

<Short Note>

**Three bivalve fossils from the Dongmyeong Formation
of Gisan, Goryeong in Korea**Cheol-Soo Yun¹ and Seong-Young Yang²¹Kyungdeok Girls' High School, Jungri-dong 100-1, Seo-gu, Daegu 703-090, Korea²Korea Institute of the Geology and Paleontology, Kingdom Officetel No. 805,
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INTRODUCTION

The lower formations of the Gyeongsang Group yield the various fossils; e.g. bivalves, gastropods, ostracods, estherids, plants, vertebrate fossils including dinosaur remains. Among them, bivalves are well known and their specific varieties reach to 12 species. Yang(1974, 1975, 1979a, b, 1982, 1983, 1989) has already described most of bivalves from the Gyeongsang Basin distributed widely in Gyeongsang-do. Subsequently, Yun and Yang(2001a, 2001b) reported molluscan fauna from the Hasandong Formation in the most northern area, Euseong, and *Nagdongia soni* from the Hasandong Formation in the near Waegwan area, respectively.

Recently, we found several new localities for the non-marine invertebrate fossils and vertebrate remains from the Hasandong Formation and Dongmyeong Formation(Jinju Formation; Tateiwa, 1929) in the Goryeong area. In this paper, a bivalve fauna with fish remains from the Dongmyeong Formation at Gisan-ri, Goryeong, Gyeongsangbuk-do is preliminarily reported. These molluscan fossils should be supported as basic data in solution with the paleobiogeographical and paleoecological environments in Cretaceous Period since the Nakdong fauna of *Trigonioides*, *Plicatounio* and *Nakdongia* is useful for the Mesozoic non-marine formations between Korea and Japan.

GEOLOGICAL SETTING

The fossil locality is geographically placed in Gisan-ri, Seongsan-myeon, Goryeong-gun, Gyeongsangbuk-do(Yun and Yang, 2001, fig. 1). It is Latitude 35°13'33" and Longitude 128°13'33". This area is correspondent to road cutting part between Nongong and Seongsan for the expansion work on the 26th National road. The fossil horizons are in the lower part of the Dongmyeong Formation of Gyeongsang Group. The strike and dip of this measured section are about N35°E and 20°SE, respectively. The lithology of this site consists of mudstone, sandstone and the well-laminated black shale with the thickness of 7 m(Fig. 1; Yun and Yang, 2001c, fig. 2). The bivalve and vertebrate fossils are discovered in the massive black mudstone. The overlying horizon of the bivalve-bearing bed yields fish fossil of about 15 cm in length. The around facies are characterized by minor faults and ripple mark in sandstone.

SYSTEMATIC PALEONTOLOGY

Class Bivalvia

Order Paleoheterodonta



Fig. 1. Outcrop of the molluscan fossil locality(A), showing zoomed in fossil-bearing horizon indicated by arrow(B).

Order Unionoida
 Superfamily Unionacea
 Family Trigonoididae
 Subfamily Trigonoidinae
 Genus *Trigonioides* Kobayashi and Suzuki, 1936

Trigonioides jaehoi Yang, 1983
 Fig. 2, Fig. 3, Fig. 5-3

1983 *Trigonioides jaehoi* Yang, p. 183, pl. 39, figs. 9-10; pl. 3, figs. 1-16, text-fig. 4

Material: 21 specimens (YCS1001~YCS1020, YCS1032), middle part of the Dongmyeong Formation; collected by junior author.

Description: As shown by Yang(1983).

Remarks: The present species is very similar to *Trigonioides kodairai* in surface ornamentation and outline. However, in the present species the riblets on the antero-dorsal side are fewer, and on the postero-dorsal side more than in *Trigonioides kodairai*. In the *T. jaehoi* the ribs are gradually effaced towards the antero-ventral margin. This effacement can not nearly observed in *T. kodairai*. Furthermore, *T. kodairai* possesses pseudocardinal teeth, three on the right valve and two or three on the left valve, while the present species possesses three or four on both valves(Fig. 3-5, 6, 7).

After Kobayashi and Suzuki(1936) described this species from Sumudong, about ten species of *Trigonioides* have been reported from the Mesozoic non-marine formations of Southeast Asia, Japan, Manchuria. Accordingly, the present genus is famous for critical index fossils among the non-marine bivalves. The present species has frequently found in association with *Plicatounio naktongensis* in Gyeongsang Group.

Family Unionidae
 Subfamily Unioninae
 Genus *Plicatounio* Kobayashi and Suzuki, 1936

Plicatounio naktongensis Kobayashi and Suzuki, 1936

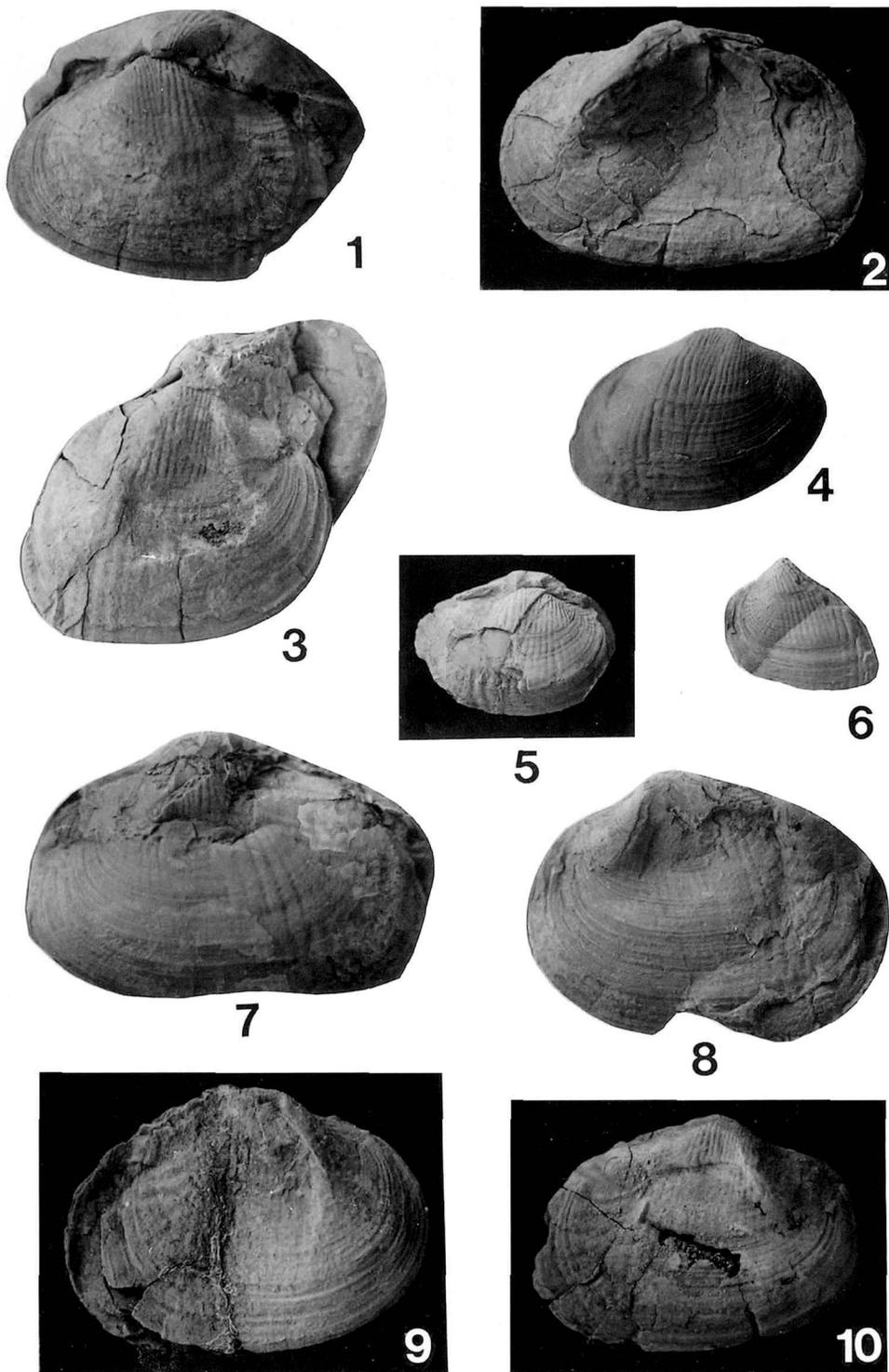


Fig. 2. *Trigonioides jaehoi* Yang, 1983

1. Bivalved(YCS1001), showing the V-shaped surface ornaments, 2. Left valve(YCS1002), somewhat deformed, 3. Bivalved (YCS1003), right valve turned out contrary to left valve, 4. Right valve(YCS1004), showing well-developed V-sculpture, 5. Bivalved(YCS1005), posterior part of the shell broken out, 6. Left valve(YCS1006), partly deformed, 7. Bivalved(YCS1007), showing left valve, 8. Bivalved(YCS1008), showing left valve, 9. Bivalved(YCS1009), showing right valve, 10. Bivalved(YCS1010), showing right valve. All figures are approximately of natural size.

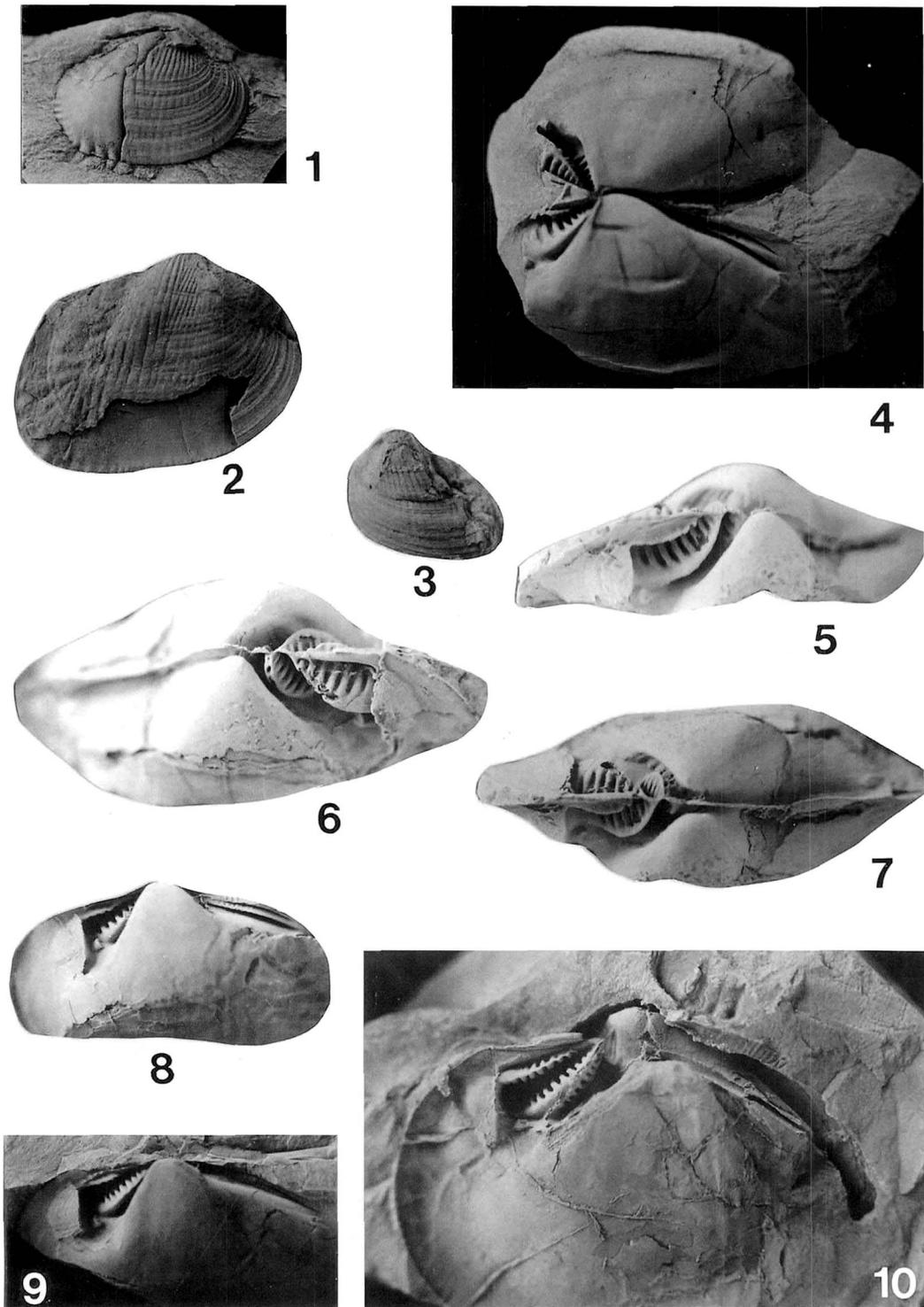


Fig. 3. *Trigonioides jaehoi* Yang, 1983

1. Right valve(YCS1011), posterior part broken out, 2. Right valve(YCS1012), ventral part partly broken out, 3. Left valve(YCS1013), posterior part deformed, 4~10. Internal structure(YCS1014~1020 orderly), showing the crenulated hinge teeth. All figures are approximately of natural size.

Fig. 4, Fig. 5-1, 2, Fig. 6-1

- 1936 *Plicatounio naktongensis* Kobayashi and Suzuki, p. 252, pl. 28, figs. 1-4, 6-8
 1943 *Plicatounio naktongensis* Kobayashi and Suzuki - Suzuki, p. 210-211, pl. 16, figs. 14, 15
 1956 *Plicatounio naktongensis* Kobayashi and Suzuki - Kobayashi, p. 80, pl. 5, fig. 3
 1959 *Plicatounio naktongensis* Kobayashi and Suzuki - Ohta, p. 15, pl. 3, figs. 4-8
 1960 *Plicatounio* aff. *naktongensis naktongensis* Kobayashi and Suzuki - Hase, p. 313, pl. 39, fig. 1
 1979a *Trigonioides(Trigonioides) kodairai* Kobayashi and Suzuki - Yang, p. 103, pl. 9, figs. 1-9; pl. 10, figs. 1-8
 1989 *Plicatounio(Plicatounio) naktongensis* Kobayashi and Suzuki - Yang, p. 82, figs. 3-1A—16; 4-1A—7
 2001a *Plicatounio naktongensis* Kobayashi and Suzuki - Yun and Yang, p. 7, pl. 2, figs. 2-4; pl. 3, figs. 1-3

Material: Twelve specimens(YCS1021~YCS1033) from the same locality of the above species; collected by junior author.

Description: As shown by Yun and Yang(2001a).

Remarks: The generic name *Plicatounio* is derived from the meaning of plication developed on the surface of *Unio* and its specific name is derived from the Nakdong Formation in which the fossils was originally discovered (but, Hasandong Formation in present).

The present species is well characterized by four or five strong plicae developed on the posterior part. In this respect, this species differs from *Plicatounio yooni* with distinct plicae throughout whole surface.

Genus *Nagdongia* Yang, 1975*Nagdongia soni* Yang, 1975

Fig. 6-3~9

- 1975 *Nagdongia soni* Yang, p. 180, pl. 16, figs. 1-11; pl. 17, figs. 1-44, text-figs. 3, 4 and 6
 2001a *Nagdongia soni* Yang - Yun and Yang, p. 9, pl. 3, figs. 4-12
 2001b *Nagdongia soni* Yang - Yun and Yang, p. 88, pl. 1, figs. 1-6; pl. 2, figs. 1-9; pl. 3, figs. 1-8

Material: Eight specimens(YCS1035~YCS1042) from the same locality of the above species; collected by junior author.

Description: As shown by Yun and Yang(2001).

Remarks: The present species abundantly occurs in the Yeonhwadong and Hasandong formations and thus Yang(1979b) established the so-called "*Nagdongia soni* Zone" in the former two formations.

ACKNOWLEDGEMENTS

We are grateful to Hyeong, Jin Tae(Kyungsin High School) and Lee, Il Hyeong (Daegu Education and Science Research Institute) for kind help in field works.

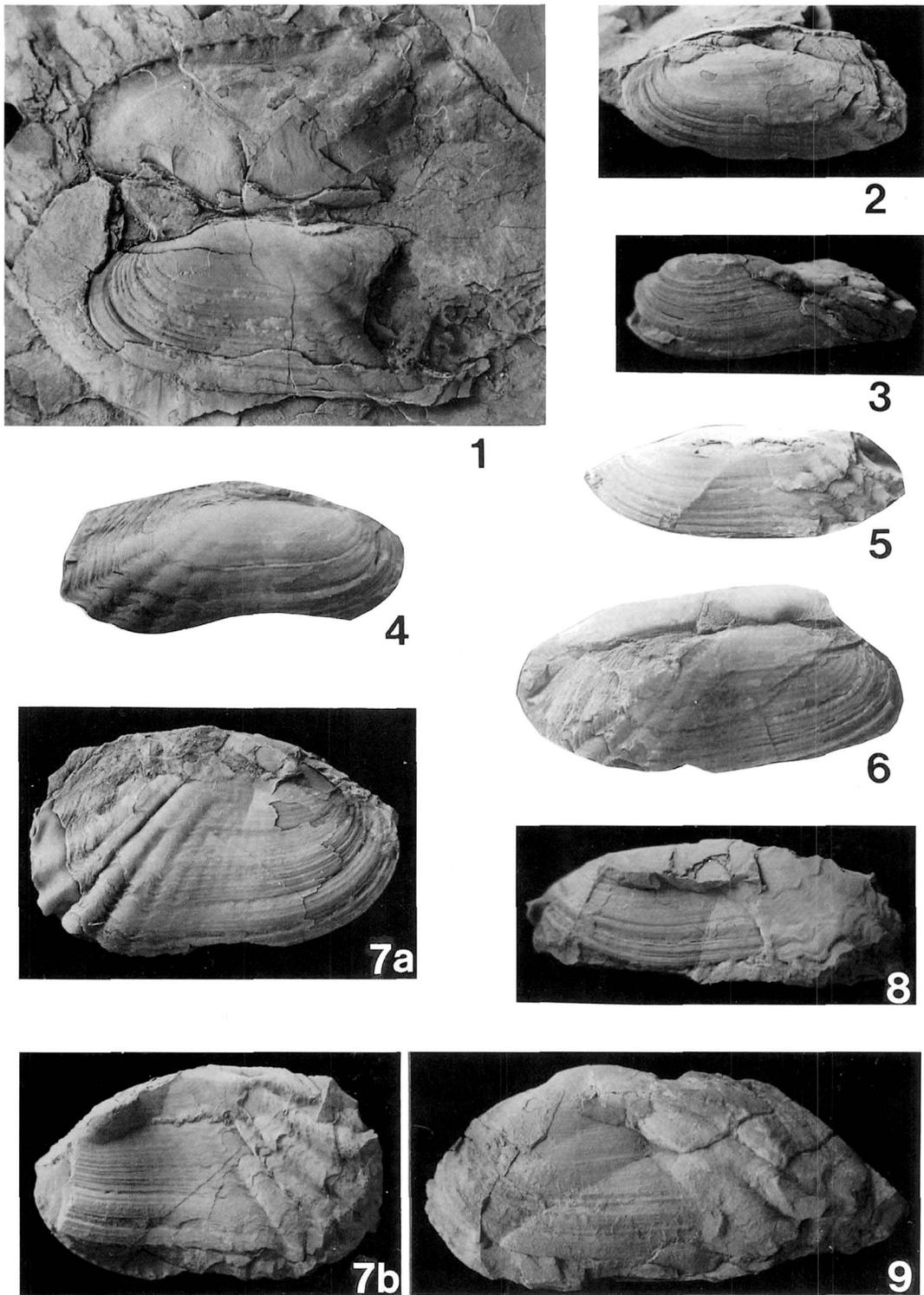


Fig. 4. *Plicatounio naktongensis* Kobayashi and Suzuki, 1936

1. Opened bivalve(YCS1021), 2. Left valve(YCS1022), 3. Left valve(YCS1023), 4. Right valve(YCS1024), 5. Left valve(YCS1025), 6. Right valve(YCS1026), 7a. Bivalved(YCS1027), showing right valve, 7b. Bivalved(YCS1027), showing left valve, 8. Left valve(YCS1028), 9. Left valve(YCS1029)

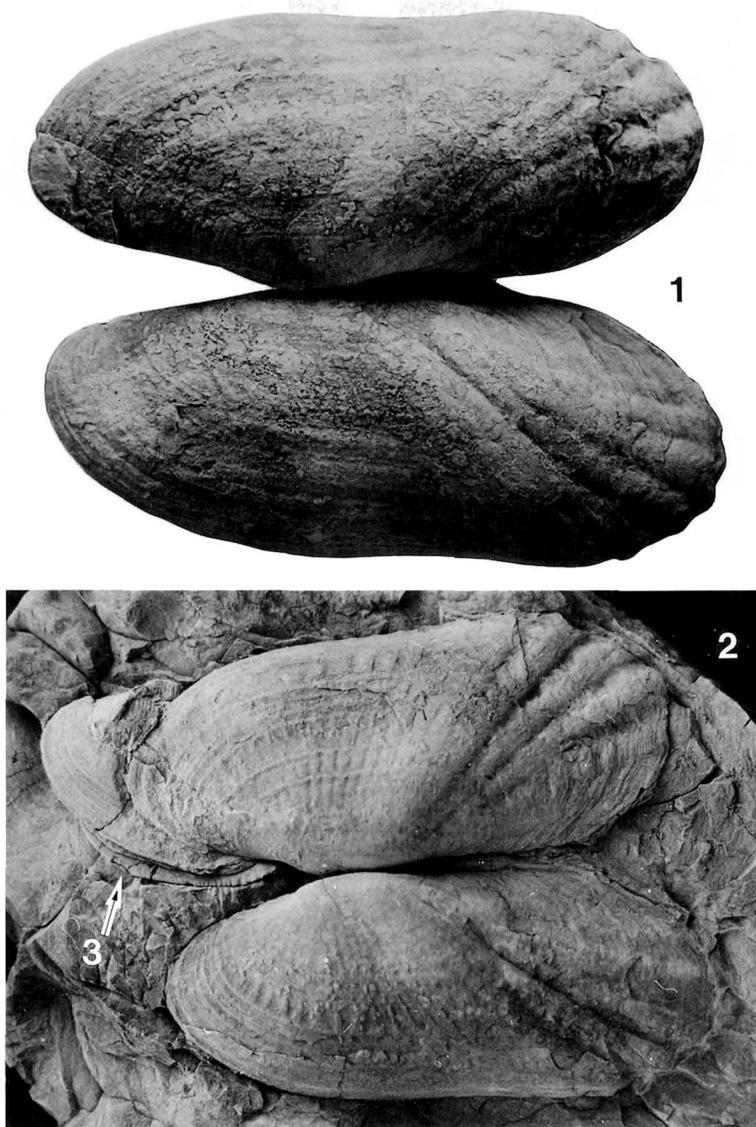


Fig. 5. Two bivalve fossils.

1. *Plicatounio naktongensis* Kobayashi and Suzuki, 1936, Opened bivalve(YCS1030), relatively large adult shell, 2. Opened bivalve(YCS1031), showing well preserved shell ornaments, 3. Bivalved(YCS1032) *Trigonioides jaehoi* Yang, 1983, indicated by arrow and pressed down by the other specimen. All figures are approximately of natural size.

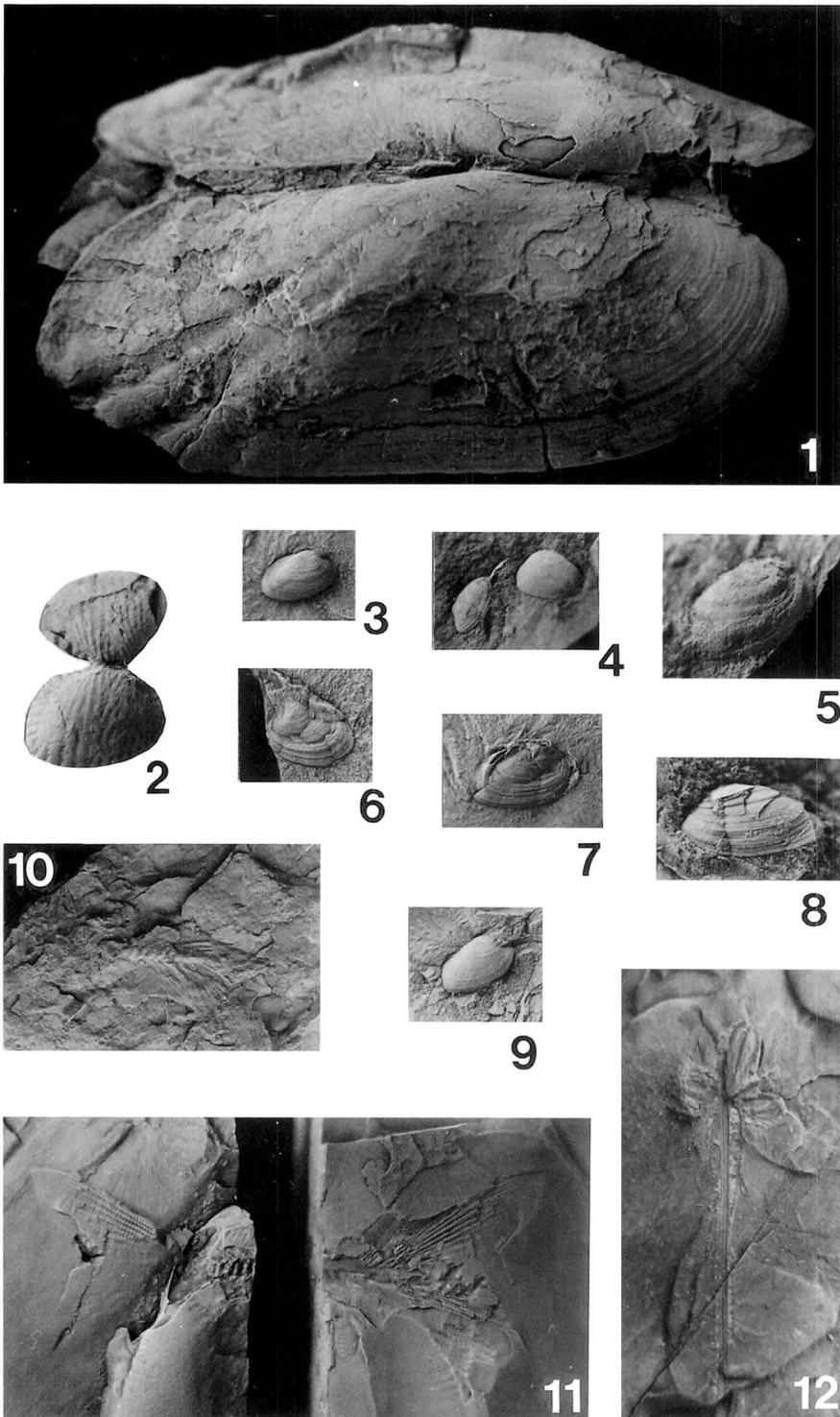


Fig. 6. Various accompanying fossils.

1. Bivalved(YCS1033), *Plicatounio naktongensis* Kobayashi and Suzuki, 1936
2. Opened bivalve(YCS1034), *Trigoniooides* sp., 3~9. *Nagdongia soni* Yang, 1975, 3. Right valve(YCS1035),
4. Left valve (YCS1036~1037), 5. Right valve(YCS1038), 6. Left valve(YCS1039), 7. Right valve(YCS1040),
8. Left valve(YCS1041), 9. Right valve(1042), 10. Caudal part of the specimen (fish) YCS1043, 11. Caudal fin (YCS1044), 12. Plant fossil(YCS1045), *Onychiopsis elongata* (Geyler). All figures are approximately of natural size.

경북 고령군 기산리에 분포하는 동명층에서 발견된 3종의 이매패 화석

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