earth, and going vertically upwards, Mr. Schlemüller finds the height of an atmosphere

Of pure oxygen	... ...	43,360m., or 27 miles
Of pure nitrogen	... ...	49,360m., or 31 miles
Of watery vapour	... ...	76,980m., or 48 miles

These results are, indeed, fair approximations to the ordinary values.

At the end of his treatise the author gives some formulæ which are destined to serve for the measurement of heights by means of the barometer and thermometer.

On p. 10 there is a curious statement. Supposing the air or gas to be inclosed in a vertical "narrow tube," the author thinks that the molecules will be able to make vertical movements only, and he introduces, therefore, into his calculations the mean value of the vertical components of their velocity, viz., $\frac{V}{2}$. The result is that, according to Mr. Schlemüller, the temperature in a narrow vertical tube, open at top and bottom, increases four times faster towards the bottom than in the free atmosphere. What the author considers to be a "narrow tube" he shows on p. 12, where he applies his rule to a pit or well (!). It is not too much to say that a perpetuum mobile might be constructed on that principle.

Mr. Schlemüller's formulæ for measuring heights might be perhaps accepted by some who would take the numerical results given by the author as a sufficient proof of his theory. It is, however, impossible that a theory resting on false assumptions should give correct results, and the coincidence of the results given with data derived from other sources is only apparent. First these data themselves are so varying that it is not very difficult to produce a number approaching pretty closely to some of them; on the other hand, the results calculated from a theory which supposes an atmosphere not exposed to radiation *ought not* to coincide with data derived from the *actual* atmosphere, which is far from fulfilling the conditions supposed by the theory.

L. HAJNIŠ

Prague, December 3

Alternative Interpretation of Sensation

THE curious optical phenomena which form the subject of Mr. Ackroyd's letter (NATURE, vol. xxi. p. 108) have their analogues, as many have probably observed, in other orders of sensation. When travelling by railway, or indeed in any closed vehicle, I have often noticed that, if passing objects be shut out from view, it is possible with a little effort to mentally reverse the direction of the train, so that if sensation only were concerned, there would be no doubt as to this reversed motion. Another example of this choice of interpretation is also afforded by the sensations of motion, but in a slightly different way. Standing low down by the water, on a moving steamer or on a bridge over a rapid stream, we can at will either *feel* that we are moving through the water or that we are stationary while the water is flowing by. The same, or at any rate a very similar, choice is presented when the clouds are scudding over the moon's disk; we can either see the moon travelling behind unmoving clouds, or the clouds passing rapidly across the moon.

It would appear from the above facts that we have in certain cases the power of selecting from the experiences which have been associated with a given set of sensations that one which we wish the sensations to convey. It is difficult to see how this can be explained without admitting a certain amount of freedom of will, as the sum of our previous experience, including the sensation itself, is the same, whether we choose to go backwards or forwards, to stand still or to move on.

FRED. D. BROWN

Science Schools, South Kensington, December 16

Curious Incubation

INDIAN birds avail themselves largely of natural heat in incubating; as breeding-time generally begins in March, the hot weather is generally well on by the time the eggs are laid, and as the temperature of the air is never below a minimum of 98° – 100° during the day, the eggs are but little sat upon except during the night, and so rest and duty are combined judiciously.

On one occasion I collected birds' eggs, and, until I could blow them, I used to place them in a drawer of my office table, and there they would lie for two or three days until I had leisure. One day, while writing, I heard strange sounds from this drawer, and opening it found a young crow (*Corvus splendens*) emerged from its egg. On a second occasion I similarly found a young myna. I tried hard to rear these strange hatchings, but failed.

One day I saw a kite's nest in the top of a fan palm, and sent up a native to bring down the contents, which turned out to be eggs. In a spirit of mischief I placed them, without saying anything to any one, under a hen which was sitting upon ducks' eggs, and awaited the result. Two days after, my fowl-man came to me with a long and solemn face, and asked permission to address me. That accorded, he mysteriously whispered, "My lord, a great wonder has occurred in the fowl-house; a marvel has happened; devils have been hatched in the fowl-house." Then began a *tableau* of descriptive acting which I cannot reproduce. "Did not I place ducks' eggs under that hen, and, my lord, have not ducks flat feet like this (flattening and extending his hand), and noses like this (compressing his thumb and index-finger); have they not, my lord?" On my solemnly assenting, he proceeded: "But these devils, my lord, have feet like this (clawing all his fingers), and noses like this (hooking his thumb and index together at his own nose)? Oh! my lord, what shall I do?" "Well, let me see these devils," I replied, sympathisingly; and we walked off to the fowl-house and found the hen sitting dazed beside her basket, in which were five recently-hatched kites. The *finale* was tragical, for the poor hen abandoned both her eggs and the kites, and the latter would have died had I not had them replaced in their nest. As it was, the ducks' eggs were abandoned.

R. F. HUTCHINSON

THE GEOLOGY OF THE HENRY MOUNTAINS[1]

THE Henry Mountains are a group of five peaks, ranging in height from 7,000 to 11,000 feet above the sea, which rise out of the table-land, now so well known to all students of physical geography, to which the American geologists have given the name of the Colorado Plateau.

They are situated in Southern Utah, and are crossed by the meridian of 110° 45′ and the thirty-eighth parallel.

They stand close upon the northern bank of the Colorado, which flows past their base in a canon 1,500 feet in depth.

Mr. Gilbert's account of the geology of these mountains is specially interesting to the student of physical geology, on account of the explanation it contains of the machinery by which their uplift was brought about. His views have certainly the merit of novelty, and at the same time the evidence in their favour, if not quite conclusive, carries with it considerable weight.

All previous speculation on the subject of mountain-building may be grouped under two heads. Nearly all mountain ranges have a central axis or core of crystalline rock. By the older geologists this crystalline mass was looked upon as intrusive, and it was believed that the violent injection of a huge body of molten matter had lifted up the stratified rocks through which it forced its way, and shouldered them off on either side, giving them a dip coinciding in direction and approximately in amount with the slopes of the chain. A section across a mountain chain would show, according to this view, an anticlinal arrangement of the bedded rocks with a body of intrusive rock in the centre, and it was the intrusion of this central mass that was believed to have caused the upheaval. The force, then, which according to this view, raised mountains to their present elevation, was of the nature of a *thrust acting vertically upwards.*

Never, perhaps, did any theory collapse more completely than this when it came to be subjected to the test of examination in the field. As mountain chains were one by one investigated by geologists, the anticlinal arrangement of their rocks which this theory required was found to be more and more conspicuous by its absence. Marked peculiarities of structure were indeed found to be so universally present in mountain chains, that no range of hills was deemed worthy of that title

[1] "Report on the Geology of the Henry Mountains." By G. K. Gilbert. (Washington, 1877.)