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Bivalve Mollusks in Yeongil Bay, Korea, 1. Introductory Part and Annotated List of Species

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Abstract : An annotated listing of bivalve mollusks collected at 31 sampling sites in Yeongil Bay (eastern coast of Korea) at a depth of 0 - 52 m is presented here. A total of 98 species belonging to 75 genera and 36 families are enumerated; all species are provided with habitat data (bathymetric distribution and bottom sediments character), given separately for living and dead (empty shells) specimens, and some with taxonomic and zoogeographic comments. Fifty-six species are illustrated with photographs. *Astarte hakodatensis* Yokoyama, 1920 (Astartidae), *Nitidotellina pallidula* (Lischke 1871) (Tellinidae) and *Lyonsia nuculaniformis* Scarlato in Volova et Scarlato, 1980 (Lyonsiidae) are found to be new to the Korean fauna, and the genus *Salaputium* Iredale, 1924 (Crassatellidae) with one species *Salaputium cf. unicum* Hayami and Kase, 1993, previously described as being found only from submarine caves in the Ryukyu Islands, is recorded as being found in the East Sea (Sea of Japan) for the first time.

Key words : Bivalvia, species list, taxonomy, East Sea (Sea of Japan), Yeongil Bay, Korea.

1. Introduction

Bivalve molluscan fauna off the Korean coast of the East Sea (Sea of Japan) is of special interest for biogeographers, because this sea is believed to be intermediate or transitional between the boreal and subtropical zones in terms of zonal biogeography (Scarlato 1981), or between the mild temperate and warm temperate areas (Hall 1964). Other specialists have proposed several zoogeographic boundaries along the Korean coast (Nishimura 1965). However, the species composition and distribution of bivalve mollusks remain insufficiently known, which makes faunal demarcation of the region tentative as compared to the more adequately studied Japanese waters. Environmental characteristics of the Korean coastal waters are rapidly changing due to anthropogenic pressure, affecting the status of fauna in many polluted areas.

In August 1997, we undertook a survey of the bottom

fauna in Yeongil Bay (Yeongil-man), near Pohang City. The results of this study with an annotated list of species (part 1) and faunal analysis and discussion on the faunal relationships between various areas of the East Sea (part 2) are presented in this paper.

2. Materials and methods

The materials collected consist of three parts: shells washed ashore (beach drift); living and dead (empty shells) mollusks collected in the intertidal and upper subtidal zones (to 1-2 m deep); and those collected with a dredge at a depth range of 6.5-51.9 (52) m on soft bottoms in Yeongil Bay. The dredge is a small (36-cm-wide) simple apparatus designed by Dr. E.I. Schornikov (Institute of Marine Biology FEB RAS, Vladivostok) with a nylon sack (meshes of 0.15 mm × 0.15 mm) and an inserted sieve (meshes of 1.5 mm × 1.5 mm) (see for details: Lee *et al.* 2000). All dredge samples were sieved to extract meiobenthic organisms; the macrobenthic fraction was

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Fig. 1. The map of sampling sites of mollusks in Yeongil Bay.

Fig. 2. View of the coast near Daedongbae Village (sites 65, 66).

fixed in 50-70% alcohol. Macrobenthos was sorted into empty shells and animals collected alive; fixed mollusks were dried after a fixation period of 1-2 years. In all, mollusks were collected at 31 sampling sites (Fig. 1): 3 beach samples, 27 subtidal and one intertidal station. Shallow water (1-2 m) samples were collected by snorkeling near Imgok and Daedongbae Villages (Fig. 2); these samples consisted mainly of roots of sea-grasses with pieces of bottom deposits, so they were intensively washed,

and mollusks and their shells were extracted. In total, 1,373 specimens of bivalves were examined. For species recorded in Korea for the first time, synonymy is given; some species are provided with comments on their taxonomy and/or distribution. The collection studied is deposited in the Zoological Museum, Far East State University, Vladivostok (hereafter ZMFU). Lee and co-authors (2000) published a list of the ostracod fauna from the same samples.

3. Previous research

The East Sea coast of Korea is still an inadequately researched area of the sea with respect to malacology. In the 19th century, the Korean molluscan fauna received little attention from the European or American zoologists as compared to the fauna of Japan (Lischke 1869-1874; Dunker 1882; Pilsbry 1895; see also for review: Cosel 1998). However, some mollusk collections from Korean waters had been made in the 19th century during the visit of H.M.S. *Samarang* under the command of Captain Edward Belcher. It was young Arthur Adams who collected samples. Subsequently, this collection was described in the "Zoology of the Voyage of H.M.S. *Samarang*" (Adams and Reeve 1848-1850). Jeffreys (1879) described

a collection of bivalves, gastropods and brachiopods without illustrations from the Korea Strait, but he based this on the misconception that a number of species from Japan or Korea are the same as those found in Europe: "certain species ... are identical to varieties of European species" (l.c., p. 418). Some other European works of the 19th century dealt mainly with fresh- or brackish-water fauna. A review of these earlier works may be found in Lee (1956) and Yoo (1976). No comprehensive lists of Korean mollusks were published until the first half of the twentieth century when Japanese authors began to catalog the fauna. An attempt of this kind was made by Noboru Shiba (Shiba 1934) who published "Catalogue of the Mollusca of Chosen (Corea)" enumerating 93 marine bivalves (excluding freshwater Unionidae and fresh/brackish-water Corbiculidae).

The situation has begun to improve with Korean national malacological studies started in the 1950s (Lee 1956, 1958, etc.). Three identification guide-books with many color photographs (Yoo 1976; Kwon *et al.* 1993, 2001) and several lists of Korean mollusks (Je 1989; List of Animals... 1997) have been published. These works contributed much to the understanding of the species composition of the molluscan fauna. Nevertheless, no exact faunal data is available for many areas of the East Sea zone of Korea. The species lists of recent mollusks were published mostly for some localities in the southern part of the Korean Peninsula (South Sea of Korea): Geojedo Island and the adjacent islets (Kim *et al.* 1979; Rho *et al.* 1998); Geomundo, Daesambudo and Sangbaekdo Islands (Kim and Kim 1985); Dolsan Island (Kim and Shin 1986); and Ulleungdo Island (Choe and Lee 1993). The death shell assemblages were studied on the southeastern continental shelf of Korea (Yoon *et al.* 1994). Ecological data on the bivalves, their distribution, biomasses and abundance can be found in studies of intertidal and subtidal communities around Pusan (Busan) (Yi 1975; Lee 1976; Hong *et al.* 1982; Lee *et al.* 1984), Ulsan Bay (Yi *et al.* 1982), Onsan Bay (Rho *et al.* 1997), Deukryang Bay (Ma *et al.* 1995), Jinhae Bay (Lim *et al.* 1992; Lim and Hong 1994), Yeosu Bay (Lim *et al.* 1991), Aenggang Bay (Lim *et al.* 1999), near Gangneung (Choi *et al.* 2000), and of exposed rocky island shores (Je *et al.* 1997a). A study of the fouling organisms in the pearl oyster culture grounds in the southern part of Korea was carried out by Je *et al.* (1988a).

Distribution, shell morphology and taxonomy of selected species of *Mytilus* (Je *et al.* 1990; Yoo 1992), representatives of the families Arcidae, Parallelodontidae, Glycymerididae,

Mytilidae, Pectinidae, Spondylidae, Limidae, Anomiidae and Ostreidae from Ulleung Island (Choe *et al.* 1994), *Theora fragilis* (Lim *et al.* 1995) in Jinhae Bay, the families Gryphaeidae and Ostreidae from Korean waters (Qi and Choe 2000) and abundant and commercially exploitable species in Jeju Island (Choi 1996; Choi *et al.* 2000) were described during the last decade. A preliminary study on marine benthic organisms of Dokdo Island located to the east of the Korean Peninsula has been undertaken by Je *et al.* (1997b) who enumerated 40 species of mollusks. On the eastern coast of Korea, intertidal and subtidal benthic community structures were investigated in Aninjin (Kim *et al.* 1983). As for Yeongil Bay, there is a paper dealing with the distribution of drifting larvae of the Japanese scallop *Mizuhopecten yessoensis* (Yoo and Park 1979).

4. Regional setting

The study area is located in the southwestern part of the East Sea, approximately between 36°06'N and 36°00'E (Fig. 3). Yeongil Bay is the largest bay on the eastern coast of the Republic of Korea, and is rather shallow with depths not exceeding 30 m at its entrance.

Based on dredging data, the central part of the bay is occupied mostly by muddy sediment (sta. 35-43, 59-60), brown and gray in color. At some stations located near the coastline, the mud had an admixture of sand (sta. 38) or molluscan shells (sta. 41). Muddy sand is also distributed in the outer area (sta. 53-55) where the depth varies from between 30 and 50 m. Sandy sediment is characteristic of the north - western part of the bay (sta. 34, 44-48, 52). At the entrance to Pohang Harbour (sta. 49), black mud with an admixture of sand was found. The northeastern part is

Fig. 3. View of the coast of Yeongil Bay.

dominated by coarse-grained sand with shells and shelly fragments (sta. 58), and gravel (sta. 56, 57). In general, at depths of less than 100 m, in the shelf area opposite Yeongil Bay, sand and gravelly sand are found along with silt and sandy silt in the zone lying deeper than the above-mentioned sand sediment (Park 1988). Most of the sandy and gravelly sediment deposits on the outer shelf floor in the Korean seas are relict sediments that were deposited when the sea level was lower than at present (Choi and Park 1993). In Yeongil Bay, during low tide (Würm glacial stage), the extended Hyoungsan River formed a submerged delta (40 to 70 m deep) (Oh 1977).

Oceanographic conditions in the study area are determined by currents and upwelling water. The North Korean Cold Current and the East Korean Warm Current, a branch of the Tsushima Warm Current, form a strong thermal front off Jukbyeon (Chukpyon) ($\sim 37^{\circ}\text{N}$), but its position varies from year to year. Kim and Kim (1983) found that the coldwater mass off the Jukbyeon-Cheoksan coast in summer belongs to the North Korean Cold Current (Water) and is not upwelling East Sea proper water mass. This current flows strongly in summer; its southern limit is generally off Cheoksan-Janggigab (i.e., Yeongil Bay), and occasionally it runs further south, off Gampo (Kampo). Lee and Chung (1981) also found that the North Korean Cold Current intrusion is strong and persistent in summer (August) with an average velocity of 23.4 cm/sec near Jukpyeon when the Tsushima Current is strong as well. However, no indication of the former current was detected in November. In Yeongil Bay itself, cold water inflow is stable from May to August and its upwelling usually occurs three times during this period; these waters stagnate for ten or twenty days from June to August (Son 1977). In October, surface water mass in Yeongil Bay might originate from the Tsushima Current flowing during the summer season; and bottom water mass, from the cold body of the East Sea, which seems to extend to the coastal zone during the winter (Kwak 1976). Mean SST (sea surface temperature) in the coastal area around Pohang is about 16°C (Kang and Jin 1984a). However, in July, a strong inflow of cold water into Yeongil Bay is extended throughout the whole bay area in July with a bottom temperature of about $7\text{--}9^{\circ}\text{C}$, which is lower than in winter ($9\text{--}12^{\circ}\text{C}$) (Son 1977).

South of Yeongil Bay, an upwelling of coldwater occurs near Ulgi (Ulsan) and Gampo. However, SSTs decrease only in the area mentioned (Ulgi-Gampo), but not at Busan and Pohang (Janggigab) (Lee and Na 1985). The difference between upwelling cold water masses in the area of Ulsan and in Pohang may be very substantial:

SSTs around Yeongil Bay can reach 25°C , and around Ulsan Bay only $17\text{--}20^{\circ}\text{C}$ (August 1969); SSTs near Gampo, another cold area south of Pohang, can decrease to 22°C , while around Janggigab (Yeongil Bay) they increase to 25°C (July 1973) (Lee 1978). Thus, there is a significant difference between near-bottom and surface temperatures in Yeongil Bay and the adjacent waters in summer. High water temperatures in Janggigab even during the upwelling events cannot be explained by differential heating, but it might be due to the approach of the East Korean Warm Current, which flows toward the coast (Lee 1983). According to Yoo and Park (1979), the range of bottom temperatures (in 1973, 1978 and 1978) was between 10 and 19°C .

The annual mean salinity at the sea surface around Yeongil Bay is 33.7‰ , and 34.05‰ at a depth of 30 m (Kang and Jin 1984b). At Pohang site of NFRDA, salinity slightly decreases in August and October (to about 33‰) (Khim *et al.* 2000). Land water discharge from the Hyoungsan River into the bay is considered a minor factor in the water mass composition of the area (Kwak 1976).

The range of maximum current velocities in Yeongil Bay is $22\text{--}40$ cm/sec at a depth of 3 m and $8\text{--}25$ cm/sec at a depth of 15 m; waters enter through the northeastern entrance and move counterclockwise in the bay (Sung *et al.* 1993).

5. Species richness

Ninety-eight species of bivalves belonging to 75 genera and 36 families were found in Yeongil Bay. The population of this species may increase in future, as our survey was short-term. Among other bays of the East/Japan Sea coast of Korea, Ulsan and Onsan Bays have the richest composition: 29 and 25 species, respectively (Yi *et al.* 1982; Rho *et al.* 1997). Bivalve molluscan faunas of the islands are more diverse. Thus, 45 species were recorded for Geojedo (Rho *et al.* 1998), 63-for Ullungdo (Choe and Lee 1993); and only 11 species for the small Dokdo group (Je *et al.* 1997b). In coastal areas of Gangneung and Aninjin located further north of Yeongil Bay, 31 and 15 species were found (Kim *et al.* 1983; Choi *et al.* 2000). However, the majority of these studies were benthic ecological surveys not devoted specifically to molluscan collecting. Beach sampling in six areas around Gangneung, Jumunjin, Daejin, Gallam, Jukpyeon, Hupo, and Chooksan was successful in collecting 39 species (Lutaenko *et al.* 2002). Further north, in East Korean Bay of North Korea,

Table 1. Species richness of bivalve molluscan faunas in bays and some other localities of Japan

Locality	Species richness	Reference
Ariake Bay (Kyushu)	121	Habe and Tanaka, 1959
Usuki Bay (Kyushu)	116	Shuto, 1973
Suruga Bay (Honshu)	446	Habe <i>et al.</i> , 1986
Sagami Bay (Honshu)	403	Kuroda <i>et al.</i> , 1971
Wakasa Bay (Honshu)	207	Ito, 1990
Tsukumo Bay (Noto Peninsula, Honshu)	104	Habe, 1973
Ichikawa Prefecture (around Noto Peninsula)	119	Ito <i>et al.</i> , 1986
Sado Island	211	Kuroda, 1957; Honma and Kitami, 1978, 1979, 1995
Mano Bay (Sado Island)	103	Ito, 1978
Otsuchi Bay (Honshu)	119	Tsuchida and Kurozumi, 1993, 1995, 1996
Mutsu Bay (Honshu)	123	Yamamoto and Habe, 1958, 1959
Akkeshi Bay (Hokkaido)	61	Habe, 1955b
Nemuro Bay (Hokkaido)	25	Tsuchida, 1998

only 31 bivalve species were collected (Evseev 1996). In total, about 350 marine species of Bivalvia are recorded in Korea (Kwon *et al.* 2001).

A comparison with Japanese bay fauna (Table 1) shows that the richest and most diverse species composition of bivalves on the East Sea (Japan Sea) side was detected in Wakasa Bay—a total of 207 species. In smaller bays (Mano and Tsukumo Bays), species richness is two times lower. No exact data is available for Toyama Bay as a whole (Fujii 1987; Miyamoto and Nunomura 1999; Miyamoto *et al.* 2000). In northern Honshu (Mutsu and Otsuchi Bays), 119–123 species were found, while in Hokkaido, Nemuro Bay, the species population decreases to 25. Sado Island washed by the warm Tsushima Current has a rich molluscan fauna comparable to that of Wakasa Bay further to the south. Unfortunately, scarce data exists for large Ishikari Bay in Hokkaido (Kosuge 1979).

Only a few bays and localities on the Russian coast of the East Sea have been studied in detail with respect to the species composition of bivalves. All of them are situated inside large Peter the Great Bay: in Possjet Bay, 97 species are known to date (Golikov and Scarlato 1967; Scarlato 1981); in Vostok Bay, 88 species (Evseev 1981); and in Amursky Bay and the adjacent areas, 119 species (Lutaenko 2002; Lutaenko in press). A total of 135 species were recorded from Peter the Great Bay as a whole (Scarlato 1981).

6. A list of species

Class Bivalvia

Subclass Protobranchia Pelseneer, 1889

Order Nuculoida Dall, 1889

Superfamily Nuculoidea Gray, 1824

Family Nuculidae Gray, 1824

Acila (Truncacila) insignis (Gould, 1861)

Plate 1, fig. 1

Sampling Sites: 35, 43–45, 52, 54, 59.

Material Examined: 54 specimens.

Occurrence: This species was found at a depth range of 19.5–35.5 m, mainly as live specimens, in mud, silty and sandy mud, sand and coarse-grained sand with gravel.

Nucula (Nucula) paulula A. Adams, 1856

Sampling Site: 58.

Material Examined: 3 specimens.

Occurrence: Empty shells were taken at 25 m, in sand.

Nucula (Ennucula) tenuis (Montagu, 1808)

Plate 1, fig. 2

Sampling Sites: 36, 53–55, 59, 60.

Material Examined: 123 specimens.

Occurrence: Live specimens (except for site 60) were collected at a depth of 20.5–52 m in mud, sandy mud and muddy fine-grained sand.

Remarks: Scarlato (1981) divided this species into two subspecies: nominative and *Nucula tenuis expansa* Reeve in Belcher, 1855. According to Bernard (1983), *N. expansa* is a compressed form of *Nucula bellotii* A. Adams, 1865; another form, inflated, is *Nucula inflata* Hancock, 1846. At the same time, *N. bellotii* is a cold-water variant of *N. tenuis* (Bernard 1983) and the lack of a latitudinal or ecological pattern in the distribution of the two species suggests that they should be synonymized (Coan *et al.* 2000). Scarlato (1981) also considered *N. inflata* as a separate species with two subspecies: boreal-arctic *N. inflata inflata* and arctic *N. inflata romboides* (Scarlato 1981), which seems to be a separate species (Coan *et al.* 2000). Kafanov (1991) regarded *N. bellotii* as a subspecies of *N. tenuis* with *N. inflata*, *N. expansa* and *N. inflata romboides* as its synonyms. Scarlato described *Leionucula ovatotruncata* Scarlato in Volova *et al.* Scarlato, 1980 (the name was formally introduced in a guide-book for students in Volova and Scarlato (1980) but a year later he (Scarlato 1981) described this species again with the designation “holotype” (in fact, lectotype) which is differentiated from *N. tenuis* by the lesser dorso-ventrally broadened shell and the relatively

shorter resilifer (Scarlato 1981, p. 174). *N. ovatotruncata* is believed to be distributed in southern Primorye (between Possjet and Kievka Bays) in the northwestern East Sea (Sea of Japan) and in the South Kurile Islands area (between Hokkaido and Kunashir Isls.); but, judging from available literature, it has never been recorded by Japanese malacologists. Coan *et al.* (2000) synonymized it with *N. tenuis*. Specimens of *N. tenuis* from Yeongil Bay are similar to those from the Bering Sea (Scarlato 1981, photo 26) as well as to *N. ovatotruncata* from Peter the Great Bay (i.e., photos 21-23); and they differ from "*Leionucula tenuis tenuis*" from Terpenya Bay in Sakhalin Island (i.e., photos 24-25) and from *Ennucula tenuis* from Washington (Coan *et al.* 2000, p. 77, pl. 4). Korean specimens resemble in shell outline Chinese *N. tenuis* figured by Xu (1984, pl. 1, fig. 4) and a specimen designated as "*Nucula paulula* A. Adams" in Ito *et al.* (1986, pl. 34, fig. 8) from off the Noto Peninsula.

According to Xu (1999), *N. tenuis* occupies the greater part of the Yellow Sea. Therefore, the species penetrates into subtropical waters. Such a wide distributional range seems to indicate that the species taxonomy needs a thorough revision.

Superfamily Nuculanoidea H. et A. Adams, 1858

Family Yoldiidae Habe, 1977

Yoldia (Cnesterium) notabilis Yokoyama, 1922

Plate 1, fig. 3

Sampling Sites: 35-37, 40, 41, 44, 49, 53, 55, 59.

Material Examined: 28 specimens.

Occurrence: Empty shells were taken at a depth of 12-52 m; and live specimens at 8.5-52 m, in mud, muddy sand and sand.

Subclass Pteriomorphia Beurlen, 1944

Order Mytiloida Ferussac, 1822

Superfamily Mytiloidea Rafinesque, 1815

Family Mytilidae Rafinesque, 1815

Mytilus (Mytilus) galloprovincialis Lamarck, 1819

Pl. 1, fig. 11

Sampling Sites: 34, 37, 41, 48, 58, 59, 61, 62, 64, 65.

Material Examined: 49 specimens.

Occurrence: Numerous empty shells and their fragments were collected at a depth range of 6.5-28 m, in fine and coarse-grained sand and mud. It is also common on sandy beaches near Pohang and Daedongbae.

Remarks: Some samples (sites 48, 59, 64) contain shells with an intermediate set of morphological features between *M. galloprovincialis* and *Mytilus (Mytilus) trossulus*

Gould, 1850, the latter is believed at present to be a widely distributed mussel species in the northwest Pacific Ocean (Coan *et al.* 2000). The presence of intermediate forms might be related to hybridization, as is the case with Peter the Great Bay (northwestern East Sea) populations (Ivanova and Lutaenko 1998). *Mytilus* sp. found around Ohori and Hajodae on the eastern coast of Korea differs from typical *M. galloprovincialis* by the shell profile and degree of convexity (Je *et al.* 1990). The wide spatial and bathymetric distribution of shells and shell fragments of *M. galloprovincialis* in Yeongil Bay seems to indicate its participation in the biofouling communities on anthropogenic substrates and in the intertidal zone.

Mytilus (Crassimytilus) coruscus Gould, 1861

Sampling Site: 64.

Material Examined: 1 specimen.

Occurrence: It was found on a beach near Daedongbae.

Septifer (Mytilisepta) virgatus (Wiegmann, 1837)

Sampling Site: 64.

Material Examined: 3 specimens.

Occurrence: It was found on a beach near Daedongbae.

Septifer (Mytilisepta) keenae Nomura, 1936

Sampling Site: 58.

Material Examined: 9 specimens.

Occurrence: Empty shells were collected at a depth of 25 m, on coarse-grained sand.

Modiolus (Modiolus) auriculatus (Krauss, 1848)

Plate 1, fig. 10

Sampling Site: 58.

Material Examined: 4 specimens.

Occurrence: Empty shells were found at a depth of 25 m on coarse-grained sand.

Remarks: This species was referred to as *Modiolus agripetus* (Iredale 1939) in earlier Korean documents (Yoo 1976; Kwon *et al.* 1993).

Modiolus (Modiolus) kurilensis Bernard, 1983

Sampling Site: 64.

Material Examined: 1 specimen.

Occurrence: An empty shell was found on a beach near Daedongbae.

Remarks: Coan *et al.* (2000) regarded this species as a synonym of *Modiolus (Modiolus) modiolus* (L., 1758), a widely distributed species in boreal waters of both the Pacific and Atlantic Oceans.

Vilasina decorata (Adams, 1862)

Sampling Site: 58.

Material Examined: 5 specimens.

Occurrence: Empty shells were collected at a depth of 25 m on coarse-grained sand.

Lithophaga (Leiosolenus) cf. curta (Lischke, 1874)

Sampling Site: 58.

Material Examined: 1 specimen.

Occurrence: One valve fragment was found at a depth of 25 m on coarse-grained sand.

Order Arcoida Stoliczka, 1871

Superfamily Arcoidea Lamarck, 1809

Family Arcidae Lamarck, 1809

Arca boucardi Jousseaume, 1894

Plate 1, fig. 19

Sampling Sites: 34, 41, 44, 45, 47, 49, 53, 58.

Material Examined: 25 specimens.

Occurrence: Empty shells were found on fine- and coarse-grained sand, sometimes mixed with gravel, and in mud and muddy sand at a depth range of 6.5-30 m. Shells were collected also near Imgok on a beach.

Acar plicatum (Dillwyn, 1817)

Sampling Site: 58.

Material Examined: 6 specimens.

Occurrence: Empty shells were found at a depth of 25 m, on coarse-grained sand mixed with shells.

Anadara (Scapharca) kagoshimensis (Tokunaga, 1906)

Plate 1, figs. 12, 15

Sampling Sites: 61, 62.

Material Examined: 2 specimens.

Occurrence: Only two small-sized valves (up to 30 mm) were collected on beaches near Pohang and Imgok.

Remarks: This species name was recently applied to a previously widely known commercial species, *Anadara (Scapharca) subcrenata* (Lischke 1869). However, type material of *A. subcrenata* is not found (Cosel 1998). A more detailed taxonomic discussion is given by Lutaenko (2002).

Family Parallelodontidae Dall, 1898

Porterius dalli (Smith, 1885)

Plate 1, figs. 16, 18

Sampling Site: 58.

Material Examined: 2 specimens.

Occurrence: Empty shells were discovered at a depth of 25 m, on coarse-grained sand mixed with shells.

Superfamily Limopsoidea Dall, 1895

Family Limopsidae Dall, 1895

Empleconia cumingii (Adams, 1863)

Plate 1, fig. 4

Sampling Site: 58.

Material Examined: 2 specimens.

Occurrence: Live specimens were extracted at a depth of 25 m, from coarse-grained sand with shells.

Family Glycymerididae Newton, 1916

Glycymeris (Glycymeris) aspersa (Adams et Reeve, 1850)ⁱⁱ

Plate 1, fig. 5

Sampling Site: 58.

Material Examined: 1 specimen.

Occurrence: Empty shells were found at a depth of 25 m, on coarse-grained sand with shells.

Glycymeris (Glycymeris) cf. rotunda (Dunker, 1882)

Sampling Sites: 53, 66.

Material Examined: 2 specimens.

Occurrence: Empty shells were found at a depth of 30 m, on mud mixed with sand; and near Daedongbae at a depth of 2 m.

Glycymeris (Glycymeris) cf. yessoensis (Sowerby III, 1889)

Plate 1, fig. 6

Sampling Sites: 56, 58.

Material Examined: 13 specimens.

Occurrence: Empty shells were found at a depth of 25-25.5 m, on gravel and coarse-grained sand.

Order Limoida Waller, 1978

Superfamily Limoidea Rafinesque, 1815

Family Limidae Rafinesque, 1815

Limaria (Limaria) hakodatensis (Tokunaga, 1906)

Plate 1, fig. 14

Sampling Site: 64.

Material Examined: 1 specimen.

Occurrence: Empty shell (valve) was collected near Daedongbae on the beach.

Remarks: This species described by Tokunaga (1906, p. 64, pl. 3, fig. 27; as *Lima*) was synonymized by some

ⁱⁱ⁾ A number of juvenile mollusks belonging to this genus have been found at sampling sites 44, 45, 47, 49, 52, 56, but they could not be identified at the species level.

authors with *Limaria (Limaria) basilanica* (Adams et Reeve 1850) (Bernard *et al.* 1993) or *Limaria (Limaria) orientalis* (Adams et Reeve, 1850) (Choe *et al.* 1994; Higo *et al.* 1999). According to Oyama (1980), the range of *L. hakodatensis* extends to the western Okinawa Islands, while Hayami (2000) limits its trajectory from southern Hokkaido to Kyushu. Kuroda *et al.* (1971) and Habe (1977) first considered *L. hakodatensis* as a distinct species; but later Habe (1981) synonymized it and *L. orientalis* with *L. basilanica*. Our shell is similar to those figured by Kwon *et al.* (1993, 2001, as *L. hakodatensis*).

Limatula (Limatula) kurodai Oyama, 1943

Sampling Site: 58.

Material Examined: 4 specimens.

Occurrence: Empty valves were found at a depth of 25 m, on coarse-grained sand with shells.

Remarks: This species differs from an allied *Limatula (Limatula) vladivostokensis* Scarlato, 1955 occurring in Korean seas (Kwon *et al.* 2001) by the less elongated and less equilateral shell.

Order Ostreoida Ferussac, 1822

Superfamily Ostreoida Wilkes, 1810

Family Ostreidae Wilkes, 1810

Crassostrea gigas (Thunberg, 1793)

Plate 1, figs. 7, 8

Sampling Sites: 61-63.

Material Examined: 6 specimens.

Occurrence: Shells were collected on beaches near Pohang and Imgok, and were also found at a depth of 1 m near Imgok.

Crassostrea nippona (Seki, 1934)

Plate 1, fig. 9

Sampling Site: 64.

Material Examined: 2 specimens.

Occurrence: Shells were collected on a beach near Daedongbae.

Remarks: Kwon *et al.* (2001) considered this species (as "*nipponica*") to be a synonym of *Crassostrea belcheri* Sowerby, 1878.

Superfamily Pectinoidea Wilkes, 1810

Family Pectinidae Wilkes, 1810

Chlamys (Swiftopecten) swiftii (Bernardi, 1858)

Sampling Site: 64.

Material Examined: 1 specimen.

Occurrence: A shell fragment was collected on a beach

near Daedongbae.

Pecten (Notovola) albicans (Schroter, 1802)

Plate 1, fig. 17

Sampling Site: 55.

Material Examined: 1 specimen.

Occurrence: An empty shell was found at a depth of 50-52 m, on muddy fine-grained sand.

Mizuhopecten yessoensis (Jay, 1857)

Sampling Sites: 55, 56, 58, 64.

Material Examined: 9 specimens.

Occurrence: Empty shells were found at a depth range of 25-(50-52) m, on fine- and coarse-grained sand and gravel; one shell was collected on a beach near Daedongbae.

Subclass Heterodonta Neumayr, 1884

Order Veneroida H. et A. Adams, 1856

Superfamily Chamoidea Lamarck, 1809

Family Chamidae Lamarck, 1809

Chama sp. (juv.)

Plate 1, fig. 13

Sampling Site: 53.

Material Examined: 1 specimen.

Occurrence: One valve was found at a depth of 30 m, on mud mixed with sand.

Superfamily Lucinoidea Fleming, 1828

Family Lucinidae Fleming, 1828

Pillucina pisidium (Dunker, 1860)

Sampling Sites: 49, 58.

Material Examined: 4 specimens.

Occurrence: Empty shells were found at a depth range of 8.5-25 m, on mud mixed with sand and coarse-grained sand.

Family Thyasiridae Dall, 1900

Axinopsida subquadrata (Adams, 1862)

Sampling Sites: 35, 42, 43, 52, 54, 55, 57, 59, 60.

Material Examined: 131 specimens.

Occurrence: Empty shells and live specimens were removed at a depth range of 19.5-(50-52) m, from mud, muddy sand and occasionally from gravel.

Family Ungulinidae H. et A. Adams, 1857

Cycladicama lunaris (Yokoyama, 1927)

Plate 3, fig. 2

Sampling Sites: 35, 49, 54.

Material Examined: 3 specimens.

Occurrence: Empty shells were discovered at a depth

range of 8.5-35.5 m, on silty mud and black mud with sand.

Cycladicama cumingii (Hanley, 1844)
Plate 3, fig. 4

Sampling Site: 41, 49, 58.

Material Examined: 3 specimens.

Occurrence: This species was found at a depth range of 8.5-25 m, on grey mud, mud mixed with sand and coarse-grained sand.

Felaniella (Felaniella) usta (Gould, 1861)
Plate 3, fig. 1

Sampling Sites: 41, 46, 47, 49, 52, 58.

Material Examined: 15 specimens.

Occurrence: Empty shells were found at a depth range of 8.5-25 m, on mud, muddy sand, fine- and coarse-grained sand; live specimens were recorded at a depth of 25 m.

Phlyctiderma japonicum (Pilsbry, 1895)
Plate 3, fig. 3

Sampling Sites: 47, 49, 61.

Material Examined: 9 specimens.

Occurrence: Empty shells were excavated at a depth range of 8.5-13.5 m, from muddy sand; one valve was found on a beach near Pohang.

Superfamily Galeommatoidea Gray, 1840
Family Lasaeidae Gray, 1847
Borniola sp.

Sampling Site: 49.

Material Examined: 1 specimen.

Occurrence: A shell was taken in 8.5 m, in mud mixed with sand.

Montacutona sp.

Sampling Sites: 44, 47, 49.

Material Examined: 4 specimens.

Occurrence: Empty shells were found at a depth range of 8.5-22.5 m, on sand and muddy sand.

Remarks: Specimens collected can be compared with *Montacutona olivacea* Habe, 1959.

Nipponomysella oblongata (Yokoyama, 1922)

Sampling Sites: 44, 46, 52.

Material Examined: 3 specimens.

Occurrence: Empty shells were found at a depth of 18.5-24.5 m on sand.

Nipponomysella cf. *subtruncata* (Yokoyama, 1927)

Sampling Site: 48.

Material Examined: 1 specimen.

Occurrence: A shell was taken at a depth of 7 m, on sand mixed with mud.

Nipponomysella obesa Habe, 1960

Sampling Sites: 44, 47.

Material Examined: 2 specimens.

Occurrence: Empty shells were taken at a depth range of 13.5-22.5 m, on sand and muddy sand.

Superfamily Carditoidea Fleming, 1828
Family Carditidae Fleming, 1828
Cardita leana Dunker, 1860

Sampling Sites: 45, 47, 58.

Material Examined: 4 specimens.

Occurrence: Empty shells were discovered at a depth range of 13.5-25 m, on muddy sand and coarse-grained sand.

Cyclocardia ferruginea (Clessin, 1888)

Sampling Site: 55.

Material Examined: 2 specimens.

Occurrence: Empty shells were found at a depth of 50-52 m, on muddy sand.

Megacardita coreensis (Deshayes, 1854)

Sampling Site: 58.

Material Examined: 2 specimens.

Occurrence: Empty shells were taken at a depth of 25 m, on coarse-grained sand.

Superfamily Crassatelloidea Ferussac, 1822
Family Crassatellidae Ferussac, 1822
Salaputium cf. *unicum* Hayami and Kase, 1993
Plate 5, figs. 1, 2

Sampling Sites: 58.

Material Examined: 2 specimens.

Occurrence: Empty shells were found at a depth of 25 m, on coarse-grained sand.

Remarks: This small-sized crassatellid rarely exceeding 3 mm in maximum length was described as being found in subtidal caves of Ie, Shimoji and Irabu Islets, Ryukyu Islands, which was the only locality of the species until present (Hayami and Kase 1993). Dr. Tomoki Kase, who kindly examined our photographs, informed us that this species is uncommon in the submarine caves and may occur in other habitats such as small crevices, or beneath rubble, etc. Our specimens do not exceed 5.3 mm in

length and have a slightly concave posterodorsal margin, while specimens from the Ryukyu Islands exhibit a slightly convex posterodorsal margin and bear more sharp commarginal lamellae on the shell surface (Hayami and Kase 1993, figs. 304, 307, 308). This is the first time this genus is recorded as having been found in the East Sea.

Nipponocrassatella sp.

Plate 5, fig. 6

Sampling Site: 45.

Material Examined: 1 specimen.

Occurrence: An empty shell was discovered at a depth of 21 m, on coarse-grained sand.

Indocrassatella cf. *oblongata* (Yokoyama, 1920)

Plate 5, fig. 3

Sampling Site: 45.

Material Examined: 1 specimen.

Occurrence: An empty shell was found at a depth of 21 m, on coarse-grained sand.

Family Astartidae d'Orbigny, 1844

Astarte hakodatensis Yokoyama, 1920

Plate 2, figs. 5, 7, 8

Astarte hakodatensis-Nomura and Hatai, 1940, p. 81; Kuroda and Habe, 1952, p. 14; Habe, 1968, p. 177, pl. 55, fig. 6; Habe, 1977, p. 160, pl. 30, figs. 4, 5; Ito, 1978, p. 210; Kafanov, 1991, p. 49; Amano, 1994, p. 243, pl. 1, figs. 4, 9-13, 17, 18; Higo *et al.*, 1999, p. 469; Matsukuma, 2000, p. 947, pl. 474, fig. 1.

Astarte (Astarte) hakodatensis-Oyama, 1980, p. 90, pl. 37, figs. 1-2.

Sampling Sites: 56, 58.

Material Examined: 16 specimens.

Occurrence: A live specimen was found at a depth of 25 m, in coarse-grained sand; and empty shells at a depth of 25-25.5 m, on coarse-grained sand and gravel.

Remarks: This species is recorded as having been found in Korean waters for the first time. Its distribution ranges from the Goto Islands further north to Hokkaido (Matsukuma 2000).

Astarte sp.

Plate 2, fig. 6

Sampling Site: 58.

Material Examined: 1 specimen.

Occurrence: An empty shell was found at a depth of 25 m, on coarse-grained sand.

Superfamily Cardioidea Lamarck, 1809

Family Cardiidae Lamarck, 1809

Clinocardium (Keenocardium) cf. *californiense*

(Deshayes, 1839)

Plate 2, figs. 2, 4

Sampling Sites: 53, 55, 56, 58, 59.

Material Examined: 7 specimens.

Occurrence: Empty shells were discovered at a depth range of 25-(50-52) m, on mud, muddy sand, sand and gravel.

Remarks: Kafanov (1999) subdivided this species into three subspecies: *C. californiense californiense*, *C. californiense uchidai* Habe, 1955 and *C. californiense middendorffi* (Kafanov, 1999), based on the geographical variation in rib numbers and the valve convexity/length ratio. According to this author, the Korean population belongs to *C. californiense uchidai*, in which the average rib number is more than 46, the average above-mentioned ratio is about 0.26, and it has a moderately thick-walled shell and normally developed cardinal teeth. Kafanov (l.c.) recorded *C. californiense* only from the Busan area in Korea based on the collection of the California Academy of Sciences, San Francisco. The other part of distributional range of the subspecies lies in Japan, Primorye, southern and southwestern Sakhalin Island, and the southern Kuril Islands. However, there are several records of *C. californiense* from the Yellow Sea, both Chinese (Xu 1964, 1997; Qi *et al.* 1989; Huang 1994) and Korean coasts (Yoo 1976; Je *et al.* 1988; Kwon *et al.* 1993; Kwon and Lee 1999). Xu (1964, p. 98) mentioned that *C. californiense* "is a boreal form widely distributed in the North Pacific, and is found only in the deeper waters of the Yellow Sea occupied by the cold water mass...". We believe that part of these records refer, in fact, to *Clinocardium (Keenocardium) buelowi* (Rolle 1896), which differs clearly from *C. californiense* by the lack of a keel twist on the posterior area of the valves and a reduced number of ribs (37-38) (Kafanov 1999). At least the illustrations found in Qi *et al.* (1989 textfig. 141-about 37 ribs), Yoo (1976, pl. 29, figs. 10-11), Kwon and Lee (1999, textfig. on p. 75) might belong to the former species and, vice versa, the illustration of *C. buelowi* in Lee (1958, pl. 5, fig. 3, specimen from Yusu, Korea) resembles our specimens. It should be noted that *C. californiense* was not listed in the catalogue of bivalve mollusks of China by Bernard *et al.* (1993), thus making Yellow Sea records of the species questionable. Coan *et al.* (2000) suggested that the relationship of *C. californiense uchidai* to *C. buelowi*

has yet to be fully resolved.

Specimens collected from Yeongil Bay differ from the southern subspecies *C. californiense uchidai* (Plate 2, fig. 1) by the thin, interiorly colorated shell with a lesser number (32-34) of sparsely spaced radial ribs, and that the ratio of convexity/length is between 0.52 and 0.72 (0.59 on average) in measured specimens:

Rib number	Length, mm	Height, mm	Shell convexity, mm	Left/right valve
34	29.1	24.4	-	Left
33	44.3	38.4	25.8	left
35	(same shell)	(same shell)		right
32	21.8	23.2	15.7	right
34	(same shell)	(same shell)		left
32	8.6	7.6	4.5	right
34	(same shell)	(same shell)		left
37	4.1	3.9	2.3	Right
34	(same shell)	(same shell)		left
32	18.5	15.5	10.3	Right
34	(same shell)	(same shell)		left

The number of ribs on specimens of *C. californiense* collected in the Okhotsk and Japan Seas (collection of the IMB) (Fig. 4) is between 34 and 56, but mostly about 43-51; this figure is close to that of Kafanov (1999, fig. 1)-39-61, which most often averaged about 43-53 ribs. This suggests that the Korean population may belong to a new species, which can be described after a detailed study of additional materials and those from the Yellow Sea and Chinese coast.

Fig. 4. Number of radial ribs in *Clinocardium* (*Keenocardium*) *californiense* (Deshayes, 1839) collected from Russian Far Eastern seas (based on the collection of the Institute of Marine Biology FEB RAS, Vladivostok).

Fulvia mutica (Reeve, 1844)

Plate 2, fig. 3

Sampling Sites: 35, 41, 49, 58, 64.

Material Examined: 7 specimens.

Occurrence: Empty shells were found at a depth range of 8.5-25 m, on mud and sand, and a shell fragment was collected on a beach near Daedongbae.

Superfamily Mactroidea Lamarck, 1809

Family Mactridae Lamarck, 1809

Mactra (*Mactra*) *chinensis* Philippi, 1847

Plate 3, fig. 13

Sampling Sites: 34, 44, 48, 49, 61-64.

Material Examined: 31 specimens.

Occurrence: Empty shells were collected in a depth range of 1-22.5 m, on sand and occasionally on black mud with sand; also on beaches near Pohang, Imgok and Daedongbae.

Spisula (*Pseudocardium*) *sachalinensis* (Schrenck, 1862)

Plate 3, fig. 7

Sampling Sites: 61, 62.

Material Examined: 2 specimens.

Occurrence: Empty shells were collected on beaches near Pohang and Imgok.

Mactromeris polynyma (Stimpson, 1860)

Plate 3, fig. 14

Sampling Site: 58.

Material Examined: 8 specimens.

Occurrence: Empty shells and a live specimen were collected in 25 m, on coarse-grained sand.

Tresus keenae (Kuroda et Habe, 1950)

Plate 3, fig. 10

Sampling Site: 63.

Material Examined: 1 specimen.

Occurrence: One empty shell was extracted at a depth of 1 m from sea-grass known as *Phyllospadix* and algae near Imgok.

Raeta (*Raetella*) *pulchella* (Adams et Reeve, 1850)

Sampling Sites: 34-43, 47-49, 52, 53, 59, 60.

Material Examined: 88 specimens.

Occurrence: Empty shells were found at a depth range of 6.5-30 m, mostly on mud, and rarely on muddy sand.

Superfamily Solenoidea Lamarck, 1809

Family Solenidae Lamarck, 1809

Solen (Solen) cf. strictus Gould, 1861

Sampling Site: 61.

Material Examined: 1 specimen.

Occurrence: A shell fragment was found on a beach near Pohang.

Solen (Ensisolen) krusensterni Schrenck, 1867

Sampling Sites: 38, 45.

Material Examined: 2 specimens.

Occurrence: Empty shells were collected at a depth range of 14-21 m, on muddy sand and coarse-grained sand with gravel.

Family Pharidae H. et A. Adams, 1858

Siliqua pulchella (Dunker, 1852)

Plate 5, fig. 7

Sampling Sites: 34, 38, 48, 49.

Material Examined: 11 specimens.

Occurrence: Empty shells were excavated at a depth range of 6.5-14 m, from muddy sand and fine-grained sand.

Superfamily Tellinoidea Wilkes, 1810

Family Tellinidae Wilkes, 1810

Cadella lubrica (Gould, 1861)

Sampling Sites: 44, 58.

Material Examined: 21 specimens.

Occurrence: Empty shells were found at a depth range of 22.5-25 m, on sand.

Moerella jodoensis (Lischke, 1872)

Plate 4, fig. 11

Sampling Sites: 35, 41, 43.

Material Examined: 4 specimens.

Occurrence: Empty shells were discovered at a depth range of 19-23 m, on muddy bottom.

Moerella rutila (Dunker, 1860)

Sampling Site: 49.

Material Examined: 1 specimen.

Occurrence: An empty shell was discovered at a depth of 8.5 m, on black mud with sand.

Moerella sp.

Plate 4, fig. 5

Sampling Site: 35, 48, 49.

Material Examined: 4 specimens.

Occurrence: An empty shell was found at a depth of 19.5 m, on mud.

Nitidotellina hokkaidoensis (Habe, 1961)

Plate 4, fig. 16

Sampling Sites: 34, 40-42, 45, 49.

Material Examined: 17 specimens.

Occurrence: Empty shells were extracted from the seabed at a depth of 6.5-23 m, on mud, and occasionally on sand with gravel.

Nitidotellina minuta (Lischke, 1872)

Plate 4, figs. 12, 14

Sampling Sites: 41, 48, 49, 52, 60.

Material Examined: 8 specimens.

Occurrence: Empty shells were found at a depth range of 7-27.5 m, in mud and fine-grained sand.

Nitidotellina pallidula (Lischke, 1871)

Plate 4, fig. 15

Tellina pallidula-Kuroda and Habe, 1952, p. 33.

Fabulina pallidula-Kira, 1959, p. 157, pl. 60, fig. 8; Yamamoto and Habe, 1959, p. 107; Kira, 1965, p. 173, pl. 61, fig. 8; Ito, 1967, p. 69.

Nitidotellina pallidula-Kuroda et al., 1971, p. 691 (Jap.), p. 453 (Engl.), pl. 99, fig. 16; Habe, 1977, p. 206; Habe, 1981, p. 132; Inaba, 1983, p. 55; Kafanov, 1991, p. 75; Bernard et al., 1993, p. 93; Higo et al., 1999, p. 488.

Sampling Sites: 40, 47.

Material Examined: 4 specimens.

Occurrence: Empty shells were excavated at a depth range of 13.5-18 m, from mud and muddy sand.

Remarks: This species is a new record for the Korean fauna. Its range extends from Mutsu Bay (northern Honshu) to the East China Sea, the Philippines and Southeast Asia (Higo et al. 1999).

Macoma (Macoma) tokyoensis Makiyama, 1927

Plate 4, figs. 1, 2

Sampling Sites: 35, 37, 41, 45.

Material Examined: 11 specimens.

Occurrence: Empty shells were found at a depth range of 12-21 m, on mud and sand.

Macoma (Macoma) incongrua (Martens, 1865)

Plate 4, fig. 6

Sampling Site: 61.

Material Examined: 1 specimen.

Occurrence: An empty shell was collected on a beach near Pohang.

Macoma (Macoma) nipponica (Tokunaga, 1906)

Plate 4, figs. 8, 9

Sampling Site: 58.

Material Examined: 4 specimens.

Occurrence: Empty shells were found at a depth of 25 m, on coarse-grained sand.

Macoma (Rexithaerus) sector Oyama, 1950

Plate 4, figs. 7, 10, 13

Sampling Sites: 49, 61, 62.

Material Examined: 4 specimens.

Occurrence: Empty shells were extracted at 8.5 m, from muddy sand, and were also collected on beaches near Pohang and Imgok.

Remarks: Northern records (Peter the Great Bay, southern Sakhalin, Hokkaido and Kunashir Islands) previously assigned to this species were recently shown to be a new species, *Macoma (Rexithaerus) hokkaidoensis* Amano et Lutaenko, 1999 (Amano *et al.* 1999).

Macoma (Heteromacoma) irus (Hanley, 1845)

Plate 4, figs. 3, 4

Sampling Site: 62, 64.

Material Examined: 6 specimens.

Occurrence: Shells were collected on beaches near Imgok and Daedongbae.

Family Semelidae Stolizka, 1870

Theora fragilis Adams, 1856

Sampling Sites: 35-37, 39, 41-43, 49, 59, 60.

Material Examined: 138 specimens.

Occurrence: Live specimens were removed from the seabed at a depth range of 8.5-28 m, exclusively on mud.

Superfamily Arcticoidea Newton, 1891

Family Kelliellidae Fischer, 1887

Alveolus ojanus (Yokoyama, 1927)

Sampling Sites: 34, 40, 43, 44, 46-48, 52, 54, 58-60.

Material Examined: 60 specimens.

Occurrence: Live specimens were found at a depth range of 13.5-27.5 m, on muddy sand and mud; empty shells in 6.5-35.5 m, on sand, mud and muddy sand.

Family Corbiculidae Gray, 1847

Corbicula japonica Prime, 1864

Sampling Site: 61.

Material Examined: 1 specimen.

Occurrence: One valve was found on a beach near Pohang, indicating environmental mixing of beach assemblages;

this species inhabits brackish water and lower reaches of rivers.

Superfamily Veneroidea Rafinesque, 1815

Family Veneridae Rafinesque, 1815

Mercenaria stimpsoni (Gould, 1861)

Sampling Sites: 47, 49, 56, 58, 62.

Material Examined: 15 specimens.

Occurrence: Empty shells were found at a depth range of 8.5-25.5 m, on sand, muddy sand, mud and gravel, and on a beach near Imgok.

Callithaca adamsi (Reeve, 1863)

Plate 3, fig. 9

Sampling Sites: 34-37, 40-46, 48, 49, 52-55, 58-60.

Material Examined: 168 specimens.

Occurrence: Empty shells were discovered at a depth range of 6.5-52 m, on mud, muddy sand, and live specimens were collected at 20.5-28 m, on mud.

Protothaca (Notochione) jedoensis (Lischke, 1874)

Plate 3, fig. 12

Sampling Site: 61.

Material Examined: 2 specimens.

Occurrence: Empty shells were collected on a beach near Pohang.

Callista (Ezocallista) brevisiphonata (Carpenter, 1864)

Sampling Sites: 56, 58.

Material Examined: 2 specimens.

Occurrence: Empty shells were recovered at a depth of 25-25.5 m, from gravel and coarse-grained sand.

Saxidomus purpurata (Sowerby II, 1852)

Sampling Sites: 61-64, 66.

Material Examined: 9 specimens.

Occurrence: Empty shells were removed from the seabed at a depth of 1-2 m, among *Phyllospadix*, algae and *Caulerpa* near Imgok and Daedongbae; shells were collected on beaches near the same localities and also near Pohang.

Dosinia (Asa) japonica (Reeve, 1850)

Plate 3, figs. 6, 11

Sampling Sites: 52, 56, 62, 63.

Material Examined: 9 specimens.

Occurrence: Empty shells were recovered at a depth of 24.5-25.5 m, from sand and gravel; shells were collected in Imgok at a depth of 1 m and were recovered on the beach.

Ruditapes philippinarum (Adams et Reeve, 1850)

Sampling Sites: 47, 61-64, 66.

Material Examined: 22 specimens.

Occurrence: Empty shells were found at a depth range of 1-13.5 m (including Imgok and Daedongbae), and in beach drift at the same localities and near Pohang.

Gomphina (Macridiscus) melanaegis Romer, 1861

Sampling Site: 34.

Material Examined: 1 specimen.

Occurrence: An empty shell was recovered at a depth of 6.5 m, on sand.

Remarks: See about the taxonomy and nomenclature of this species: Lutaenko, 2001.

Irus (Irus) macrophyllus (Deshayes, 1853)

Sampling Sites: 37, 49, 58, 66.

Material Examined: 9 specimens.

Occurrence: Empty shells were recovered at a depth range of 8.5-25 m, from mud and sand; one specimen was collected near Daedongbae, at a depth of 2 m, among *Phyllospadix* and *Caulerpa*.

Irus (Irus) mitis (Deshayes, 1853)

Plate 3, fig. 8

Sampling Site: 63.

Material Examined: 2 specimens.

Occurrence: Empty shells were collected at a depth of 1 m, among *Phyllospadix*, near Imgok.

Family Petricolidae d'Orbigny, 1840

Petricolirus aequistriatus (Sowerby II, 1874)

Plate 3, fig. 5

Sampling Site: 61.

Material Examined: 2 specimens.

Occurrence: Empty shells were collected on a beach near Pohang.

Order Myoida Goldfuss, 1820

Superfamily Myoidea Lamarck, 1809

Family Myidae Lamarck, 1809

Mya (Arenomya) cf. japonica Jay, 1856

Sampling Site: 49.

Material Examined: 1 specimen.

Occurrence: A valve was taken at a depth of 8.5 m, on black mud mixed with sand.

Paramya reclusii (A. Adams, 1864)

Sampling Site: 49.

Material Examined: 1 specimen.

Occurrence: An empty shell was found at a depth of 8.5 m, on black mud mixed with sand.

Cryptomya busoensis (Yokoyama, 1922)

Plate 5, fig. 10

Sampling Site: 49.

Material Examined: 5 specimens.

Occurrence: Empty shells were removed at a depth of 8.5 m, from black mud mixed with sand.

Family Corbulidae Lamarck, 1818

Anisocorbula venusta (Gould, 1861)

Sampling Sites: 45, 58.

Material Examined: 2 specimens.

Occurrence: Empty shells were recovered from the seabed at a depth range of 21-25 m, on coarse-grained sand.

Superfamily Hiatelloidea Gray, 1824

Family Hiatellidae Gray, 1824

Hiatella arctica (L., 1767)

Sampling Site: 35.

Material Examined: 1 specimen.

Occurrence: An empty shell was recovered at a depth of 19.5 m, from mud.

Superfamily Pholadoidea Lamarck, 1809

Family Pholadidae Lamarck, 1809

Barnea (Anchomasa) manilensis (Philippi, 1847)

Sampling Sites: 35, 37, 45, 49.

Material Examined: 8 specimens.

Occurrence: Empty shells were discovered at a depth range of 8.5-21 m, on mud, sand and mud mixed with sand.

Zirfaea subconstricta (Yokoyama, 1924)

Sampling Site: 49.

Material Examined: 1 specimen.

Occurrence: An empty shell was recovered at a depth of 8.5 m, from black mud with sand.

Subclass Anomalodesmata Dall, 1889

Order Pholadomyoida Newell, 1965

Superfamily Thracioidea Stolizka, 1870

Family Laternulidae Hedley, 1918

Laternula (Laternula) anatina (L., 1758)

Plate 5, fig. 9

Sampling Sites: 35-43.

Material Examined: 18 specimens.

Occurrence: Live specimens were recovered at a depth range of 12-23 m, exclusively from mud; empty shells-in 14-20.5 m, on mud.

Superfamily Pandoroidea Rafinesque, 1815

Family Lyonsiidae Fischer, 1887

Lyonsia ventricosa Gould, 1861

Plate 5, fig. 14

Sampling Site: 44.

Material Examined: 1 specimen.

Occurrence: An empty shell was recovered at a depth of 22.5 m, on fine-grained sand.

Remarks: Coan with co-workers (2000) synonymized *L. ventricosa* with Panarctic and circumboreal *Lyonsia arenosa* (Möller 1842); the same viewpoint was shared by Kafanov (1991). Good quality illustrations of *L. ventricosa* in Japanese (Kuroda *et al.* 1971, pl. 103, fig. 18; Fukuda *et al.* 1992, fig. 585; Tsuchida and Kurozumi 1996, pl. 5, fig. 6) and Korean (Kwon *et al.* 2001, fig. 1156) works show that this species clearly differs from *Lyonsia nukulanoformis* Scarlato in Volova et Scarlato, 1980 and seems to be a subtropical species distributed as far south as Taiwan (Bernard *et al.* 1993; Higo *et al.* 1999), while *L. nukulanoformis* is a low-boreal (warm-temperate) mollusk occurring in the East/Japan Sea. "*L. ventricosa*" from northern Hokkaido (Tsuchida 1998, pl. 5, fig. 8), seems to be the same species that was illustrated by Scarlato (1981, photo 203-204) under the heading *Lyonsia* sp. from the Okhotsk Sea. Habe (1955) mentioned that "*Lyonsia arenaria sibirica*" (= *L. arenosa*) is less rostrate posteriorly than *L. ventricosa*. Another related species, *Lyonsia kawamurai* Habe, 1952, is the same one described as being found in Sagami Bay and is also known as having been found off the Noto Peninsula (East Sea/Japan Sea side of Honshu), and is distinguished from *L. ventricosa* in that it has a posterior margin, and is not rostrated but broadly truncated (Habe 1952, p. 154, pl. 22, fig. 1). Although the majority of Japanese and some Chinese (Xu 1992, 1997) authors regarded *L. kawamurai* as a distinct species, Bernard *et al.* (1993) and Higo *et al.* (1999) synonymized it with *L. ventricosa*. Two more synonyms of *L. ventricosa* are often mentioned in Asian literature, *Lyonsia rostrata* Lischke, 1874 and *Lyonsia praetenuis* Dunker, 1882 (e.g., Habe 1952), but they are not listed in the synonymy of *L. arenosa* by Coan *et al.* (2000). It is clear that the relationships between *L. arenosa*, *L. ventricosa*, *L. kawamurai* and other possible synonymous

species are in need of reconsideration.

The record of *L. ventricosa* for the Primorye region (Russian coast of East Sea) (Higo *et al.* 1999) is erroneous.

Lyonsia nukulanoformis Scarlato in Volova et Scarlato, 1980

Plate 5, fig. 11

Lyonsia ventricosa-Golikov and Scarlato, 1967, p. 134, text-fig. 118 (non Gould, 1861).

Lyonsia nukulanoformis-Scarlato in Volova and Scarlato, 1980, p. 43, text-fig. 35.

Lyonsia nukulanoformis (sic!)-Scarlato, 1981, p. 279, photo 209; Kafanov, 1991, p. 45.

Sampling Site: 60.

Material Examined: 1 specimen.

Occurrence: An empty shell was recovered at a depth of 27.5 m, from mud.

Remarks: Distribution of this species ranges from Peter the Great Bay to Sovetskaya Gavan and Chikhacheva (De-Kastri) Bay in the north along the continental coast of the East Sea; the Yeongil Bay finding is a new record in the East Sea and is the first for Korea. This species was formally described in a guidebook for students (Volova and Scarlato 1980) without the designation of holotype, and one year later it was re-described by Scarlato (1981) with the illustration of the "holotype," which must be considered a kind of lectotype.

Agriodesma navicula (Adams et Reeve, 1850)

Plate 5, fig. 12

Sampling Sites: 61, 64.

Material Examined: 2 specimens.

Occurrence: Empty shells were collected on beaches near Pohang and Daedongbae.

Family Myochamidae Bronn, 1862

Myadora japonica Habe, 1950

Plate 5, fig. 4

Sampling Site: 58.

Material Examined: 6 specimens.

Occurrence: Empty shells were recovered at a depth of 25 m, from coarse-grained sand.

Myadora reeveana (Smith, 1880)

Plate 5, fig. 5

Sampling Site: 58.

Material Examined: 4 specimens.

Occurrence: Empty shells were found at a depth of 25 m, on coarse-grained sand.

Myadoropsis transmontana (Yokoyama, 1922)

Plate 5, fig. 8

Sampling Sites: 48, 58.

Material Examined: 8 specimens.

Occurrence: A live specimen was collected at a depth of 25 m, on coarse-grained sand, and empty shells-at 7-25 m, on sand.

Superfamily Cuspidarioidea Dall, 1886

Family Cuspidariidae Dall, 1886

Cuspidaria (Cuspidaria) hindsiana (Adams, 1864)

Plate 5, figs. 13, 15, 16

Sampling Site: 58.

Material Examined: 4 specimens.

Occurrence: Empty shells were recovered at a depth of 25 m, from coarse-grained sand.

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PLATE 1

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PLATE 5

PLATE 1

- Fig. 1. *Acila (Truncacila) insignis* (Gould, 1861). East Sea (Sea of Japan), Yeongil Bay, site 54, depth 35.5 m, external and internal views of the same valve, length 12.7 mm. ZMFU no. 19351/Bv-2826.
- Fig. 2. *Nucula (Ennucula) tenuis* (Montagu, 1808). East Sea (Sea of Japan), Yeongil Bay, site 55, depth 50-52 m, length 6.8 mm. ZMFU no. 19299/Bv-2792.
- Fig. 3. *Yoldia (Cnesterium) notabilis* Yokoyama, 1922. East Sea (Sea of Japan), Yeongil Bay, site 55, depth 50-52 m, length 24.3 mm. ZMFU no. 19322/Bv-2815.
- Fig. 4. *Empleconia cumingii* (Adams, 1863). East Sea (Sea of Japan), Yeongil Bay, site 58, depth 25 m, external and internal views of the same valve, length 14.4 mm. ZMFU no. 19300/Bv-2793.
- Fig. 5. *Glycymeris (Glycymeris) aspersa* (Adams et Reeve, 1850). East Sea (Sea of Japan), Yeongil Bay, site 58, depth 25 m, length 66.1 mm. ZMFU no. 19302/Bv-2795.
- Fig. 6. *Glycymeris (Glycymeris) cf. yessoensis* (Sowerby III, 1889). East Sea (Sea of Japan), Yeongil Bay, site 58, depth 25 m, length 35.3 mm. ZMFU no. 19301/Bv-2794.
- Fig. 7. *Crassostrea gigas* (Thunberg, 1793). East Sea (Sea of Japan), Yeongil Bay, site 62, beach drift, height 49 mm (umbonal area is broken off). ZMFU no. 19356/Bv-2831.
- Fig. 8. *Crassostrea gigas* (Thunberg, 1793). East Sea (Sea of Japan), Yeongil Bay, site 62, beach drift, height 32.2 mm. ZMFU no. 19356/Bv-2831.
- Fig. 9. *Crassostrea nippona* (Seki, 1934). East Sea (Sea of Japan), Yeongil Bay, site 64, beach drift, height 94 mm. ZMFU no. 19303/Bv-2796.
- Fig. 10. *Modiolus (Modiolus) auriculatus* (Krauss, 1848). East Sea (Sea of Japan), Yeongil Bay, site 58, depth 25 m, length 20.3 mm. ZMFU no. 19319/Bv-2812.
- Fig. 11. *Mytilus (Mytilus) galloprovincialis* Lamarck, 1819. East Sea (Sea of Japan), Yeongil Bay, site 61, beach drift, length 72.2 mm. ZMFU no. 19353/Bv-2828.
- Fig. 12. *Anadara (Scapharca) kagoshimensis* (Tokunaga, 1906). East Sea (Sea of Japan), Yeongil Bay, site 61, beach drift, length 29.8 mm. Collection of K.A. Lutaenko.
- Fig. 13. *Chama* sp. East Sea (Sea of Japan), Yeongil Bay, site 53, depth 30 m, height 3.4 mm. ZMFU no. 19342/Bv-2818.
- Fig. 14. *Limaria (Limaria) hakodatensis* (Tokunaga, 1906). East Sea (Sea of Japan), Yeongil Bay, site 64, beach drift, length 27.5 mm. ZMFU no. 19343/Bv-2819.
- Fig. 15. *Anadara (Scapharca) kagoshimensis* (Tokunaga, 1906). East Sea (Sea of Japan), Yeongil Bay, site 62, beach drift, length 30.3 mm. Collection of K.A. Lutaenko.
- Fig. 16. *Porterius dalli* (Smith, 1885). East Sea (Sea of Japan), Yeongil Bay, site 58, depth 25 m, external and internal views of the same valve, length 29.4 mm. ZMFU no. 19349/Bv-2824.
- Fig. 17. *Pecten (Notovola) albicans* (Schroter, 1802). East Sea (Sea of Japan), Yeongil Bay, site 55, depth 50-52 m, height 17.6 mm. ZMFU no. 19304/Bv-2797.
- Fig. 18. *Porterius dalli* (Smith, 1885). East Sea (Sea of Japan), northern part, Moneron Island (near Sakhalin), depth 25 m, length 28 mm. ZMFU no. 8946/Bv-46. [Given for comparison].
- Fig. 19. *Arca boucardi* Jousseaume, 1894. East Sea (Sea of Japan), Yeongil Bay, site 58, depth 25 m, length 28.1 mm. ZMFU.

PLATE 2

- Fig. 1. *Clinocardium (Keenocardium) californiense* (Deshayes, 1839). East Sea (Sea of Japan), Peter the Great Bay, Nakhodka Bay, length 37 mm. [Given for comparison; originally published in: Lutaenko, 1999, pl. 2, fig. 4].
- Fig. 2. *Clinocardium (Keenocardium) cf. californiense* (Deshayes, 1839). East Sea (Sea of Japan), Korea, Yeongil Bay, site 56, depth 25.5 m, internal and external views of the same valve, length 44.4 mm. ZMFU no. 19284/Bv-2777.
- Fig. 3. *Fulvia mutica* (Reeve, 1844). East Sea (Sea of Japan), Korea, Yeongil Bay, site 49, depth 8.5 m, length 27.1 mm. ZMFU no. 19352/Bv-2827.
- Fig. 4. *Clinocardium (Keenocardium) cf. californiense* (Deshayes, 1839). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, internal and external views of the same valve, length 29.1 mm. ZMFU no. 19285/Bv-2778.
- Fig. 5. *Astarte hakodatensis* Yokoyama, 1920. East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, external and internal view of the same valve, length 11.5 mm. ZMFU no. 19286/Bv-2779.
- Fig. 6. *Astarte* sp. East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 14.9 mm. ZMFU no. 19287/Bv-2780.

- Fig. 7. *Astarte hakodatensis* Yokoyama, 1920. East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, external and internal views of the same valve, length 11.2 mm. ZMFU no. 19286/Bv-2779.
- Fig. 8. *Astarte hakodatensis* Yokoyama, 1920. East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 13.3 mm. ZMFU no. 19286/Bv-2779.

PLATE 3

- Fig. 1. *Felaniella (Felaniella) usta* (Gould, 1861). East Sea (Sea of Japan), Korea, Yeongil Bay, site 41, depth 19 m, external and internal views of the same valve, length 11.7 mm. ZMFU no. 19307/Bv-2800.
- Fig. 2. *Cycladicama lunaris* (Yokoyama, 1927). East Sea (Sea of Japan), Korea, Yeongil Bay, site 54, depth 35.5 m, length 8.4 mm. ZMFU no. 19324/Bv-2817.
- Fig. 3. *Phlyctiderma japonicum* (Pilsbry, 1895). East Sea (Sea of Japan), Korea, Yeongil Bay, site 61, beach drift, internal and external views of the same valve, length 14.6 mm. ZMFU no. 19308/Bv-2801.
- Fig. 4. *Cycladicama cumingii* (Hanley, 1844). East Sea (Sea of Japan), Korea, Yeongil Bay, site 41, depth 19 m, length 21.3 mm. ZMFU no. 19318/Bv-2811.
- Fig. 5. *Petricolirus aequistriatus* (Sowerby II, 1874). East Sea (Sea of Japan), Korea, Yeongil Bay, site 61, beach drift, length 35.1 mm. ZMFU no. 19306/Bv-2799.
- Fig. 6. *Dosinia (Asa) japonica* (Reeve, 1850). East Sea (Sea of Japan), Korea, Yeongil Bay, site 62, beach drift, length 77.1 mm. ZMFU no. 19357/Bv-2832.
- Fig. 7. *Spisula (Pseudocardium) sachalinensis* (Schrenck, 1862). East Sea (Sea of Japan), Korea, Yeongil Bay, site 61, beach drift, length 58.5 mm. ZMFU no. 19354/Bv-2829.
- Fig. 8. *Irus (Irus) mitis* (Deshayes, 1853). East Sea (Sea of Japan), Korea, Yeongil Bay, site 63, depth 1 m, length 28.4 mm. ZMFU no. 19305/Bv-2798.
- Fig. 9. *Callithaca adamsi* (Reeve, 1863). East Sea (Sea of Japan), Korea, Yeongil Bay, site 43, depth 23 m, length 13.4 mm. ZMFU no. 19320/Bv-2813.
- Fig. 10. *Tresus keenae* (Kuroda et Habe, 1950). East Sea (Sea of Japan), Korea, Yeongil Bay, site 63, depth 1 m, length 123 mm. ZMFU no. 19309/Bv-2802.
- Fig. 11. *Dosinia (Asa) japonica* (Reeve, 1850). East Sea (Sea of Japan), Korea, Yeongil Bay, site 63, depth 1 m, length 76.9 mm. ZMFU no. 19350/Bv-2825.
- Fig. 12. *Protothaca (Notochione) jedomensis* (Lischke, 1874). East Sea (Sea of Japan), Korea, Yeongil Bay, site 61, beach drift, length 18.9 mm. ZMFU 19345/Bv-2821.
- Fig. 13. *Macra (Macra) chinensis* Philippi, 1847. East Sea (Sea of Japan), Korea, Yeongil Bay, site 62, beach drift, length 56.6 mm. ZMFU no. 19358/Bv-2833.
- Fig. 14. *Mactromeris polynyma* (Stimpson, 1860). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 14.6 mm. ZMFU no. 14346/Bv-2822.

PLATE 4

- Fig. 1, 2. *Macoma (Macoma) tokyoensis* Makiyama, 1927. East Sea (Sea of Japan), Korea, Yeongil Bay, site 35, depth 19.5 m, internal and external views of left and right valves of the same shell, length 36.7 mm. ZMFU no. 19288/Bv-2781.
- Fig. 3. *Macoma (Heteromacoma) irus* (Hanley, 1845). East Sea (Sea of Japan), Korea, Yeongil Bay, site 64, beach drift, length 24.5 mm. ZMFU no. 19289/Bv-2782.
- Fig. 4. *Macoma (Heteromacoma) irus* (Hanley, 1845). East Sea (Sea of Japan), Korea, Yeongil Bay, site 64, beach drift, length 24.4 mm. ZMFU no. 19289/Bv-2782.
- Fig. 5. *Moerella* sp. East Sea (Sea of Japan), Korea, Yeongil Bay, site 35, depth 19.5 m, external and internal views of the same valve, length 30.7 mm. ZMFU no. 19290/Bv-2783.
- Fig. 6. *Macoma (Macoma) incongrua* (Martens, 1865). East Sea (Sea of Japan), Korea, Yeongil Bay, site 61, beach drift, length 19.5 mm. ZMFU no. 19291/Bv-2784.
- Fig. 7. *Macoma (Rexithaerus) sector* Oyama, 1950. East Sea (Sea of Japan), Korea, Yeongil Bay, site 61, beach drift, external and internal views of the same valve, length 38.5 mm. ZMFU no. 19292/Bv-2785.
- Fig. 8. *Macoma (Macoma) nipponica* (Tokunaga, 1906). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 21.9 mm. ZMFU no. 19294/Bv-2787.
- Fig. 9. *Macoma (Macoma) nipponica* (Tokunaga, 1906). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 15.5 mm. ZMFU no. 19294/Bv-2787.

- Fig. 10. *Macoma (Rexithaerus) sector* Oyama, 1950. East Sea (Sea of Japan), Korea, Yeongil Bay, site 62, beach drift, external and internal views of the same valve, length 40.6 mm. ZMFU no. 19293/Bv-2786.
- Fig. 11. *Moerella jedoensis* (Lischke, 1872). East Sea (Sea of Japan), Korea, Yeongil Bay, site 41, depth 18.8 m, length 13.9 mm. ZMFU no. 19295/Bv-2788.
- Fig. 12. *Nitidotellina minuta* (Lischke, 1872). East Sea (Sea of Japan), Korea, Yeongil Bay, site 41, depth 18.8 m, length 15.5 mm. ZMFU no. 19296/Bv-2789.
- Fig. 13. *Macoma (Rexithaerus) sector* Oyama, 1950. East Sea (Sea of Japan), Korea, Yeongil Bay, site 62, beach drift, external and internal views of the same valve, length 50.5 mm. ZMFU no. 19293/Bv-2786. [This shell was referred to by Amano *et al.* (1999, p. 97, fig. 4) and was referred by mistake to "Kallam Village near Samchok City"].
- Fig. 14. *Nitidotellina minuta* (Lischke, 1872). East Sea (Sea of Japan), Korea, Yeongil Bay, site 41, depth 18.8 m, length 15.3 mm. ZMFU no. 19296/Bv-2789.
- Fig. 15. *Nitidotellina pallidula* (Lischke, 1871). East Sea (Sea of Japan), Korea, Yeongil Bay, site 40, depth 17.8 m, length 18.8 mm. ZMFU no. 19298/Bv-2791.
- Fig. 16. *Nitidotellina hokkaidoensis* (Habe, 1961). East Sea (Sea of Japan), Korea, Yeongil Bay, site 42, depth 23 m, length 20.4 mm. ZMFU no. 19297/Bv-2790.

PLATE 5

- Fig. 1. *Salaputium cf. unicum* Hayami and Kase, 1993. East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 5.3 mm. ZMFU no. 19323/Bv-2816.
- Fig. 2. *Salaputium cf. unicum* Hayami and Kase, 1993. East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 4.9 mm. ZMFU no. 19323/Bv-2816.
- Fig. 3. *Indocrassatella cf. oblongata* (Yokoyama, 1920). East Sea (Sea of Japan), Korea, Yeongil Bay, site 45, depth 21 m, external and internal views of the same valve, length 11.1 mm. ZMFU no. 19348/Bv-2823.
- Fig. 4. *Myadora japonica* Habe, 1950. East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 16.1 mm. ZMFU no. 19312/Bv-2805.
- Fig. 5. *Myadora reeveana* (Smith, 1880). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 14.3 mm. ZMFU no. 19313/Bv-2806.
- Fig. 6. *Nipponocrassatella* sp. East Sea (Sea of Japan), Korea, Yeongil Bay, site 45, depth 21 m, external and internal views of the same valve, length 13.8 mm. ZMFU no. 19344/Bv-2820.
- Fig. 7. *Siliqua pulchella* (Dunker, 1852). East Sea (Sea of Japan), Korea, Yeongil Bay, site 49, depth 8.5 m, length 20.0 mm. ZMFU no. 19310/Bv-2803.
- Fig. 8. *Myadoropsis transmontana* (Yokoyama, 1922). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 11.3 mm. ZMFU no. 19311/Bv-2804.
- Fig. 9. *Laternula (Laternula) anatina* (L., 1758). East Sea (Sea of Japan), Korea, Yeongil Bay, site 35, depth 19.5 m, length 41.6 mm. ZMFU no. 19314/Bv-2807.
- Fig. 10. *Cryptomya busoensis* (Yokoyama, 1922). East Sea (Sea of Japan), Korea, Yeongil Bay, site 45, depth 8.5 m, length 10.4 mm. ZMFU no. 19321/Bv-2814.
- Fig. 11. *Lyonsia nukulanoformis* Scarlato in Volova et Scarlato, 1980. East Sea (Sea of Japan), Korea, Yeongil Bay, site 60, depth 27.5 m, external and internal views of the same valve, length 30.0 mm. ZMFU no. 19316/Bv-2809.
- Fig. 12. *Agriodesma navicula* (Adams et Reeve, 1850). East Sea (Sea of Japan), Korea, Yeongil Bay, site 61, beach drift, length 48 mm, ventral and posterior margins broken off. ZMFU no. 19355/Bv-2830.
- Fig. 13. *Cuspidaria (Cuspidaria) hindsiana* (Adams, 1864). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 6.9 mm. ZMFU no. 19315/Bv-2808.
- Fig. 14. *Lyonsia ventricosa* Gould, 1861. East Sea (Sea of Japan), Korea, Yeongil Bay, site 44, depth 22.5 m, internal and external views of the same valve, length 23.8 mm. ZMFU no. 19317/Bv-2810.
- Fig. 15. *Cuspidaria (Cuspidaria) hindsiana* (Adams, 1864). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 6.2 mm. ZMFU no. 19315/Bv-2808.
- Fig. 16. *Cuspidaria (Cuspidaria) hindsiana* (Adams, 1864). East Sea (Sea of Japan), Korea, Yeongil Bay, site 58, depth 25 m, length 4.6 mm. ZMFU no. 19315/Bv-2808.