bergensis with an *S. cerevisiae* haploid a hybrid was obtained which could ferment melibiose. When the four ascospores from an ascus of the hybrid were isolated in the absence of melibiose and afterwards tested they were found to segregate in a 2:2 ratio for the capacity of adaptation to melibiose fermentation. When, however, melibiose is present throughout the isolation process, all four ascospore cultures are able to ferment melibiose. Similar results were obtained for the capacity of adaptation to galactose from crosses involving *S. cerevisiae*, adaptable to galactose fermentation and *S. Bayanus*, non-adaptable. It seems that both the gene controlling a specific enzyme and the substrate are necessary for the induction of the enzyme. Once present, however, the enzyme can be perpetuated in the cytoplasm without genic action if the substrate is present.

Mutation

Mutation has been studied in some detail in the haploid, *Nadsonia Richteri*, by Skovsted¹. Mutants differ from the original type and from each other in size and shape of cell, extent of sporulation and details of ascospore formation and in the size, colour and form of their giant colonies on lager-wort gelatine. The mutants all produce asci on lager-wort gelatine although the original type did not. Mutants were picked out as sectors reaching the edge in giant colonies. Single-cell cultures from the original culture were of two types. One culture of the predominant type was chosen for further study. A number of single-cell cultures of this type each gave the same two types of mutants. Each of these types produced three new types. Of these six types, two were tested and each gave four new types. Five of these eight types gave altogether twenty-three new types. Thus, although only two mutant types could be obtained from the original type, further types could be obtained from these mutants and their derivatives. Skovsted has described this process as 'successive mutation'.

In the case of *Saccharomyces*, mutation has to be distinguished from segregation. Winge² found that mutations occurred in old cultures derived from single ascospores and therefore originally homozygous. Spiegelman and Lindgren³ have given evidence of the genetical variability of haploid strains of *S. cerevisiae*. 'Illegitimate' diploids, on the other hand, are very stable when kept under conditions which prevent sporulation. When these diploids are allowed to sporulate, however, segregation often takes place, indicating the occurrence of mutation which had been hidden in the diploid because of the presence of the normal allele.

There are three main circumstances affecting the detection of a mutant: (1) the frequency of occurrence, (2) the possibility of expression, and (3) the survival of the mutant in competition with the parental type. In the case of the haploid *Nadsonia*, the possibility of expression of a mutant character is very great in contrast to the diploid *Saccharomyces*, where the presence of a normal allele at the corresponding locus will usually suppress the expression of a new mutation until segregation occurs at sporulation. However, the survival factor must operate very powerfully in the case of mutants appearing in giant colonies, and only mutants with a growth-rate equal to, or surpassing, that of the normal can be expected to survive and give sectors reaching the edge of the colony. In the case of *Saccharomyces*, weak mutants are protected from the effects of competition by the presence of their normal alleles and only appear when

ascospore formation occurs. When fusion follows rapidly on ascospore formation, such types may be carried in the heterozygous condition through succeeding sexual generations. Evidence that such weak types occur in *S. cerevisiae* was given by Winge, who found that although the percentage of germinating ascospores was high, about 50 per cent of the cultures stopped growing soon after germination³.

The phenomenon of successive mutation as observed in *Nadsonia* may be due to three causes. The original type may be capable of throwing a number of different mutations, only two of which can compete with the parental type in the conditions of the experiment, but in the genetical environment of the new types some of the other new types may become able to compete. Secondly, the new types may permit the expression of genes which are unable to express themselves in the original type. Thirdly, the new types may lead to the actual occurrence of different mutations.

These studies are of great interest to the geneticist since they afford information regarding the occurrence of mutation and the nature of gene action. They should be of interest to the mycologist because they clarify and enhance our knowledge of the life-histories of these lower forms.

¹ Winge, Ø., and Laustsen, O., *C.R. Lab. Carlsberg, Série Physiologique*, **23**, 17 (1940).

² Winge, Ø., and Laustsen, O., *C.R. Lab. Carlsberg, Série Physiologique*, **22**, 99 (1937).

³ Winge, Ø., *C.R. Lab. Carlsberg, Série Physiologique*, **24**, 79 (1944).

⁴ Lindgren, Carl C., *Ann. Missouri Bot. Garden*, **32**, 107 (1945).

⁵ Lindgren, Carl C., and Lindgren, G., *Ann. Missouri Bot. Garden*, **31**, 203 (1944).

⁶ Ditlevsen, E., *C.R. Lab. Carlsberg, Série Physiologique*, **24**, 31 (1944).

⁷ Skovsted, A., *C.R. Lab. Carlsberg, Série Physiologique*, **23**, 409 (1943).

⁸ Spiegelman, S., and Lindgren, C. C., *J. Bact.*, **49**, 257 (1945).

RESTORATION OF SCIENCE IN AUSTRIA

IT was the aim of a meeting called on November 3, by the Association of Austrian Chemists, Engineers and Scientific Workers in Great Britain, to enlist support from British men of science for the restoration of a genuine scientific life (physics, chemistry, biology) in free Austria. In a leaflet distributed*, the extent to which science in Austria has suffered under seven years of Nazi domination is described. The advance of Fascism all over Central Europe made itself felt in Austria's scientific life even before the annexation; but German rule and the War brought large-scale destruction. Many buildings, including the University Library in Vienna and Prof. Hans Przibram's Vivarium, have been heavily damaged, and repair work is most difficult at the present level of industrial activity. Even more serious is the intellectual and moral damage.

A large number of Austria's leading men of science have been banished by the Germans, or prevented from returning there had they wished to do so. The names alone of the men of science who have combined to promote the meeting (all of them outside Austria) make impressive reading. They include the mathematicians, K. Menger and R. von Mises; the physicists, V. F. Hess, Lise Meitner, K. Przibram, E. Schrödinger and K. Weissenberg; the chemists, E.

* Obtainable from the Hon. Secretary, 133 Hatherley Court, London, W.2.

Abel, F. Feigl, P. Gross, H. von Halban, sen., H. Mark, F. A. Paneth and W. Pauli, sen.; the biochemists and biologists, F. Bergel, S. Jellinek, O. Loewi and L. Portheim. Others, like Hans Przibram, have died in concentration camps. Finally, Austria has been isolated from the democratic world and starved of literature other than Axis literature. So it may truly be said that the reconstruction of the Austrian universities will be a Herculean task.

It is gratifying to know that the first condition for the fulfilment of the task is being met by a purge of the schools of Nazis, carried out by the Provisional Government of the Republic. At the same time, instruction is reformed; for example, the teaching of languages—English and the Slav languages—is being extended, and para-military training has been abolished. Another encouraging feature is the energy with which the students are tackling the task of rebuilding the laboratories with their own hands.

Sir D'Arcy W. Thompson, the chairman of the meeting, recalled that some sixty years ago, a few years before the discovery of the X-rays and of radioactivity, and before the development of quantum theory and the theory of relativity, it seemed to many that not much was left to be done in science. Sir D'Arcy forecast similar revolutions, and expressed his confidence that Austria, like other countries, would contribute to them. Among Austrian men of science of the past he singled out L. Boltzmann, who inaugurated a new era in physics, and is of particular interest to British men of science because of his association with Maxwell in more than one field. Prof. F. G. Donnan was hopeful that British, American and Soviet men of science will extend a helping hand. Among Austrian scientific workers he named specifically the older physicists, Doppler, Stefan, Loschmidt, Mach and, above all, Boltzmann; the contemporary physicists, Stefan Meyer, K. Przibram, Schrödinger, Lise Meitner, Pauli; the chemists, Wegscheider, Abel, Paneth, Mark, K. H. Meyer, and the pioneers of micro-chemistry, Pregl, Emich and Feigl; the father of genetics, Mendel; the founder of psychoanalysis, Freud.

Prof. L. Hogben dealt particularly with the devastating influence of pseudo-scientific racialism and said: "It is high time for someone to say, and to say on the housetops, that the moral horrors of the Belsen camp are the practical application, with a ruthlessness particularly Prussian, of a body of views, some of which are scientifically false, some entirely unproved, at best distortions of established truth impudently masquerading with the guise of biological science. I believe them to be false for reasons I set out as a professional biologist in my book 'Nature and Nurture' which appeared significantly before Hitler's rise to power. . . . I say significantly because such views are not confined to Nazi circles. They did not originate exclusively in Germany, though they there fell on receptive soil. They do not automatically die with the death of the Nazi regime. . . . Because these views are still widely prevalent, because they are still a septic focus in the body politic, it is still necessary to refute them publicly wherever and whenever they find exponents. That is one of my reasons for participating in this gathering, not to emphasize what British science can do for Austria, but to suggest what the rebirth of Austrian science can contribute to a saner British outlook on man's social relations. For those who are rebuilding Austrian science have reason to recognize the malign consequences which *Rassenhygiene* or Eugenics, call it what you will, have

left in their train; and I do not believe that you will lightly tolerate attempts to rehabilitate in the cap and gown of academic respectability an ideology which has brought untold misery to your country. . . . During the past ten years there has been a Central European black-out of publications contributory to the advancement of intellectual freedom and civic enlightenment. . . . Might it not be at least a helpful gesture if a group of British scientific men who have played their part on the ideological front against the Nazi conspiracy against human freedom offered to make a first edition of their writings available for publication in Austria without monetary recompense as royalties? I do not think that our American colleagues would be slow to co-operate if we signified our will to do so."

Prof. P. M. S. Blackett, the last of the British speakers, paid tribute to Hess, who laid the basis of cosmic ray research, and expressed his pride in having had O. R. Frisch in his laboratory. He welcomed the idea of organizational union of academic and industrial men of science, as achieved in the Association of Austrian Chemists, Engineers and Scientific Workers in Great Britain and in the (British) Association of Scientific Workers. He stressed the necessity of equipping laboratories with up-to-date research tools, many of which are expensive; in the liberated countries this will often be possible only with collaboration from outside. Blackett specially supported plans for the exchange of personnel. Finally, Prof. K. Przibram, of the Radium Institute of the Vienna Academy of Sciences, who lived in Belgium during the German occupation, described the moral effects on men of science of intellectual isolation, and expressed Austria's desire to break this isolation as soon as possible.

At the end of the meeting it was announced that a committee of British men of science is being formed to implement suggestions for practical help. In particular, the committee will at the present stage concentrate on the question of the supply of literature.

E. BRODA.

HÆMOGLOBIN LEVELS IN BRITAIN

THE Report of the Medical Research Council's Committee on Hæmoglobin Surveys*, entitled "Hæmoglobin Levels in Great Britain in 1943 (with Observations upon Serum Protein Levels)", is a valuable record of one aspect of national war-time health. The hæmoglobin level of some thirteen thousand adults (including seven hundred pregnant women) and some three thousand children were measured from the middle of the spring of 1943 until the middle of the autumn of that year. The Haldane-Gowers method was used and its efficacy is discussed. Although the Committee does not consider this method ideal, it concludes that it was accurate enough to justify the broad conclusions which are recorded in the 128 pages of this report, which is well illustrated by diagrams and graphs. The technical evidence thus published cannot be summarized adequately here. The main conclusions, very briefly given, are as follows.

Severe grades of anæmia were rarely observed. Among men there was little difference, if any, between the hæmoglobin level of married and single men. In the age groups 20–49 both showed a virtually

* Special Report Series, No. 252 (H.M. Stationery Office, 1945). 2s.