SCIENCE NEWS

CHEMISTRY AND THE WAR

Science Service

IN a war where high explosives and poisonous chemicals were the dominant weapons, Great Britain entered without the facilities or experience for making either, according to a statement made by Sir Robert Robertson, chemist to the British Government, in his presidential address before the chemical section of the British Association for Advancement of Science, in session at Toronto.

No high explosives had been manufactured by the government before the war, no plants existed for turning them out in quantity, no adequate supply of materials was in the country and no satisfactory processes were known. But the chemists of the country were mobilized for research, and the results of their laboratory experiments were speedily put into practice in the erection of plants for the manufacture of the necessary munitions. In certain fields such as metallurgy, the British were strong, but they had allowed themselves to become dependent upon Germany for such organic chemicals as dyes, drugs and photographic developers and sensitizers, especially important in war time.

As Sir Robert said: "While our well-developed position as regards the great inorganic chemical manufactures was a source of strength when the demand came during the war for an enormous production of ammonia nitrate, for example, our neglect to foster a great organic chemical industry led to dangerous delays and improvisations."

The formula worked out for the high explosive amatol which filled the British shell for land and aerial warfare, called for 80 per cent. of ammonia nitrate and 20 per cent. of trinitrotoluene, commonly abbreviated to TNT. But new methods had to be devised for the manufacture of the TNT, and its properties had to be systematically studied in order to obtain a pure and safe explosive. The problem was attacked with such success by the chemists of England that by 1917 amatol was being turned out at the rate of 4,000 tons a week.

The necessary nitrates the British were able, through their command of the sea, to procure from Chile, at least at first, but later, when the shipping was interrupted, they turned their attention to the study of the Haber process of making nitrates and ammonia from the nitrogen of the air, which the Germans had been using before the war. By the end of the war, a nitrogen-fixation plant was in course of erection, and is now employed in producing nitrogen fertilizers for British farmers.

The smokeless powder used as propellant in the British service was made by dissolving gun-cotton in acetone, but since acetone had to be imported a new process was invented using alcohol instead. In order to get the necessary alcohol, beer and spirits were weakened and restricted in sale. This had the additional advantages of saving grain and reducing drunkenness.

The lesson learned from the war-time experience of England is thus stated by Sir Robert Robertson: "The last and more recent stage is in the nature of a recognition that the state is under an obligation to assist science, and in this case the science of chemistry, on which so many important industries are based. It took the war to bring home the danger that, although the record of the country as regards discovery in pure science was unrivaled, its systematic application was too often left to other countries, with the result of lamentable shortages during war and the risk of many industries being ineffective in peace. A measure of government intervention and action appeared requisite, and research became the business of a government department. Outside of the great firms which maintain progressive chemical staffs, the firms in numerous industries have been encouraged and assisted to cooperate in the betterment of their manufactures by the application of the methods of science, and from these associations and the organizations dealing with national problems begins to flow a stream of communications indicative of useful work accomplished. Nor is the foundation of it all neglected, for encouragement is given to workers in the academic field to follow out their ideas, whithersoever they may lead them, in accordance with the truth that 'research in applied science might lead to reforms, but research in pure science leads to revolutions.'"

The Department of Scientific and Industrial Research, established as a war measure by the British Government, has become a permanent national policy and continues actively engaged, not only in investigations relating to preparedness for war, but also in those dealing with public health, food supply, fertilizers and metallurgy. There are now 375 chemists in state employ, and the government appropriates about $250,000 annually as grants to 156 chemists engaged in research.

THE SEGREGATION OF RACES

Science Service

HOLDING that "when different races live side by side, the more primitive race, unless conditions be imposed upon it fatal to its spirit, will outlive the other wherever the struggle for existence is keen," Professor J. W. Gregory, of the University of Glasgow, in addressing the Geographical Section of the British Association for the Advancement of Science at Toronto, advocated exclusive territory as the best way of treating racial difficulties, in places where the policy can be applied.

He does not think that policy would be consciously adopted in the United States because of political reasons, but thought that it would ultimately come about by the natural drift of circumstances. The Negro problem in America has, in his opinion, been steadily growing from bad to worse during the last twenty years, and none of the conceivable constructive measures for its solution seems likely to be put into effect.

"Absorption is rejected as it would make the United States a nation of octoroons," he said, "but the infiltration of Italians and Mexicans and other South European peoples, who have no repugnance toward inter-marriage, may lead to the occupation of the cotton districts by a hybrid race similar to that of tropical South America.

"This process," he said, "would render impossible the continued refusal of political and municipal rights to any citizen who has a trace of Negro blood. The colored people would regain the suffrage, and the political development of the southern states on normal American lines would be impossible. If the Whites in the southern states be divided between Republicans and Democrats, the Negro vote would hold the balance of power; and owing to the considerable over-representation of the southern states in proportion to population, American politics might be determined by the Negro vote. Such a situation would be intolerable to the northern and western states. Hence, to avoid it, they might agree to the south-eastern states being formed into a group with a special measure of home rule in some departments of federal jurisdiction. This solution may take a century or more to develop; but the geographical considerations indicate it as the most probable issue from the Negro strength in the south-eastern states."

In South Africa where the blacks outnumber the whites more than three to one and are increasing the faster, Professor Gregory thinks "the maintenance of the white supremacy and even of a white Afrikander people is doubtful." The day's wages for a white laborer are about the same as the month's wages of a colored laborer doing the same sort of work. The rule of the white minority is threatened by the rise of an active Negro party, "largely inspired from the United States" and increasing in numbers and influence. The speaker argued that "as white labor is excluded from some parts of South Africa in the interest of the Negro, it would seem only fair that the Whites should have a corresponding advantage elsewhere and especially in districts which were practically unoccupied until the European entered them. Most of Africa is the home of the Negroes, whose numbers are increasing faster than any other population in the world."

But there is one continent that may be kept exclusively for the whites and completely occupied by them. This is Australia, for Professor Gregory believes that even the tropical northern territory can be colonized by white men now that tropical diseases are being conquered and that Europeans are learning to live in hot and humid climates.

MECHANISM AND PURPOSE

Science Service

DENYING that the human being can be explained as a superior penny-in-the-slot machine, Professor William McDougall, of Harvard University, in an address at Toronto, on August 8, urged psychologists of the British Association for the Advancement of Science to recognize the striving aspect of human nature as a fundamental category of psychology.

He pointed out that the mechanistic confidence of the nineteenth century is fading away, as the complexity of the living organism is more fully realized, as its powers of compensation, self-regulation, reproduction and repair are more fully explored.

"Let the budding psychologist ponder some phase of human life that is dominated by some strong but thwarted desire," he said. "Let him consider the strange yet familiar case of Romeo seeking the Juliet who is forbidden to him. How this desire to see, to hear, to touch the loved one dominates his life, waking and sleeping! How it fevers his blood; wears him to a shadow; keeps him running to and fro, scheming, trying, hoping, desponding, exulting, despairing, and always desiring! The desire governs all his thinking and acting; the most rooted habits of mental associations are as nothing in the course of this torrent of purposive activity, all directed to Nature's most imperative goal.

"Can we accept any account, any description or explanation of human life, which leaves out of the picture this all-important aspect that we call impulse, desire, striving toward a goal?"

It may be, Professor McDougall suggests, that eventually men of science will agree that there are in the universe two ultimately different kinds of processes—the mechanistic and the purposive—the strictly determined and the creative, the physical and the mental. Or it may be that, eventually, one of these may be shown to be merely an appearance of the other, an appearance due to the present limitations of our understanding.

He predicted, however, that if the two types of process are ever resolved into one, the purposive type that we regard as the expression of the Mind will be found to be more real than the other.

THE GAME ANIMALS OF CANADA

Science Service

DEPLETION of the larger game animals, even in the deepest Canadian wilds, is a disaster that hangs over the heads of the present generation, in the opinion of Dr. Rudolph Martin, chief of the division of biology of the Victoria Memorial Museum at Ottawa, in a paper read before the British Association at Toronto.

Not only have hunters and trappers nearly exterminated many fur-bearing species for the supply of the markets of fashion, but the breaking up of the prairies under the plow has deprived many hoofed and horned species, like the prong-horn antelope, the bison and members of the deer family, of their pastures and is killing off the species by preventing natural increase. A last refuge of many animals, and one which Dr. Anderson believes should be theirs in perpetuity, is the Arctic.

"A large area of arctic and sub-arctic lands beyond the range of possible cultivation are still occupied by large numbers of wild caribou and a few remnants of musk-oxen," he said. "The Arctic can never be agricultural, but there is a probability of developing a domestic reindeer industry in certain districts and attractive possibilities in attempted domestication of the musk-ox. The economic advisability of replacing a valuable, healthy and thoroughly adjusted wild stock by

more expensively reared domestic stock in remote districts is questioned.

"The proportion of the Canadian Arctic area which is actually suited for pasturage is largely problematical and needs investigation rather than speculation. Tundra is not prairie, but consists mostly of mossy swamps or comparatively barren upland. Many extensive areas are rocky or sterile and severe climatic conditions reduce materially the amount of vegetative growth on the limited fertile areas, so that a much greater acreage is required for the support of each animal than in more friendly regions. Population must necessarily be sparse outside of mining areas and enormous distances from markets will prevent profitable commercial exploitation under present methods of transportation."

Dr. Anderson's remarks concerning the Canadian Arctic regions apply with equal force to American possessions in interior Alaska, and to vast tracts in northern Siberia, which can never be cultivated, but must remain as permanent grazing lands.

THE USES OF ARMOR AND ACTIVITY IN EVOLUTION

Science Service

CONTINUED aggressiveness is the price of existence, as the rocks reveal the story of the tides of life through the aeons, according to Professor W. W. Watts, who spoke before the section of geology of the British Association.

Whenever any form of life has fallen back upon passive resistance it has perished, he said, through the very expense of keeping up the protective armor. There has been a tendency in life forms, he pointed out, once having attained to great size to abandon functions promoting swiftness in attack. The armored fishes and reptiles he mentioned as cases in point. The latter finally survived by throwing away their protection for the most part and developing swiftness and fighting qualities.

"Every time," said Professor Watts, "the race has been to the swift, active and strong, and those that trusted in defense rather than defiance have gone under in competition with those prepared to face the risks involved in attack. The fact that turtles and armadillos have survived to the present endorses rather than vitiates the principle. The human brain is the product of all the world's yesterdays, and the entire course of evolution could not have been planned better to make possible the existence of such an overlord of creation.

The giant reptiles of the mesozoic period, whose skeletons now fill the museums of the world, may have perished, because their brains and nerve systems were not sufficiently developed to cope with the conditions they faced. The actual physical changes of the period do not account for their disappearance.

THE GENEALOGY OF MAN

Science Service

A NEW way of tracing back the genealogy of man to pre-human forms was pointed out at a meeting of the Section of Anthropology of the British Association by Dr. Charles Hill-Trout. He argued that in comparing the skulls of man with the anthropoid apes the skulls of the young should be used instead of those of adult individuals, since the immature skulls would be likely to represent the ancestral type more closely.

By carrying out such a comparison of the skulls of modern children and of the young of the primitive Neanderthal man with the skulls of young apes, a closer conception of their common ancestor is obtained and it is then seen that, contrary to what has been most generally held, it is the anthropoid ape and not man which has departed most from the ancestral type. Man himself has retained most nearly the skull characteristics common to both branches of the primates. This ancestral form is best typified by the skull found in the Thames gravels at Piltdown, Sussex, and named the Eoanthropus. He is supposed to have lived about 150,000 years ago and his skull is much more like the modern man than the skulls found in the Neanderthal ravine near Dusseldorf, in 1858, which are thought to be about twice as old.

ITEMS

Science Service

A REAL problem in the production of large amounts of high voltage direct current power may have been solved in England by a so-called transverter, now on exhibition for the first time at the Empire Exhibition at Wembley, according to Professor G. W. O. Howe, president of the engineering section of the British Association. The apparatus consists of an arrangement of transformers and a system of rotating brushes, whereby a three-phase alternating current supply is converted into an almost steady continuous current. The apparatus at Wembley is designed to deliver a continuous current at 100,000 volts. It can also be used for the reverse process. It would thus enable a three-phase generating station and a three-phase substation to be connected to a direct current transmission line, thus avoiding not only the maximum voltage of 1.4 times the effective voltage, but also all trouble due to the capacity and inductance of the line. The disadvantages of the apparatus, however, remain to be seen.

NEARLY 200 species of fossil plants and animals unearthed near Toronto show that between the great ice ages Toronto had a climate like Pennsylvania, Dr. A. P. Coleman, of the University of Toronto, told members of the British Association. The geological formation from which these fossils were obtained is the most extensive and important interglacial formation in America.

MENTAL fatigue is more important than physical in industry, said Dr. C. S. Myers, director of the National Institute of Industrial Psychology of Great Britain, speaking before the section of psychology of the British Association. In industry, he said, there are three sources of fatigue: Exhaustion of the store of material energy; accumulation of waste products in the body, and the continuous "set" of controlling or directing which comes from maintaining the posture of the body or the orderliness of its acts.