

both charts, 24 on Neison's and not on Prof. Pickering's, while 11 were found on Prof. Pickering's and not recorded by Neison. With higher powers, all Neison's, except two, were discovered, and, in addition, several other small ones. Just about the region of Bessel a change seems to have taken place since Neison made his map, for there are one or two cases in which the crater-pits picked out by him for reference are now not the most conspicuous objects, there being several others far more prominent in the immediate vicinity. The floor of Plato also has been carefully scrutinized, and several of what were then more or less distinct luminous points are now either invisible or barely so, while one large crater was seen where previously none was recorded. Whether a real change has taken place in these parts of the moon's surface, or whether the antecedent observations were sufficiently accurate, is a matter of doubt, and it is for future observers to determine this. But now, as Prof. Pickering says, "that we are able to study the smaller lunar craters to advantage, and so many changes are noted, it does not seem as if the same cause (the mere action of sunlight) can have affected so many of them in the same way, nor does it seem as if all the changes noted can be due to erroneous delineation."

CATALOGUE OF NEBULÆ.—In *Astronomische Nachrichten*, No. 3094, the Catalogue No. 10 of nebulæ discovered at the Warner Observatory by Swift is inserted. The number included, which generally consists of one hundred, amounts here to sixty, the reason being that owing to the increasing number of electric street lights these faint objects are rendered invisible by the illumination of the atmosphere.

GEOGRAPHICAL NOTES.

DR. HENRY SCHLICHTER contributes a valuable epitome of our knowledge of the pygmies of Africa to the June number of the *Scottish Geographical Magazine*. He divides the dwarf tribes hitherto reported into four great groups, according to the regions they inhabit, recognizing, however, the probability of further exploration revealing connecting links between them. The first group, or dwarfs of West Africa, includes the Obongo, Akoa, and Babongo, which vary between 4 and 5 feet in height. The second, or Central African group, contains the Akka, Wambutti, and Batua, of even smaller stature, inhabiting the Congo Basin, scattered amongst Bantu tribes. The third group is that of the East African pygmies, whose existence east of the Nile and south of Kaffa was reported as early as 1826; but they are still little known. The fourth group, those dwelling south of the Congo basin, is relegated to another paper.

ORDNANCE MAPS of Great Britain are at last coming prominently before the public. Although not likely to gratify those engaged in producing the sheets, popular attention will doubtless result in direct and early benefit to cartography and even to geography at large. A Parliamentary Committee, on which scientific geographers are well represented, has the whole matter under investigation, and the energetic criticisms of Mr. Crook, which have so long passed unheeded, are now receiving further expression in a series of articles in the *Times*. The particular object of attack is the new quarter-inch outline map of England and Wales, a map put forward by the Survey with some natural diffidence, for it is founded on measurements the most recent of which were made twenty years ago, and the earliest at the very beginning of the century. The delineation of the country, in consequence of the want of subsequent revision, resembles a star-chart, in so far as it represents each point as it existed at some different time in the past. Unlike a star-chart, however, the quarter-inch map of England is of no scientific and little practical value. The more thoroughly this matter is investigated, and the more speedily it is rectified, the better will it be for the Survey officers, whose magnificent triangulations and unparalleled accuracy of observation have made the mapping of the British Islands a model for the world to admire. It is high time that steps be taken for regular periodical revision of all Ordnance maps, and for publication in a form comparable with that of the Staff maps of France and other Continental nations.

AN appreciative article on the late Prof. Freeman and his services to geography appears in the June number of the *Proceedings* of the Royal Geographical Society. Freeman's most important service was to demonstrate that the physical geography of a region largely determines the political geography of the countries upon it, and that a knowledge of past geographical conditions is essential in order to understand history.

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THE report of an expedition to Argentine Tierra del Fuego by Señor Julio Popper has been recently published by the Argentine Geographical Society. The region in question is the eastern half of Tierra del Fuego, the geological structure of which is mainly Tertiary rocks much disintegrated; the coast line is little indented, with few harbours, the sea shallow and abounding in sand-banks, while the climate, dominated by the warm Brazil current, is equable and moist. The south coast bordering the Beagle Channel is rugged, rocky, and under the climatic influence of the cold Antarctic drift. The tribes inhabiting the island of Tierra del Fuego proper are the Ona (compare *NATURE*, xlv. 577), who are described as of fine physique, resembling the Indians of North America, and susceptible of civilization. Indeed, Señor Popper contrasts their magnanimous and forgiving character very favourably with the unreasoning cruelty of the white gold-seekers who have invaded their territory, yet the Onas are said to be inveterate thieves. The map accompanying this report is covered with new names for features already designated, and it can hardly be expected that these will be accepted by European geographers.

MRS. BISHOP (Miss Bird) read an interesting paper on her recent journey to Little Tibet, before the London branch of the Royal Scottish Geographical Society, on May 31, the Duke of Argyll presiding. Lady travellers are not encouraged to describe their expeditions to the Royal Geographical Society, and as the British Association, which receives communications from men and women on an equal footing, cannot meet in London, this opportunity of a metropolitan audience to hear at first hand the account of an adventurous journey, and the sympathetic estimate of the inhabitants of a little-known region, by a woman of Mrs. Bishop's tried courage and trained observing powers was naturally taken advantage of to the utmost.

MICRO-ORGANISMS IN THEIR RELATION TO CHEMICAL CHANGE.¹

ALMOST exactly on this day twenty-two years ago the subject of micro-organisms was introduced to the audience of the Royal Institution in one of those charming discourses, which so many of us well know were always to be heard from Dr. Tyndall. The title of his discourse on that occasion was "Dust and Disease," and its contents should be studied by all interested in this departure of science, forming, as it does, a part of the classical literature of the subject in which it marks the commencement of a new epoch.

It has probably rarely, if ever, happened before, that in so short a period as twenty-two years any science has undergone such a marvellous advance, such a many-sided development, as that which has taken place in the case of bacteriology, the science which is devoted to the study of those low forms of life which we group together under the name of *micro-organisms*. This advance has been made through the ungrudging expenditure of self-denying labour by a great body of earnest workers of nearly every nationality. The subject is, indeed, one calculated to draw forth interest and enthusiasm, for the problems involved are not only of high scientific importance, but are also of incalculable moment to mankind, and, indeed, to the entire living creation.

The great impetus which this new science received at its outset was imparted by Pasteur, who has not only laid the foundations, but has also added, and is still adding, so much to the superstructure of its many mansions.

The side of bacteriology with which the general public is most commonly brought in contact is that which relates to disease, but of this I propose saying absolutely nothing to-night. It has been dealt with by others in this place, and notably by my friend Dr. Klein.

There is a second side of bacteriology which has also a special interest for at least a portion of the public, in consequence of the invaluable assistance which it has afforded to some sections of the industrial world. Indeed, chronologically, this industrial department of bacteriology was the first which claimed attention, for the growers of wine, the brewers of beer, and the manufacturers of fermented liquors of all kinds from the highest antiquity have been practical bacteriologists, of the same spontaneous order, it is true, as M. Jourdain was an unconscious

¹ Friday Evening Discourse, delivered by Prof. Percy F. Frankland F.R.S., at the Royal Institution of Great Britain, on February 19, 1892.