to that occurring normally *in vivo*, but the degree of development attained was less. The enzyme is confined to bone and ossifying cartilage; it is absent from small-celled, non-hypertrophied cartilage. It presumably plays some part in calcification: it has been shown that it is capable of causing the deposition of calcium phosphate from calcium glycerophosphate in the complete absence of inorganic phosphate (for example, Robison, *ibid.*, vol. 20, p. 388; 1926).

T. H. Milroy examined the processes of fatigue and recovery in normal and diabetic muscle and found that fatigue was characterised by the entrance of water, the loss of some phosphate, depletion of the glycogen store, and increase in lactic acid, together with loss of the power of esterification of phosphate under the influence of sodium fluoride (*Quart. Jour. Exp. Physiol.*, vol. 17, p. 161; 1927). In recovery the reverse changes were observed; with muscle taken from a depancreatised cat, the recovery processes were much slower, especially the storage of glycogen and the ability to synthesise hexose phosphate.

D. Stiven has recently investigated in detail the part played by phosphoric esters in the formation of lactic acid from glycogen or starch, using a muscle extract: muscle from a cat perfused with Ringer's solution after killing instantaneously was extracted, after mincing, with cold sodium chloride and bicarbonate solution; the extract was obtained by pressing through muslin and concentrated by freezing out water; the *p*H was adjusted by adding phosphate and bicarbonate (*Biochem. Jour.*, vol. 22, pp. 867, 874, and 882; 1928: vol. 23, p. 583; 1929: vol. 24, pp. 169 and 172; 1930). Under anaerobic conditions, the extract produces lactic acid from glycogen, starch, or glucose, though at somewhat different rates. With glycogen as substrate, the changes in phosphoric esters were followed in detail and found to be of three types: in the first, there is no ester accumulation or change in phosphate until all the glycogen has been used up, when phosphate increases; in the second, no ester accumulates for the first 30–40 min. of incubation, but thereafter accumulation is rapid; in the third, ester accumulates at the commencement and is then broken down. The actual course depends in part on the concentration of glycogen and the extract used. In any event, there is no molar relationship between lactic acid production and phosphoric ester accumulation or breakdown.

Addition of hexose diphosphate under certain conditions inhibits lactic acid formation and increases the formation of phosphoric ester; at the same time the glycogen decreases more rapidly than when the addition is not made. Stiven has also found that a sterile cell-free muscle extract prepared from a cat or wild rabbit will convert glucose to lactic acid without the addition of any activator; the glycolysis occurred in the early stages of incubation and was certainly due to the muscle enzymes and not to any infection.

Although the rate and extent of lactic acid formation from glucose are usually greater than from glycogen, the ester accumulation is much greater in the case of the latter. Again, the rate of lactic acid production and ester accumulation is greater with glycogen than with soluble starch in the earlier stages of the reaction, although finally the lactic acid formation is the same with both. Irradiation of the muscle extract with ultra-violet rays from a quartz mercury vapour lamp for short periods increased the rate of lactic acid production from glycogen; at first ester accumulation increased, but later decreased, coincident with the maximum rate of formation of the acid; longer exposures destroyed the enzyme. These results differ in some respects from those obtained by previous observers, and further work will be necessary before the details of the chemical changes produced by muscle or muscle extracts upon carbohydrates are finally and completely elucidated.

The Psychology of Adolescence.

THE psychology of adolescence has not received from psychologists that attention which its popularity with novelists, poets, and painters would seem to merit. It is, therefore, a matter of interest that, at the Bristol meeting of the British Association, Section J (Psychology) devoted the whole of a morning's session to hearing and discussing four papers on this subject.

In his paper on "The Basis of Social Adjustment", Dr. R. G. Gordon maintained that the problems of adolescence were largely problems of adjustment to society, and that the success of such adjustment depended on the formation of a sentiment of a social self which should in large measure dominate the other sentiments in the personality. The organisation of this sentiment, he said, depended on certain emotional dispositions or instincts: suggestibility, passive sympathy, imitation, and the herd instinct—the last of these being of first importance. These, however, were not enough, for the mentally defective often exhibited them in no small degree and yet was almost totally ineducable: he showed no particular peculiarities in respect of the instinctive bases of social adjustment; he was, for example, no more suggestible than normal people. Nor was the tale completed by the sex instinct. "To describe social intercourse as a manifestation of sexuality", said Dr. Gordon, "is, to my mind, a mistake. What the sex instinct does is to give a tremendous impulse to extraversion: it directs the individual's interest away from himself." He made the interesting suggestion that differences in the strength of the herd instinct were largely responsible for differences between the introvert and the extravert. These emotional dispositions, he said, had to be controlled and organised, and the individual had to learn to discriminate between what met with social approval and what did not. This control, integration, and discrimination depended on the acquisition of knowledge, the organisation of beliefs, and the development of the power of making sound judgments. It was in these respects that the mentally defective was lacking. They were associated with the proper development of the cerebral cortex; so social adjustment had to be regarded as of gradual development and only coming to fruition with a full functional activity of the cortex.

Dr. Gordon made an interesting distinction between the control, integration, and discrimination implied in social adjustment and what is commonly called intelligence, and suggested that some intelligent people never developed the capacity for social adjustment, because they were lacking in the special cortical development necessary for the integration of their instincts and the formation of the social sentiments: they were aments in spite of their intelligence. Such people might compensate either by an intense integration of the ego-centric sentiment, as in the typical epileptic personality, or by failure to adjust to life, as in many psychasthenics and chronic hypochondriacs, who preferred illness to health, finding

that a convenient way of escape from social adaptation.

Prof. Olive Wheeler, in her paper on "Variations in the Emotional Development of Normal Adolescents", gave some account of the results of her own inquiries, in which she used the questionnaire method. The replies to her questions pointed to an increase of emotionality during the period of adolescence, which showed itself in three directions: first, an increased feeling of self, tending towards psychological independence and the finding of a vocation; second, a rise or intensification of sex emotions, tending towards the development of a hetero-sexual attitude and the finding of a mate; and third, the development of social, æsthetic, and religious emotions, tending towards the formulating of a point of view on society and on life in general. There were great variations in the time and rate of this emotional development, and equally great variations in the intensity of the new experiences; in some cases there appeared to be a great accession of energy along each of the three chief channels of experience and adjustment, an observation which supported Burt's hypothesis of a central emotional factor.

As regards emotional differences between the sexes, Prof. Wheeler thought that, apart from the earlier emotional maturity of the girl, the most striking difference between the sexes was to be found in a difference of emphasis on the active and passive groups of emotions: boys tended to be more aggressive; their misdemeanours were aggressive (pugnacity, acquisition), while those of girls were passive (lying, sex offences, and attempted suicides). This difference, it was suggested, might be partly responsible for the fact that highly intelligent girls and women found it more difficult to attain that eminence in professional, business, or cultural life justified by their intellectual ability: in boys there was a harmony between the egoistic and the sex emotions which resulted in activity, while in girls there was a perpetual liability to conflict between them, which tended to a passive resultant.

Concerning environmental influences, Dr. Wheeler expressed the opinion that emotional maturity was much more affected by training and circumstances, particularly by the home, than is any other phase of development. Many parents delayed the psychological weaning of their children, with serious consequences; they tended to keep their sons and daughters in emotional leading-strings and to allow them too little freedom of thought and action. The long preparation period necessary for entrance into the professions made difficult the harmonious development of some adolescents: biological maturity was attained before economic independence was reached. Hence the self-help movement, which largely arose through stress of economic circumstances and was beginning to be a feature of English (as of American and Scottish) university life, was psychologically sound: in their vacations, at any rate, students could get a taste of real work, responsibility, and economic independence. The difficulties were very much greater for the youth who was unemployed and sometimes found a mate before he found a vocation and had been trained by work to accept responsibilities and to consider the rights and needs of others.

The development of the young industrial worker of the continuation school was discussed by Miss M. Phillips in a paper entitled "The Adolescence of the Young Wage-earner". His social development, she said, was hampered by his limited environment. Repetitive work provided an even more restricted environment than did the school-room: it provided him with few opportunities of expressing his initiative. Most of these workers resigned themselves to the world as they saw it, and resorted to fantasy: some sought opportunities for development in personal relationships outside of the workshop: a few carried the unadventurous, spiritless attitude of the workshop into their personal relationships.

The fourth paper, by Miss A. H. M'Allister, on "Adolescent Modes of Thinking", gave an account of her own observations made with a method of studying adolescent thought, which seems very promising. She compared some 400 stories written by girls of 18 and women of 30 to be told to children, thinking that the writers would in the selection and treatment of their material reveal their own attitude of life; and her expectations were fully realised, for there were distinct differences between the stories of the younger women and those of the older, which can only be explained by their difference of outlook. Fairy stories were more popular with the adolescents and were treated somewhat differently: they depicted a beautiful, busy, but secret world, a place of feasting and dancing and all sorts of wild impossibilities; it was an expression of the adolescent's growing interest in the world, of her hopes, and realisation of her own independence: those of the older women were more sober by comparison. A curious feature of the adolescent stories, one which raises a problem for the psychoanalyst, was the comparative absence of 'fathers'; 'mothers' were plentiful, but 'father' was seldom introduced, and then usually to explain his absence.

Anthropology and Archæology in the "Encyclopædia Britannica".

AS a survey of natural and applied science the "Encyclopædia Britannica" is a record of stupendous achievement by the human intellect in probing Nature's secrets and in the reduction of material conditions to subservience to man's needs. When we turn to the sciences which deal specifically with man himself and his past, we enter upon a field of discovery in which the results, if less spectacualr, offer no lesser appeal to the imagination, and redound no less to the credit of those to whose genius and patient piecing together of the evidence they have been due.

In those branches of science which deal with the origin and development of man and the growth of civilisation, there is one name which dominates all others, one man whose influence and example, explicit or merely implied, permeate the whole and determine the attitude of the investigator towards his material. That man is Darwin. In his article on the evolution of man, Sir Arthur Keith, in paying a tribute to Sir Edward Tylor, the greatest of the early anthropologists, emphasises the effect of his acceptance of the evolutionary theory of human descent as a working hypothesis. He goes on to demonstrate that Darwin's views on the descent of man have withstood all attack, remaining the only sound guiding principle in interpreting the facts.

An earlier generation, apt to facile generalisation, found in the Darwinian theory a ready key to the solution of all its difficulties. Since then as the facts have accumulated they have been seen to conflict with the crudities of premature theorising, and this has led to a popular misconception that the Darwinian position has been discredited. Far from this being the case, as Sir Arthur Keith shows, for example, in his review of the evidence of embryology on the descent