National Museum of Natural History (Naturalis).

During December 15-17, 2004 and October 24-26, 2005, the first author (T. S.) accompanied by Prof. Tagai and investigated the fossil specimens both in mineralogy and paleontology sections at the Naturalis. An illustrated list of mineral collection, as well as some of the fossils were already published by Tagai & Mikouchi (2008). In this report, we attempted to document previously unknown specimens of fossils, describe general characteristics of the collection, and give more detailed accounts on each molluscan specimen.

General characteristics of the Siebold fossil collection

The fossil collection of Siebold is the largest and oldest set of fossils from Japan collected for scientific interest. Unfortunately, there are limited descriptions on the source of each specimen, but obviously specimens were collected from many different localities and show varying geologic ages (Cretaceous to Pleistocene). Taxonomically molluscs, especially bivalves, constitute a large part of the collection as described below.

Depository: Compiling a complete list of fossil collection is difficult if not impossible, because the specimens are scattered into different places. There are possibilities that additional specimens are found in the future. At present Siebold specimens exist in at least the following four places: (1) When being examined in the mineralogy collection during 2004, the collections were contained in three large dark green boxes (Box 18 AA/?/LU//1/ Fossils Quando? Asia; Box 418 AA/?/NW/1 Fossils Quando? Japan; Box 419 AA/?/NW/2 Fossils Quando? Japan) and a smaller cardboard box (without number) also in mineral collection. These specimens are mostly fossils except for a few Recent bivalve and coral specimens. The specimens were registered in part, but most are not yet given registration number; (2) Fossil specimens are found sporadically in other boxes of the Siebold mineral collection. These were illustrated by Tagai and Mikouchi (2008); (3) In paleontological collection, there is a single steel drawer (“059/30 Japan”) containing fossils from Japan. The specimens are a mixture of fossils by Siebold, by Dr. Hisakatsu Yabe (molluscs from the Pleistocene Tokyo Formation), and from other sources. These specimens were preliminarily examined by Prof. Itoigawa and Dr. Nobuhara during September, 1990 (Itoigawa and Nobuhara, 1991), and later moved to the 13th floor of Naturalis. All specimens in the drawer are given registration numbers; (4)

Several plant fossils were contained in mineral collection, and were partly transferred to the Siebold House in 2004.

Localities and collectors: Localities of most Siebold's specimens are noted as "Japan" only, and details need investigation from indirect evidence. A few specimens are accompanied by Japanese labels indicating that their origin is "Mino" (= Gifu Prefecture) or "Owari" (= Aichi Prefecture). In mineral collection, the each has a hand-written label "Japan, Siebold," which was not created by Siebold himself. Two specimens, Turritella and Glycymeris, have a note "Kii" in alphabet (not Japanese letters), suggesting their localities are from Wakayama Prefecture. These were probably made by Dr. Yabe. True collectors or donators of the Siebold specimens are unidentifiable from labels.

Contents of collection: Judging from the collection, it is evident that Siebold attempted to collect a wide range of fossilized animals and plants. The majority of the fossil collection are isolated specimens of molluscs, which are mentioned below in detail. Other specimens include fish (Fig. 1A-B), sedimentary rocks containing shell fragments (Figs. 1C-G, 2A, C), burrows of boring bivalves ("Teredo": Fig. 2E-F), heart urchin (Fig. 3A), barnacles (Fig. 3D), shell or bone fragments identified as "dragon bones" (Fig. 3E, G), corals (Fig. 3I-J), wood (Fig. 4A) and plant leaves (Fig. 4C, E). These non-molluscan specimens should be identified in the future by specialists in each field.

Labels in alphabet: Labels attached to Siebold's fossils consist of several different versions, depending on specimens. (1) A large-sized label is put on the bottom of the box (the largest label in Fig. 11B). The size of a label is almost the same as that of a box. In this type of label, the written data is only "Siebold, Japan". (2) A double-margined black label (Figs. 2H, 3H) is possibly the original label by Siebold. This format is rare among fossil specimens, but frequently used for mineral specimens (see Tagai & Mikouchi, 2008). (3) An elongate strip with black lines is given to some specimens. In most cases ink was faded out and data is not readable. (4) A scientific name is described (Fig. 3B; uppermost label in Fig. 11B) in a small label with red margin. This type of label is obviously confused in part. For example, labels of the gastropod genera such as *Cerithium* and *Terebra* are attached to bivalve specimens. The identification seems to be given in old age. For example, the genus name *Pectunculus* is used instead of *Glycymeris*. The former name was commonly used as a glycimeridid genus-group name in the 19th century. (5) In paleontological

collection, a label of the former museum is retained for all registered specimens. The names of museum in the labels are “Rijksmuseum van Geologie en Mineralogie”, “Rijksmuseum van Geologie Leiden”, or “Rijks Geologisch-Mineralogisch Museum Leiden”.

Labels in Japanese letters: The limited number of specimens are accompanied by Japanese labels. In most cases, labels are directly pasted on specimens. Names are written in Katakana letters only (e.g. Fig. 1E) or both in Chinese and Katakana letters (e.g. Figs. 1B, 3C, 3F).

Identification of a few specimens in Japanese label is different from current our recognition and interesting. “Ryôkotsu” in Figs. 3F and 3H means dragon bones, but they are actually fragments of molluscan shells and eroded mammalian bones, respectively. In China, fossil vertebrate bones are called “Longgu” which is written in the same Chinese characters as “Ryôkotsu” in Japan, and have been used as a crude medicine.

“Mimizu-ishi” in Fig. 2E stands for an earthworm stone, and winding tubes on the rock are bore holes of boring bivalve (“Teredo” sp.) with interior lining.

Other fossils were precisely identified at phylum or class level. Examples are fossil fish (“Sekigyo”: Fig. 1B), fossil of wood (“Moku-kwaseki”: Fig. 4A), stone clam (“Ishi-hamaguri”: Fig. 11A), and fossil of heart urchin (“Kaien-no-kwaseki”: Fig. 3A).

Molluscan specimens in Siebold fossil collection

The molluscs in the Siebold fossil collection consist of more than 40 species as described below (Figs. 5-14). This number, however, does not contain the shell fragments in sandstone (Figs. 1D-G, 2A). In the following accounts, the depository of the specimens is in the mineralogical collection in Naturalis, unless otherwise mentioned.

The identification was roughly made by the first author at genus level at Naturalis. Then, species-level identification was discussed by both authors based on photographs in Japan. For taxonomic judgment, we referred to various literature on Japanese molluscan fossils and also compared with specimens preserved at the Department of Historical Geology and Paleontology in The University Museum, The University of Tokyo (Fig. 15).

Localities were inferred mostly by the second author on the basis of author’s experience and also information from old literature in the Edo Period. Fossil localities already known at that age