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## New record of the freshwater mussel *Lanceolaria gladiola* Heude, 1877 (Family: Unionidae) from South Korea

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### Abstract

The present study represents the first record of freshwater mussel *Lanceolaria gladiola* (Heude, 1877) in the Korean Peninsula. The species was found and collected live from the banks of the Mangyeong River, Gimje, North Jeolla Province, South Korea. It was preserved, and sent to the Natural History Collections of Sam Houston State University, Texas, USA to identify, photograph and measure. The specimens were identified using morphologic characters including shell shape, exterior sculpturing, color of nacre, color of periostracum and shape of pseudocardinal and lateral teeth.

**Keywords:** Freshwater mussels, Korean Peninsula, South Korea, *Lanceolaria gladiola*, new record

### 1. Introduction

Freshwater mussels of the order Unionida are key elements of freshwater habitats and are responsible for important ecological functions and services, but unfortunately, they are among the most threatened freshwater taxa in the world [1]. *Lanceolaria gladiola* Heude, 1877 (Family: Unionidae) [2] is a freshwater mussel recorded from Hebei, Shandong, Anhui, Jiangsu, Zhejiang, Jiangxi, Hubei and Hunan in China and also in Vietnam and Japan [3]. Additional distributional records are available from MUSSELP Database and these include 43 records of *L. gladiola* from China, Japan, Vietnam and also in Cambodia [4]. Freshwater mussels are dependent upon fishes for dispersal within aquatic habitats. Adults of freshwater mussels are not vagile. Dispersal occurs as larvae of freshwater mussels attached to the gills of fishes. Mussels of the genus *Lanceolaria* are known to use bitterlings (Genus *Rhodeus*) as a larval host [5]. These larvae are termed glochidia and known as obligate ectoparasites of fishes [5]. These facts about ontogeny of freshwater mussels indicate to the authors that the discovery of two specimens of *L. gladiola* in the Mangyeong River, South Korea are evidence of an established population. The aim of this study is to contribute new information about the distribution of this species, which will ultimately have bearing upon conservation issues and biogeographic studies.

### 2. Materials and Methods

Two individuals of *L. gladiola* were recorded in the Mangyeong River (35.91574° N, 126.95303° E, accuracy: 860m), Gimje, North Jeolla Province, South Korea (Fig. 1) on 13 April, 2017. The recorded individuals were collected live and were preserved, and later sent to the Natural History Collections of Sam Houston State University, Texas, USA. Thereafter, their identification was confirmed by D. Barclay to be *L. gladiola* by considering their shell shape and color. The specimens were photographed (Fig.2) and length and the greatest width of the specimens were measured. The specimens were deposited in the Natural History Collections of Sam Houston State University, TX, USA (SHSUUNIO000374).

### 3. Results and Discussion

The present study represents a new distributional record of *L. gladiola* in South Korea and to the best of the knowledge of the authors, this is the first record of *L. gladiola* in South Korea. Also, factors of the biology of *L. gladiola* and other related mussels indicate that the two specimens cited here are evidence of an established population of *L. gladiola* in South Korea.

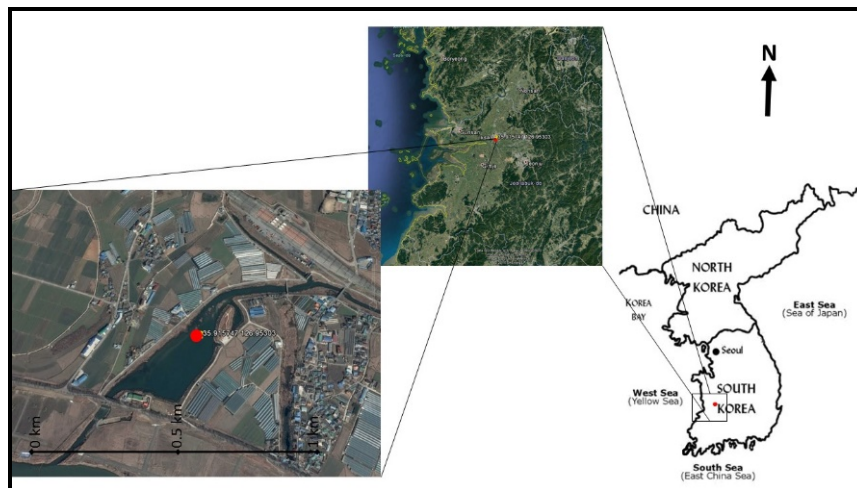
The shells of the present specimens resemble typical specimens of *L. gladiola* from both China and Japan [4] (Fig. 2). Although this species has not been previously recorded from the Korean peninsula, studied specimens exhibited all of the characteristics mentioned by Jing & Zimin [6] which would separate them from *Lanceolaria grayii* Lea 1834 [7], with the exception of the nacre being described as "dull," possibly due to the freshness of the studied material. The Mangyeong River specimens that form the basis of this study share many characters that are used in the description of *L. gladiola* in Jing & Zimin [6] and are typical of those examples that are figured in that publication. These specimens exhibit elongated shape, inflated-solid shell, and strong posterior ridge ending in a downturned point terminating below the median line. Other key features evident in the examined specimens include faint sub-vertical surface folds, strong, irregular growth lines, and a coarse brown periostracum. Internally, the strong pseudocardinal and lateral teeth, elongated callus behind the laterals, and flesh-colored nacre also agree well with the description of Jing & Zimin [6].

Conversely, *L. grayii* is described as having a somewhat silky periostracum that is olive colored with yellow or green clouds, a base line that is nearly straight, a series of somewhat corrugated ridges near the middle of the disk and "a number of strong, sub-concentric folds near the anterior end." [6]

*Lanceolaria acrorrhyncha* Martens, 1894 [8] is the only other similar species recorded from Korea. Two specimens of *L. acrorrhyncha* from near the collection site of the study specimens were examined, along with several photographs of museum specimens [4]. All had broader shells, none were nearly as elongated as the study specimens, the posterior tips were not as rostrated, and all had white or nearly white nacre. *L. acrorrhyncha* also tended to have much stronger surface sculpture near the posterior end of the shell, particularly the posterior third of the shell along the outer margins.

Because of the noted distinctions, the authors believe that the two study specimens represent a new record of *L. gladiola* from the Korean peninsula.

The dimensions of the collected specimens are shown in Table 1.



**Fig 1:** Map showing the area where *L. gladiola* was recorded in South Korea. The red dot indicates the exact recorded location with an accuracy of 860m.

**Table 1:** Dimensions of the *L. gladiola* specimens collected from Mangyeong River, South Korea.

Morphologic characteristic	Specimen A	Specimen B
Length /mm	107.48	111.51
Greatest width /mm	22.69	24.37



**Fig 2:** *L. gladiola* specimens collected from Mangyeong River, South Korea and deposited at the Sam Houston State Natural History Collections of Sam Houston State University, Texas, USA.

### 5. Acknowledgement

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