

Earthworms from Chejoo-do Island, Korea

Min Ja Song and Kap Yong Paik

(Dept. of Biology, Kyungpook University)

제주도산 육서 빈모류의 분류학적 연구

宋 敏 子 · 白 甲 鏞

(慶北大·師大·生物學科)

(Received January 28, 1970)

적 요

제주도산 육서 빈모류의 분류학적 연구는 Kobayashi, S. (小林新二郎)에 의하여 1937년에 *Drawida anchingiana*, *Pheretima kanrazana*, *Ph. masatacae*, *Ph. quelparta* 등의 4종이 보고 되었고, 다시 1938년에 *Dr. japonica*, *Ph. carnososa*, *Ph. hupeiensis*가 보고 되었을 뿐이다. 저자들은 1966년 및 1969년에 채집된 제주도산 지렁이 총 1045개체를 정리한 결과 다음 2과 2속 11종을 얻었기에 이에 보고 하는 바이다.

제주도 기지종: *Pheretima carnososa*, *Ph. hupeiensis*, *Ph. kanrazana*, *Ph. masatacae*, *Ph. quelparta*.

제주도 미기록종: *Allolobophora caliginosa trapezoides*, *Ph. agrestis*, *Ph. heteropoda*, *Ph. phaselus var. kamitai*, *Ph. soulensis*.

신종: *Ph. seungpanensis* n. sp.

신종 *Pheretima seungpanensis*의 체장은 105~120mm, 체폭은 5~6mm, 체절수는 78~98개 spermathecal pore는 2쌍으로서 첫째쌍은 11체절의 setal line 뒷쪽에서 이 선과 인접해 있으며 둘째쌍은 setal line의 앞쪽에 intersegmental furrow에 가까운 부분에서 개구한다. 본종은 spermathecal pore의 위치가 이속의 다른 종에서 보듯처럼 intersegmental furrow에 개구하지 않는 점이 특별하다. 그 뿐 아니라 male pore region의 모양에 있어서도 모든 기지종과 뚜렷이 구별된다.

INTRODUCTION

Up to the present, on the earthworms of Chejoo-do Island, Kobayashi had reported four species, *Drawida anchingiana*, *Pheretima masatacae*, *Ph. kanrazana* and *Ph. quelparta* in 1937 and other three species, *Ph. hupeiensis*, *Ph. Carnosa* and *Dr. japonica* in 1938.

The paper now presented deals with the species belong to the Genus *Pheretima* and *Allolobophora* which were collected from Chejoo-do Island in 1966

and 1969. In carrying out the present study, about 1045 specimens were examined. As a result of investigation, the authors found out five known species, five unrecorded species of Chejoo-do Island and one new species. The type of new species is deposited in the collection of Kyungpook National University.

The authors are indebted to Mr. Bong Ok Kim, Vice Principal of Chejoo Third High School for the opportunity of examining this material. Deep gratitude is also expressed to Mrs. Yeon Heo, Un Jin Yang, Young Tae An and Sang Mo Jeong, students of Teachers College, for their kind assistances in

the collection of specimens.

DESCRIPTION

Fam. *Lumbricidae*

Gen. *Allolobophora* Eisen et Rosa

Allolobophora caliginosa trapezoides (Anton Duges, 1828)

Korean name: Galsaegnagsi-Jileungi (갈색 낙시지렁이)

Lumbricus trapezoides Anton Duges, 1828, Ann. Sci. Nat., 15p. 289.

Allolobophora caliginosa trapezoides: Chen, 1931, p. 163; 1933, pp. 216-217. Kobayashi, 1935, p. 130; 1938(b), p. 6; 1939(a), p. 738; 1940(a), p. 180; 1941, pp. 150-151. Song & Paik, 1969, p. 13.

Specimens Examined: Chejoo-do Isl., (3 clitellate and 21 acitellate specimens, 12-VIII-1966, Y.J. Yang)

Distribution: Korea, Chejoo-do Isl., Japan, China, Central Asia, Europe, South & North America, Africa. (cosmopolitan)

Fam. *Megascolecidae*

Gen. *Pheretima* Kinberg, 1867

Pheretima agrestis (Goto et Hatai, 1899)

Korean name: Batt-Jileungi(밭지렁이)

Perichaeta agrestis Goto and Hatai, 1899, p. 17.

Pheretima agrestis: Hatai, 1930, pp. 651-655. Kobayashi, 1935, p. 128; 1938(a), p. 520; 1938(d), pp. 405-415. Gates, 1958, pp. 1-3. Ohfuchi, 1957, p. 1360, fig. 3850. Song & Paik, 1969(a) p. 14.

Specimens Examined: Chejoo-do Isl., (98 clitellate specimens, 29-VII~9-VIII-1969, M.J. Song & Y. T. An)

Distribution: Korea, Dagelet Isl., Chejoo-do Isl., Japan, U.S.A.

Pheretima carnosa (Goto et Hatai, 1899)

Korean name: Jeut-kokchi-Jileungi (젓꼭지지렁이)

Pheretima carnosa(Goto and Hatai, 1899, p. 15,

fig. 4.

Amyntas hawayanus(part): Beddard, 1900, p.645.

Pheretima carnosa : Michaelsen, 1900, p. 261. Kobayashi, 1936 (b), pp. 115-138; 1938 (b), p. 7; 1938 (c), p. 161. Ohfuchi, 1937, pp. 56-62; 1957, p. 1364, fig. 3861.

Pheretima pingi: Stephenson, 1925, pp. 891-893; 1931, pp. 55-56. Michaelsen, 1931, pp. 11-13. Chen, 1933, pp. 228-234. Gates, 1935, p.14.

Pheretima kyamikia: Kobayashi, 1934, pp. 1-4.

Pheretima hywayana (part) : Gates, 1932, p.433.

Specimens Examined : Chejoo-do Isl., (48 clitellate, 5 acitellate specimens, 29-VII~9-VIII -1969, K.Y. Paik & M.J. Song

Distribution: Korea, Chejoo-do Isl., Japan, China.

Pheretima heteropoda (Goto et Hatai, 1898)

Korean name: Byeoniseong- Jileungi (변이성지렁이)

Perichaeta heteropoda Goto et Hatai, 1898, p. 69.

Pheretima heteropoda: Ohfuchi, 1937, pp. 42-50; 1957, p. 1363, fig. 3857. Song & Paik, 1969(a), pp. 14-15.

Specimens Examined: Chejoo-do Isl., (310 clitellate specimens, 29-VII~9-VIII-1969, K.Y. Paik & M.J. Rong)

Distribution: Korea, Chejoo-do Isl., Japan, Taiwan.

Pheretima hupeiensis (Michaelsen, 1892)

Korean name: Ddong-Jileungi(뚫지렁이)

Pheretima hupeiensis: Chen, 1933, pp. 251-255; 1935, p. 121. Kobayashi, 1938(b), p. 7; 1938(c), pp. 152-153; 1939(b), p. 778; 1940(c), p. 120. Ohfuchi, 1957, p. 1359, fig. 3847. Gates, 1958, p.17. Song & Paik, 1969(a), p. 16.

Specimens Examined: Chejoo-do Isl., (8 clitellate specimens, 29-VII~9-VIII-1969, Y. Heo & S.M. Jeong; 5 clitellate specimens, 25-VII-1966, B.O. Kim)

Distribution: Korea, Japan, China, U.S.A.

Pheretima kanrazana Kobayashi, 1937

Korean name: Hanra-Jileungi(한라지렁이)

Pheretima kanrazana Kobayashi, 1937, pp. 340-

347. figs. 3 & 4. Song & Paik, 1969(b), pp. 136~139.

Specimens Examined: Chejoo-do Isl., (105 clitellate and 34 acitellate specimens, 29-VII~9-VIII-1969, K.Y. Paik & M. J. Song)

Distribution: Chejoo-do Isl. (Korea).

Pheretima masatakae (Beddard, 1892)

Korean name: Seukjeum- Wangjileungi

(석점 왕지렁이)

Perichaeta masatakae Beddard, 1892, p. 761.

Pheretima masatakae: Kobayashi, 1937, pp. 337-340; 1938(c), pp. 137~139. Ohfuchi, 1957, p. 1357, fig. 3839.

Specimens Examined: Chejoo-do Isl., (19 clitellate, 3 acitellate specimens, 25-VII-1966, B.O. Kim; 58 clitellate specimens, 29-VII~9-VIII-1969, S.M. Jeong & Y. Heo)

Distribution: Korea, Chejoo-do Isl., Japan.

Pheretima phaselus var. kamitai,

Kobayashi, 1934

Korean name: Hismure-jileungi(히스무레 지렁이)

Pheretima kamitai Kobayashi, 1934, pp. 5-6; 1938(c), pp. 146-149.

Pheretima phaselus var. kamitai: Kobayashi, 1938(d), pp. 405~415.

Ph. serrata: Kobayashi, 1936(a), pp. 165~168. Song & Paik, 1969(a), pp. 16~17.

Specimens Examined: Chejoo-do Isl., (4 clitellate specimens, 29-VII~9-1966, Y.T. An & Y.J. Yang)

Distribution: Korea, Chejoo-do Isl., Japan.

Pheretima quelparta Kobayashi, 1937

Korean name: Chejoo-Jileungi(제주 지렁이)

Pheretima quelparta Kobayashi, 1937, pp. 347~350; 1938(c), pp. 155~158.

This species was described by Kobayashi in 1937 and 1938(c) respectively. In the latter year, he described it as *Ph. quelparta* in the text, but as *Ph. keishuensis* in the contents of the same paper.

Furthermore, in the remark of the paper, he wrote "The present specimens are identical with *Ph. quel-*

parta, though slight differences are found" as if it was another new species.

The authors believe that this confusement was probably brought about by his mistake. Anyhow, it is sure that after comparing the description, *Ph. keishuensis* is the synonym of *Ph. quelparta*.

Specimens Examined: Chejoo-do Isl., (34 clitellate specimens, 25-VII-1966, B.O. Kim; 18 clitellate specimens, 29-VII~9-VIII-1969, M.J. Song & K.Y. Paik)

Distribution: Korea, Chejoo-do Isl.

Pheretima soulensis Kobayashi, 1938

Korean name: Seoul-Jileungi(서울 지렁이)

Pheretima soulensis Kobayashi, 1938(c), p. 131, fig. 8; 1940(b), p. 44. Song & Paik, 1969(b), pp. 139~141.

Specimens Examined: Chejoo-do Isl., (152 clitellate and 98 acitellate specimens, 29-VII~9-VIII-1969, M.J. Song & Y. Heo)

Distribution: Korea, Chejoo-do Isl.

Pheretima seungpanensis n. sp.(Figs. 1~13)

Korean name: Seungpan-Jileungi(성판 지렁이)

External characteristics: Length 101mm., greatest diameter 5mm., number of segments 94 in Holotype. (Length varies from 105~120mm, diameter 5~6mm, number of segments 78~98.) Color in formalin, reddish brown dorsally, yellowish grey ventrally, clitellum light brown.

Prostomium epilobous. First dorsal pore in 12/13.

Clitellum entire in XIV-XVI, without setae, intersegmental furrows 14/15 and 15/16, obliterated, sites of dorsal pores usually recognizable. Setae present from II, small in size and closely spaced; 51/III, 60/V, 67/VIII, 67/XII., 63/XX, spermathecal setae 14/VI 16/VII, between the male pore setae lacking.

Male pores, situated on the setal line of XVIII, nearly 1/2 circumference apart. Ventrally, around the male pore region, intersegmental furrows 17/18 and 18/19 are unrecognizable and formed characteristic genital area which is protuberant laterally in general appearance. Each area somewhat circular or peach-shaped, distinctly delimited by a glandular, light-coloured and slightly depressed circumferential

band. Its anterior and posterior borders extending partially to segments XVII and XIX respectively. On the center of male disc situated circular small papillae with minute prophore. Spermathecal pores, minute, superficial and circular with white spot on the center, separated by about the same distance as are the male pores, two pairs on VI and VII. The first pair situated posterior just close to the setal line of VI and the second pair placed anterior to the setal line of VII and just close to the intersegmental furrow of VI and VII.

Female pore median.

Internal anatomy: Septa 5/6, 6/7 thickened, 8/9, 9/10 lacking. Gizzard, bell-shaped, broadest in middle portion, occupying about VIII-X. Intestinal origin in XV. Intestinal caeca originating in XXVII, simple, finger shaped, the anterior portion of each caecum bent towards the dorsal side (two out of six specimens), extending as far anteriorly as XXIV or X XIII, constricted by septa 24/25 and 25/26. Typhlosole, a low simple lamella, begins in region of XXVII posteriorly, especially easily recognizable between XXVII and XXXII. Hearts, four pairs in X-XIII small in calibre. Lymph glands paired, recognizable from XXVII posteriorly. Testis sacs of X may be vertical, one or both of the sacs reaching up to level of dorsal face of gizzard, the testis sac of XI is V-shaped. Seminal vesicles, in XI and XII, acinous, well developed, distinct dorsal lobe. Anterior and posterior nearly equal in size. Prostates large, in X VII-XX, composed of two or four main lobes, each is divided into small lobe. Prostatic duct, in a U-shaped loop with marked muscular sheen. Male gonoduct passes into ental end of prostatic duct. Ovaries usual in position, fan-shaped, each with several egg strings. Spermathecae, two pairs in VI and VII, the ampullae are oval or broad red-pepper shaped, swollen dorso-ventrally, filled with a flocculent material.

Duct is shorter than the ampulla, though it is slender. Diverticulum longer than the main portion, if it stretched. Ectal half slender tubular and ental half is much coiled. Iridescence is recognizable at the

end of ental portion.

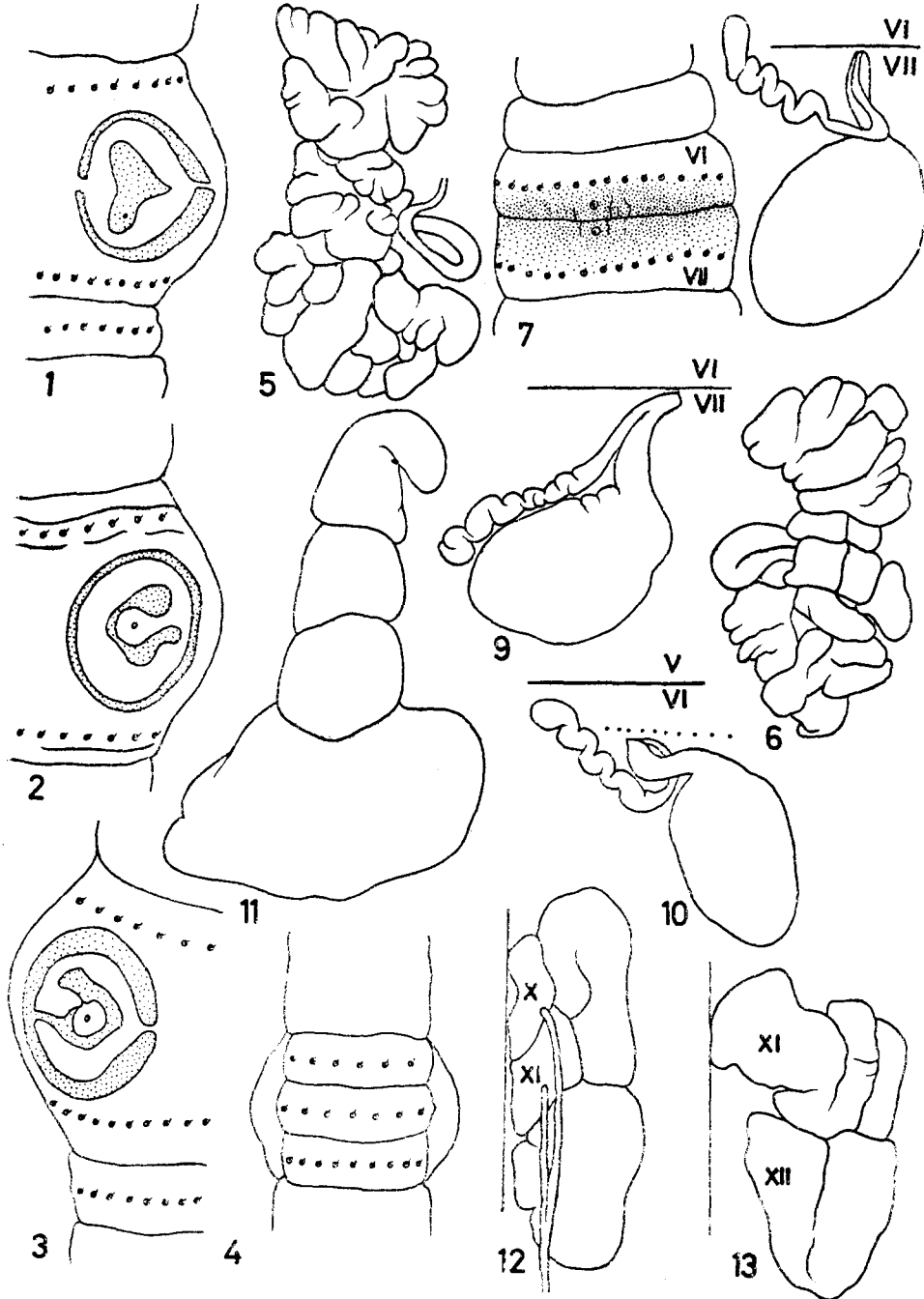
Specimens Examined: Holotype; Mt. Hanra, Chejoo-do Isl., (1 clitellate specimen, 29-VII~9-VIII-1969, K.Y. Paik. Paratypes; Mt. Hanra, Chejoo-do Isl., (5 clitellate and 16 acitellate specimens, 29-VII~9-VIII-1969, K.Y. Paik, and M.J. Song).

Diagnosis: The present new species is clearly distinguished from other known species of the genus in the position of spermathecal pores and by the shape of male pore region.

REFERENCES

- Beddard, F. E., 1892. On some Perichaetidae from Japan. *Zool. Jahrb. Abteil. Syst. Geogr. Biol. Bd. 6*. pp. 760~761.
- , 1900. A Revision of the Earthworms of the Genus *Amyntas* (Perichaeta). *Proc. Zool. Soc. London* pp. 609~652.
- Chen, Y., 1931. On the Terrestrial Oligochaeta from Szechuan, with descriptions of some new forms. *Contr. Biol. Lab. Sci. Soc. China, Zool. Ser. 7* (3): 117~171.
- , 1933. A Preliminary Survey of the Earthworms of the Lower Yangtze Valley. *Ibid.* 9(6): 177~269.
- , 1935. On two new species of Oligochaeta from Amoy. *Ibid.* 11 (4): 109~122.
- , 1936. On the Terrestrial Oligochaeta from Szechuan II. *Ibid.* 11 (8): 269~304.
- Gates, G.E., 1932. The earthworms of Burma. III. The Megascolecinae, *Rec. Ind. Mus.* 34 : 357~549.
- , 1935. New Earthworms from China, with notes on the synonymy of some Chinese species of *Drawida* and *Pheretima*. *Smithson. Misc. Coll.* 93 (3): 1~19, 15 figs.
- , 1958. On some species of Oriental earthworm Genus *Pheretima* Kinberg, 1867, with key to species reported from Americas. *Amer. Mus. Novit.* (1888): 1~33.
- Goto, S. and S. Hatai, 1898. New or Imperfectly

- known species of Earthworms, No. 1. *Annot. Zool. (Jap.)* 2 (1) : 65~78.
- Goto, S. and S. Hatai, 1899. New or Imperfectly known species of Earthworms. No. 2, *Annot. Zool. (Jap.)* 3 (2) : 13~23.
- Hatai, S., 1930. Note on *Pheretima agrestis* (Goto and Hatai), together with the description of four new species of the genus *Pheretima*. *Sci. Rep. Tohoku Imp. Univ. Biol.* 5 (4) : 651~667.
- Kobayahi, S., 1934. The new Korean Earthworms belonging to the Genus *Pheretima*, together with the wider range of the distribution of *Pheretima hilgendorfi* (Michaelsen). *J. Chosen Nat. Hist. Soc.* 19 : 1~11.
- , 1935. Classification and Distribution of Korean Earthworms. *Zool. Mag. (Jap.)* 47 (557) : 128~130.
- , 1936 (a). Earthworms from Koryo, Korea. *Sci. Rep. Tohoku Imp. Univ. 4th ser. Biol.* 11 (1) : 139~184.
- , 1936 (b). Distribution and some external characteristics of *Pheretima* (Goto et Hatai) from Korea. *Ibid.* 11 (1) : 115~138.
- , 1937. Preliminary Survey of the Earthworms of Quelpart Island. *Ibid.* 11 (3) : 333~351.
- , 1938(a). The Earthworm of Atsukeshi. *Zool. Mag. (Jap.)* 50 (12) : 520.
- , 1938(b). Oligochaeta found in Sapling-beds in Korea. *J. Chosen Nat. Hist.* 24 : 6~18.
- , 1938(c). Earthworms of Korea. I. *Sci. Rep. Tohoku Imp. Univ.* 13 (2) : 89~170.
- Kobayashi, S., 1938(d). Earthworms from Hakodate, Hokkaido. *Annot. Zool. (Jap.)* 17(3/4) : 405-415.
- , 1939(a). On the Earthworm of Manchulia from a distributional view point. *Bot. Zool. (Shokubutsu oyobi Doubutsu)* 7 (4) : 737~742.
- , 1939(b). Earthworms of Shinchiku and its Neighborhoods. *Zool. Mag. (Jap.)* 55(12) : 777~779.
- , 1940(a). The Earthworm of Saghalien. *Zool. Mag. (Jap.)* 52 (4) : 180.
- , 1940(b). Distribution of Genus *Pheretima* without male pore. *J. Chosen Nat. Hist.* (29) : 44.
- , 1940(c). The Earthworm of Formosa and Shinchiku (III). *Zool. Mag. (Jap.)* 52 (3) : 120~121.
- , 1941. Earthworms of Korea (II). *Sci. Rep. Tohoku Imp. Univ.* 16 : 147~156.
- Michaelsen, W., 1900. Oligochaeta. Das Tierreich Berlin.
- , 1931. The Oligochaeta of China. *Peking Nat. Hist. Bull.* 5 (2) : 1~24.
- Ohfuchi, S., 1937. On the species possessing four pairs of spermathecae in the Genus *Pheretima*, together with the variability of some external and internal characteristics. *Saito Ho-on Kai. Mus. Res. Bull.* (12) : 32~136.
- , 1957. Oligochaeta, Illustrated Encyclopedia of the fauna of Japan *Hokuryukan, Tokyo* (Jap.) pp. 1352~1369.
- Song, M.J. and K.Y. Paik, 1966(a). Preliminary Survey of the Earthworms from Dagelet Isl., Korea. *Kor. Jour. Zool.* 12(1) : 13~21.
- Song, M.J. and K.Y. Paik, 1969(b). Supplemental Note of *Pheretima kanrazana* and *Ph. soulensis*. *Theses Coll. Comm. 60th Birthday of Dr. In Suck Yang.* pp. 135~144.
- Stephenson, J., 1925. Oligochaeta from various regions, including those collected by the Mount Everest Expedition 1924. *Proc. Zool. Soc. London.* pp. 897~907.
- , 1931. Oligochaeta from Burma, Kenya, and other parts of the world. *Proc. Zool. Soc. London.* pp. 33~92.



EXPLANATION OF FIGURES

1. Ventral view of male pore, left. 2. Same, left. 3. Same, right. 4. Dorsal view of male pore region.
 5. Prostate gland, left. 6. Same, right. 7. Lateral view of spermathecal pore region.
 8. Spermathecae, right II. 9. Same, right II. 10. Same, right I. 11. Intestinal caecum, left.
 12. Ventral view of seminal vesicle. 13. Dorsal view of seminal vesicle.