

*Pictorial Geography of the British Isles.* By Mary E. Palgrave. (London: Society for Promoting Christian Knowledge, 1887.)

THIS volume, although it could not be used as a text-book, might be of considerable service to young students of geography. The pictures would probably excite their interest, and would certainly tend to give definiteness to some of their conceptions. The letterpress is, upon the whole, very good. Beginning with a chapter on how our scenery was made, the author gives what she calls "a summary of British scenery," and then proceeds to describe the coasts, the mountains and hills, the plains and rivers, and the lakes and islands of the British Isles. There are also chapters on historical scenery and industrial geography.

#### 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 insure the appearance even of communications containing interesting and novel facts.]

#### The Spectator and Science.

IN a recent number the *Spectator* discussed a rumour that an American inventor had discovered a compound which possessed the peculiar property of exploding "forward only." The matter was discussed quite seriously, and it was pointed out that if the report were correct the defence of the northern frontier of India would be facilitated, as it would be possible to substitute parchment for metal in the construction of guns. So enamoured was the writer with this idea that it was again referred to in a subsequent article on "The New Air-Cannon."

Upon this I ventured to address to the editor a short note, in which I pointed out that as it is improbable that the most ingenious inventor will now upset the law that "action and reaction are equal and opposite," the rumour might be safely discredited.

More than one number has since appeared, but no steps have been taken to remove the misconception which the serious discussion of an absurdity must have produced on the minds of many non-scientific readers.

It may be, of course, that the *Spectator* would consider it a useful exercise to discuss what would follow if perpetual motion were realized or the circle squared. If so, there is nothing more to be said, except that the grave application of such speculations to questions like the defence of India is apt to mislead. It may perhaps be added that such a habit is not likely to increase the respect with which the opinions of the paper are received when it plunges hotly into a controversy of practical importance on scientific methods, such as that on the utility and morality of vivisection.

It is, I believe, a subject of regret to others besides myself that a journal, the attitude of which on other matters we admire, should betray such obvious ignorance on matters scientific. Before the *Spectator* discusses yachts' bottoms, new air-cannons, and compounds which explode forward only, it would be well for the management to obtain the advice of someone who has a competent knowledge of the scientific problems involved.

October 10.

ARTHUR W. RÜCKER.

#### "Toeing" and "Heeling" at Golf.

I WAS much interested in the "Unwritten Chapter on Golf" (*NATURE*, Sept. 22, p. 502), signed with the well-known initials of "P. G. T." The mechanical explanation of "toeing and heeling," is however incomplete, as it does not take into account the torsion of the head and shaft caused by the impact of the ball on one side or other of the centre of percussion. If the ball be "heeled" (that is, goes off any point of the club-face nearer to the heel than the centre of percussion), the impact on the

club-head causes it and the shaft to twist horizontally from right to left, a movement that is plainly felt in the hands as a disagreeable jar. Even should the club-face approach the ball in a line perpendicular to the direction of the intended drive, it no longer remains so on meeting the ball.

In the best driving the club follows the ball nearly to the extent of the swing, so that before they part company, the elasticity of the shaft twists the club-face back to or beyond its normal position, which should be perpendicular to the line of drive. If the ball happens to be "toed," the reverse movement takes place. A curve to the right in the course of the ball so invariably follows "heeling," even with the best drivers, and a curve to the left (but not so frequently) "toeing," that they have become recognized by golfers as cause and effect. I have always looked upon the torsional movement described as the main cause of the horizontal rotation given to the ball, and still think that any explanation which leaves this unconsidered is incomplete.

T. MELLARD READE.

Park Corner, Blundellsands, September 24.

[THE cause spoken of by Mr. Reade has occasionally some little effect, and I was fully aware of this long before I wrote my article. But, as most golfers know to their disgust, a ball can be badly "heeled" or "toed" when driven by a club or a cleek with the most untwistable of shafts. I should thus have confused instead of enlightening the ordinary reader, had I entered upon such a subsidiary question as *this* effect of torsion. For my own part, I believe that the most serious effects of torsion are produced *before* the club reaches the ball. This is not alluded to by Mr. Reade.

Mr. Reade uses the word "heeling" in the literal sense of "striking with the heel of the club," and has thus been led to state the opposite of the facts. If he will think over the result of the impulsive rotation of the club-head, which is due to smallness of torsional rigidity in the shaft, he will see that (supposing the club-face at impact to be exactly perpendicular to the course desired) hitting off the heel tends to produce what is commonly called "toeing":—*i.e.* skewing to the *left*! Similarly, hitting off the toe will produce what is commonly called "heeling":—*i.e.* skewing to the *right*! Thus the torsion of the shaft tends to mitigate ordinary "heeling" if the heel of the club be used, and to intensify it if the toe be used. Surely this would not have been easily understood by the ordinary reader of newspapers, for whom my article was written.—P. G. T.]

#### The Fertilization of the Coffee Plant.

I SEND you the following notes on the fertilization of the coffee plant (*C. arabica*) which I made some time ago, and which may be interesting to those who study the subject.

Your readers are doubtless aware that coffee was cultivated some twelve years ago to a very large extent in Ceylon and South India, but owing to the attacks of leaf disease, the area has been rapidly reduced, except, I believe, in some parts of Coorg and Mysore, where the climate is drier, and the leaves suffer less from the fungus. It has now been largely replaced by tea.

The jasmine-like flowers of the coffee are borne in clusters in the axils of the leaves, and appear simultaneously all over the estates. After a prolonged drought of one or two months, or even more, at the beginning of the year, there is generally a heavy fall of rain, sometimes lasting only an hour or two, sometimes continuing for two or three days: the amount that falls must be enough to saturate the ground, and should not be less than one inch.

In from six to eight days from the time of the first shower, the flowers burst into full blossom, last for a day, and then drop off. On the evening before the blossom is fully out, if the flowers are examined it will be found that they are partially open, the stigma being protruded and receptive. During the

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night the hum of insects can be distinctly heard, and I am of opinion that the flowers are largely fertilized by night-flying insects which carry pollen from those flowers which happen to be open rather before the others, as some are delayed. On the following morning all the flowers will be found open, and