Data Files (Appendix 2): 宮田和周・中田健太郎・柴田正輝・長田充弘・永野裕二・大藤　茂・中山健太朗・安里開士・中谷大輔・小平将大, 2023, 長崎半島東岸長崎市北浦町の上部白亜系層序の再定義とその地質年代学的意義. 地質雑, **129** [Miyata, K., Nakada, K., Shibata, M., Nagata, M., Nagano, Y., Otoh, S., Nakayama, K., Asato, K., Nakatani, D. and Kodaira, S., 2023, Redefining of the Upper Cretaceous stratigraphy on the eastern coast of the Nagasaki Peninsula (Kitaura, Nagasaki City), northwestern Kyushu, Japan, and its geochronological significance. *J. Geol. Soc. Japan*, **129**]

Appendix 2. Paleontological descriptions.

Paleontological descriptions

1. Material and method (by K. Miyata)

All paleontological specimens described here are housed in the Board of Education, Nagasaki City (BENC). the ammonoid specimens (BENC101657 and 101658) are poorly preserved and are partially deformed in matrix of sandy mudstone (nodules). To avoid risks by physical preparation, the specimens were scanned (275 kV, 150–233 μA) on a micro focus X-ray computerized tomography (CT) system, TXS320-ACTIS (TESCO Co., Yokohama, Japan), at the Fukui Prefectural Dinosaur Museum, Fukui, Japan. Each CT slice is 0.2 mm thick and has a resolution of 1024×1024 pixels, and the interval between slices is 0.1 mm. Stacks of CT images were used to produce virtual renderings (voxel resolution: BENC101657, 0.098 mm × 0.098 mm × 0.1 mm; BENC101658, 0.109 mm × 0.109 mm × 0.1 mm) by the software VGStudio Max 3.3 (Volume Graphics, Heidelberg, Germany). Linear measurements were taken directly with VGStudio Max 3.3. The shell of BENC101657 is partially lacking, and a part of the shell is shifted from the original position in the matrix. We reconstructed the shell of BENC101657 in the rendering image (Fig. A2). As for BENC101658, we used the CT data of the undeformed part of the shell to produce virtual renderings (Fig. A3c, d). BENC101659 (*Platyceramus japonicus*: Fig. A4) and 100002 (a hadrosauroid femur: Fig. A5) were prepared mechanically at the Fukui Prefectural Dinosaur Museum.

2. Ammonoids (by K. Nakada)

Class Cephalopoda Cuvier, 1797

Order Ammonoidea Zittel, 1884

Suborder Ancyloceratina Wiedmann, 1966

Superfamily Turrilitoidea Gill, 1871

Family Diplomoceratidae Spath, 1926

Subfamily Polyptychoceratinae Matumoto, 1938

Genus *Polyptychoceras* Yabe, 1927

Polyptychoceras obatai (Matsumoto, 1977)

Figure A2

Heteroptychoceras obatai Matsumoto, 1977, p. 357–359, pl. 58, fig.4, pl. 60, fig. 1a–c; Kawabe and Okamoto, 2012, pl. 1, fig. 5.

Polyptychoceras (*Heteroptychoceras*) *obatai* (Matsumoto). Hayakawa and Tashiro, 1994, p. 171, fig. 5.

Material.–One specimen (BENC101657) contained in a sandy mudstone block (Fig. A2a).

Horizon.–The Akasakino-hana Sandstone and Mudstone Member, the lower part of the Nagasaki Kitaura Formation. See also the main text for the locality and horizon.

Description.–The specimen consists of the partial first straight shaft (I in Fig. A2), the first U-turn (i in Fig. A2), the second straight shaft (II in Fig. A2), the second U-turn (ii in Fig. A2) and the incomplete third straight shaft (III in Fig. A2). The aperture, first and second U-turns are damaged. The third straight shaft is shifted about 12 mm in direction of the first U-turn. However, most of the whorl and the surface ornaments are observable in the virtual images (Fig. A2). The length of the clip-like heteromorph shell is at least 101.4 mm.

The preserved first straight shaft is about 13 mm in long, with very weak, simple ribs and the almost circular whorl section (Fig. A2b). The first U-turn of shell shows an abrupt curving; therefore, the second straight shaft is nearly parallel to the first one with no interspace between them. The second straight shaft is about 77 mm in long, and its elliptical whorl section is gradually enlarged, reaching 11.9 mm in diameter at the second U-turn. The simple ribs on the second straight shaft are wide and round-headed with moderate density and constant interspaces, while the flared ribs occur infrequently between the simple ribbing. All these ribs on the shaft are rectiradiate. The second U-turn and the third straight shaft, which correspond roughly to the body chamber, shows a broadly curved hook-like shape (Fig. A2b, d). The shell of the second U-turn is gently curved at anterior and posterior parts but is relatively straight in medium part. The whorl of the second U-turn is elliptical in cross section, being 14.6 mm in the major axis at the posterior part. The surface ornaments on the body chamber are characteristic in the simple and constant ribbing, and some ribs are rursiradiate in the late stage of the second U-turn.

Remarks.–We follow the taxonomy of Wright et al. (1996) for the genus *Polyptychoceras*. BENC101657 shows the juvenile to semi-adult stage represented by the first and second straight shafts and the abrupt first U-turn and the broadly hooked body chamber in the adult stage. Based on these characteristics, especially on the adult stage, BENC101657 is identified as *Polyptychoceras obatai* (Matsumoto, 1977). Although high morphological variabilities of the last hooked shell and the ribbing have been known as intraspecific in previous studies (Matsumoto, 1977; Hayakawa and Tashiro, 1994), BENC101657 is almost identical to the paratype of *P. obatai* (Hbo2018 illustrated by Matsumoto, 1977, pl. 60, figs. 1a–c) in shape of hooking with straight medium part.

Order Phylloceratina Arkell, 1950

Superfamily Phyllocerataceae Zittel, 1884

Family Phylloceratidae Zittel, 1884

Subfamily Phylloceratinae Zittel, 1884

Genus *Phylloceras* Suess, 1865

Cf. *Phylloceras* sp.

Figure A3

Material.–One specimen (BENC101658). Most of the shell is contained in a nodule of sandy mudstone (Fig. A3a), and only a narrow mould of the whorl is partially exposed on the surface (Fig. A3b).

Horizon.–The Akasakino-hana Sandstone and Mudstone Member, the lower part of the Nagasaki Kitaura Formation. See also the main text for the locality and horizon.

Description.–An ammonoid shell of plane spiral, with entire diameter attaining to about 200 mm (Fig. A3a). Although most of the shell is contained in matrix (a nodule of sandy mudstone), the rendering image for the partial shell with ornamentation (about 45 degrees of the outer whorl) is obtained (Fig. A3). The shell seems to be very involute judging from the cross section of the specimen (Fig. A3b), being at least 140 mm in whorl height and ca. 10 mm in umbilical diameter. The virtual rendering of shell indicates that the outer whorl with oval cross section (Fig. A3c, d) is ornamented by simple, fine, distinct and rectiradiate ribs (Fig. A3c). The ribs are dense and constant, some of them are periodically stronger than others. The ribbing character is available at the exposing outer mould (Fig. A3b). The venter is rounded without keel and sulcate, therefore all the ribs cross the venter vertically (Fig. A3d). The dorsal part of the flank is unknown in BENC101658.

Remarks.–The available characters, such as the quite involute coiling, fine and simple ribbing and the elliptical whorl section, suggest that BENC101658 is probably within the genus *Phylloceras*, which includes three subgenera: *Phylloceras*, *Hypophylloceras* and *Neophylloceras* (Matsumoto and Toshimitsu, 1996). Recently, the three subgenera have been treated as individual genera or as synonyms with each other (Murphy and Rodda, 2006; Howarth, 2020). We follow the interpretation of Matsumoto and Toshimitsu (1996) in here, because taxonomy in generic level for the Late Cretaceous phylloceratines from Japan has not been reviewed sufficiently since Matsumoto and Toshimitsu (1996). Although detailed whorl shape, surface ornaments and sutures are available for distinguishing the subgenera; the further taxonomy for BENC101658 cannot be made owing to lack of them.

3. Bivalve (by K. Nakayama and K. Asato)

Class Bivalvia Linnaeus, 1758

Order Myalinida Paul, 1939

Superfamily Inoceramoidea Giebel, 1852

Family Inoceramidae Giebel, 1852

Genus *Platyceramus* Heinz, 1932

Platyceramus japonicus (Nagao and Matumoto, 1940)

Figure A4

Inoceramus japonicus (Sasa MS) Nagao and Matumoto, 1940, p. 24–28, pl. 9, fig. 1; Matsumoto, 1959, p. 86, pl. 11, fig. f; Matsumoto and Ueda, 1962, p. 165, pl. 24, fig. 1a–1b.

Inoceramus (*Cataceramus*) *japonicus* Nagao and Matumoto. Hayami, 1975, p. 57, pars.

Inoceramus (*Platyceramus*) *japonicus* Nagao and Matumoto. Matsumoto et al., 1982, p. 62, pl. 10, fig. 5; Nikkawa and Tashiro, 1996, p. 31, pl. 9, fig. 1, 2.

Inoceramus (*Platyceramus*) *japonicus japonicus* Nagao and Matumoto. Noda, 1983, p. 204, text-fig 8, fig. 1, pl. 41, fig. 1; Toshimitsu, 1994, p. 37, fig. 2.

Platyceramus japonicus (Nagao and Matumoto). Toshimitsu, 1988, pl. 24, fig. 1; Kawabe and Okamoto, 2012, pl. 1, fig. 11.

Materials.–One articulated specimen (BENC101659), with outer mould of right valve (Fig. A4).

The left valve is damaged by weathering so that it is preserved only the postero-dorsal inner mould of the umbonal area, which shows the hinge morphology including teeth and ligaments (Fig. A4b, c). The right valve of mould and cast (Fig. A4a, d) is well-preserved of shell surfaces.

Horizon.–The Akasakino-hana Sandstone and Mudstone Member, the lower part of the Nagasaki Kitaura Formation. See also the main text for the locality and horizon.

Description.–Shell equivalve, medium in size (length: 62.5 mm, height: 58.6 mm, hingeline length: 40.6 mm), roundly and laterally distorted ovoid form; Shell convexity gentle and uniform, anterior part comparatively steep but become flattened toward posterior edge; Umbo small, subterminal, somewhat protruded from the hingeline, and slightly prominent but incurved; Wing-like area wide but the boundary unclear and uniform; Shell obliquity (growth obliquity angle, the angle between growth axis and hingeline) gradually sharpened with growth stages, 53° to 48° (Table A4); Antero-dorsal edge curved, extended to the anterior edge that is slightly protruded along the growth axis, continued uniformly to gentle-curved posterior edge; Postero-dorsal edge straight, forms an angle of 117° (right valve) and 135° (left valve) with the hingeline; Hingeline relatively long, two-thirds of shell length in the younger growth stage, a half of the shell length in the older stage (around shell edge); Shell ornamentations consisting of concentric and divergent sculptures, the former numerous, fine and low minor concentric rings and major concentric ribs in combination, the concentric ribs regular in size, intensity and distance; Divergent sculpture composed of round-headed ribs separated by concave interspaces which are as wide as the ribs, appearing gradually from one-third of the valve; Those of the posterior half of the valve commonly developing later and often less numerous than the anterior part; Hinge edentulous, with four multivincular ligament grooves and unknown chondrophore-like projection (Fig. A4b).

Remarks.–The roundly ovoid shell form, the curved antero-dorsal shell edge, the relatively steep anterior part of shells, the regular concentric rings and ribs, and the comparatively rough divergent ribs are coincided with the diagnosis of *Platyceramus japonicus* (Nagao and Matumoto, 1940). Such morphological features also resemble to those of *Cladoceramus undulatoplicatus* (Roemer, 1852). Matsumoto and Ueda (1962) pointed out four morphological characters (the morphology of anterior edge, the angle between the hingeline and the antero-dorsal edge, convexness of the antero-dorsal edge, and the arrangement of concentric rings) to distinguish between *P. japonicus* and *C. undulatoplicatus*. The features of BENC101659 including the curved anterior edge, around 130°

angle between the hingeline and antero-dorsal edge, inflated antero-dorsal part of shells, and the obscure concentric rings are suggested that this specimen is *P. japonicus*, not *C. undulatoplicatus*.

Platyceramus japonicus was established as *Inoceramus japonicus* by Nagao and Matumoto (1940) with three morphological variations: forma α, forma β, and forma γ. Later, Noda (1983) redescribed this species and reallocated three morphological variations as three subspecies, forma α as *I.* (*P.*) *japonicus higoensis*, forma β as *I.* (*P.*) *japonicus hokkaidoensis*, and forma γ as *I.* (*P.*) *japonicus japonicus*. These three subspecies have been revised as the species of the genus *Platyceramus*, *I.* (*P.*) *japonicus japonicus* as *P. japonicus*, *I.* (*P.*) *japonicus higoensis* as *P. higoensis*, and *I.* (*P.*) *japonicus hokkaidoensis* as *P. hokkaidoensis* (Toshimitsu, 1988; Kawabe and Okamoto, 2012; Aiba et al., 2017). BENC101659 is similar to *P. higoensis* and *P. hokkaidoensis*, but according to the rejection ellipse between the ratio of shell height/length and the ratio of the hingeline length/shell height, which is distinguishable analysis among three species (see also Noda, 1983), the former in BENC101659 is 0.95 and the latter is 0.68. Both the ratios are out of the ellipse area of *P. higoensis* and *P. hokkaidoensis*, suggesting the taxonomic difference with the two species. In addition, the growth obliquity angle of BENC101659 is around 50° that is the same angle of *P. japonicus*, whereas the obliquities of *P. higoensis* and *P. hokkaidoensis* are relatively higher (70° and 60°, respectively). Focusing on the shell ornamentations, the divergent ribs of *P. higoensis* are finer and more sharpened than in BENC101659. The divergent ribs of *P. hokkaidoensis* are also different from those of BENC101659; in the former, the ribs intersect the divergent ribs by the concentric ones, being separated like blocks. Therefore, BENC101659 is identified as *P. japonicus*.

4. Dinosaur (by M. Shibata)

Superorder Dinosauria Owen, 1842

Order Ornithischia Seeley, 1887

Suborder Ornithopoda Marsh, 1882

Division Iguanodontia Dollo, 1888 [URLA1]

Superfamily Hadrosauroidea Sereno, 1986 [URLA1]

Gen. et sp. indet.

Figure A5

Materials.–Proximal half of a right femur (BENC100002)

Horizon.–The Zatobama Gravelly Sandstone and Mudstone Member, the upper part of the Nagasaki Kitaura Formation. See also the main text for the locality and horizon.

Description.–The proximal half of right femur is anteroposteriorly compressed. The measurements are listed in Table A5, and the measurement positions are shown in Figure A5. The saddle-shaped proximal end consists of the femoral head and the greater trochanter (Fig. A5). The femoral head shows a spherical shape and is stuck out medially (Fig. A5a–c). The greater trochanter, which is relatively developed, sets lateral to the femoral head. A flat lateral side of the greater trochanter bears distinct scars for *Musculus pubioschiofemoralis externus* (Maidment and Barrett, 2011) (Fig. A5). The shaft of the femur is straight and robust. The lesser (cranial) trochanter is developed on the anterior side of the greater trochanter and is slightly lower than the greater one (Fig. A5a, d). The fourth trochanter situated on the medioposterior corner of the diaphysis shows a triangle shape (Fig. A5b–d).

Remarks.–BENC100002 exhibits a typical iguanodontian features; straight and massive-built shaft of the femur and a well-developed fourth trochanter (Norman, 2004). Although some basal forms of iguanodontians, such as *Camptosaurus*, have a distally curved femur, femur becomes straight in derived forms. In addition, a shape of fourth trochanter generally tends to change from a pendant shape in basal to a triangle or rounded blade-like shape in derived forms (Norman, 2004). BENC100002 shows those derived iguanodontian characters with a straight shaft and triangular fourth trochanter, although they are insufficient to identify its species. Those femoral morphological features are also commonly seen in non-hadrosauroid iguanodonitans, such as *Iguanodon* and *Mantellisaurus,* and contemporaneous hadrosauroids in Asia, such as *Bactrosaurus*, *Gilmoreosaurus* and hadrosaurids (e.g., Young, 1958; Norman, 1980, 1986, 2014; Prieto-Márquez and Norell, 2010; Prieto-Márquez, 2011). Considering only hadrosauroids have been known from post-Santonian of Asia, it is appropriate to conclude that BENC100002 possibly belongs to derived iguanodontians, Hadrosauroidea, at this moment.

5. References

Aiba, D., Yamato, H., Kurihara, K. and Karasawa, T., 2017, A new species of *Eubostrychoceras* (Ammonoidea, Nostoceratidae) from the lower Campanian in the northwestern Pacific realm. *Paleontol. Res*., **21**, 255–264.

Arkell, W. J., 1950, A classification of the Jurassic ammonites. *J. Paleontol.*, **24**, 354–364.

Cuvier, G., 1797, *Tableau Élémentaire de l'Histoire Naturelle des Animaux*. Paris, Baudouin, 710p.

Dollo, L., 1888, Iguanodontidae et Camptonotidae. *C. R. Acad. Sci. Paris,* **106**,775–777.

Giebel, C. G. A., 1852, Erster Theil, Paläozoologie. *Allgemeine Palaeontologie: Entwurf einer systematischen Darstellung der Fauna und Flora der Vorwelt, zum Gebrauche bei Vorlesungen und zum Selbstunterrichte*, Ambrosius Abel, Leipzig, 13–328.

Gill, T., 1871, Arrangement of the families of the mollusks. *Smithsonian Miscellaneous Collect.*, **227**, 1–49.

Hayakawa, H. and Tashiro, M, 1994, Taxonomy, mode of occurrences and stratigraphic position of *Polyptychoceras* from the Himenoura Group. *Res. Rep. Kochi Univ.*, *Nat. Sci.*, **43**, 167–181.*

Hayami, I., 1975, A systematic survey of the Mesozoic Bivalvia from Japan. *Univ. Mus., Univ. Tokyo, Bull.,* **10**, 1–249.

Heinz, R., 1932. Aus der neuen Systematik der Inoceramen: Beiträge zur Kenntnis der Inoceramen XIV. *Mitt. Min. Geol. Staatsinst. Hamburg*, **13**, 1-26.

Howarth, M. K., 2020, Part L, revised, volume 3B, chapter 2: systematic descriptions of the Jurassic and Cretaceous Phylloceratoidea, Boreophylloceratoidea, and Aequiloboidea. *Treatise Online*, **128**, 1–37.

Kawabe, S. and Okamoto, T., 2012, Restudy of the Upper Cretaceous megafossil biostratigraphy in the Migi-no-sawa area, a tributary of the Haboro River, northwestern Hokkaido. *J. Geol. Soc. Japan*, **118**, 769–781.*

Linnaeus, C., 1758, *Systema naturae per regna tria naturae*. 10th ed., 826p. Stockholm.

Maidment, S. C. R. and Barrett, P. M., 2011, The locomotor musculature of basal ornithischian dinosaurs. *J. Vertebr. Paleontol.,* **31**, 1265–1291.

Marsh, O. C., 1882, Classification of the Dinosauria. *Am. J. Sci., Ser.* 3, **23**, 81–86.

Matsumoto, T., 1959, Zonation of the Upper Cretaceous in Japan. *Mem. Fac. Sci. Kyushu Univ., Ser. D, Geol.*, **9**, 55–93.

Matsumoto, T., 1977, Some heteromorph ammonites from the Cretaceous of Hokkaido (Studies of the Cretaceous ammonites from Hokkaido and Saghalien-XXXI). *Mem. Fac. Sci. Kyusyu Univ.*, *Ser. D*, *Geol.*, **23**, 303–366.

Matsumoto, T, Noda, M. and Kozai, T., 1982, Upper Cretaceous inoceramids from the Monobe area, Shikoku. *Palaeont. Soc. Japan, Spec. Pap.*, **25**, 53–68.

Matsumoto, T. and Toshimitsu, S., 1996, A phylloceratid ammonite species from the Maastrichtian of the Hobetsu district, Hokkaido (Studies of the Cretaceous ammonites from Hokkaido-LXXVIII). *Bull. Hobetsu Mus.*, **12**, 1–8.

Matsumoto, T. and Ueda, Y., 1962, Palaeontological notes. *In* Ueda, Y., The type Himenoura Group. *Mem. Fac. Sci. Kyushu Univ., Ser. D, Geol.*, **12**, 129–178.

Matumoto, T., 1938, A biostratigraphic study on the Cretaceous deposits of the Naibuti Valley, South Karahuto. *Proc. Imp. Acad.*, **14**, 190–194.

Murphy, M. A. and Rodda, P. U., 2006, California Early Cretaceous Phylloceratidae (Ammonoidea). *Univ. Calif., Riverside, Campus Mus. Contrib.*, **7**, 1–97.

Nagao, T. and Matumoto, T., 1940, A monograph of the Cretaceous *Inoceramus* of Japan. Part 2. *J. Fac. Sci. Hokkaido Univ., Ser. 4, Geol. Mineral.*, **6**, 1–64.

Nikkawa, N. and Tashiro, M., 1996, Significance of hinge in some inoceramid bivalves from the Upper Cretaceous of Japan. *Mem. Fac. Sci. Kochi Univ., Ser. E, Geol.*, **17**, 1–31.

Noda, M., 1983, Notes on the so-called *Inoceramus japonicus* (Bivalvia) from the Upper Cretaceous of Japan. *Trans. Proc. Paleont. Soc. Japan. N. S.*, **132**, 191–219.

Norman, D. B., 1980, On the ornithischian dinosaur *Iguanodon bernissartensis* from the Lower Cretaceous of Bernissart (Belgium). *Mém. Inst. R. Sci. Nat. Belg.*, **178**, 1–103.

Norman, D. B., 1986, On the anatomy of *Iguanodon atherfieldensis* (Ornithischia: Ornithopoda). *Bull. Inst. R. Sci. Nat. Belg., Sci. Terre*, **56**, 281–372.

Norman, D. B., 2004, Basal Iguanodontia. *In* Weishampel, D., Osmolska, H. and Dodson, P. eds., *The Dinosauria* (*second edition*). Univ. California Press, 413–437.

Norman, D. B., 2014, Iguanodonts from the Wealdean of England: do they contribute to the discussion concerning hadrosaur origins? *In* Evans, D. and Eberth, D. eds., *Hadrosaurs*. Indiana Univ. Press, 10–43.

Owen, R., 1842, Report on British fossil reptiles. Part II. *Report of the Eleventh Meeting of the British Association for the Advancement of Science*, 60–204.

Paul, H., 1939, Die Muscheln der Magdeburger Kulmgrauwack. *Abh. Ber. Mus. Naturkd. Vorgeschichte Naturwiss. Ver. Magdeburg.* **7**, 165–181.

Prieto-Márquez, A., 2011, Cranial and appendicular ontogeny of *Bactrosaurus johnsoni*, a hadrosauroid dinosaur from the Late Cretaceous of northern China. *Palaeontol*., **54**, 773–792.

Prieto-Márquez, A. and Norell, M. A., 2010, Anatomy and relationships of *Gilmoreosaurus mongoliensis* (Dinosauria: Hadrosauroidea) from the Late Cretaceous of Central Asia. *Am. Mus. Novit.,* **3694**, 1–49.

Roemer, F., 1852, *Die Kreidebildungen von Texas und ihre organischen Einschlüsse*, Bonn, 100p.

Seeley, H. G., 1887, On the classification of the fossil animals commonly named Dinosauria. *Proc. R. Soc. London,* **43**, 165–171.

Sereno, P. C.,1986, Phylogeny of the bird-hipped dinosaurs (Order Ornithischia). *National Geogr. Res.,* **2**, 234–256.

Spath, L. F., 1926, On new ammonites from the English Chalk. *Geol. Mag.*, **63**, 77–83.

Suess, E., 1865, Über Ammoniten. *Sitzungsber. Math.-Naturwiss.*, *Kl. Kais. Akad. Wiss.*, **52**, 71–89.

Toshimitsu, S., 1988, Biostratigraphy of the Upper Cretaceous Santonian Stage in Northwestern Hokkaido. *Mem. Fac. Sci. Kyushu Univ., Ser, D, Geol.*, **26**, 125–192.

Toshimitsu, S., 1994, Geological significance of the occurrence of *Inoceramus* (*Platyceramus*) *japonicus* from the Fukaushi-zawa River in the Tomiuchi region of Hobetsu Town, Hokkaido, Japan. *Bull. Hobetsu Mus.*, **9**, 35–38.*

Wiedmann, J., 1966, Stammesgeschichte und System der posttriadischen Ammonoideen, ein Überblick (2 Tail). *Neues Jahrb. Geol. Paläontol. Abh.*, **127**, 13–81.

Wright, C. W., Callomon, J. H. and Howarth, M. K., 1996, *Treatise on Invertebrate Paleontology, part L, Mollusca 4, revised, vol. 4, Cretaceous Ammonoidea*. Geol. Soc. Am., Boulder and Univ. Kansas Press, Lawrence, 362p.

Yabe, H., 1927, Cretaceous stratigraphy of the Japanese Islands. *Sci. Rep. Tohoku Imperial Univ.*, *2nd ser.* (*Geol.*), **11**, 27–100.

Young, C.-C., 1958, The dinosaurian remains of Laiyang, Shantung. *Palaeontol. Sin., n. ser. C*, **16** (whole series no. 142), 1–138.**

Zittel, K. A. von, 1884, Cephalopoda. *In* Handbuch der Paläeontologie, Abt. 1, Band. 2, Lief. 3, Oldenbourg, München and Leipzig, 329–522.

[URLA1] Sereno, P. C., 2005, Stem Archosauria Version 1.0. TaxonSearch web site., http://www.taxonsearch.org/Archive/stem-archosauria-10php. Accessed September 20, 2021.

*: in Japanese with English abstract

**: in Chinese with English summary

6. Tables, figures and captions

Table A4. Ontogenetic change of shell obliquity (growth obliquity angle, angle between growth axis and hingeline) in BENC101659.

Shell length (in mm)	10	20	30	40	50	60	70
Obliquity	53°	53°	52°	51°	48°	48°	48°

Table A5. Measurements of BENC100002. See also Fig. A5 for the positions (numbers in parentheses, 1–5).

Proximodistal length (1)	420 mm
Mediolateral width at the proximal end (2)	269 mm
Anteroposterior width at the proximal end (4)	90 mm
Mediolateral width at the shaft (3)	128 mm
Anteroposterior width at the shaft including the fourth trochanter (5)	115 mm

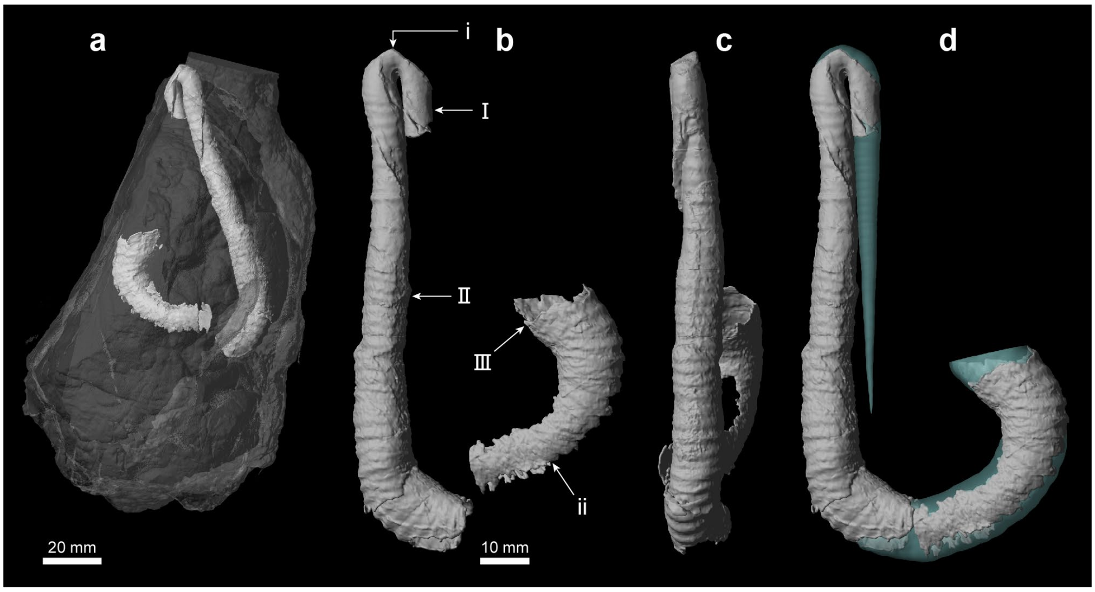

Fig. A2. BENC101657, *Polyptychoceras obatai* (Matsumoto) from the Akasakino-hana Sandstone and Mudstone Member of the Nagasaki Kitaura Formation. All images are virtual renderings generated from the CT images. (a), BENC101657 in the transparent matrix (sandy mudstone block); (b) and (c), BENC101657 in lateral (b) and ventral (c) views, respectively; (d), lateral view of reconstructed BENC101657 with missing parts shown in blue. Abbreviations of descriptive terms: I, the first straight shaft; II, the second straight shaft; III, the third straight shaft; i, the first U-turn; ii, the second U-turn. Scale bar under (b) is applicable for (c) and (d).

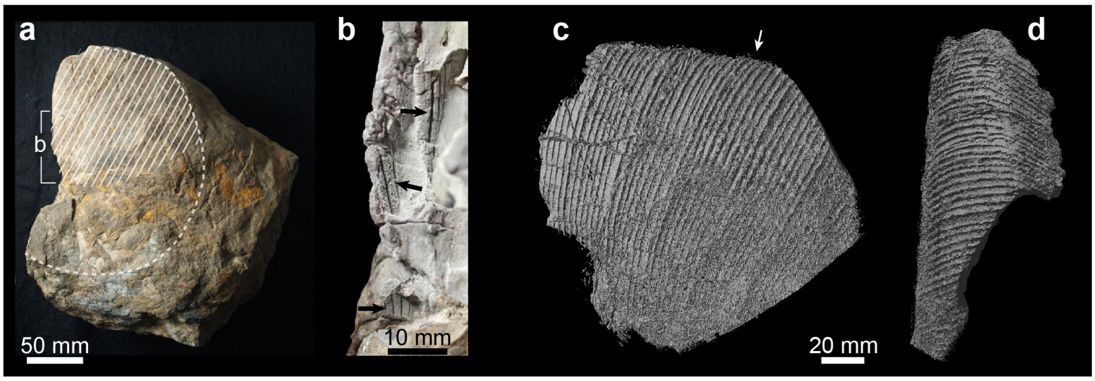

Fig. A3. BENC101658, cf. *Phylloceras* sp. from the Akasakino-hana Sandstone and Mudstone Member of the Nagasaki Kitaura Formation. (a), BENC101658 in the nodule of sandy mudstone, with the broken line showing the approximate lateral outline of the shell and the shaded area indicating the rendering part from CT images (c and d). The pointed area in (a) denotes the position of (b). (b), partial outer mould preserved on the surface of matrix, with arrows indicating the ribs of shell. (c and d), the virtual rendering images of the partial shell of BENC101658, (c), lateral, (d), ventral views. The arrow in (c) denotes the direction of view of (d).

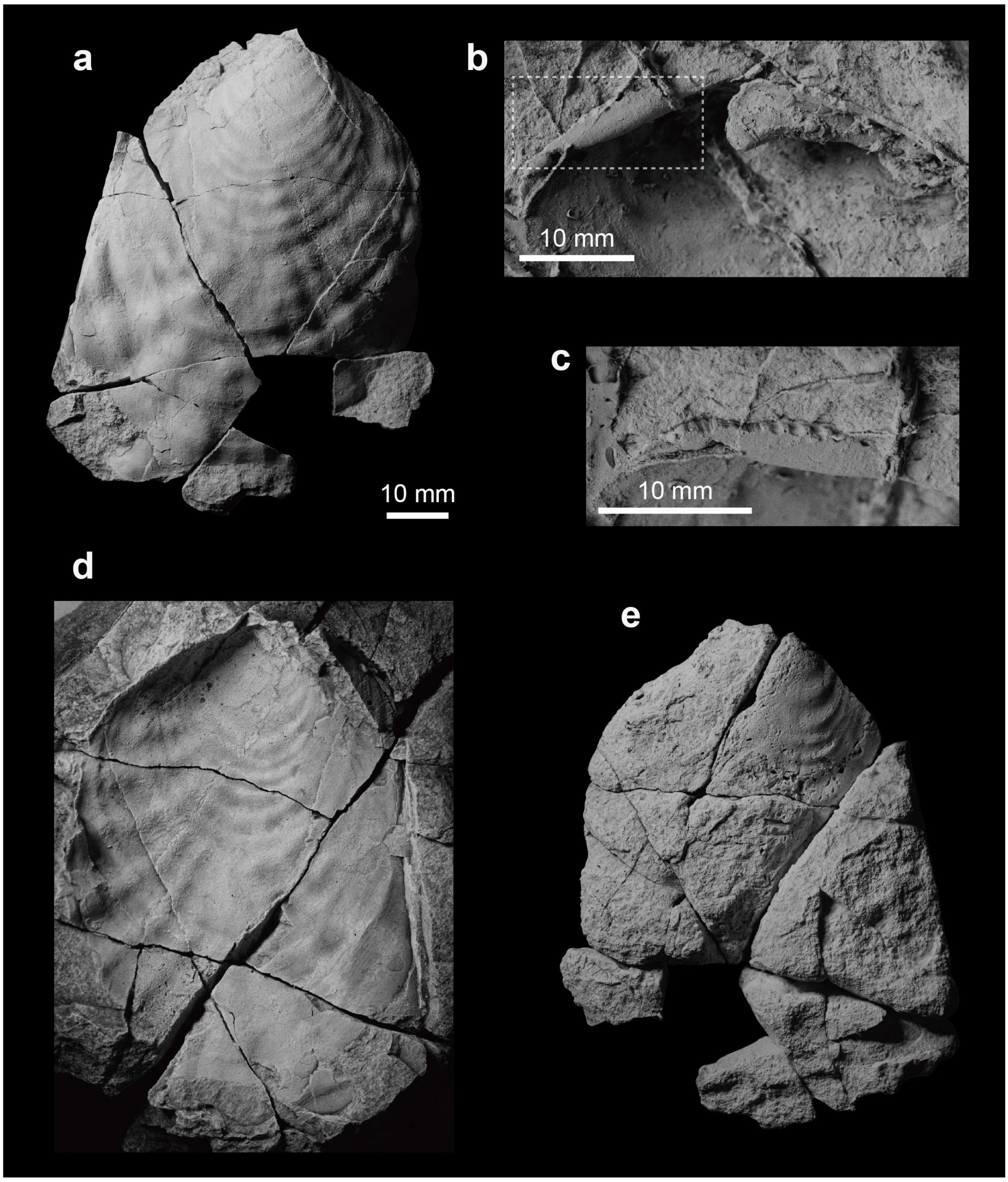

Fig. A4. BENC101659, *Platyceramus japonicus* (Nagao and Matumoto) from the Akasakino-hana Sandstone and Mudstone Member of the Nagasaki Kitaura Formation. (a), right valve of BENC101659; (b), inner rubber mould of the left valve showing the hinge morphology and the area of (c); (c), enlarged picture of the ligaments at the postero-dorsal area of the inner shell; (d), outer mould of the right valve; (e), left valve of BENC101659.

Fig. A5. Photographs and illustrations of the proximal half of the right femur (BENC100002) from the Zatobama Gravelly Sandstone and Mudstone Member of the Nagasaki Kitaura Formation. (a), anterior; (b), posterior; (c), medial; (d), lateral views. Abbreviations: fh, femoral head; gtr, greater trochanter; ltr, lesser trochanter; 4th, fourth trochanter. Measurement positions (1–5) are following; 1, length; 2, mediolateral width of the proximal end (between the greater and lesser trochanters); 3, mediolateral width of the diaphysis (shaft); 4, anteroposterior width of the proximal end; 5, anteroposterior width of the diaphysis (shaft) including the fourth trochanter.