The Floor of Anglesey.¹

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THE thoughts of travellers across Anglesey in the Irish mail-train are usually controlled by a previous vision of the breakers rolling in on Colwyn Bay; yet many must have been attracted by glimpses of grey homesteads set on elongated mounds, farmlands alternating with strips of marsh and moor, and here and there the "desert scenery" of some sunlit groove, bounded by low terraces of ancient rock, along which the sand has drifted inwards from the sea. In 1895 Mr.

of research; but nothing in Anglesey proved foreign to his aim as he carried out his work. The result is a memoir presented by its author to the Geological Survey, and thus to the general public, accompanied by a map reproduced on the scale of one inch to one mile. Mr. Greenly's generosity has led him even to provide much of the cost of publishing these two handsome volumes. Geologists in many countries will associate themselves warmly with the thanks so well expressed by Sir Aubrey

FIG. 1.—The folding of the Mona complex, from the South Stack, Holyhead. Height seen 445 ft. From "The Geology of Anglesey," by permission of His Majesty's Stationery Office.

Edward Greenly retired from the staff of the Geological Survey to devote himself to the geology of the island. For twenty-four years he pursued his investigations, recording his results line by line upon the six-inch maps. The antique complex, offering problems similar to those faced by him in the Scottish highlands, was his first object

Strahan in his preface. May we be allowed to join also in the author's gratitude to Mrs. Greenly for her co-operation in long years of preparation?

A comparison of the map, which is so clearly produced, in spite of all its detail, with the hand-coloured sheets issued in 1852 will best reveal the changes of view that studies in other areas have brought about. When J. F. Blake, in 1888, read his memorable paper on "The Monian System of Rocks," we were still in the grip of what may be called the pre-cambrian controversy. Lapworth had recently published his work on the north-western highlands of Scotland; the Geo-

¹ (1) "The Geology of Anglesey." By Edward Greenly. (Memoirs of the Geological Survey.) Vol. i., pp. xl+388+plates i-xxvi; Vol. ii., pp. 389-980+plates xxvii-ix+16 folding plates. (Southampton: Ordnance Survey Office; London: E. Stanford, Ltd., 1919.) Price, two vols., 3 guineas net.

(2) Geological Survey of England and Wales "Anglesey." Colour-printed map, one inch to one mile. (Southampton: Ordnance Survey Office, 1920.) Price 2s. 6d.

logical Survey, after a natural hesitation, had frankly accepted and developed his conclusions; but many felt that to surrender large areas of "altered Lower Silurian" on our maps to combatant claimants was a first step in the disintegration of the British Empire. On the other hand, the word "mica-schist" was reserved by others for a type of sediment that had not been repeated since pre-cambrian times. Mr. Greenly came into the field without any of these predilections, and his memoir on Anglesey represents the reasoning of an absolutely unhampered mind.

His first volume is devoted to the "Mona complex," which is regarded as probably pre-cambrian

(p. 142). The details of folding and of foliation in the successive divisions of the complex, and of the spilitic lavas, with their associated red jaspers, are finely illustrated in the author's plates. Two of his broader landscapes have been selected for the present notice. The word "encarsioblast" is introduced on p. 43 for a lenticular crystalline growth in a schist, in which the cleavages and planes of intergrowth are at a high angle to the general foliation, features indicating that such growths are among the latest features of reconstruction. When a term like this is written in international Greek, cannot we get rid of "hornfels" and "augen" from British usage? The

FIG. 2.—Typical scenery of the Mona complex; Amlwch Port Moor. From "The Geology of Anglesey," by permission of His Majesty's Stationery Office.

throughout. The green rocks, including the pillow-lavas of Newborough, are included in one of the earliest divisions—the Gwna "group." With J. F. Blake the author recognises (p. 896) this "group" in Howth, in eastern Ireland—a view that carries with it far wider suggestions. Gneisses underlie the Mona complex, but an unconformity has not been traced; the typical gneiss (p. 133) is composite, consisting of a granitoid element veining and permeating an originally sedimentary series, which includes even limestones. The resemblance with the gneiss of eastern Sutherlandshire and Forfarshire is close

metamorphic rocks of Anglesey are admirably dealt with, and the glaucophane-schists are held (p. 120) to be modifications of the Gwna spilitic lavas.

The geological systems in Anglesey range up to the Coal Measures, in which the barren red strata of Malldraeth and the Menai Strait are now included (p. 668); but we must pass on to the features impressed on the island by denudation and deposition since Cretaceous times. Mr. Greenly (p. 777) shows the probability of a large outlier of Chalk, resting on Jurassic beds, remaining in the sea between the Isle of Man and

Lancashire. The Cretaceous sea lay over Anglesey, and Cainozoic folding has carried its base (p. 895) to some 700 or 800 ft. above the present sea-level. No great warping is needed to prolong this base over Snowdon, and the excavation of the deep valleys of the highland is ascribed, like the levelling of the "Menaian platform" (p. 783), to Pliocene denudation. The contrast between

Snowdonia and the lowland of Anglesey is not due to differential erosion, but to the curve of the Cainozoic anticline, rising to the east.

The details of the glaciation of the island are now for the first time adequately dealt with, and with this last hint of the additions made by Mr. Greenly to British geology, our notice must, ever gratefully, conclude.

Food Requirements and the Minimum Wage.

A WELL-KNOWN and trusted Labour leader remarked, not very long ago, to the writer of the present article, *apropos* the scientific assessment of food requirements, that "Science leaves me cold." Labour, in common with other parties in the community, has to learn that, unpalatable or no, scientific truth must be faced squarely. Unless the conduct of affairs be laid securely on a sound, scientific basis, and not on sentimentalism, the social edifice will collapse. It is constantly forgotten that the scientific dictum of to-day usually becomes the hackneyed commonplace of to-morrow.

Much as the recent proposal to base wages on a sliding scale, rising and falling with the cost of living, is resented, it is an absolutely sound doctrine, and probably the only practicable base to work from without inflicting undue hardship upon the community at large. Many workers seem to resent the utilisation of this base on the ground that it would reduce them, in their opinion, to the level of animals. This is a perfectly unsound deduction, and not only is it unsound; it is unwarranted. The introduction of such a scientific assessment of wages does not reduce the status of the worker.

We all have a right to live, and life is maintained by an adequate ingestion of food. The only practicable basis for the fixation of the level of the minimum wage would seem to be the cost of living. It has been contested by many people who are unacquainted with the methods of science that as all humanity is neither of the same sex nor of equal age and size, and as the work performed by various classes of the community varies within wide limits, as regards both severity and duration, it is impossible to lay down standards which will be uniformly applicable. So far as the *minimum* wage is concerned, there is absolutely no difficulty.

It may be well to state briefly, in the first place, the methods by which science has reached its definite conclusions, as the whole question is dependent on the fact that food is consumed as a source of energy for internal and external work. The demands for internal work are fairly definitely known, and are a function of the mass of the active tissue (mainly muscle) of the body. This fraction will be considered under the terms of basal or standard metabolism—*i.e.* the energy requirements when the body is in a state of complete repose. In order to assess the amount of work

done, both internal and external, and the amount of food which must be consumed in order to cover this, it is obvious that there must be some common unit to which everything is reduced. The unit most generally utilised is the large calorie, as all forms of energy may finally be reduced to terms of heat. The large calorie is the amount of heat required to raise 1 kilo. of water from 15° to 16° C.

The number of Calories contained in a unit mass of food can be determined directly by burning the food in a special small steel chamber (the bomb calorimeter) where the heat liberated by the combustion of the food material is taken up by water contained in a water-jacket, the rise of the temperature of the water being measured by a sensitive thermometer. The amount of energy given off by the body can also be determined, either directly by measuring the amount of heat given off as heat and estimating the external work done in work units, which, in turn, can also be stated in terms of heat, or indirectly by means of the exact analysis of the expired air, where each litre of oxygen consumed can be calculated in terms of Calories.

The cost of the internal work, the basal metabolism, is, as already mentioned, a function of the amount of active metabolic tissue present in the organism. It is obvious that the actual amount of such tissue cannot be directly determined in the living subject. Formerly it was assumed that the weight of the individual gave a good approximation, and that therefore the Calorie output per kilogram body weight—*i.e.* including active tissue like muscle and inactive tissue like fat—would be the measure of the cost of internal work. Recent research has shown that such a value is an approximation only; that much more uniform values can be obtained if the weight-factor is correlated with the age and the height of the individual. The basal metabolism by the use of suitable formulæ can now be stated in terms of Calories per square metre surface of the body. The mean of a large number of determinations has shown that the basal metabolism of a man between the ages of twenty and fifty on an ordinary diet is 39.7 Calories per square metre surface per hour. It is generally accepted that the "average" man has a surface of about 1.77 square metres, and, therefore, a daily basal metabolism of approximately 1700 Calories—*i.e.* as cost of internal work.

This method of assessing the basal metabolism