Feature

Fossils as Neolithic funereal adornments in County Kerry, south-west Ireland

Argument rages in the media on the effects of road-building on sites of archaeological importance. Certainly there have been many cases where sites of value have been lost, but others where sites of importance have been revealed that would probably have gone undetected for a considerable time, if not for ever. One example of a lucky discovery arose from a proposal to widen the road between the towns of Tralee and Killarney in County Kerry, south-west Ireland. A preliminary archaeological survey carried out along the route in 1996 revealed an area of exceptional archaeological richness. What was particularly surprising was that one feature contained a significant collection of fossils used for funereal or ceremonial purposes.

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On a small limestone hillside, 3.5 km east of Tralee, the county town of Kerry (Fig. 1), in the townland of Ballycarty, was found a complex of structures that included ditches, ramparts, enclosures, stone cairns and small mounds. While most of these structures were outside the line of the proposed motorway, the westernmost mound was directly threatened by its construction. Consequently, it was decided to excavate this mound during a four-month period in the summer of 1996.

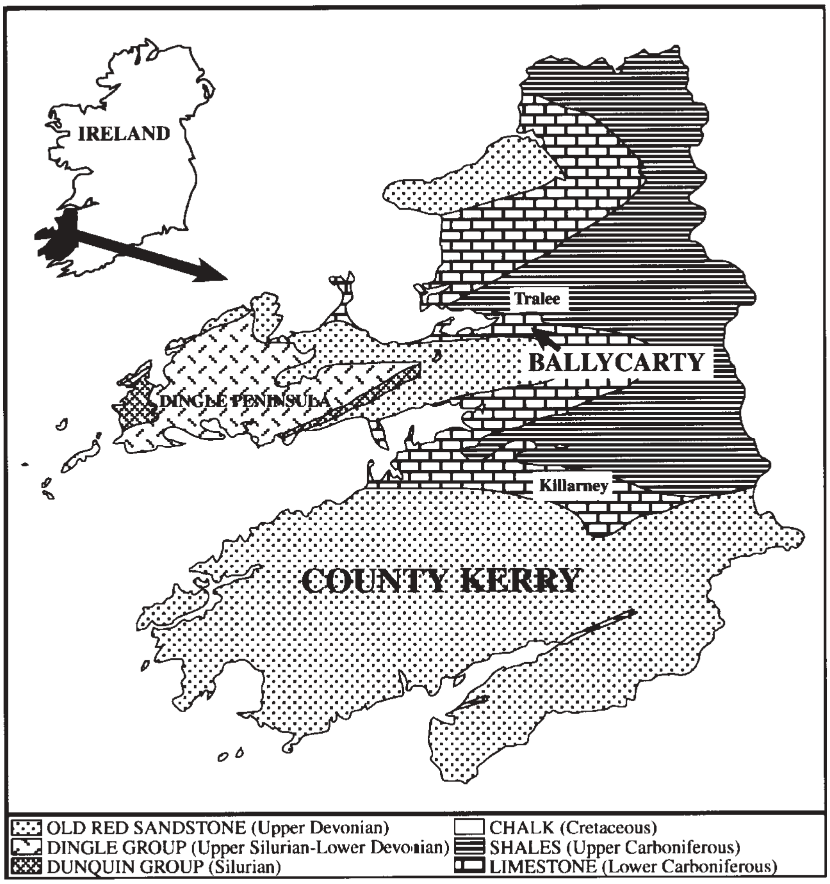

Fig. 1. Geology of the Tralee area, showing the location of the Ballycarty passage tomb.

Under the direction of one of us (Michael Connolly, then of the Kerry County Museum in Tralee), this excavation showed, surprisingly, that the mound was in fact a passage tomb. This startled the archaeologists because, hitherto, passage tombs were not known from western Ireland. These tombs date from the Neolithic and were built somewhere between 3000 and 2500 BC. While some are more complex than others, all follow a general plan; they comprise a mound of stones (now covered in earth) in which a narrow passage penetrates to a small chamber or number of chambers in the centre. Here, the cremated remains of the dead were placed. The most famous tombs of this type were those found in eastern Ireland, particularly at Newgrange and Knowth in the Boyne valley. The passage tomb at Ballycarty is now the most western example known in Europe.

The importance of the Ballycarty passage tomb from a palaeontological perspective is that numerous loose fossils were discovered both in the cairn fill that lay above the passage tomb and within the burial chamber itself. Their presence indicated that the builders of the structure held the objects to have some significance; they are the earliest example of fossils being used as funereal objects, and considerably predate similar occurrences in southern England.

Geological setting of the Ballycarty passage tomb

The area between Tralee and Castleisland to the east (the Vale of Tralee) and the Magharees and Camp on the Dingle Peninsula to the west (Fig. 1) is underlain by a succession of limestones and shales that were deposited during the Lower Carboniferous. This narrow strip of low-lying terrain is sandwiched between areas of considerable topographical relief to the north-east and to the south. Older sediments, including the Old Red Sandstone of Devonian age which forms the bulk of the Slieve Mish Mountains, are exposed to the south, while to the north-east younger black shales that were deposited during the Upper Carboniferous form the Stacks Mountains.

Ballycarty is underlain by Waulsortian Limestone of early Carboniferous age, which in the Tralee area reaches 600 m in thickness. Within this unit occurs limestone of two differing styles. At the base of the unit are well-bedded limestones of the Castleisland Limestone, which are pale grey in colour, partially dolomitized in parts and highly fossiliferous with corals, goniatites, nautiloids and brachiopods. These bedded limestones grade or interdigitate with developments of unbedded, massive, pale grey limestone which formed discrete banks of aggregrated lime mud known as Waulsortian mudmounds.

Waulsortian mudmounds are found in western Europe, North America and Asia. In Ireland, they were most extensively developed. They grew from the seabed through the accumulation of limey mud, and developed relief of up to 200 m. Waulsortian mudmounds occurred individually, where they reached a thickness of several tens of metres and an area of several hundreds of metres, or as large banks, where several coalesced, with thicknesses of 1 km and areal extent of 30 000 km^2. Waulsortian limestones contain abundant and diverse fossil assemblages, the distribution of which is often depth-determined; bryozoans and crinoids are most common in basal portions while formaminifera and algae are found in upper portions. Bryozoans, brachiopods, cephalopods and gastropods are common while corals are rare.

Geology of the Ballycarty passage tomb

At Ballycarty, a Waulsortian mudmound now forms a low hill on which the passage tomb is located. The tomb is constructed of Waulsortian limestone which was collected from the immediate area. Natural joints, which trend broadly in an east–west orientation, developed in the limestone and these allowed the builders of the tomb to extract large blocks of stone without having to break or work it. The boulders are irregular to regular in shape and average 75 cm in length, width and height. The natural, flat, joint surfaces of the boulders have been aligned to form the smooth interior walls of the passage and chamber. In some cases, irregular boulders and cobbles of varying dimensions were used to infill the cavity between the outer facing stones of the walls.

The building of Ballycarty passage tomb

The passage tomb comprises three circles of stones which are pierced with an entrance and passage at their western side (Fig. 2). The tomb shows evidence of having been constructed in three phases (Fig. 3). The outer circle is approximately 7 m in diameter, while the smallest innermost circle of stones is 4 m in

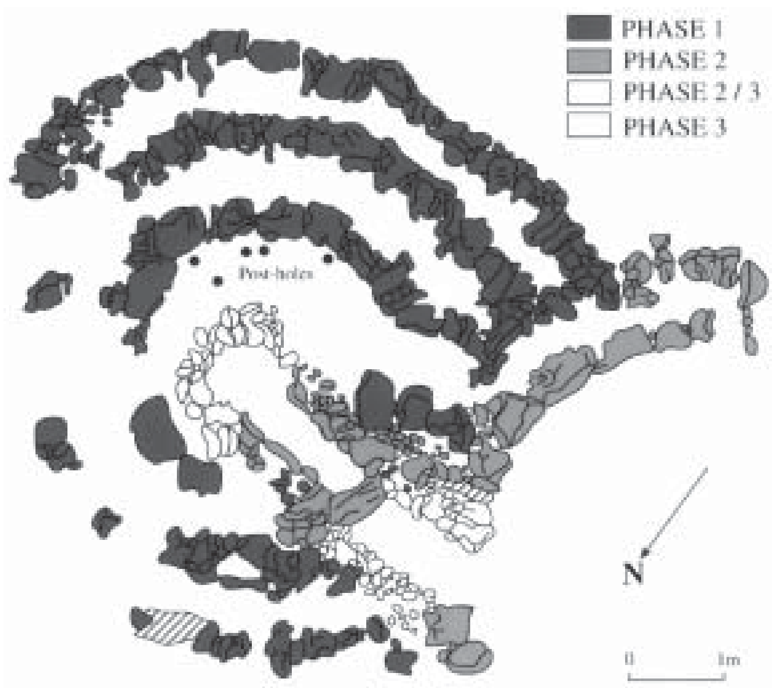

Fig. 2. (right, above) Aerial view of the Ballycarty passage tomb from the south.

Fig. 3. (right, below) Phases of the building of the Ballycarty passage tomb.

diameter. These three stone circles were constructed in Phase 1. A curved wall closed the margins of the outer two stone circles and led to the opening of the tomb. A short passage of approximately 1 m in length led to the inner burial chamber. Some time later, the passage tomb was altered and a new entrance and burial chamber were constructed in Phases 2 and 3. The old entrance was closed off by a wall of large tabular stones and a short passage 1.5 m long led to a small chamber 1 m in diameter inserted in the older and larger chamber of Phase 1. In Phase 3 the passage was elongated towards the west so that it reached 3.5 m at its maximum.

Archaeological finds

A large quantity of material was recovered from the passage tomb during the excavation. This included a stone pendant of Carboniferous limestone which had been bored by marine sponges, a small circular bead carved from deer antler, and a number of rubbing stones of local sandstone that would have been used to sharpen tools of some sort. Pottery fragments and a number of ringed pins were also found. The pins would have been used to tie animal skins together.

Within the tombs, various grave-goods were recovered, including bone and also items placed with the dead. The latter included water-worn stones which were probably recovered from local river beds, the antler disc and the limestone pendant. Present too were bones of dogs, cattle, sheep, pigs and birds such as corncrakes and song thrushes. Two human bones, a portion of the mastoid process from the base of the skull and a part of an adult ulna, also showing evidence of cremation, were found. The small number of human bones recovered suggests that the bodies were cremated elsewhere and that only small portions were interred during the burial ritual at Ballycarty.

Geological and palaeontological finds

Within the chamber of the passage tomb and in the cairn in-fill, a variety of geological objects were recovered. Although the bulk of the material consisted of various Carboniferous fossils (Fig. 4), some other non-fossiliferous specimens – cobbles, nodules and limestone fragments – are also of interest. Two rounded cobbles of Old Red Sandstone (91 mm and 77 mm maximum diameter) from the Slieve Mish Mountains were present. These were derived from local glacial till that covers much of the area. Both have been broken in half, which may have happened if they were used as hand-held tools. A black chert fragment (33 mm in diameter) derived from local Carboniferous limestone, and a quartz crystal (20 mm across) as well as a rounded ironstone nodule (29×15 mm)

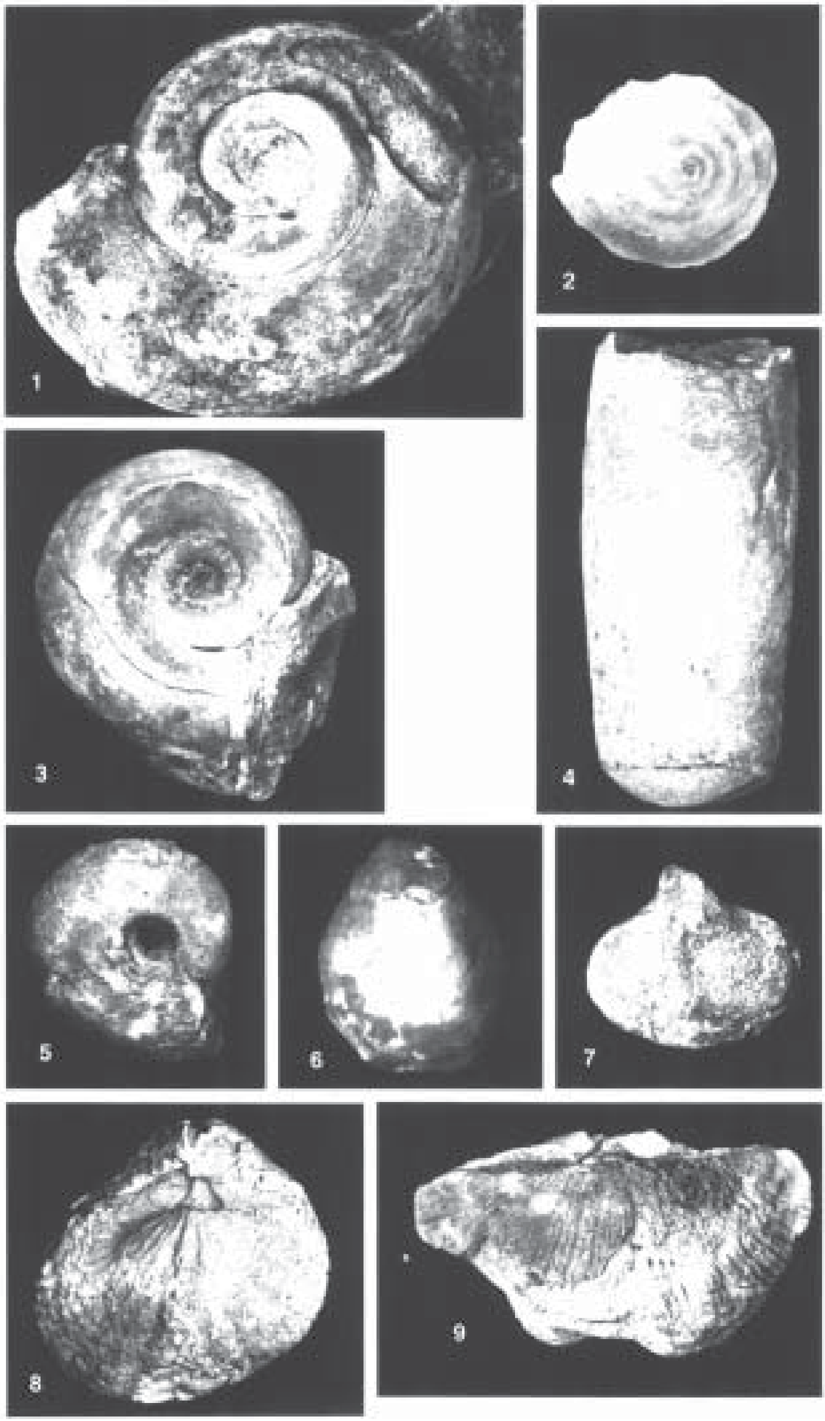

Fig. 4 Fossils from the passage tomb at Ballycarty. A–B, gastropods: A. *Euomphalus pentangulatus*, B. *Flemingia prisca*; C–E, cephalopods: C. *Subvestinautilus crateriformis*, D. orthoconic nautiloid sp. indet., E. *Goniatites* sp.; F–I, brachiopods: F. *Dielasma hastatum*, G. *Martina glabra*, H. *Brachythris pinguis*, I. *Spirifera striatus*. (All $\times 1.2$).

Table 1. Carboniferous fossils recovered from the Ballycarty passage tomb.

Brachiopods
Productoids: *Eomarginifera* sp., *Productus* sp.
Spirifids: *Brachythris pinguis*, *Martina glabra*, *Spirifera striatus*.
Terebratulids: *Dielasma hastatum*.

Cephalopods
Orthoconic nautiloids (straight shelled): *Kionoceras* sp., Orthoconic nautiloid spp. indet.
Cyrtoconic nautiloids (curved shelled): *Eusthenoceras* sp.
Coiled nautiloids (coiled shelled): *Epidomatoceras* sp., *Maccoyoceras* sp., *Subvestinautilus crateriformis*, Coiled nautiloid sp. indet.
Goniatites: *Goniatites* sp.

Gastropods: *Euomphalus pentangulatus*, *Naticopsis* sp., *Flemingia prisca*.
Bryozoans: *Fenestella s.l.* spp.
Crinoids: Crinoid stems.

derived from Upper Carboniferous rocks (probably from the north-east) were located inside the chamber.

However, the fossils found at Ballycarty are the most significant from a geological viewpoint. All the fossils were derived from the Waulsortian limestone and were probably collected on the site or close by. Most of the fossils have a slightly roughened surface texture, which indicates that they were exposed on the surface for some time. This, together with the development of soil generally, loosens the fossils from the surrounding rock matrix, which would have made it relatively easy for the builders of the passage grave to winkle out complete or near-complete specimens. Only one, *Naticopsis*, a large gastropod, shows some fresh broken surfaces, which may have been where matrix was broken away by the collector.

The diversity is quite rich (see Table 1) with at least six brachiopod species present, six or seven orthoconoic and cyrotconic nautiloid cephalopods, three gastropods, crinoids, and various bryozoan species.

Significance of the fossils as funereal objects

For many thousands of years, fossils have been noticed by man; and it is thought that by the 6th century BC the Greeks had worked out the connection between fossils and living organisms, the Chinese probably having done likewise. When Pythagoras noticed shells in mountainous rocks, he deduced that the mountains must have been below sea level at some time in the past. Pliny the Elder, who lived from 23 to 79 AD, noted several fossils, including shells and sponges, and correctly attributed amber to pine trees.

However, Pliny also, and incorrectly, described fossil sea urchins as snake eggs, which were reputed to be strong antidotes against snake poison, and sharks' teeth as tongue-stones. The latter were correctly described some 16 centuries later by the Italian Fabio Colonna (1567–1650).

Throughout medieval times, it appears that the true nature of fossils was unknown to researchers, and legends and folklore grew up about various fossils. In popular folklore, many fossils were given names that alluded to their supposed origin. In England, pointed shells of the cephalopod belemnites were thought to be petrified thunder bolts on account of their shape; the bivalve *Gryphaea arcuata*, commonly found in rocks around the River Severn, was called the Devil's toenail; the echinoid *Micraster* has a heart-shaped shell known to local people on the south coast of England as a fairy loaf; and crinoid stems were known as screwstones.

There have been few examples of fossils having been used by early man for decoration and adornment. Fossils have been reported from a number of Upper Palaeolithic and later sites in Europe and North America, where they were used for necklaces and pendants or for other decorative purposes. Necklaces of Tertiary fossils have been recovered from the Upper Palaeolithic burial site at Dolni Vestonice, Moravia; of the small bead-like sponge *Porosphaera* from the Bronze Age site at Higham Marshes, near Gravesend, England; and of the trilobite *Elrathia kingii* from early 19th-century Indian sites in Utah, USA.

Until now, as far as we can ascertain, the earliest recorded occurrence of fossils used for ceremonial purposes in burials in the British Isles were those from the early Bronze Age tumulus on the Dunstable Downs, near the south coast of England, and from a small burial site at Stonepark, near Claremorris, County Mayo, Ireland. At the former, nearly 100 Chalk fossil sea-urchins were discovered surrounding the remains of a woman and a child, and have been interpreted as having had a ceremonial significance. Alternatively perhaps, the fossils may have been thought to constitute a source of food which could be utilized by the internees in any future incarnation. In the 1930s, when a cist-grave at Stonepark was excavated, a specimen of the Carboniferous coral *Michelinia megastoma* was discovered and was thought to have been worn as an amulet. This coral would have been collected by the grave builders from the local Carboniferous bedrock that underlies much of north-west Ireland.

In megalithic tombs in Ireland, beads, pottery, stone pendants and stone balls have been commonly found; it is thought that the last may have been fertility symbols. Uniquely at Ballycarty, loose fossils have been discovered within a Neolithic passage tomb which significantly pre-dates the examples on Dunstable Downs and in County Mayo.

It is not possible that these fossils could have become incorporated into the passage tomb at Ballycarty through natural erosion processes. Rather, they were collected purposely by the builders of the passage tomb and placed within it. What these early builders made of the fossils is impossible to say, but they clearly recognized their unique features and considered them interesting and valuable. It is probable that the fossils were placed with the remains of the dead as ceremonial decorations, ornaments or charms.

Conclusion

A diverse assemblage of Lower Carboniferous fossils has been found in a 4500- to 5000-year-old passage tomb at Ballycarty, County Kerry, and is considered to be the oldest such occurrence yet reported. This pre-dates similar instances in Bronze Age burial chambers by between 500 and 2000 years. The fossils include brachiopods, gastropods and cephalopods and were collected from the immediate area and placed within the tomb by its builders. They probably held some ceremonial or decorative purpose.

Suggestions for further reading

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Feature

A karst of thousands: Jamaica's limestone scenery

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About two-thirds of the surface-rock outcrop of Jamaica consists of Cretaceous and Cenozoic, particularly mid-Tertiary, limestones. The island has been subaerially exposed for less than 10 million years. During this time, a combination of high tropical temperatures and high seasonal rainfall, coupled with widespread jointing and faulting related to the island's position within the North Caribbean Plate Boundary Zone, has led to the development of an impressive karst topography over much of Jamaica.

'The major controls on the development of tropical karst include the limestone, the climate and the relief ... The tropical climate – high rainfall and warm temperatures – produces the two most important constituents for the dissolution of limestone: water and carbon dioxide gas, produced by the abundant vegetation.' (Troester, Back & Mora in Gardner and others, *Geomorphic Systems of North America*, p.357, 1987).

The geology of Jamaica is of interest to different groups of Earth scientists for sundry reasons. Tectonicists recognize the importance of its fault patterns in analysing deformation in the Northern Caribbean Plate Boundary Zone (NCPBZ). Palaeontologists come to Jamaica for a variety of fossils, such as the rudist bivalves of the Cretaceous. However, for the geomorphologist, one word serves to summarize much of the fascination of the island – karst.

M. M. Sweeting noted that 'karst' is a German form of *krâs*, 'a bleak, waterless place' in Slovene. Waterless in this instance is not an obvious reflection of rainfall or climate, but of the absence of surface water; karst regions typically lack surface drainage. Jamaica lies in the humid tropics and has two rainy seasons (April/May and October/November) during which precipitation, which may be further increased by the arrival of tropical storms and hurricanes, is considerable. However, in the karst regions of Jamaica, which approximate to the outcrop area of the Yellow and, particularly, White Limestone groups (Fig. 1), drainage is largely internal, water sinking into underground cavern systems that have evolved