elimination of sources of infection of crop plants.

The writer appreciates the danger of generalizing upon such a subject. However the two conditions, the one a prompt utilization of all vegetable material and the other an almost entire absence of leaf spot diseases, are both so noticeable that the coincidence and suggested explanation seem worthy of note.

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Bureau of Plant Industry

A METHOD OF IMBEDDING IN PARAFFINE

The following method of imbedding tissues in paraffine preparatory to sectioning has proven so satisfactory in routine work in our laboratory that this brief note of description is offered.

The imbedding is done in paraffine buttons formed on the surface of cold water. Melted paraffine is allowed to flow from a pipette down the side of a glass dish with sloping wall, such as a finger bowl, nearly full of water. On reaching the surface, the paraffine hardens below, forming a button still liquid above and anchored securely at one edge to the glass. The tissue is now p'aced in the fluid paraffine and oriented. More paraffine may then be added to thicken the button if necessary. A label is attached by its end with a small drop of paraffine. The button is then disengaged from the class by a dissecting needle and carried on the point of the latter below the surface. It is at once transformed to a glass of water inverted over a basin, where it remains until solid.

Large thick buttons may be obtained in this way without the use of glycerin, paper boats or frames. The rapidity with which imbedding may be done by this method is perhaps its chief recommendation.

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QUOTATIONS

SCIENTIFIC AND INDUSTRIAL RESEARCH IN ENGLAND

The fourth annual report of the Committee of the Privy Council for Scientific and Industrial Research has just been issued; it covers the period from August 1, 1918, to July 31, 1919. Earl Curzon, of Kedleston, the Lord President, records that during the past year the work of the Department of Scientific and Industrial Research has steadily grown in usefulness and in amount. The passage from war to peace, he says, reveals more and more clearly as it proceeds the need for the sympathetic encouragement and organization of research in every sphere of national life. Encouraging progress is recorded in several directions. Thus a marked change is observed to be taking place in the attitude of industry towards scientific research; both masters and men are beginning to recognize its vital importance. Something also has been done to increase the number of trained research workers, the demand for whose services rose rapidly not only in industries, but also in the universities and government departments. The report of the Advisory Council, signed by the administrative chairman, Sir William McCormick, describes in greater detail the various branches of the department's work. The work of the Food Investigation Board grew enormously during the year. The field to be covered is so large and the range of scientific knowledge so wide, that only a complex organization could hope to deal with the problems effectively. The board accordingly set up six committees to deal respectively with fish preservation, engineering, meat preservation, fruit and vegetables, oils and fats, and canned foods; and these committees have in turn appointed seven special committees. The therapeutic uses of oxygen, shown by recent practise to be capable of very great extension, and being actively investigated by the Medical Research Committee in close cooperation with the Oxygen Research Committee of the Department. The Industrial Fatigue Research Board was established jointly by the Medical Research Committee and the Department, the former being responsible for administration. The demands made upon the Board have far exceeded all anticipation, while industrial unrest, believed by many to be closely related to present ignorance of the laws of fatigue and the best modes of applying them in practise, has emphasized the importance of this branch of research.—*British Medical Journal.*

SCIENTIFIC BOOKS

Constructional Data for Small Telescope Objectives. Calculated at the National Physical Laboratory. By T. SMITH and R. W. CHESHIRE. 4to. Pp. 32. *Additional data for the construction of small telescopes objectives.* By the same authors. Prepared at the request of the Director General of Munitions Supplies. 4to. Pp. 82. London, Harrison and Sons, 1915 and 1916. Price, 2s. 6d. and 5s.

During the war every possible stimulus and aid was offered to manufacturers by the English government no less liberally than by our own, and of course some years earlier. The present volume is intended to save the manufacturer of small telescopes a large part of the time and expense that would be consumed in perfecting his models. British glass factories, aroused to the emergency, had succeeded in producing new varieties and a large quantity of optical glass, duplicating in feverish haste inventions evolved at leisure by German scientists and artisans during the previous thirty years. But the grinding of lenses and their combination into effective sets for binoculars, gun-sights, range-finders and photographic cameras can not be begun until protracted mathematical calculations are finished. Years of preliminary study have often gone into the making of an improved objective. One must conjecture, design, calculate and compare. Obviously, carefully systematized records of previous studies would save labor: cooperation is economy. These tables mark a new application of this principle. Glass factories supply, with a list of available melts, their indices of refraction and dispersion. By the tables one can decide quickly upon the comparative merits of doublets made from those materials.

Objectives are usually made of from two to six separate lenses. Each component by itself gives a defective image. Rings of blue or red encircle each bright object, and in place of points of light there appear hazy circles or fantastic comet-like shapes. If at the center of the field a picture is fairly good, the parts toward the edge are distorted. To improve such crude images, at least two lenses must be used in combination. Accordingly data are here given for suitably matched two-lens objectives, one lens of crown glass, the other of flint glass, so proportioned as to eliminate at least two of the so-called aberrations, or defects of the image. The figures relate to six kinds of crown glass (a seventh in the supplement) and six kinds of flint glass. The selection of typical sorts is not made at random, nor at equal intervals in the whole range of possibilities, but near what we may call, borrowing a statistical term, "accumulation" points of the catalogue list. To suit each of six sets of conditions the proper dimensions are found for every combination of one kind of crown with one kind of flint, so that every table contains 36 entries.

The first set of tables (A) eliminates color and spherical aberration; not, of course, for all kinds of light and for objects at all possible distances, but for two different wave lengths of light and for objects at a distance so great that the rays striking the glass are practically parallel ("object at infinity"). To the removal of color from the image corresponds an algebraic equation of the first degree between the focal lengths of the two lenses, both considered as "thin"; while that for spherical aberration is of the third degree in the curvatures, or reciprocals of the radii of the spherical surfaces of the lenses. But when the two lenses are to be in contact, and their contiguous surfaces are exactly alike so that they may be cemented, the third degree equation for that common radius is reduced by one degree, to a quadratic. For this equation then there are two solutions, and so two tables of curvatures. Indeed all the pairs here tabulated are cemented lenses. Since two of the four spherical surfaces have equal radii for any desired focal length, there re-