cules. For in a cubic centimeter of the air there are about ten million million million molecules. In other words, for every ten thousand million million molecules, only one has lost an electron. If a molecule were to go about saying that it had once seen one of its brothers which had lost an electron, it would be less likely to be believed than would the story of a miracle which had been claimed to be seen by only one person since the dawn of history. Yet these ions play a very important part in certain aspects of atmospheric electricity. Similar remarks may be made about most of the phenomena which are vital to modern physics. An X-ray is generated when an electron traveling with high speed penetrates an atom and suffers a change in its velocity. Yet, from the standpoint of the individual atoms, even of the atoms of the X-ray target, the phenomenon is so rare that if you lived on an atom you could never be made to believe that it had ever occurred. The photoelectric cell, which is responsible for the wireless transmission of pictures, owes its action to the effect of light in ejecting electrons from the atoms of a sensitive potassium surface on which it falls. Yet, if you lived on one of the atoms of the layer of potassium, it is probable that you could never be persuaded that such an emission of an electron had ever occurred, so rare is the phenomenon to the individual atom.

And so the fact that vital phenomena do not make themselves immediately evident in so-called non-living matter is no criterion as to the certainty of their complete absence. It is, in fact, not inconceivable that the existence of completely non-living matter as such would be unstable, and that the living activity might increase, perhaps slowly at first, but possibly at an increasing rate, until, at any rate in the presence of suitable conditions and environment, it finally attained a steady state in which there was a definite equilibrium between the living and the non-living matter.

In bringing to a conclusion a lecture which, I realize, many of you will consider highly speculative, I will utter one word of warning to the effect that before we make a statement that such and such a type of phenomenon would be inconsistent with physical principles, we should first weigh with care the question of what we are going to exclude under the head of non-physical principles. For, in these days of such radical developments of the abstract point of view in physics itself, it may well be that, if he is not careful, the biologist will seek to be more materialistic than the physicist would ever dream of being, and will bar from his realm of philosophy as unphysical, doctrines far less revolutionary to the thought of fifty years ago than those which the physicist himself has found it necessary to admit in the fields of his own immediate interests.

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FRACTURES AND FIORDS IN THE FAEROES

THE Faeroes constitute an archipelago, spreading sixty-five miles east-west in the north, trailing 110 miles to the south, and including over twenty islands which have been carved out of an upstanding part of the vast Thulean basalt field of the northeastern Atlantic. They have been beautifully mapped by Danish topographers on seventy-two sheets, 1:20,000, and on two sheets, 1:100,000. They have lately been described as to structure and form by Peacock,[1] who visited the archipelago in 1925 as a Carnegie research fellow of the University of Glasgow. The basalt flows lie about horizontal in the north, but dip 15° or 20° to the south or southeast in the south; and are estimated to have a total thickness of over thirteen thousand feet, although the highest summit now rises only 2,894 feet above sea-level. The islands have been heavily glaciated except on their highest parts, and are of massive form. They are separated by smooth- and steep-walled fiords, generally trending northwest-southwest, as if consequent upon the dip of the lavas; but certain islands are incompletely divided by two opposing, collinear fiords which are continued inland in great, trough-like valleys to low, open cols. Similar cols are found in the submerged floors of the through-going fiords where they are narrowest and shallowest. The smooth fiord walls are repeatedly cut back in cirques which, according to J. Geikie, frequently open in hanging relation to the fiord level; and the discordance is in some cases over one thousand feet; but the walls are little dissected by normal side valleys, although side streams abound. The outer headlands are steepened into great cliffs by wave work.

The islands are traversed, without faulting displacement, by a system of profound, east-west fissures, which are ascribed by Peacock to torsional stresses caused by an inferred Postglacial subsidence, and on which erosion, chiefly weathering, has recently opened many a V-shaped cleft, called by the Scotch (Caithness) modification, *goe,* of the Danish original, *gjov;* over eighty goes are located on an outline

[1] Peacock, Martin A., "Recent Lines of Fracture in the Faeroes in Relation to the Theories of Fiord Formation in Northern Basaltic Plateaus," Trans. Geol. Soc. Glasgow, 1926–27, xviii 1–26.

map. Peacock suggests that a continuation of cleft-making erosion would eventually transform the narrow goes into open, steep-walled fiords, and therefore explains the existing fiords by long-continued ordinary erosion now advanced to early maturity on an inferred, earlier system of northwest-southeast fractures, when the plateau stood higher than now. This explanation, in which glacial erosion is minimized, is difficult to accept in view of the abundant evidence for strong glacial erosion found in various deglaciated mountains; and as Peacock's paper proposes to discuss "the theories of fiord formation," his summary rejection of their glacial origin is unsatisfying. It may be fairly urged that the small amount of erosion by side streams in the walls of the Faeroe fiords, noted below, is of itself strongly suggestive of their excavation by ice; for had the fiords gained their present width by ordinary weathering and washing of fracture-guided goes, the abundant side streams would have cut equally abundant side valleys, because side-stream erosion is more rapid than interstream weathering; but side valleys are practically wanting in these massive islands. In this respect the Faeroes are very unlike the Pescadores in the China Sea, which also consist of nearly horizontal lava flows, but which in the absence of glacial erosion are now reduced by ordinary erosion to elaborately dissected, ragged residual masses. Ancient fractures systems, trending northwest-southeast, may truly, if they ever existed, have guided stream erosion in excavating normal valleys below the initial basalt surface in Preglacial time, but the present form of the islands appears to be much more largely due to the widening and deepening of shallow Preglacial valleys of whatever origin by energetic glacial erosion than to any other agency.

Peacock's reasons for dismissing glacial erosion as incompetent to sculpture the Faeroes appear to be as follows: First, because glacial erosion has never, to his knowledge, been invoked as the main agent for the production of the Faeroe fiords; yet over a quarter century ago it was concisely said, on the basis of the large-scale maps, that the Faeroe fiord-trough slopes "are notably smooth, unravined by the numerous streams that descend from the uplands, and hence it may be concluded that much of the dissection of the lava plateau was accomplished by ice action."[2] Second, because James Geikie concluded in 1883 (before the more recent understanding of glacial erosion had been reached) that the Faeroe glaciers faithfully followed the Preglacial topography of the islands; but this conclusion can not be now regarded as well supported, in so far as it excludes strong glacial modification of the Preglacial valleys. Third, because Professor J. W. Gregory, of Glasgow University, regards the Faeroe and other fiords as of Preglacial date, and as "having their ultimate origin in networks of fractures, produced by the upheaval of the earth's crust in late Miocene and Pliocene times;" but this view, although accepted by Peacock as "firmly established," has not found general acceptance among students of deglaciated highlands. And perhaps fourth, because Peacock himself is not familiar, as far as one may judge by his essay, with the enlarged and over-deepened valleys of the Alps and other deglaciated mountains, or with the compelling evidence by which the enlargement and over-deepening of such valleys is ascribed to glacial erosion.

It may be added that, if glacial erosion be accepted as the chief process of fiord production in the Faeroes, the east-west fractures that are now followed by the cleft-like goes need not be regarded as of Postglacial date, although the goes themselves are evidently enough due to Postglacial erosion localized by fractures in the strongly ice-carved island masses; also, that as glacial erosion is competent to excavate fiords well below sea-level, the Postglacial subsidence of the archipelago, assumed by J. Geikie and accepted by Peacock, is not necessary in accounting for the present separation of the islands.

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[2] SCIENCE, xvi, 1902, 915.

SCIENTIFIC EVENTS

THE FAUNA OF THE BRITISH EMPIRE

THE need for the provision of more reserves for the protection of wild animal life was emphasized at the general meeting of the Society for the Preservation of the Fauna of the Empire, which was held on October 9 at the offices of the Zoological Society, Regent's Park. According to the report in the London *Times*, Lord Onslow, who presided, said that the membership had doubled during the past two years.

Mrs. Mary L. Jobe Akeley, widow of Mr. Carl Akeley, the American naturalist and explorer, who accompanied her husband to Africa in 1926 as secretary of the expedition of the American Museum of Natural History, showed a number of lantern slides of scenes in the Kivu Parc National in the Belgian Congo, which, she said, was due to the initiative of King Albert. The park comprised an area of uneconomic territory of about 6,000 square miles, half of it consisting of a mountainous region of active volcanoes, and half of sand and swamp, abutting on the Uganda border. It was a realm of exceptional