blockade and war conditions, even the neutral countries can only maintain their economic life by diverting a high proportion of their normal trade to Germany or to countries under her domination. Sweden, for example, is now entirely dependent for supplies of coal, and for many other commodities, on imports from Germany, and in return continues to export to the Reich high-grade iron ore and other materials urgently required for the German war economy. Continental Europe has been taking about two-thirds of Sweden's export trade, of which Germany receives some half. Again, Germany has been forced by events to concentrate more on short-term plans for the mobilization of resources for their immediate effect than on long-term policy for the 'New Order', and the factors which govern the economic policy for any territory are the current requirements of the German war machine and the need for the maintenance and security of the German home front.

The fundamental difficulty in Germany's war economy problems is a shortage of man-power. The social and industrial consequences of the German exploitation of the human and material resources of the occupied countries, and the resultant food situation, need only to be pondered to realize how grave are the implications for the post-war period. The pamphlet, however, also directs attention to the enormous demand for fuel and power created by Germany's war economy, together with the shortages resulting from the British blockade of overseas supplies of oil and also raw materials. The extensive development of substitute raw materials and the power requirements of industry, as well as the demands of transport and the armed forces, have placed a tremendous burden on available supplies of coal, wood and electricity. The manufacture of substitutes is estimated to demand a third of the total output of electricity in the Reich and about one-fifth of the output of coal. Moreover, while Germany has gained control of all the main sources of coal in Europe, she has apparently been unable appreciably to increase production. The whole transport system under the control of Germany is now suffering from severe strain, motor transport has had to be cut to the barest minimum, sabotage is an increasingly important element and the railways of occupied Europe are being taxed and drained to the limit regardless of ultimate or immediate deterioration.

Agricultural production is being adjusted to serve Germany's special needs, with compulsory delivery at stable prices and the control of harvesting, enforced by heavy penalties. The long-term policy has attempted to increase production in the low-yield areas with adjustment in Western countries in consequence of the shortage of feeding stuffs, which has involved a compulsory decrease in draught animals, cattle, pigs, and other livestock. This policy has not conduced to willing co-operation from farmers in the Scandinavian countries and the Netherlands, and many factors have operated against the policy of increasing the production of oil seeds in south-eastern Europe. Improved weather conditions in 1943 more than compensated for shortage of labour, fertilizers and equipment. The yields of crops increased and the position as regards vegetable oils improved. With regard to industrial raw materials, in spite of the opening of mines and exploitatic of resources, the lack of certain raw materials is still a problem which must be intensified by the loss of the manganese resources at Nikopol and bombing policy in the west, with the destruction of molybdenum mines in Norway, for example. In the U.S.S.R. the withdrawal of practically all skilled labour by the Russians, and their 'scorched earth' policy, made it difficult for the Nazis to execute plans for rapid economic development, and apart from manganese the gain in raw materials appears to have been small.

The review of the mechanism of economic exploitation adopted by the Germans in accordance with their policy of organizing the maximum development of essentials in their own interests draws largely on the Inter-Allied Information Committee's report, "The Penetration of German Capital into Europe". It is, however, well that it should be widely realized that as the occupied areas are released from enslavement they will be faced not only with conditions of starvation, destitution and probably, in consequence, disease, far more widespread and acute than in 1918–19, but also, in consequence of this exploitation, with far-reaching disintegration and breakdown of their national economies. Unless the British and American peoples fully understand the position, they can scarcely be expected to make the sacrifices that will be involved in their own standard of living.

While it is difficult to forecast the dimension or order of the problem of relief and rehabilitation, the second part of this booklet at least gives a succinct account of the immediate needs which the United Nations Relief and Rehabilitation Administration and similar bodies will have to face, whether the release of occupied areas is gradual or the collapse of Germany sudden. Detailed planning of long-term reconstruction has as yet only reached the stage of initial discussion and investigation, though the pamphlet gives some indication of the factors that may determine it—the development of synthetic and substitute materials, of hydro-electric power and transport, agricultural policy and adjustments; but the provision of relief and rehabilitation will be, as Sir Frederick Leith-Ross has pointed out, the test of the capacity of the United Nations to rebuild a more prosperous world and to give freedom from want in their territories. The Royal Institute of International Affairs in this pamphlet has done something to make plain what this will involve in terms of the continuance in the immediate post-war period of the shortages and rationing, controls and restrictions of war-time.

THE NUCLEOLUS

THE nucleolus was first figured in 1781 as a spot in the centre of a round or oval body (the nucleus) in epithelial cells of the eel. Since then it has been described in the nuclei of almost every type of plant and animal cell. Many interpretations were offered of its nature and function. Perhaps the view most widely accepted until very recent years was that it acted as a focus for the elaboration of chromatin which passed from it to the chromosomes as they developed through the prophase. During the last decade the use of Feulgen's reaction for the staining of nuclei has given a new impetus to the study of the nucleolus. This stain showed that at no stage does the nucleolus contain chromatin. Feulgen's stain, together with other modern cytological methods, has made possible the tracing of nucleolar behaviour through all stages of the mitotic and meiotic cycles, and has led to entirely new interpretations of the

role of the nucleolus. Most of the recent work has been done on plant cells. Although it is essential that much more attention be given to the nucleoli of animal nuclei, sufficient has been accomplished to show that plant and animal nucleoli are similar in essentials.

Three important discoveries during this century have determined the trend of modern research on the nucleolus. In 1912 were first seen, in Galtonia, chromosomes with satellites to which the nucleolus was connected. In 1926, the discovery in meiosis of Lathyrus of the 'nucleolar body' established a definite connexion between the chromosomes and the nucleolus. This body was a globule within the nucleolus to which the 'continuous spireme' was attached in prophase. With the methods then in use chromatin thread and nucleolar body stained similarly. In 1934, it was found that a 'nucleolar organizer' existed at a fixed point on certain chromosomes of maize. It was not of necessity visible as a separate entity but the nucleolus always arose in telophase at this point.

It is now well established that nucleoli are produced from the chromosomes in the telophase of mitosis. Each nucleus contains at least one pair of nucleolar chromosomes and each of the pair produces a nucleolus. The nucleolar chromosomes are frequently the sex chromosomes. Each of the pair has attached to it, by a very fine thread, a satellite which may be exceedingly small or may be a globular body as wide as the chromosome. The nucleolar organizer is usually at the tip of the chromosome at the point of attachment of the satellite thread; but it may be placed farther back at a secondary constriction. Suitable technique shows the origin of the nucleolus to consist of two minute granules, one on each strand, which stain similarly to the chromosome sheath. They may be formed from the material of this sheath, for it disappears as the granules increase in size. Any two nucleoli which touch because of growth or due to chromosome movement within the nucleus merge together. By the following prophase all are usually fused into a single body to which all the nucleolar chromosomes for some time remain attached. They break away when the nuclear membrane breaks down in late prophase and the nucleolus passes into the cytoplasm and disappears. A previous decrease in size of the nucleolus suggests that it may contribute material to the sheaths of the newly differentiated chromosomes.

The presence of several nucleoli at telophase, all of which fuse into one body before prophase, has been frequently described, but only recently has it been realized that the number of nucleoli is constant within any one species and is probably of as great phylogenetic importance as the number of chromosomes. Diploids may have one or more pairs of nucleolar chromosomes, and primary and secondary polyploids show a corresponding increase in their numbers of nucleoli countable in early telophase.

So much data on the nucleolus has accumulated that, although he gives eight pages of references, in his monograph "Nucleoli and Related Nuclear Structures"*, Prof. R. Ruggles Gates is able to quote only the more important work. Much of the earlier research obviously needs amplification or repetition using more modern technique. Gates deals briefly with the historical aspects of the subject, and then ably summarizes and critically reviews the more important recent work. As well as discussing the nucleolar cycle in mitosis in the normal higher organism, he discusses and brings into line the nucleolar behaviour in some lower organisms, he tells of related structures induced by pathological conditions and also discusses nucleolar budding. He refers to variations in nucleolar size due to physiological and other causes and evaluates the work on the chemical composition of nucleoli, much of which is at present inconclusive. He examines the relationships of the nucleoli with the chromosomes, the satellites and satellite threads. Gates suggests that the nucleolus may be of genetic and developmental significance for, after being in intimate association with genic material, at metaphase a large part of it is dissolved into the cytoplasm. Finally, he stresses the phylogenetic importance of the numbers of nucleoli, asking that future reports of chromosome numbers should include a determination of the number of chromosomes with satellites or secondary constrictions and the number and sizes of the nucleoli in somatic telophase. F. M. L. SHEFFIELD.

* Gates, R. Ruggles, "Nucleoli and Related Nuclear Structures" *Bot. Rev.*, **8**, 337 (1942).

THE HYGIENE OF THE EIGHTH ARMY IN NORTH AFRICA

LIEUT.-COLONEL H. S. GEAR, of the South African Medical Corps, has described the hygiene aspects of the El Alamein victory won by the Eighth Army in North Africa (*Brit. Med. J.*, March 18, 1944). "The Germans," says Colonel Gear, "must regretfully realize that their neglect" of sanitation "contributed seriously" to their defeat. Some 40–50 per cent of the German and Italian front-line troops were suffering from dysentery and diarrhœa, while the Eighth Army, thanks to the efficient methods outlined by Colonel Gear, was "probably as fit mentally and physically as any army has ever been".

The supply of rations to such an army, and of purified water to the quantity, during the preparatory phases at any rate, of one gallon a day for every man, must have been tremendous problems in themselves. The battle ration was reorganized, but, when the advance began, the rapid movement and dispersal of units created serious problems of cooking and refuse disposal. Each vehicle adopted the practice of preparing its own meals, a practice which resulted in feeding out of tins, waste of rations and the scattering of food remains over large areas, with the resultant encouragement of the breeding of flies. Mobile cooking lorries were therefore instituted, which carried hot, properly cooked meals forward to fighting men. It was found that continuous training and propaganda were necessary to ensure that all units had good cooks, proper company cooking arrangements and a sense of cooking hygiene and sanitation.

The water supply is always a vitally important problem of war in what Colonel Gear modestly calls "warm climates", because so many water-borne diseases exist which can rapidly destroy the efficiency of any force. El Alamein was supplied by water pipes laid from Alexandria by British Army engineers. These carried purified water for fifty miles into the desert and to points within a few miles of the front line. This was truly a remarkable feat. But, when this supply was left behind, the captured water points, polluted by the enemy with oil, dead bodies and filth of all kinds, had to be made fit for