methods, and the new questions raised by investigation, many series of experiments will be undertaken, the outcome of which will definitely settle the question of the entrance of free nitrogen into vegetable tissues. If this question be answered affirmatively, agricultural science will not place bounds to the possible production of foods. If the nitrofying process does go on within the cells of plants, and if living organisms do fix free nitrogen in the soil in a form in which at least a portion of it may be nitrified, we may look to see the quantities of combined nitrogen increase *pari passu* with the needs of plant life. Thus, even intensive culture may leave the gardens and spread over the fields, and the quantities of food suitable for the sustenance of the human race be enormously increased.

In regarding the agricultural economies of the future, however, it must not be forgotten that a certain degree of warmth is as necessary to plant development as potash, phosphoric acid, and nitrogen. If it be true, therefore, that the earth is gradually cooling, there may come a time when a cosmic athermacy may cause the famine which scientific agriculture will have prevented. Fortunately, however, for the human race, the cereals, the best single article of food, are peculiarly suitable to a cold climate. Barley is cultivated in Iceland, and oatmeal feeds the best brain and muscle of the world in the high latitudes of Europe.

It is probably true that all life, vegetable and animal, had its origin in the boreal circumpolar regions. Life has already been pushed half way to the equator, and slowly but surely the armies of ice advance their lines. The march of the human race equatorwards is a forced march, even if it be no more than a millimetre in a millenium. Some time in the remote future the last man will reach the equator. There, with the mocking disc of the sun in the zenith, denying him warmth, flat-headed, and pinched as to every feature, he will gulp his last mite of albuminoids in his oatmeal, and close his struggle with an indurate in hospitality.

NOTES AND NEWS.

ACCORDING to the report of Gustavus Hinrichs of the weather service of Iowa, that state, since the middle of May, has been subjected to a drouth, the most severe on record. The most serious drouth preceding the present one prevailed during June and July of 1863, when for sixty days no serviceable rains fell in Iowa City; but rains had been sufficiently abundant till the end of May, and nearly five inches of water fell during the first ten days of August. In the early summer of 1886, the last good rain fell on May 13. After that time, there was no rain reaching half an inch until August 4, — eighty-three days without a serviceable shower! The total rainfall during that period was less than one inch, while the normal rainfall would be nearly ten and a half inches. But, notwithstanding this extreme drouth, it cannot be said that there is a failure of crops; because farming operations in that state are so diversified that a total failure is almost an impossibility.

LETTERS TO THE EDITOR.

****Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Glaciers and glacialists.

THE number of *Science* for the 23d of July last contains a paper by Mr. Jules Marcou, in which he refers to my memoir on Professor Guyot (published by the U. S. national academy), and denies statements cited by me from a publication by Professor Guyot with regard to the latter's glacier discoveries. Mr. Marcou commences his criticism on the subject with the following paragraph: "At Princeton Guyot was long isolated from intercourse with Swiss naturalists; and at the close of his life, while suffering under the malady which proved fatal in 1884, he put forth claims of doubtful value. These are the facts." Then follow the facts as Mr. Marcou understands them.

Mr. Marcou's statement is wrong in important points. Professor Guyot gives an account of his own discoveries of 1838 in his memoir of Professor Agassiz, which was read before the national academy, the first part in October, 1877, the second in April, 1878. This is six years before his decease, while he was still engaged in his laborious topographical survey of the Catskills. The following is the paragraph from the Agassiz memoir: —

"In the spring of 1838 I had the pleasure of a visit from my dear friend Agassiz in Paris, where I then resided. The main topic of conversation was, of course, the glaciers. He put me *au courant* of Charpentier's views, as yet imperfectly published (his book having been issued only two years later, in 1840), and adding his own idea of a general glacier era, he urged me to turn my attention to these phenomena. I asked to be allowed to suspend my judgment until my own observations should justify my adhesion to so startling a theory, but promised to visit the glaciers that very summer. I did so, and an exploring tour of six weeks in the Central Alps rewarded me beyond my expectation. The glacier of the Aar, on which Agassiz began two years later (1840) his regular system of observations, taught me the law of the moraines. The glacier of the Rhone gave me the law of the more rapid advance of the centre of the glacier, and that of the formation of the crevasses, both transversal and longitudinal. The glacier of Gries showed me the laminated, or ribboned (blue bands) structure of the ice deep down in the mass of the glacier, and the law of the more rapid advance of the top over the bottom. On the southern slope of Mont Blanc, the great glacier of La Brenva, with its twin rocks, rising like two dark eyes from the middle of the ice (they are, indeed, called by the mountaineers the 'eyes of the glacier'), made me understand that the motion of the glacier takes place by a gradual displacement of its molecules under the influence of gravity, giving it a sort of plasticity, and not