system has thus been formed largely at the expense of the Forth, and in its later depredations has also appropriated part of the Tweed. It has been favoured by the comparatively soft rock-material along its earlier course, by its steeper gradient, but most, perhaps, by the more copious rainfall of the western mountains.

The subsequent Glacial period, although causing considerable modification in detail, has not altered the essential features of the topography developed by the rivers. Neither has the submergence which has drowned the seaward parts of the Clyde and Forth valleys, and transformed the Clyde system especially into a series of sea-lochs, availed to obscure the ancient lines of the drainage-system, of which Mr. Cadell has given such a luminous explanation.

Much scattered information on related physiographic subjects, such as the buried channels of the Forth valley and the old lochs of the Edinburgh district, is brought together for the first time in this book.

The latter half of the book deals with industrial subjects connected with the Forth valley. The famous Carron Company and the rise of the Scottish iron industry are treated in chapters ix. and x., and we are reminded how great a part the Cadell family took in the establishment of this great concern in the latter half of the eighteenth century. We also note that Mr. William Cadell, after leaving the Carron Company, interested himself in the establishment of the Clyde Ironworks at Old Monkland, near Glasgow, and thus helped to lay the foundations of the iron-smelting industry in the west of Scotland.

The final chapters deal with land reclamation in the Forth valley, and a very interesting account of an old labour colony is given. This was established by Lord Kames in 1766 for the clearing of Blairdrummond Moss, a work which turned a quaking bog into a fertile plain that now supports scores of families. These later chapters are most interesting and readable, although garnished here and there with obsolescent economics. The book is finely printed, and is a pleasure to read and handle. It is illustrated by many excellent plates and maps.

FIG. 1.—Scene at the end of the Ice age when the valley was submerged under an icy sea.

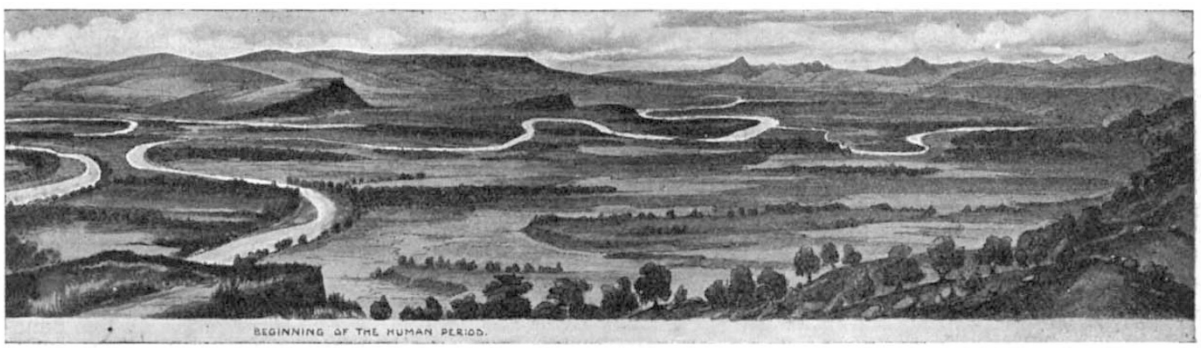

FIG. 2.—The modern landscape after the sea had retreated to its present level.
Panoramas from the Craig at Stirling at different periods in the history of the earth. From "The Story of the Forth.

THE IMPROVEMENT OF INDIAN WHEAT.[1]

NOWADAYS, when the English miller regards Indian wheat as a valuable addition to his resources, the work of the authors of this memoir in improving it is of the utmost national importance. The progress they have made already deserves to be widely known and commended. The problem is the same as that which confronts us in this country, where, however, the farmers still refuse even to try to understand it—namely,

[1] Memoirs of the Department of Agriculture in India, vol. v., No. 2. By A. Howard, H. M. Leake, and G. L. C. Howard, Agricultural Research Institute, Pusa.

the introduction of a strain of wheat, of easy cultivation, which will combine high yield with quality and give a satisfactory straw. Usually in India, as elsewhere, the consistency of a wheat varies greatly, according to the conditions under which it is grown. Although weak wheats can be improved to some extent in milling and baking qualities by cultivation, they have not been made to behave like strong wheats. Owing to the shortness of the growth-period and the liability of the water-supply to deficiency, moderate-yielding wheats are on the average the most profitable to the grower. The Pusa experiments, which have been in progress since 1907, show that the strong wheats with good milling properties retain these properties both under canal irrigation and on the black soils, and that high yield and high quality can be combined in the same wheat.

Such adverse factors as waterlogging and late cultivation affect both the yield and quality of the wheat, and the ryot requires training to the fact that rice conditions of drainage will not do for wheat cultivation. As elsewhere, the greatest financial return for the labour is obtained by growing to perfection a wheat which combines yield with quality.

We believe that the type of wheat preferred by the natives for their home consumption is altogether different from the strong wheat so desired for the export market: the authors ignore this point, but it would appear undesirable to sacrifice the home to the export market for the sake of such an elusive quality as strength.

E. F. A.

PROF. JOHN MILNE, F.R.S.

TO few men is it given to follow the growth of a new science from its infancy to maturity, and to still fewer to be prime movers in bringing about such a development. Nevertheless this is the claim we can confidently make for Dr. John Milne. He found seismology in its embryo stage, as left by the pioneer Robert Mallet—with its instruments of the most unsatisfactory type, its observational methods of the crudest description, and its inferences far from conclusive—but he lived to see well-equipped seismographical observatories scattered all over the globe, seismological societies established in every civilised State, and the science of seismology universally recognised as an important and highly suggestive branch of geophysics. And it was undoubtedly to Milne's genius and energy that the impulse leading to these results has been largely due. Yet he had not reached the age of sixty-three when he died on July 31, and his earthquake studies were comprised within a period of thirty-five years!

The two halves of this period of incessant activity had each its particular outlook—the first mainly confined to earthquake-shaken Japan; the second extending to the whole globe. At the early age of twenty-five, Milne, a student from the Royal School of Mines, with a short experience in Newfoundland, Labrador, and Arabia, was appointed Professor of Geology and Mining in the University of Tokyo. Active as the young professor was in his teaching work, writing text-books on crystallography and mining, and conducting expeditions to study the volcanic and other phenomena of Japan and neighbouring lands, it was, nevertheless, outside his official duties that he began to find the fullest scope for his superabundant energies.

It was the frequent earthshakings of his adopted country that supplied food to Milne's inquiring and speculative mind. Before he was thirty he had founded the Seismological Society of Japan, and a seismological journal; but for the first ten years at least Milne might have truthfully asserted, "I am the Seismological Society, and I *write,* as well as *edit,* the journal." He established observing stations all over Japan, eventually reaching nearly 1000 in number, each of which was supplied with a register in the form of a cheque-book, and the "cheques," filled up with answers to questions in Japanese and English, when posted to Milne, supplied him with the means of drawing "isoseismal" lines on his maps for each shock. But this laborious task, with earthquakes of almost daily occurrence, was only a small part of his work. He invented and improved various forms of recording instruments, investigated the laws of transmission of vibrations through the earth's crust by "artificial earthquakes," studied the principles on which buildings that should be "earthquake-proof" may be constructed, registered the meteorological conditions under which earthquakes occur, and perseveringly followed innumerable clues in diverse directions that continually suggested themselves to his ever-open mind.

Not the least important part of his work was the training a band of native observers, who are ably continuing and extending Milne's investigations in Japan. More than one hundred memoirs, filling more than two-thirds of the nineteen volumes of the Transactions and Journal of the Seismological Society of Japan, constitute the best evidence of Milne's devotion to the science during his seventeen years of residence in the country.

But Milne's retirement from the Japanese professorship at the age of forty-five furnished the opportunity for entering on a wider sphere of labour—one to which he was able to devote the whole of his time and effort. Just before starting for England, however, a most disastrous fire destroyed his accumulated books and instruments—the most serious loss being that of the stock of precious volumes of the Transactions and Journal of his society.

Undismayed by this misfortune, Milne, within three weeks of his arrival at home, had built a brick pillar at Shide, in the Isle of Wight, and set up on it his seismographs. The site of this now famous observing station had been selected from