nature and arrangement of the dentigerous bones of the mouth, and the form of the dermal armour of the head, are all typically coelacanthid.

The skeleton was cartilaginous, the vertebral column apparently tubular, and the whole fish extraordinarily oily. The fish has small spiracles situated as shown in the accompanying illustration, and a definite though not very obvious lateral line, which continues uninterrupted to the end of the supplementary caudal. Other differences from the known coelacanthid fishes are the pronounced pedunculation of the lobate pectorals, the reduction of the dermal armour of the head, and the presence of two small heavily ornamented bones at the anterior lower corner of the opercular plate, which probably correspond with the more fully developed inter- and sub-opercula of teleosts, also a similar posterior post-spiracular ossicle. Dermal parafrontals are not visible. There is a

free tongue composed of four fused segments covered with presumably ossified tubercles.

It is probable that systematists will wish to propose a new family (some even a new order) for this fish, but I am at present satisfied that it is close enough to the Mesozoic Coelacanthidae to justify its inclusion in that family. It has been noted that certain coelacanthid fishes underwent little apparent change from the Devonian to the Cretaceous. It is therefore not surprising that this species, which presumably has survived from the Mesozoic, should still retain most of the features which characterize that family.

For the fish described and figured above I propose the name *Latimeria Chalumnae* gen. et sp. nov.; the full account of the species and of its taxonomic relationships will be published in the *Transactions of the Royal Society of South Africa*.

A Tentative Land Fertility Map of England and Wales*

By Dr. L. Dudley Stamp,

Director of the Land Utilisation Survey of Britain

INDUSTRIAL and housing development in England and Wales is estimated to have absorbed since 1900 no fewer than 800,000 acres—an area equivalent to the counties of Buckingham and Bedford combined. This land has been taken mainly from that devoted previously to agriculture and, once covered with bricks and mortar, it is lost to agricultural production for ever. Not only is the area concerned 2 per cent of the total area of the country, but it is also largely the best quality land. The modern factory with its horizontal layout requires level or gently undulating land, preferably well-drained; such land is also that most easily and cheaply developed as building estates and is also of the type required for aerodromes. It is precisely the best ploughland which has these characteristics and which is therefore being absorbed with alarming rapidity. Amongst the assets of the nation, its good agricultural land is surely one of the most precious, and yet, at the present time, enjoys little or no protection.

First-class arable land, suitable for intensive use as market gardens, occupies a strictly limited area in Britain—probably not more than 5 per cent—yet the value of even this land for agricultural purposes is below its 'development' value

if it is so situated as to be suitable for housing or industrial purposes. Similarly, local and other public authorities take such land without hesitation for housing, recreation or public utilities (notably reservoirs), thus impoverishing national resources as a whole. Under the Town and Country Planning Acts, most agricultural land is 'zoned' for housing independently of its value for food production. Indeed, many town and regional plans completely ignore agricultural values and, as in the case of the South Essex regional plan, would result in the best land being devoted to housing and industry before the poorer land is touched. It is becoming increasingly apparent that, in the matter of land planning, local and national needs are in direct conflict, and that a National Planning Board is an urgent necessity.

If the national stability depends in any way on the maintenance and perhaps increase in home food production, and if the national health can be related in any way to a supply of fresh milk, vegetables and fruit, then the appropriate land must be preserved. The determination of the areas of best land thus becomes a problem of greatest urgency.

Several different bases might clearly be adopted in attempting a classification of the land of Britain. It might be made on the basis of a detailed soil survey, but this has not yet been made and there remain technical difficulties, including both finance

* Summarized, by permission, from a report prepared at the request of the Royal Commission on the Geographical Distribution of the Industrial Population and included in a public lecture delivered at the London School of Economics on January 31.

and personnel. Another method is to take agricultural productivity, but this is only valid if crop yields are studied on a field-to-field basis or carrying capacity of grassland on similar small units. Conclusions based on statistics available—even if individual farm or parish figures are used—are far too generalized because of the inherently heterogeneous character of the units. A survey of land values at a given time might seem to indicate a suitable basis were it not that these are related too closely to considerations of accessibility and to amenity or 'development' values. In a country where natural or semi-natural vegetation is still dominant an ecological survey may well, as F. E. Clements has urged, assess the combined total influence of all natural factors—of elevation, aspect, drainage, soil, climate. This method can be applied to the great moorland and 'rough grazing' areas of Britain and has been extended by Stapledon and his co-workers to the whole of Wales by using 'index species' and the floristic composition of the widely distributed grassland.

It is possible to devise a classification based primarily on existing land use provided that natural, historical and economic factors are all adequately considered. The Land Utilisation Survey has completed a field-to-field survey of present land use over the whole of England, Wales and Scotland. The six-inch field maps and the one-inch coloured maps (of which eighty sheets have now been published) form the starting point for comparison with the past. Over large areas of the country, a direct comparison can be made with the period 1837–1845 by plotting on to modern six-inch maps the information collected in parish surveys made under the Tithe Redemption Act of 1836—a tedious and laborious though illuminating exercise. In some areas, eighteenth century enclosure, manorial and other medieval maps carry

back the story much farther. Contrary to popular belief, the natural factors exercise a greater influence now than they did in the past in the determination of land use. With the improvement of internal communications and the development of overseas supplies, it is no longer economic to use land for the production of commodities (such as wheat in much of the West and Midlands) for which it is, for climatic or edaphic reasons, unsuited.

Most of Britain has been settled and farmed for hundreds, if not thousands, of years. Recent land-use is often the result of a long continued process of determination by trial and error. Our investigations have stressed what might therefore be expected, though which is constantly denied, that there is a remarkable stability of land use in Britain. This applies to the poorest land—moorland and wasteland now and in the past; and to the best land—selected for ploughland in the past and remaining under the plough to the present day despite economic vicissitudes. The maximum of change has taken place on lands of intermediate

quality—under certain economic conditions it may pay to plough them; under others to put them down to grass; under others to abandon them entirely or in part.

Thus the classification of the land of Britain now proposed is based on a variety of considerations. The accompanying map is a first attempt to show the approximate distribution of each type. It has been prepared on incomplete information and is published now for the first time in order to secure constructive criticism.

(1) *Land of the highest agricultural value—actual or potential market-garden land*, capable of intensive cultivation, with deep, fertile, easily worked loamy soils, retentive of moisture and of manure and often naturally rich in humus and mineral salts. Most of this land has long been tilled, though some (for example, Fenland and south Lancashire) has been made available by careful drainage. This is the land above all other needed by the nation for the production of fresh fruit and vegetables, and which needs protection from the inroads of housing and industry. Its protection near towns is especially desirable to secure local supplies of fresh vegetables. Some at least might be reserved for allotment gardens.

(2) *Land of high agricultural value—the major ploughlands*. For climatic reasons this land is mainly in eastern and southern England and is the land from which Britain must obtain the bulk of her ordinary farm crops for direct human consumption. Whilst from its position and character some may be needed for aerodromes and other national requirements, it should be protected so far as possible from housing and industrial development. Most has shown great stability in use as crop land.

(3) *Land of high agricultural value—first quality grassland*. This includes the best 'fattening pastures', capable of fattening one bullock per acre (or equivalent in other animal units) and usually managed as permanent grassland. Soils are often heavy though fertile and surface water is available. The land is the basis of the home-killed beef industry and much of the dairying industry and should be preserved as far as possible.

(4) *Land of high agricultural value—the major stretches of good grassland*. The carrying capacity is lower than on the first quality grassland and the pastures are not normally fattening pastures without the aid of auxiliary feeding stuffs. The land should be regarded as primarily agricultural but not debarred from other uses under adequate safeguards or control.

(5-7) *Lands of intermediate value*. In the present state of information available no attempt has been made on the map to subdivide this land,

though clearly two or three major types can be separated; for example, the broad stretches of downland, normally under mixed farming, contrasting with the hilly lands of western England and Wales under alternate husbandry. Quite apart from detailed soil studies (the soils are extremely varied) most of this land can be detected when its utilization is studied historically. Much of it to-day is under pasture (often of second quality with reeds, rushes, bracken, etc.); in past times of prosperity or under economic stimulus, much of it was ploughed and cropped; with the advent of times of depression, it became in part agriculturally sub-marginal and much is allowed to lie idle. This is land which should be the especial concern of national planning, where an integration of agriculture, housing, industry, including garden cities, recreational areas, high-speed parkways and other requirements of present and future, should really be planned.

(8) *Land of low agricultural value—moorland and rough hill pasture*. This is land with immature mountain soils, usually thin, or stony podsolized soils, which is of limited economic value as rough grazing, as sporting estates or as gathering ground for water supply. Because of its hilly or mountainous character it is rarely suitable for industrial development, but its greater use in the national economy can be found by a careful division into areas suitable for (a) improvement to good pasture, (b) afforestation, (c) recreation (national parks, etc.), (d) water supply and (e) rough pasture as at present.

(9) *Land of low agricultural value—heathland and lowland areas of rough pasture*. These are the old 'wastelands' of the medieval farmer, usually with 'hungry' light soils, and most of the 'commons' of south-eastern England, as well as larger areas such as the New Forest and Breckland, are of this type. Where occurring near towns, this land is ideal for those parts of 'green belts' designed primarily as public open spaces—scenically attractive with heather and pine woods and drying quickly after rain. If abundant (for example, parts of Surrey) the land is very attractive for good types of residences, provided the owner does not look for a substantial return from the cultivation of his garden or small-holding. The more extensive or remote areas are suitable for coniferous afforestation, military training grounds, and even in some areas for industrial purposes.

The driest and least fertile tracts of downland and limestone pasture are allied in value and utilization; for example, parts of the Chilterns and South Downs.

(10) *Land of low agricultural value—rough marsh pasture, saltings, etc.* Although the reclamation of such land often provides good grazing

(Thames marshes) or even good arable land, it is expensive and difficult to justify commercially; on the other hand, the waterside location, ease of excavation for docks, wharves, etc., and the possibility of building up the land by dredging silt from neighbouring watercourses and thus

improving the river channels, makes this cheap land attractive to heavy industry. There is every reason to encourage industry to use such land; for example, Tees-side, Teesmouth, Thames-side, banks of Lower Medway, certain parts of Southampton Water, etc.

National Nutrition Policies

By Sir John Boyd Orr, F.R.S.

IT has been known for many years that faulty diet is the direct cause of a heavy mortality throughout the world through deficiency diseases such as pellagra and beriberi, and, even in the wealthiest countries, of a great deal of ill-health. It has also been known that diseases due to faulty diet are possibly the easiest of all to prevent. Yet we are only now beginning to make a survey of the extent of the damage being done to the human race by malnutrition, and of our food resources available to prevent that damage.

Through the action of the League of Nations, this is now being done on an international basis*. Following the recommendation of the League's Mixed Committee on Nutrition, twenty-one countries have set up national nutrition committees to collect information regarding the state of nutrition in the different countries and to ascertain what is needed to make national dietaries fully adequate for health. The committees are conducting inquiries on what foods and what amounts of each are consumed by people of all classes and living under all sorts of conditions. This information, got by family budget inquiries and dietary surveys, enables estimates to be made of the nutritive value of the diet of different classes and also gives an indication of the level of income necessary for adequate nutrition. A parallel investigation of the state of nutrition of the families whose diets are determined will give some indication of the extent to which ill-health and poor physique can be attributed to deficiencies in the diet.

It is difficult, however, to assess the relative influence on health of faulty diet and of other factors inimical to health which usually accompany faulty diet. Useful information on this can be obtained by feeding experiments on children on poor diets, the deficiencies of which are made good by the addition of supplements of high nutritive value, and comparing the subsequent health of these children with that of children on similar diets and under comparable conditions but not receiving supplementary feeding. A further line of inquiry

recommended is a survey of total national food supplies, home products plus imports, and a comparison of total food available with total national nutritional requirements. The information obtained in all these investigations will show what changes are needed in national food policies in the interest of health.

Governments were requested to furnish to the League annual reports on the work of their nutrition committees and the secretariat was instructed to publish an annual summary of these statements and of the proceedings of meetings of the representatives of the national committees. This survey of national nutrition policies now available gives the first annual report on the statements received and of the proceedings of the first meeting held last October, at which sixteen countries were represented.

Though the work of most of these committees is still in the initial stage, this report promises well for the success of the difficult work which they have undertaken. The information brought out in the preliminary inquiries shows the great need for a world-wide investigation and the immense possibilities of promoting human welfare by the application of "the newer knowledge of nutrition". The facts already revealed are sufficiently startling to warrant immediate changes in national food policies. Even in a country like Australia, where the standard of living is high compared with European countries, it was found that clinical survey with modern scientific methods revealed a quite unexpected amount of malnutrition. Of more than three thousand children examined in four inland areas, 17.9 per cent were recorded as showing evidence of unsatisfactory nutrition. An inquiry among pre-school children in Melbourne revealed evidence of malnutrition in 21.7 per cent of those examined. It is suggested that the malnutrition is due to a lack of dairy products, fruit and vegetables. The Australian Government has been trying to find a market for the export of these. It looks as if she has a market within her own borders which could be exploited to the great benefit of the people of Australia. In the United States, more than 60 per cent of the diets of Negro

* League of Nations. *Survey of National Nutrition Policies, 1937-38*. (Official No.: C478.M.321.1938.IIA.) Pp. 120. (Geneva: League of Nations; London: George Allen and Unwin, Ltd., 1938.) 2s. 6d.