

of an arch, every alternate couple only being connected together; the intermediate two timbers being unconnected, and resting upon, instead of supporting, the outer planking. The mode of joining the different pieces of the same rib is also highly objectionable. It is effected by the introduction of a wedge-piece, by which the grain of the rib pieces is much cut, and the general fabric weakened, with a great consumption of materials. The object of the introduction of these *wedge pieces* or *chocks*, is to procure the curvature requisite in forming a ship, when crooked timber is scarce; but the curve may be equally obtained by a different arrangement of materials, and with less consumption of useful timber.

After pointing out several other defects and disadvantages arising out of the present mode of building mercantile ships, Sir Robert proceeds to consider the best means of obviating them. He employs shorter lengths of timber and of less curvature, consequently less grain-cut, and their ends are connected by coaks or dowels, instead of wedge pieces. In the event of a ship grounding, such a construction is much better adapted to give support and strength to the fabric than the former.

The advantages of this new principle in practice appear from a report of the officers of Woolwich Yard to the Navy Board, relating to a comparison of the *Talavera*, built upon the improved construction, with the *Black Prince*, constructed in the usual way. Another important circumstance relating to the *Talavera* is, that her frame consists of small timber, hitherto considered as only applicable to frigates, but which, when properly combined, may, in Sir Robert's opinion, be rendered equal in strength and economy to the large and often grain-cut materials used in the frames of large ships.

Several drawings accompany this paper, the inspection of which is requisite to render the further details which it contains intelligible.

*On the Milk Tusks, and Organ of Hearing of the Dugong.* By Sir Everard Home, Bart. V.P.R.S. Read April 13, 1820. [*Phil. Trans.* 1820, p. 144.]

The skull upon which the following observations were made, was sent to the author from Sumatra by Sir Thomas Stamford Raffles, and is the only perfect specimen in Europe. The milk tusks were first examined; and as their points only were visible, one of the bony canals in which the tusk is contained was laid open: it was removed from its socket, and cut through longitudinally, when it appeared similar to the milk tusks of the narwhale and elephant, and like them deficient in external smoothness as compared with the permanent tusks.

The milk tusk of the dugong is peculiar in having a shallow cup attached to its base, apparently for the purpose of receiving the point of the permanent tusk as soon as formed; and as the milk tusk advances in the act of being shed, the other may be directed forwards in the same course, which differs from that in which it set out.

The milk tusks of the dugong have hitherto been mistaken for its permanent tusks, the appearance of which is unknown, since no full-grown skull has hitherto been examined. The grinding teeth differ from those of any other known animal: they consist of a double cone, the external crust of which is not enamel, and covers an interior harder coat; the bulk of the tooth consisting of soft ivory, so that in wearing down, these teeth will be formed into a concave surface.

The organ of hearing presents a peculiarity, says the author, unknown in any other tribe of animals; the malleus and incus being fastened to the sides of the tympanum by a bony substance extending across the intervening space; the stapes is opposed to, but not connected with the foramen of the incus; the handle of the malleus projects in the centre of the circle over which the membrana tympani had been spread, so that in the perfect animal it is doubtless attached to the centre of the membrane.

The habits of the dugong being allied to those of the hippopotamus, Sir Everard was induced to examine how far this peculiarity of structure might exist in the latter animal; it is, however, perfectly different, the ossicula in the ear of the hippopotamus being separate, and readily dropping out of the cavity of the tympanum. The ossicula of the hippopotamus are small compared with the size of the animal; but the cochlea makes two turns and a half, which is uncommon. The semicircular canals present no apparent peculiarity. In the dugong the semicircular canals are extremely small, as is the cochlea, which only makes one turn and a half.

The peculiar bony union of the ossicula of the ear with the skull renders it probable that this animal is more indebted for its hearing, than any other that lives in the water, to the vibrations received by the bones of the skull being communicated to the ossicula, and thence to the cochlea and canals.

*Upon the different Qualities of the Alburnum of Spring and Winter-felled Oak Trees.* By Thomas Andrew Knight, Esq. F.R.S. Read April 20, 1820. [*Phil. Trans.* 1820, *p.* 156.]

It has long been believed that oak timber felled in winter is superior to that felled in spring; but the cause of the superiority has not been inquired into, and the practice of winter-felling has been discontinued, in consequence of the superior value of the spring bark.

In the spring of 1817, the author selected two oak trees, not quite a century old, and growing near each other: the one was barked and suffered to remain standing; the other felled, and being immediately stripped of bark, was placed in a situation protected from sun and rain. The following December, the other tree, still alive, was cut down, placed in the same situation, and pieces of each, from similar parts, were subjected to the following experiments, at different subsequent periods.