long
Thanh); Ba Ria-Vung Tau (Vung Tau, Ba Ria, Xuyen
Moc, Tan Thanh, Dat Do, Long Dien); Binh Duong (Di
An, Dau Tieng, Bau Bang, Thu Dau Mot); Binh Phuoc
(Chon Thanh); Ho Chi Minh City (Nha Be, Binh Chanh,
Hoc Mon, Cu Chi); Tay Ninh (Trang Bang, Go Dau, Duong
Minh Chau, Tan Chau, Tay Ninh).
Remarks: The species was found aggregated in high
density in sandy soil and decomposed cow dung.

Genus Perionyx Perrier, 1872
3. Perionyx excavatus Perrier, 1872
(image 2 b1–b2, Table 1)
Examined material: 1C (CTU-EW.003.02) and 1C
(CTU-EW.003.03); data for samples in Table 1.
Distribution: Dong Nai (Nhon Trach); Binh Duong (Di
An, Dau Tieng, Bau Bang, Thu Dau Mot); Ho Chi Minh City (Binh Chanh); Ba Ria-Vung Tau.
Remarks: The species has been bred commonly in local earthworm farms, but rarely found in the wild.

Genus Pontodrilus Perrier, 1874
4. Pontodrilus litoralis (Grube, 1855)
Examined material: No specimen available
Distribution: Ba Ria-Vung Tau (Omodeo 1956)
Remarks: Omodeo (1956) collected samples of the species from mangrove soils (Ba Ria-Vung Tau Province), but there were no other further records in the study area recently.

Genus Amynthas Kinberg, 1867
5. Amynthas dorsomorrioides Nguyen & Nguyen, 2020
(image 2 f1–f2, Table 1)
Examined material: 1C (CTU-EW.174.h01), 2C (CTU-
EW.174.p02), and 2C (IEBR-EW.174.p02); data in Table 1.
Distribution: Ba Ria–Vung Tau (Ba Ria City, Minh Dam Mts).
Remarks: The species is closely similar to A.  
dorsomorrioides (Do & Tran, 1995), however, distinguished by having spermathecal pores laterally, a pair of genital markings in xvii, first dorsal pore in 12/13, 6–7 setae between two male porophores, intestine swelling at xv, and lobulated typhlosole (Nguyen et al. 2020a).

6. Amynthas exiguo austrinus (Gates, 1932)
(image 2 d1–d2, Table 1)
Examined material: 4C (CTU-EW.057.01), 5C (CTU-
EW.057.02), 14C (CTU-EW.057.03), 8C (CTU-EW.057.04),
8C (CTU-EW.057.05), and 11C (CTU-EW.057.11); data in
Table 1.
Distribution: Dong Nai (Vinh Cuu, Thong Nhat, Long
Khanh); Binh Phuoc (Bu Dang, Bu Gia Map, Dong Phu,
Phuc Long); Ba Ria-Vung Tau (Dat Do); Tay Ninh (Tay Ninh City).

7. Amynthas juliani (Perrier, 1875)
Examined material: No specimen available.
Distribution: Ho Chi Minh City (Perrier 1875).
Remarks: There were no further reports in the study area since Perrier (1875).

8. Amynthas longiprostaticus Nguyen & Lam, 2020
(image 2 g1–g2, Table 1)
Examined material: 1C (CTU-EW.088.h01), 5C
(CTU-EW.088.p02), 4C (IEBR-EW.088.p02), 30C (CTU-
EW.088.03), and 17C (IEBR-EW.088.03); data in Table 1.
Distribution: Dong Nai (Cam My, Cat Tien NP).
Remarks: The species is somewhat similar to A.  
papilio (Gates, 1930) and A. khaohayod Bantaowong &
Panha, 2015. It is, however, characterized by having the distance between male pores wider, presence of genital markings in the spermathecal region, first dorsal pore in 11/12, and smaller size (Nguyen et al. 2020a).

9. Amynthas minhdam Nguyen & Tran, 2020
(image 2 h1–h2, Table 1)
Examined material: 1C (CTU-EW.168.h01), 1C (CTU-
EW.168.p02), 3C (CTU-EW.168.p03), and 2C (IEBR-
EW.168.p03); data Table 1.
Distribution: Ba Ria-Vung Tau (Minh Dam Mts).
Remarks: The species is fairly similar to A. sapinianus
(Chen, 1946) and A. morrisi (Beddard, 1892). It is,
however, distinguished by having a pair of genital markings in the male region, chain-shaped seminal chamber, and first dorsal pore in 12/13 (Nguyen et al. 2020a).
10. Amynthas ocularius Nguyen & Lam, 2020
(Image 2 i1–i2, Table 1)
Examined material: 1C (CTU-EW.167.h01), 2C (CTU-EW.167.p02), 3C (CTU-EW.167.p03), and 2C (IEBR-EW.167.p03); data in Table 1.
Distribution: Ba Ria-Vung Tau (Binh Chau-Phuoc Buu NR).
Remarks: The species is somewhat similar to A. compositus (Gates, 1932) and A. papulosus (Rosa, 1896). It is, however, distinctly different from those congeners in having numerous genital markings being arranged in transverse lines in both of the spermathecal and male regions, and being agglomerated into two groups in 19/20, and first dorsal pore in 13/14 (Nguyen et al. 2020a).

11. Amynthas polychaetiferus (Thai, 1984)
(Image 2 e1–e2, Table 1)
Examined material: 29C (CTU-EW.008.01), 10C (CTU-EW.008.04), 11C (CTU-EW.008.07), 20C (CTU-EW.008.10), 10C (CTU-EW.008.18), 6C (CTU-EW.008.21), and 2C (CTU-EW.008.24); data in Table 1.
Distribution: Widely distributed in the study area, but more gathered in Dong Nai and Ba Ria-Vung Tau, little known in Binh Duong and Binh Phuoc, and rarely found in Ho Chi Minh City and Tay Ninh.
Remarks: The species have setae crowded ventrally in xix, varied in numbers or sometimes in usual position. The species was reported from the study area with the highest frequency and species abundance compared to other places.

Genus Metaphire Sims & Easton, 1972
12. Metaphire anomala (Michaelsen, 1907)
(Image 3 k1–k2, Table 1)
Examined material: 11C (CTU-EW.020.06), 7C (CTU-EW.020.07), 10C (CTU-EW.020.13), 8C (CTU-EW.020.14), and 20C (CTU-EW.020.21); data in Table 1.
Distribution: Dong Nai (Vinh Cuu, Xuan Loc, Dinh Quan, Trang Bom, Cam My, Long Thanh); Ba Ria-Vung Tau (Chau Duc, Xuyen Moc, Tan Thanh, Ba Ria City); Binh Duong (Tan Uyen; Binh Phuoc: Phu Rieng); Tay Ninh (Duong Minh Chau, Tay Ninh City).
Remarks: The species is morphologically different
Image 2. Male region (1) and Spermathecae (2) of megascopelid species in southeastern Vietnam: a—Lampito mauritii | b—Perionyx excavatus | c—Amynthas corticis | d—Amynthas exigus austrinus | e—Amynthas polychaetiferus | f—Amynthas dorsomorroides | g—Amynthas longiprostaticus | h—Amynthas minhdam | i—Amynthas ocularius | j—Metaphire bahli | k—Metaphire cf. campanulata | l—Metaphire easupana. Scale bar= 1mm. © D.H. Lam.
from the original description of Michaelsen (1907) by having male pore in xix, four pairs of spermathecal pore in 5/6/7/8/9, no genital markings, and bigger size.

13. Metaphire bahli (Gates, 1945)  
(Image 2 j1–j2, Table 1)  
Examined material: 30C (CTU-EW.004.01), 30 (CTU-EW.004.02), 22 (CTU-EW.004.03),16 (CTU-EW.004.04), 28C (CTU-EW.004.19), 19C (CTU-EW.004.24), 20C (CTU-EW.004.25), 39C (CTU-EW.004.54), and 30C (CTU-EW.004.62); data in Table 1.  
Distribution: Widely distributed in southern Vietnam.

14. Metaphire bariaensis Nguyen, Nguyen, Lam & Nguyen, 2020  
(Image 3 l1–l2, Table 1)  
Examined material: 1C (CTU-EW.169.h01), 2C (CTU-EW.169.p02), 3C (CTU-EW.169.p03), and 15C (CTU-EW.169.04); data in Table 1.  
Distribution: Ba Ria-Vung Tau (Ba Ria, Bao Quang Mts).  
Remarks: The species is somewhat similar to M. truongsonensis (Thai, 1984); however, it is characterized by having spermathecal pores located laterally and separated intestinal caeca (Nguyen et al. 2020b).

15. Metaphire cf. campanulata (Rosa, 1890)  
(Image 2 k1–k2, Table 1)  
Examined material: 17C (CTU-EW.018.01), 14C (CTU-EW.018.09), 14C (CTU-EW.018.11), 25C (CTU-EW.018.20), 4C (CTU-EW.018.34), and 8C (CTU-EW.018.36); data in Table 1.  
Distribution: Commonly found in the study area.  
Remarks: The species is closely similar to M. houlleti (Perrier, 1872) but it is characterized by having mushroom-shaped spermathecae, first dorsal pore in 11/12, and bigger size.

16. Metaphire easupana (Thai & Huynh, 1993)  
(Image 2 l1–l2, Table 1)  
Examined material: 5C (CTU-EW.012.04), 35C (CTU-EW.012.05), 10C (CTU-EW.012.10), 25C (CTU-EW.012.17), and 23C (CTU-EW.012.26); data in Table 1.  
Distribution: Dong Nai (Vinh Cuu, Xuan Loc, Dinh Quan); Ba Ria-Vung Tau (Tan Thanh, Ba Ria City, Long Dien: Minh Dam Mts); Tay Ninh (Ba Den Mts).  
Remarks: The species was known as M. magophila (Nguyen, 2011), but it was synonymized by Nguyen et al. (2017).

17. Metaphire grandiverticulata Nguyen & Lam, 2017  
(Image 3 a1–a2, Table 1)  
Examined material: 1C (CTU-EW.089.h01), 9C (CTU-EW.089.p02), 13C (CTU-EW.089.03), and 24C (CTU-EW.089.04); data in Table 1.  
Distribution: Dong Nai (Long Khanh); Ho Chi Minh City (Hoc Mon).  
Remarks: The species is similar to M. neoexilis (Thai & Samphon, 1988), but it is characterized by having large and stout spermathecal diverticula and ventrally connected testes sacs (Nguyen & Lam 2017).

18. Metaphire haui Nguyen, Nguyen, Lam & Nguyen, 2020  
(Image 4 a1–a2, Table 1)  
Examined material: 1C (CTU-EW.172.h01), 4C (CTU-EW.172.p02), 2C (CTU-EW.172.p03), and 4A (CTU-EW.172.p04); data in Table 1.  
Distribution: Ba Ria-Vung Tau (Dinh Mts, Tan Thanh).  
Remarks: The species is fairly similar to M. peguana (Rosa, 1890), but it is distinguished by having spermathecal pores located laterally, first dorsal pore in 7/8, and genital markings in xvi and xix (Nguyen et al. 2020b).

19. Metaphire houlleti (Perrier, 1872)  
(Image 3 b1–b2, Table 1)  
Examined material: 49C (CTU-EW.006.01), 25C (CTU-EW.006.06), 26C (CTU-EW.006.11), 10C (CTU-EW.006.19), 3C (CTU-EW.006.27), 9C (CTU-EW.006.45), and 11C (CTU-EW.006.48).  
Distribution: Widely distributed in southern Vietnam.

20. Metaphire houlletoides Nguyen, Nguyen, Lam & Nguyen, 2020  
(Image 4 b1–b2, Table 1)  
Examined material: 1C (CTU-EW.180.h01) and 3C (CTU-EW.180.p02); data in Table 1.  
Distribution: Binh Phuoc (Loc Ninh, Dong Phu, Bu Gia Map NP, Bu Dang).  
Remarks: The species is fairly similar to M. houlleti (Perrier, 1872), however, it is characterized by having two pairs of spermathecal pores in 7/8/9 and smaller size (Nguyen et al. 2020b).

21. Metaphire malayanoides Nguyen & Lam, 2017  
(Image 3 c1–c2, Table 1)  
Examined material: 1C (CTU-EW.084.h01), 8C (CTU-EW.084.p02), 5C (CTU-EW.084.p03), 16C (CTU-EW.084.04), 31C (CTU-EW.084.05), 14C (CTU-EW.084.06), and 34C (CTU-EW.084.07); data in Table 1.  

Image 3. Male region (1) and Spermatheca (2) of megascolecid species in southeastern Vietnam (continued): a—Metaphire grandiverticulata | b—Metaphire houlleti | c—Metaphire malayanoides | d—Metaphire mangophiloides | e—Metaphire neoxilis | f—Metaphire pacseana | g—Metaphire peguana peguana | h—Metaphire planata | i—Metaphire posthuma | j—Metaphire xuanlocensis | k—Metaphire anomala | l—Metaphire baroaensis. Scale bar = 1mm. © D.H. Lam.
22. **Metaphire mangophiloides** Nguyen & Le, 2015  
(Image 3 d1–d2, Table 1)  
Examined material: 1C (CTU-EW.082.h01) and 1C (CTU-EW.082.p02); data in Table 1.  
Distribution: Dong Nai (Vinh Cuu).  
Remarks: The species is closely similar to *M. easupana* (Thai & Huynh, 1993) but it is characterized by having spermathecal pores in 5/6 and polythecate (Nguyen et al. 2015a).  

23. **Metaphire neoexilis** (Thai & Samphon, 1988)  
(Image 3 e1–e2, Table 1)  
Examined material: 32A (CTU-EW.085.01), 13A (CTU-EW.085.02), 3A (CTU-EW.085.03), and 3A (CTU-EW.085.04); data in Table 1.  
Distribution: Dong Nai (Vinh Cuu, Xuan Loc, Nhon Trach, Long Thanh); Binh Duong (Dau Tieng, Phu Giao); Binh Phuoc (Chon Thanh); Ho Chi Minh City (Can Gio, Nha Be, Binh Chanh, Hoc Mon, Cu Chi).  
Remarks: The species is somewhat similar to *M. bahli* (Gates, 1945), but is characterized by having large disc-shaped genital markings and unconcave male region.  

24. **Metaphire pacseana** (Thai & Samphon, 1988)  
(Image 3 f1–f2, Table 1)  
Examined material: 6C (CTU-EW.083.01), 4C (CTU-EW.083.03), 3C (CTU-EW.083.07), and 6C (CTU-EW.083.14); data in Table 1.  
Distribution: Dong Nai (Vinh Cuu, Xuan Loc, Nhon Trach); Ho Chi Minh City (Can Gio, Nha Be, Binh Chanh, Hoc Mon, Cu Chi); Tay Ninh (Go Dau, Duong Minh Chau, Ba Den Mts).  
Remarks: The populations collected in Ba Den Mountain (Tay Ninh province) and Phu Giao (Binh Duong province) lack genital markings while others have two pairs in 17/18 and 18/19 as in the original description.  

25. **Metaphire peguana peguana** (Rosa, 1890)  
(Image 3 g1–g2, Table 1)  
Examined material: 5C (CTU-EW.009.02), 15C (CTU-EW.009.03), 3C (CTU-EW.009.05), 13C (CTU-EW.009.07), and 16C (CTU-EW.009.14); data in Table 1.  
Distribution: Dong Nai (Vinh Cuu, Xuan Loc, Nhon Trach, Long Thanh); Binh Duong (Bac Tan Uyen, Phu Giao, Ben Cat); Binh Phuoc (Chon Thanh).  
Remarks: The species is closely similar to *M. malayana* (Beddard, 1900), however, it is recognized by having presence of genital markings in intersegmental furrows (from 19/20 to 26/27), first dorsal pore in 12/13, and separated testes sacs (Nguyen & Lam 2017).  

26. **Metaphire planata** (Gates, 1926)  
(Image 3 h1–h2, Table 1)  
Examined material: 9C (CTU-EW.016.04), 11C (CTU-EW.016.05), 11C (CTU-EW.016.10), 8C (CTU-EW.016.15), 31C (CTU-EW.016.20), 12C (CTU-EW.016.36), and 9C (CTU-EW.016.39); data in Table 1.  
Distribution: Widely distributed in southern Vietnam, but more commonly found in grey soils of deltas.  
Remarks: The species was erroneously identified as *M. californica* (Kinberg, 1867), but corrected by Nguyen et al. (2020). *M. planata* differs from *M. californica* in having spermathecal pores in 5/6/7, genital marking present in the spermathecal region associated with saccular accessory glands internally, simple intestinal caeca, separated testes sacs, and smaller size. It is noted that the preservation code CTU-EW.005 (for *M. californica*) would be changed to CTU-EW.016 (for *M. planata*).  

27. **Metaphire planatoides** Nguyen, Nguyen, Lam & Nguyen, 2020  
(Image 4 c1–c2, Table 1)  
Examined material: 1C (CTU-EW.171.h01) and 2C (CTU-EW.171.p02); data in Table 1.  
Distribution: Ba Ria-Vung Tau (Minh Dam Mts).  
Remarks: The species is closely similar to *M. planata* (Gates, 1926), but it is distinguished by lacking of genital markings and accessory glands, having waved diverticula, connecting testes sacs, and smaller size (Nguyen et al. 2020b).  

28. **Metaphire posthuma** (Vaillant, 1868)  
(Image 3 i1–i2, Table 1)  
Examined material: 10C (CTU-EW.011.01) and 19C (CTU-EW.011.03); data in Table 1.  
Distribution: Dong Nai (Xuan Loc); Binh Duong (Dau Tieng, Phu Giao); Ho Chi Minh City (Can Gio, Hoc Mon, Cu Chi); Tay Ninh (Tan Chau).  

29. **Metaphire setosa** Nguyen, Nguyen, Lam & Nguyen, 2020  
(Image 4 i1–i2, Table 1)  
Examined material: 1C (CTU-EW.179.h01), and 6C (CTU-EW.179.p02); data in Table 1.  
Distribution: Binh Phuoc (Hon Quan).
Image 4. Male region (1) and Spermathecae (2) of megascolecid species in southeastern Vietnam (continued): a—Metaphire sp. | b—Metaphire haui | c—Metaphire houlletoides | d—Metaphire planatoides | e—Metaphire setosa | f—Metaphire songbeensis | g—Polypheretima cattienensis | h—Polypheretima colonensis | i—Polypheretima cordata | j—Polypheretima elongata | k—Polypheretima grandiseta | l—Polypheretima militium | m—Pheretima vungtaensis. Scale bar= 1mm. © D.H. Lam.
Table 1. The collection of earthworm samples from southeastern Vietnam.

| No. | Species names and label codes | Number of Specimen | GPS Coordinates | Location | Collector |
|-----|------------------------------|--------------------|-----------------|----------|-----------|
|     |                              |                    | Latitude (North) | Longitude (East) | Date       |
| 1   | Glyphidrilus papillatus (Rosa, 1890) | 2C                  | 10.487778       | 107.251111  | x.2016 Nam G. Nguyen |
|     |                              |                    | 10.913889       | 106.566111  | ix.2019 Nam G. Nguyen |
| 2   | Lampito mauritii Kinberg, 1867  | 27C                 | 10.792778       | 107.525556  | x.2012 Thang V. Nguyen |
|     |                              |                    | 10.464167       | 107.276944  | x.2016 Nam G. Nguyen |
|     |                              |                    | 11.429167       | 106.548333  | x.2017 Nam G. Nguyen |
|     |                              |                    | 11.412500       | 106.412778  | x.2017 Nam G. Nguyen |
|     |                              |                    | 10.691667       | 106.603056  | ix.2019 Nam G. Nguyen |
|     |                              |                    | 10.077500       | 106.402222  | ix.2019 Nam G. Nguyen |
| 3   | Perionyx excavatus Perrier, 1872 | 1C                 | 10.727222       | 106.827222  | x.2016 Nam G. Nguyen |
|     |                              |                    | 11.336111       | 106.746389  | x.2017 Nam G. Nguyen |
| 4   | Amynthas dorsomorrioides Nguyen & Nguyen, 2020 | 1C                  | 10.511111       | 107.126944  | x.2016 Hau P. Nguyen |
|     |                              |                    | 10.405833       | 107.721667  | x.2016 Hau P. Nguyen |
|     |                              |                    | 11.258889       | 107.658333  | x.2013 Trong C. Duong |
|     |                              |                    | 11.809444       | 107.675000  | x.2017 Nam G. Nguyen |
|     |                              |                    | 12.192778       | 107.065833  | x.2017 Nam G. Nguyen |
|     |                              |                    | 11.390556       | 106.155278  | ix.2019 Nam G. Nguyen |
| 5   | Amynthas exigus australis (Gates, 1932) | 4C                  | 11.142778       | 107.225556  | x.2013 Nhan V. Le |
|     |                              |                    | 10.994444       | 107.151389  | x.2013 Nhan V. Le |
|     |                              |                    | 11.258889       | 107.065833  | x.2013 Trong C. Duong |
|     |                              |                    | 11.809444       | 107.675000  | x.2017 Nam G. Nguyen |
|     |                              |                    | 12.192778       | 107.206944  | x.2017 Nam G. Nguyen |
|     |                              |                    | 11.390556       | 106.155278  | x.2019 Nam G. Nguyen |
| 6   | Amynthas longiprostaticus Nguyen & Lam, 2020 | 1C                  | 11.425000       | 107.423333  | x.2013 Nhan V. Le |
|     |                              |                    | 11.425000       | 107.423333  | x.2013 Nhan V. Le |
|     |                              |                    | 11.425000       | 107.423333  | x.2013 Nhan V. Le |
|     |                              |                    | 11.425000       | 107.423333  | x.2013 Nhan V. Le |
|     |                              |                    | 11.425000       | 107.423333  | x.2013 Nhan V. Le |
| 7   | Amynthas mindham Nguyen & Tran, 2020 | 1C                  | 10.405556       | 107.271667  | x.2016 Hau P. Nguyen |
|     |                              |                    | 10.405556       | 107.271667  | x.2016 Hau P. Nguyen |
|     |                              |                    | 10.405556       | 107.271667  | x.2019 Dang H. Lam |
|     |                              |                    | 10.405556       | 107.271667  | x.2019 Dang H. Lam |
| 8   | Amynthas ocularius Nguyen & Lam, 2020 | 1C                  | 10.547500       | 107.512778  | x.2016 Ai T. Truong |
|     |                              |                    | 10.547500       | 107.512778  | x.2016 Ai T. Truong |
|     |                              |                    | 10.547500       | 107.512778  | x.2019 Dang H. Lam |
|     |                              |                    | 10.547500       | 107.512778  | x.2019 Dang H. Lam |
| 9   | Amynthas polychaetiferus (Thai, 1984) | 1C                  | 11.331944       | 107.157778  | x.2012 Trong C. Duong |
| No. | Species names and label codes | Number of Specimen | GPS Coordinates | Location | Date | Collector |
|-----|--------------------------------|---------------------|-----------------|---------|------|-----------|
|     |                                |                     | Latitude (North) | Longitude (East) |      |           |
| 1   | Metaphire anomala (Michaelsen, 1907) |                     | 10.89611 | 107.021667 | Trang Bom, Dong Nai | x.2013 | Nhan V. Le |
| 2   |                                | 11C                  | 10.803056 | 107.225833 | Cam My, Dong Nai | x.2014 | Nhan V. Le |
| 3   |                                | 20C                  | 10.646111 | 107.458333 | Xuyen Moc, Ba Ria Vung Tau | x.2016 | Nam Q. Nguyen |
| 4   |                                | 10C                  | 11.798056 | 106.933889 | Phu Rieng, Binh Phuoc | x.2017 | Nam Q. Nguyen |
| 5   |                                | 6C                   | 11.050000 | 106.788889 | Tan Uyen, Binh Duong | x.2017 | Nam Q. Nguyen |
| 6   |                                | 2C                   | 11.077500 | 106.400000 | Go Dau, Tay Ninh | ix.2019 | Nam Q. Nguyen |
| 7   | Metaphire bahli (Gates, 1945)   |                     | 10.921667 | 107.076111 | Trang Bom, Dong Nai | x.2013 | Nhan V. Le |
| 8   |                                | 7C                   | 11.434444 | 107.428889 | Tan Phu, Dong Nai | x.2013 | Nhan V. Le |
| 9   |                                | 10C                  | 10.525833 | 107.162222 | Ba Ria City, Ba Ria Vung Tau | x.2016 | Nam Q. Nguyen |
| 10  |                                | 8C                   | 11.798056 | 106.933889 | Phu Rieng, Binh Phuoc | x.2017 | Nam Q. Nguyen |
| 11  |                                | 20C                  | 11.386944 | 106.14056 | Tan Ninh City, Tay Ninh | ix.2019 | Nam Q. Nguyen |
| 12  | Metaphire bariaensis Nguyen, Nguyen, Lam & Nguyen, 2020 |                     | 11.231389 | 107.381944 | Dinh Quan, Dong Nai | x.2013 | Nhan V. Le |
| 13  |                                | 30C                  | 10.837500 | 107.541111 | Xuan Loc, Dong Nai | x.2012 | Thang V. Nguyen |
| 14  |                                | 22C                  | 11.312222 | 107.394722 | Tan Phu, Dong Nai | x.2013 | Nhan V. Le |
| 15  |                                | 16C                  | 11.018333 | 106.953889 | Vinh Cuu, Dong Nai | ix.2012 | Trong C. Duong |
| 16  |                                | 28C                  | 10.639167 | 107.085556 | Tan Thanh, Ba Ria Vung Tau | x.2016 | Nam Q. Nguyen |
| 17  |                                | 19C                  | 11.429167 | 106.548333 | Chon Thanh, Binh Phuoc | x.2017 | Nam Q. Nguyen |
| 18  |                                | 20C                  | 10.942778 | 106.772500 | Di An, Binh Duong | x.2017 | Nam Q. Nguyen |
| 19  |                                | 39C                  | 10.387500 | 106.912500 | Can Gio, Ho Chi Minh City | ix.2019 | Nam Q. Nguyen |
| 20  | Metaphire cf. campanulata (Rosa, 1890) |                     | 11.231389 | 107.381944 | Dinh Quan, Dong Nai | x.2013 | Nhan V. Le |
| 21  |                                | 30C                  | 10.593333 | 107.113889 | Bao Quang Mts., Ba Ria Vung Tau | x.2016 | Hau P. Nguyen |
| 22  |                                | 30C                  | 10.593333 | 107.113889 | Bao Quang Mts., Ba Ria Vung Tau | x.2016 | Hau P. Nguyen |
| 23  |                                | 3C                   | 10.639167 | 107.085556 | Ba Ria City, Ba Ria Vung Tau | x.2016 | Hau P. Nguyen |
| 24  |                                | 15C                  | 10.525833 | 107.162222 | Tan Thanh, Ba Ria Vung Tau | x.2019 | Nam Q. Nguyen |
| 25  | Metaphire cf. campanulata (Rosa, 1890) |                     | 11.231389 | 107.381944 | Dinh Quan, Dong Nai | x.2013 | Nhan V. Le |
| 26  |                                | 1C                   | 10.666667 | 107.248333 | Chau Duc, Ba Ria Vung Tau | x.2016 | Nam Q. Nguyen |
| 27  |                                | 14C                  | 11.527778 | 106.916667 | Dong Xoai, Binh Phuoc | x.2017 | Nam Q. Nguyen |
| 28  |                                | 25C                  | 11.050000 | 106.789167 | Tan Uyen, Binh Duong | x.2017 | Nam Q. Nguyen |
| 29  |                                | 4C                   | 11.021389 | 106.555000 | Cu Chi, Ho Chi Minh City | ix.2019 | Nam Q. Nguyen |
| 30  |                                | 8C                   | 11.382778 | 106.200000 | Duong Minh Chau, Tay Ninh | ix.2019 | Nam Q. Nguyen |
| 31  | Metaphire easupana (Thai & Huynh, 1993) |                     | 11.425278 | 107.426111 | Tan Phu, Dong Nai | x.2013 | Nhan V. Le |
| 32  |                                | 14C                  | 10.666667 | 107.248333 | Chau Duc, Ba Ria Vung Tau | x.2016 | Nam Q. Nguyen |
| 33  |                                | 11C                  | 11.527778 | 106.916667 | Dong Xoai, Binh Phuoc | x.2017 | Nam Q. Nguyen |
| 34  |                                | 25C                  | 11.050000 | 106.789167 | Tan Uyen, Binh Duong | x.2017 | Nam Q. Nguyen |
| 35  |                                | 4C                   | 11.021389 | 106.555000 | Cu Chi, Ho Chi Minh City | ix.2019 | Nam Q. Nguyen |
| 36  |                                | 8C                   | 11.382778 | 106.200000 | Duong Minh Chau, Tay Ninh | ix.2019 | Nam Q. Nguyen |
| 37  | Metaphire grandiverticulata Nguyen & Lam, 2017 |                     | 11.160000 | 107.314444 | Dinh Quan, Dong Nai | x.2013 | Nhan V. Le |
| 38  |                                | 35C                  | 10.944167 | 107.386111 | Xuan Loc, Dong Nai | x.2012 | Thang V. Nguyen |
| 39  |                                | 10C                  | 11.018889 | 106.877500 | Vinh Cuu, Dong Nai | ix.2012 | Trong C. Duong |
| 40  |                                | 25C                  | 10.404167 | 107.267778 | Minh Dam Mts., Ba Ria Vung Tau | x.2016 | Nam Q. Nguyen |
| 41  |                                | 23C                  | 11.390556 | 106.155278 | Ba Den Mts., Tay Ninh | x.2019 | Nam Q. Nguyen |
| 42  | Metaphire grandiverticulata Nguyen & Lam, 2017 |                     | 10.741389 | 106.975278 | Long Thanh, Dong Nai | x.2014 | Nhan V. Le |
| 43  |                                | 9C                   | 10.741389 | 106.975278 | Long Thanh, Dong Nai | x.2014 | Nhan V. Le |
| No. | Species names and label codes | Number of Specimen | GPS Coordinates | Location | Date | Collector |
|-----|-------------------------------|--------------------|-----------------|----------|------|----------|
|     |                               |                    | Latitude (North) | Longitude (East) |       |          |
|     |                               |                    |                 |           |      |          |
| 16  | Metaphire hauki Nguyen, Nguyen, Lam & Nguyen, 2020 |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
| 17  | Metaphire houlleti (Perrier, 1872) |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
| 18  | Metaphire houlletoides Nguyen, Nguyen, Lam & Nguyen, 2020 |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
| 19  | Metaphire malayanoides Nguyen & Lam, 2017 |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
| 20  | Metaphire mangophilioides Nguyen & Le, 2015 |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
| 21  | Metaphire neoexilis (Thai & Samphon, 1988) |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
| 22  | Metaphire pacesana (Thai & Samphon, 1988) |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
| 23  | Metaphire peguana peguana (Rosa, 1890) |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
|     |                               |                    |                 |           |      |          |
| No. | Species names and label codes | Number of Specimen | GPS Coordinates | Location | Date | Collector |
|-----|-------------------------------|--------------------|----------------|----------|------|-----------|
|     |                               |                    | Latitude (North) | Longitude (East) |      |           |
|     |                               |                    |                |           |      |           |
| 24  | Metaphire planata (Gates, 1926) |                    |                |           |      |           |
|     | CTU-EW.005.04                 | 9C                 | 11.010278      | 106.846944 |      | x.2012    | Trong C. Duong |
|     | CTU-EW.005.05                 | 11C                | 10.727500      | 106.892778 |      | x.2014    | Nhan V. Le |
|     | CTU-EW.005.10                 | 11C                | 10.643889      | 107.113889 |      | x.2016    | Nam Q. Nguyen |
|     | CTU-EW.005.15                 | 8C                 | 11.429167      | 106.548333 |      | x.2017    | Nam Q. Nguyen |
|     | CTU-EW.005.20                 | 31C                | 11.419167      | 106.413611 |      | x.2017    | Nam Q. Nguyen |
|     | CTU-EW.005.36                 | 12C                | 10.558889      | 106.821111 |      | x.2019    | Nam Q. Nguyen |
|     | CTU-EW.005.39                 | 9C                 | 11.077500      | 106.400000 |      | x.2019    | Nam Q. Nguyen |
| 25  | Metaphire planatoides Nguyen, Nguyen, Lam & Nguyen, 2020 |                    |                |           |      |           |
|     | CTU-EW.171.h01                | 1C                 | 10.405833      | 107.271667 |      | x.2016    | Hau P. Nguyen |
|     | CTU-EW.171.p02                | 2C                 | 10.405833      | 107.271667 |      | x.2016    | Hau P. Nguyen |
| 26  | Metaphire posthuma (Vaillant, 1868) |                    |                |           |      |           |
|     | CTU-EW.011.01                 | 10C                | 10.780000      | 107.495278 |      | x.2012    | Thang V. Nguyen |
|     | CTU-EW.011.03                 | 19C                | 10.387500      | 106.912500 |      | x.2019    | Nam Q. Nguyen |
| 27  | Metaphire setosa Nguyen, Nguyen, Lam & Nguyen, 2020 |                    |                |           |      |           |
|     | CTU-EW.179.h01                | 1C                 | 11.567222      | 106.596111 |      | x.2017    | Tien T. H. Luong |
|     | CTU-EW.179.p02                | 6C                 | 11.567222      | 106.596111 |      | x.2017    | Tien T. H. Luong |
| 28  | Metaphire songbeensis Nguyen, Lam & Nguyen, 2020 |                    |                |           |      |           |
|     | CTU-EW.176.h01                | 1C                 | 10.760833      | 106.572222 |      | x.2017    | Tien T. H. Luong |
|     | CTU-EW.176.p02                | 9C                 | 10.760833      | 106.572222 |      | x.2017    | Tien T. H. Luong |
|     | CTU-EW.176.03                 | 13C                | 11.760833      | 106.572222 |      | x.2017    | Tien T. H. Luong |
|     | CTU-EW.176.04                 | 8C                 | 11.294722      | 106.406111 |      | x.2017    | Na S. Dinh |
| 29  | Metaphire xuanlocensis Nguyen & Lam, 2017 |                    |                |           |      |           |
|     | CTU-EW.086.h01                | 1C                 | 10.815833      | 107.542222 |      | x.2012    | Thang V. Nguyen |
|     | CTU-EW.086.p02                | 9C                 | 10.815833      | 107.542222 |      | x.2012    | Thang V. Nguyen |
|     | CTU-EW.086.03                 | 17C                | 10.712500      | 107.324722 |      | x.2013    | Nhan V. Le |
|     | CTU-EW.086.04                 | 6C                 | 10.654444      | 107.264722 |      | x.2016    | Nam Q. Nguyen |
|     | CTU-EW.086.05                 | 12C                | 10.606111      | 107.438611 |      | x.2016    | Nam Q. Nguyen |
|     | CTU-EW.086.06                 | 6C                 | 10.646111      | 107.458333 |      | x.2016    | Nam Q. Nguyen |
| 30  | Pheretima vungtauensis Nguyen, Nguyen & Nguyen, 2018 |                    |                |           |      |           |
|     | CTU-EW.166.h01                | 1C                 | 10.749167      | 107.243056 |      | x.2016    | Ai T. Truong |
|     | CTU-EW.166.p02                | 2C                 | 10.749167      | 107.243056 |      | x.2016    | Ai T. Truong |
|     | CTU-EW.166.p03                | 1C                 | 10.661667      | 107.156389 |      | x.2016    | Ai T. Truong |
|     | CTU-EW.166.p04                | 1C                 | 10.640278      | 107.350000 |      | x.2016    | Ai T. Truong |
|     | CTU-EW.166.p05                | 2C                 | 10.643889      | 107.113889 |      | x.2016    | Hau P. Nguyen |
|     | CTU-EW.166.p06                | 1C                 | 10.485833      | 107.181667 |      | x.2016    | Hau P. Nguyen |
|     | CTU-EW.166.p07                | 1C                 | 10.594167      | 107.123333 |      | x.2016    | Hau P. Nguyen |
| 31  | Polypheretima cattienensis Nguyen, Tran & Nguyen, 2015 |                    |                |           |      |           |
|     | CTU-EW.040.h01                | 1C                 | 11.425000      | 107.428333 |      | x.2013    | Nhan V. Le |
|     | CTU-EW.040.p02                | 6C                 | 11.425000      | 107.428333 |      | x.2013    | Nhan V. Le |
|     | CTU-EW.040.p03                | 6C                 | 11.425278      | 107.428611 |      | xi.2019   | Dang H. Lam |
| No. | Species names and label codes | Number of Specimen | GPS Coordinates | Location | Date | Collector |
|-----|------------------------------|--------------------|----------------|----------|------|-----------|
|     |                              |                    |                |          |      |           |
| 32  | *Polypheretima cordata* Nguyen, Tran & Nguyen, 2015 | 1C | 11.113611 107.052778 | Vinh Cuu, Dong Nai | x.2013 | Trong C. Duong |
|     |                              | 7C | 11.113611 107.052778 | Vinh Cuu, Dong Nai | x.2013 | Trong C. Duong |
|     |                              | 4C | 11.428333 107.427222 | Tan Phu, Dong Nai | x.2013 | Nhan V. Le |
|     |                              | 7C | 11.113611 107.052778 | Vinh Cuu, Dong Nai | x.2013 | Trong C. Duong |
|     |                              | 4C | 10.947778 107.018333 | Dinh Quan, Dong Nai | x.2013 | Nhan V. Le |
|     |                              | 4C | 11.113611 107.052778 | Dong Phu, Binh Phuoc | x.2013. | Nhan V. Le |
|     |                              | 4C | 11.291111 107.203333 | Bu Gia Map, Binh Phuoc | x.2017 | Nam Q. Nguyen |
|     |                              | 4C | 11.527778 106.916667 | Dong Xoai, Binh Phuoc | x.2017 | Nam Q. Nguyen |
| 33  | *Polypheretima elongata* (Perrier, 1872) | 4C | 10.835278 106.526944 | Binh Chanh, Ho Chi Minh City | x.2019 | Nam Q. Nguyen |
| 34  | *Polypheretima militium* Nguyen, Tran & Nguyen, 2015 | 1C | 11.142500 107.014444 | Vinh Cuu, Dong Nai | x.2013 | Trong C. Duong |
|     |                              | 6C | 11.142500 107.014444 | Vinh Cuu, Dong Nai | x.2013 | Trong C. Duong |
|     |                              | 3C | 11.142500 107.014444 | Vinh Cuu, Dong Nai | x.2013 | Trong C. Duong |
|     |                              | 5C | 11.113611 107.053333 | Vinh Cuu, Dong Nai | x.2013 | Nam Q. Nguyen |
| 35  | *Drawida beddardi* (Rosa, 1890) | 4C | 11.925000 106.726944 | Bu Gia Map, Binh Phuoc | x.2017 | Nam Q. Nguyen |
|     |                              | 7C | 11.433056 106.385278 | Dau Tieng, Binh Duong | x.2014 | NHI T. N. Nguyen |
| 36  | *Eukenia saltensis* (Beddard, 1895) | 8C | 12.057222 107.127500 | Bu Gia Map, Binh Phuoc | x.2017 | Nam Q. Nguyen |
|     |                              | 7C | 11.024722 106.621944 | Thu Dau Mot, Binh Duong | x.2017 | Nam Q. Nguyen |
|     |                              | 7C | 10.387500 106.912500 | Can Gio, Ho Chi Minh City | x.2019 | Nam Q. Nguyen |
|     |                              | 8C | 10.691389 106.660000 | Binh Chanh, Ho Chi Minh City | x.2019 | Nam Q. Nguyen |
|     |                              | 29C | 10.387500 106.385278 | Binh Chanh, Ho Chi Minh City | x.2019 | Nam Q. Nguyen |
|     |                              | 16C | 11.390556 106.155278 | Tay Ninh City, Tay Ninh | x.2019 | Nam Q. Nguyen |
|     |                              | 20C | 11.371389 106.155278 | Tay Ninh City, Tay Ninh | x.2019 | Nam Q. Nguyen |
| 37  | *Dichogaster affinis* (Michaelsen, 1890) | 16C | 10.551944 106.779722 | Can Gio, Ho Chi Minh City | x.2019 | Nam Q. Nguyen |
|     |                              | 3C | 11.077500 106.400000 | Trang Bang, Tay Ninh | x.2019 | Nam Q. Nguyen |
| 38  | *Dichogaster bolaui* (Michaelsen, 1891) | 5C | 10.639167 107.085556 | Tan Thanh, Ba Ria Vung Tau | x.2016 | Nam Q. Nguyen |
|     |                              | 20C | 12.191111 107.203333 | Bu Gia Map, Binh Phuoc | x.2017 | Nam Q. Nguyen |
|     |                              | 20C | 10.749722 107.349722 | Cam My, Dong Nai | x.2013 | Nhan V. Le |
|     |                              | 11C | 10.477222 106.879444 | Can Gio, Ho Chi Minh City | x.2019 | Nam Q. Nguyen |
|     |                              | 5C | 11.390556 106.155278 | Tay Ninh City, Tay Ninh | x.2019 | Nam Q. Nguyen |
| 39  | *Pontoscolex corethrurus* (Müller, 1857) | 31C | 11.424444 107.435278 | Tan Phu, Dong Nai | x.2013 | Nhan V. Le |
|     |                              | 5C | 10.628889 107.112500 | Tan Thanh, Ba Ria Vung Tau | x.2016 | Nam Q. Nguyen |
|     |                              | 69C | 11.861111 107.025556 | Bu Gia Map, Binh Phuoc | x.2017 | Nam Q. Nguyen |
|     |                              | 19C | 11.058888 106.788888 | Tan Uyen, Binh Duong | x.2017 | Nam Q. Nguyen |
|     |                              | 27C | 10.702778 106.573889 | Binh Chanh, Ho Chi Minh City | x.2019 | Nam Q. Nguyen |
|     |                              | 21C | 11.371389 106.254722 | Duong Minh Chau, Tay Ninh | x.2019 | Nam Q. Nguyen |
Remarks: The species has very unique morphology characters among known *Metaphire* species, with regard to its saddle-shaped clitellum and setal arrangement in two rings (Nguyen et al. 2020b).

30. *Metaphire songbeensis* Nguyen, Nguyen, Lam & Nguyen, 2020
   (Image 4 e1–e2, Table 1)
   Examined material: 1C (CTU-EW.176.h01), 9C (CTU-EW.176.p02), 13C (CTU-EW.176.03), and 8C (CTU-EW.176.04); data in Table 1.
   Distribution: Binh Duong (Dau Tieng, Di An, Ben Cat, Bau Bang); Binh Phuoc (Loc Ninh, Chon Thanh, Dong Xoai, Dong Phu, Phu Rieng, Bu Dang, Phuc Long, Bu Gia Map, Bu Dop).
   Remarks: The species is fairly similar to *M. posthuma* (Vaillant, 1868), but it is recognized by having spermathecal pores in the dorsum, first dorsal pore in 9/10, and ventrally connected testes sacs. There are two morphological forms. The first form found in Binh Duong Province has spermathecal pores located closely to the mid-dorsal line and four pairs of genital markings in the male region. The other form has spermathecal pores located laterodorsally and more than four pairs of genital markings (Nguyen et al. 2020b).

31. *Metaphire xuanlocensis* Lam & Lam, 2017
   (Image 3 j1–j2, Table 1)
   Examined material: 1C (CTU-EW.086.h01), 9C (CTU-EW.086.p02), 17C (CTU-EW.086.03), 6C (CTU-EW.086.04), 12C (CTU-EW.086.05), and 6C (CTU-EW.086.06); data in Table 1.
   Distribution: Dong Nai (Xuan Loc, Cam My); Ba Ria-Vung Tau (Ba Ria City, Xuyen Moc, Chau Duc).
   Remarks: The species is closely similar to *Po. grandisetosa* (Thai, 1996), but it is specialized by number of spermathecal pores (one pair in 5/6, 2 pairs in 6/7 or a pair per segment (found in Binh Phuoc Province)), holandry, presence of copulatory pouches, and absence of stout setae in the dorsum (Nguyen et al. 2015b).

Genus *Pheretima* Kinberg, 1867

32. *Pheretima vungtauensis* Lam, Nguyen & Lam, 2018
   (Image 4 l1–l2, Table 1)
   Examined material: 1C (CTU-EW.166.h01), 2C (CTU-EW.166.p02), 1C (CTU-EW.166.p03), 1C (CTU-EW.166.p04), 2C (CTU-EW.166.p05), 1C (CTU-EW.166.p06), and 1C (CTU-EW.166.p07); data in Table 1.
   Distribution: Ba Ria-Vung Tau (Chau Duc, Tan Thanh).
   Remarks: The species is closely related to *M. houleti* (Perrier, 1872), it is but specialized by the presence of micronephridia attached onto the spermathecal ducts (Nguyen et al. 2018). Currently, *Pheretima vungtauensis* is known as the only species of genus *Pheretima* sensu stricto found in Vietnam.

Genus *Polypheretima* Michaelsen, 1934

33. *Polypheretima cattienensis* Tran & Nguyen, 2015
   (Image 4 f1–f2, Table 1)
   Examined material: 1C (CTU-EW.026.h01), 7C (CTU-EW.026.p02), 4C (CTU-EW.042.03), 7C (CTU-EW.042.04), 4C (CTU-EW.042.05), 4C (CTU-EW.042.06), 4C (CTU-EW.042.07), and 4C (CTU-EW.042.08); data in Table 1.
   Distribution: Dong Nai (Vinh Cuu, Tan Phu, Trang Bom, Dinh Quan); Binh Phuoc (Dong Phu, Bu Dang, Bu Gia Map, Loc Ninh).
   Remarks: The species is closely similar to *Po. grandisetosa* (Thai, 1996), but it is specialized by number of spermathecal pores (one pair in 5/6, 2 pairs in 6/7 or a pair per segment (found in Binh Phuoc Province)), holandry, presence of copulatory pouches, and absence of stout setae in the dorsum (Nguyen et al. 2015b).

34. *Polypheretima cordata* Lam, Tran & Nguyen, 2015
   (Image 4 h1–h2, Table 1)
   Examined material: 1C (CTU-EW.042.h01), 7C (CTU-EW.042.p02), 4C (CTU-EW.042.03), 7C (CTU-EW.042.04), 4C (CTU-EW.042.05), 4C (CTU-EW.042.06), 4C (CTU-EW.042.07), and 4C (CTU-EW.042.08); data in Table 1.
   Distribution: Dong Nai (Vinh Cuu, Tan Phu, Trang Bom, Dinh Quan); Binh Phuoc (Dong Phu, Bu Dang, Bu Gia Map, Loc Ninh).
   Remarks: The species is closely similar to *Po. grandisetosa* (Thai, 1996), but it is specialized by number of spermathecal pores (one pair in 5/6, 2 pairs in 6/7 or a pair per segment (found in Binh Phuoc Province)), holandry, presence of copulatory pouches, and absence of stout setae in the dorsum (Nguyen et al. 2015b).

35. *Polypheretima elongata* (Perrier, 1872)
   (Image 4 j1, Table 1)
   Examined material: 4C (CTU-EW.026.02); data in Table 1.
   Distribution: Ho Chi Minh City (Binh Chanh).
   Remarks: This is the first record of the species in the southeastern part of Vietnam, although it is widely distributed in the Mekong Delta (Nguyen 2014).

36. *Polypheretima militium* Lam, Tran & Nguyen, 2015
   (Image 4 i1–i2, Table 1)
   Examined material: 1C (CTU-EW.041.h01), 6C (CTU-EW.041.p02), 3C (CTU-EW.041.03), and 5C (CTU-EW.041.04); data in Table 1.
   Distribution: Dong Nai (Vinh Cuu).
### Key to the earthworm species in southeastern Vietnam

| 1. | Setae Lumbricine ......................................................................................................................... | 2 |
| 2. | Setae Perichaetae .......................................................................................................................... | 8 |
| 3. | Clitellum formed from more than one layer of cells .................................................................... | 3 |
| 4. | Clitellum formed from a single layer of cells ............................................................................. | 7 |
| 5. | Drawida beddardi .......................................................................................................................... | 5 |
| 6. | Eukeria saltensis ............................................................................................................................ | 1 |
| 7. | Clitellum saddle-shaped .............................................................................................................. | 4 |
| 8. | Pontodrilus litoralis ..................................................................................................................... | 4 |
| 9. | Metaphire anomala ....................................................................................................................... | 6 |
| 10. | Metaphire bariaensis .................................................................................................................... | 9 |
| 11. | Metaphire easupana .................................................................................................................... | 10 |
| 12. | Metaphire bariaensis .................................................................................................................... | 12 |
| 13. | Metaphire neoexilis ....................................................................................................................... | 13 |
| 14. | Metaphire grandiverticulata .......................................................................................................... | 14 |
| 15. | Metaphire mangophiloides ............................................................................................................ | 15 |
| 16. | Metaphire setosa .......................................................................................................................... | 16 |
| 17. | Metaphire soguenesis .................................................................................................................... | 17 |
| 18. | Metaphire bariaensis .................................................................................................................... | 18 |
| 19. | Metaphire neoexilis ....................................................................................................................... | 19 |
| 20. | Metaphire malayanoides ................................................................................................................. | 20 |
| 21. | Metaphire bariaensis .................................................................................................................... | 21 |
| 22. | Metaphire megalocnemus ................................................................................................................ | 22 |
| 23. | Metaphire bariaensis .................................................................................................................... | 23 |
| 24. | Metaphire bariaensis .................................................................................................................... | 24 |
| 25. | Metaphire bariaensis .................................................................................................................... | 25 |
| 26. | Metaphire bariaensis .................................................................................................................... | 26 |
| 27. | Metaphire bariaensis .................................................................................................................... | 27 |
| 28. | Metaphire bariaensis .................................................................................................................... | 28 |
| 29. | Metaphire bariaensis .................................................................................................................... | 29 |
| 30. | Metaphire bariaensis .................................................................................................................... | 30 |

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- One pair of genital markings in xviii. First dorsal pore in 8/9.
- Female pore single. Genital markings absent in the male region.
- Female pore paired. Genital marking single in mid-ventral of 8/9.
- Clitellum annular ..........................................................................................................................
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35. *Amynthas longiprostaticus* (Can Gio, Nha Be, Binh Chanh); Tay Ninh (Tay Ninh City).

(Chon Thanh, Bu Dang, Bu Gia Map); Ho Chi Minh City (CTU-EW.182.07); data in Table 1.

29C (CTU-EW.182.05), 16C (CTU-EW.182.06), and 20C (CTU-EW.182.02), 7C (CTU-EW.182.03), 8C (CTU-EW.182.04),

38. *Eukerria saltensis* (Michaelsen, 1890)

Genus *Eukerria*

Family OCTOCHAETIDAE Gates, 1959

39. *Dichogaster affinis* Michaelsen, 1890

(image 1 d1–d2, Table 1)

Examined material: 16C (CTU-EW.033.01) and 3C (CTU-EW.033.02); data in Table 1.

Distribution: Ho Chi Minh City (Can Gio); Tay Ninh (Ba Den Mts, Trang Bang).

Remarks: The species was recorded for the first time in southeastern Vietnam. It was usually found along with Dichogaster bolaii in soils of roadside or fallow lands.

40. *Dichogaster bolaii* (Michaelsen, 1891)

(image 1 f1–f2, Table 1)

Examined material: 5C (CTU-EW.035.03), 20C (CTU-EW.035.04), 20C (CTU-EW.035.08), 11C (CTU-EW.035.09), and 5C (CTU-EW.035.11); data in Table 1.

Distribution: Ba Ria-Vung Tau (Ba Ria City, Tan Thanh); Dong Nai (Cam My); Binh Phuoc (Bu Gia Map NP); Ho Chi Minh City (Can Gio, Hoc Mon, Binh Chanh).

Remarks: It was very common in southeastern Vietnam, especially in moist soils.

Family RHINODRILIDAE Benham, 1890

41. *Pontoscolex corethrurus* (Müller, 1857)

(image 1 e1–e2, Table 1)

Examined material: 5C (CTU-EW.035.03), 20C (CTU-EW.035.04), 20C (CTU-EW.035.08), 11C (CTU-EW.035.09), and 5C (CTU-EW.035.11); data in Table 1.

Distribution: Ba Ria-Vung Tau (Ba Ria City, Tan Thanh); Dong Nai (Cam My); Binh Phuoc (Bu Gia Map NP); Ho Chi Minh City (Can Gio, Hoc Mon, Binh Chanh).

Remarks: It was very common in southeastern Vietnam, especially in moist soils.

Remarks: The species is somewhat similar to *Po. colonensis* (Thai, 1996), but it is identified by holandry, polythecate, first dorsal pore in 12/13 or 13/14, and intestinal swelling at xv (Nguyen et al. 2015b).

Family MONILIGASTRIDAE Claus, 1880

Genus *Dichogaster* Michaelsen, 1900

37. *Dichogaster beddardi* (Rosa, 1890)

(image 1 b1–n2, Table 1)

Examined material: 4C (CTU-EW.031.02) and 7C (CTU-EW.131.04); data for samples were shown in table 1.

Distribution: Binh Phuoc (Tan Thanh, Bu Dang); Binh Duong (Phu Giao, Dau Tieng) (Nguyen 2014; Nguyen et al. 2015).

Family OCNERODRILIDAE Beddard, 1891

Genus *Eukerria* Michaelsen, 1935

38. *Eukerria saltensis* (Beddard, 1895)

(image 1 c1, Table 1)

Examined material: 8C (CTU-EW.182.01), 7C (CTU-EW.182.02), 7C (CTU-EW.182.03), 8C (CTU-EW.182.04), 29C (CTU-EW.182.05), 16C (CTU-EW.182.06), and 20C (CTU-EW.182.07); data in Table 1.

Distribution: Binh Duong (Thai Dau Mot); Binh Phuoc (Chon Thanh, Bu Dang, Bu Gia Map); Ho Chi Minh City (Can Gio, Nha Be, Binh Chanh); Tay Ninh (Tay Ninh City).
Examined material: 31C (CTU-EW.001.01), 5C (CTU-EW.001.11), 69C (CTU-EW.001.22), 19C (CTU-EW.001.29), 27C (CTU-EW.001.44), and 21C (CTU-EW.001.45); data in Table 1.

Distribution: Very commonly distributed in Vietnam.

Remarks: The species was known to be native to the South America region, but wide spread over the world (Brown et al. 2006). In Vietnam, this species has been known widely in all habitats except natural forests in high mountains.

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