weather, it is equally important that the crop should not be so advanced that it emerges from the state of hardness before winter is over. Whether or not a plant is in the state that it can acquire or retain hardiness, cannot be judged by external appearance; it is governed more by the stage of development than by state of growth.

In Great Britain, capacity to withstand water logging is a more important aspect of winter hardiness than frost resistance, and it is interesting to note from these contributions that 'hardening' increases resistance to water-logging as well as to frost, and that the curves of both were similar from the time of sowing throughout the winter.

Moshkov makes an interesting contribution on photoperiodism and hardiness, showing how plants introduced from regions of comparatively short day-length display a lowered resistance to frost when grown in regions with a greater length of day, such as near Leningrad; the resistance is restored if the plants are shaded for some hours daily in such places, thus artificially shortening the day. The author is of opinion that plants are not so winter hardy when grown in places having a day-length differing from that of the region where they grow in the wild state. This work will probably throw light on some important problems connected with the introduction of strains of pasture plants from country to country, and help to explain the value of the indigenous strains.

In a study of the effects of a covering of snow, it is pointed out that the plants are killed if the layer is too thin or too thick. It has hitherto been assumed that the harmful effect of a deep layer of snow is due to the exclusion of air; but the authors show that it is caused by the exhaustion of the carbohydrates in the leaves and nodes, followed by a breakdown of proteins, and the subsequent attack of the weakened plants by 'snow mould'.

Metric System for Maps

WE have received a copy of the memorandum submitted by the Council of the Decimal Association to the Departmental Committee on the Ordnance Survey, appointed by the Minister of Agriculture and Fisheries, now sitting. The memorandum urges the adoption of the metric system for British maps.

The Association is naturally strongly in favour of the suggestion of the Director-General of the Ordnance Survey that a metric grid for maps of Great Britain would be preferable to a yard grid (see NATURE, February 1, p. 196). It also directs attention to the want of simplicity which exists among the present scales of maps. Of the eight different scales, only three are simple ratios to the actual. The Association agrees with the Director-General that if a grid system is adopted there are great advantages in having map scales exact multiples of one another.

In the accompanying table the existing Ordnance Survey scales are contrasted with the scales which it is suggested should replace them.

"It will be seen," the memorandum remarks, "that, with one exception, there is only a negligible difference of ratio between the existing and the suggested improved scales." Whether these changes could be brought about or not must largely depend on being able to educate the public to appreciate the advantages of the metric system. The Ministry of Transport might assist by having the distances on road finger-posts shown in kilometres, in brackets, after the present mileage figures. By this means the numerous map and road users could readily be reached.

Suggested Natural Scale		Scales of Existing Maps	
Denomination (mm. to km.)	Ratio 1 to	Inches to mile	Ratio 1 to
1	1,000,000	$\frac{1}{15.782}$	1,000,000
2	500,000	$\frac{1}{10}$	633,600
4	250,000	$\frac{1}{4}$	253,440
8	125,000	$\frac{1}{2}$	126,720
16	62,500	1	63,360
100	10,000	6	10,560
400	2,500	25,344	2,500
800	1,250	50,688	1,250

Since the chief reference to the Departmental Committee is concerned with the revision of the Ordnance maps, it would appear to be a favourable opportunity, which may not occur again, for a serious consideration of the adoption of the metric system, now used in every Continental country. At the same time, a simplification of the scales could be taken in hand. Anyhow, nothing, we suggest, should be done to hamper the eventual adoption of the metric system, if it cannot be introduced at present.

Design of Cargo Steamers

IN the aftermath of the Great War, probably no branch of activity suffered so much disorganisation as that of shipbuilding. To make good the deficiencies of the moment, standard ships were hurriedly built with little or no relation to the particular work which each would have to do, and with inadequate attention to other details of design. The lean years which followed made the times difficult even for the most efficient of fleets, and, without any foundation on which to build up a post-War policy, the business of shipbuilding has been in much the same plight as a ship the steering gear of which has broken down.

From this unsatisfactory condition there is now some prospect of release, and in a paper entitled "New Cargo Steamers: Efficiency Problems" read before the North East Coast Institution of Engineers and Shipbuilders on March 6, Mr. J. Leslie Batey discusses the question of obsolescence and its bearing on the probable demand for new tonnage. A chart showing tonnage under construction in the United Kingdom since 1911 and the corresponding figure

of twenty years earlier gives a clear idea of the author's view that there will, in the next five years or so, be a considerable increase of shipbuilding, and, therefore, of prices above the present low levels. He points to the advantage, where immediate profits can be dispensed with, to be derived from building when prices are low and obtaining a few years later enhanced rates together with capital appreciation.

On the technical side it is shown that for efficiency, design and specification must be suitable for the particular trade for which the vessel is intended, that features which are nothing more than fads must be eliminated, and that accommodation for officers and crew should be such as to attract the best type of men. Drawings of the S.S. *Dumfries* are appended to show the author's idea of a good plain cargo vessel with a well-balanced specification and arranged on simple and efficient lines. Questions of strength and weight should be left to the classification societies as the greatest authorities on the subject and the depositories of data relating to structural trouble experienced with ships in service. Stream-lining of the rudder and stern frame is recommended as one of the conditions essential to efficiency.

On the subject of service speed, the author indicates the retarding effects on a vessel in a sea-way due to rolling, pitching, heaving and yawing, and the additional fluctuations due to orbital velocity of the surface of the water which in waves 6½ ft. high and 100 ft. in length has been found to be as much as 2¾ knots. To maintain the service speed against such adverse conditions, he considers it advisable to give the vessel a form suitable for a speed ½–3 knots (according to trade) in excess of the service speed demanded, and suggests that on trial the engines should be able to develop 15 per cent surplus power on the Skelmorlie mile (or 10 per cent on Hartley). As a standard of propulsive efficiency, Ayre's basis is taken and data are adduced regarding four types of vessel, including one of the *B* Standard vessels, and their performances are analysed and compared in detail on this basis.

Embryology of Angiosperms

AN article by Dr. P. Maheshwari from *Current Science* of June last, entitled "Progress of Work in India on the Embryology of Angiosperms", reviews the considerable amount of research already completed in his own department at the Agra College and at other Indian botanical centres.

Contributions from Agra include a series of papers by B. M. Johri on the embryology of the Alismataceæ as illustrated by species of *Limnophyton* and *Sagittaria*, with a review of previous work on the family: there is some variability in development in the embryo-sac and in endosperm formation. B. L. Gupta gives a comparative account of previous work on the embryology of the Potamogetonaceæ and contributes results of his own researches on pollen and ovule-development in *Potamogeton crispus* and *Wolffia arrhiza*. *Wolffia* shows several important differences in this respect from the allied genus *Lemna*. Similar work on the Centrospermales is found in studies by H. R. Bhargava on *Boerhaavia* (Nyctaginaceæ) and *Mollugo* and *Trianthema* (Aizoaceæ) and by V. Puri and B. Singh on *Digera* (Amarantaceæ). In a comparative review of embryological work on the Centrospermales, Puri and Singh suggest the separation of the Portulacaceæ, Basellaceæ and Caryophyllaceæ as a distinct order. Species of *Neptunia* (Mimosaceæ), *Eclipta* (Compositæ) and *Cuscuta* have also been studied. In a paper on the gametophytes of *Berberis nepalensis*, Johri discusses the relationship between the families Ranunculaceæ and Berberidaceæ. The marked similarity in members of the two families in sporogenesis and gametogenesis suggests their close alliance in spite of differences in floral structure which have been used to separate them in distinct orders.

Dr. Maheshwari introduces a study of the life-history and anatomy of *Ephedra foliata* with an account of the development of the two gametophytes. With B. Singh he contributes an account of the morphology and anatomy of the fern, *Ophioglossum fibrosum*. In his general article referred to above, he stresses the importance of a study of the plants in their entirety in approaching a natural system of classification. He also refers to the serious difficulty arising from paucity of literature in India, and pleads for a more general exchange of reprints and journals.

Experiments in Salmon Marking in Norway, 1935

A NOTABLE paper has just been published by Prof. Knut Dahl and Sven Sømme on this subject (*Statens Forsøksvirksomhet for Ferskvannsfiskeri, Oslo*. I. Matem.-Naturwid. Klasse, 1935. No. 12), and it is demonstrated that *Salmo salar* has a wider range in its migratory movements than was supposed, or at any rate than had been proved in Europe.

The Scottish coastal marking carried on for a number of years in the Moray Firth and east and north coasts of Sutherland certainly resulted in a large number of recaptures and records published by the Fishery Board for Scotland—up to 38 per cent of the fish marked in one of the seasons—and shed a good deal of light on the movements of fish round the coast. Indications were collected also from the capture of salmon, at infrequent intervals, at far distant points, that the Atlantic salmon ranged widely. But the Norwegian results now published prove this to be the case.

The authors are of opinion that the high percentage of recaptures—reaching 48 per cent—is due really