

eye' trade and by the recent practice in Russia of saving and planting the top 10 per cent or less by weight of the larger tubers used in canteens, etc. My own experiments using potato tops and other cut pieces of various sizes and after various treatments indicate that, at least in the absence of favourable weather conditions on which we cannot count, or of laborious early planting in boxes³, cut pieces of less than 20 gm. weight are unlikely to prove practicable in England except in conditions of extreme shortage of seed. But whether or not, under our very different climatic and present economic conditions, these Russian and American measures could be of commercial value in the British Isles, we should make haste to find out more about their practice and local application in case of emergency when their widespread employment might well save us a million tons of potatoes for food or other purposes.

Meanwhile the economical, practical mean for us lies in the widespread application of such less extreme cutting methods as have long been extensively employed in the United States. This cutting can be done on a large scale mechanically and *inter alia* made to solve our main problem in perfecting an efficient potato planting machine; it would save huge quantities of valuable carbohydrate material which is otherwise put back annually into the soil; it would abolish all need for the laborious and artificial separation of 'seed' from 'ware' tubers; it would help economize fuel and transport; it would speedily reduce 'degeneration', as small tubers tend to be more heavily infected with virus; and it would allow correspondingly better disease control, as more or all of our acreage could, with proper organization and education, be grown from certified stock using large as well as small tubers.

Contrary to popular conception and practice the tubers should be cut across transversely or into square-faced chunks rather than lengthwise—not only, with most strains and shapes of tuber, in order to expose less area to drying and subsequent fungal attack but also because morphologically speaking potato tubers are shoots and only by transverse cutting will the usual backward movement of growth-retarding substances from the dominant sprouts of the (physiological) tip be restricted and sturdy, productive daughter shoots obtained from the 'heel' (proximal) as well as the 'rose' (distal) end. Moreover, contrary to the usual directions given in Great Britain, the pieces if not planted immediately after cutting must be kept *moist* (for example, covered over with damp sacking) at least until they have healed by local deposition of suberin (12-24 hours at about 10° C. usually suffices). Everything considered, sets weighing an ounce or so and planted rather closer together than is usual with whole tubers may be expected to give the most satisfactory results.

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April 27.

¹ NATURE, 151, 421 (1943).

² Gard. Chron., 113, 36-7 (1943).

³ J. Min. Agriculture, 50, 20 (1943).

Map Construction from Aerial Photographs

During the early part of the War a need arose for showing how a map can be constructed from aerial photographs. Since no suitable strips of aerial photographs were readily obtainable, strips of

imitation aerial photographs were prepared by traversing a fairly large plaster relief model of part of a well-known part of the Western Highlands of Scotland with an ordinary camera kept at a small fixed distance from the base of the model, and maintained with its optical axis normal to the base of the model. The successive positions of the camera relative to the model were arranged so as to give adequate overlap of adjacent photographs and strips. Enlarged prints of a convenient size were made and successfully used for demonstrating the construction of a map from a series of strips of aerial photographs. (It should be noted that the camera had no collimating marks, and therefore the principal point of the photographs was assumed to be at the intersection of the diagonals. No special photographic materials were employed.)

Increasing numbers of people are taking a keen interest in the applications of aerial photographs, and a recent book¹ suggests various exercises. Under war conditions it is not at all easy to obtain photographs which can be used for practising the manipulation of aerial photographs. Hence the above method of making imitation aerial photographs, a method which may possibly have been employed and described by others previously, may be of assistance to those who possess no suitable real aerial photographs.

There seems to be no reason why these imitation aerial photographs should not be used for practising the compilation of mosaics; and when a stereoscope and stereometer are available, contouring might be attempted, the contours being tied to spot-levels determined by means of a cathetometer. Tilted photographs can be made and photographs with short overlap in order to show the difficulties which arise in such cases. Finally, maps compiled from imitation aerial photographs can be checked by comparison with the model.

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¹ "Aerial Photographs: their Use and Interpretation", by A. J. Eardley (see NATURE, April 24, p. 459).

H. L. Callendar and the Theory of the Liquid State

In 1902, H. L. Callendar¹ suggested that the variation of specific heat of water with temperature could be explained by assuming that a volume of liquid in equilibrium with its vapour contained dissolved in it a number of molecules of its own vapour. The number of molecules assumed to be dissolved was such that, as a vapour, they would occupy the same volume as the liquid, so that the concentration of dissolved molecules in the liquid was the same as that of ordinary molecules in the vapour.

Since Callendar's time, developments in general physical theory have removed the difficulty which he found in accepting a variable specific heat. As a result of X-ray studies, the chemical idea of different 'hydrol' molecules has also been superseded. Nevertheless it is the object of this note to point out that, applied to liquids generally, Callendar's suggestion is precisely equivalent to a later concept which has proved acceptable and capable of useful development.

In 1936, Eyring² pointed out that the energy