

The examples given by Mr. Spencer were examples of *consciously*-formed conceptions based on this *unconsciously*-formed preconception acquired during childhood and boyhood. Mr. Spencer gave three instances into which this preconception tacitly enters: one chemical, another relating to the melting of ice, and a third to the process of weighing. The last is the only one into which the relation between force and motion can be supposed to enter. But the consciously-formed conception that double weights will balance double masses, and so on, is not one into which there really enters any relation between force and motion. The notion of weighing is that of the equal forces of equal masses at the ends of equal levers. So long as there is motion, there cannot be equilibrium. The idea of motion is excluded when weighing is complete.

When Mr. Hayward says that Mr. Spencer has taken Newton's "Second Law of Motion" as an example of unconsciously-formed preconceptions, he utterly misapprehends Mr. Spencer's meaning. The "Second Law of Motion" is one of those developed *conceptions* derived from the organic *preconceptions* above described.

Mr. Spencer's argument appears to be briefly this:—1. There are numberless experiences unconsciously acquired and unconsciously accumulated during the early life of the individual (in harmony with the acquisitions of all ancestral individuals) which yield the preconception, long anteceding anything like conscious physical experiments, that physical causes and effects vary together quantitatively. This is gained from all orders of physical experiences, and forms a universal preconception respecting them, which the physicist or other man of Science brings with him to his experiments.

2. Mr. Spencer showed in three cases—chemical, physical, and mechanical—that this preconception, so brought, was tacitly involved in the conception which the experimenter drew from the results of his experiments.

3. Having indicated this universal preconception, and illustrated its presence in these special conceptions, Mr. Spencer goes on to say that it is involved also in the special conception of the relation between force and motion, as formulated in the "Second Law of Motion." He asserts that this is simply one case out of the numberless cases in which all these conscious-reasoned conclusions rest upon the unconsciously-formed conclusions that precede reasoning. Mr. Spencer alleges that as it has become impossible for a boy to think that by a smaller effort he can jump higher, and for a shopman to think that smaller weights will outbalance greater quantities, and for the physicist to think that he will get increased effects from diminished causes, so it is impossible to think that "alteration of motion" is not "proportional to the motive force impressed." And he maintains that this is, in fact, a latent implication of unconsciously organised experiences just as much as those which the experimenter necessarily postulates.

I may add that if mathematics included in its range the connection between objective phenomena and the answering subjective states, this question would be one for mathematicians; but at present it is, as it seems to me, a question pertaining to the psychological basis of inductive logic. JAMES COLLIER  
Bayswater, May 18

#### The Glacial Period

I THINK there are but few points in Mr. Belt's letter ("The Glacial Period," NATURE, vol. x. p. 25) to which Geologists who have devoted much attention to the ice action will not take exception. May I be allowed to call attention to one or two?

1. I do not believe that there is evidence, which anyone accustomed to glacier "spoor" would admit, of an extension of the ice-cap so far south as the Thames valley.

2. It is in the highest degree improbable that the shells on Moel Tryfaen should have been scooped out of the bed of the North Sea by moving ice and transported to their present position. Apart from the difficulties of a glacier thus walking so far up-hill, and of shells having escaped utter smashing in this uncomfortable mode of transport, Mr. Belt has forgotten that Wales was a centre from which radiated glaciers, and at one time an ice-sheet, which surely would have warded off from its own hills the northern intruder. What evidence is there that the ice-sheet ever followed its path? All that I know points to local glaciation.

3. Mr. Belt forgets that the various sea-marks are often at very different heights above the present water-level—as is so well

shown in Scandinavia—and that no lowering of the water will explain this. The height of even 600 ft. which he claims is one that rests on many assumptions and but little confidence can be placed on the numerical results.

It would be easy to discuss many other questions which he raises, but this would occupy far too much space. My present purpose is not so much to do this, as to utter a protest against such a portentous development of a theory which has for some time past been assuming nightmare proportions.

St. John's College, Cambridge, May 19 T. G. BONNEY

#### Lakes with two Outfalls

IT is quite possible that I am wrong in my memory of the Nystuen watershed; and as Prof. Stanley Jevons examined the place critically, I can have no doubt that I am so. I passed merely as a traveller, and described what I had seen, from a memory, not specially sharpened by a knowledge of the importance of the point, at the time the observation was made. I know well what tricks one's memory plays under such circumstances, particularly when one has been rambling over many similar localities; and my letter indicated that I was in doubt as to the particular lake which gave the double outfall. I passed, too, just after much heavy rain, and it is possible that the boggy bottom which Mr. Jevons describes was temporarily converted into the lake, which deceived me. I may add, that both the guide who brought me over the mountains from Aardal, and the Skydgudt who took me to Skogstad, confirmed the double outfall.

My object, however, in writing, was chiefly to draw attention to Norway, as offering an admirable field for the settlement of the controversy, without going to the wilds of America. If there be such phenomena, and I believe there are, they may assuredly be looked for in that land of hard granite rock, mountain plateaux, and innumerable watersheds of all sizes and varieties, and if the hundreds of educated Englishmen who go there every year be only impressed with the importance of accurate observations, the point may soon be settled.

Certainly I agree that Colonel Greenwood, who has kindly favoured me with a most interesting letter of advice, has done excellent service by his quite justifiable incredulity, and I shall myself be content to have made a mistake, if by it I shall be the cause of greater accuracy in others. W. B. THELWALL  
27, Burghley Road

#### Glass Cells with Parallel Sides

I SEND you a brief description of a method I have recently employed for rapidly fitting up glass cells with parallel sides, believing that it may be of interest to your readers.

A piece of indiarubber tubing (or of solid rubber) bent into a semicircular form is placed between two equal-sized rectangular plates of glass, the ends of the tube terminating at the upper edges of the glass plates; the plates are then held together by passing two strong indiarubber rings over their ends. If the rings are of such a size as to exert the requisite compression a semicircular water-tight cell is thus obtained, which can be taken to pieces and cleansed with the greatest ease.

A trough so made served well to exhibit with an ordinary magic-lantern the experiments described on pp. 173 and 174 in Tyndall's "Heat a Mode of Motion," and smaller cells suitably fitted with platinum wires, and held in the wooden frame of an ordinary lantern-slide, enabled the galvanic decomposition of acidulated water and of saline solutions to be thrown upon a screen and thus rendered visible to a large audience.

Queenwood College, Hants.

FRANK CLOWES

#### Brilliant Meteor

WHEN nearing Holyhead at 0.50 A.M. on the 19th inst. the most brilliant meteor I have ever seen passed slowly across the heavens. It formed near Antares, remained stationary for two or three seconds, and then slowly moved to the northward, disappearing in the Great Bear. Throughout, the soft green light showed every portion of the hull and rigging with as much distinctness as a number of pyrotechnic fires could have done. The shape was that of an elongated ellipse, slightly contracted at one end, with the major axis of the apparent diameter of the sun. A short time before it disappeared six sparks as large as Jupiter were discharged from the southern end, and I thought a crackling sound followed.

Celtic, May 20

WM. W. KIDDLE