clay, showing that in some remote age the hippopotamus must have traversed the plains of England and wallowed in its rivers."—*Rev. J. G. Wood's Illustrated Natural History, p.* 766.

"Nearly allied to the elephants is an extinct genus termed mastodon, which was characterized by the form of its molar teeth." * * * "Several other species of mastodon, however, have been distinguished by their remains—of these some were natives of the old world, and probably even of Britain."—*Carpenter's Zoology, sec.* 209.

"Mastodon.—A genus of extinct quadrupeds allied to the elephant."—*Agassiz and Gould's Comparative Physiology (glossary).*

"The other cetacea have the head so large that it constitutes one-third or even one-*half* of their length."—*Rymer Jones.*

But the writer of the article is evidently largely gifted with the organ of wonder, for he says:—"Our author on p. 101 develops some still more remarkable views as to the habits and structure of the wood-pecker. His beak, he says, is straight and sharp, and he pecks into the bark of trees till he has made a deep hole. Into this he extends his tongue, which is armed with barbs at the end, like the teeth of a saw. These turn backwards towards the birds' head; and as the tongue is fixed inside of the back of the head, it works by a sort of spring, and so deepens the hole and brings out the insects or their eggs which form the food of this hard-working bird. So the wood-peckers bore holes in trees with their tongues, these remarkable organs being fixed inside the back of the head. No one, we venture to say, but a very close observer of nature would ever have discovered these facts."

In reply, I quote as follows:—

"The wood-pecker is furnished with a singular apparatus, for enabling it to dart out with great velocity its long and pointed tongue, and transfix the insects on which it principally feeds; and these motions are performed so quickly that the eye can scarcely follow them.

"The tongue itself is a slender, sharp-pointed horny cylinder, having its extremity beset with barbs of which the points are directed backwards; it is supposed on a slender *oshyoides* or lingual bone to the posterior end of which the extremities of two very long and narrow cartilaginous processes are articulated.

"The two cartilages form at a junction with the tongue a very acute angle, slightly diverging as they proceed backwards, until bending downwards, they pass obliquely round the sides of the neck, connected by a membrane, then being inflected upwards, they converge towards the back of the head where they meet, &c. A long and slender muscle is attached to the inner margin of each of these cartilages, and their actions conspire to raise the lower and most bent parts of the cartilages, so that their curvature is diminished, and the tongue protruded to a considerable distance for the purposes of catching insects. As soon as this has been accomplished, the muscles being suddenly relaxed, another set of fibres passing in front of the anterior portion of the cartilages, nearly paralled to them are thrown into action, and as suddenly retract the tongue into the mouth with the insect adhering to the barbed extremity. Whilst the bird is in the tree, it repeats those motions almost incessantly, boring holes in the bark, and picking up the minutest insect with the utmost celerity and precision."—"*Roget*" *Bridgewater Treatise on Animal Physiology.*

An account of this mechanism, is given by Mr. Waller in the Phil. Trans., for 1716, p. 509. I may add that in almost every good natural history or encylopœdia there is to be found an engraving of a section of the head of the wood-pecker, showing that the action and wonderful construction alluded to have been examined and delineated. But, then, naturalists ought to be, and *are* "close observers."

The reviewer then says:—"For the benefit of non-scientific readers, we may state that the crustaceans derive the lime for their shells from the sea-water, whence it passes into the blood, and that the 'crabs'-eyes' of Mr. Davidson have as much to do in the production of the shell as they have in determining the price of wheat."

I subjoin the following on the authority of Dr. Carpenter and Professor Rymer Jones:—

"The mode in which the crustacea, whose calcareous shell is periodically thrown off, are able to renew it with rapidity, is very curious. There is laid up in the walls of their stomachs a considerable supply of calcareous matter, in little concretions which are commonly known as crabs'-eyes; when the shell is cast this matter is taken up by the blood and is thrown out from the surface mingled with animal matter.

"This hardens in a day or two, and the new covering is complete. The concretions in the stomach are then found to have disappeared, but they are gradually replaced, before the supply of lime they contain is again required."—*Carpenter's Animal Physiology, sec.* 170.

"The pressure of the old shell being removed, the animal suddenly increases in bulk, the new skin, as yet soft and flexible, allowing at first of great expansion, but it rapidly hardens, a stock of shelly matter having been for some time accumulating in its stomach in the form of two hard balls commonly called 'crabs'-eyes.'

"This substance is supposed to be taken up and distributed to the surface, so that when the new crust has again acquired consistence, these concretions are no longer found. The whole process occupies from one to three days."—*Professor Rymer Jones' Animal Creation, p.* 203.

I do not feel justified in trespassing further on your space, or on the patience of the public, but I am prepared to send you if you can find room for their insertion, replies as complete as those now submitted to every single accusation of the so called "errors."

I may add that a copy of the book is in the possession of almost every teacher of the subject in England, and that it is largely used as a text-book in several of our highest schools, so that the Canadian Educational authorities in making choice of this work did not select an unknown work as your reviewer would seem to imagine, but one which had already an established reputation as a school-book in England.

I have the honour to be, Sir,
Yours very truly,
ELLIS A. DAVIDSON,
Author of "The Animal Kingdom."

II. Mathematical Department.

To the Editor of the Journal of Education.

SIR,—A majority of those employed in public instruction would hail with pleasure the event of the *Journal of Education* becoming a medium for the diffusion of mathematical as well as literary knowledge. A Mathematical Department would become practically useful to teachers, and interesting to your general readers. Our spare time could be profitably and honourably employed by pleasant and friendly competition in science and literature; and though widely separated by space, we could form a school of mutual instruction, and make the *Journal of Education* really pleasing, attractive, and useful to the teachers of Ontario. Under these considerations, I humbly send the following problems as the result of my first effort to begin a mathematical column. I do not claim originality for all; but in their choice, I have endeavoured to avoid extreme difficultics and to aim at practical usefulness.

1. In what time could $2.500 yield the same amount, if placed at 6 per cent. simple, and 3 per cent. compound interest? To be solved by arithmetic.

2. $\sqrt{n^3} - \sqrt[3]{n^2} = 4.962\,x$; find the value of x.

3. The principal, time, rate, and gain, at compound interest, are all equal; required the time.

4. $x^3 + y_3 = z_3$; find x, y, and z.

5. A bar of wrought iron, 150 feet long and 1-5th square inch in section, lengthens ·289 inch under a certain strain, what must be the additional strain necessary to produce rupture?

6. The base of a triangle is 80, and sides containing the vertical angle are 65 and 55 perches, respectively; required the length of a line drawn from a point without the triangle, 8·53 perches from the side (55), so as to cut off 5-7ths of the area.

7. An iron wedge whose vertical angle is 14°, is driven into a mass of oak by a force of 125 lbs.; what force is necessary to extract it?

8. A beam of oak 1 foot square has its end firmly embedded in masonry from which it projects 9 feet; to what height could a wall of brickwork 2 feet thick and resting on the beam, be carried without producing rupture?

9. In a given triangle, the base AC = 100; AB = 70; BC = 90. (I) What is the length of a line parallel to the base? (II) perpendicular to the base? (III) inclined at a given angle to the base (15°), so as to cut off 7-11ths of the area? (IV) Bisect the triangle by a line whose length is 49·32.

10. The rafters of a house are each 18 feet long, and tied by a wrought-iron rod 30 feet long and section $\frac{1}{4}$ square inch; what weight must be suspended from the vertical angle so as to break the rod?

11. What must be the length of a bar of wrought-iron, which, if suspended vertically, would break by its own weight?

12. If into a hollow cylinder, the inner diameter of whose base is 3 inches, and length 18 feet, we put as many wires of 1-14th inch in diameter and same length as the cylinder, as it can contain, how much water could be afterwards poured into the vessel?