Data to the earthworm fauna of Myanmar with notes on some little known species (Annelida, Oligochaeta)

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Abstract. The earthworm fauna of the Republic of the Union of Myanmar (Burma) is quite well studied due to the studious works of Gordon E. Gates. However, after the publication of the comprehensive monograph Burmese earthworms (Gates 1972) there has been no new data published from this country. In the last year the last author collected several earthworm samples from Burma, resulting in 7 species records belonging to the families Moniligastridae, Benhamiidae, Octochaetidae and Megascolecidae including some little known species like Tonoscolex depressus (Gates, 1929) and Eutyphoeus constrictus Gates, 1929. Examination of the E. constrictus specimens revealed that they show different states of metandry, they are morphologically very similar to E. hastatus Gates, 1929, and only differ by the functionality of the testes in segment 10, therefore it should be regarded as a synonym of E. constrictus.

Keywords. Burma, earthworms, Eutyphoeus, Tonoscolex, new synonym

INTRODUCTION

The first data on the earthworm fauna of Myanmar (Burma) was presented by Rosa (1888, 1890a, 1890b) working on rich material collected by Leonardo Fea, a renowned Italian naturalist. In this series of papers Rosa reported 13 species new to science and Perionyx excavatus Perrier, 1872 being present in Myanmar. In the subsequent years several other sporadic datasets have been presented by Michaelsen (1907, 1908) and Stephenson (1912, 1916) and later, in the monograph of the Oligochaeta of British India, Stephenson (1923) listed 20 species occurring within the territory of the present day Myanmar.

In the middle of the 1920's the earthworm research of Burma got under way through the work of Gates, who organized a thorough collecting campaign and described some 80 species new to science (Gates 1972, Blakemore 2006). Unfortunately these activities ended abruptly because of WWII and Gates had to leave behind the collection and flee to the USA (Gates 1972). However, as a result of his 20 years of research, Gates continued publishing on the earthworms of Burma and finally produced a comprehensive monograph of the earthworm fauna of Burma reporting on 174 species occurring in Burma proper and another 84 species present in the neighbouring regions (Gates 1972). This list of earthworms has recently been updated by Blakemore (2006) reporting altogether 195 species of which ca. 130 are thought to be endemic to Myanmar.

After Gates’ (1972) work, to the best of our knowledge, there have been no earthworm records
presented from Myanmar, until the last author (YH) organized several collecting trips to the country resulting in the description of the full mitochondrial genome of the giant Burmese earthworm *Tonoscolex birmanicus* (Gates, 1927) (Wang *et al.* 2015) and a report on some little known species presented herein.

**MATERIAL AND METHODS**

Earthworms were collected by the diluted formaldehyde method (Raw 1959), complemented with digging and searching under stones and under the bark of fallen logs. The specimens were killed and fixed in 96% ethanol, then transferred into 75% ethanol and deposited in the earthworm collection of the Hungarian Natural History Museum (HNHM). The penial setae were removed by dorsal dissecting of the animals, mounted in Euparal on a microscopic slide and were studied using a Nikon Eclipse 660 DIC microscope.

**RESULTS**

**Family Moniligastridae Claus 1880**

**Genus Drawida Michaelsen 1900**

*Drawida* sp. juv.


*Remarks.* We have several aclitellate specimens from this medium sized (50x3 mm) species. Their colour is grey with slight greenish hints. They have no clitellum and any other genital markings. Male pores obvious, lateral in 10/11. Four intestinal gizzards in segment 13–16. Prostates long, finger-like, muscular. Ovisac long extends back to 17. Taking into account these characteristics our specimens are most similar to *Drawida caerulea* Gates, 1926 but they lack the characteristic blue colour.

**Family Benhamiidae Michaelsen, 1897**

**Genus Dichogaster (Diplothecodrilus) Csuzdi, 1996**

*Dichogaster (Diplothecodrilus) annae* (Horst, 1893)

*Benhamia annae* Horst, 1893: 32.
*Dichogaster (Diplothecodrilus) annae*: Blakemore 2006:15, Csuzdi 2010: 194 (for complete synonymy).

*Material examined.* HNHM AF/ 5639, 10 ex. Quarter 3 B, Bo Aung Kyaw Street, Hopong Town, Southern Shan State. 22km distance from Taunggyi, found in soil nearby house. 22. August 2014, leg. Y. Hong, Tin Moe Win & Cho Nyi.

*Remarks.* This species has previously been recorded from Burma under its synonymous name *Dichogaster curgensis* by Gates (1961).

*Dichogaster (Diplothecodrilus) saliens* (Beddard, 1893)

*Microdrilus saliens* Beddard, 1893 683.

*Material examined.* HNHM AF/ 5638, 2 ex. Quarter 3 B, Bo Aung Kyaw Street, Hopong Town, Southern Shan State. 22km distance from Taunggyi, found in soil nearby house. 22. August 2014, leg. Y. Hong, Tin Moe Win & Cho Nyi.

**Family Octochaetidae Michaelsen, 1900**

**Genus Eutyphoeus Michaelsen, 1900**

*Eutyphoeus constrictus* Gates, 1929

(Figure 1)

*Eutyphoeus hamatus* Gates, 1930: 332.
*Eutyphoeus montanus* Gates, 1933: 587.
Figure 1. Eutyphoeus constrictus, ventral view of the clitellar region. prp = prostate pore, mp = male pore.


culate with short duct and larger oval ampoule. Prostates large, coiled in 17–20. Each prostate is accompanied with several penial setae. The mature setae slightly bent sabre-shaped, ca. 3–3.5 mm long 70 µ at the widest region (just under the tip), 50 µ at the middle. Ornamentation dense serrations.

Remarks. Our worms are clearly similar to E. hastatus Gates, 1929. The shape of spermathecae and the penial setae (Gates 1929 fig. 19) are completely identical with those of the present specimens, however hastatus is holandric, our specimens mainly metandric (with vestigial testis and male funnels in 10). But there are differences in the reduction of the first testes pairs, in one specimen it is much smaller but clearly functional, in the others hardly detectable, just the thin male duct can be seen. As the difference between E. constrictus and E. hastatus is quite small (absence or presence of functional testes in 10) Gates (1972) questioned the validity of this arbitrary distinction but formally kept the two species apart. As in our samples both forms appear, it is clear that E. hastatus Gates, 1929 is only a synonym name of E. constrictus Gates, 1929.

Eutyphoeus foveatus Rosa, 1890

(Figure 2)

Typhaeus foveatus Rosa, 1890a: 389.


Figure 2. Eutyphoeus foveatus, ventral view of the clitellar region. fp = female pore, mf = male field, gm = genital marking.


Genus Octochaetona Gates, 1962

Octochaetona surensis (Michaelsen, 1910)

Octochaetus (Octochaetoides) birmanicus Gates, 1925: 55.


Family Megascolecidae Rosa, 1891

Genus Tonoscolex Gates, 1933

Tonoscolex depressus (Gates, 1929)

Notoscolex choprai Stephenson, 1929: 230.

Material examined. HNHM AF/5640, 3 + 2 juv ex. Loi San Sit mountain, Lashio. Northern Shan State. (23° 25.30'N, 097° 05.80'E) 1441m. 15. August 2013, leg. Y. Hong & Tin Moe Win.


Remarks. The genus is characterized by the special enteric excretory system and the seemingly unusual positions of the genital organs (female pores in 13, prostatic pores in 17 testes in 9, 10). However, dissecting the buccal cavity revealed a retracted vestigial first segment (Fig. 3). Adding this to the segment count would mean all the strange positions would shift to the normal place (ie. testes 10, 11, female pores 14, prostatic pores 18).

Figure 3. Tonoscolex depressus, buccal cavity. afs = apparent first segment, vfs = vestigial first segment retracted into the buccal cavity.
Our present specimens completely agree with the description of Gates (1929, 1972) and are well recognizable by the characteristic male field (Gates 1929, Fig. 6). However, all the three mature worms are at the lower range of the species’ size variation (75–500 mm by Gates 1972).

Acknowledgments – This research was supported by Korea Rural Development Administration fund (PJ009778). Our thanks are due to Emma Sherlock (NHM, London) for polishing the English of the Ms. Comments and suggestions of the anonymous reviewers are also kindly acknowledged.

REFERENCES


