

up to 5,000 m, a Geiger-Müller counter, X-ray equipment, a geo-electrokinetograph, a graduated thermostatic culture tank, and a large-scale projector for minute organisms.

The *Bulletin of the Tokai Regional Fisheries Research Laboratory* appears about three times a year in Japanese, with English summaries. This journal commenced publication in December 1950.

Most Japanese research organizations are in direct contact with their American equivalents, and the Tokai Laboratory is no exception. Knowledge of European work in fishery, however, is negligible, and what little there is has been obtained through exchanges with the Hull Branch of the Torry Research Station. There has also been an exchange of lists of publications with Aberdeen. The Tokai Laboratory is not an educational estab-

lishment so that it does not compete in any way with the Fisheries University a mile or two away (which does exchange literature with the Torry Research Station). Trainees do, however, go after graduation to the Tokai Laboratory from countries of south-east Asia for more advanced work. These attachments are usually for periods of six months, and the number of students involved at any one time is less than ten—in January 1964 it was one, a Filipino.

Three of the staff of the Tokai Laboratory are serving as members of technical committees of the Indo-Pacific Fisheries Council of the Food and Agriculture Organization of the United Nations. There is usually someone from the Laboratory acting as a Food and Agriculture Organization Fishery adviser to the Government of a foreign country.

C. R. S. MANDERS

THE CARNEGIE UNITED KINGDOM TRUST

THE fiftieth annual report of the Carnegie United Kingdom Trust for 1963* contains some quotations from Sir Hector Hetherington's oration on the work of the Trust delivered at Dunfermline on October 3, 1963.

In his address Sir Hector Hetherington described the expenditure of £1.5 million on building up the public library service as the largest, longest and perhaps the most productive of the Trust's endeavours. In the social services, about £375,000 had been expended on building or improving some 2,160 village halls, while more than £1.5 million had been spent on the urban areas, especially on helping the voluntary services to cope with their needs. Support of the Museums Service continued during 1963, and the Government approved a token sum of £10,000 to enable the Treasury to contribute up to half the net cost incurred by local museum authorities in participating in self-help schemes conducted by Area Museum Councils. Schemes of improvement totalling £7,150 were adopted by eight authorities as a result of suggestions in expert reports, and grants for reorganizing 24 museums were paid during 1963. Six new community projects were promised assistance before an allocation of £100,000 was set aside for distribution during 1961-65. From the latter, allocations have been made for schemes at the new towns of Livingston and Basildon, the expanded town of Thetford, and housing estates in redeveloped areas at Edinburgh and Winchester. To qualify for these grants the schemes must concern wholly or mainly new communities, preferably expanding ones and be promoted by a responsible local body, democratically elected and competent to receive grants from charitable funds. The proposed community centre must provide facilities not already existing in the area and be settled on acceptable legal trusts, and the capital cost of the scheme must not exceed £1,000. £1,000 was provided to enable the Highland and Islands Film Guild to acquire film screens and a launching grant of £3,000 went to the National Bureau for Co-operation in Child Care, while the grant for a new Child Welfare Centre in Glasgow, containing a unit to provide special services for the handicapped, was increased to £16,000.

* The Carnegie United Kingdom Trust, 50th Annual Report, 1963. Pp. viii+72. (Dunfermline, Fife: The Carnegie United Kingdom Trust, 1964.)

By the end of 1963 about half the £100,000 allocated for youth projects had been committed and during 1963 grants were paid in respect of improvements completed by 85 clubs in England, 14 in Scotland, 9 in Wales and 3 in Northern Ireland. From June 1963, regional youth centres were admitted as eligible to apply for assistance. Pioneering projects supported during the year included £1,250 towards the establishment of a highland out-station at Inverhair Lodge, Lochaber, for pupils of a secondary modern school in Buckhaven, Fife, and £1,500 to enable the Roxburgh Education Committee to develop a field study centre at Scotch Kershope under the management of a specially created voluntary body. A capital grant of £6,000 was also promised to the Greenhouse Trust to enable it to secure tenure of premises for its work in holding together small groups of teenagers in south-east London who are not at home in normal youth clubs. A grant of £4,000 was made to the Paddington Young People's Hostel Association towards the purchase of a hostel, and £3,000 a year for 3 years to the Community Service Volunteers for its work in enabling young people to gain experience of work in hard-pressed projects of social service in Britain.

The Trust's last grant to the Conservation Corps expired at the end of 1963 and the Corps is now independent of Trust subvention. The work output of the Corps has increased from 1,238 man-days in 1959 to 6,300 in 1963, of which 17.1 per cent and 50.6 per cent, respectively, were performed by volunteers from youth groups and employment. Small grants for the purchase of tools were made to some County Naturalists' Trusts and the Trust is providing £16,000 for the development of the first public Nature centre at Brantwood House, Coniston, as well as £5,000 for a permanent field centre at Kindrogan House, eight miles east of Pitlochry. Field study bursaries were awarded to members of 51 local scientific societies and grants totalling £838 were made for 15 projects sponsored by archaeological societies in membership of the Council for British Archaeology; while seven successful courses in meteorology for amateurs were arranged by the Royal Meteorological Society with the aid of the £500 annual grant from the Trust.

CUNEIFORM STUDIES AND THE HISTORY OF CIVILIZATION

THE December issue of the *Proceedings of the American Philosophical Association* (107, No. 6; 1963) includes papers read by five of the most eminent American cuneiformists at the 1963 annual general meeting of the Association. Each of these scholars writes on the subject which forms his own special field of interest, but each has

taken pains to present his material in a context of wider philosophical issues.

Prof. J. J. Finkelstein writes on Mesopotamian historiography. He is mainly concerned to show that accurate and unbiased records of historical events are to be found only in the omen literature and that "true historiography"

ultimately developed out of these records in the form of the Chronicles, but not until the first millennium B.C. He maintains that because all other genres of cuneiform literature that purport to deal with past events, from the legends of the Dynasty of Akkad to the Assyrian royal annals, are motivated by purposes other than the desire to know what really happened, they cannot be considered to represent native Mesopotamian historiography. Huizinga's definition of history, which the author adopts at the outset, scarcely seems to support this contention; one would have thought that these were the very forms of literature in which, before the first millennium, the Mesopotamians most characteristically "rendered account to themselves of their past", in spite of their admitted lack of objectivity.

Prof. T. Jacobsen seeks to trace the central concerns of ancient Mesopotamian religion through its history of four millennia. Defining religion as "the human response to the religious or 'numinous' experience", he selects one particular factor in this response—the urge in man to seek security in his deepest needs, his most profound fears, and shows that the religious response was lent a different emphasis from age to age in accordance with changes in the historical conditions and the basic fears to which they gave rise. These basic fears were, in the fourth millennium, famine, in the third, war, and in the second, with the gradual emancipation of the individual from his community, personal suffering and guilt. In the first millennium Mesopotamian civilization drew to its close without producing any new development; the new beginnings were in Israel and Greece. The thesis is most fully developed for the earlier periods by means of extensive quotations from Sumerian religious literature, on which Jacobsen is one of the foremost living authorities.

Prof. S. N. Kramer, another eminent Sumerologist, contributes a paper consisting largely of translations of

the texts on the 'Sacred Marriage', most of which are here treated for the first time (complete with transliteration). This long article will be of greater value to the specialist than to the general reader, despite the importance of these texts for our understanding of Sumerian religion.

Prof. O. Neugebauer discusses the survival of Babylonian methods in the exact sciences of antiquity and the Middle Ages, a subject on which he is an unrivalled authority. His purpose is to distinguish clearly between knowledge, methods and procedure which the Babylonians did have and those which they did not have. He shows that the basic mathematical knowledge collected in Euclid's *Elements* had been known for a millennium and more, whereas all that we know of Babylonian astronomy and mathematics speaks against the existence of any spherical geometry. Despite the popular belief that astrology originated with 'the Chaldeans', textual evidence for true astrology in Babylonia (as distinct from celestial omens) is very meagre and comes only from the latest period of Mesopotamian history. The really significant contribution of Babylonian astronomy to Greek astronomy lies in the establishment of very accurate values for the characteristic parameters of lunar and planetary theory and in particular in the careful separation of the components of lunar motion.

The final article on cuneiform law and the history of civilization is by Prof. E. A. Speiser. His thesis is that for the Mesopotamians 'law' was epitomized by the phrase "truth and right", truth being an immutable aspect of cosmic order communicated to the ruler by the god (Shamash), "right" being the function of the ruler in implementing this cosmic design. The implications of this fundamental conception of law are developed with much acumen, and the author finally traces its influence on neighbouring and succeeding civilizations.

O. R. GURNEY

DETONATION EMISSIVITIES AND TEMPERATURES IN SOME LIQUID EXPLOSIVES

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EXPERIMENTAL measurement of the spectral distribution of radiation from a detonation wave enables the detonation temperature and emissivity to be calculated using Planck's radiation equation, provided that the grey or black body nature of the wave is established. Several workers¹⁻⁴ since 1945 have used this method to determine detonation temperatures of condensed explosives, but although confirming the grey body nature of the detonation products no emissivities have been quoted. Gas emissivities are normally low, but under the conditions obtaining in the detonation of condensed explosives, where pressures and temperatures are greater than 100 kb and 3,000° K, statistical and quantum mechanical considerations suggest that the emissivities should be close to unity. This is substantiated by the experimental evidence adduced here for the liquid explosives nitromethane, diethylene glycol dinitrate (DEGDN) and ethyl nitrate.

A spectrophotometer was used to compare the intensity of radiation from the explosive with that from a temperature calibrated tungsten ribbon lamp at six selected narrow wave-bands in the visible region. Identical optics were used for each of the two light sources in each experiment, the radiation being focused by reflective optics on to the entrance slit of a Hilger medium quartz spectrograph which had been modified to enable the use of a photomultiplier detector at each selected wave-band. The output of each photomultiplier was fed through a cathode

follower, displayed as a function of time on an oscilloscope and recorded photographically; the overall rise-time of the apparatus was 15 nanosec.

The explosive charge was contained in an aluminium tube, 2½ in. inside diam., 3 in. outside diam., having at one end a 1-mm thick glass window and at the other a suitable initiator. It was immersed in water to help maintain the planarity of the detonation wave and to obviate the production of a highly luminous air shock at the end of the charge. The charge was viewed normal to the detonation front. Radiation reaching the spectrophotometer originated from only a small area 2 mm × 0.1 mm at the centre of the detonation front, corresponding to a region of high confinement.

Fig. 1 is a typical record showing the time-resolved radiation intensity at two wave-bands for a nitromethane charge in which initiation phenomena of the type described by Campbell *et al.*⁵ are observed between entry of the shock wave into the nitromethane (*A*) and the onset of steady-state detonation (*B*). As the detonation wave advances towards the window the apparent radiation intensity increases as a result of the decreasing optical absorption by the nitromethane. All intensity measurements were made at the end of the charge (*C*) to eliminate absorption effects.

The magnitudes of wave-length and temperature in this work make $\exp(c_2/\lambda T)$ always much greater than unity, so that Planck's equation may be approximated by