



## Six exotic terrestrial earthworms (Oligochaeta: Megadrilacea: Moniligastridae, Lumbricidae, Ocneroдрilidae & Megascolecidae) newly added to Korean species biodiversity list\*

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Preliminary inspection by the principal author of the NIBR Oligochaete collection, maintained by marine Annelida curator T.-S. Park, revealed several new endemic species, such as an *Amyntas* sp. nov. described in the current *Zootaxa* issue, plus three of the six exotics titled above. Three additional new exotic records are the results of recent in-country collection by the authors in early 2012 that together raise the Korean earthworm biodiversity count to ~113 named species.

Exotics new for Korea are:

### Family MONILIGASTRIDAE

#### *Drawida* cf. *barwelli* (Beddard, 1886)

NIBR IV0000245078. Jeollanam-do, Gurye-gun, Masan-myeon, Naengcheon-ri, (N35°12'41.0"E127°28'51.8") 37m AMSL. Collected by R.J.Blakemore, J.-L. Cho and Hanna Bae, 19<sup>th</sup> Jan. 2012 behind tea shop and beside fallow rice paddy drain ditch under frozen soil cap at ca. 15cm depth. Two specimens with regressed clitella, both coiled in diapause in small soil 'cells'; here fixed and preserved in 80% ethanol (EtOH) before dissection and tissue sampling for DNA analysis (pending). Both specimens agree with *Moniligaster beddardii* Rosa, 1890 especially as redescribed by Gates (1972: 246) that, although having (three or) four gizzards in 15–18, as in present specimens, is currently maintained in synonymy of *D. barwelli* that more often has two to four gizzards in some of 12–16 (allowing for Beddard's original segment miscount). Michaelsen (1900: 116) first synonymized these two names and their subsequent accounts have been variously intermingled—Blakemore (2010b: 142–154, figs. 1–6) and Blakemore & Kupriyanova (2010) provide fuller details.

### Family LUMBRICIDAE

#### *Eiseniella tetraedra tetraedra* (Savigny, 1826)

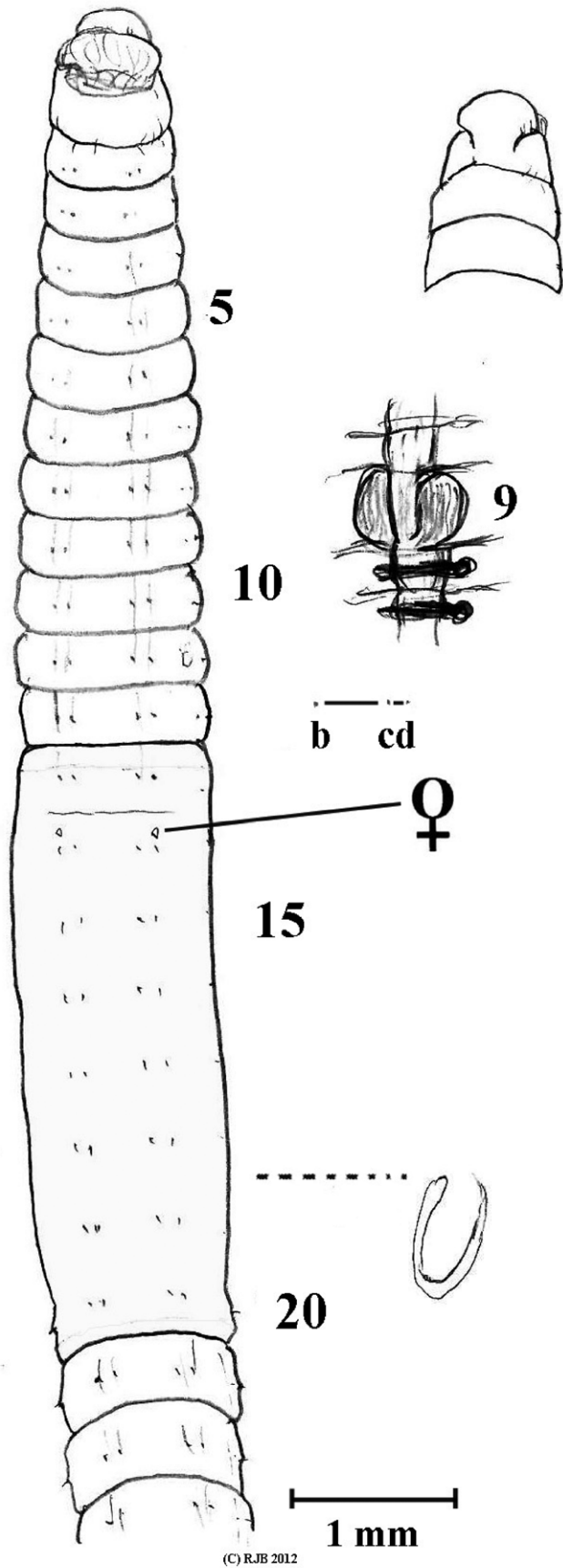
NIBR IV0000213512. Jeollabuk-do, Jeongsup-si, Sanae-myeon, Jeongnyang-ri. Collected by M.C. Kim & J.Y. Mun, 20 May, 2005. "*Eisenia* sp". Mature specimen.

NIBR IV0000243427. Gyeonggi-do. Collected by D.H. Won. 11 Apr. 2004. "*Eisenia* sp". Six specimens, mostly fully mature clitellates.

NIBR IV0000213239. Gyeonggi-do Hwaseong-si Sinnam-dong. Collected by D. H. Won, 14 Apr. 2004. "*Eisenia* sp". Thirteen specimens, mostly mature.

NIBR IV0000213622. Gyeonggi-do Anyang-si. Manan-gu Seoksu-dong. Collected by D.H. Won, 14 Apr. 2004. An immature *Eiseniella* sp. specimen.

NIBR IV0000213625. Gyeonggi-do Hwaseongsi namyang-dong. Collected by D.H. Won, 14 Apr. 2004. "*Eisenia* sp". Five juvenile *Eiseniella* sp. specimens. All in NIBR collection.



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**FIGURE 1.** *Ocnodrilus occidentalis*. Korean specimen with diverticula in 9, actual setal ratios in 12 and possible detached prostate or parasite artefact near 18–19.

## Family OCNERODRILIDAE

### *Ocnerodrilus occidentalis* Eisen, 1878

(Fig. 1)

NIBR IV0000245077. From Seoupong beach, Jeju-si, Jocheon-eup, Hamdoek-ri (N33°30'E126°30') north coast of Jeju-do Island. Collected by R.J. Blakemore, 15<sup>th</sup> Feb. 2012 from sandy parkland behind shops on beachfront, under logs and stones along with many other introduced lumbricids. A single clitellate but parthenogenetically degraded specimen. Preserved in 80% EtOH, sketched, dissected and tissue samples (of worm and possible nematode parasite) taken for DNA analysis. Note: Part of an *Ocnerodrilus occidentalis* species-complex *sensu* Gates (1972).

### *Eukerria saltensis* (Beddard, 1895)

NIBR IV0000213619. Seoul, Gangnam-gu, Suseo-dong. Collected by D.H. Won. 26 Oct. 2003. Single mature specimen in NIBR collection.

## Family MEGASCOLECIDAE *sensu* Blakemore, 2000

### *Metaphire californica* (Kinberg, 1867)

(Fig. 2)

NIBR IV0000246440. from beside Temple at Mt Sanbongsan, Seogwipo-si, Andeok-myeon, Sangye-ri, SW coast of Jeju-do Island. Collected by R.J. Blakemore, 17<sup>th</sup> Feb. 2012 from near drainage ditch. Single specimen in 80% EtOH.

### *Pontodrilus litoralis* (Grube, 1855)

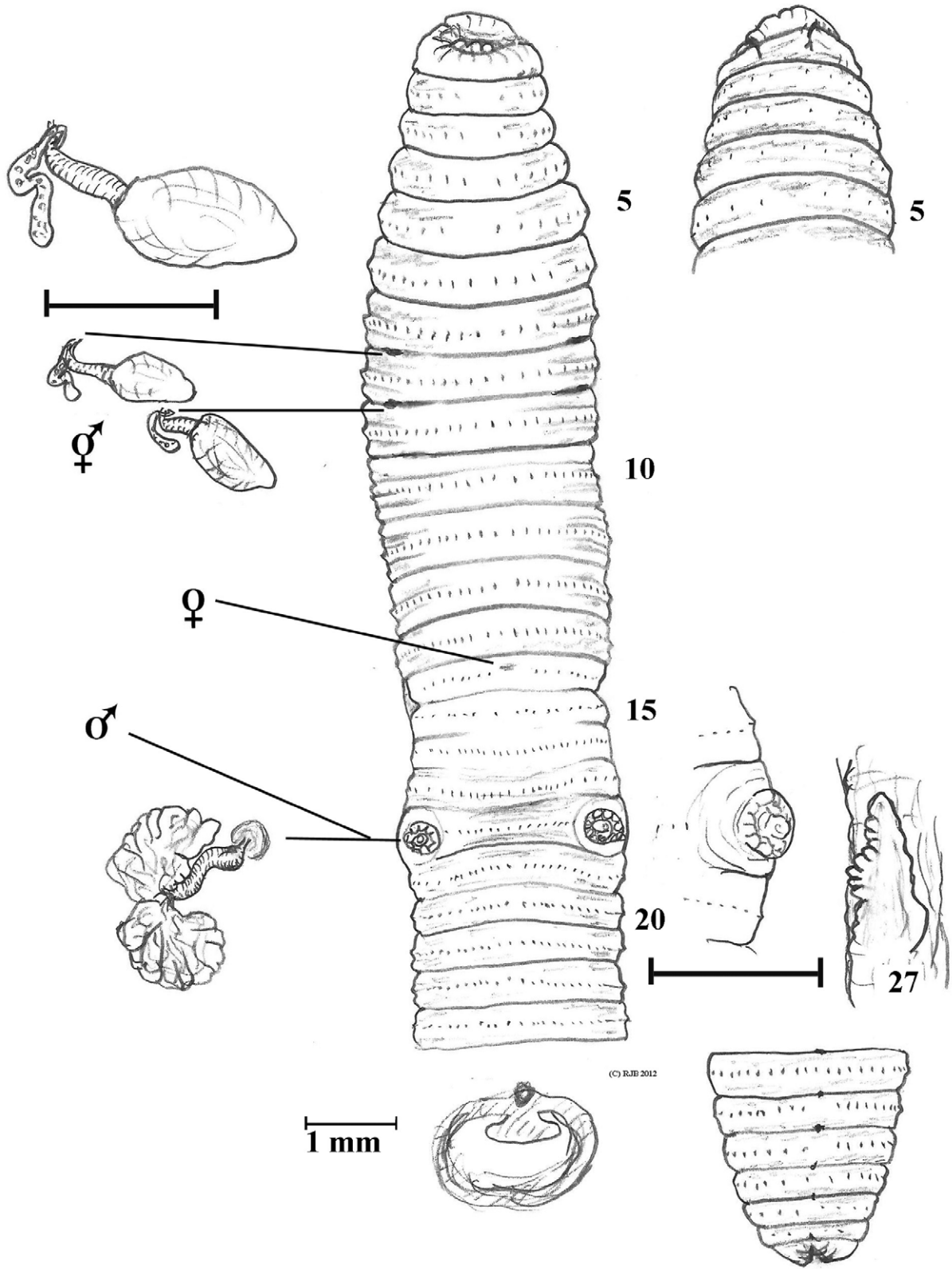
NIBR IV0000245076. Jeju-si, Udo-myeon, Hakosutong beach, Udo Island (N33°30'46.1" E126°57'31.5"), east coast of Jeju-do Island. Collected by T.S. Park, 26<sup>th</sup> Aug. 2009. Four mature specimens bleached white in 75% EtOH in NIBR. Note: Searches of adjacent Jeju beaches (RJB, TSP) failed to yield further specimens (Feb. 2012).

**Remarks.** The Convention on Biological Diversity website provides online links to international databases and regulations regarding various 'invasive' species ([www.cbd.int/invasive/](http://www.cbd.int/invasive/)). All six of the current species are listed—with full descriptions, distributions, figures and synonymies – along with all 150 or so others of the so-called 'Cosmopolitan Earthworm' species that have been carried, presumably by agency of man, to other parts of the world and this resource has been compiled and maintained for the last 20 years (e.g., Blakemore 1999, 2002, 2010b, and in prep). Although usually considered beneficial or benign, those few earthworms that have been implicated in deleterious environmental effects (e.g. *E. saltensis* in rice paddies) are noted.

Approximately 50 new exotic records worldwide are by the principal author. For example, the Australian report of *Drawida barwelli* plus new records from both Australia and Tasmania of *Ocnerodrilus occidentalis* were by Blakemore (1994, 1999, 2000, 2002); two others of the semi-aquatic species (*Ei. tetraedra* and *Eu. saltensis*) as in the current paper were discovered and reported in Japan by Blakemore *et al.* (2006); and euryhaline *Pontodrilus litoralis* was redescribed by Blakemore (2007) with several new locations recognized from Australia, Japan and the Galapagos Islands.

Regarding Korea, currently ~113 species of earthworms are now recorded in four families and more than a dozen genera. Blakemore (2006, 2008) checklisted 94 species and, while adding twelve supposedly new Korean megascolecoid earthworms, Hong & James (2009) said the number then was 106 species. Despite not citing these checklists, they presumably accept all the synonyms and taxonomic decisions therein since 94 + 12 = 106 species. Nevertheless, it seems from fundamental revision that several species described from Korea are already well established cosmopolitans from adjacent lands such as Japan (e.g. Blakemore 2003, 2010a, 2012), China or Taiwan (e.g. Blakemore *et al.* 2006, Shen *et al.* 2005). Thus the current species tally may decline even as new records are added and it is inadvisable to add yet more names without thorough taxonomic revision from earliest records.

Elimination of the possibility of specimens being exotic expedites comparison with domestic and neighboring faunas and facilitates descriptions of truly new native taxa.



**FIGURE 2.** *Metaphire californica*. From Jeju Island with reproductive organs, typhlosole and intestinal caecum in 27 right-hand-side.

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