

FIG. 1.  $\frac{1}{4}$  NAT. SIZE.

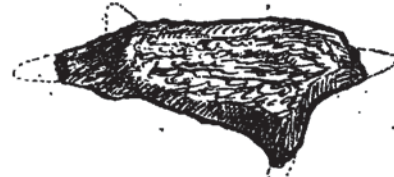
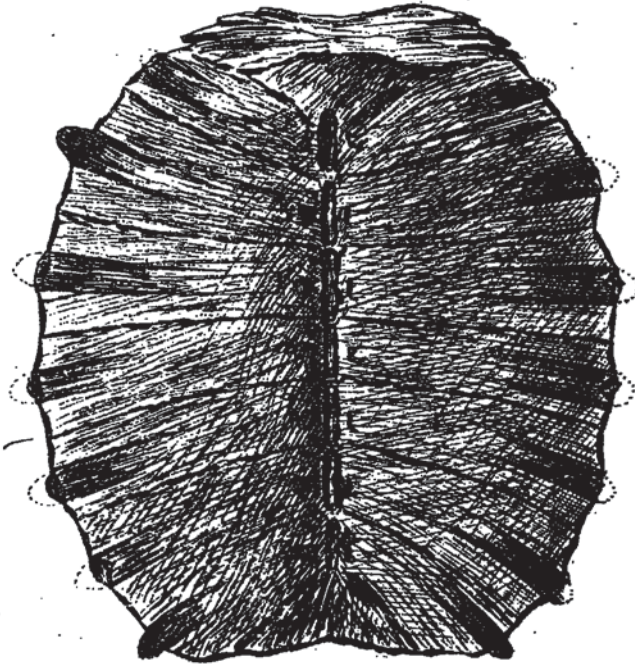


FIG. 2.  $\frac{1}{2}$  NAT. SIZE.

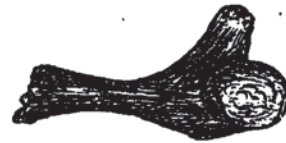


FIG. 3.  $\frac{1}{2}$  NAT. SIZE.

TRIONYX INCRASSATUS. BEMBRIDGE BEDS, THORNESS BAY, I.W.

G.W.C. del.

WILSON LITHO.

THE FOSSIL CHELONIANS OF THE  
OLIGOCENE STRATA OF THE ISLE  
OF WIGHT.

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BY G. W. COLENUTT.

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In studying the organic remains from the Headon, the Osborne, the Bembridge, and the Hamstead beds, one is often struck with the similarity of the types of life which existed during the deposition of the various strata; and this resemblance is more particularly marked in the three uppermost series, the Headon beds being rather more distinct in their characteristics. So clearly have geologists come to recognise this pervading resemblance among the embedded fossils, that Professor Forbes's very useful division of the strata into the above named four groups has been more clearly defined by the application of the term "Oligocene" to all the clays and sand above the Upper Bagshots, the old term "Eocene" being still applied to the older Tertiaries. Thus these deposits have become recognised as virtually the representatives of one period, for their fossils resemble each other so closely, and so frequently pass from one horizon to another, that any hard and fast dividing line between the beds is misleading. This of course is excepting the marine band of the Middle Headon, which is distinct from the beds above or below it, and also excepting the limestone of the Bembridge beds, which is of a distinct and peculiar nature, and retains its features throughout its entire extent.

Foremost among the animals, the remains of which occur in all the groups of the Oligocene, we may especially notice the turtles or chelonians, which lived in large numbers in the

waters where most of the Oligocene clays were deposited. The peculiar structure of the chelonians, the remarkable developments and adaptations of their bony skeleton, and the unique economy of their organization render the study of the living and fossil members of this order of especial interest. The lateral growth of the ribs, forming with the vertebral column a hard bony shell or carapace, and the immense development of the sternum or breast-bone into a similar covering on the under side of the body, have completely altered the relative positions of the parts of the skeleton. The scapula and the clavicle are both absent, or absorbed into the external bony covering, their places and functions being taken by the scapular arch which provides a basis on which the fore limbs are supported. The cervical vertebræ are provided with a singular jointing, and the neck with suitable muscles, enabling the animal to completely withdraw its head beneath the carapace, the limbs being at the same time also withdrawn beneath the shell. Singular also are the characteristics of the jaws—there are no teeth, the edges of the jaws being cased in horn, thus forming a kind of beak.

As might be imagined from the indestructible nature of the skeleton, the remains of turtles are by no means uncommon in a fossil state, some of the best preserved specimens being found in our Oligocene clays and marls. The turtles range back as far as the Jurassic series, but they do not appear to have approached their zenith until the Tertiary age, while at the present time the living members of this order range over more extended areas and consist of more species than in any previous period.

In the Oligocene beds of the Isle of Wight we find the remains of three chelonians. The most common is *Trionyx incrassatus*, a form nearly related to the recent *Trionyx* or mud turtle of North America. The fragments of the carapace and thoracic plates of this species are often met with in most of the Oligocene clays, and they may be at once identified by the peculiar granulated outside surface. The *Trionycidæ* were singular in having a carapace which did not cover the whole of the back, but which formed a large oval plate, around which the leathery skin of the animal projected.

The ends of the ribs protruded from the sides of the carapace in the manner shown in Fig. 1. The plastron was not attached along its sides to the carapace, as was the case in the *Emydidæ* and from its edge projected several bony spikes, the use of which is obscure. In addition to the plastron there were several dermal plates on the under side of the body, and apparently unattached to the internal skeleton. One of these plates is shown in Fig. 2.

Almost as common as those of *Trionyx* are the remains of *Emys*, a being which inhabited in great numbers the shallow lagoons and tidal rivers of this epoch. Unlike the *Trionyx* the external parts of the skeleton are quite smooth, and when the animal was alive were coated with a horny shell, the fine furrows by which the shell was attached being usually well shown. The range of this species seems even more extensive than the *Trionyx*, and we find its remains in nearly all the beds, from the Hamstead down to the limestones of the Lower Headon. There is a third species of chelonian, the remains of which are comparatively rare, and the outer surface of whose carapace is furrowed in lines, much after the manner of the larger species of recent land tortoises. This is apparently a species of *Platemys* (?) but the means of identification of this species are limited, for so far as I know the chelonidæ of these beds have never been studied in an exhaustive manner. I have met with the remains of this species in several localities, but chiefly in the Osborne beds of King's Quay and in the Bembridge marls of Thorness Bay.

All along the north shore of the Island plenty of fragments of plates of *Emys* and *Trionyx* may be found among the shingle on the beach, having been washed out of the clays of the Hamstead, Bembridge, and Osborne series, which crop out in the cliffs. The bones may often be found embedded *in situ* in the clay strata, more especially along Hamstead cliff and in Thorness Bay. On the shore at the base of Hamstead cliff the clays are very prolific in organic remains; and this bit of coast is of great interest, inasmuch as it is almost the only locality where anything like a workable section of the Hamstead beds can be examined. Here we can begin at the "black band" and work our way up through

the various beds of the series. There are very few other places in the Island where we can get at these clays at all, except at Hamstead itself; in the brick pit at Ashlake, near Wootton Bridge, however, we find the black band well exposed, and from it plenty of the characteristic shells may be obtained; also at Alverstone brickyard some portion of the Hamstead beds may be seen. Just below the coastguard's hut, on the top of the cliff above Sticelet Ledge, at the north east corner of Thorness Bay, the black band is also exposed, but only extends for a short distance. With these few exceptions the Hamstead beds are difficult of access, though Mr. Clement Reid, in the course of the recent geological survey of the Island, has demonstrated their existence over a very large part of the northern half of our area—a fact previously unknown.\*

From the Osborne beds on the shore below Chapelcorner Copse, near King's Quay, I have obtained many very interesting turtle remains, among the more noticeable being a fine cervical vertebra of a large *Trionyx*; this bone shows admirably the peculiar arrangement of hinges or jointing, enabling the creature to swiftly withdraw its neck. From this place I have also obtained a perfect rib of *Trionyx*, and also nearly the whole of the half of one of the thoracic plates, showing the peculiar bony points or spikes projecting at the end of the plate. Many fragments of carapace and a few imperfect limb bones were also found here. The remains of all three species of chelonians have been found in these beds, which is easily accounted for, as the Osborne clays were more or less estuarine in their origin; animals of various and diverse habits would therefore naturally come within the area of deposit.

The Bembridge beds, however, are the most prolific in yielding turtle remains, and Thorness Bay is one of the best localities for examining the strata. The clays on the shore below Burnt Wood are peculiarly rich in fossils, and from this place I have been fortunate in obtaining a number of most interesting specimens. There is one particular seam of clay about an inch thick, largely composed of comminuted

\* Memoirs Geol. Survey. Geology of the Isle of Wight, by H. W. Bristow, 2nd ed., by C. Reid and A. Strahan, 1889, p. 184.

*Melania muricata* and *Melania turritissima*, which is quite a store-house for the geologist. It occurs in the cliff below Burnt Wood, and is easily traced down into the beach and out below the shingle towards low water mark. It rises up gradually from east to west, and the best place for examining it is of course where it flattens out on the shore below the shingle, but here it is sometimes covered by a thin layer of sand and mud. When it is well exposed, however, fish vertebræ and other fossils may generally be met with in abundance. The most interesting turtle bones which I have ever found have been from this one thin seam. As might be expected, the most common bones are those forming the carapace and plastron, and the fragments washed out of the clay may be found in plenty in the shingle at Thorness Bay. The limb bones are not common, while the bones of the head are rare and as a rule very badly preserved. On one occasion the hinder end of the carapace of a *Trionyx* was found in this seam; it has the last two pairs of ribs and the flattened end of the carapace between them, with the last joint of the vertebral column. In the summer of 1887 I came across, in the same seam of shelly clay, what was evidently the head and several cervical vertebræ, with portions of the bones of the fore limbs of a turtle. The salt water had unfortunately made the bones very friable and rotten, and it was impossible to extract them whole. Two sides of the lower jaw, what is evidently the top portion of the cranium, and the larger portions of several cervical vertebræ were extracted in fairly good condition, together with parts of the scapular arch. The bones were mostly softer than the clay and therefore very difficult to deal with. The finding of these bones was of much interest, as it was the only occasion on which I had found so much of the skeleton of a turtle at one time. It is a matter of difficulty to say whether these remains are those of *Trionyx* or *Emys*; from the granulated surface of the cranium I believe them to be *Trionyx*. On the 12th July, 1888, I was fortunate to find, in the same seam again, and in the same locality, what I believe to be the most perfect *Trionyx* hitherto obtained from our Island Tertiaries—or indeed any other strata. It consists of the perfect carapace, which measures 14 inches in

length by  $12\frac{1}{2}$  inches in breadth, and which apparently belonged to a half-grown individual; also two of the dermal thoracic plates; the larger part of the scapular arch; a number of limb-bones, consisting of a femur (of which, unfortunately, the lower end was lost in getting it out of the clay), two bones which are apparently the tibia and either the radius or the ulna, and six small bones of the feet, together with several portions of bones whose exact places in the skeleton it is impossible to determine. The identification of the bones is a matter of some difficulty, for I am not aware that the osteology of the fossil *Trionycidae* has ever been thoroughly worked out. Excepting one corner of the carapace the whole of these interesting and valuable remains were in a good state of preservation. The work of extracting the carapace from the seam of shelly clay was a matter of great difficulty, but success was ultimately attained and the specimen is now almost as perfect as when first found. So far as I have been able to ascertain this is the most complete skeleton of *Trionyx* which has hitherto been discovered, and I think its occurrence well merits recording in the Proceedings of the Field Club. The illustration Fig. I shows the underside of the carapace; Fig. II one of the thoracic plates; and Fig. III the femur.

The most notable of the remains of *Emys* from the Oligocene are, I believe, those found at Whitecliff Bay by Mr. H. Loe, of Brading. They consist of parts of the skeletons of two individuals, about half grown. In one case the carapace and the plastron are almost perfect, and in the other case most of the carapace and the larger part of the plastron are present. The dimensions of the carapaces in both specimens are about 12 inches in length by 9 inches in breadth. No limb bones were found with these remains, and the exact horizon in which they occurred is unfortunately unknown, the fragments of bone being all found scattered about on the sliding talus about 30 feet above the Bembridge Limestone, at the northern end of Whitecliff Bay. The remains are all of a pale cream colour, and it might therefore be supposed that they came from one of the many bands of light coloured marly clay which occur some distance above the limestone. With great ingenuity and patience Mr. Loe

has fastened the fragments together until now the specimens are nearly perfect and are of great importance, being probably the most entire fossils of their kind hitherto found in the Oligocene Beds.

It is much to be regretted that the many valuable fossils which have from time to time been found in the Island have been scattered and distributed out of reach. In consequence when working out the details of a particular Order like the *Chelonida* one is compelled to plod along in the dark, with no possible means of ascertaining the extent of the records of former discoveries. This, however, should not act as a deterrent to the local geologist, for in our Oligocene Beds alone there is ample scope for all his energies, and there are very many interesting groups besides the *Chelonida*, which will well repay the labour and study he may expend upon them.

