In all these the reader has the advantage—inherent in the form in which these transactions are published—of not only learning what an experimenter has to say about his work, but, in addition, seeing the comments it elicited from other keenly interested participants. The question and answer, and the pooling together of small observations which, in isolation, might seem unimportant or meaningless, encourage a clarification and building up of ideas. The contrasting styles of the different contributors also make the reading of these publications much more enjoyable than the reading of some technical journals in which the papers have been so zealously 'edited' that all trace of individual style of expression has disappeared.

The remaining topics discussed at this fifteenth meeting were mostly concerned with hormone studies, and several of the papers consisted in the presentation of further data from work which had already been reported at earlier meetings. The interdependence of the multifarious metabolic activities which take place in the human body and the consequent folly of trying to interpret any one in isolation become more and more evident as each set of these transactions is put together.

M. W. GRANT

MECHANICAL FOAM FOR FIGHTING PETROL FIRES

FOAM for dealing with petrol fires can be generated in two ways: by chemical reaction (chemical foam), or by mechanical agitation (mechanical or air foam). Mechanical foam is largely used in Great Britain and is produced by churning up air and water with a foam-stabilizing agent, such as saponin or soap. The foam-making branch pipe is the apparatus in general use by fire services.

The use of foam appears to have been originally suggested by Laurent in 1904. He successfully demonstrated at St. Petersburg the use of chemical foam against burning naphtha. In 1912, the first foam fighting apparatus for fire-brigade use was introduced into Britain. By 1939, one or two efficient foam compounds were available; but they were both expensive and made from imported materials. With the outbreak of hostilities there came the probability of a large increase in the incidence of petrol fires and also the danger of a shortage of raw materials. Consequently, at the request of the Ministry of Home Security, Research and Experiments Department, an investigation into the whole problem of suitable foaming agents for combating fires of inflammable liquids was undertaken at the Chemical Research Laboratory of the Department of Scientific and Industrial Research. The experimental team was under the leadership of Dr. N. O. Clark, who is the author of Chemical Research Report No. 6: "A Study of Mechanically Produced Foam for Combating Petrol Fires" (London: H.M. Stationery Office. 2*s*. 6*d*. net), in which full details of the problem, the course of the researches and the results obtained are given.

Large-scale methods were developed which permitted a quantitative estimation of the value of foam as a fire-fighting agent, and also a laboratory technique was devised for the investigation of the physical properties of foam. The nature and properties of suitable foaming agents, such as chemically broken down hoof and horn meal, or glue mixed with materials similar to soapless shampoos or chemically treated blood, were elucidated. The use of chemically treated blood—a waste material from abattoirs—as a foaming agent was discovered by the research team. This new compound had the additional advantage of a much lower viscosity than other types and so could be used without modification in R.A.F. crash tenders. It produces a high-efficiency foam for combating aircraft fires, and during the War production was devoted entirely to this particular type of foam.

On the purely scientific side, quantitative evidence was obtained in favour of Plateau's classical theory of foam stability. It would appear that the expansion property depends on the interfacial tension, air/liquid, at the appropriate age of the surface, and the rate of diffusion of the active material into the surface, and is limited by the energy-level of the method of preparation. The hydrolysed proteins are, for example, slow in diffusing into the surface of their solutions. A close relation was shown to exist between the critical shearing stress of a foam prepared from a liquid with appreciable solidity in its surface to that of the corresponding liquid surface.

For the first time, a proper scientific background to the problem has been established, and the 'figure of merit' of foam on a petrol fire can be roughly estimated, but not accurately predicted, from laboratory measurements of the properties of foam, the most important being heat resistance, expansion, and petrol resistance. There is still need for relating laboratory experimental data with those of large-scale tests.

S. WEINTROUB

LINEN INDUSTRY RESEARCH ASSOCIATION

THE report of the Council of the Linen Industry Research Association, Belfast, for the year ended September 30, 1947, states that the strengthening of the financial position of the Association, which now includes practically all the firms in the industry, has permitted the Council to proceed with the Director's plans for expansion, and the new buildings have been commenced. In addition to the large shed with a floor space of 9,800 sq. ft. for technological researches on line and tow preparing, dry spinning and weaving, which forms the main extension, the new plans include the provision of more staff amenities and facilities, extension of the testing-room and further space and equipment for research in bleaching, dyeing and finishing. Reference is made to the co-operation in research which has already flowed from the liaison service described in the last annual report. Comprehensive surveys of conditions of temperature, humidity and ventilation in wet spinning mills have brought to light many striking anomalies, and have led to suggestions by which decided improvements can often be introduced very economically into the working conditions by comparatively simple measures.

Studies in the retting of different types of straw by various methods in the large-scale retting tanks have continued, and in view of the larger differences in yield caused by variations in weather conditions during field-drying of the retted flax, attention has

been focused on treatments to prevent such micro-biological deterioration. Investigations are being continued to improve the efficiency of fibre extraction by turbine scutching machines. An investigation for the Ministry of Supply has shown that the strength of flax yarn depends on the fibre-breaking stress, the fineness and the length of the fibre strands in the raw. A study has also been made of the levelness of rayon staple yarn spun on flax machinery, and one commenced on the suitability of flax machinery for spinning wool, alone and mixed with other fibres. The possibilities of automatic winding and weaving are being studied, while research on bleaching and dyeing continues to have as its object the development of existing methods and investigation of new ones to improve the quality of the product. In finishing research, the study of the application of crease-resistant finishes to linen fabrics has figured prominently and the possibility of fixing both finishes and protective agents by chemical combination with the cellulose has been examined.

Some six hundred testing reports have been made to members, and much cloth testing, chiefly the measurement of tearing and tensile strength, has been undertaken in connexion with the development of new types of flax canvas. Special attention has also been directed to the influence of the micro-structure of flax fibres on the behaviour of flax materials, both during processing and in service.

EDUCATION IN AND FOR THE SERVICES

ALTHOUGH the education authorities of the three Services—Royal Navy, Army and Royal Air Force—frequently collaborate and meet to pool experiences and thrash out problems common to all, it was probably for the first time that all three met by invitation to present their case and reveal their main objectives and the problems which they entail to an audience of nothing but civilian educationists on July 14 at the Conference on "The Education of the Young Worker" organised by the Department of Education of the University of Oxford and held at Manchester College, Oxford, during July 12–17.

The case for the Royal Navy was presented by Instructor-Captain F. C. Sobey, director of studies, H.M.S. *Kestrel*, Winchester; that for the Army (Royal Army Educational Corps) and the Army Cadet Force by Brigadier W. G. Pidsley, deputy director of Army education, and Brigadier H. Kenyon, deputy director cadets, respectively; and that for the Royal Air Force by Group-Captain I. B. Hart, deputy director of education. The meeting was held under the chairmanship of a civilian, Mr. L. J. F. Brimble.

Mr. Brimble emphasized the exceptionally difficult problems which arise in Service education—problems which are often not appreciated by its critics. Now that the Services, particularly the Army, have to deal with National Service entrants, their subject-material is not just a cross-section of the public; indeed, it is almost the entire public at the age of 18–19 plus years. Service intakes at these age-levels include all grades of intelligence and all standards of educational attainment from illiterates up to university graduate level. In most areas there are not enough men or women to warrant segregation into groups according to standard of intelligence or achievement, so that frequently many different grades have to be taken together, though, of course, individual teaching and training are not overlooked. This is, perhaps, the greatest imaginable challenge to the ingenuity of the education officer or instructor. As an illustration, Mr. Brimble described a lecture-discussion which he recently led with Army men of Higher School Certificate standard and upwards, and compared this with a lecture he gave soon afterwards to a group of Army near-illiterates of ages 19–25 years in which only one had ever heard of Faraday and only two of Gladstone. In these two cases, he had his audiences segregated, which made matters much easier than they frequently are in the field.

Group-Captain Hart stated that in the Royal Air Force there are two main educational aims—education for the Service itself and education for the individual. Naturally one aim helps the other, so the distinction between the two is more imaginary than real, and both aims are integrated and correlated wherever possible. Education for the Service is compulsory, whereas that for the individual is mainly voluntary. By and large, the scheme works well in spite of two main difficulties: (1) the peripatetic nature of most Royal Air Force personnel which can frequently upset completely even the best-devised schemes, and (2) the lack of qualified instructors—a lack which is at present common to all educational projects, both Service and civilian.

Brigadier Pidsley gave a very lucid account of the recently planned scheme for the Army which, he emphasized, is still only of an interim nature since the Army itself has still to settle down to a peace-time footing. The Army absorbs the majority of National Service entrants (it is composed roughly of half regulars and half National Service men); but despite the movable nature of Army men and units and the shortage of trained instructors, the scheme, like that of the Royal Air Force, is getting well under way. Just as in the Royal Air Force, units are sent to many parts of the Commonwealth, etc.; but wherever they may be, the presence of the Royal Army Educational Corps is felt. Some units are isolated and there the ingenuity of the instructors is taxed to the limit; other units are near big towns where civilian educational facilities are available to Army men and women. The Army educational scheme is very flexible though it has three broad aims: (1) to make a man a soldier; (2) to train him in good citizenship; and (3) to enable him to develop along the best lines as an individual. Broadly speaking, Brigadier Pidsley claimed that the Army education scheme has got its horse to the water; now it is the job of the Royal Army Educational Corps to see that it drinks.

Speaking for the Army Cadet Corps, Brigadier Kenyon claimed that its educational and training scheme has a real moral purpose behind it and he described various means whereby this purpose is being achieved. The wide variety of interests, both cultural and vocational, inherent in such groups of boys is recognized and catered for so far as is possible. Though religion is recognized and encouraged, politics, and especially party politics, are not. Everything is dealt with on a voluntary basis; nothing is forced upon the boys.

As was clearly stated by Instructor-Captain Sobey in a stimulating yet amusing contribution, the case for the Royal Navy is somewhat different from those of the other two Services. The Navy has few problems arising as a result of the intake of National Service men because that intake is so small—at the rate of about two thousand a year. There is no ship, how-