

the abolition of corporal punishment, was described as "premature"—surely the first time that that cautious document has ever been described as ahead of its time. One delegate even went as far as to quote the German military strategist Clausewitz in support of the argument for the cane. Finally, the head teachers called on Mr Anthony Crosland, the Secretary of State for Education and Science, to postpone the raising of the school leaving age to 16 until some unspecified time after 1970.

The head teachers also had something to say about university students and about the cost of maintenance grants now paid by public authorities. After references to the "high pregnancy rate among students", and the growing sense of irresponsibility as shown by recent events at the London School of Economics, Mr F. C. Raggatt, headmaster of Stockwell Manor Comprehensive School in Lambeth, proposed that part of students' grants should be replaced by loans. Claiming that one in seven of London students drop out before the end of their course, he suggested that loans would induce a greater sense of responsibility. Mr Raggatt's system would provide for exemption from repayment if the student agreed to work for a set period in an approved form of public service. Unfortunately for the cause of public understanding, Mr Raggatt did not attempt a definition of what constitutes public service. It can hardly contribute to the moral or financial good of the country to try to persuade a young graduate to empty dustbins rather than work for Imperial Chemical Industries.

Mrs Shirley Williams, Minister of State for Education, must have found all this little to her taste. At the dinner she said that school management was an important part of the ministry's programme. Heads, she said, would be the leaders of a movement to transform British education and school management. If she believes this, she must have wondered whatever they would transform it into.

Co-operative Reactor

JAPAN has decided to join the current research programme of the OECD reactor at Halden in Norway. The reactor, which is under the control of the European Nuclear Energy Agency, is a boiling heavy water reactor used as a test facility by a large number of countries including Norway, Austria, Denmark, the Netherlands, Sweden, Switzerland, a West German industrial group, Italy and Britain. The research programme is mainly concerned with the long term testing of fuel elements, fuel irradiation, investigations of the water chemistry of boiling reactors, and the development of instrumentation, and the reactor can be controlled by an on-line computer. At the moment the reactor itself is shut down, but will begin operations again in July with 37 test fuel assemblies in the core.

The reactor has been operating since 1958, and until the end of 1966 had cost \$11.9 million, with a contribution from the UKAEA of \$2 million. The current programme which runs from June 1 this year until the end of 1969 has been increased from \$4.9 million to \$5.3 million by the intervention of the Japan Atomic Energy Research Institute, and the UK will contribute \$0.35 million. The AEA has in the past used the reactor primarily as an irradiation facility, because facilities within Britain were fully occupied.

Last Sky Catalogue?

THE second and final part of the fourth Cambridge catalogue of radio sources has now made its formal appearance in the *Memoirs of the Royal Astronomical Society* (71, Part 2, 49; 1967). The survey has taken seven years to complete and has been made with the large interferometer at the Mullard Radio Astronomy Observatory. Altogether the catalogue includes 4,844 radio stars—ten times as many as in the third Cambridge (3C) catalogue. The chances are that this will be the last of the complete sky catalogues, although surveys at a still greater resolution are being and will be carried out in selected patches of the sky.

The radio stars in the 4C catalogue lie in declination between -7° and $+80^\circ$. The observations have been carried out on a frequency of 178 megacycles by aperture synthesis, with a radio telescope beam, 30 min of arc across, and the positions of sources have been defined to within 0.35 min of arc in right ascension and 2.5 min of arc in declination. In the compilation of the catalogue, radio sources have been given decimal numbers which indicate their declination. Thus the radio source now familiar as 3C273 has been rechristened 4C-02.32. It will be interesting to see how long it is before the assignments of the third catalogue are overtaken by the fourth.

Ribosome Synthesis

from a Correspondent in Cell Biology

THE latest report from Warner and Darnell's laboratory at Yeshiva University, New York (Vaughan, Warner and Darnell, *J. Mol. Biol.*, 25, 235; 1967), summarizes the data they and their colleagues have obtained over the past few years on the synthesis of ribosomes in HeLa cell nuclei. They are able to define a complicated series of changes that occur during the maturation of ribosomal precursor RNA.

A high molecular weight ribosomal precursor RNA, sedimenting at 45S, is synthesized in the nucleolus of HeLa cells and is rapidly split into two RNA molecules sedimenting at 32S and 16S. The 16S RNA can be recovered from the small sub-units of cytoplasmic ribosomes only a few minutes after the synthesis of the precursor 45S RNA in the nucleolus. The 32S RNA, however, undergoes further changes in the nucleus. It is converted into a 28S RNA which after association with ribosomal protein forms the large sub-unit of a ribosome. 28S RNA first appears in the nucleus some 30 min after synthesis of the precursor 45S RNA and only appears in the large sub-units of cytoplasmic ribosomes about 20 min later.

Since both 28S and 16S RNA are never found free in the cytoplasm but always in structures indistinguishable from ribosomal sub-units derived from functional ribosomes, it was concluded that the assembly of the sub-units is largely completed within the nucleus and furthermore that the large and small sub-units only associate to give functional ribosomes in the cytoplasm.

By fractionating isolated HeLa nuclei, Vaughan, Warner and Darnell have now shown that this is the case. HeLa cell nuclei contain small amounts of two types of ribonucleoprotein particles which under the conditions employed sediment together with authentic cytoplasmic ribosome sub-units at 50S and 30S. Moreover, the 50S and 30S nuclear particles contain