

qualities. But the principle of continuity may be used the other way up—it may be argued that if a lump of protoplasm can perform the essential functions of a living thing to all appearances without consciousness, the supposed value of consciousness in Man is an illusion. This is the doctrine of animal automatism so brilliantly treated by Mr. Huxley.¹ He is chiefly concerned with the value of consciousness to an organism—a question into which I cannot enter. What concerns us now is that, however we use the doctrine of continuity, it gives support to belief in a psychic element in plants. All I contend for at this moment is that there is nothing unscientific in classing animals and plants together from a psychological standpoint. For this contention I may quote a well-known psychologist, Dr. James Ward,² who concludes that mind “is always implicated in life.” He remarks, too (*ibid.* p. 287), “it would be hardly going too far to say that Aristotle’s conception of a plant-soul . . . is tenable even to-day, at least as tenable as any such notion can be at a time when souls are out of fashion.”

This is a path of inquiry I am quite incapable of pursuing. It would be safer for me to rest contented with asserting that plants are vegetable automata, as some philosophers are content to make an automaton of Man. But I am not satisfied with this resting-place. And I hope that other biologists will not be satisfied with a point of view in which consciousness is no more than a by-product of automatic action, and that they will in time gain a definite conception of the value of consciousness in the economy of living organisms. Nor can I doubt that the facts we have to-night discussed must contribute to the foundation of this wider psychological outlook.

LESSONS FROM GERMANY.

WE are glad to see that many public men are directing attention to the relationship between scientific investigation and industrial progress, and urging reforms which were advocated in these columns, and by men of science generally, long before the present position was reached. There is no question now that resolute efforts must be made if Great Britain is to hold her own during the twentieth century. Already we have lost supremacy in several branches of industry, and we shall probably be surpassed in others by America and Germany unless our commercial men learn to realise that science is the source of energy of all sustained industrial movements.

It is the business of scientific research to extend natural knowledge, and the investigator is not usually concerned with the commercial aspects of his work. The application of scientific results to industrial developments is for the manufacturer and merchant to consider, but they are unable to appreciate the possibilities of such results unless they have themselves had a scientific education. A discovery which to one man appears trivial may be made by another the nucleus of a great industrial development. Commercial history can afford numerous instances of the connection between science and prescience and the influence which the two combined exert upon progress. Mr. R. B. Haldane, M.P., mentions a few cases of this kind in an article in the November number of the *Monthly Review*. He selects the brewing industry as one instance of a change which should cause national concern. Thirty years ago Germany exported no beer, to-day she exports almost as much as Britain. The advance is due to the discovery and application of scientific method. When the “Brauereibund” was formed, it was definitely decided to make science with practice and practice with science the principle to work upon. Scientific stations were established in which technical problems confronting the practical brewer could be studied, brewing schools were founded, each with laboratories, experimental maltings and a brewery attached to them, and every effort was made to provide for the education of brewers with scientific as well as technical knowledge. The result of this thorough provision for educating scientific brewers is that German beer is a very active rival of English beers in our own country, and in France it almost monopolises the market.

This is one example given by Mr. Haldane to show how the industrial life in Germany is in close contact with the academic life. The case of the aniline dyes is too well known to need to be described here again, but our loss may be understood by the fact that 80 per cent. of the coal-tar colours used by the Bradford Dyers’ Association now comes from Germany.

¹ “Science and Culture,” Collected Essays, i.

² *Loc. cit.* p. 288.

It is, however, not only through the school that the man of science in Germany comes to the aid of industry, but also through the experiment stations or central bureaux of scientific opinion. The German, remarks Mr. Haldane, “is aware of the enormous extent to which he is dependent upon high science, and, further, that the best high science cannot be bought by the private firm or company. Accordingly the rival German explosives manufacturers several years ago combined to subscribe about 100,000*l.* and to found close to Berlin what they call their Central-Stelle. This establishment, which is maintained by subscription at a cost of about 12,000*l.* a year, is presided over by one of the most distinguished professors of chemistry in the University of that city, with a staff of highly-trained assistants. To it are referred as they arise the problems (in this industry these abound) by which the subscribers in their individual work are confronted. By it is carried on a regular system of research in the field of production of explosives, the fruits of which are communicated to the subscribers.”

Compare this organised system of determining the best methods and processes with the narrow spirit in which most of our commercial work is carried on. Trade rivalry exists in Germany as much as here, but it does not prevent combination having for its object the scientific study of subjects related to industries and manufactures.

The universities, technical schools and other academic institutions are all part of an organised system, and though the aim is culture, the application of the highest knowledge to commercial enterprise is borne in mind, and everything is done to encourage it. It is not necessary for us to copy Germany in everything, but we need more of the spirit which has built up such a splendid system of study and brought science, education and industry into such close relationship. It is the duty of the State to do far more than it has hitherto done to promote this connection by assisting research, organising and extending scientific education, and encouraging men to devote their lives to the extension of natural knowledge.

THE BICENTENNIAL OF YALE UNIVERSITY.

THE two hundredth anniversary of the foundation of the University was celebrated by a series of imposing ceremonies at the end of last month. Representatives were present from many universities and colleges, and addresses of congratulation upon the past performances and future promise of Yale were read.

The following is the address written by the Public Orator, Dr. Sandys, and presented to Yale University by the delegates appointed to represent the University of Cambridge at the recent celebration. The delegates appointed were Sir Robert Ball, Fellow of King’s and Lowndean professor of astronomy, the Hon. W. Everett, formerly of Trinity College (author of lectures “On the Cam,” delivered in Boston, 1865), and Mr. John Cox, late Fellow of Trinity, professor of physics at Montreal. Sir Robert Ball was unavoidably prevented from attending the celebration.

“Litteris vestris, viri nomine non uno nobis coniunctissimi, trans oceanum Atlanticum ad nos nuper perlatis libenter intelleximus, Universitatem vestram, inter Musarum sedes transmarinas prope omnium vetustissimam, annis iam ducentis ab origine sua feliciter exactis, sacra saecularia paucos post menses esse celebraturam. Trans oceanum illum, non iam ut olim dissociabilem, plus quam sexaginta (ut accepimus) ante originem vestram annis, Insulae Longae e regione, Fluminis Longi inter ripas, Britannorum coloni Portum Novum invenerunt, ubi postea Collegio vestro antiquo nomine novo indito civis Londiniensis liberalitatem etiam illustriorem effecistis. Ergo et animi nostri fraterni in testimonium, et diei tam fausti in honorem, tres viros amicitiae foederi novo vobiscum ferundo libenter delegimus, primum Astronomiae professorem nostrum facundum, quem quasi nuntium nostrum sidereum, velut alterum Mercurium Pleiadis filium Atlantis nepotem, trans maria ad vos mittimus; deinde, e vestra orbis terrarum parte, non modo Universitatis Cantabrigiensis utriusque aluminum, cuius eloquentia olim Cami nostri nomen Angliae Novae inter cives magis notum reddidit, sed etiam Universitatis nostrae aluminum alterum, qui provinciae Canadensis Universitatum inter professores numeratur. Has igitur litteras a legatione nostra ad vos perferendas Mercurio nostro tradimus, in quibus Universitati vestrae florentissimae propterea praesertim gratulamur, quod