

beyond controversy, for your geoid makes no pretensions except to irregularity.

The surface of the geoid is in fact at every point perpendicular to the direction of gravity there. Thus the surface of the (unagitated) sea is a geoid, the surface of all lakes are portions of geoidal surfaces, nearly but not exactly parallel to that of the sea. That particular geoidal surface which represents the figure of the earth is the sea surface, which indeed is an old enough idea with a new name.

The work may be characterised as a fairly successful attempt to combine the advantages of a scientific and a popular treatment of its subject. It does not claim originality, and the mechanical theory of the earth's figure is not touched on.

#### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

#### Special Solar Heat-Radiations and their Earth-felt Effects

I REGRET if, by the words "lagging behind" in my paper to NATURE, vol. xxiv. p. 150, I have inadvertently misrepresented the views of Prof. Piazz Smyth. Had his paper been only recently published, I might have been able to plead ignorance of its contents, but it is one which was published in 1869, and which I have read several times in the belief that it contains not only the first, but likewise the most complete contribution to this branch of knowledge.

Having made this confession, let me now in a very words endeavour to render clear that which I intended to say.

The hypothesis advocated in the lectures to which Prof. Smyth alludes was that which represents the sun as most powerful when it has most spots on its surface. Nevertheless if we take the observations of Prof. Smyth, of Mr. Stone, and of Dr. Köppen, and bring them together, we are led to think that perhaps on the whole we have highest temperatures about those times when there are fewest spots on the sun's surface. I then endeavoured to show that such an experience was nevertheless not inconsistent with the hypothesis of increased solar heat during times of most sun-spots.

Again, if we take rainfall, while we find that perhaps on the whole there is most rain during times of maximum sun-spots, yet there are certain stations which form an exception to this rule. Nor is this to be wondered at if we reflect that the direction, as well as the intensity, of the earth's convection currents must be affected by solar variability, and bear in mind that local causes have a very powerful influence upon rainfall. Now this last remark applies to temperature as well. I should therefore be prepared to hold, *simply as a working hypothesis*—

1. That, on the whole, the temperature on land may be less at times of maximum than at times of minimum sun-spots.

2. That, on the whole, the rainfall on land may be greater at times of maximum than at times of minimum sun-spots.

3. That while a period of temperature and one of rainfall coinciding with the sun-spot period will probably be found at most stations, nevertheless in individual localities the turning-points of these periods may vary considerably from the rule laid down in 1 and 2.

4. That the above order of phenomena is not inconsistent with the hypothesis that the sun is most powerful when there are most spots on its surface.

In conclusion permit me cordially to assent to the remarks of Prof. Smyth about the possibility of rapid outbreaks of solar heat being responded to by the earth; it may be only a few hours afterwards. His Madeira observations are of great interest to those who, like ourselves, believe that the bond between the sun and the earth is more intimate and sympathetic

and less formal in its nature than that which the older generations of astronomers have been accustomed to imagine.

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BALFOUR STEWART

#### How to Prevent Drowning

I OBSERVE several letters in NATURE, vol. xxiv. pp. 101 and 126, on floating as a means of preventing drowning, but I do not think the last word is yet said on this subject. I fully agree with Dr. Dudgeon that no rules for preventing drowning are of any practical value, and also with Mr. Hill and Dr. Dudgeon that those who can float are the rare exceptions. According to my observation not one in ten, in fact I might say hardly one in 100 even, of good swimmers can float in fresh water in any useful fashion, *i.e.*, lying motionless on the water and breathing easily. The obvious reason is that the human body in the natural condition, *i.e.*, with the lungs half inflated, is specifically heavier than water. Many persons say they can float, but in most cases they either inflate the lungs and hold the breath, or else they make slight movements of the hands.

But Dr. Dudgeon is wrong in supposing that the exceptions are all fat men. I am myself a case in point. I am slender almost to meagreness, and yet I float easily. From boyhood I have been fond of all athletic sports, and especially I am a practised and expert swimmer. I swim almost as easily as I walk. I float even in fresh water with the utmost ease, and for any length of time, breathing meanwhile naturally. While floating, the whole face, a large area on the chest, a small spot on the knees, and the tips of the toes are above the surface. Breathing causes the body to rise and fall gently, so that the exposed areas of the face and chest increase and diminish alternately.

It is evident therefore that the cases of persons who can really float are of two kinds, *viz.*, (1) Those who are very fat, and (2) slender persons with very small bones and proportionately large lungs. This latter is my case. I never knew a heavy, muscular, large-boned man without excess of fat who could float. Such men make powerful swimmers, but are less easy and graceful in the water than those who are slenderer.

Berkeley, California, June 27

JOSEPH LE CONTE

#### Optical Phenomenon

I INCLOSE copies of photographs from two negatives (as you may see by looking at the points stereoscopically) of the Cyclopean gallery at Tiryns, for the sake of calling attention to the optical phenomenon shown in it. The gallery is very dark, the only light entering it by the narrow entrance and crevices between the rocks. At the extreme end of the gallery is an opening to the sky large enough to put one's hand through. In the photograph this is shown as a nucleus by a black speck surrounded by bright light, around which appears a dark circle, which again is encircled by a halo as perfectly rendered as one can see that around the moon at times. The dark nucleus is larger in the negative which had the longest exposure (the irregular lights around are only the light falling on the stones from side openings not visible). There was no such phenomenon recognisable to the naked eye.

The exposures were 25 and 15 min. with the full opening of the Ross "portable" lens and a gelatine plate.

Athens, July 3

W. J. STILLMAN

[The photographs quite bear out Mr. Stillman's statements. —ED.]

#### Implements at Acton

IN reply to the letter of Mr. Worthington G. Smith (NATURE, vol. xxiv. p. 141), the Palæolithic implements at Acton I found in a gravel pit on the hill west of the North London Railway, and from spread gravel which was local. Those I obtained at Hammersmith occurred in gravel raised on a piece of ground (Mr. Butt's) south of Great Church Lane, where building is going on. They consisted of a hollow scraper, drill, &c., which I readily found; but the implements here seem ruder than at Acton, and less easy of detection. I also found implements in gravel raised from the foundations of the neighbouring houses, which had been spread on some newly-made roads south of Shepherd's Bush, between the Uxbridge Road and Addison Road Stations. I see no reason for supposing that the implements here or at Hammersmith occur under different conditions from those at Acton.