that the proposal to seek closer association of the latter college with the University is not inconsistent with the purposes of the University. So little does it regard the Welsh Advanced College in its own right, that it sees the link with the University as unquestionably conferring status on technical studies in Wales, and that "A further and quite substantial advantage would be that a clearer and more easily recognisable line of demarcation than now exists could be drawn between the College of Advanced Technology and other technical colleges concerned with advanced courses". Under the Administrative Council, or under University governance, or both? What happens then to the new route in higher education complementary to that of the universities, and to the apex of the technical college system?

Instead of being doubled in size through bilingual publication, the report would have been better had it analysed more fully the consequences of its recommendations, and also dealt with some important omissions. Notable among the latter are some of the basic reasons why less than 2 per cent of eligible Ordinary National Certificate candidates go on to courses for the Diploma in Technology, and less than

7 per cent to Higher National Diploma courses. Do the other colleges accept a contributory role to the higher colleges? The resistance to change and support of new ventures, for example, by the schools and firms, are hinted at but not fully examined. Nowhere does the report deal candidly with the issues underlying "the delicate work of regionalisation of advanced courses . . ." which as an independent body it ought to have done; it is not surprising already to find it reported that the Flintshire authorities are taking steps to protect their right to advanced courses. A more penetrating and critical examination on the educational and administrative sides, as was done on the apprenticeship side, would have greatly increased the value of the report. The Minister of Education commends the report as a good one, and hopes that many of the recommendations will be put into practice as soon as possible; many, it may reasonably be hoped, but not some of its major ones, not at all before due consideration has been given to the report of the Committee of Enquiry into Higher Education, of which Lord Robbins is chairman.

P. F. R. VENABLES

ADDICTION-PRODUCING DRUGS

IN the eleventh report issued by the World Health Organization's Expert Committee on Addiction-producing Drugs* recommendations are given that the following substances should be subject to the provisions of the 1931 Convention in respect of addiction-producing drugs comparable to morphine: clonitazene, diapromide, diphenoxylate, etonitazene, hydromorphinal, phenampromide and phenoperidine.

Evidence concerned with two analgesic benzodioxane derivatives and ethoheptazine indicated that these compounds were not to be regarded as addiction-producing drugs. Exemption from the provisions of international control was recommended in favour of two preparations containing diphenoxylate, a new constipating agent, but the Committee was unable to support the request for exemption in favour of dextro-phenomorphan.

The Committee was concerned with reports on the abuse of amphetamines and amphetamine-like substances contained in weight-reducing medicines, and emphasized the need for appropriate control measures on a national level to prevent such abuse. Attention was also directed to the need to watch closely the

development of new psychically active compounds that might be abused by narcotic addicts, as has already occurred in the case of SPA((-)-1-dimethyl-amino-1,2-diphenylethane) in Japan. There is need for improvement in regard to the information given on the possibilities of addiction liability of new drugs, particularly where analgesic and anti-cough properties are claimed.

In response to an invitation from the Economic and Social Council, the Committee outlined the procedure by which the addiction-producing properties of a drug are established; but a precise code of practices cannot be drawn up at the present time.

The Committee was not of the opinion that there is at present any case for making *Cannabis* available for the extraction of antibiotic substances, and considered that the prohibition or restriction of the medical use of this plant should continue to be recommended by the international organs concerned.

With regard to the treatment of drug addicts, the Committee was in favour of a proposal that addicts should be committed to the care of a medical panel, as is done in the case of mental patients in general. This measure is intended to ensure adequate and complete treatment, but not to replace penalties for violations of the law.

* World Health Organization: Technical Report No. 211. Expert Committee on Addiction-producing Drugs—Eleventh Report. Pp. 16. 1 Swiss franc; 1s. 9d.; 0.30 dollar. (Geneva: World Health Organization; London: H.M.S.O.) 1961.

CULTURAL SEQUENCES IN NORTH-WEST AMERICA

IN the past few years, evidence has been accumulating for a considerable variety in subsistence activities at an early date in North America. To the big-game hunters of the Plains have been added people who gathered seeds and plants and hunted small game in the Great Basin, and the archaic foragers of the East have proved to have begun

earlier than we used to believe. The latest report* of Prof. L. S. Cressman's pioneer explorations in the north-western United States shows that yet another

**Trans. Amer. Phil. Soc.*, N.S., 50, Part 10: *Cultural Sequences at the Dalles, Oregon—a Contribution to Pacific Northwest Prehistory*. By Prof. L. S. Cressman, in collaboration with David L. Cole, Wilbur A. Davis, Thomas M. Newman and Daniel J. Scheans. Pp. 108. (Philadelphia: American Philosophical Society, 1960.) 3 dollars.

way of life was followed by people who settled at the strategic point where the Columbia River passes through the Cascade Range on its westward journey. In historic times this was a great trading centre and the Indian inhabitants were noted middle-men.

The construction of the Dalles Dam was the occasion of an archaeological salvage programme, and Prof. Cressman, of the University of Oregon, undertook the work on the left bank of the river. A good deal of the evidence had been destroyed by previous building work, but Cressman succeeded in establishing a continuous succession from at least 8000 B.C. to recent times. (The date is based on a composite radiocarbon sample from the lowest stratum, and Cressman considers that it could indicate a beginning date of 9000 B.C. or earlier.) At an unknown time before this, the release of some 500 cubic miles of water by the breaking of an ice dam had produced a fantastic flood through the gorge, obliterating most of the signs which could indicate an earlier occupation, although Cressman produces some rather slender evidence that there might have been one.

The succession falls into three main divisions, dated by four carbon dates. There is an early one lasting until a few centuries after 6000 B.C., followed by a

transition lasting to about 4000 B.C., leading to a late period covering protohistoric and historic times. Certain types of artefact are confined to the early period and others to the late, and there are two other groups, one of which decreases from an early maximum while the other increases to a late one. The period of greatest interest to readers outside North America is the early one, to which antler and bone artefacts, bolas stones, certain types of projectile point, and burins are confined. The assemblage is interpreted as indicating a great exploitation of the salmon run, the hunting of large scavenger birds (the condor, etc.) with the bolas, and the hunting of small animals and, to a lesser extent, elk and deer; in short a dependence on the river and its immediate surroundings. Of great interest is the use of burins to cut antler and bone, in exactly the same way as was done at Prof. Grahame Clark's Mesolithic site at Star Carr in Yorkshire at about the same time, though many of the resulting artefacts differ. With the end of the early period not only the characteristic artefacts but also the animal, bird and fish bones disappeared entirely from the archaeological record, a loss which has not yet been satisfactorily explained.

G. H. S. BUSHNELL

TOTAL MAGNETIC FIELD MEASUREMENTS BETWEEN NEW ZEALAND AND ANTARCTICA

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SOME results of a survey of the Earth's total magnetic field between New Zealand and Antarctica are presented in this article. No magnetic survey of this area has previously been made.

A proton magnetometer, of design similar to that described by Hill¹, was constructed at the Naval Research Laboratory, Auckland, New Zealand. It was installed aboard the Antarctic supply ship, H.M.N.Z.S. *Endeavour*, and was operated during this ship's Antarctic cruise between December 20, 1958, and February 15, 1959. One measurement was made each minute and the readings were recorded on a strip chart recorder to a significant value of 1 γ .

Figs. 1 and 2 show charts of the area covered by the operation. The solid portions of the ship's track represent those parts over which measurements were obtained. The decimal figures beside the tracks give the values of the total field in gauss. These values have been smoothed, where necessary, to correct for local anomalies, but no corrections for time variations of the field have been made. The solid line contours have been drawn both from these measurements and also by reference to spot values obtained for various islands in the area and from the New Zealand Geomagnetic Survey maps². The dotted line contours are from a total field chart issued by the U.S. Hydrographic Office, 1955 (ref. 3). It will be seen that south of lat. 55° S. the two sets of values diverge considerably. In particular, at lat. 61° S., long. 172° E., where the 1955 data show a maximum of 72,000 γ , the value measured in the

present instance was only 66,000 γ . This discrepancy continues over the area of the Ross Sea shown in Fig. 2. Three isolated values which have been obtained from extrapolated rocket flight measurements⁴ are shown in Figs. 1 and 2 with the values that were recorded marked beside them. It will be seen that these values agree with the measurements made in the present survey. Extrapolation of the field-values from the contours show that the maximum of 72,000 γ would be located near a position lat. 70° S., long. 150° E.

In Fig. 3 two profiles of the total field which were obtained across an ocean trough are given. This trough is bounded to the north by a line of islands passing through Auckland, Campbell, Bounty and the Antipodes Islands, and the tracks cross it at a latitude of approximately 54° S. To the south the ocean trough is bounded by a portion of the mid-ocean ridge system. This section appears to run from just north of the Balleny Islands to Easter Island and the ship's tracks cross it at a latitude of approximately 68° S. The bathymetric depth over most of the 600 miles of the tracks shown in Fig. 3 was between 2,800 and 3,000 fathoms, and so far as could be ascertained from the depth measurement was flat. These depths were determined from explosive echo soundings made during the transit and from Admiralty Chart 788 and U.S.N. Hydrographic Office Chart No. 6636. The trough runs in a direction N. 74° E.

It will be seen that the peaks of anomaly have amplitudes of between 200 and 500 γ , and that at least 25 of these may be correlated between the two