

makes up the true species complex. It can be demonstrated that in certain fungi, at any rate, the morphological expression varies with every medium, *i.e.* with environment, and must rightly be regarded as a resultant of a comparatively fixed physiological constitution and a variable environment, *i.e.* of two sets of interacting physico-chemical factors.

In his paper on mutational *versus* recapitulatory characters Dr. Gates endeavoured to distinguish between new characters which result from nuclear changes in the germ-cell, which he classed as mutational and referred to as "a new Mendelian character," and new characters which result from "the impress of the environment," which he classed as recapitulatory and described as "gradually developed, involving adaptation to new conditions, and, if permanent, the principle of inheritance of acquired characters." He went on to say: "The theory of antithetic alternation of generations, which is widely held as regards archegoniate plants, implies a gradual lengthening in the sporophyte through the addition of cell-divisions to its subterminal stages. This can scarcely be supposed to have resulted from an alteration in the cell-unit."

Miss Saunders's paper on a graded series of forms in *Matthiola* added very important data bearing on the relation between continuous and discontinuous characters. She has traced the genetic origin of a perfectly continuous series of forms between the glabrous variety and the normal densely hairy plant. These were produced as the result of crossing the familiar glabrous variety with a rare half-hairy form. "The phenomenon is explicable on the supposition of multiple allelomorphs."

Dr. Scott, in a paper entitled "The Relation of the Seed-Plants to the Higher Cryptogams," discussed the prevailing view that the pteridosperms, and hence the spermatophytes as a whole, are to be derived from some unknown group of ferns. Dr. Scott combated this view, and took the stand that "pteridosperms have always been distinct from any of the known phyla of vascular Cryptogams . . . parallel in important aspects to the ferns, but of unknown and remote origin." He adduced anatomical and geological evidence in support of his view.

Another morphological paper concerned itself with the vexed question of the nature and origin of the pith and inner endodermis in medullated ferns. Dr. McLean Thompson concluded from his extensive investigation of *Platysoma microphylla* that it furnished very good proof of the intrastelar or potentially vascular nature of the pith in this form. Not merely does the basal protosteles pass gradually into the medullated condition once in the development of the individual, as in many other forms, but in this species the protostelic structure appears again in later-formed regions.

In a paper entitled "Monocotyledonous Features of the Ranunculaceæ, with Special Reference to the Floral Structure," Dr. Salisbury reviewed the similarities met with in the two groups in relation to number of parts, *dédoublement*, meristic variation, apocarpny, nature of fruits, placentation, etc.

As the result of her extensive work on movable-cell inclusions or statoliths, Miss Prankerd has found that they may be (1) starch grains, (2) chloroplasts, or (3) crystals, and that the nucleus may move with these inclusions. Even when this is not so, the nucleus of the statocyte may be markedly differentiated from that of neighbouring cells.

Under the heading of "Mychorrhiza and the Ericaceæ," Dr. M. C. Rayne added to her former work new facts tending to establish obligate symbiosis in *Vaccinium* similar to that in *Calluna*, and

raising the question of the possibility of nitrogen fixation by the fungus.

Prof. Priestley put forward a very important contribution to the theoretical consideration of the phenomenon of root-pressure, involving an ingenious use of the rapidly accumulating knowledge of the behaviour of a colloid gel in respect to its variability towards water. It is hoped that this important subject will come up again for discussion at the Cardiff meeting in 1920.

The formal meetings of the section were brought to a close by a semi-popular lecture of exceptional interest given by Prof. F. W. Oliver on *Spartina* and Poole Harbour.  
E. N. T.

#### EDUCATION AT THE BRITISH ASSOCIATION.

AFTER the presidential address by Sir Napier Shaw the Section settled down to discuss a varied and interesting programme, which attracted large and appreciative audiences throughout the week. It was a great disappointment that Sir A. Quiller Couch was unable to be present himself, but his paper on the teaching of English admirably expressed a need now widely felt by thoughtful teachers that English should be the root of all learning for an English-speaking child; that until the age of fourteen or fifteen he should practise the language natural to his mind in addition to one other; that the plainest, most everyday speech should be clear, expressive, accurate, graceful whenever possible, and at any rate decent; that a child should learn to define and clarify in his mind the terms in which he thinks, to think in real English, not in jargon. Therefore, to attain this, teachers should aim through English in preference to any foreign language, alive or dead. English should not be treated as a special subject, but should be the basis of all others. He deprecated the inordinate amount of time given in the lower forms to linguistics and mathematics, since these are mainly ancillary, the former to literature and history, the latter to natural science; they are formal studies, studies in the abstract, and lacking the content of the other three, employing processes alien to a child's thought.

Mr. W. D. Eggar read a paper on the teaching of English in relation to school science and claimed that the teaching of English was as much the concern of the science master as that of any other master—perhaps more so, as he is concerned with the live end of the language. He strongly urged that a broader and more intelligent study of English should take the place of much of the mathematical and linguistic work in preparatory schools.

Prof. H. E. Armstrong opened a discussion on "Method and Substance of Science Teaching" by criticising the Government report on the position of natural science in the educational system of Great Britain. This report he thought would prove of little value to teachers, and not likely to influence educational opinion to any degree. He looked upon it as a lost opportunity for examining and utilising experiments already tried. He combated the absurd statement made in Paragraph 43 of the report: that the heuristic method involves the rediscovery by the pupil in his school hours of all that he may fairly be expected to know. The method does however, involve neither more nor less than learning the art of inquiry. The method employed must be disciplinary—the method of science; scientific outlook must be acquired if scientific knowledge is to be of any avail.

On the same topic Sir Richard Gregory, although advocating heuristic methods, thought that the substance of instruction suffered from concentration upon method, and that laboratory work should be supplemented by a broad general course of descriptive lessons given quite independently of the practical work. Dr. E. H. Griffiths said he hesitated to accept this divorce of lecture and practical work. Mr. Mangham spoke of the neglect of biological science in education, and asked for a closer co-operation between the lecturers in various branches of science at the universities. Dr. Lilian Clarke gave some interesting details of a sound practical course of elementary science in girls' schools, showing how the spirit of inquiry can be aroused in botany as well as in chemistry. Her plea for more time should not go unheeded; for it is impossible to go far in such valuable work with only one to one and a half hours per week. Miss Shove discussed the necessity of a thorough course of elementary chemistry and physics preliminary to a botanical course.

A joint session was arranged with Section F, when a paper from Sir Herbert E. Morgan was read. The paper had for its theme the real need of the country for educated men in directing business affairs, men educated in the right way, with technical training added to sound general knowledge and broad views. Mr. C. R. Fay emphasised the value of university influence in business, and claimed that a central school for all branches of economic science at the university would co-ordinate effort and effect a rapid diffusion of new methods. Mr. H. N. Sullivan thought that young men entered business too early. Prof. Oldham described the work of the faculty of commerce in Dublin University. Sir Hugh Bell said that the bold step of appointing university men in railway business was a success, but that it was objected to by men whose promotion had thereby been affected.

A discussion on continuation schools was opened by Sir Robert Blair, who, speaking from the point of view of the largest urban district, suggested that for the first two years education should be general, and for the second two may have a technical or commercial bias derived from the occupation; that residence is the basis of obligation on the authority; that the required eight hours per week should be taken in two four-hour periods; that it would be inadvisable to divide the four-year period between two schools, one from fourteen to sixteen, the other from sixteen to eighteen; that schools may be mixed, not dual; that continuation schools will be ends in themselves and, for some, "stepping-stones" to higher things. Interest, he declared, is the key to the problem of instruction; the schools will be what the staff makes them. Extra class-room activities are no less important—libraries, clubs, games, and societies will attract the adolescent.

Mr. A. P. M. Fleming followed with a paper on works schools, in which he illustrated their advantages, such as the close correlation between the school work and the practical training in the works, the increased facilities for the selection for employment, promotion, systematic training, and for ensuring harmonious relations between the management and the worker. Mr. J. S. Rainer took a rather contrary view of works schools, and in a very able paper presented the W.E.A. point of view as being opposed to works schools. He contended that for efficiency and success these schools must be entirely independent of employers' control; for distrust of the employing interest, as being almost entirely personal and mercenary, would prevent such schools from giving suit-

able and adequate education. The subjects of study must be related to the interests of the pupil, and not determined by the needs of trades or industries. Mr. G. F. Daniell dealt with the problem in rural districts, and pointed out the need for transport facilities. He urged close relations with the village clubs and institutes, and thought that attendance could be arranged either for one day per week for forty weeks, or for a seasonal attendance. Mr. C. A. Buckmaster pleaded for full liberty to the teachers and for the provision of school societies and games, and thought that the content of the curriculum was secondary to the training of character. Lord Malmesbury advocated the gradual elimination of those unable to profit by the education provided out of public funds, but would encourage and spend as much as possible on the best boys and girls.

Dr. Vincent Naser, of Copenhagen, submitted proposals for an exchange of students between Denmark and Great Britain, and suggested the formation of bureaux of international information in connection with universities.

Sir Richard Gregory spoke on the educational value of the kinema—not to make learning easy, but to awaken interest and synthesise instruction. An exhibition of some instructive films was given by the Community Picture Bureau.

Bishop Welldon, in opening a discussion on training in citizenship, said that something must be done through co-operation or co-partnership to create a fellow-feeling between capital and labour, and that an enlightened patriotism as well as the dignity and history of the Empire should be taught.

Lt.-Gen. Sir Robert Baden-Powell made an eloquent appeal for the need of out-of-school training and environment as auxiliary to education for producing efficient human citizens. The wonderful success of the Boy Scout movement suggests that the most important duty of the schoolmaster is to discover what particular portion of his environment appeals most to each of his pupils, and to use that as the medium for inducing mental activity.

In a valuable paper on fundamental principles in education Prof. A. N. Whitehead claimed that all education is the development of genius, and showed that the true ultimate problem before the educator is how to impart knowledge so as to stimulate genius. He showed that language is essential, but argued that a child should not study a dead language until a modern literature has gripped the imagination; that classical learning is the superstructure of a literary education, and not the foundation.

Mr. F. S. Preston submitted a paper in which he emphasised the value of literary studies in the development of imagination and the moral faculties. A paper from Prof. Marcus Hartog on the function of examinations in education followed.

The final sitting of the Section was occupied with two excellent papers on the present position of private schools in the educational system, one by Mr. R. H. Hume, the president of the Private Schools Association, the other by Mr. Alex. Devine. These papers, and the discussion that followed, brought out the fact, little realised by many, that the number of children educated in private schools approaches in many places 50 per cent. of the school population.

Reports by special committees of the section were read and discussed, that on the free-place system by Mr. C. A. Buckmaster and Mr. D. P. Berridge, that on museums by Mr. Herbert Bolton, and that on the registration of schools by Lady Shaw—all embodying valuable information and suggestions for the educational reformer.