and Kettle rivers, in Minnesota, where the Keweenawan beds are identical in all respects, even to the occurrence of interbedded porphyry-conglomerates and cupriferous amygdaloids, with those of Keweenaw Point.

As to the Animikie group, I have only to say, that I have not asserted its identity with the so-called Huronian rocks on the east shore of Lake Superior, spoken of by Mr. Selwyn, but merely its *probable* identity with the original Huronian of the north shore of Lake Huron, which neither I nor Mr. Selwyn have seen, and its certain identity with the iron-bearing schists of the south shore of Lake Superior. The term 'Huronian' has been so differently used by different members of the Canadian geological corps since the first establishment of the system, that much doubt must still remain as to whether there are two sets of schistose rocks north of Lake Superior, or not. This much, however, I regard as certain; viz., that the flat-lying Animikie rocks of Thunder Bay and northern Minnesota were once continuous with *some* of the folded schists lying north of them in northern Minnesota and Canada, — the Vermilion Lake iron-bearing schists, for instance, — although now separated from them by belts of gneiss and granite. The lithological differences between the Animikie rocks and the folded schists are often more apparent than real; while, in many respects, there is a very close lithological likeness. However, I do not expect, and indeed have no right to expect, acquiescence in my novel position as to the Animikie rocks until the evidence I have collected has been published. I am confident, that, with the evidence that I now have, in his hands, Mr. Selwyn would at least think the matter worth looking into.

With regard to the occurrence of volcanic ash in the Keweenaw series, I must acknowledge at once, that, so far as field-experience goes, Mr. Selwyn is far better equipped than I to judge of such materials, and that, not having seen Michipicoton Island, I am bound to accept his statement. I understood his first letter to indicate the occurrence of such ash in places which I had myself seen. Nevertheless, I bear in mind that a considerable school of English geologists has been long in the habit of calling almost any detrital rocks, not distinctly quartzose and associated with eruptive rocks, *volcanic ash*, when very often, at least, they might be simply derived by water-action from these rocks. Possibly there is some misunderstanding in our use of the term. Most of the detrital rocks of the Keweenaw series are volcanic detrital matter, in that they have been derived by water-action from the eruptive, massive rocks of the same series; but I used the term as applied to fragmental material produced by the volcanic action itself. I do not know of any *proof* of such an origin in stratified material, other than the vesicular character, and perhaps constant angularity, of the particles, which proof I have failed to find.

The discussion of such a question as the present one evidently cannot, however, be carried on satisfactorily in the pages of a journal; and I must ask my scientific *confrères* to defer their judgment until my publications on this subject, now in type, are issued. R. D. IRVING.

University of Wisconsin,
April 12, 1883.

Pairing of the first-born.

As regards the pairing of the first-born, my calculation of which called forth Mr. Hendricks's criticism, permit me to call attention to the following letter from Mr. Edmands, which I hope will set the matter straight. I applied to Mr. Edmands, because mathematics is not my *fach;* and I now have the pleasure of thanking him for the very kind attention he has given this matter. CHARLES SEDGWICK MINOT.

Boston, April 24, 1883.

As J. E. Hendricks remarks in SCIENCE of April 13, p. 278, "the chance that the first-born male will pair with the first-born female is as one to ten;" but Dr. Minot's argument in SCIENCE of March 16, p. 165, depends upon "the probability of both parents" being first-born, as stated at the beginning of the last paragraph on p. 165. If we first restrict the case to the offspring of first-born males, the chance that both parents will be first-born is evidently one in ten. But in the remaining ninety per cent of the race there would be no case of both parents being first-born. Taking the race as a whole, out of one hundred pairs, one pair would be both first-born, nine would have the male only first-born, nine the female only, and eighty-one (9×9) neither male nor female first-born. This does not touch the question whether Dr. Minot is justified in giving no weight to the eighteen cases in a hundred, where only one individual of the pair is first-born. J. RAYNER EDMANDS.

Cambridge, April 19, 1883.

Place the ten females in a row, and the ten males opposite them, with the 'first-born' opposite each other. The ten males are susceptible of $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10$ permutations, each of which furnishes a distinct system of pairing. Of these, $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9$ are possible without disturbing the juxtaposition of the first-born. The chance of their pairing will therefore be,

$$\frac{1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9}{1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10} = \frac{1}{10},$$

as stated by Dr. Hendricks in SCIENCE, April 13, p. 278. Mr. Minot's solution is correct only upon the supposition that *one pair, and no more*, will be formed. T. C. M.

JAMES CLERK MAXWELL.

The life of James Clerk Maxwell; with a selection from his correspondence and occasional writings, and a sketch of his contributions to science. By LEWIS CAMPBELL and WILLIAM GARNETT. London, *Macmillan & Co.*, 1882. 16+662 p., 3 portr., 4 pl., facsim., etc. 8°.

JAMES CLERK MAXWELL was born in Edinburgh on the 13th of June, 1831. He died Nov. 5, 1879.

The late Professor Benjamin Peirce once said in the hearing of the writer, that great geometricians did their best work before they had reached their fortieth year. This can hardly be said of the mathematical physicist; for the constant accumulation of new facts tends to make mature years the most fruitful in results to the student who still preserves his mental and physical activity. Commoner men doubtless, in time, make good the premature loss to the world of a genius. Those epochs, however, in a nation's history, in which men of