

Lord Haldane had arranged to give an address in the afternoon, but unfortunately he has had to cancel all public engagements for reasons of health. Two important meetings will be held on Friday, September 8. In the morning there will be a joint meeting with the Psychological section for the discussion of psycho-analysis in relation to the school. The opening speakers will be Dr. C. W. Kimmins, Dr. Crichton Miller, Prof. Pear, and Dr. R. G. Gordon. In the afternoon, addresses on Imperial Citizenship will be given by the Rt. Hon. Lord Meston and the Rt. Hon. Sir Joseph Cook (High Commissioner for Australia). Bishop Welldon will also speak. On Monday, September 11, there will be a paper on international students' organisations, by Mr. Iveson

S. Macadam (President of the National Union of Students), and a discussion on English as the basis of national education, at which the speakers will include Mr. G. R. Pocock (Dartmouth College), Prof. Edith Morley, and Dr. F. S. Boas. The morning of Tuesday, September 12, will be devoted to local educational work, and the papers will be on the movement towards individual work in schools, with special reference to experiments in Hull, by Miss F. Sayer; and on the Dalton Plan, by Miss C. T. Cumberbirch. In the afternoon there will be a joint discussion with the engineering section on the effect of reformed methods in teaching mathematics, to be opened by Prof. P. T. Nunn and Mr. R. C. Fawdry (Clifton College).

The Imperial Cancer Research Fund.

THE executive of the Imperial Cancer Research Fund can look with satisfaction on twenty years' of steady progress towards the understanding of the nature of tumours. In the twentieth annual report, lately issued, the director, Dr. J. A. Murray, records once again a tale of sound and solid work in a field which is rather particularly liable to be overrun with hasty and slipshod frontal attacks and premature attempts to find a cure for cancer.

Of chief interest perhaps are Dr. Drew's experiments on the growth of normal and malignant tissues *in vitro*. Observations on the transplantable tumours of mice have shown that malignant tissue has no natural duration of life, the same tumour growing continuously under favourable conditions for a period far longer than the normal life of the animal in which it arises. Similarly, experiments on the continuous culture of normal tissue *in vitro* show, with a certainty which will increase with further lapse of time, that they too may achieve an analogous immortality. The fundamental functional characteristic of tumours is their independence of, and dissociation from, the rest of the body in which they grow. If normal tissues are subjected to the same dissociation by isolation in artificial cultures, they too appear to be capable of continuous life without the intervention of sexual regeneration.

Dr. Drew has now analysed this question of the influence of different tissues on one another to a further point. He finds that epithelial cells when growing in pure culture remain undifferentiated. When connective tissue cells are added to such cultures, differentiation sets in with little delay, squamous epithelium producing keratin in the familiar form of the concentric corpuscles so well known in human epitheliomata and mammary epithelium growing into branching acinous structures.

The form of the cells depends, then, more on where they are than on their origin, and the facts form an interesting commentary from the experimental side on the views of Dr. G. W. Nicholson on heteromorphosis in tumours put forward in his essays in recent numbers of the Guy's Hospital Reports. Dr. Drew has discovered also the curious point that malignant cells quickly make the fluid in which they grow unsuitable for further multiplication, though normal tissue will still grow in it readily. Continuous culture of malignant cells requires more frequent transplantation than do normal tissues, exemplifying the observational fact that human tumours are less resistant than normal tissues to all sorts of harmful influences—infections, poisons such as arsenic, radiation of different kinds, and so forth. They are superior to normal tissues only in their capacity to override the rules governing normal growth differentiation and morphology.

Drs. Cramer Drew and Mottram have continued their studies of vitamin deficiencies. Defect of vitamin A produces characteristically a diminution in the blood platelets, just as absence of vitamin B leads to almost complete disappearance of lymphoid cells. Similar changes in the blood elements may be induced by X-rays and radium. No success was obtained in attempts to influence the growth of transplanted tumours by vitamin deficiencies. In continuation of the production of malignant epithelial tumours by the repeated irritation of the skin by tar and similar substances, Dr. Russell now records the generation of malignant tumours of connective tissue by its subcutaneous administration. He also records further progress in his study of the respiratory exchange of tumours.

European Fish in New Zealand Waters.

A VERY useful account of the Marine Biological Station and Fish Hatchery at Portobello in New Zealand has been prepared by the Hon. G. M. Thomson and the late Mr. Thos. Anderton, and is published as Bulletin No. 2 of the Board of Science and Art of the Dominion. There is an appreciative note about Mr. Anderton, a man of great practical ability, who began life as a mercantile marine officer and then became a marine zoologist: he organised the Portobello Station with conspicuous success. The work of this institution is remarkable for the very original experiments carried out in connexion with it, having in view the naturalisation of European

fishes and other marine edible animals in New Zealand waters. These attempts are well known in a general way, but it is well to have detailed records of their methods and results.

The main object was to introduce the European herring, turbot, edible crab and lobster. The herring was taken over in the form of large numbers of fertilised ova and the turbot in the form of small immature fishes. Undismayed by unfavourable reports by various ichthyologists, a number of preliminary experiments were made in order to discover whether the rate of development of herring ova could be retarded by the employment of low

temperatures so that the eggs could be carried through the tropics and would hatch at about the end of the journey to New Zealand.

Prof. J. Cossar Ewart and Dr. H. C. Williamson made the preliminary experiments and Mr. Anderton devised the water-cooling and circulating apparatus, which was fitted up in a cold room on an ordinary commercial vessel. As fishery zoologists well know, it is not easy to collect large numbers of healthy, fertilised herring eggs, but this was successfully done at Lowestoft by Mr. Anderton, and the ova were made to adhere to glass plates, which were then transferred to the apparatus on board ship. The water was kept at a temperature a little above 0° C. and was circulated over the eggs. The experiment would have been quite successful but for a breakdown in the tank arrangements of the ship. It has not been repeated, though it is now evident that the method presents no insuperable difficulties. The young turbot and the pregnant edible crabs and lobsters were taken out to New Zealand without any difficulty and were successfully "planted" there.

So far there is no proof, however, that these species have established themselves in their new environment. The ingenuity displayed in these experiments and the eminently practical methods employed are of much interest and well deserve permanent record.

University and Educational Intelligence.

EDUCATIONAL legislation in America in 1919 and 1920 is reviewed by one of the specialists of the Washington Bureau of Education in Bulletin No. 13 of 1922. Of the many problems connected with education which have been dealt with by the State Legislatures since the war, several are, or have lately been, subjects of controversy in this country. The proportions in which the cost of supporting schools is shared between the general tax-payer and the rate-payer have been changing at the expense of the former throughout the States, "including the South, where the State, as such, is already relatively a very large contributor and where the need is rather for the further development of local educational spirit." In the State of New York the increase in appropriations for schools amounted to over twenty million dollars, which was added for the purpose of raising teachers' salaries. Texas appropriated four million dollars for the same purpose. Many of the States passed salary laws more or less on the lines of the "Burnham scales." Under an Iowa act, for example, a schedule of minima is prescribed, the lowest being 50 dollars a month, while a teacher who has received a degree upon completion of a four-year college course and holds a State certificate must be paid not less than a hundred dollars a month, and after two years of successful experience not less than a hundred and twenty. Teachers' superannuation systems are of recent origin in the United States, very few having been established earlier than the beginning of the present century. Nearly half of the States now have systems established by law for the entire State, and nearly a third have laws for certain cities only. Tendencies in recent pension laws are in general towards a larger participation of public funds in the support of the system, a more thorough application of scientific actuarial data, and more business-like administration. Extensions of the age limits of compulsory education have been effected recently in many States, the upper limit being in many cases raised to sixteen, while the lower limit is commonly seven or eight years.

Calendar of Industrial Pioneers.

August 20, 1769. Gabriel Jars died.—A native of Lyons and born in 1732, Jars acquired a practical knowledge of mining under his father, and after studying at the *École des ponts et chaussées*, made a long tour of inspection of the mines of England, Scotland, Sweden, Holland, Austria, and other countries, the results of his observations appearing in his "*Voyages métallurgiques*" published after his death.

August 21, 1884. Henry Wimshurst died.—For many years a shipbuilder at Millwall, Wimshurst was an ardent supporter of Pettit Smith in his endeavours to introduce screw propulsion, and, with the aid of friends, in 1838 he built the *Archimedes*, the vessel which first demonstrated the value of the screw for propelling ships in the open sea, and in 1839 he built the *Novelty*, the first screw steamer to make a commercial voyage.

August 23, 1836. Louis Marie Henri Navier died.—A distinguished professor of engineering, known for his mathematical investigations, Navier was an engineer in the *Corps des ponts et chaussées*, and at the time of his death was professor of analysis and mechanics in the *École Polytechnique*.

August 24, 1860. Jesse Hartley died.—The son of the master bridge-builder to the county of York, Hartley succeeded to his father's position, and in 1824 became engineer to the Liverpool docks, in which capacity he planned and executed with complete success the most extensive dock works in the world.

August 25, 1819. James Watt died.—Acknowledged to be the greatest engineer of modern times, Watt made his great discovery of the separate condenser in 1765, while engaged on the repair of a model of a Newcomen atmospheric steam engine for Glasgow University. This improvement in the steam engine was followed by his patents of 1769, 1781, 1782, and 1784, which collectively transformed a rude and imperfect contrivance into an efficient and powerful machine, providing the miner with his pump, the smelter with his blast, and the weaver with his power-house. From his early boyhood Watt was given to scientific pursuits, and all his work was the result of the application of scientific principles to practical problems. Born in Greenock, he became instrument maker to Glasgow University, and after some years of civil engineering, in 1775 entered into partnership with Matthew Boulton, the founder of the Soho Manufactory. Watt died at Heathfield House, close by Soho, and was buried in Handsworth Church.

August 25, 1862. James John Berkley died.—Trained under Bidder and Robert Stephenson, Berkley in 1849 was appointed Chief Resident Engineer of the Great Indian Peninsular Railway, and as such projected and carried through with the highest skill the line of railway from Bombay to Calcutta.

August 26, 1845. Philippe Henri de Girard died.—Famous as a chemist, a mechanic, and technologist, Girard was born on February 1, 1775, and after the French Revolution had soda factories at Marseilles and Paris. The offer by Napoleon in 1810 of a prize of a million francs for flax machinery led Girard to devise new machinery and establish flax mills, but he received no prize. After the Restoration he lived mainly in Austria and Poland, promoting steam navigation on the Danube, and carrying out extensive operations in manufactures, metallurgy, and practical engineering at Warsaw.

E. C. S.