

America, and we believe the Filices are also to be included.

We are pleased to see that at the conclusion of the work it is announced that an introductory volume will be given containing an account of the physical features of the country and a series of maps. No specially faunistic work should be issued in these days without a map, and in that map moreover all the localities mentioned in the letterpress should be inserted. Furthermore care should be taken that the names of the places should be spelt alike in the letterpress and in the map—a point which in several instances that have come before us, has not been sufficiently attended to.

We are, however, fully aware that in the present case our authors are well acquainted with the value of geography—one of the two "*faces Zoologiae*," as the late Prince Bonaparte called it, and we do not fear that they will even spell their names of places incorrectly. And on the whole it may be fairly said that the "*Biologia Centrali-Americana*," if carried, and we doubt not it will be carried, to its promised extent, favoured as it is by the co-operation of some of the most accomplished naturalists of the day, will not only remain a lasting testimony to the learning and munificence of its editors, but will also equal in completeness and finish any geographical work on natural history ever published.

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.*]

Visualised Numerals

It may interest those who have read my memoir in NATURE, vol. xxi. p. 252, on visualised numerals, to learn some of the principal results obtained thus far through its publication. I have received several new diagrams more or less similar to those already published, so that I have now about thirty of them in all. My new contributors are of the same classes as before. There is only one high mathematician among them; the remainder are pursuers of science, authors of various degrees of reputation, persons engaged in tuition, students at Oxford and Cambridge, some other adults, and one schoolboy. If my collection becomes still further increased, I have grounds for belief that I shall be able to classify the cases, and to extract more meaning out of them than has hitherto been feasible.

It has been a satisfaction to me to receive emphatic acknowledgment of its correctness from the author of the curious shaded diagram (Fig. 5) in the memoir. The sketch sent to me was drawn with evident painstaking, but it was rubbed and faint; the engraver, however, succeeded in justly interpreting it, and supplying its defects of tone. Fig. 4 is unfortunate, and I am to blame. I stated in the accompanying text that I had compiled it from a large diagram, much as a map-maker would compile a small map from an elaborate itinerary. However, my map proves to be a failure, so I withdraw it. The other diagrams were almost exact reductions of plain drawings; their truth has been acknowledged in one group of cases, and I have no grounds for doubt as to the remainder. FRANCIS GALTON

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A Psychological Aspect of the Vortex-Atom Theory

It is a very generally accepted fact that the phenomena of thought are at least connected with a physical basis, however difficult it may be at present to trace the connection. The dependence, however, of mental attributes and sensations upon

brain-structure, is too notorious a fact to admit of doubt by competent judges. This view is illustrated well by a remark of Prof. Huxley's in his essay "On the Physical Basis of Life," viz.: "And if so, it must be true in the same sense and to the same extent that the thoughts to which I am now giving utterance and your thoughts regarding them are the expression of molecular changes in that matter of life which is the source of our other vital phenomena" (*Fortnightly Review*, 1868).

It becomes evident in view of this that the phenomena of thought would be enormously influenced by the changes or permutations of which the molecules of matter were capable. Under the old theory of perfectly rigid molecules, it would seem difficult to conceive permutations enough to act as an accompanying physical basis to the phenomena of thought, for according to this theory, the mere motion or change of place of the molecules among each other would be the sole permutations of which they could be capable. But the modern theory of vortex-molecules shows molecules to be elastic bodies, which are consequently "capable of infinite changes of form"—as the late Prof. Clerk Maxwell remarks [*Encyc. Brit.* 1875, Article "Atom"]. It would therefore follow that according to the modern theory, the permutations of the physical accompaniment of thought would be absolutely infinite, in analogy with the infinite variety and range of thought itself. Possibly this may be a point of interest, if indeed it has not already been reflected on by others.

London

S. TOLVER PRESTON

A Speculation Regarding the Senses

ON examining the modes of action of the senses we find a series of advances in refinement. Beginning with *touch*, we find it has primarily to do with *solids* which come into direct contact with the organ. In *taste* a *liquid* medium is necessary. In *smell* we have minute particles carried by a *gas*. In *hearing* we have *vibrations* (longitudinal) in a *gas*. In *sight*, finally, we find transverse vibrations transmitted by a finer medium, the *ether*.

Now, whatever views may be taken of the doctrine of evolution, there can be no doubt of the progress of the human race in what we may generally here term *power*. And it is interesting to look into the future and inquire whether future developments of the relations between the *ego* and the *non-ego* may not, in time, take such forms as will be equivalent to the acquisition of new senses.

Guided by the gradation above referred to, I would throw out the suggestion that the molecular vibrations in the brain accompanying thought, may affect a surrounding medium, and through that, other brains at a distance, awaking in these corresponding vibrations and thoughts. The medium might be supposed, perhaps, one of different nature from that in which light-vibrations occur, or (not to multiply ethers) the same as the so-called luminiferous ether; and in the latter case we might suppose the vibrations such as not to be appreciated through any of the present senses of ordinary persons.

A person of high refinement and delicate organisation has a wonderfully exalted power (as compared, say, with a country bumpkin) of interpreting the *tout ensemble* of external appearance and bodily motions of another person in his presence, thereby perceiving at a glance much of the thought of that other, as it arises. But the kind of action I have referred to is of a still more delicate kind, and may be supposed to obtain when the eyes, and perhaps other avenues of sense, are closed. It might be termed a kind of *induction of thought*.

This speculation is not, I think, without some encouragement in actual fact. It is a familiar experience that two persons who are together will discover themselves to have been thinking of the same thing at the same moment; and this without any apparent cause in what one *sees* in the other, or in association of ideas in conversation. The ascertained facts of *clairvoyance* and *mesmerism*, however, are what I have more specially in view, and the light in which I would place them is that of a natural development of human faculty, at present appearing only sporadically and in few persons, but destined, perhaps,

* The molecules of matter, according to this theory, though indestructible (like the molecules of the ancients), are nevertheless *elastic*, or capable of distortion or changes of form (much in analogy with larger scale elastic solids), the molecule always tending to recover its natural symmetrical shape when released from constraint. These changes of form may of course be conceived infinite in variety, without the total amount of distortion itself being at any time great. This *elasticity* possessed by molecules is sufficiently proved by the vibrations of varied periods which the spectroscope shows them to be capable of executing.