less in itself; not only is it worthless, but it is excessively expensive.' I am sure Mr. Bryce * would agree with everything I have said upon this point, and everything I am going to say upon it—for I shall not go into controversial matter—because, while I think that those who object to technical education have their justification, it yet remains true that if you include, as you ought to include, within the term technical education the really scientific instruction in the way of turning scientific discoveries to practical account, if that is what you mean—and it is what you ought to mean by technical education—then there is nothing of which England is at this moment in greater need. There is nothing which, if she, in her folly, determines to neglect, will more conduce to the success of her rivals in the markets of the world, and to her inevitable abdication of the position of commercial supremacy which she has hitherto held."

"I do not deny that, if manufactures and commerce have an immense amount to gain from theoretical investigations, on the other hand—as everybody will admit that has even the most cursory acquaintance, let us say, with the history of the discoveries in electricity and magnetism—pure science itself has an enormous amount to gain from industrial development. While both these things are true, I am the last person to deny that it is a poor end, a poor object, for a man of science to look forward to, merely to make money for himself or for other people. After all while the effect of science on the world is almost incalculable, that effect can only be gained in the future, as it has only been gined in the past, by men of science pursuing knowledge for the sake of knowledge, and for the sake of knowledge alone; and if I thought that by anything that had dropped from me to-night I had given ground for the idea that I looked at science from what is commonly called the strictly utilitarian standpoint—that I measured its triumphs by the number of successful companies it had succeeded in starting, or in the amount of dividends which it gave to the capitalist, or even by the amount of additional comfort which it gave to the masses of the population—I should greatly understate my thought; but I know this great Society, while it has in view these useful objects, still puts first of all the pursuit of truth, which is the goddess to which every man of science owes his devotion. And truth, not profit, must necessarily be the motto of every body of scientific men who desire to be remembered by posterity for their discoveries. These things can only be done through a disinterested motive, and it is because I believe that societies like the great Society I am addressing do more than any other organization to attain that great object: because I think they bring together men engaged in congenial pursuits; because the stimulus of mind brought close to mind, and the honorable ambitions and the honorable rivalries of men engaged in the same great task must lead to an enormous extension of our knowledge of the secrets of Nature; that I, as an outsider, not belonging to your body, do, in the name of a public for which I venture to speak, wish you all success and wish you all prosperity." W. W. R.

* The Rt. Hon. James Bryce, President of the Board of Trade.

CORRESPONDENCE.

HAECKEL'S MONISM.

EDITOR OF SCIENCE: In reponse to your kind note of recent date concerning Haeckle's 'Monistic Creed,' I may state that I find myself in the fullest sympathy with the views expressed by Professor Brooks.

I may perhaps be permitted to add the following:—

The senses of man, as of other animals, yield certain impressions which so far as they go are of the nature of truth. We

know truth only through approximation, the revision and extension of these sense impressions. These impressions and the inductions from them serve as guides to action. In this relation these common impressions must be true, because trust in them has been safe. Wrong action must have led to the destruction of the actors. One test of truth, perhaps the only one, is the safety that comes from trusting it. The power of choice implies that right choice must be made. Only those who in the narrow range of choice choose safely can survive. To this end of safe choice, sensations, desires and reason must coöperate. The adaptation to complex conditions rests on the ability of the individual to receive the degree of truth he needs to make safe choice possible, and no more. For truthfulness in sensation exists only in the range within which action and choice are dependent on it. Beyond this range truth would have no value as an aid to adaptation. Our senses tell us something of truth as to bread and fruit and stones, which we may use or touch or avoid. They do not give us just impressions of the stars or sky, which we cannot reach,nor of the molecule, which we cannot grasp. Our sense powers, as well as our powers of reasoning, are eminently practical. They are bounded by the needs of the lives of our ancestors, to whom any form of *hyperæsthesia* would have been destructive and not helpful.

The methods and the appliances of science serve as an extension of the truthfulness of the senses into regions in which truth was not demanded for the life-purposes of our ancestors. These methods yield truth of a similar kind, which can be measured by the same test. We may trust the information given by the electrometer or the microscope or the calculus just as implicitly as we receive what our own eyes have seen or our own hands have felt. We may depend on the truth given by these instruments of precision to a greater degree than on that which the common senses furnish us, because the guards and checks on scientific appliances are more perfect. The information gained by observation and sifted by reason constitutes science. In the struggle for existence, knowledge is power. Our civilization rests directly on the growth of scientific knowledge and on the availability to the individual of its accumulated power. Its basis is the safety of trusting to human experience. The 'Laws of Nature,' as we know them, are generalizations of such experience. Their statement may form part of a 'scientific creed' to those who have tested them, if such feel that 'I believe' adds force to 'I know.'

The essence of the 'Monistic Creed' as set forth by Haeckel is not, as I understand it, drawn from such sources. It is an outgrowth from Haeckel's personality, not from his researches. So far as I know, no change has taken place in it as a result of any discovery its author has made. If its details have been changed at any time since it was first formulated, the reason for such change must be sought for in Haeckel, not in Science.

Perhaps, indeed, there is "one spirit in all things, and the whole cognizable world is constituted and has been developed in accordance with one fundamental law." But this is no conclusion of science. It rests on no human experience. If it be the induction resulting from all human experience, that fact has not been made plain to us. The hyperæsthesia of the microscope or the Calculus brings one no nearer to it. Its place is in the boundless realm of guesswork. It value lies in the stimulus which clever guesses give to the otherwise plodding operations of scientific men. It seems to me that 'Monism' belongs to the domain of speculative philosophy, a branch of thought which, according to Helmholtz, deals with such 'schlechtes stoff;' that its

conclusions, however brilliant, can have no value as guides to life or as guides to research, which is the second power of life. The theory of Monism has no interest to Science, until men can come to deal with the 'Stoff' on which its speculations rest. Every conceivable theory of life, its nature, origin and destiny, can be traced back to the pre-scientific philosophy of the Ancients, Monism with the rest. What we have found to be true was not unknown to the Greeks. But that which we find to be false had equally the weight of their authority. It is the business of Science to test by its own methods the value of the supposed basis of these theories. The use of logic is one of these methods. The only logical necessity Science can recognize, as Dr. Brooks has well said, is "that when our knowledge ends we should confess our ignorance."

I have myself not the slightest objection to 'Monism' as philosophy. As a dogma it is certainly more attractive than many others which have been brought like lightning from the clouds, as a stimulus to creeping humanity. My objection lies against the use of the divining rod in connection with the microscope. These instruments do not yield homologous results. If both yield Truth, then Truth is a word of double meaning. This method seems to carry us back to the days when truths were made known to the spirit without the intervention of the body. When some theologian of the past brought to Luther the revelations his spirit made to him, the sturdy Reformer said, "Ihren Geist haue ich über die Schnautze" (I slap your spirit on the snout). Scientific men may have as individuals their own visions and guesses and formulæ of Universal Philosophy. Spiritual gymnastics are not without value to any worker, and men of science have often suffered from their neglect. But this suffering is purely individual. The running high jump does not hasten the progress of knowledge. Science will have none of it. Nor will she tolerate a divining rod even in the hands of her wisest devotees. In other words, where the facts stop Science stops also.

David Starr Jordan.
Stanford University.

THE GENUS ZAGLOSSUS.

To the Editor of Science: Mr. T. S. Palmer's article in Science of May 10th fixes the synonymy of this genus with precision; but one statement he makes is incorrect, namely, that '*Zaglossus* Gill seems never to have been mentioned by any subsequent author.' The Century Dictionary has three articles from my pen on the subject. 1. *Zaglossus* is defined as 'the proper name of that genus of prickly ant-eaters which is better known by its synonym *Acanthoglossus* (which see).' 2. Under *Acanthoglossus* the genus is characterized, with the statement that this name 'is antedated by *Zaglossus* of Gill.' 3. Under *Echidnidæ* the animal is figured with the legend '*Zaglossus* or *Acanthoglossus bruijni*.'

Elliott Coues.

SCIENTIFIC LITERATURE.

The Cambridge Natural History, III., Molluscs: By the Rev. A. H. Cook; *Brachiopods* (Recent): By A. E. Shipley; *Brachiopods* (Fossil): By F. R. C. Reed. New York, Macmillan & Co. 1895. XIV., 536. Pp. 8°. Illustrated.

This work is one of a series intended especially for intelligent persons without scientific training, but in which the attempt is made to combine popular treatment and untechnical language with the latest results of scientific research.

Mr. Cooke, who is known as a painstaking and well informed conchologist, has endeavored to unite in one general classification the views of specialists in the various groups, such as Hoyle for the recent, Foord and Fischer for the fossil Cephalopods, Bergh for the Nudibranches, Pelseneer for the Pelecypoda, etc.; but, in conformity with