

partment will become familiar with Governmental inspection; the engineering department with Government blue-prints and specifications; the firm with Governmental methods of business; and the shipping department will know how to crate and ship the finished article.

The terms on which these contracts are to be made are significant. They are to be on a basis of cost plus a reasonable profit, or at a fixed dividend. There are to be no excess profits for anybody arising out of the national need, but the stockholders are to have a living wage, "since it is economically undesirable that the stockholders cease to have any dividend from their investment"! In this way will be prevented any suggestion of a profit-interest in war, of a munition lobby, of a section of the community having an interest in forcing the nation into war. If there is a war every person in the nation must accept his share of the national sacrifice and turn in and work in whatever place his ability can be best applied.

The third and final step in the programme is the enrolment of skilled labour in an "Industrial Reserve" in time of peace. Skilled mechanics in all lines of production must be kept from enrolment in the Army. Rather must bankers, clerks, shopkeepers, and professional men be sent. The skilled workers must be badged, and the only restriction imposed on them by the badge will be prevention of enlistment. Enrolment in the Industrial Reserve will be considered to carry with it honours equal to enrolment in the fighting forces.

It is claimed that this plan is a most democratic and American way of doing the job. It is cheap; it lays the ghost of a munitions trust, with its dangerous interest in provoking war; it safeguards labour from exploitation for excess profits; it educates the manufacturers; and it is not only an insurance against war, but it has great advantages in peace.

Direct organisation for peaceful competition is dealt with in another series of articles. The survey of national resources and their conservation includes significantly "our 22,000,000 children." These must be trained, not only in the schools, but in the vital years between fourteen and eighteen, the waste of which has recently been pointed out by Mr. Galsworthy in the Press and Lord Haldane in the House of Lords. The methods of intensive industrial efficiency which were coming into notice before the war must be continued and developed.

Other articles deal with the disposal of the finished products—the careful preparation of the ground in foreign markets by personal inquiries; by correspondence with consular agencies, chambers of commerce, and universities; by improved methods of packing and dispatch; and by cultivating the "human side of salesmanship." Some of the devices described under this last head would not commend themselves to British ideas, and are not perhaps very seriously urged. There is a thoroughgoing materialism in some of the utterances quoted which we could not accept. "Real immorality," says Prof. Carver, of the

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Economics Department of Harvard University, in a paper on the Conservation of Human Energy, "is nothing in the world except waste or dissipation of human energy. Real morality is nothing in the world except the economy and utilisation of human energy. The reason why it is better to tell the truth than to lie is because a community in which truth prevails will waste less energy than a community where lying prevails. . . . Honesty is one of the greatest labour-saving inventions ever devised. This may be said of any other form of morality which is genuine and not merely conventional."

There are things in our British life which we should not sell for all the markets in the world. But the treasuring of these ideals is not inconsistent with sane preparation to meet the tremendous competition we shall have to encounter in the material sphere at the conclusion of the war. What this preparation should be, in the opinion of President Wilson, is indicated in the letter addressed by him to the editor of the *Scientific American*, directing attention to the articles which have since appeared in that journal. We think it worth quoting in full:—

It will be a signal service to our country to arouse it to a knowledge of the great possibilities that are open to it in the markets of the world. The door of opportunity swings wide before us. Through it we may, if we will, enter into rich fields of endeavour and success. In order to do this we must show an effectiveness in industrial practice which measures up to our best standards. We must avail ourselves of all that *science* can tell us in aid of industry, and must use all that *education* can contribute to train the artisan in the principles and practice of his work. Our industries must be self-reliant and courageous, because based upon certain knowledge of their task, and because supported by the efforts of citizens in the mills. If scientific research and the educated worker go hand in hand with *broad vision in finance* and with that keen *self-criticism* which is the manufacturer's first duty to himself, the fields will be few indeed in which American commerce may not hold, if it chooses, a primary place.

The significant thing about this letter is that there is in it no allusion to Protection. The President is for open operations by an industry relying on its own efficiency, not for trench warfare behind tariffs. Science, education, broad vision in finance, self-criticism—that is the programme. A nation which has imagination, courage, and honesty enough to depend on these can look forward without fear to whatever the future may have in store for it.

J. C.

#### RHODODENDRONS AND LIME.

IN a note in NATURE of February 17, 1916 (vol. xcvi., p. 684), reference was made to Mr. Forrest's discovery of rhododendrons growing on limestone rocks in N.W. Yunnan. In this connection Lady Wheeler-Cuffe, writing from Maymyo, Upper Burma, informs the Editor that she found "a beautiful blush-white rhododendron growing actually wedged into a bare limestone crag on the very summit of Sindaung (6022 ft.), in the southern Shan States, a few years ago." Mr.

Forrest also states definitely that he found rhododendrons with their roots actually spreading in the crevices of the limestone rock.

From the evidence of Mr. Forrest and Lady Wheeler-Cuffe it would appear that these particular rhododendrons must come in contact with a large quantity of lime, but, unfortunately, we have no definite information as to the particular character of the limestone rocks on which they have been found.

In the European Alps the two endemic species of rhododendron, *R. ferrugineum* and *R. hirsutum*, are recognised as being chalk-avoiding and chalk-loving respectively. *R. ferrugineum* is found in damp, deep-layered soil rich in humus, and it will only grow in a limestone region when there is an overlying layer of humus. *R. hirsutum*, on the other hand, is a limestone rock plant, found in dry, open situations, and when the two species are found in the same locality, *R. hirsutum* grows only on the rocks, while *R. ferrugineum* occurs in the pockets of humus. The hybrids which have been raised in gardens with *R. hirsutum* as one of the parents are also lime-loving, like that species.

Several of the new Chinese rhododendrons which were collected on limestone are now being experimentally cultivated in this country on various lime-containing soils. Some of the species (see Grove in *Gardeners' Chronicle*, January 29, 1916, p. 65) appear to thrive under these conditions very well, while to others the lime has proved fatal, but the experiments have not been in progress for a sufficiently long time for a definite verdict as to the behaviour of these limestone rhododendrons under cultivation to be given.

The abhorrence of lime by the humus-loving rhododendrons appears to be intimately connected with the mycorrhiza, the symbiotic fungus which lives in association with the roots of the rhododendron and heath family (*Ericaceæ*), and performs the functions of the root-hairs in absorbing water from the soil; and it may be that the mycorrhizal fungi associated with the humus-loving forms of rhododendron are physiologically, if not specifically, distinct from those of the lime-loving species.

It has recently been shown by Rayner, Jones, and Tayleur (*New Phytologist*, vol. x., 1911, pp. 227-240) that the common ling, *Calluna vulgaris*, though it is sometimes found on chalk downs, is really growing in pockets of loamy soil rich in mineral constituents but poor in lime. It is also worthy of note that in the "limestone pavement" district of Westmorland ling grows vigorously in the very thin layers of earth which lie directly on the limestone rock. An analysis of the surface soil, however, reveals an almost complete absence of lime, and so lime-free is this layer that it is actually necessary to add lime thereto in the course of ordinary agricultural operations.

Cultures made by C. A. Weber and Graebner (see Graebner, "Lehrbuch der Allgemeinen Pflanzenphysiographie," 1910, p. 236) have shown that the lime-avoiding *Ericaceæ* and other plants

they examined suffer from lime only when this is associated with a large amount of soluble salts, and that root-formation fails when nutritive salts are in abundance in the presence of lime. Rhododendrons, however, do not appear to have been among the plants examined.

In connection with their behaviour towards lime-containing soils, plants may be roughly divided into two groups: of those which avoid lime, the heath family affords one of the most striking examples, but, contrary to expectation, certain members of the family, as, for instance, *R. hirsutum*, are characteristic plants of limestone districts.

It seems probable from the evidence now before us that some of Forrest's newly discovered Chinese rhododendrons, as also the one found by Lady Wheeler-Cuffe, must be reckoned as lime-loving species, but in all these cases the interesting question as to the quantity of lime absorbed by the plants growing on limestone rock still awaits an answer. Under natural conditions these lime-loving rhododendrons are flourishing on what we should consider a very sterile medium, and it may be that the poor growth which such plants exhibit when grown in lime-containing soil in our gardens is due to the superabundance of soluble nutritive salts, which may cause the lime to react unfavourably on the mycorrhiza of the roots, and that, under certain chemical conditions, the lime may have a definitely toxic influence. A. W. H.

#### NOTES.

At a meeting of the council of the National Museum of Wales held at Cardiff on October 28, it was announced that a sum of 10,000*l.* had been received in War Loan Scrip from Capt. W. R. Smith, senior partner of the firm of W. R. Smith and Son, Cardiff, and Mrs. Smith towards the building fund of the new museum. The generous donors had made this gift in the belief that the National Museum would be one of the first educational influences in the Principality. There were other donors, who wished to remain anonymous for the present, and it is expected that when the present contract has been paid there will be a balance of about 16,000*l.* towards the 50,000*l.* which is needed to complete the furnishing and equipment of the portion of the building at present in course of erection.

DEALING with the fine collection of statues of eminent Welshmen at Cardiff unveiled by Mr. Lloyd George, a correspondent, writing in the *Western Mail*, points out with regret that no man of science figures in the series. He says that Robert Record, of Tenby, who flourished in the first half of the sixteenth century, might well have been included. Record was a man of cyclopædic knowledge, and was most eminent in his time, though little known to modern Welshmen. The use of the sign = to denote equality was introduced by him in 1557. He was "the first mathematician who wrote on arithmetic in English; the first who wrote on geometry in English; the first who introduced algebra into England; the first who wrote on astronomy and the doctrine of the sphere in English; and, finally, the first Briton (in all probability) who adopted the system of Copernicus." As a statue or two are still to be added, perhaps science may yet be represented in the Welsh Valhalla.