solution upon the lines indicated, there is no reason beyond that of expense why vision should not be electrically extended over long distances. The only method which can be regarded as feasible (unless, indeed, M. Armengaud has made a revolutionary discovery) is that suggested by the structure of the eye itself; the essential condition is that every unit area of the transmitter screen should be in permanent and independent connection with the corresponding unit of the receiving screen. This idea would naturally present itself to anyone approaching the subject for the first time, but would probably be rejected in favour of something apparently more simple. Such an apparatus could, however, be constructed without any serious complexity apart from that arising from the mere multiplication of its components. I have made a rough estimate of the cost, assuming the stations to be 100 miles apart, the received picture to be 2 inches square, and the length of a unit to be 1/150 inch. Of each of the elementary working parts—selenium cells, luminosity-controlling devices, projection lenses for the receiver, and conducting wires—there would be 90,000. The selenium cells would be fixed on a surface about 8 feet square, upon which the picture would be projected by an achromatic lens (not necessarily of high quality) of 3 feet aperture. The receiving apparatus would occupy a space of about 4000 cubic feet, and the cable connecting the stations would have a diameter of 8 or 10 inches. The thing could probably be done for 1,250,000*l.*, but not for much less. By an application of the three-colour principle it would be possible to present the picture in natural colours, like that shown upon the focussing screen of a camera. The cost would in that case be multiplied by three.

SHELFORD BIDWELL.

ARISTOTLE AND NATURAL SELECTION.

A PASSAGE of Aristotle's " Physics," in which he alludes to the theory of natural selection, has been frequently quoted and almost as frequently misinterpreted. It may therefore be worth while to devote a short space to a careful consideration of its import.

The passage in question is in the " Physica Auscultatio," ii., 8, §§ 1–6. In it Aristotle begins by asserting the existence in nature of final causes (ἕνεκά του αἰτίαι). He next considers objections that may be brought against this view, as, for example, that rain falls simply in obedience to natural law (ἐξ ἀνάγκης) and not for the sake either of making the corn grow or of spoiling it when cut. So, too, the supposed objector proceeds, with the parts or organs of animals; what is to prevent us from saying that the teeth originate in their various forms of incisors and molars simply by the operation of natural law? That they are serviceable respectively for cutting and grinding is not purposeful, but coincidental (οὐ τούτου ἕνεκα γενέσθαι, ἀλλὰ συμπεσεῖν). The existence of these apparent adaptations, the objector adds, can be accounted for by the fact that, as Empedocles has pointed out, those organisms that are unfitted for their conditions do not survive, but perish.

It will be seen from the foregoing that Aristotle does not advance the theory of natural selection as part of his own explanation of adaptation in nature, but as a principle that might be used to reinforce an alternative view.

We may now turn to his answer. The objection, he replies, will not hold, because things that arise naturally (φύσει) always, or nearly always, come about thus; *i.e.*, like the teeth, already adapted and fit to survive; while beings such as the unadapted monsters imagined by Empedocles originate, if at all, by chance or spontaneously (ἀπὸ τύχης καὶ τοῦ αὐτομάτου), and are, Aristotle would say, outside the ordinarily observed course of nature. It cannot be alleged, he goes on to point out, that such phenomena as rain and warm weather are altogether dependent on chance or coincidence (ἀπὸ τύχης οὐδ᾽ ἀπὸ συμπτώματος). Warm weather is the rule in the dog-days, and rain in winter. Everyone admits that things of this kind are in accordance with the ordinary course of nature; and if they occur in this regular way neither of themselves (like monsters) nor by mere coincidence (like unseasonable rain) it remains that they must exist for some purpose (ταῦτ᾽ ἕνεκά του ἂν εἴη). It must then be concluded that final causes exist in reference to natural products (ἔστιν ἄρα τὸ ἕνεκά του ἐν τοῖς φύσει γιγνομένοις καὶ οὖσιν).

Whatever may be thought of Aristotle's argument, it is clear that his general object throughout this passage is to defend his doctrine of final causes (it is to be observed that he does not say that final causes are of universal operation). He is unable to fall in with the view of natural selection as propounded by Empedocles, because, as it appears to him, adaptations are produced ready-made; the non-adapted is not merely eliminated, but seldom comes into existence at all. He seems, however, to admit that for those who believe (as he does not) in a purely fortuitous origin of natural objects, the hypothesis of natural selection affords a feasible explanation of adapted structures.

The erroneous views that have been taken of this passage by various writers have been due, I think, to the general failure to recognise that the whole of sections 2, 3 and 4 are devoted to Aristotle's statement of a possible objection to his own opinion. Thus Gomperz (" Griechische Denker," xiv., pp. 103, 104; Leipzig, 1908), although he clearly states Aristotle's position with regard to the Empedoclean monsters, nevertheless quotes the sentence about the rain and the growing corn as if it gave Aristotle's own explanation instead of the plea of an opponent. Osborn (" From the Greeks to Darwin ") falls into the same error; the author of a pamphlet (Αἱ τῶν Lamarck καὶ Darwin Θεωρίαι παρὰ τῷ Ἀριστοτέλει), lately published at Athens, has similarly missed the point; nor has Darwin himself escaped the like misapprehension, for which probably the translator on whom he relied was responsible (" Origin of Species," note to " Historical Sketch " in the later editions). On the other hand, the general drift of the passage was rightly appreciated by G. H. Lewes, though the confusion of ideas with which he taxes it belonged, perhaps, rather to his own mind than to that of Aristotle.

F. A. DIXEY.

NOTES.

WE notice with deep regret that Sir John Evans, K.C.B., F.R.S., died at his residence, Britwell, Berkhampsted, on Sunday, May 31, in his eighty-fifth year.

SIR GEORGE DARWIN, K.C.B., F.R.S., and Prof. E. B. Tylor, F.R.S., have been elected corresponding members of the Vienna Academy of Sciences.

THE twenty-fourth Congress of the Royal Sanitary Institute will be held at Cardiff on July 13–18, under the presidency of the Earl of Plymouth. In addition to sectional meetings, there will be a number of conferences on various aspects of sanitary science, among the subjects being spring cleaning and its sanitary significance, and the sorting and grouping of school children for educational purposes.