

increase of more than 10 per cent. Demand for oil for central heating totalled 847,710 tons and has more than doubled during the past five years. Motor spirit consumed was 6,240,391 tons, 5 per cent above the 1954 figure. The booklet shows that sales of premier-grade petroleum were up by 10 per cent over standard grades, which showed a decline on the previous year. The growing popularity of diesel-engine commercial vehicles is revealed by the fuel consumption of the diesel-engined road vehicle ('Derv'), which increased by 188,000 tons in 1955; despite the much-criticized restrictions on major highway construction in Britain, asphaltic bitumen, so commonly employed in road-surfacing, actually showed a 7 per cent rise in consumption over the previous year.

### A Medieval East African Coastal Civilization

THE Rev. Gervase Mathew contributes to the May number of *Man* an interesting article on some early cultures of the East African littoral. To-day the whole region is under the influence of Zanzibar; but during the seventeenth and eighteenth centuries—between the fading away of the power of Portugal and the rise of Zanzibar—there existed a number of town settlements which were nominally Islamic in religion and influenced at least in part by South Arabia. Formerly, they have been classed as medieval Persian settlements; but Mathew is convinced that they represent a series of small autonomous Swahili States, oligarchic in their social structure, and using a currency of beads and rolls of cloth when trading in ivory and slaves. Did some of the Southern Rhodesian gold pass that way? Many of the buildings and their decoration and contents are impressive, and indicate wealth and a high degree of culture. Naturally, the influence of the Portuguese, who with the Spanish occupied the area from 1592 until about 1637, was considerable. But even before their arrival it would seem that there had existed an important series of townships in the region, as these are described in the early Portuguese annals. There were great walled cities and a population both dark (African) and white (Persian?), the latter being the ruling caste. It is to be hoped that the author will some day write a monograph on the subject. But before this can be done, excavation will have to be undertaken at a number of key sites, and in the meanwhile every effort should be made to preserve as far as is possible the monuments which have survived.

### Research on the Formation of Hurricanes

THE spring number of *Oceanus*, a magazine published quarterly by the Woods Hole Oceanographic Institution, Massachusetts, for distribution to the associates of the Institution and others interested in oceanography, is devoted to meteorology and includes an article by the director of the Institution, Dr. C. O'D. Iselin, on projected research into the formation of hurricanes. Dr. Iselin describes an ingenious theory, which it is hoped to investigate on voyages in the converted 125-ft. cutter, *Crawford* (see *Nature*, July 28, p. 181). The theory is that the essential precursor of a hurricane is a period of abnormally light winds in a part of the northern half of the trade-wind belt in which sea-surface temperature exceeds 27° C. These light winds mean that so few large sea-salt condensation nuclei would form that less than the usual number of the cumulus

clouds would precipitate rain, leading to development of unusually high humidity in the lower atmosphere. It is then supposed that an 'easterly wave' disturbance moves along in the trade winds, stirring up the sea and producing many nuclei and stimulating convection by release of latent heat. The intense convection then produces a whirl in the usual way. Dr. Iselin envisages that, if the theory is true, it might be possible, by maintaining random convection in the early stage, to stop the development of the abnormally high humidity and so prevent hurricanes from forming.

### Freshwater Biological Research by a School-boy

THE magazine of the Oundle School Natural History Society contains a useful comparative study by a school-boy, M. J. Fenwick, of the biology of species of *Asellus*, *Eucrangonyx* and *Gammarus*. These show that *Asellus* seems to favour almost any kind of water, but it is most frequently found in deep, almost stagnant water among plant debris; *Gammarus* favours very shallow and fairly swift water, usually with a sandy or shingle bottom; and *Eucrangonyx* favours a deeper, almost stagnant pond or pit, where there is plenty of shelter from bright daylight. Experiments showed that *Asellus* survives in water with a low oxygen concentration; *Eucrangonyx* can survive in water of almost any oxygen concentration; while *Gammarus* only survives in water of a very high oxygen concentration. *Eucrangonyx* appears to be strongly negatively phototropic, and *Gammarus* and *Asellus* are slightly negatively phototropic. Another series of experiments showed that *Asellus* is quite tolerant of any temperature from 0° C. to 30° C. *Eucrangonyx* is not quite so tolerant and only survives in temperatures between about 5° C. and 20° C.; and *Gammarus* is much less tolerant and will only survive in temperatures between about 10° C. and 20° C.—considerably lower than the temperatures tolerated by *Asellus* and *Eucrangonyx*. The observations show that each animal fills its ecological niche, and that the three are very rarely found together.

### Recent Investigations of Cocoa

THERE was a time, not so very long ago, when new research information about the botany and horticulture of cocoa (*Theobroma cacao*) was relatively scanty and hard to come by. That time may now be said to have receded into the past. During recent months several full and important reports have appeared, including the Annual Report of the West African Cocoa Research Institute for 1954-55 (Crown Agents, 4 Millbank, London, S.W.1; 5s.), a Report on Cocoa Research, 1954 (Imperial College of Tropical Agriculture, Trinidad, B.S.I.; also from the London Office, 40 Norfolk Street, W.C.2; 12s. 6d.), the Proceedings of the West African International Cocoa Research Conference, 1953 (Crown Agents; 12s. 6d.), and the Cocoa Conference, 1955 (The Cocoa, Chocolate and Confectionery Alliance, 11 Green Street, London, W.1). From these several publications a comprehensive impression of the very considerable research effort that is now being devoted to all aspects of this important and valuable tropical crop may be obtained. The subject-matter ranges from such topics as soils and fertilizers and vegetative propagation by novel methods, to breeding and selection, the control of fungal and virus diseases and pests, and the processing of the eventual product, the cocoa bean.