employment for his pen in proposing such alterations or additions to these rules as would remedy the "grievance" (as I term it) or the "evil practice" (as he prefers to call it), and in that I can assure him he would meet with hearty co-operation from all English naturalists, and from none more heartily than from the undersigned. R. BOWDLER SHARPE

The Origin of Variations

THERE is a slight difference between all three of the answers to Mr. Murphy's queries on Protective Mimicry (vol. xiv. pp. 309, 329); but, I think, the authors of those replies are unanimously over-hasty to call in the aid of protective selection. I cannot but think that the perpetuation of nascent variations may more safely be attributed to causes identical with those in which the variations originate. If this be so, though the origin of variation is necessarily beyond the scope of any selection-theory, these causes continuing to act on the varying organism become of vast importance to the evolutionist. Too much importance cannot, I think, be given in this connection, to the principle of economy of nutrition, or balancement of growth, formulated by Aristotle, in the words "ἅμα δὲ τὴν αὐτὴν ὑπεροχὴν εἰς πολλοὺς τόπους ἀδυνατεῖ διανέμειν ἡ φύσις," and by Goethe, in the expression "Nature, in order to spend on one side, is forced to economise on the other." I gave one example of this law in a previous letter (NATURE, vol. xiii. p. 107) in speaking of the indirect uses of the waste, or secondary products of metastasis in plants; but as the subject is admirably sketched in Mr. Lowne's suggestive essay on "The Philosophy of Evolution," a work too little known or appreciated, I will give here an outline of the argument. Food may be divided into three parts—for nutrition, for the production of energy and waste, or excretion. In many lower organisms the excreted material forms a simple shell; in plants manna, nectar, and resins belong to this group. The chief form of energy in the organic kingdom is that resulting from the oxidation of carbon, chiefly characteristic of animals, while plants secrete the energy-producing material. In higher organisms it is physiologically advantageous that the parts of an organism should differ in the kind of nourishment they require and thus act, as Sir James Paget has shown, as excretory organs to one another. Thus all animals which feed on large quantities of comparatively slightly nutritious matter have a complicated digestive apparatus, and a strong tendency to the production of large skeletons or cutaneous organs, which relieve the special excretory organs. The stag applies a large portion of the calcareous salts derived from the herbage to the production of horns in the male and the bones of the young in the female. The thoracic appendages of the lamellicorns and the beaks of the toucan and hornbill are given as further examples, and "the dermal appendages of reptiles and the feathers of birds, rich in pigment and nitrogen are probably entirely excrementitious to the other tissues." Mr. Lowne makes an interesting final application of this hypothesis to the loss of the hairy covering of the human skin, it being the albuminous tissue most easily dispensed with to nourish the highly developed nervous system. "Phosphorus was likewise required in large quantities and the osseous system became reduced in size." The composition of the nutrient fluid of the organism remaining constant, the excreted matter will be so also, and thus, for example, a rudimentary horn or a pigment may be produced by a change of food and preserved, while the food remains the same, by a physiological selection, as preventing the overtaxing of the kidneys, before sexual selection or protective selection come into play. I have an instance in point before me. Two plants of variegated kale under the influence of the late drought have produced axial structures from the midribs and veins of all their leaves, and I have no doubt that were their seedlings grown under similar nutritive conditions, a race of plants thus substituting fibro-vascular tissue for the usually abnormal development of parenchyma in the kale would be produced. G. S. BOULGER

Agricultural College, Cirencester, Aug. 25

THE BRITISH ASSOCIATION

THE forty-sixth Annual Session of the British Association was formally opened last night by the address of the president, Prof. Andrews, of Belfast. From the reports of the preparations we have already given, it will have been seen that unusual efforts have been made to render this Glasgow meeting a success, and so far as can be judged at present this end has been gained. This is the third time the Association has met in Glasgow. The first occasion was in 1840, when the Marquis of Breadalbane was president, and the last time in 1855, when a similar honour was conferred on the Duke of Argyll. This is the eighth time the Association has held its meeting in Scotland, Edinburgh having been the first northern town visited, so far back as 1834, four years after the foundation of the Association; the Scottish capital was again visited in 1850 and 1871; Aberdeen in 1859, when Prince Albert was president; and Dundee in 1867.

The arrangements for the evening lectures, about which there was at one time some difficulty, have been happily completed. The first lecture will be delivered on Friday in the Kibble Palace, by Prof. Tait; the second, for working-men, in the City Hall, on Saturday evening, probably by Commander Cameron, R.N.; and the third on Monday, Sept. 11, in the Kibble Palace, by Prof. Sir C. Wyville Thomson.

Among the foreign visitors who are expected at the Glasgow meeting, are:—Dr. Janssen, Prof. Negri, of Florence, Prof. Braune, Leipsic, Dr. Edward Grubi, Breslau, Prof. Cohn, Breslau, Prof. Stoletow, Baron von Wrangell, St. Petersburg, and Prof. Ceruti, Rome.

The specially prepared Guide-book to Glasgow is in three volumes, some of the former guides of this description being considered too bulky. The volumes will be full of interesting information regarding such subjects as the geology of the Valley of the Clyde, fossils found in the West of Scotland; the archæology, zoology, and botany of the district; the rise and progress of the iron manufacture in Scotland, chemical industries, the engineering and ship-building industries of the Clyde, and the textile industries of Glasgow and neighbourhood. Mr. Graham, the Hon. Secretary of the Association, has prepared an excellent sketch map of the country surrounding Glasgow, with its general geological features, which has been lithographed, and will be inserted in one of the volumes. Each member of the Association will be presented with a copy of the handbook.

INAUGURAL ADDRESS OF THOMAS ANDREWS, M.D., LL.D., F.R.S., Hon.F.R.S.E., M.R.I.A., &c., PRESIDENT.

SIX and thirty years have passed over since the British Association for the Advancement of Science held its tenth meeting in this ancient city, and twenty-one years have elapsed since it last assembled here. The representatives of two great Scottish families presided on these occasions; and those who had the advantage of hearing the address of the Duke of Argyll in 1855 will recall the gratification they enjoyed while listening to the thoughtful sentiments which reflected a mind of rare cultivation and varied acquirements. On the present occasion I have undertaken, not without anxiety, the duty of filling an office at first accepted by one whom Scotland and the Association would alike have rejoiced to see in this Chair, not only as a tribute to his own scientific services, but also as recognising in him the worthy representative of that long line of able men who have upheld the pre-eminent position attained by the Scottish schools of medicine in the middle of the last century, when the mantle of Boerhaave fell upon Monro and Cullen.

The task of addressing this Association, always a difficult one, is not rendered easier when the meeting is held in a place which presents the rare combination of being at once an ancient seat of learning and a great centre of modern industry. Time will not permit me to refer to the distinguished men who in early days have left here their mark behind them; and I regret it the more, as there is a growing tendency to exaggerate the value of later discoveries, and to underrate the achievements of those who have lived before us. Confining our attention to a period reaching back to little more than a century, it appears that during that time three new sciences arose, at least as far as any science can be said to have a distinct origin, in this city of Glasgow—Experimental Chemistry, Political Economy, and Mechanical Engineering. It is now conceded that Black laid the foundation of modern chemistry; and no one has ever disputed the claims of Adam Smith and of Watt to have not only founded, but largely

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