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Description of the fossil remains of Mollusca found in the chalk of England

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London, 1853-1909

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Turrilites.

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Genus—TURRILITES, *Lamarck*. 1801.

Animal unknown : shell chambered, turreted, usually sinistral, with numerous angular whorls, twisted spirally round a central cavity, and contiguous throughout on their upper and lower sides : chambers separated by transverse, flexuous septa, deeply sinuated towards the edges, and divided into six branching lobes, which are unsymmetrical, those on the outer side of the whorls being much larger than the corresponding lobes on the inner side : spire traversed by a continuous tube, situated on the outer side of the whorl, a little below the suture : mouth of the adult shell produced downwards, and bent over somewhat into the form of a hood.

The genus *Turrilites*, as it has been usually received, includes, in addition to the shells here classed in it, other chambered, turreted species, with contiguous, rounded whorls, and the siphuncle placed on the middle of the outer side of the whorl. I have ventured to remove these species to the genus *Helicoceras*, with which they agree in the round form of their whorls, and in the position of their siphuncle, and only differ in having their whorls contiguous instead of separate. The importance of that difference is destroyed by our finding a species with rounded whorls, *Helicoceras* or *Turrilites polyplocus*, Roemer, in which the whorls are separate during the early part of their growth, contiguous in their next stage, and again separate when full grown ; in consequence of which it has been moved from one to the other genus, according to the part of the spire which was described. M. D'Orbigny had already pointed out that there were two very distinct groups of *Turrilites*, and assigned their characters—1st, the *rotundati*, which are those which I propose to unite to *Helicoceras* ; 2d, the *angulati*, which form the genus *Turrilites*, as here retained.

The produced, arched mouth has not yet been seen in all the *Turrilites*, but there are indications of it in so many species, that it may be presumed to be universal in the genus. I can find no evidence that this mouth was formed more than once during the life of the animal, as is conjectured by M. D'Orbigny ('Terr. Crét.,' p. 570) ; on the contrary, we find that, before the mouth is produced, there is always some modification in the form of the ribs which would betray the previous position of the produced mouth, if such had existed and had been absorbed by the animal ; but no specimens show any such irregularity of the ribs in any of the upper whorls, so that we must conclude that the mouth was only produced once, and the different size of individuals of the same species on which this occurs only show that some reached their adult form sooner than others.

There is very little difference in *Turrilites* between their forms and ornaments in the young and older stages of their growth, excepting near the produced mouth ; so that the species may be recognised in specimens of any size or age.

None of the group of the *rotundati* have been found with the produced mouth like the *Turrilites*, and the only modification known in the adult shells of that group is a thickening of the edge of the mouth: probably this will be found to be another generic difference between *Turrilites* and *Helicoceras*.

Classification of Turrilites.

1. ROTUNDATI, D'Orb. Whorls round; siphuncle near the middle of the exterior side of the whorl; ribs simple; mouth thickened.

Common in the Gault.

T. acuticostatus, D'Orb. C. C.

2. ANGULATI, D'Orb. Whorls angular; siphuncle near the suture; mouth covered with a hood.

- 2 a. Lateral lobe trifid; ribs or tubercles not arranged in regular lines across the whorl.

T. tuberculatus, Bosc. L. Chalk.

T. Gravesianus, D'Orb. Pl. 144, fig. 3. L. Chalk.

T. Mantelli, Sharpe.

- 2 a a. Lateral lobe trifid; tubercles in regular rows across the whorl.

T. Bergeri, Brong. Gault and L. Chalk.

- 2 b. Lateral lobe bifid; tubercles or ribs arranged in regular lines across the whorl.

T. catenatus, D'Orb. Pl. 140, fig. 1. Gault.

T. Puzosianus, D'Orb. Pl. 143, fig. 1. Gault.

T. Scheuchzerianus, Bosc. L. Chalk.

T. costatus, Lam. L. Chalk.

T. Wiestii, Sharpe. L. Chalk.

- 2 c. Lateral lobe bifid; tubercles not in regular rows across the whorl.

T. Morrisii, Sharpe. U. G. Sand and L. Chalk.

1. *TURRILITES TUBERCULATUS*, *Bosc.* Plate XXV, figs. 1 to 4, and Pl. XXVI, figs. 15, 16.*TURRILITES TUBERCULATUS*, *Bosc.* Buff. da Déterville, Vers., t. 42, fig. 8.— — *Sow.* Min. Conch., t. 74.— — *Mantell.* Geol. of Sussex, t. 24, fig. 7.— — *D'Orb.* Pal. Franç. Terr. Crét., t. 144, figs. 1, 2.— — *Pictet and Roux.* Foss. des Grès Vert de Genève, t. 15, fig. 10.— *VARICOSA*, *Bosc.* l. c., p. 190.— *GIGANTEUS*, *Haan.* Mon. Amm. et Goni., p. 78.

T. testá turrítá, sinistrorsá: anfractibus numerosis, extrá convexis, tuberculato-spinosis: tuberculis 4-serialibus; serie superiori, in medio anfractuum, tuberculis 20 distantibus, maximis, spinosis; seriebus tribus inferioribus propé suturam tuberculis parvis, numerosis, approximatis: angulo spirali 16°—20°.

Shell turreted, with a spiral angle of 16° to 20°, sinistral: whorls numerous, rounded externally, with one row of above 20 very large spinose tubercles near their middle, and three rows of numerous small tubercles near their base, the lowest of which three rows is concealed by the suture; the tubercles of the middle row have a rounded base, those of the three lower rows are elongated in a direction parallel to the suture, and are of the same number in each row: upper and lower sides of the whorls ornamented with faint, radiating ribs, corresponding to the tubercles of the lowest row: umbilicus narrow: section of the whorls nearly rhomboidal, with the outer side convex: mouth somewhat produced, and rising to a blunt point on the inner side of the whorl, and surrounded by a wing-shaped expansion, with a nearly semicircular outline.

The figures 1 and 4 represent the usual form of this species, with nearly twice as many tubercles in the lower rows as there are in the upper one; but specimens are often found like fig. 3, with less difference between the different rows in the size and number of the tubercles, and with the two lower rows of tubercles almost coalescing. I have seen no specimen in which these two varieties are found in the same individual, as is represented in M. D'Orbigny's fig. 1; but as the lobes of the septa of the two forms closely correspond, we must presume that they belong to the same species. In very large individuals the tubercles of the upper row are fewer in number, and proportionably larger.

The lobes of the septa are much divided and branching; the outer side of the whorl holds half of the dorsal lobe, the dorsal saddle, and half of the superior lateral lobe, which last has five principal branches; the dorsal saddle is divided into two nearly equal parts, and each of these is divided into two nearly equal branches (fig. 15). This is the character by which *T. tuberculatus* is best distinguished from *T. Gravesianus*, which has the dorsal saddle divided into two very unequal parts, only the upper of which is again divided.

The larger specimens of *Turrilites* are never found perfect, so that their length must be

calculated. The specimen of this species figured in the 'Mineral Conchology' has a diameter of 5 inches in the lower whorl, and must have been above 18 inches long. The common-sized specimens have their largest diameter about $2\frac{1}{2}$ inches, and probably reached 9 or 10 inches in length.

Common in the Grey Chalk of the South of England, and in the Chloritic Marl of the Isle of Wight, and the Chalk with siliceous grains, of Dorset and Somerset.

2. *TURRILITES GRAVESIANUS*, *D'Orbigny*. Plate XXV, fig. 7, and Plate XXVI, fig. 14.

TURRILITES GRAVESIANUS, *D'Orb.* Pal. Franç. Terr. Crét., t. 144, figs. 3—5.

— *TUBERCULATUS*, *Mantell.* Geol. of Sussex, t. 24, fig. 6.

T. testá turrítico-conicá, sinistrorsá; anfractibus paucioribus, extrá angulato-convexis, tuberculato spinosis; tuberculis 4 serialibus; serie superiore, in medio anfractuum, tuberculis 10—12 maximis, spinosis, distantibus; seriebus tribus inferioribus propé suturam tuberculis parvis, numerosis, approximatus; angulo spirali 30°.

Shell conical, with a spiral angle of about 30°, sinistral: whorls few, externally convex, and somewhat angular in the middle, with one row of 10 or 12 very large spinose tubercles a little above their middles, and three rows of numerous small tubercles near their base; the two lowest of these rows are so near together that the tubercles almost coalesce, and are partially concealed by the suture; the tubercles of the upper row have a rounded base, those of the other three rows are elongated in a direction parallel to the suture, and are of the same number in each row: upper and lower sides of the whorls ornamented with radiating ribs, corresponding to the tubercles of the lowest row: umbilicus narrow: section of the whorls somewhat pentagonal: the perfect mouth has not been seen.

The lobes of the septa are much divided, and form a very complicated pattern; the dorsal lobe, dorsal saddle, and nearly two thirds of the superior lateral lobe are visible on the outer side of the whorl; the latter has four principal branches, of very unequal size: the dorsal lobe is short; the dorsal saddle is very large, and unevenly divided, the upper half having two principal branches, of which the upper ends in three, the lower in two terminal branchlets; the lower half of the dorsal saddle has only one undivided straight branch, parallel to the siphuncle: this peculiarity in the dorsal saddle distinguishes the species from *T. tuberculatus*; the superior lateral lobe is very large, and is divided into five large branches (Plate XXVI, fig. 14).

Diameter of the largest whorl, $1\frac{3}{4}$ inch; presumed length, 5 inches.

Rare in the Grey Chalk, near Lewes, and in the Chloritic Marl of Ventnor, Isle of Wight.

The external form of this species is very similar to that of *T. tuberculatus*, with which

it was long confounded. M. D'Orbigny pointed out the distinctions between them, which consist in the shorter and blunter spire, fewer and larger tubercles of *T. Gravesianus*. Slightly crushed specimens of *T. tuberculatus* are sometimes very difficult to distinguish from *T. Gravesianus*, unless the outline of the septa can be traced, when the different forms of the dorsal saddles set all doubts on the subject immediately at rest.

3. TURRILITES MANTELLI, Sharpe. Plate XXV, figs. 5 and 6.

T. testâ turrîtâ, sinistrorsâ: anfractibus numerosis, extrâ convexis, tuberculatis: tuberculis 4 serialibus; serie superiori, in medio anfractuum, tuberculis 20—24, basi rotundatis; seriebus tribus inferioribus, tuberculis 30 minoribus, basi elongatis, approximatis: angulo spirali 18°—20°.

Shell turreted, with a spiral angle of 18° to 20°, sinistral: whorls numerous, convex externally, with one row of 20 to 24 tubercles near their middle, and three rows of about 30 smaller tubercles near their base, the lowest of which rows is hid by the suture; the tubercles of the middle row have a rounded base, those of the three lower rows are elongated in a direction parallel to the suture, and are of the same number in each row: upper and lower sides of the whorls ornamented with radiating ribs, corresponding to the tubercles of the lower row: umbilicus narrow: mouth somewhat produced, and rising to a blunt point on the inner side of the whorl, and surrounded by a broad, wing-shaped expansion of somewhat rhomboidal form.

Only a small part of the outline of a septum has been seen, which is shown on the upper whorl of fig. 5; the dorsal saddle is divided into two unequal parts, which are intermediate in form between those of *T. tuberculatus* and *T. Gravesianus*, more nearly resembling the latter.

Diameter of last whorl, $2\frac{1}{2}$ inches; probable length, 12 inches.

Rare in the Grey Chalk, near Lewes, Sussex.

This species is readily distinguished from *T. tuberculatus* by the greater number and smaller size of the tubercles of the upper row, which are almost as numerous as those of the three lower rows. There is also a marked difference in the rhomboidal form of the expanded margin of the mouth. These distinctions will probably be strengthened when a more complete view is obtained of the lobes of the septa.

The only specimens which I have seen were collected by Dr. Mantell, and are now in the British Museum. The specific name is therefore a just tribute to the memory of that zealous geologist.

4. TURRILITES SCHEUCHZERIANUS, *Bosc.* Plate XXVI, figs. 1—3.

TURRILITES SCHEUCHZERIANUS, *Bosc.* Buffon du Deterville, vol. v, p. 190.

— UNDULATUS, *Sow.* Min. Con., t. 75, figs. 1—3.

— — *Mantell.* Fossils of the South Downs, t. 23, figs. 14 and 16; t. 24, fig. 8.

— — *Geinitz.* Kreide, t. 13, figs. 1—3.

— — *D'Orb.* Paléont. Franç. Terr. Crét., t. 146, figs. 3, 4.

— DESNOYERSI, *D'Orb.* Paléont. Franç. Terr. Crét., t. 146, figs. 1, 2.

T. testá turritá, sinistrorsá: anfractibus numerosis, extrá rotundatis, costatis: costis numerosis, sub-angulatis; junioribus interruptis; adultis continuís: angulo spirali 15°—18°.

Shell turreted, with a spiral angle of 15° to 18°, sinistral: whorls numerous, rounded externally, crossed by 20 to 24 sharp, elevated ribs; on the upper whorls the ribs are nearly straight, and broken into two unequal parts by a depression a little below their middle; towards the middle of the shell the depression gradually disappears, and on the lower whorls the ribs continue uninterruptedly across the whorl, and become more and more flexuous: upper and under sides of the whorls smooth: umbilicus very small: mouth produced considerably downwards, partially arched over, and expanded towards the umbilicus: the outline of the septa has not been seen.

Diameter of last whorl, $1\frac{3}{4}$ inch; estimated length, 8 inches.

Common in the Grey Chalk, wherever that bed occurs, in the South of England.

This species is so well distinguished from all the other Turrilites by its elongated form and comparatively simple ribs, that it had remained free from all confusion, until M. D'Orbigny unfortunately proposed the specific name of *T. Desnoyersi* for its young form, and gave an appearance of probability to his suggestion by representing both the young and the old forms as full grown shells on his plate 146, without any variation in the ribs during the growth of either.* Such errors are the natural consequence of what is called *restoring* the entire form of a shell from a fragment, instead of representing what is actually seen. Dr. Mantell had already given an admirable figure of a nearly perfect specimen, exhibiting the change from the broken ribs of the upper whorls to the unbroken ribs of the older whorls, which ought to have preserved M. D'Orbigny from this unnecessary addition of a synonym.

Figure 2 represents a young shell, with ribs still divided, which is already beginning

* Figures 1 and 3, plate 146, are both stated to be "restauré sur un échantillon de ma collection." *D'Orb.*, 'Terr. Crét.', vol. i, pp. 602 and 604.

to form a mouth like an adult, with the ribs becoming flexuous. A still younger shell, with the produced mouth completed, is shown in fig. 3; but as this specimen has the lower side of the whorl strongly ribbed, it may be doubted whether it belongs to the same species.

5. *TURRILITES MORRISII*, Sharpe. Plate XXVI, figs. 4—8.

T. testá turritá, sinistrorsá: anfractibus numerosis, extrá planiusculis tuberculatis: tuberculis 3 vel 4 serialibus; serie superiori, in medio anfractuum, tuberculis 8—12 majoribus, distantibus; seriebus inferioribus propé suturam, tuberculis minoribus, numerosis: angulo spirali 15°.

Shell turreted, with a spiral angle of about 15°, sinistral: whorls numerous, nearly flat externally, with one row of 8 to 12 large tubercles near their middle, and two or three rows of above 20 smaller tubercles near the suture, all of them with a round base: upper and lower sides of the whorls ornamented with faint, radiating ribs, corresponding to the tubercles of the lowest row: umbilicus very narrow: section of the whorls rhomboidal: septa with the superior lateral lobe bifid, with four branches on each side, and the dorsal saddle divided into two very unequal parts: the perfect mouth has not been seen.

In the young shell the three lower rows of tubercles are usually distinct; in older shells the tubercles of the two lower rows gradually coalesce, and at last hardly more than one row can be distinguished, close to the suture.

Largest diameter, $1\frac{1}{4}$ inch; probable length, 6 inches.

Common in the Chloritic Marl of the Isle of Wight, and in the Chalk with siliceous grains, Chardstock, Somersetshire.

6. *TURRILITES BERGERI*, Brongniart. Plate XXVI, figs. 9—11.

TURRILITES BERGERI, Brong. Env. de Paris, t. 7, fig. 3.

— — D'Orb. Pal. Franç. Terr. Crét., t. 143, figs. 3—6.

T. testá turritá, sinistrorsá (vel dextrorsá?): anfractibus paucioribus, rotundatis, tuberculatis: tuberculis 4 serialibus, æquidistantibus, æqualibus: aperturá rotundato-rhomboideá.

Shell turreted, turned to the left: whorls not very numerous, increasing rapidly in size, rounded, and ornamented with four equidistant rows of numerous, rounded tubercles, which are of the same number, and nearly the same size in each row; only three rows are

exposed, the upper one being covered by the next whorl; the tubercles are so placed as to appear to form sloping, transverse bands across the whorls: section of the whorls somewhat rhomboidal: septa, and position of the siphuncle, unknown.

Spiral angle about 35° .

Diameter of the largest specimens from Chardstock, in Mr. Wiest's collection, 3 inches.

This is a well-marked shell, which can hardly be confounded with any other species. We have not met with any specimen turned to the right like that figured by M. D'Orbigny, t. 143, fig. 6.

Abundant in the Chalk with green grains, at Chardstock. (*Mr Wiest.*)

7. *TURRILITES BECHII*, *Sharpe*. Plate XXVI, fig. 13.

T. testá turritá, sinistrorsá: anfractibus paucioribus, extrá rotundatis, costatis, tuberculatisque: costis numerosis, superioribus, flexuosis, tenuibus, infrá interruptis: tuberculis biserialibus, inferioribus, numero costarum æqualibus: angulo spirali 30° .

Shell turreted, sinistral, with a spiral angle of 20° : whorls few, externally rounded, prettily ornamented with numerous delicate, flexuous ribs, which extend from the suture across the upper two thirds of the whorl, where they are interrupted by a smooth space, in which are two rows of tubercles, elongated in the direction of the suture, and equal in number to the ribs; below these the ribs appear again, bending backwards over the lower side of the whorl; thus each rib, with its corresponding pair of tubercles, forms a flexuous line across the outer and the under sides of the whorl: umbilicus small: the outline of the septa has only been partially seen; the dorsal saddle is divided into two slightly unequal parts: the specimen figured shows the beginning of a produced mouth.

Diameter of last whorl, 1 inch; estimated length, 4 inches.

Only one specimen has been seen, which was found in the Chalk with siliceous grains, near Lyme Regis, by Sir H. T. de la Beche, and by him presented to the British Museum: it is named in honour of his memory.

8. *TURRILITES COSTATUS*, *Lamarck*. Plate XXVII, figs. 1—5, and 15, 16.

TURRILITES COSTATUS, *Lamk.* 1801. An. sans Vert., p. 102.

— — *Sowerby.* 1813. Min. Conch., t. 36.

— — *Brong.* 1822. Env. de Paris, p. 83, t. 7, fig. 4.

— — *Mantell.* 1822. Geol. of Sussex, t. 23, fig. 15.

— — *D'Orbigny.* Paléont. Franç., Terr. Crét., t. 145.

— *TRIPLICATUS*, *J. Sow.* In Dixon's Geol. of Sussex, t. 29, fig. 16.

T. testá elongato-turritá, sinistrorsá, costatá et tuberculatá; anfractibus convexius culis, inferné costatis, superné bituberculatis; costis tuberculisque numero æqualibus; aperturá ovali; umbilico minimo.

Shell turreted, turned to the left, with a spiral angle of about 25° ; whorls slightly convex, separated by a moderately impressed suture, and ornamented on their lower half by numerous straight, elevated ribs, which rise at their upper ends into round tubercles, and then terminate abruptly at a smooth spiral band, which encircles the shell; above are two rows of tubercles, the upper of which are smaller, and concealed by the next whorl; ribs and tubercles equal in number; aperture oval, higher than broad; umbilicus very small.

[The complicated form of the septa in this species is represented in Pl. XXVII, fig. 15.]

In Dixon's 'Geology of Sussex,' a Turrilite is described under the name of *T. triplicatus*, J. Sow., which appears to be a variety of the above. [This specimen is figured in Pl. XXVII, fig. 15.]

Found in the Chalk Marl of Ventnor, Isle of Wight; and in the Chalk with green grains, at Chardstock.

9. *TURRILITES BIFRONS?* *D'Orb.* Plate XXVII, figs. 6, 7.

[T. testá turritá, elongatá, sinistrorsá; anfractibus convexiusculis, sulco longitudinaliter ornatis; transversim costatis: costis curvatis, interruptis, biseriatis, anterioribus ad suturam divisis.]

The specimens figured differ from the ordinary examples of *T. costatus* in the flattening of the whorls, occasioned by the shallow furrow which divides the curved transverse ribs into a double series: the ribs are simple, rounded, and about as wide as the interspaces; the lower series of ribs is again divided by a furrow exactly at the suture, forming a third set of little tubercles, only visible on the base of the shell when broken.

Found in the Lower Chalk, of Ventnor, Isle of Wight.]

10. *TURRILITES WIESTII*, *Sharpe.* Plate XXVII, fig. 8, 9 *a*, *b*, and fig. 17.

T. testá turritá, sinistrorsá; anfractibus externis rotundatis, tuberculatis, intus lævibus; tuberculis conicis 4 serialibus, numero equalibus, superiore et inferiore minoribus, in suturá profundá crenulatá, coalescentibus, mediis binis majoribus prominentibus; aperturá subquadratá; umbilico parvo.

Shell turreted, tuberculated; spine turned to the left, with a spiral angle of about 22° ; whorls rounded, separated by a deep, crenulated suture, ornamented with four rows of conical tubercles, which are of the same number in each row, and set obliquely under one

another, without ribs between them; the tubercles of the two outer rows are smaller than the others, and meet at the junction of the valves, forming a crenulated suture; while the tubercles of the two middle rows, which are nearly equal, are prominent on the side of the whorls; surface of the whorls between the tubercles smooth; aperture nearly square; umbilicus small.

The largest specimen seen has a diameter of $1\frac{1}{4}$ inch, which requires a length of 4 or 5 inches.

As yet we have only seen it from the Chalk with green grains, where it is very abundant.

This elegant shell is at once distinguished from *T. tuberculatus* by having the same number of tubercles in each row, in which it agrees with *T. Bergeri*. From this it differs in the shape of the whorl, and the position of the lower row of tubercles, which is at the suture instead of projecting at the side of the whorl: in consequence of this, it has only two rows of tubercles visible instead of three on the side of the whorl.

Found in the Grey Chalk, of Ventnor, Isle of Wight; and also in the Chalk with green grains, at Chardstock, Somersetshire; and at Chaldon and Man-of-War Cove, Dorsetshire.

11. TURRILITES PUZOSIANUS, *D'Orb.*, var.? Plate XXVII, fig. 11.

? TURRILITES PUZOSIANUS, *D'Orbigny*. Terr. Crét., pl. 143, figs. 1, 2.

T. testá turritá, sinistrorsá; anfractibus externi planiusculis, costulatis, tuberculatis; costis numerosis, flexuosis, obliquis, supernè interruptis tuberculatisque; tuberculis bi-serialibus, seriis superioris binis, inferioris longitudinaliter compressis; aperturá ovali; umbilico parvo.

Shell turreted; spine turned to the left, with a spiral angle of about 15° ; whorls flattish, with the lower angle rounded off, separated by a moderate suture, and ornamented with numerous oblique, flexuous, slight ribs, interrupted near the top of the whorl by a smooth spiral band, on each side of which the ribs rise into longitudinally flattened tubercles; the tubercles of the upper row bifid or double, and stand at the angle of the whorl; aperture somewhat oval; umbilicus small.

I have as yet only seen one fragment of this shell. It resembles *T. Puzosianus*, *D'Orb.*, in having ribs rising into tubercles on each side of a smooth band, which, running round the upper part of the whorl, divides the ribs into two unequal parts. Our shell differs from *T. Puzosianus* in the flexure of the ribs, and in the position of the upper row of tubercles, which, in that species, is placed at the suture, and thus concealed by the next whorl; but in this one it is at the upper angle of the whorl, and always prominent. It differs from *T. costatus* in the flexure of the ribs and flatness of the whorls.

Found in the Chloritic Marl, of Bonchurch, Isle of Wight.

PLATE VII

Fig. 1. *Ammonia* (smaller), from the Clay Chalk of Lower Chalk of Chalk; in the collection of J. H. Marshall.

Fig. 2. *Ammonia* (smaller), from the Lower Chalk of Chalk; in the collection of J. H. Marshall.

Fig. 3. *Ammonia* (smaller), from the Lower Chalk of Chalk; in the collection of J. H. Marshall.

Fig. 4. *Ammonia* (smaller), from the Lower Chalk of Chalk; in the collection of J. H. Marshall.

Fig. 5. *Ammonia* (smaller), from the Lower Chalk of Chalk; in the collection of J. H. Marshall.

Fig. 6. *Ammonia* (smaller), from the Lower Chalk of Chalk; in the collection of J. H. Marshall.

Fig. 7. *Ammonia* (smaller), from the Lower Chalk of Chalk; in the collection of J. H. Marshall.

Fig. 8. *Ammonia* (smaller), from the Lower Chalk of Chalk; in the collection of J. H. Marshall.

Fig. 9. *Ammonia* (smaller), from the Lower Chalk of Chalk; in the collection of J. H. Marshall.

PLATE XVII.

Fig.

1*a* and *b*. AMMONITES CENOMANENSIS; from the Grey Chalk of Dover; reduced to two thirds its natural diameter; in the collection of J. S. Bowerbank, Esq., p. 37.

1*a*, side view.

1*b*, front view.

2. AMMONITES HIPPOCASTANUM; from the Lower Chalk of Man of War Cove, Dorsetshire; in the collection of E. H. Bunbury, Esq., p. 37.

3*a* and *b*. AMMONITES HIPPOCASTANUM, young; from the Lower Chalk of Chardstock; in the collection of E. H. Bunbury, Esq., p. 37.

3*a*, side view.

3*b*, front view.

4*a*, *b*, and *c*. AMMONITES HIPPOCASTANUM; a fragment, from the Lower Chalk of Chardstock; in the collection of E. H. Bunbury, Esq., p. 37.

4*a*, back view.

4*b*, side view.

4*c*, outline of a septum.

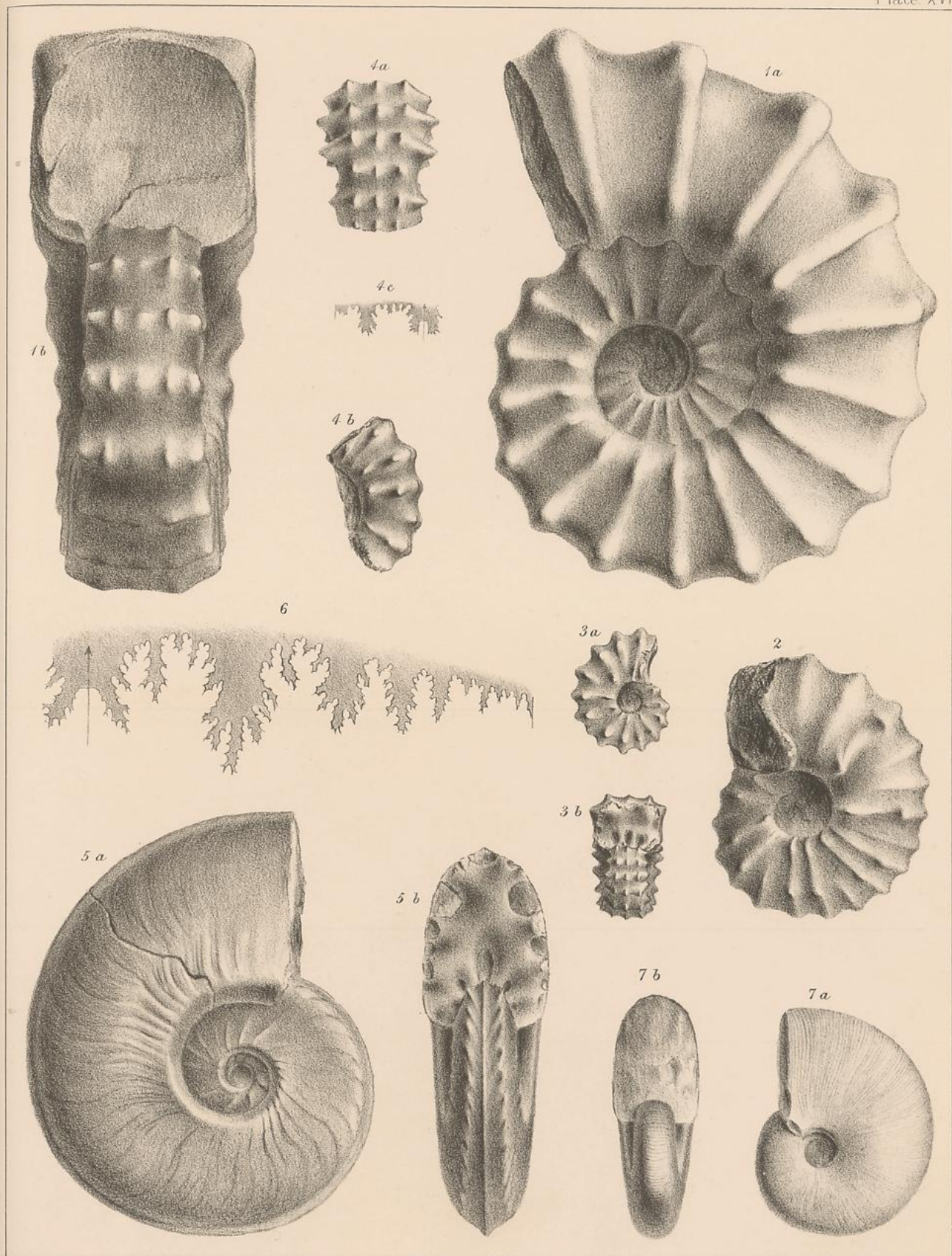
5*a* and *b*. AMMONITES GOUPILIANUS; from the Lower Chalk of Sussex; in the British Museum, from the collection of Dr. Mantell, p. 38.

6. AMMONITES GOUPILIANUS; outline of a septum, copied from Pl. xciv of M. D'Orbigny's 'Paléont. Franç. Terr. Crét.,' p. 38.

7*a* and *b*. AMMONITES VELLEDEÆ; from the Upper Chalk near Norwich; in the collection of F. G. Bayfield, Esq., of Norwich, p. 39.

7*a*, side view. N.B. The umbilicus is represented too large, the artist having been deceived by the breaking away of the soft chalk.

7*b*, front view.



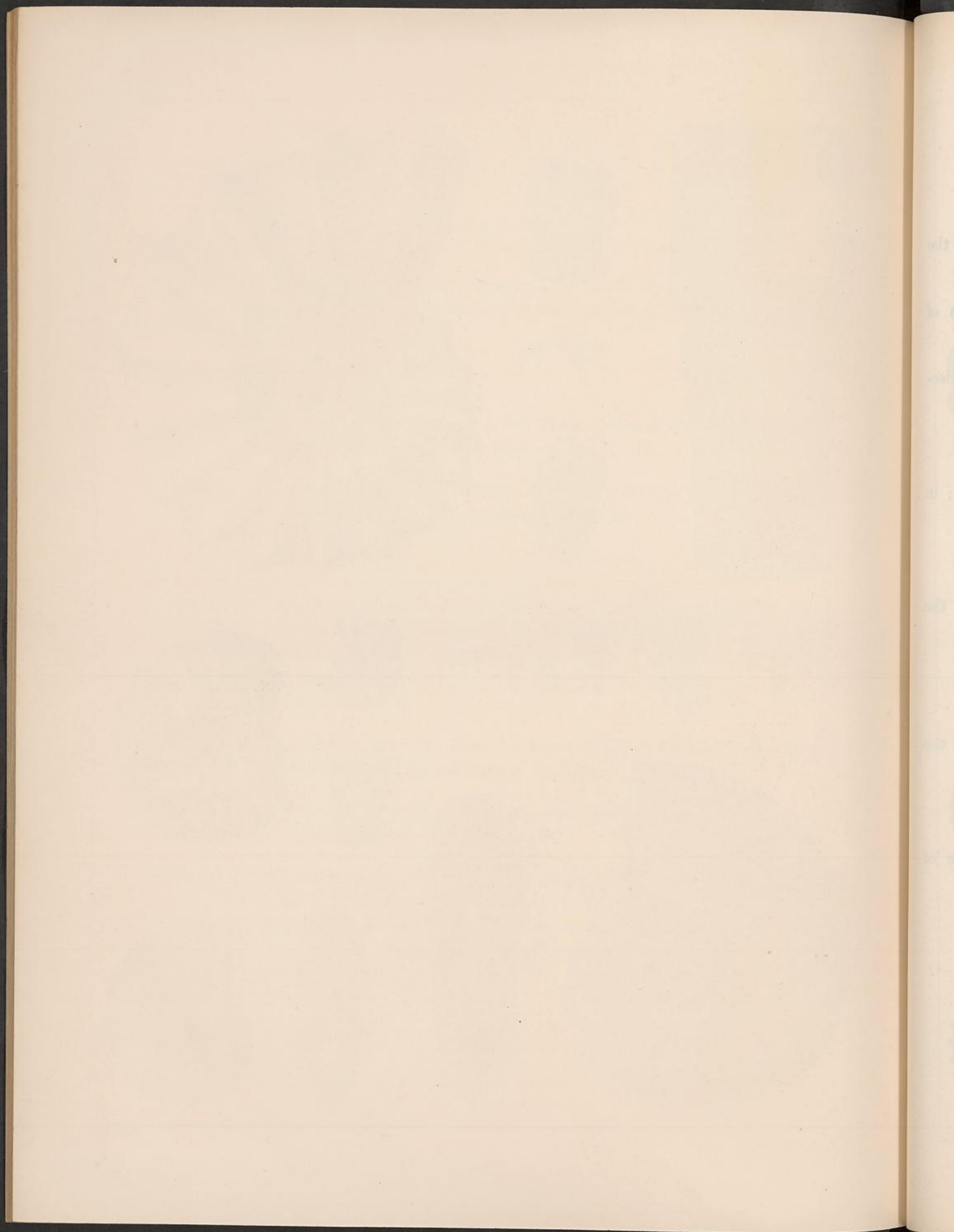


PLATE XVIII

1. *Ammonites* *varicostatus* from the Grey Chalk of Weymouth, Dorsetshire, in the collection of H. H. Woodward, Esq. p. 30.

2. *Ammonites* *varicostatus* from the Grey Chalk near Ipswich, in the collection of H. H. Woodward, Esq. p. 30.

3. and 4. *Ammonites* *varicostatus* from the Forest of Chindesloe, Lincolnshire, in the collection of John Murray, Esq. p. 30.

3a. front view.
3b. side view.

5. and 6. *Ammonites* *varicostatus* from the Forest of Chindesloe, Lincolnshire, in the collection of John Murray, Esq. p. 30.

5a. side view.
5b. front view.

7. and 8. *Ammonites* *varicostatus* from the Forest of Chindesloe, Lincolnshire, in the collection of John Murray, Esq. p. 30.

7a. side view.
7b. front view.

9. and 10. *Ammonites* *varicostatus* from the Forest of Chindesloe, Lincolnshire, in the collection of John Murray, Esq. p. 30.

9a. side view.
9b. front view.

11. and 12. *Ammonites* *varicostatus* from the Forest of Chindesloe, Lincolnshire, in the collection of John Murray, Esq. p. 30.

11a. side view.
11b. front view.

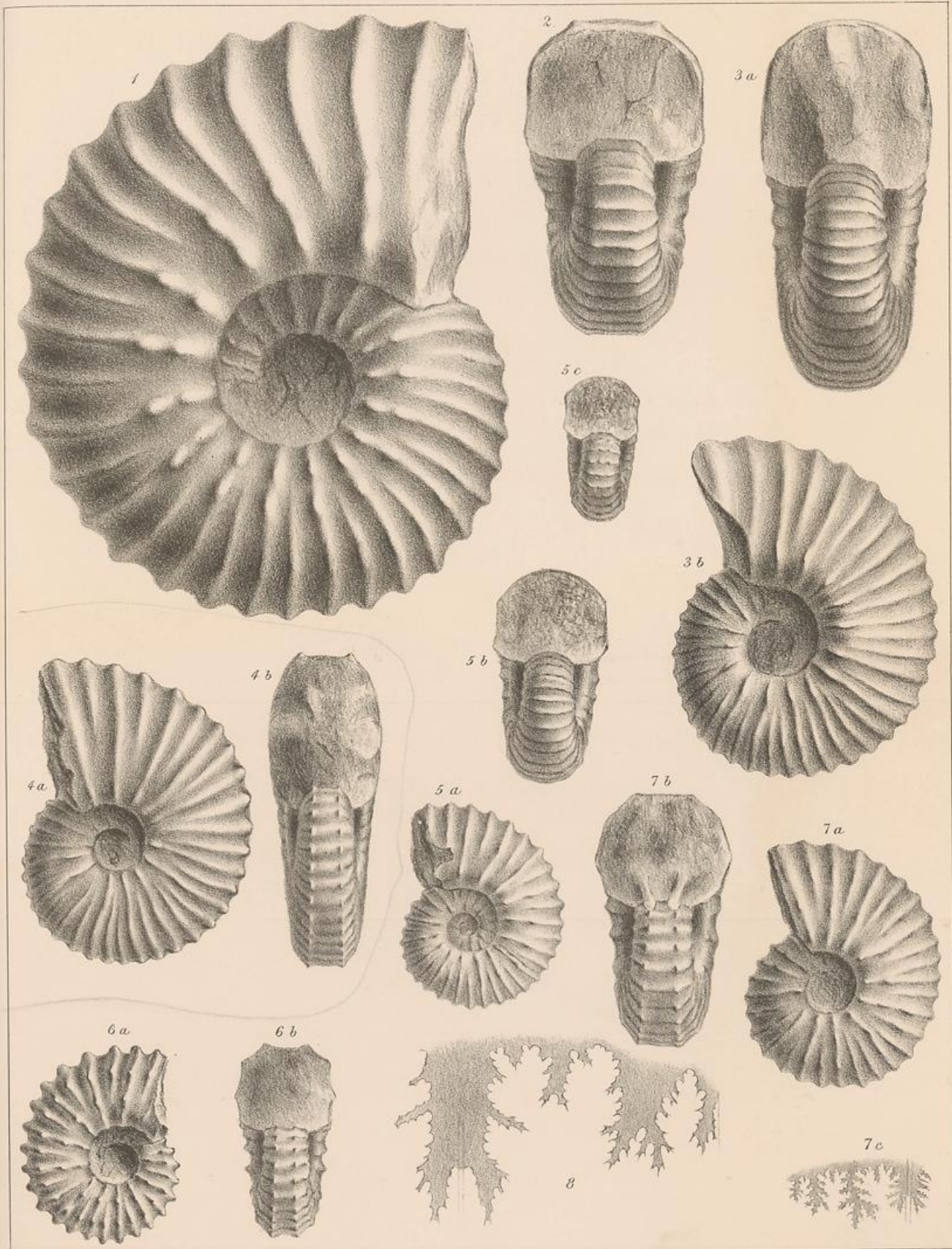
13. *Ammonites* *varicostatus* from the Forest of Chindesloe, Lincolnshire, in the collection of John Murray, Esq. p. 30.

13a. side view.

PLATE XVIII.

Fig.

1. *AMMONITES NAVICULARIS*; from the Grey Chalk of White Nore, Dorsetshire; in the collection of E. H. Bunbury, Esq., p. 39.
2. *AMMONITES NAVICULARIS*; from the Grey Chalk near Lewes; in the collection of Henry Catt, Esq., p. 39.
- 3*a* and *b*. *AMMONITES NAVICULARIS*; from the Lower Chalk of Chardstock; in the collection of John Morris, Esq., p. 39.
3*a*, front view.
3*b*, side view.
- 4*a* and *b*. *AMMONITES MANTELLI*; from the Grey Chalk of Bonchurch, Isle of Wight; in the collection of S. Saxby, jun., Esq., p. 40.
4*a*, side view.
4*b*, front view.
- 5*a*, *b*, and *c*. *AMMONITES NAVICULARIS*; from the Lower Chalk of Chardstock; in the collection of John Morris, Esq., p. 39.
5*a*, side view.
5*b*, front view.
5*c*, front view of the inner whorl of the same specimen.
- 6*a* and *b*. *AMMONITES MANTELLI*; from the Chloritic Marl of the Isle of Wight; in the collection of John Morris, Esq., p. 40.
6*a*, side view.
6*b*, front view.
- 7*a*, *b*, and *c*. *AMMONITES MANTELLI*; from the Chloritic Marl of Bonchurch, Isle of Wight; in the collection of S. Saxby, jun., Esq., p. 40.
7*a*, side view.
7*b*, front view.
7*c*, outline of septum.
8. *AMMONITES NAVICULARIS*; outline of the septum of the specimen fig. 1, above.



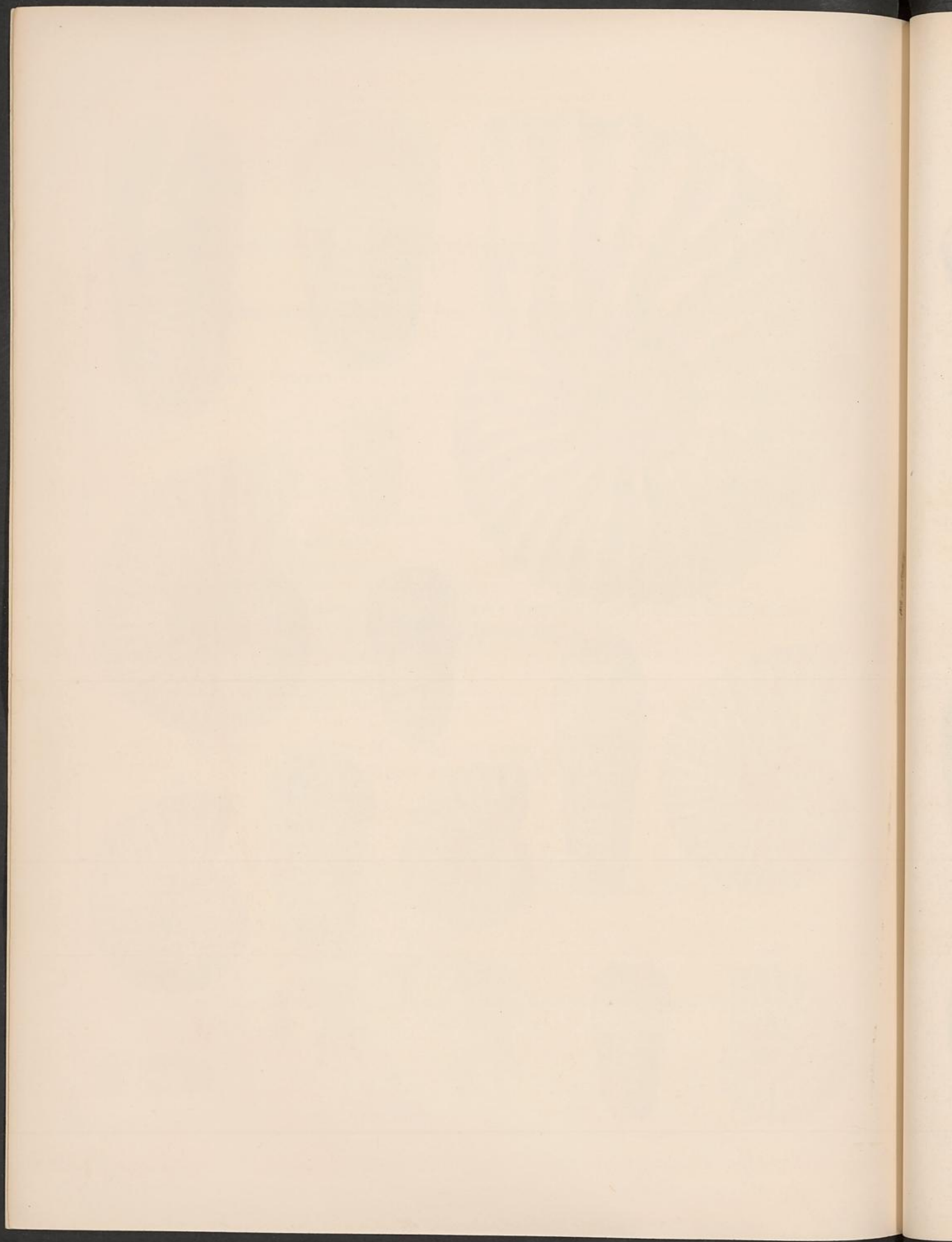


PLATE XIX

Fig. 1. A. and a. Anomalous ophiurites; from the Grey Chalk of Vézère, Isle of France.

in my collection, p. 41.

Fig. 2. side view.

Fig. 3. back view.

Fig. 4. section of a specimen.

Fig. 5. and a. Anomalous ophiurites; a young shell, from the Grey Chalk of Vézère, Isle of France.

Fig. 6. side view.

Fig. 7. back view.

Fig. 8. front view of lower end of the same specimen.

Fig. 9. Anomalous ophiurites; from the Grey Chalk of Vézère, Isle of France.

in my collection, p. 42.

Fig. 10. side view.

Fig. 11. back view.

Fig. 12. A. and a. Anomalous ophiurites; from the Grey Chalk of Vézère, Isle of France.

Fig. 13. side view.

Fig. 14. back view, showing the outline of a specimen.

Fig. 15. front view.

Fig. 16. A. and a. Anomalous ophiurites; from the Grey Chalk of Vézère, Isle of France.

Fig. 17. side view.

Fig. 18. back view.

Fig. 19. front view.

Fig. 20. A. and a. Anomalous ophiurites; from the Grey Chalk of Vézère, Isle of France.

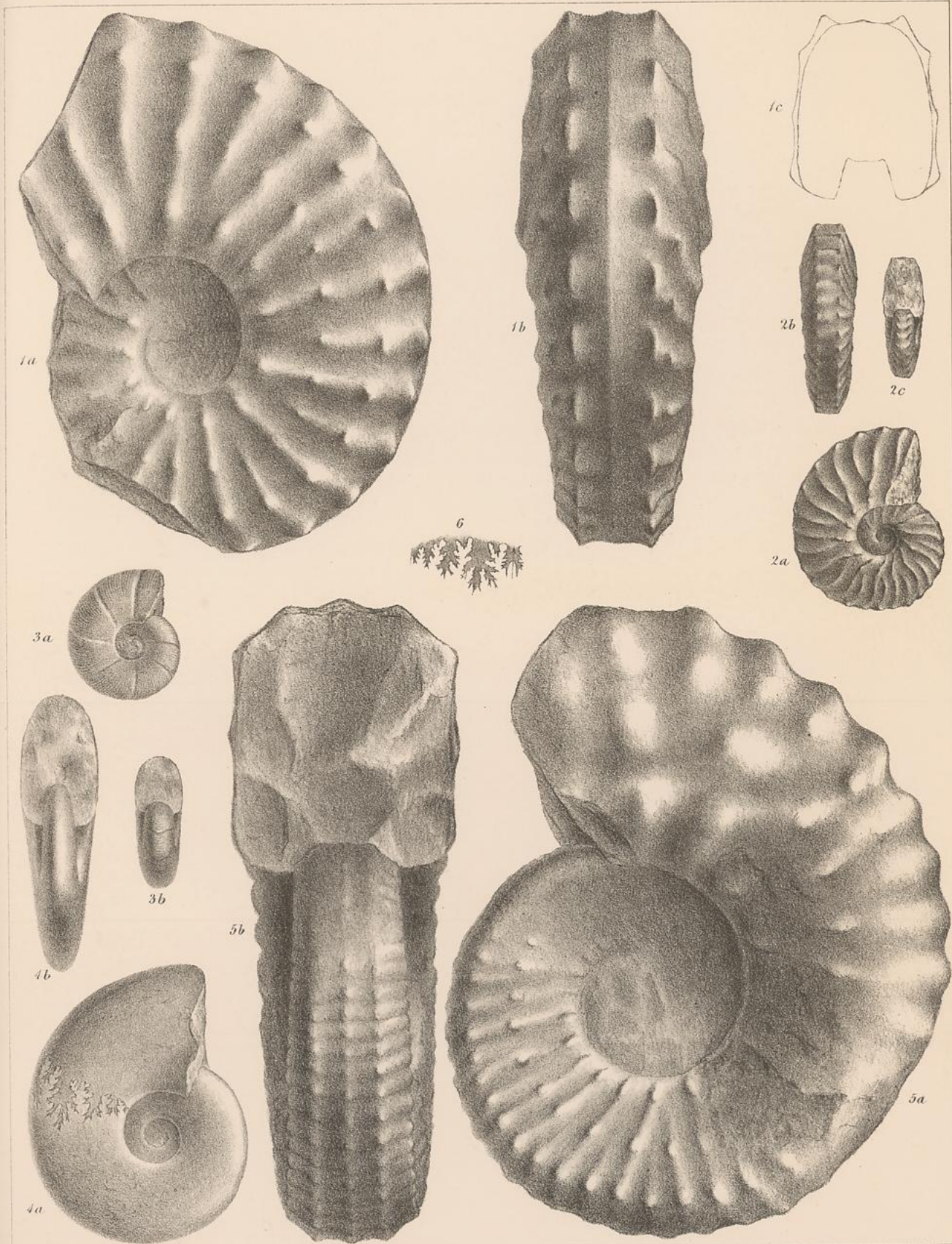
Fig. 21. side view.

Fig. 22. back view.

PLATE XIX.

Fig.

- 1*a*, *b*, and *c*. *AMMONITES COUPEI*; *var.*, from the Grey Chalk of Ventnor, Isle of Wight;
in my possession, p. 23.
1*a*, side view.
1*b*, back view.
1*c*, section of a whorl.
- 2*a*, *b*, and *c*. *AMMONITES RENAUXIANUS*; a young shell, from the Grey Chalk of Ventnor,
Isle of Wight; in my possession, p. 41.
2*a*, side view.
2*b*, back view.
2*c*, front view of inner whorl of the same specimen.
- 3*a* and *b*. *AMMONITES OCTO-SULCATUS*; from the Grey Chalk of Ventnor, Isle of Wight;
in my possession, p. 42.
3*a*, side view.
3*b*, front view.
- 4*a* and *b*. *AMMONITES ICENICUS*; from the Upper Chalk, near Norwich; in the collection
of Mr. King of Norwich, p. 43.
4*a*, side view, showing the outline of a septum.
4*b*, front view.
- 5*a* and *b*. *AMMONITES DEVERIANUS*; from the Grey Chalk of Sussex; in the British
Museum, from the collection of F. Dixon, Esq., p. 43.
5*a*, side view.
5*b*, front view.
6. *AMMONITES VELLEDE*; from the Grey Chalk of Ventnor, Isle of Wight; in my pos-
session, p. 39.
6, outline of a septum.



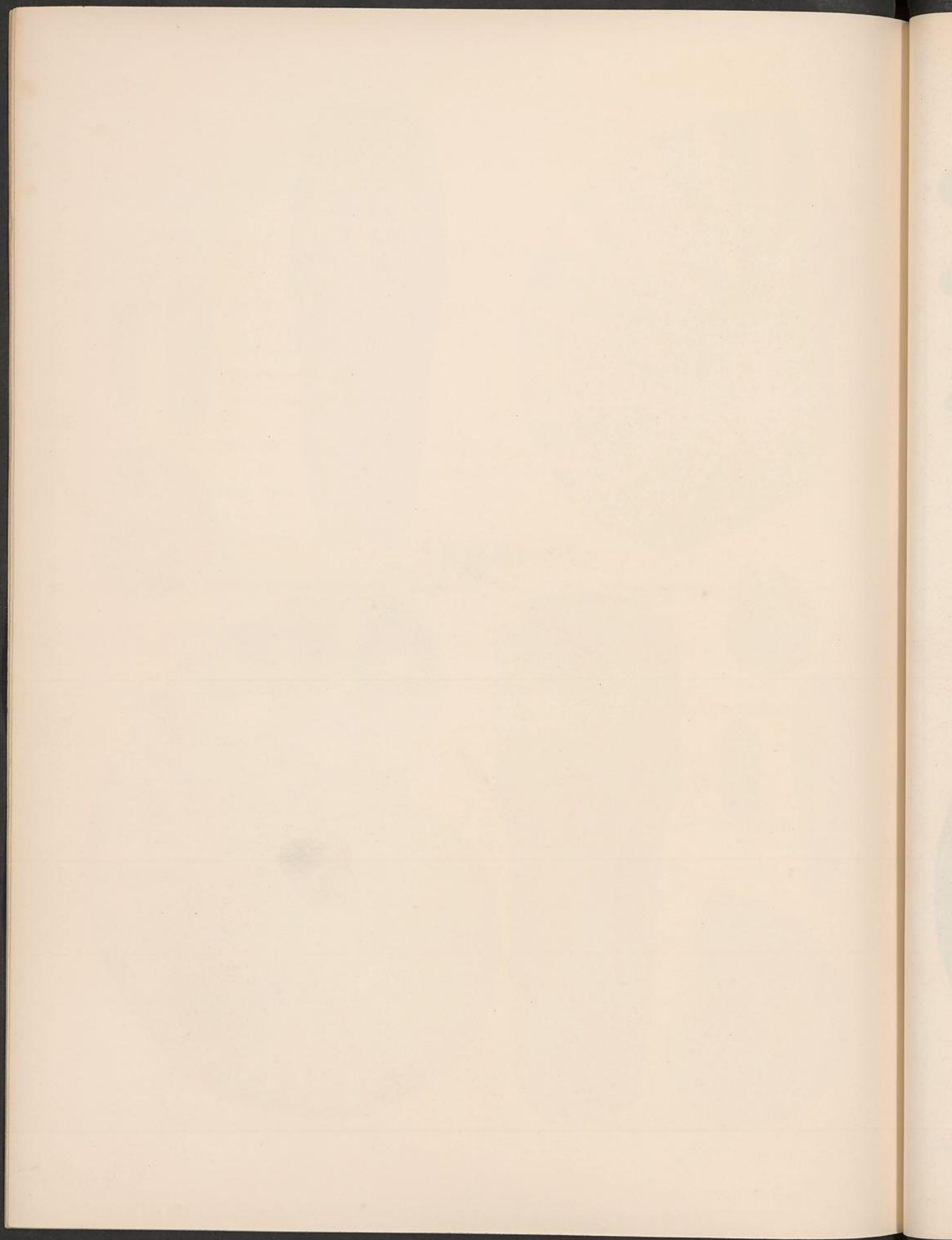


PLATE XX.

Fig.

1*a*, *b*, *c*. *AMMONITES RUSTICUS*; from the Lower Chalk, near Lyme Regis; in the Museum of Practical Geology; reduced to two thirds its natural diameter, p. 44.
The surface of the inner part has decayed away.

1*a*, side view.

1*b*, back view.

1*c*, section of the outer whorl.

2*a*, *b*, and *c*. *AMMONITES RENEVIERI*; from the Grey Chalk, near Blackdown, Isle of Wight; in the collection of E. Renevier, Esq., of Lausanne, p. 44.

2*a*, side view.

2*b*, front view.

2*c*, outline of a septum.

3*a* and *b*. *AMMONITES SAXBII*; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 45.

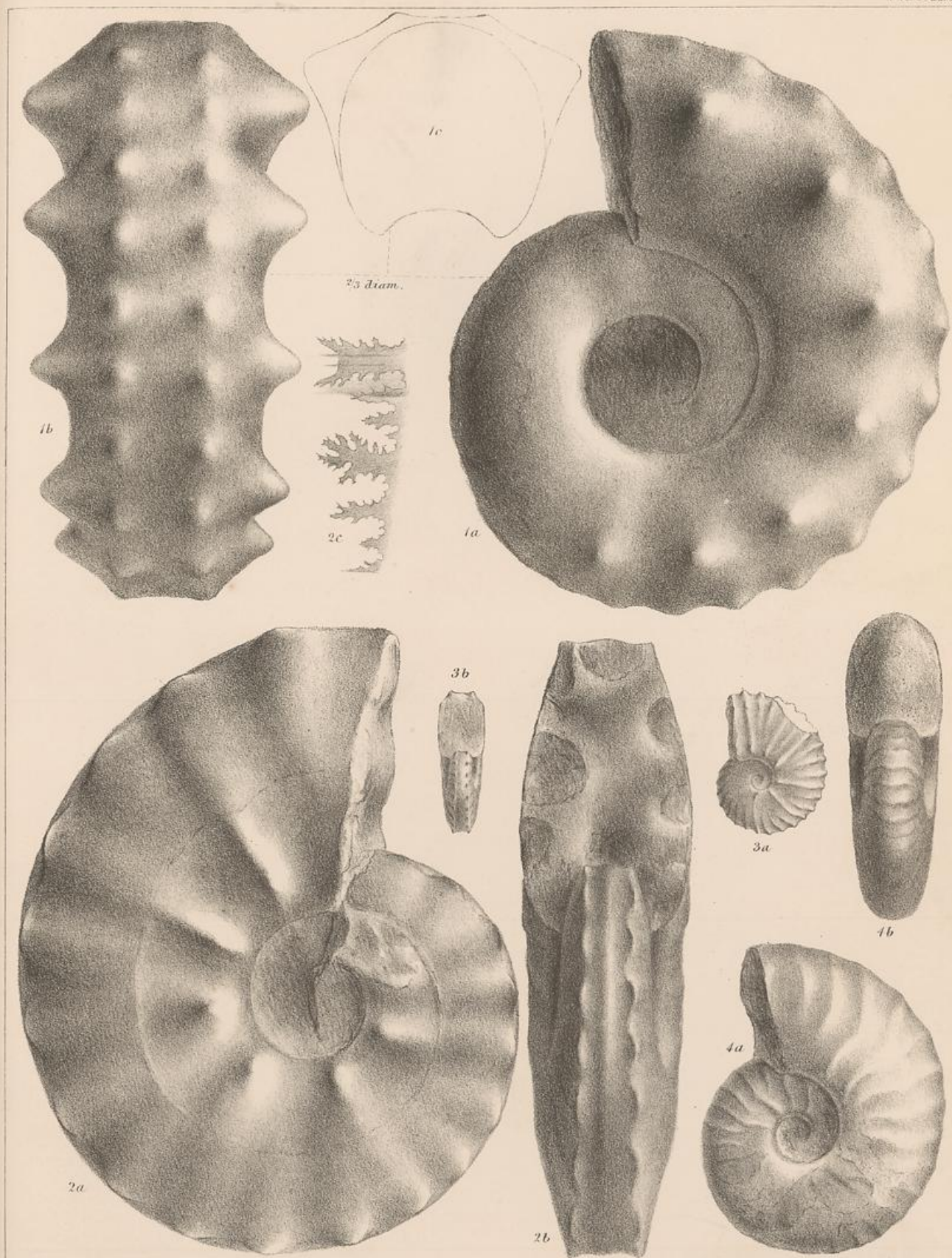
3*a*, side view.

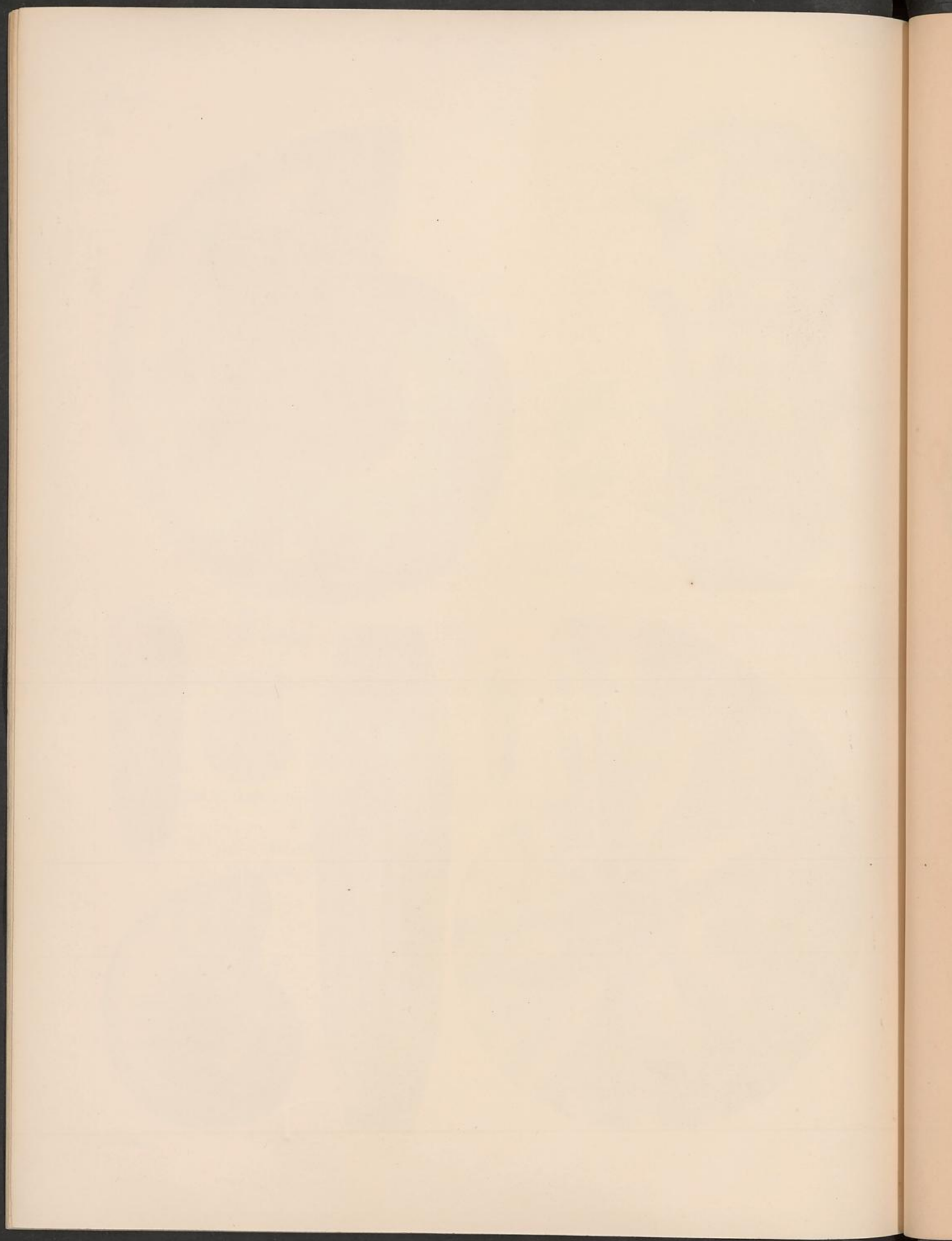
3*b*, front view.

4*a* and *b*. *AMMONITES VECTENSIS*; from the Chloritic Marl of Ventnor, Isle of Wight; in my possession, p. 45.

4*a*, side view.

4*b*, front view.





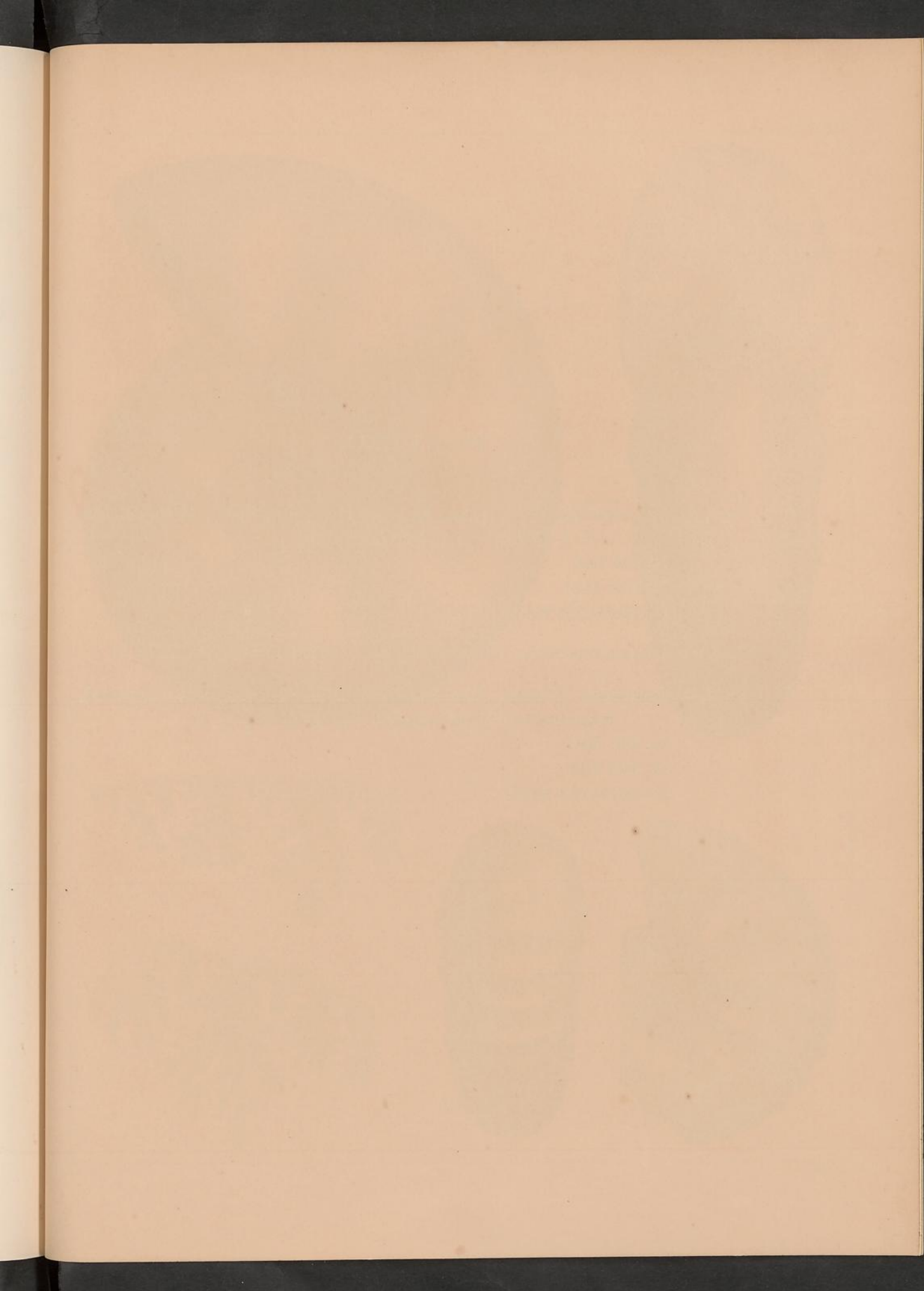


PLATE XXI.

Fig.

1*a*, *b*, *c*. AMMONITES LEWESIENSIS; from the Grey Chalk, near Dover; in the collection of S. J. Mackie, Esq., of Folkstone, p. 46.

1*a*, side view.

1*b*, front view.

1*c*, outline of a septum.

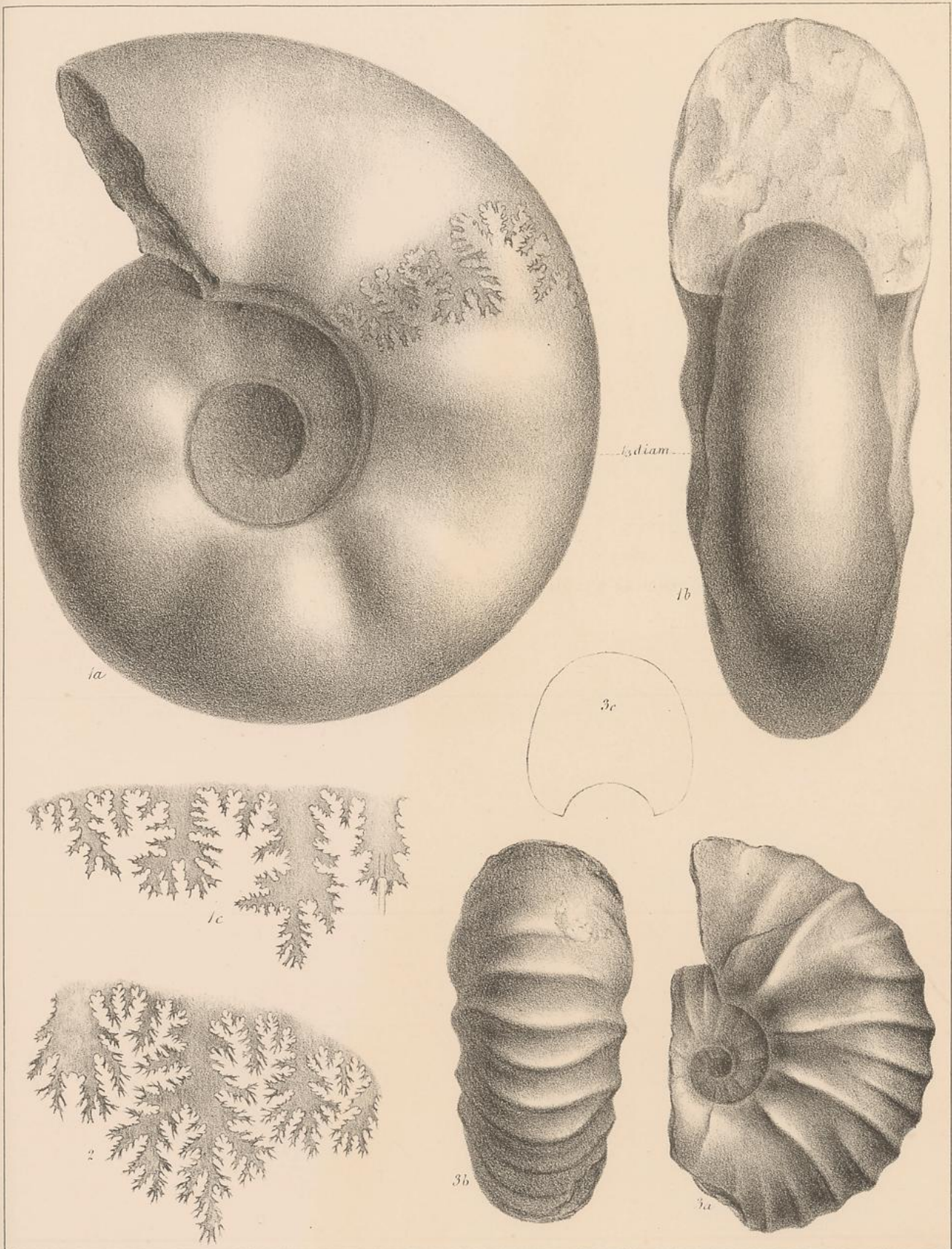
2. AMMONITES LEPTOPHYLLUS; outline of a septum of the specimen, Plate XXII, fig. 1.

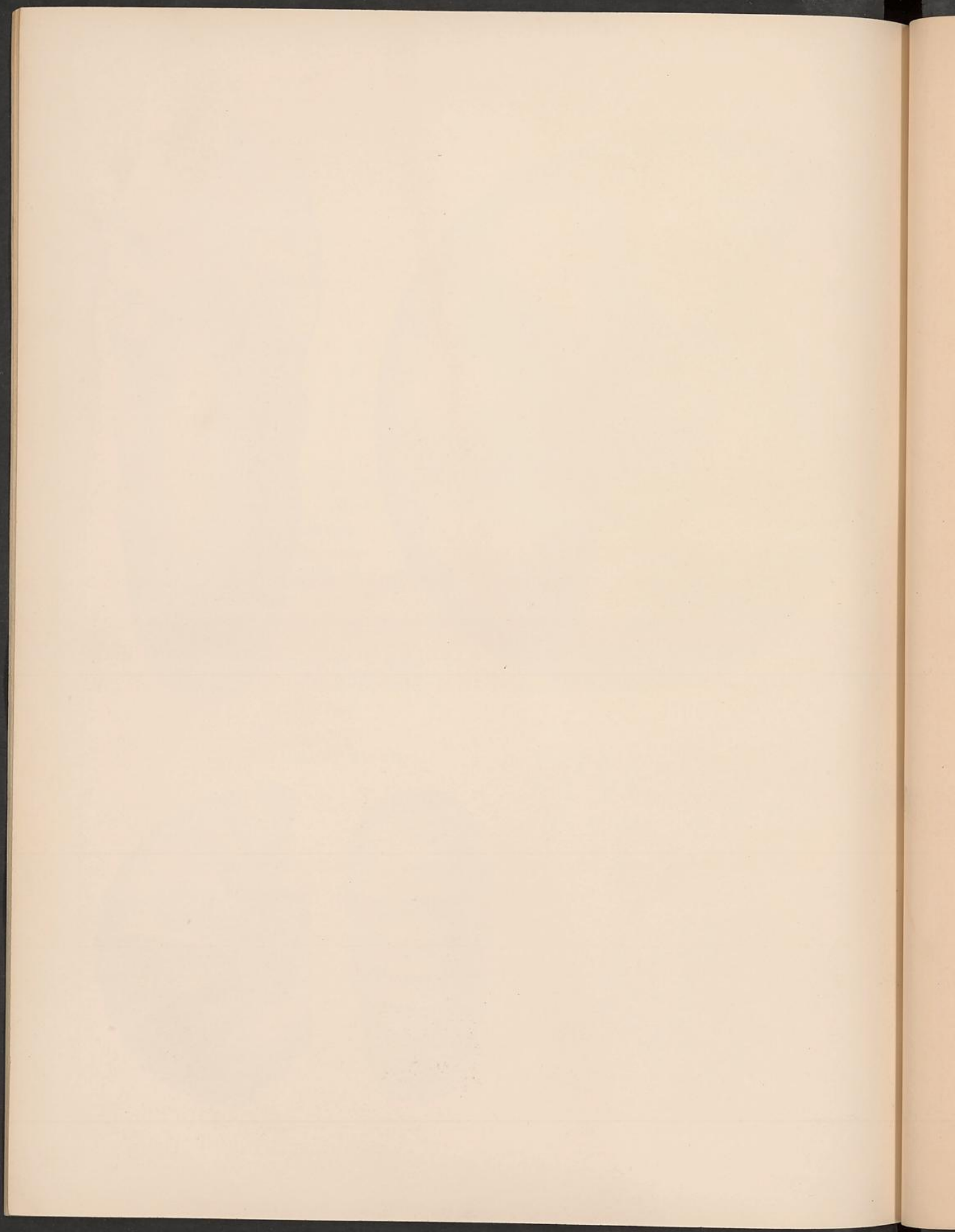
3*a*, *b*, *c*. AMMONITES WIESTII; from the Chalk with silicious grains, Chardstock, Somersetshire; in the collection of J. Wiest, Esq., p. 47.

3*a*, side view.

3*b*, back view.

3*c*, section of a whorl.





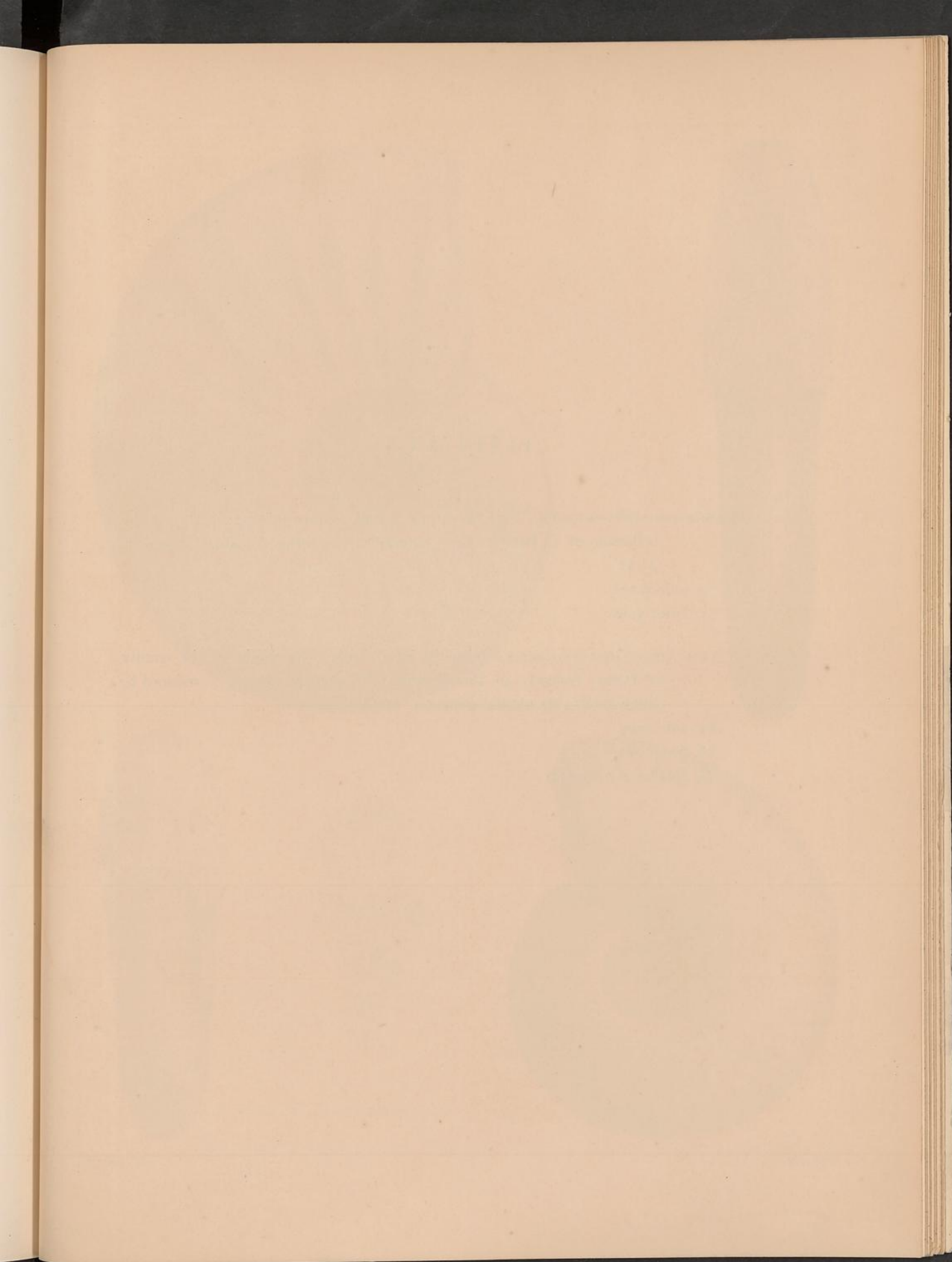


PLATE XXII.

Fig.

1*a*, *b*. AMMONITES LEPTOPHYLLUS; from the Upper Chalk of Greenhithe, Kent; in the collection of L. Barrett, Esq., reduced to two fifths its natural diameter, p. 48.

1*a*, side view.

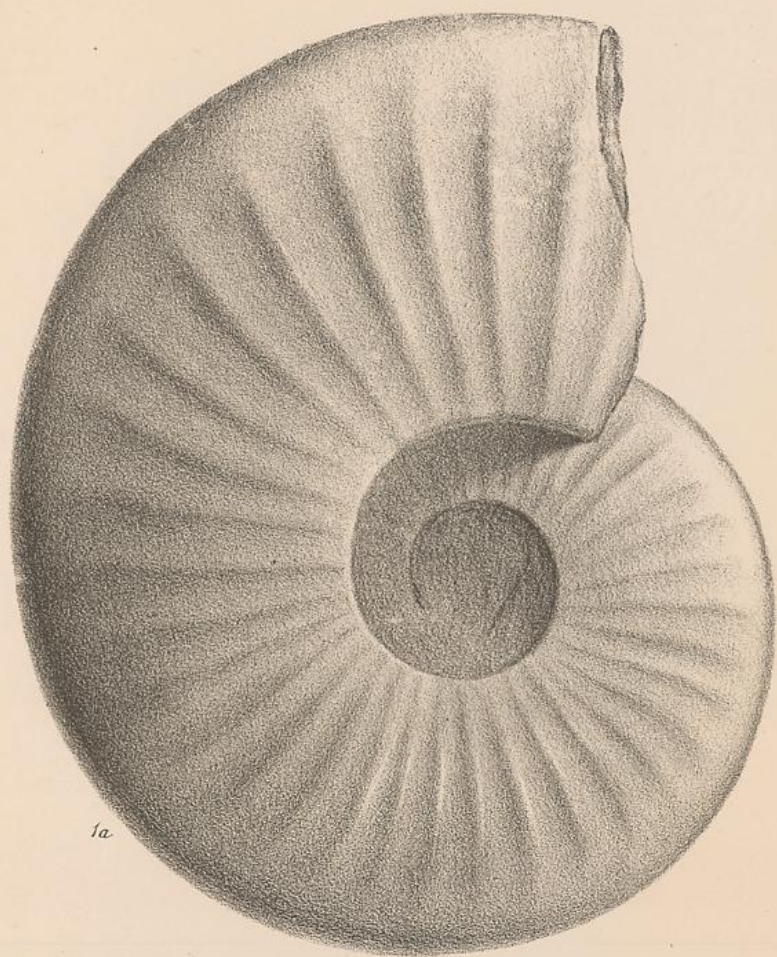
1*b*, front view.

2*a*, *b*, *c*. AMMONITES GOLLEVILLENSIS; from the hard Chalk of Damlaght, in the county of Derry, Ireland; in the Museum of Practical Geology; reduced to three fourths its natural diameter, p. 48.

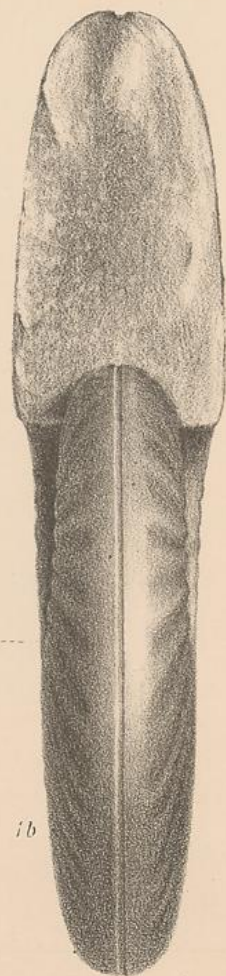
2*a*, side view.

2*b*, front view.

2*c*, outline of a septum.

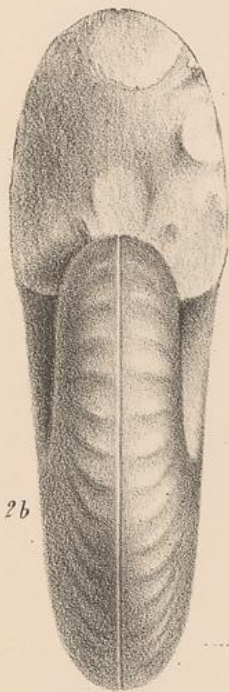


1a



1b

$\frac{2}{5}$ diam.

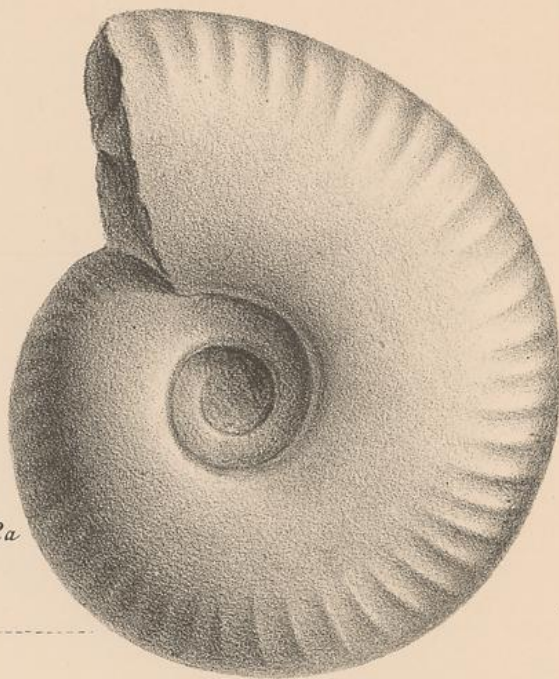


2b

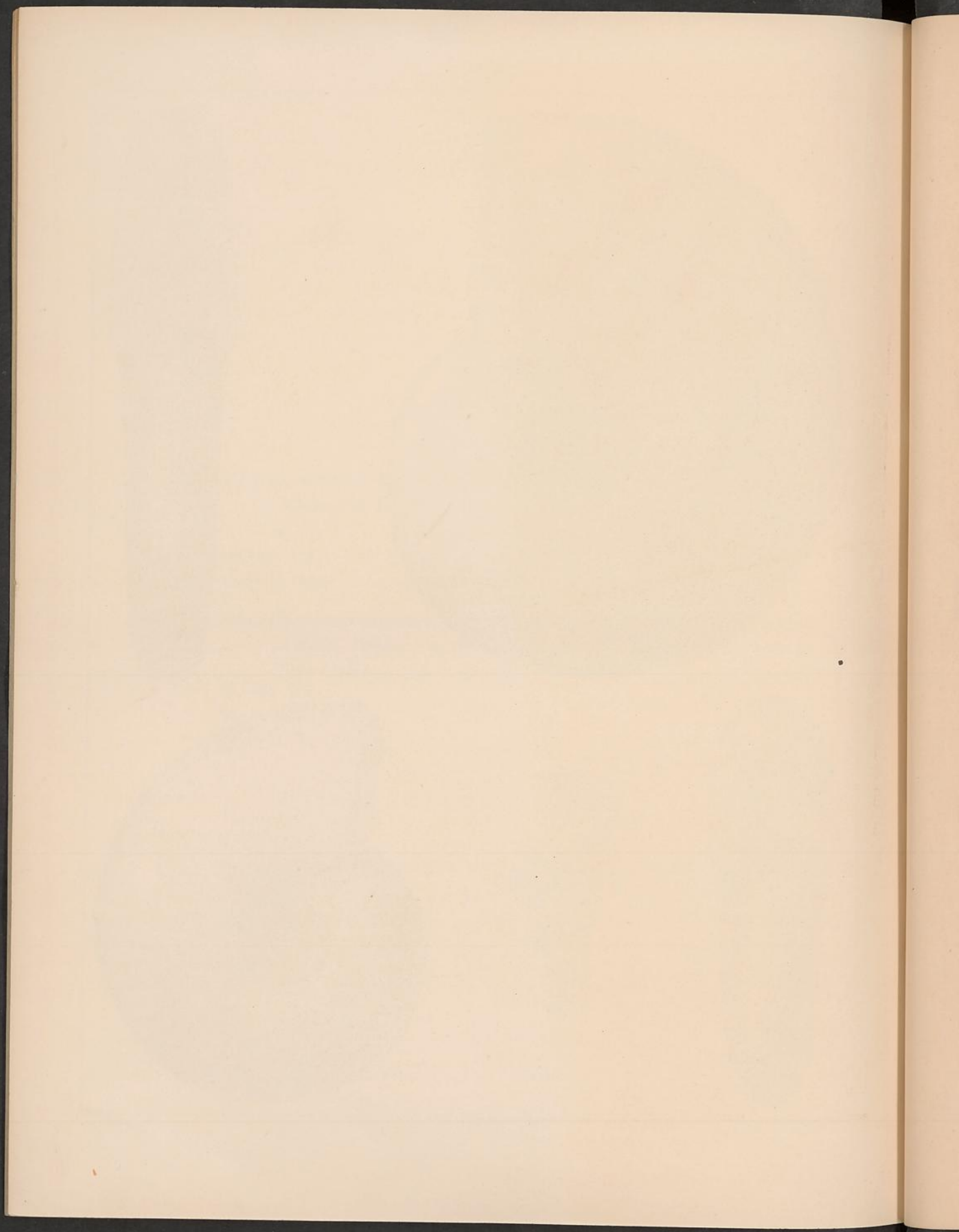


2c

$\frac{3}{4}$ diam.



2a



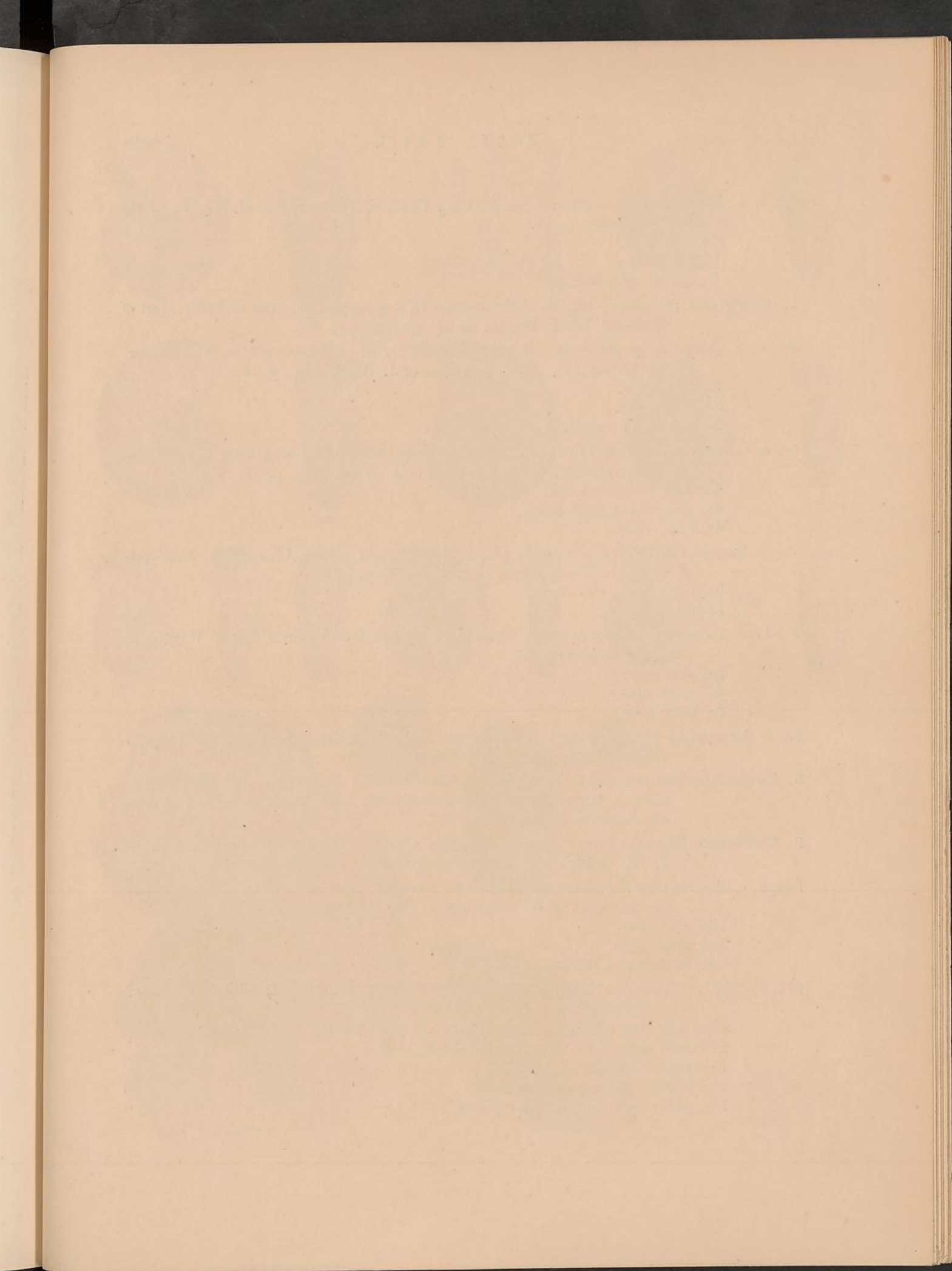
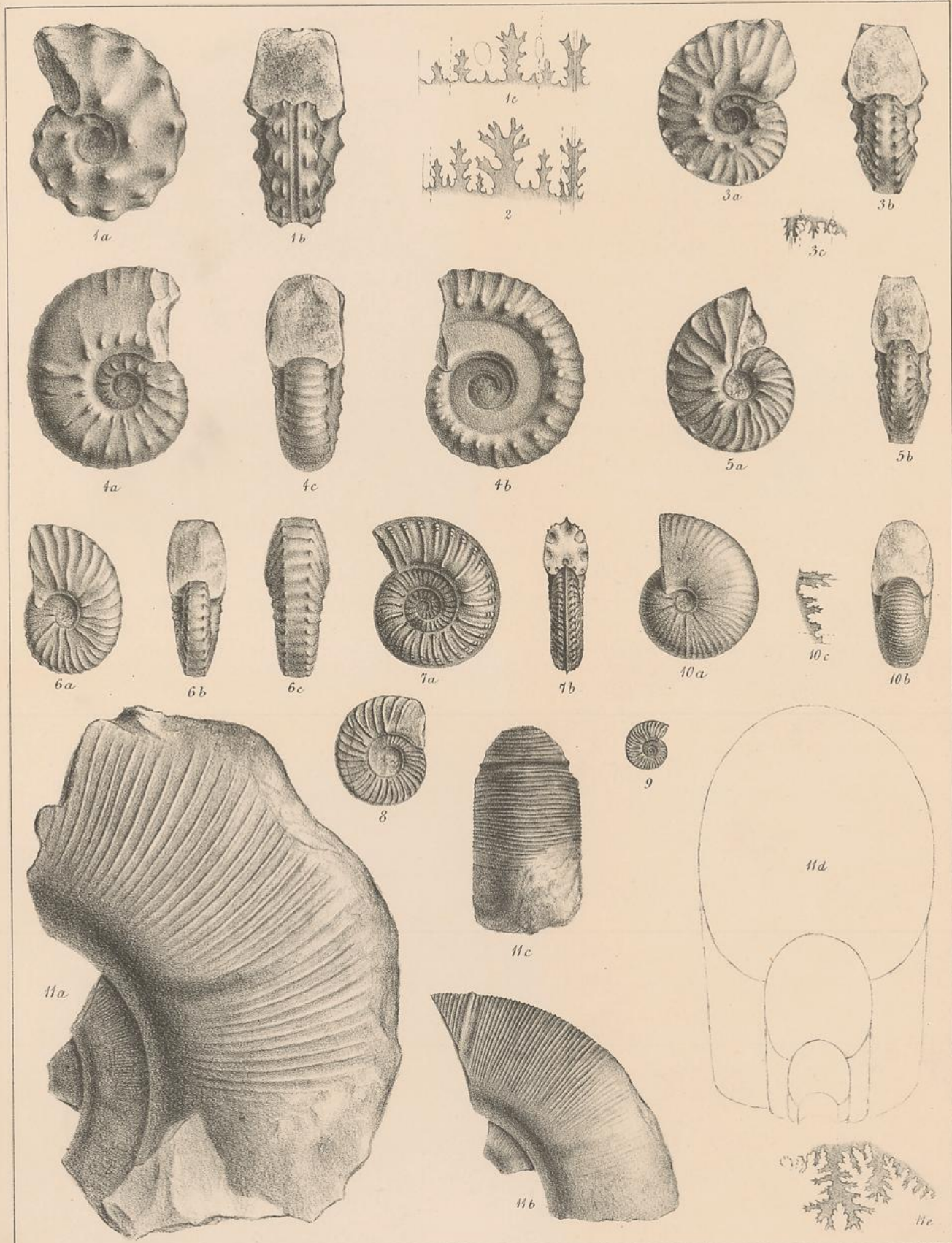
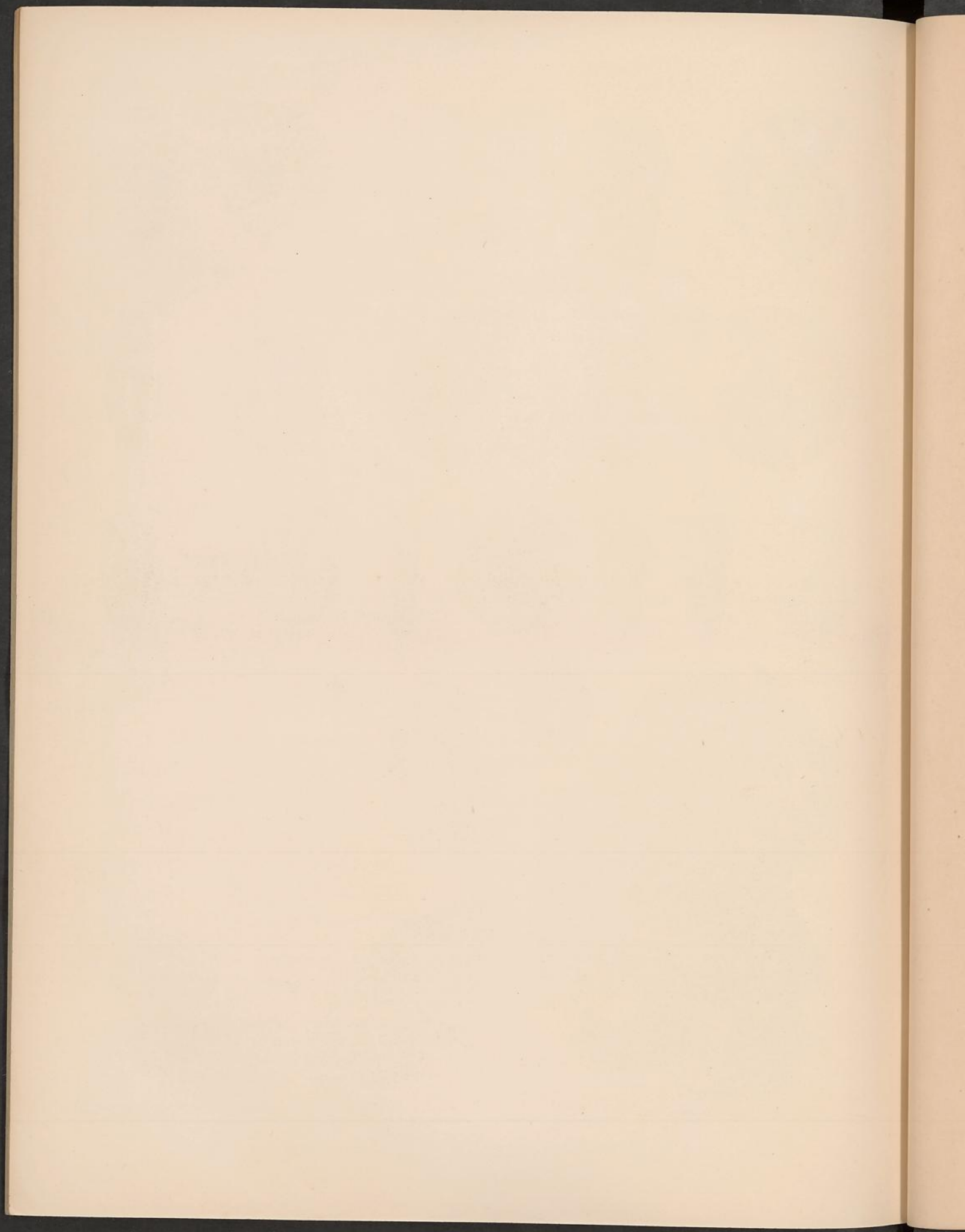


PLATE XXIII.

Fig.

- 1*a, b, c.* AMMONITES CURVATUS; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 49.
1*a*, side view.
1*b*, front view.
1*c*, outline of a septum.
2. AMMONITES FALCATUS; outline of the septum of a specimen from the Chloritic Marl of Ventnor, Isle of Wight; in my possession, p. 21.
- 3*a, b, c.* AMMONITES SALTERI; from the Chalk with siliceous grains, Chardstock, Somersetshire; in the collection of J. Wiest, Esq., p. 50.
3*a*, side view.
3*b*, front view.
3*c*, outline of a septum.
- 4*a, b, c.* AMMONITES RAMSAYANUS; from the Chalk with siliceous grains, Chardstock, Somersetshire; in the collection of J. Wiest, Esq., p. 51.
4*a*, view of the left side.
4*b*, view of the right side.
4*c*, front view.
- 5*a, b.* AMMONITES SALTERI; from the Chalk with siliceous grains, Chardstock, Somersetshire; in the collection of J. Wiest, Esq., p. 50.
5*a*, side view.
5*b*, front view.
- 6*a, b, c.* AMMONITES FERAUDIANUS; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 52.
6*a*, side view.
6*b*, front view.
6*c*, back view.
- 7*a, b.* AMMONITES BRAVAISIANUS; copied from Plate XCI, figs. 3 and 4, of D'Orbigny's 'Paléontologie Française, Terrains Crétacés,' p. 52.
8. AMMONITES BRAVAISIANUS; from the Middle Chalk of Dover; in the collection of S. J. Mackie, Esq.: the specimen has been worn, and the tubercles are nearly all rubbed off, p. 52.
9. AMMONITES BRAVAISIANUS; from the Middle Chalk of Dover; in the collection of J. W. Flower: restored by the artist from a broken specimen, p. 52.
- 10*a, b, c.* AMMONITES WILTONENSIS; from the Grey Chalk, near Devizes, Wiltshire; in the collection of W. Cunningham, Esq., of Devizes, p. 53.
10*a*, side view.
10*b*, front view.
10*c*, outline of a septum.
- 11*a, b, c, d, e.* AMMONITES JUKESII; from the hard Chalk of the county of Londonderry; in the Museum of Practical Geology, p. 53.
11*a*, side view of a fragment, with part of three whorls.
11*b*, side view of the two inner whorls of 11*a*.
11*c*, back view of 11*b*.
11*d*, section of the whorls restored.
11*e*, part of the outline of a septum.





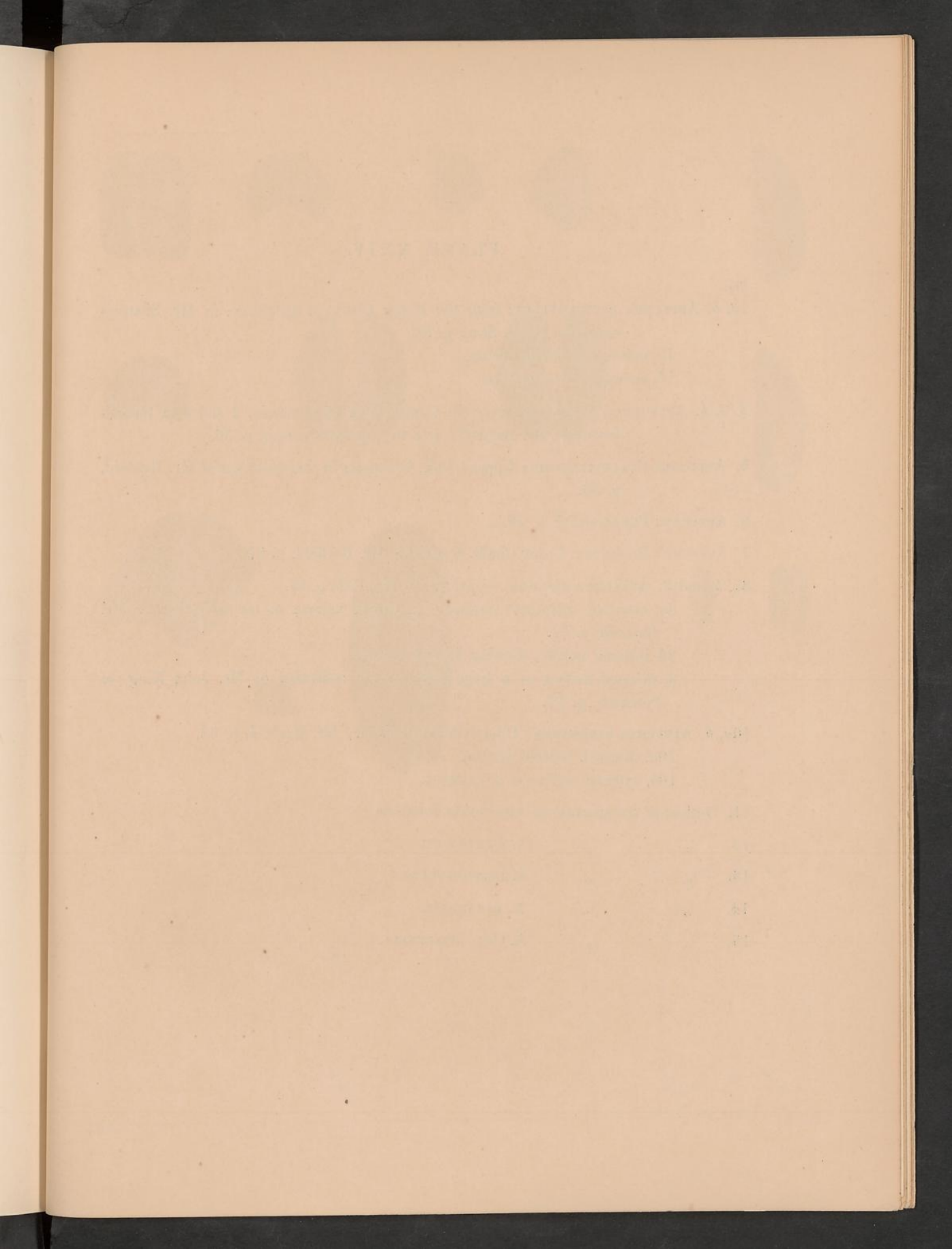


PLATE XXIV.

Fig.

1*a*, *b*. *APTYPHUS LEPTOPHYLLUS*; from the Upper Chalk of Brighton; in Mr. Sharpe's collection (Geol. Soc.), p. 55.

1*a*, concave (internal) surface.

1*b*, smooth, convex surface.

2, 3, 4. *APTYPHUS PORTLOCKII*; from the Upper Chalk of Norwich; 2 and 3 in the collection of Mr. Bayfield; 4 in the British Museum, p. 56.

5. *APTYPHUS GOLLEVILLENSIS*; Upper Chalk, Norwich; in the collection of Mr. Bayfield, p. 56.

6. *APTYPHUS PORTLOCKII*? p. 56.

7. *APTYPHUS ICENICUS*; Upper Chalk, Norwich; Mr. Bayfield, p. 57.

8*a*, *b*, and 9. *APTYPHUS RUGOSUS*; Upper Chalk, Norwich, p. 57.

8*a*, external, sculptured surface of a pair of valves; in the collection of Mr. Bayfield, p. 57.

8*b*, internal surface, showing lines of growth.

9, external surface of a large valve, in the collection of Mr. John King, of Norwich, p. 57.

10*a*, *b*. *APTYPHUS PERAMPLUS*; Upper Chalk, Norwich; Mr. Bayfield, p. 58.

10*a*, internal, striated surface.

10*b*, external surface of a fragment.

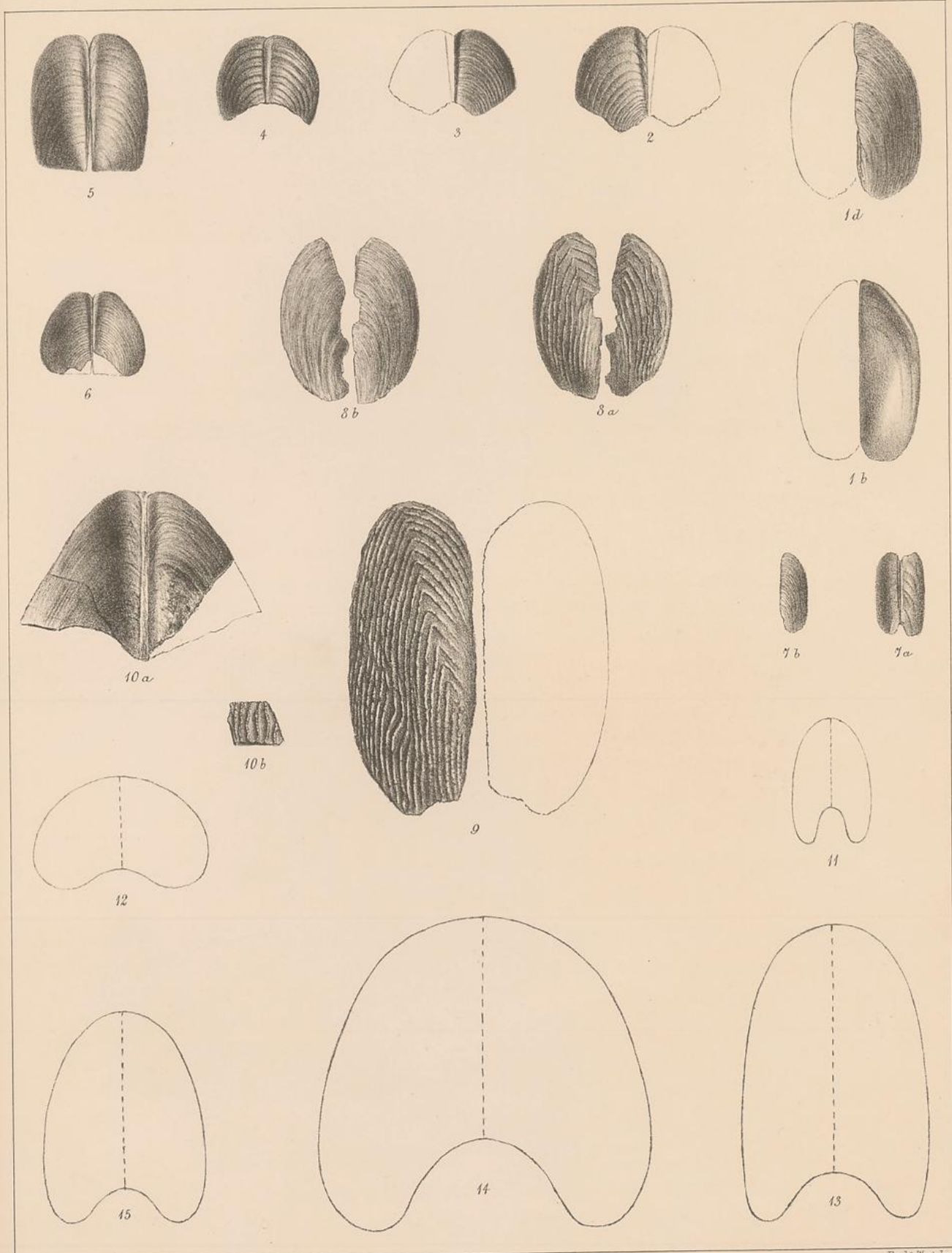
11. Outline of the aperture of *AMMONITES ICENICUS*.

12. „ „ *A. PORTLOCKII*.

13. „ „ *A. LEPTOPHYLLUS*.

14. „ „ *A. PERAMPLUS*.

15. „ „ *A. GOLLEVILLENSIS*.



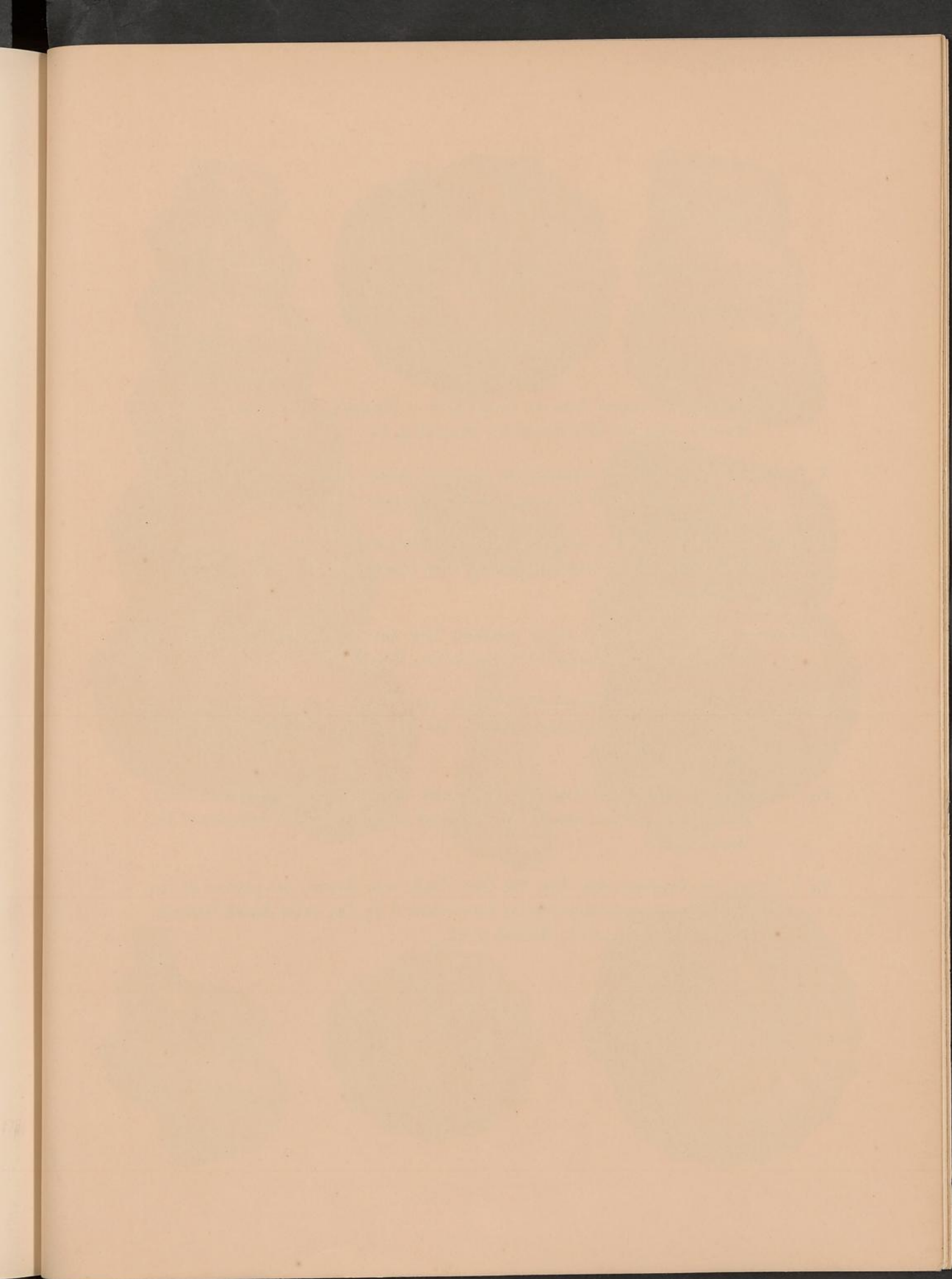
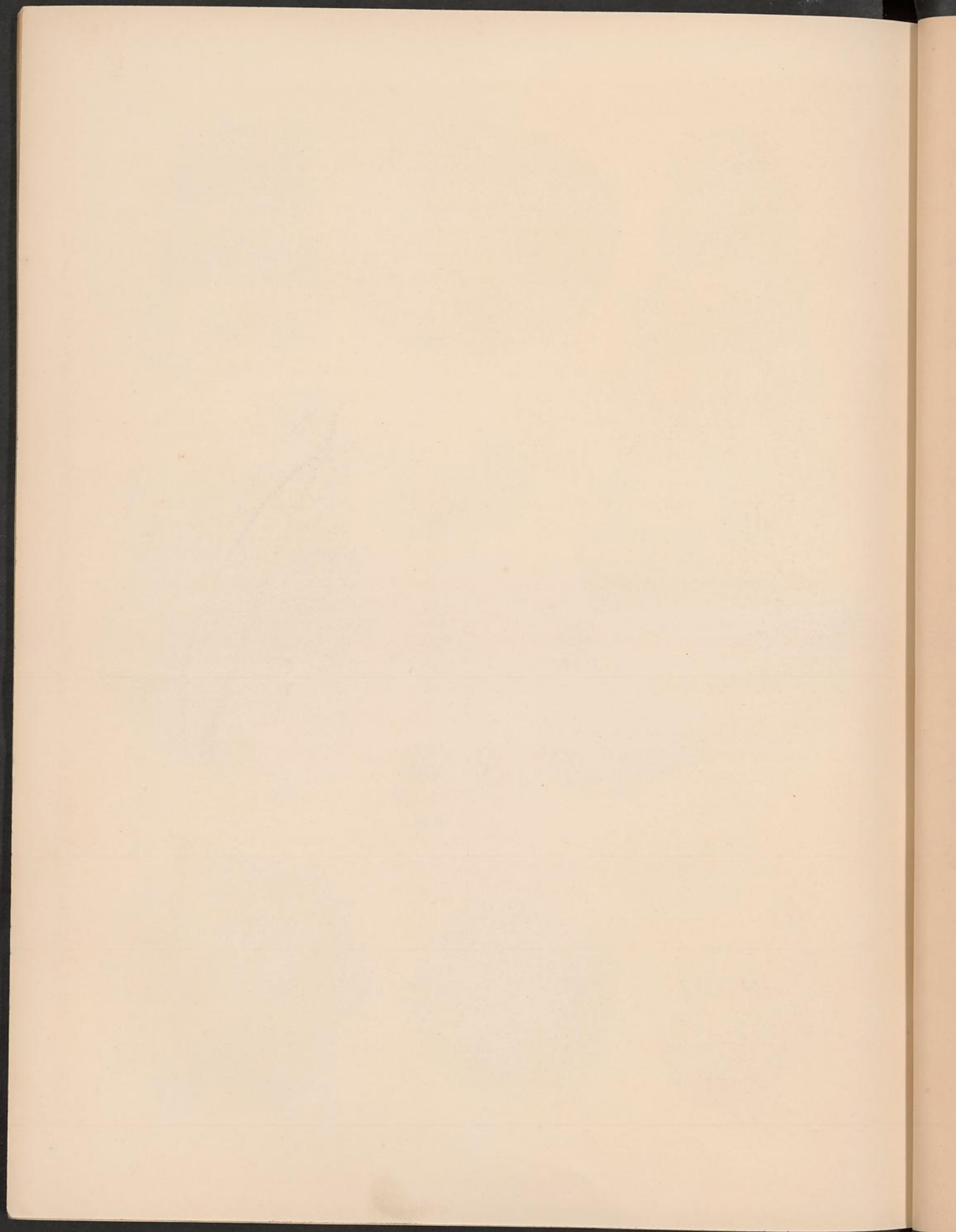


PLATE XXV.

Fig.

1. *TURRILITES TUBERCULATUS*; from the Grey Chalk of Ringmer, Sussex; in the British Museum, from the collection of Dr. Mantell, p. 61.
2. *TURRILITES TUBERCULATUS*, showing the produced mouth; from the Grey Chalk, near Lewes; in the British Museum, from the collection of Dr. Mantell, p. 61.
3. *TURRILITES TUBERCULATUS*; a fragment, showing the position of the lobes of a septum on the outer side of a whorl; from the Grey Chalk of Ventnor, Isle of Wight, in my possession, p. 61.
4. *TURRILITES TUBERCULATUS*; a young specimen, from the Grey Chalk of Ventnor, Isle of Wight; in the collection of S. Saxby, jun., Esq., p. 61.
5. *TURRILITES MANTELLI*; from the Grey Chalk, near Lewes; part of the outline of a septum is shown on the upper whorl; in the British Museum, from the collection of Dr. Mantell, p. 63.
- 6*a, b.* *TURRILITES MANTELLI*; from the Grey Chalk, near Lewes; an adult individual, showing the produced mouth; in the British Museum, from the collection of Dr. Mantell, p. 63.
- 7*a, b.* *TURRILITES GRAVESIANUS*; from the Grey Chalk, near Lewes; the position of the lobes of a septum is shown on the lower whorl of fig. 7*a*; in the British Museum, from the collection of Dr. Mantell, p. 62.





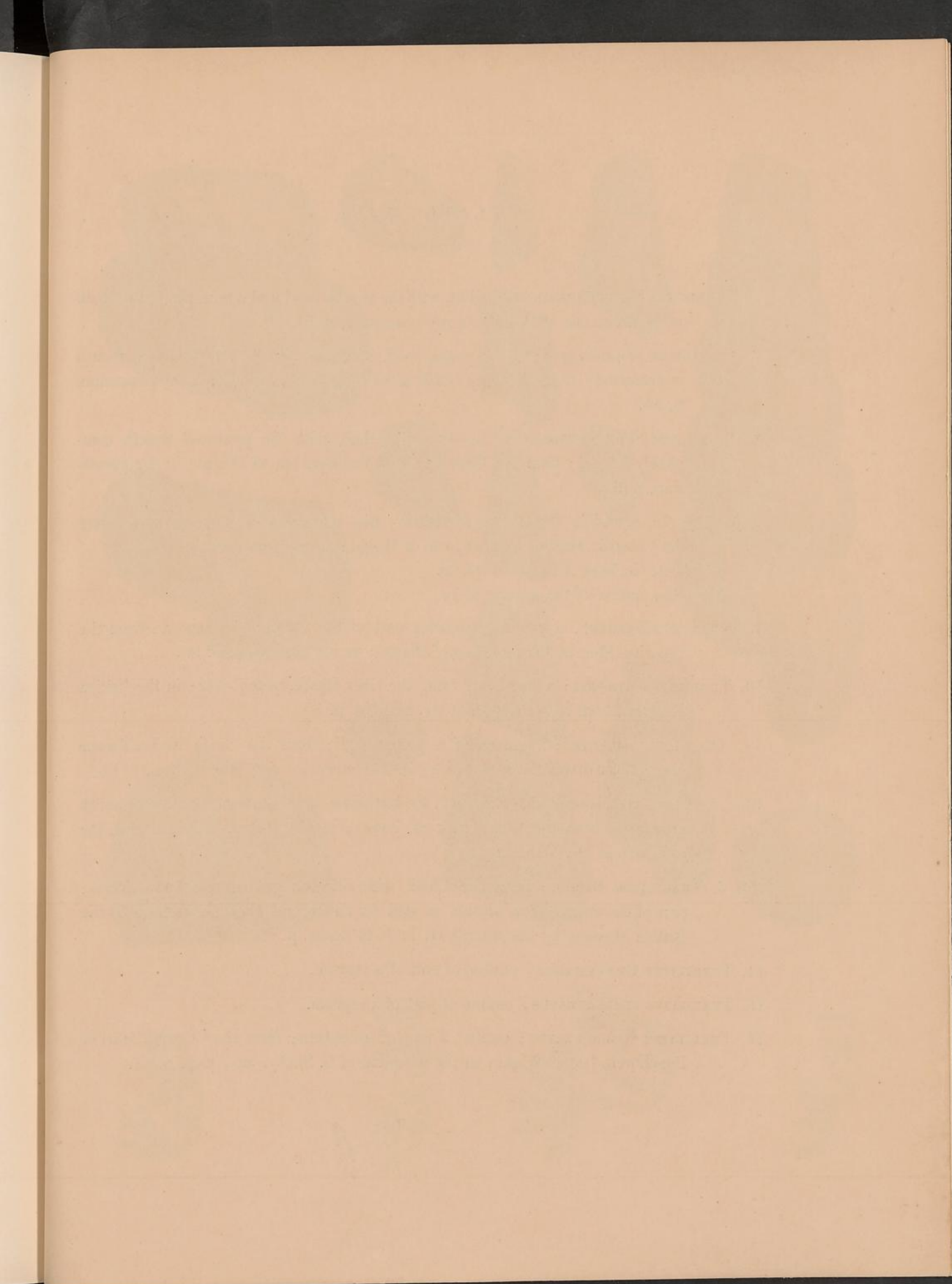
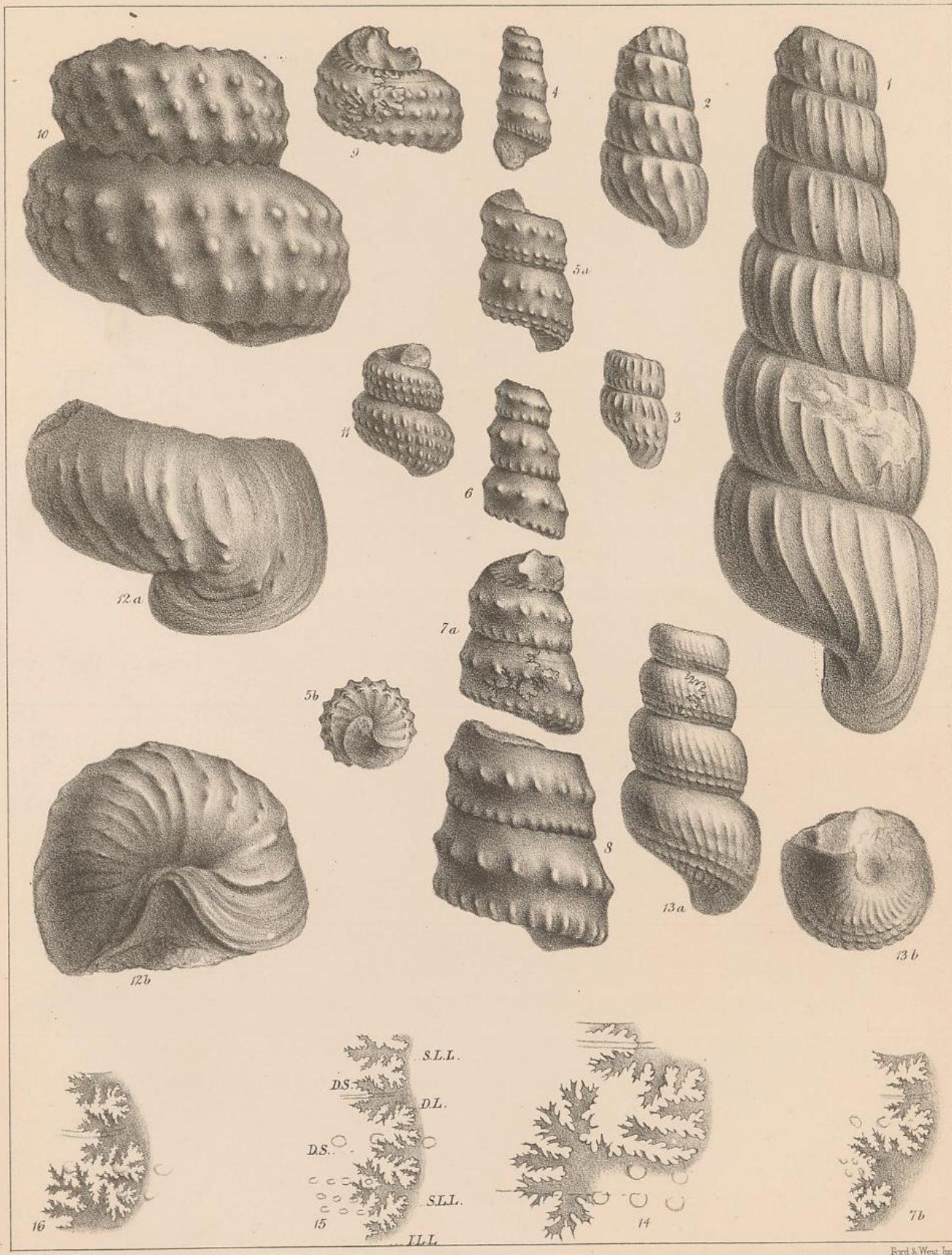
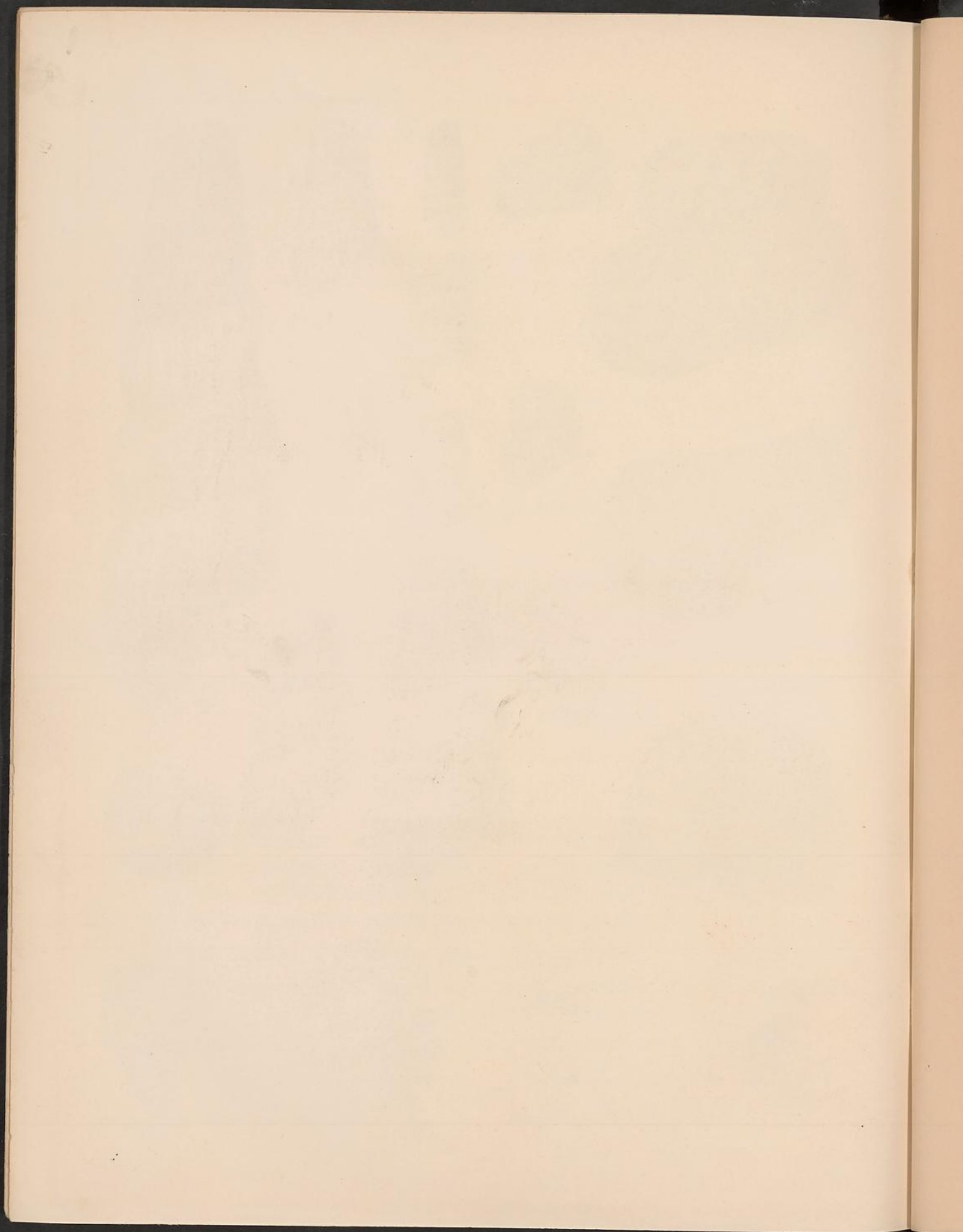


PLATE XXVI.

Fig.

1. *TURRILITES SCHEUCHZERIANUS*; adult, with the mouth produced; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 64.
2. *TURRILITES SCHEUCHZERIANUS*; a young shell, on which part of the produced mouth is preserved; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 64.
3. *TURRILITES SCHEUCHZERIANUS*? a very young shell, with the produced mouth completely formed; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 64.
- 4, 5*a*, *b*, 6, 7*a*, *b*, and 8. *TURRILITES MORRISII*; five specimens of different ages; from the Chloritic Marl of Ventnor, Isle of Wight; in my possession, p. 65.
5*b*, shows the base of the whorl of 5*a*.
7*b*, is the outline of the septum of 7*a*.
9. *TURRILITES BERGERI*; a fragment, showing part of the outline of a septum; from the Chloritic Marl of Ventnor, Isle of Wight; in my possession, p. 65.
10. *TURRILITES BERGERI*; a fragment, from the Grey Chalk, near Lewes; in the British Museum, from the collection of Dr. Mantell, p. 65.
11. *TURRILITES BERGERI*; fragment of a young shell; from the Chalk with siliceous grains, Chardstock, Somersetshire; in the collection of J. Morris, Esq., p. 65.
- 12, *a*, *b*. *TURRILITES*, species undetermined; the last whorl of an adult shell, with the mouth produced; from the Grey Chalk of Lewes; in the British Museum, from the collection of Dr. Mantell.
- 13*a*, *b*. *TURRILITES BECHEI*; from the Chalk with siliceous grains, near Lyme Regis; part of the outline of a septum is seen on the second whorl; presented to the British Museum by the late Sir H. T. de la Beche, p. 66.
14. *TURRILITES GRAVESIANUS*; outline of part of a septum.
15. *TURRILITES TUBERCULATUS*; outline of part of a septum.
16. *TURRILITES TUBERCULATUS*; outline of part of a septum; from the Chloritic Marl of Bonchurch, Isle of Wight; in the collection of S. Saxby, jun., Esq., p. 61.





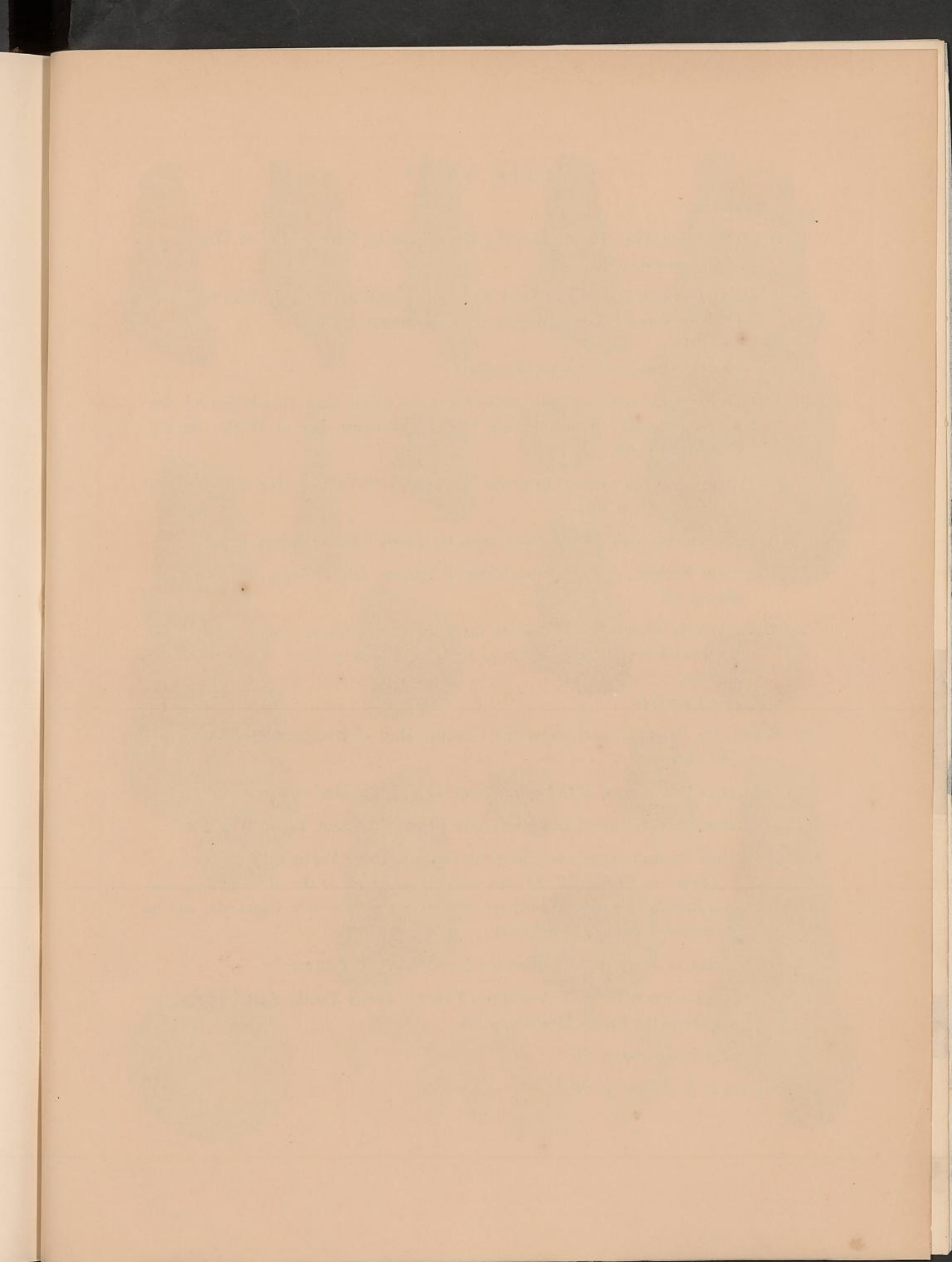


PLATE XXVII.

Fig.

1. *TURRILITES COSTATUS*; young, from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 66.
- 2*a, b.* *TURRILITES COSTATUS*; adult, with the mouth completely formed; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 66.
2*a*, side view.
2*b*, view of the base, with the perfect mouth.
- 3 and 4. *TURRILITES COSTATUS*; two small specimens which have already formed the produced mouth; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 66.
5. *TURRILITES COSTATUS*; young, from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 66.
- 6 and 7. *TURRILITES BIFRONS*? *D'Orb.*; from the Lower Chalk, Ventnor, p. 67.
8. *TURRILITES WIESTII*; from the Grey Chalk of Ventnor, Isle of Wight; in my possession, p. 67.
- 9*a, b.* *TURRILITES WIESTII*; young, from the Chalk with siliceous grains, Chardstock, Somersetshire; in the collection of Mr. John Morris, p. 67.
9*a*, side view.
9*b*, base of a whorl.
10. *TURRILITES BERGERI*? *var.*; from the Chloritic Marl of Bonchurch, Isle of Wight. (*Mr. Sawby.*)
11. *TURRILITES PUZOSIANUS*, *D'Orb. var.*; from the Chloritic Marl of Bonchurch, p. 68.
12. *TURRILITES COSTATUS, var.*; from the Lower Chalk of Ventnor, Isle of Wight.
13. *TURRILITES TUBERCULATUS, var.*; from the Lower Chalk of Ventnor.
These two figures (12, 13) are doubtfully referred to the above species, and may hereafter prove to be distinct: the specimens are only fragments, and in an imperfect state of preservation.
- 14*a, b.* *TURRILITES WIESTII, var.*; from the Lower Chalk of Ventnor.
15. *TURRILITES COSTATUS, var. T. triplicatus*, J. Sow.; Lower Chalk, Sussex; from the original in the British Museum, p. 66.
16. Septum of *T. costatus*, p. 66.
17. Septum of *T. Wiestii*, p. 67.

