XVI. *Description of portions of a Tusk of a Proboscidian Mammal.* (Notelephas* australis, Owen.)

By Professor Owen, *C.B., F.R.S., &c.*

Received March 21,—Read March 30, 1882.

[Plate 51.]

The subjects of the present communication were discovered by the late Fred. N. Isaac, Esq., in a superficial drift-deposit of a ravine in a district of Darling Downs, Australia, about 60 miles to the eastward of Moreton Bay, and have been submitted to me by his nephew, E. Thurston Holland, Esq.

They are portions of a tusk and indicate a species of Mammal larger than the *Diprotodon*, consequently the largest aboriginal land Mammal of which any satisfactory evidence has, hitherto, reached me from Australia.

Besides the larger portions of the tusk figured in the accompanying drawing (Plate 51, figs. 1–8) were many smaller portions or fragments of apparently the same tusk.

At first sight they suggested evidence confirmatory of that which, in 1843, was brought from Australia by Count Stezelecki,—a molar, viz., of a Mastodon, stated to have been obtained from a native of the interior of New South Wales, but which appeared to lack the grounds for the admission of a Proboscidian into the work 'On the Fossil Mammals of Australia,' up to the date of its publication, 1877. That molar presented the characters of the *Mastodon andium* of South America, and it is too large to be associated with the tusk under description, supposing this to have come from the upper jaw of a full-grown individual of its species. I, however, subjoin the Count's notice of the molar tooth.†

* Νοτος south, ἐλεφας ivory.

† After alluding to some Marsupial Fossils I also had submitted to me, the author proceeds :—"To these relics may be added a molar 'bone' (tooth) of the Mastodon, similar to the *Mastodon angustidens*, and provisionally called by Professor Owen *Mastodon australis*, and which I bought from a native of Boree, the station of Captain Ryan, through the agency of the overseer of the station. The natives in giving the bone stated that similar ones and larger still might be got further in the interior; but that, owing to the hostility of the tribe upon whose grounds the bones are to be found, it was impossible for him to venture in that time in search for more; as, however, he promised to exert himself at some future period in order to supply me with some better specimens, I have left a reward with the man second in command at the station, and which was to be given to the native on his redeeming his pledge. Should

The largest of the portions of the tusk (Plate 51, figs. 1–4) is from near the base, and includes part of the pulp-cavity, *p*.

It is 5 inches in length, of a full elliptical, almost circular shape transversely; measuring across at the larger end (fig. 3), 2 inches 6 lines by 2 inches 5 lines; at the smaller end (fig. 4), 2 inches by 1 inch 10 lines. The diameters of the pulp-cavity are, at the larger end, 1 inch 1 line by 1 inch; at the smaller end, 6 lines by 5 lines. The thickness of the wall of ivory, at the larger end, varies from 8 to 9 lines, and is the same at the smaller end, not decreasing in the ratio of the pulp-cavity.

In this portion of tusk the outer or cemental layer and much of the outermost layer of dentine are lost. In the smaller portions of the tusk, where the cemental layer is preserved, it has a smooth outer surface; that of the dentine which is exposed shows the shallow longitudinal linear impressions which may be seen in that part of the tusk of most Elephants recent and fossil. The transversely fractured surfaces present the decussating curvilinear lines characteristic of true or Proboscidian ivory; but they are more minute than in the tusks of the African or Indian Elephants. The dentine has, also, the compactness of ivory, and reveals the microscopic characters presently to be described. The longitudinal linear impressions on the outer layer of dentine are of varying, but nowhere of great depth, mostly alternating in this character. The deeper lines run along with interspaces of from $\frac{1}{4}$ to $\frac{1}{2}$ an inch, and such defined longitudinal tracts are commonly impressed by a fainter line running along or near their middle. A tract bounded by the deeper lines, half an inch in breadth, shows two of the shallower longitudinal impressions. The general surface is smooth and polished; the inner surface, toward the pulp-cavity, is smooth.

The present portion of tusk shows a slight departure from straightness; a degree of curvature is more evident in the second, rather narrower but longer, portion (ib., figs. 5, 6). This portion is $6\frac{1}{2}$ inches in length, 2 inches 1 line by 2 inches in thickness at the largest end, 1 inch 10 lines by 1 inch 9 lines at the smaller end (ib., fig. 6). The inner layers of the dentine at the larger end have been too much and irregularly broken away to indicate satisfactorily the size and termination there of the pulp cavity; but three inches in advance the tusk is solid, and the same absence of pulp-cavity is shown at the smaller end, where the final consolidation is indicated by a dark spot. On the surface of this portion of tusk, where the cement is wanting, the longitudinal lineation of the outer layer of dentine has become fainter.

The third portion (ib., figs. 7, 8) is from near the apical extremity of the tusk; it is solid and the outer layers of dentine, coated by the smooth cement, are partially

future enterprise lead travellers to that quarter, it will be deserving their while to push the enquiry further and add more evidence regarding the existence of the Mastodontoid animals of New Holland." —'Physical Description of New South Wales and Van Dieman's Land,' 8vo., London, 1845, p. 312.

Subsequent unintermitting correspondence in relation to discovery and acquisition of Australian fossil remains have failed to bring to my notice any evidence of a Proboscidian Mammal before the reception of the subjects of the present communication.

preserved. At the larger end (ib., fig. 8) the diameters are 1 inch 4 lines and 1 inch 1 line; at the smaller end they are 9 lines and 6 lines; but here a line's breadth should be added to both admeasurements, through lack of the outer layers of ivory with its thin coating of smooth cement.

Besides the three portions of tusk above described many fragments remained after the adjustment of the pieces forming the parts of the tusk figured in Plate 51. I estimate the length of the part of the tusk collected by Mr. ISAAC and transmitted to me at 16 inches; adding the portion wanted to connect the part fig. 5, with the part fig. 7, about 2 feet in length of the tusk would be represented. The size of the pulp-cavity in figs. 1–3 indicates the portion so figured to have come from near the exit of the tusk from its socket. Of some of the detached fragments microscopical sections have been made.

These sections of dentinal (Plate 51, figs. 9, 10) and cemental (ib., fig. 11) portions of the tusk demonstrate the characteristic structures of these tissues, which have been described by RETZIUS* and myself.†

The dentinal tubes present, at a little distance from the pulp-cavity, the characteristic minute size—$\frac{1}{5000}$th of an inch in diameter; and soon, as they recede toward the cement, show the peculiar, strong undulatory course (fig. 9) answering to the easier "secondary curves" of those tubes in the dentine of most other kinds of Mammalian teeth. The degree of curvature in the ivory of the present extinct Proboscidian is even greater in the section of the fossil ivory here figured (fig. 9) than in the section of recent ivory of the Indian Elephant, the subject of plate 149, *d*, in the 'Odontography.'‡ In the section of dentine shown by the higher power (fig. 10), are seen the strata of extremely minute opaque cells, unusually numerous in ivory, in the interspaces of the tubes.

The cemental part of the fossil repeats the elephantine characters: the radiated cells (fig. 11) are larger, averaging $\frac{1}{2500}$th of an inch in diameter, and are more uniform in size and shape than in most other Mammalian teeth; they also show, in transverse section, the circular figure characteristic of Proboscidian incisors.§

Fractured portions of a single tooth may seem to be a slender basis for predicating of a wider geographical distribution of the Proboscidian order than has, hitherto, been assigned to it. And, moreover, if the rest of the elephantine structures should be conformable, as I presume they would be, we here have, supposing the Dingo to be a human introduction into the Australian continent, a gyrencephalous exception to the characteristic aboriginal Mammalian organisation of that remote southern continent. I am encouraged, however, to submit the present evidence to the Society, by the successive

* Mikroskopiska Undersökningar öfver Jädernes särdeles Tandbenets struktur. Stockholm, 1837.

† 'Odontography,' 4to., 1840–45.

‡ Ibid.

§ Ibid., p. 641.

confirmations of the previously hugest known extinct Marsupial, ultimately establishing the ordinal, generic, and specific characters of *Diprotodon australis*, of which the primal indication was but a portion of a tusk.* This tusk, however, was evidently one of a pair which had issued in an almost horizontal direction from the symphysis of the lower jaw : and both incisors had been partially coated with true enamel. Such indication bespoke a species akin to the still existing pouched quadrupeds of Australia, represented by the Wombats and Kangaroos.

The initial fossil, large as it seemed, proved afterwards to be part of an immature individual. It was obtained, as is well known, from a cavern, which had been haunted by the largest known marsupial Carnivore (*Thylacoleo*) ; and the relations to the locality and companion fossils recalled those of the remains of Elephants and Rhinoceroses which have been a prey to spelæan Lions haunting the caves in our own island.

And here I may remark that the cave in Wellington Valley, originally discovered and explored by Major Sir THOMAS MITCHELL, F.G.S., has since, by the enlightened liberality of the Government of New South Wales, been subjected to a more searching exploration by the accomplished naturalist and curator of the Museum of Natural History at Sydney, ED. P. RAMSAY, F.L.S.

Among the additional evidences of the *Thylacoleo*—the only carnivore to which could be referred the introduction of immature Diprotodons whose remains showed indications that they had fallen a prey—was a portion of the cranium with the articular cavity for the lower jaw. This, instead of the shallow undulatory surface of the vegetarian Marsupials, showed the deep transversely extended groove for the reception of the transversely extended fore-and-aft convexity of the mandibular condyle : the joint thus conforming, as in the Felines, with the carnassial character of the dentition of *Thylacoleo*.

As, year by year, further evidences arrived contributing to the restoration of *Diprotodon*, it may be hoped that similar materials for the reconstruction of *Notelephas australis* may reach this country.

* Appendix to 'Three Expeditions into the Interior of Eastern Australia,' by Sir THOMAS MITCHELL, F.G.S., Surveyor-General of Australia; vol. ii., 8vo., 1838, plate 31, fig. 1.

Description of the Plate.

PLATE 51.

Notelephas australis.

Fig. 1. Side view of the basal part of the tusk.
Fig. 2. Ib. of the opposite side of ditto.
Fig. 3. Transversely fractured surface of the basal end of ditto.
Fig. 4. Ib. of the opposite end of ditto.
Fig. 5. Side view of the succeeding portion of the tusk.
Fig. 6. Transversely fractured end view of ditto.
Fig. 7. Side view of a terminal portion of the tusk.
Fig. 8. Transversely fractured surface of the basal end of ditto.
Fig. 9. Longitudinal section of dentine, magnified 50 diameters.
Fig. 10. Ib. ib., magnified 8 diameters.
Fig. 11. Transverse section of cement, magnified 90 diameters.

Figs. 1–8 are of the natural size.

Fig. 5.

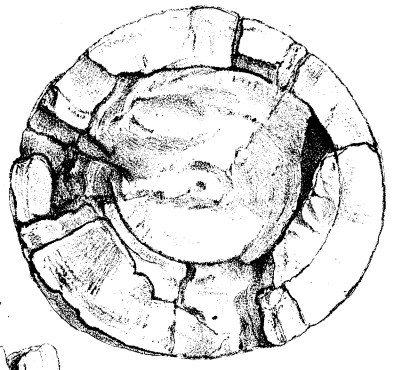
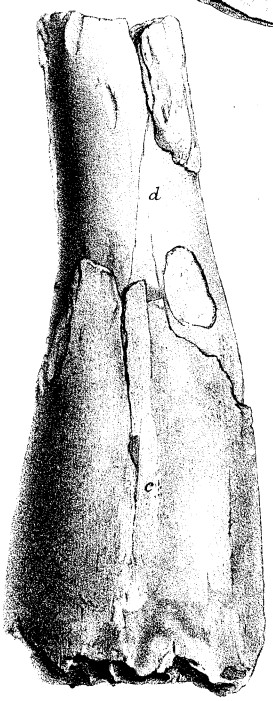


Fig. 6.

Fig. 7.



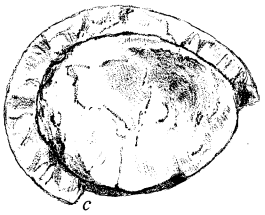
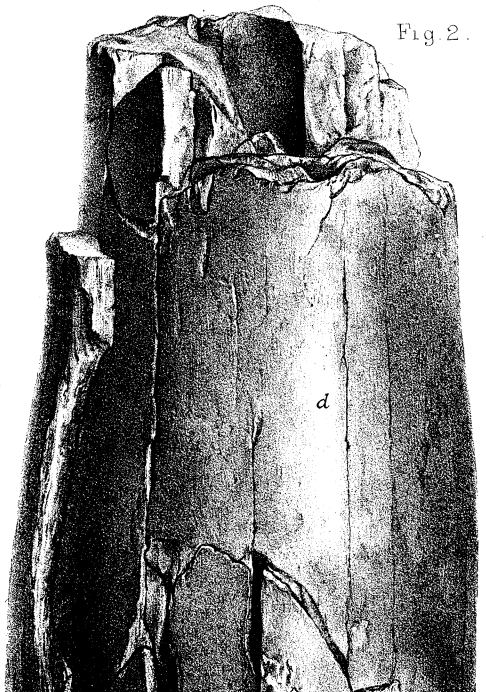


Fig. 8.

Fig. 2.



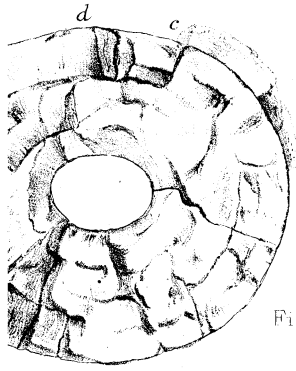


Fig. 4.

Fig. 9.

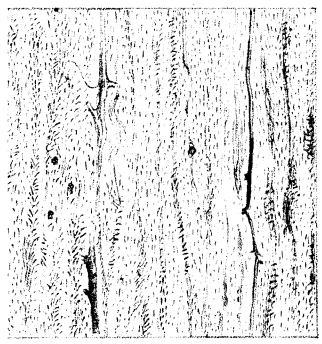


Fig. 10.

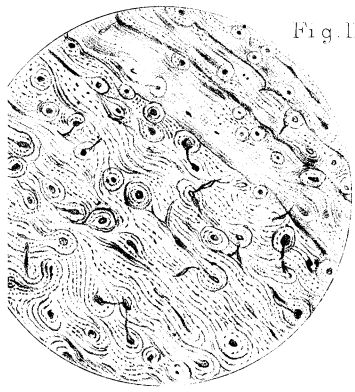


Fig. 11.

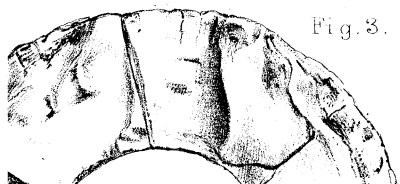
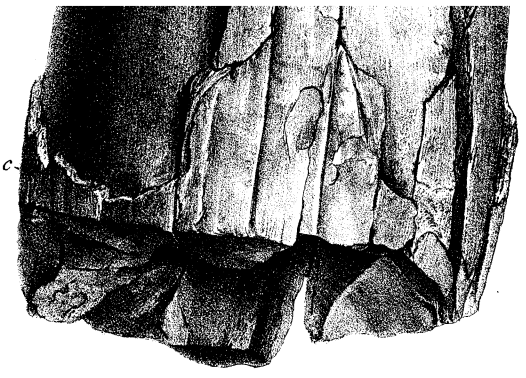
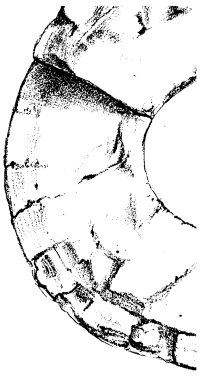


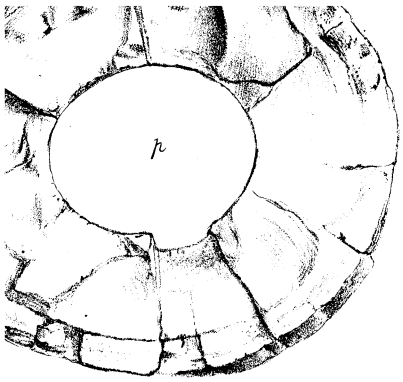
Fig. 3.





W.H. Wesley lith.

Fig. 1.



West, Newman & Co. imp.

Fig. 5.

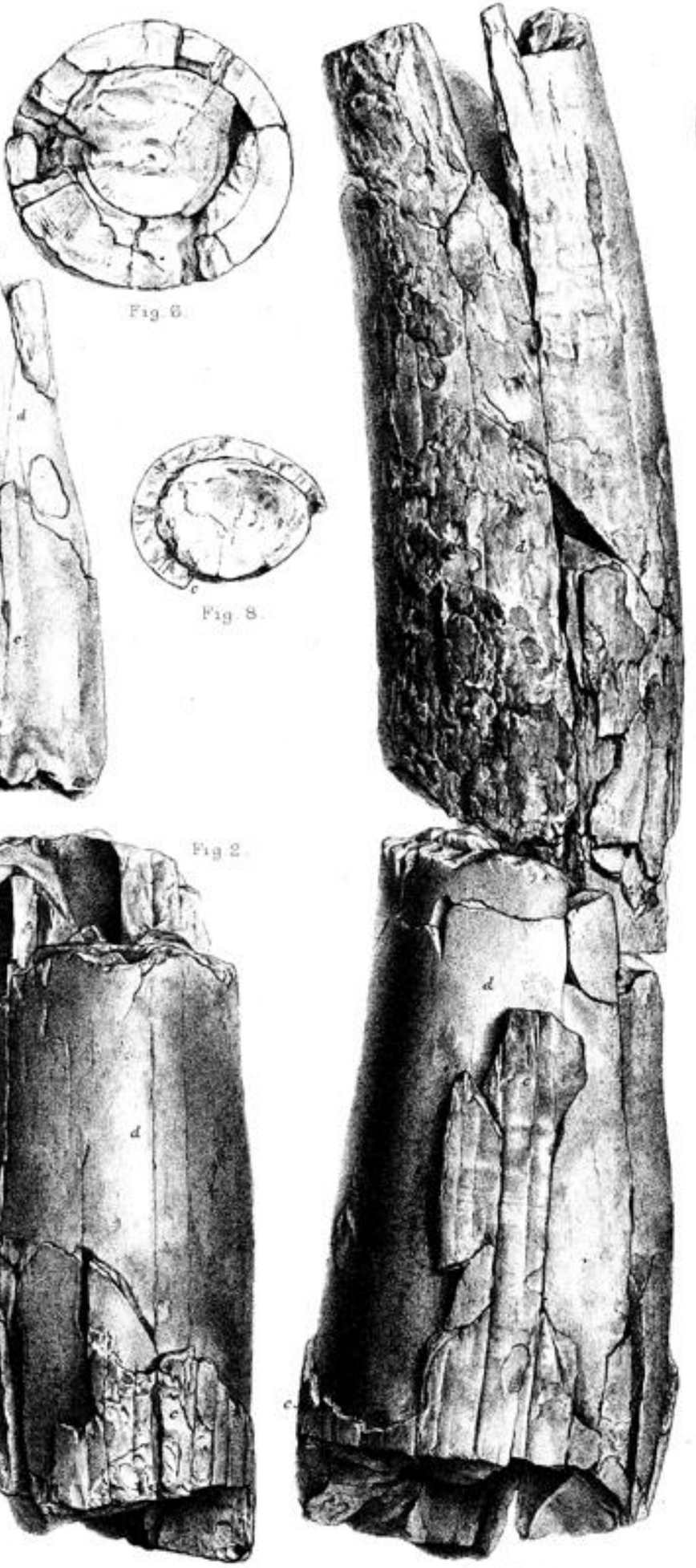


Fig. 1.

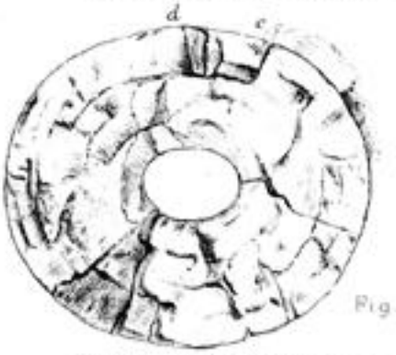


Fig. 4.

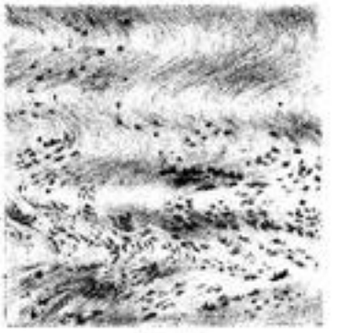


Fig. 9.

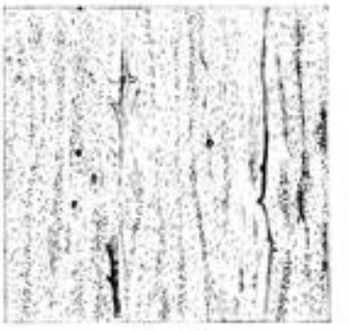


Fig. 10.

Fig. 11.

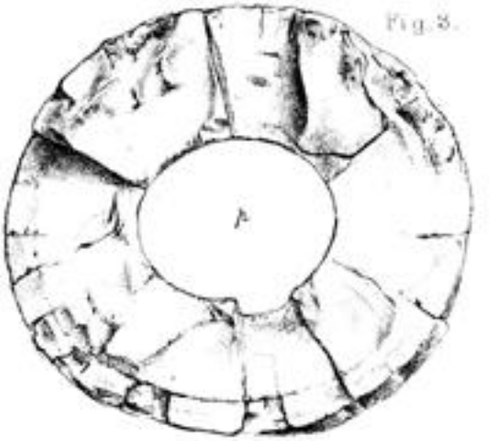


Fig. 3.

Fig. 7.

Fig. 6.

Fig. 8.

Fig. 2.