

force exists. We cannot conceive the action at any section to be simply a stress of push or a stress of pull.

What we know from experiment is that, if the ring be actually cut in two, and a piece of, say, paper be put between the halves, the paper will be squeezed with a stress equal to $B^2/8\pi$. Also, that a pull of that amount would be required to separate the two halves of the ring.

This means that when they are separated by paper the half-ring A is pulling the half-ring B towards it, and the paper is pushing the half-ring B in the opposite direction with the same force, namely $B^2/8\pi$ per square centimetre of the section.

Of course we may, if we please, say that when there is no paper interposed, each half-ring is both pulling and pushing the other. If a mechanical analogy is wanted, it might be found by imagining a stiff tubular ring with a stretched india-rubber band inside it. Suppose, further, that when such a ring is cut through at any section the india-rubber band is not cut, but only its stiff envelope. Then if we try to separate the halves, we have to apply a force equal to the pull in the rubber band. And when the halves are allowed to come together with a piece of paper between them, they will squeeze it with the same force.

Mr. Shelford Bidwell and Dr. More have done what is equivalent to asking whether the change of length which a ring undergoes when it is magnetised can be accounted for by what I have here called the pull of the rubber band acting to shorten the stiff tube in which it is stretched, the tube being treated as having the same section and the same modulus of elasticity as the real iron ring has.

But I see no ground for treating this purely hypothetical strain as a "correction" to be applied, either one way or the other, to the observed changes of length.

The case illustrated by Dr. Chree (on p. 270) is a special one. He there considers the middle piece of a long magnetised bar, separated by actual gaps from the end-pieces from which it has been cut. To preserve the gaps, the end-pieces must be held fixed. He shows that under these conditions the middle-piece is in a state of tensile stress. So it is, but only because of the pull which the other pieces apply to it across the gaps. Make the iron continuous by closing up the gaps, and the tensile stress disappears.

To discuss the sign of the magnetic stress at all in the case of a closed ring, seems much like discussing whether a man sitting in a clothes-basket exerts a pull or a push when he tries to lift it by the handles.

J. A. EWING.

Engineering Laboratory, Cambridge, January 28.

DR. CHREE'S letter in NATURE of January 23 corrects an error which it is curious has prevailed so long, and in part forestalls a communication Mr. H. Nagaoka and I had intended to make on the subject of magnetic stress. It might, however, be added that the expression $B^2/8\pi$ used by Dr. More (*Phil. Mag.*, October 1895), and originally given by Mr. S. Bidwell, for the magnetic stress causing changes of length, is incorrect also on another ground, viz. that this quantity is on Maxwell's theory the magnetic stress *in air* (where, according to the ordinary convention as to dimensions, $B = H$) and not in iron, where the expression is necessarily of a different form.

In conjunction with Mr. Nagaoka, I hope before long to discuss this subject more fully.

E. TAYLOR JONES.

University College of North Wales, Bangor, January 25.

The Astronomical Theory of a Glacial Period.

MR. CULVERWELL has pointed out to me that I am in error when I include him among those writers who think that the problem of glacial periods is to be solved by considering only the varying amounts of sun-heat at different epochs. On referring to his paper, which I had not at hand when I wrote, I find that this is the case, and that he is careful to limit his calculations as giving only the variations of temperature due to *direct* sun-heat. He also discusses, though very briefly and inadequately, the effects due to *transference* of heat from one area to another. Although willingly making this correction at his request, I am still, after another perusal of his paper, quite unable to see that it

finally disposes of Croll's theory, much less of that modification of it which I have myself set forth.

ALFRED R. WALLACE.

The Fall of the Altels Glacier, September 11, 1895.

JE vous adresse aujourd'hui un travail sur l'Avalanche du Glacier de l'Altels, que vient de publier la Commission des Glaciers de la Société helvétique des Sciences naturelles et qui complète l'intéressant article de Miss Maria M. Ogilvie: "The Gemmi Disaster" (NATURE, vol. lii. p. 573).

Ce travail rédigé par Mr. Heim n'est pas tout à fait définitif en ce que plusieurs points touchant à l'histoire antérieure du glacier de l'Altels n'ont pu être résolus encore. Il serait important de tirer au clair ces points pour pouvoir déterminer avec exactitude les causes de l'avalanche du 11 sept. 1895; mais, pour cela, il nous faut des *photographies* du glacier de l'Altels prises avant l'avalanche et remontant jusqu'à quelques années en arrière si possible. Après avoir fait depuis plusieurs mois des recherches peu fructueuses à cet égard je prends la liberté de m'adresser à vous, Messieurs, pour donner quelque publicité à ces lignes. Persuadé que beaucoup d'amateurs ont photographié l'Altels de l'W., ou du N.W., je les prie de bien vouloir me communiquer leurs épreuves, en indiquant la date (au moins le mois et l'année) à laquelle la photographie a été prise.

En vous remerciant d'avance de votre obligeance, je vous prie, Messieurs, d'agréer l'assurance de ma considération distinguée.

LÉON DU PASQUIER.

Secrétaire de la Commission des Glaciers.

Neuchâtel, le 21 janvier.

Remarkable Sounds.

IN Major Head's "Forest Scenes" (London, 1829, p. 205), I have found the passage already quoted by Mr. C. Tomlinson (p. 78, *ante*), subjoined with this phrase: "It being, in real fact and without metaphor, the voice of winds imprisoned on the bosom of the deep." In a similar manner, Olaus Magnus describes the similar sounds thus: "Mais es lacs Septentrionaux gelés, on oit sous la glace une tempête aussi horrible, à raison des vens enfermés sous la glace, qu'on fait d'un tonnerre provenant de la grâde épaisseur des nués." ("Histoire des pays Septentrionaux," Paris, 1561, fol. 21, *b*).

Sebastian Münster, in his article on Iceland, says:—"Car la glace divisée par loppins et brisée en plusieurs parties tourne à l'entour de ceste isle l'espace de huit moys, et se froisse de si grande impetuosité contre le rivage, qu'elle rend un son horrible et espouventable, et semble advis que ce soit le gemissement ou brayement d'une voix humaine. Cela fait que les plus idiotz croyèt que les âmes des hommes sont la tormentées de froid." ("La Cosmographie universelle," Basle, 1552, p. 1051.) Against this error Arngnimus Ionas writes, but at the same time he admits that "this ice at sometimes by shuffling together maketh monstrous soundings and cracklings, and againe at sometimes with the beating of the water sendeth forth an hoarse kind of murmuring." (Hakluyt, "Principal Navigation," 1599, vol. i. p. 563.)

If it be taken into consideration that so often in the volcanic craters and thermal springs¹ man found the types of the perpetual Abode of Fire, a suggestion would seem quite reasonable that the so-called "Cold Hells" of the Buddhists² and the Tauists³ had been the outcome more or less of such dreary, icy sounds.⁴

KUMAGUSU MINAKATA.

January 31.

The Antiquity of the Finger-Print Method.

IN my letter on this subject that appeared in NATURE (vol. li. p. 199, December 27, 1894), I have suggested that the ancient Japanese usage on divorce-papers of the finger-marks was probably adopted from the Chinese "Laws of Yung-Hwui"

¹ Cf. Hardy, "Manual of Buddhism," second edition, p. 27. I remember a note in NATURE about the Indian confusion of thermal springs with the hell, but at the present moment cannot refer to the number and page.

² See Beal, "A Catena of Buddhist Scriptures from the Chinese," 1871, p. 36.

³ See "Twan Ching-Shih, Yu-yang Tshah-tsu," Japanese edition, tom. ii. fol. 3, *b*.

⁴ Indeed, according to Münster, the Icelanders of old believed that their hells were in both the Hecla and the ice.