growth in Norway's maritime industry.

At the same time the economics of whaling were propelling technical developments along parallel lines in several countries. The stocks of right whales — "right" because they were slow swimmers and floated when killed — had been so decimated by the middle of the century that they were unable to support a viable industry. The interest of the whalers turned to the rorquals which "teemed in the seas", but which were too swift for the row-boats and, moreover, sank when killed. One of the first to experiment with explosive harpoons was the American T.W. Roys, who invented a harpoon-throwing gun and set out to see "if a cargo of oil could be obtained from whales previously unavailable to mankind". There were other innovators and other developments, one of which was, the authors believe, of decisive importance to Foyn's own ideas. This was the grenade harpoon invented by George Welch in 1867, three years before Foyn's final patent was granted. In many countries similar inventiveness was displayed, but Foyn was the most persistent. He believed in the potential of the rorqual fishery — even during his experiments with the *Spes et Fides* when failures lost him money, he kept going. He was in the end the right man at the right time.

The first of the rorqual stocks to follow the right whales to extinction was, not surprisingly, the Finnmark stock. From then on it was for the whaling companies a matter of geographical expansion and greater sophistication in techniques and ship design. The whalers extended their activities to wherever rorquals could be found and eventually to the waters surrounding the Antarctic continent. It was there that the greatest harvests were to be culled, and where the technical ingenuity of the whalers was again stretched.

The problems were to stay at sea long enough to justify the cost of fitting out a fleet, and to build more powerful and faster catchers. The floating whale-factory, heralding the pelagic whaling industry, extended the range of the catchers, and the introduction of off-loading the oil into tankers enabled the fleets to remain at sea for months. From 1937 and the launching of the Japanese-built *Seki Maru*, the catchers became progressively more powerful. However, no matter how long the whalers were on the oceans, nor how sophisticated their equipment, if the whales were not there they could not be caught. Inevitably the Finnmark story was to be repeated again and again, and nation after nation, including Norway, had to abandon pelagic whaling — political ingenuity in conserving whale stocks fell far short of the technical expertise in destroying them.

The whaling industry is neglected by the student of the development of the industrial nations and yet it reflects the social and economic conditions of the

times most vividly. It also provides clear insight into the way those conditions forced men to seek means of utilizing resources that had hitherto been out of reach. The story of the whaling industry shows too how difficult it is to maintain an industry based on natural resources, even renewable resources, if immediate commercial considerations over-ride the long-term benefits of rational exploitation and investment.

The authors of this book have achieved a remarkable piece of condensation and R.I.

Christophersen must be congratulated on a fine translation. The only sad thing about this volume is that it is unlikely that we shall ever see an English-language version of the original four-volume work — and that it is equally unlikely that mankind will learn from the mistakes it so amply documents. □

Arthur Bourne was an observer at the International Whaling Commission from 1964 to 1968. His great-grandfather was a contemporary and competitor of Svend Foyn.

Cartography: from astrolabe to orbiter

Helen Wallis

The Mapmakers. By John Noble Wilford. Pp.414. UK ISBN 0-86245-041-1; US ISBN 0-394-46194-0. (Junction Books/Knopf: 1982.) £9.95, \$20.

A NOTABLE theme in the history of human endeavour is the record of man's survey and mapping of the Earth, the Moon and (by spacecraft) of the nearer planets. Even the earliest surviving records show a surprising degree of sophistication in the cartographic arts. Thus an example of early cadastral mapping has been identified in the depiction of a village found in rock carvings of the Valcamonica in northern Italy and dating from the second and first millennia BC. The Babylonian world map of about 500 BC is one of the earliest depictions of the cosmos. And two silk maps recently recovered from the Ming tombs show the advanced level reached by the Chinese in the second century BC.

With the development of the geographical sciences in classical Greece, the coordinate system for the mapping of the world was established which is still the accepted method today. Even in the so-called "dark ages" of Europe, a continuing tradition can be traced from the surveys of the late Roman empire through mediaeval times.

The European Renaissance brought about a revolution in mapmaking. The newly invented techniques of engraving

made possible the "exactly repeatable picture", and in the late fifteenth century led to the establishment of the mapmaker's craft and the map publishing industry. At the same time European ventures of exploration set in motion the mapping and surveying of the world. A comparable revolution has taken place in the past 50 years with the development of aerial surveys, automated cartography, and mapping from and in space.

The history of the complicated processes involved in these developments can be told in various ways. The role of the mapmakers themselves is often subordinated to the record of the artefacts, the atlases, maps and globes. John Noble Wilford in his new history of cartography sets out to correct this bias. In *The Mapmakers* he tells the story of "the multitude of diverse characters", ranging from scholars and scientists to clockmakers, schoolteachers and spies, aviators and technicians, who stand out in the history of cartography. Although he has not spent a lifetime working with maps as such, his professional post as science correspondent for *The New York Times* makes him well qualified to identify the pioneers and innovators in the history and explains his concern to bring out the drama of personal triumph. As professional mapmakers normally write their reports in "the bloodless language of the specialized

IMAGE
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Surveyors at work in the eighteenth century — detail from a map of Warwickshire by Henry Beighton, 1728.

journals", he supplements written sources for modern surveying with interviews with the practitioners themselves, at NASA, the US National Geodetic Survey and so on.

No single volume on the history of cartography can be comprehensive. It is important therefore to note that Wilford's book is really a history of the attempts to measure, survey and map the Earth, the Moon and the planets. The definition of cartography implied in this treatment is that of the United Nations, therefore, and not that of the International Cartographic Association (which excludes survey from its terms of reference). What is particularly valuable is the integration of the historical and the modern. Most histories of mapmaking end in 1900 or earlier, and leave to others the recording of recent developments. Thus the first two parts of the book deal with the broad trends and signal achievements of cartography and geodesy prior to the twentieth century. The final two parts include some earlier history but are focused on the twentieth century.

Another, less welcome, aspect of the treatment is an evident "Western" bias. Like many other histories, the book is "ethno-centred" (to quote the current term), dealing largely with the achievements of Mediterranean and European peoples. Arab geographers such as Idrisi, for example, are conspicuous by their absence, and the remarkable achievements of Chinese cartographers appear only in the pages dealing with the maps from the Ming tombs. In so focusing the story Wilford follows Lloyd A. Brown, whose *Story of Maps* (Little, Brown; 1949) provided the classic account of mapmaking to 1800. The similarity in treatment and in the selection of illustrations for the early period explains why some parts of Wilford's book (for example, the sections on the Cassini and John Harrison) will seem almost familiar to those well acquainted with Brown. Wilford's detailed account of the survey and mapping of India and North America extends the compass, however, in addition to the fact that the time span covered by Wilford is much greater.

The book is illustrated by reproductions of some of the most important maps and by photographs, but documentation of the illustrations is inadequate. The Babylonian world map (p.11), for example, is in the British Museum, not the New York Public Library (p.415), as the reader might suppose from the credits. Sources for information in the text are, for the most part, not cited, but bibliographical notes are provided for each chapter.

In general, however, Wilford's *Mapmakers* can be warmly recommended as an essential addition to library reference shelves, and as an excellent introduction to mapmaking past and present for geographers and map lovers alike. □

Helen Wallis is Map Librarian at The British Library, London.

Ancient woods in modern times

John Andrews

Woodland Conservation and Management. By G.F. Peterken. Pp.328. ISBN 0-412-12820-9. (Chapman & Hall: 1981.) £25, \$49.95. *Ancient Woodland: Its History, Vegetation and Uses in England.* By Oliver Rackham. Pp.402. ISBN 0-7131-2723-6. (Edward Arnold/University Park Press: 1981.) £50, \$99.95.

DURING the past 30 years, more ancient mature woodland has been destroyed in Britain than in the preceding four centuries. The direct cause of this has been the parsimonious attitude of post-War government towards forestry and a corresponding benevolence to agriculture, with an increasingly phoney system of cost-benefit appraisal favouring over-production from farming while squeezing forestry into short-rotation, softwood monocultures whose main product is pulp.

It is a tribute to the Forestry Commission's technical skill that it has succeeded in developing techniques of wood production under uniquely difficult conditions in the uplands, but no credit to foresters in general that they have fostered the destruction of Britain's remaining native woodlands, both by encouraging their replacement by conifers and by meekly acceding to their conversion to farmland. Perhaps conservationists too must share the blame, for failing to protest sooner and louder: not least the Nature Conservancy Council which should lead the movement, and yet still shies away from producing a policy on forestry after nearly a decade of indecision.

Fortunately, many NCC staff are a good deal harder-nosed than their politically-appointed Council. *Woodland Conservation and Management* is written by George Peterken, a member of NCC's scientific team, and ventures some provocative views. Thus,

private landowners, who enjoy a disproportionately large share of national wealth, should be prepared to bear a disproportionately large share of the sacrifices needed to provide national needs for amenity and nature conservation. Indeed, the continued political acceptability of private landowning may depend on recognising these and other public responsibilities

— a view gaining currency among conservationists patronizingly advised to leave protection of the countryside to the good will of the landowning community.

The book, however, is primarily a scientific work. It commences by examining the origins, management and ecological characteristics of British woodland, demonstrating the special value of ancient, primary woodland to a wide range of species which have persisted in such sites — and nowhere else — despite many centuries, perhaps in some cases several millennia, of human management.

The second part of the work considers the types of semi-natural woodland, their classification and management. Woodland classification in Britain is still bedevilled by the lack of a generally accepted system and here the effort is made to present one for use by any competent naturalist or forester. Such a classification has an important practical value, providing the basis for identification of woodland sites of similar type so that comparative conservation and management judgements can be made.

About a third of the book is devoted specifically to woodland nature conservation. There is much helpful advice on the recording and assessment of woodlands and on management methods, both where conservation takes priority and where the first objective is production. Though the emphasis is on native woodlands, the pros, cons and opportunities presented by the new conifer forests in the uplands are not neglected.

The book is well and economically written. Though some sections are technically complex, it contains much of general interest, not least a clear and concise statement of the objectives and priorities of nature conservation — matters on which many foresters and some naturalists seem confused or misinformed. However, as an ornithologist, I must regret the author's heavy botanical bias: though birds have great powers of dispersal, many survive best in ancient woodland; and the absence of any reference to Britain's only endemic bird — the Scottish crossbill, which appears to be largely confined to Caledonian pine forest — cannot be lightly forgiven.

In *Ancient Woodland*, Oliver Rackham approaches the subject from a different standpoint. In the author's words, the main theme is

the self-renewal typical of English woodland history: the quiet, usually unremarked regrowth of the young shoots, automatically replacing the woods every time they were cut down, decade after decade and century after century.

But it is more than that. Dr Rackham's special skill lies in unravelling man's relationship with woodlands and, in scholarly yet entertaining style, he deduces from them aspects of rural social history since pre-Roman times.

Though the book contains examples from many parts of England and the Continent, it is based largely on the author's own studies in East Anglia. This region is a splendid study area, containing an unusual variety of woods which have been well documented — paradoxically the outcome of early clearance which meant that the remainder assumed special importance for local use and was systematically conserved until recent years.