

of around one million beekeepers only thirty use modern hives. The fact that the country has three million primitive hives exemplifies the scope for modernisation of beekeeping in the tropics. But, in addition, many areas in tropical Africa, Asia and America are grossly underpopulated with honeybees, and nectar and pollen resources go to waste.

After the sessions on bees, bee management and handling bee products (especially honey and beeswax), came the final session on apicultural development programmes, and this could usefully have lasted two days instead of four hours. It was the first meeting between representatives of donor agencies (from four continents), specialists in charge of their beekeeping programmes, and counterpart specialists from developing countries. At least 53 beekeeping development programmes have been or are now in operation. Tecwyn Jones (Centre for Overseas Pest Research, Ministry of Overseas Development, UK), who opened the Conference, stressed the advantages of beekeeping as a family-level exercise for the peasant farmer. It requires little financial input, and only a few square metres of land; it can be undertaken by people of almost any age, and the commitment can be variable, from a minimal spare-time one to full-time professional occupation. Even spare-time, it may well provide a peasant farmer with a much larger cash income than his usual full-time farming gives him. And it is environmentally sound; nectar and pollen are rarely utilised to the full unless there are social bees to take them, and beekeeping does not compete with other agricultural activities. Indeed it can greatly enrich them, through the bees' pollination of crops. □

Boats from the past

A Symposium on Boat Archaeology was held at the National Maritime Museum on September 20–24, 1976.

from Lynette Hamblin

BOATS and ships are among the largest and most complex movable structures attempted by man throughout his history, and as such offer much insight into his technical capability and organisation throughout the ages. Boat archaeology, however, is still in its adolescence and the symposium brought together nearly 100 international experts to discuss a number of the basic disciplines relevant to this specialised branch of archaeology. Techniques for recording finds and

presenting information, the problems of building boat replicas, hypothetical reconstructions of boat finds and ancient boatbuilding methods were all covered.

In-depth field recording is essential in any archaeological excavation, particularly in the case of wreck sites underwater, where material which has been perfectly preserved is prone to rapid destruction once on dry land. Whereas objects can be lifted and preserved without overwhelming difficulty, the timber of a ship presents a different problem. Lifting any boat can overstrain the conservation resources of a national museum and, unless special units can be set up to deal with specific craft, it is impracticable to haul hundreds of feet of waterlogged timber out of their protecting environment into an atmosphere where they will quickly twist, warp and ultimately disintegrate if not treated. The great ship of the Egyptian Pharaoh Cheops was preserved for 4,500 years in a bone dry, hermetically sealed pit; in the mere six years since it has been excavated and reconstructed condensation and lack of climatic stability has set up drastic deterioration. The air conditioning in the glass-walled museum that houses it is inadequate and the stress on the rebuilt timbers is proving critical.

As naval architect J. F. Coates pointed out boat reconstructions present many problems. Very often a boat find consists of only the bottom of the hull and one, if not both, ends may be missing too.

The Bronze Age boats found at North Ferriby present reconstructors with many puzzles. Nearly all the main pieces forming the bottom, and a bit of one end of a lower side strake were found; these were massive pieces of hewn oak sewn together with yew twig stitches. Coates described three possible reconstructions based on this material. The first was an effort to design a boat with the smallest amount of extra material in it. Such a boat could ferry ten people and eight paddlers across the Humber. The second reconstruction was a more ambitious and higher quality craft which could carry a larger load. However, strains increase with load and weight so design number two may be asking too much of its moss caulking—it would be necessary to find out how badly the boats leaked and this calls for a replica. His third reconstruction moved away from the actual remains. He combined the very heavy oak pieces forming the lower shell with a much lighter skin construction for the upper parts. The adze marks on the North Ferriby boats are of the maximum size possible with the available tools in-

dicating that these boats could have been the Concordes of their time—"in proportion to the Gross Tribal Product they could have been as expensive but arguably more useful".

However, no matter how well a reconstruction is worked out by theory and applied knowledge no naval architect would be too confident of a boat's practical performance unless a replica had actually been made and tested at sea. The National Maritime Museum has pioneered this form of experimental archaeology in its practical research with a replica of the Gokstad *Faering*. Line drawing and a construction plan of the Oslo *faering* were published by A. E. Christensen in 1966 and these were of use in building the replica. However, it was only once the *faering* had been rebuilt and was undergoing sea trials that it was realised why the Oslo *faering* had such large holes in the forward *stammering*—the holes in the NMM *faering* were too small for a man's hand making it difficult to haul the boat up the beach.

Experimental archaeology is concerned with the processes and production methods used in the past, and with the function of the artefact. The reconstruction of an ocean-going skin boat, the Brendan exemplifies the many factors that need to be considered. This type of boat may have been used in the west of Ireland between the 5th and 9th centuries AD. Evidence for their design was gathered from references to skin boats in contemporary texts, ethnographic evidence of the skin boats descendants, surviving examples of leather boats (all river craft), materials research as well as research into the contemporary techniques available for leather and timber working.

With the help of the British Leather Manufacturers' Research Association a test programme was conducted into the properties of various leathers. It was found that by far the most suitable leather for the hull covering was the mediaeval type of leather, tanned in oak bark. A naval architect produced the plans for the replica and shipwrights were asked to fair up a wooden frame to these drawings. Only timber available in Ireland in the early Christian era was used: oak for the gunwales and thwarts, ash for the frames and stringers. The frame was lashed together using alum-tanned leather—a technique known in Roman times—and the entire structure was coated with wool grease to preserve the ash frame and protect the leather. Forty-two ox hides were needed to cover the boat, stitched together with hand-rolled flax. The Brendan has now successfully sailed to Greenland where it will have to spend the winter before completing the trip to North America.