These Dr. Kimmins would have treated at psychological clinics such as are already established in the United States, America, and other countries, in which very useful results have been obtained. He also suggested that if the teacher had a fairly sound knowledge of his own personal equation it would greatly increase his efficiency.

Dr. Hamilton Pearson claimed that the practical application of psycho-analysis had a place in school routine with two reservations, namely, that the operator should be not only a trained analyst, but should have special experience in child analysis, since the technique is different, and the work altogether more difficult and delicate than with adults; and secondly, that the limitations of the field of application within the radius of our present knowledge are thoroughly understood. In helping to define those limitations it may be taken as a rule that no child showing normal development, adapting adequately and progressively to its environment, should have even a nodding acquaintance with analysts. The rigidity of a systematised educational scheme must of necessity fail to win response from a minority of children, and this coupled with an adverse family environment accounts for the mal-development of the few. Among this group of potential neurotics, criminals, and chronic failures lies the sphere of usefulness of the child analyst.

Dr. Pearson declared that analysis itself is not curative, but by exposing the causal factors of the mal-development it is a means of pointing the way to constructive methods of treatment. He described three cases in which analytical methods had been used, to illustrate how they had been treated. The subsequent history of each child showed how by co-operation with the teacher a definite cure had followed. He believed that in co-operation lies the future of psycho-analysis in its practical value to school life, and that the knowledge gained in dealing with the abnormal would be of inestimable importance in dealing with, and understanding, the normal.

Dr. R. G. Gordon endorsed the value of co-operation of the workers in the fields of education and psychology, and also emphasised the necessity that such problems should be dealt with only by people whose knowledge is extensive, and embraces such collateral subjects as physiology and biology. He protested strongly against the unqualified dabbler with his pseudo-metaphysical speculations which are not even logical.

Dr. Gordon described two types of children likely to give trouble, namely, the psycho-pathic child, and the retarded child who is yet not sufficiently feeble-minded to be classed as mentally deficient. Every child inherits certain predispositions, and some dispositions unmodified or uncontrolled are evil and lead to vicious conduct, but if properly correlated, and modified by each other, and by education, they are all capable of leading to the highest virtues. It is the uncontrolled impulses which characterise the behaviour of the moral deficient, such as an overmastering impulse of acquisitiveness and a complete failure to get into touch with reality.

The retarded child is a slightly different problem. If with an intellectual inferiority he possesses a nature in which self-assertion is a large factor, he will not submit to inferiority—superiority at games may save his self-respect, but in their absence his will to assertion may show itself in acts of rudeness, disobedience, or stubbornness. To avoid punishment he becomes a liar; to prove his independence he plays truant; and possibly to further his object he may steal money, etc. Other undesirable traits may exhibit themselves in his efforts to gain ascendancy over other children. In many cases it is only necessary to remove such children from the unfair competition involved in school, and start them in training suited to their intellectual capabilities. Not only will this do away with all vicious tendencies, but it will increase their achievement to a remarkable degree, so that they grow up not incapable of taking a worthy place in the world. Neglect of proper treatment for such children means that they eventually enter the ranks of the neurotic or the criminal, or may turn to drink or drugs which lead to an abased and useless life. It is obvious that investigation and treatment of such cases should be definitely undertaken both for the sake of the individual and of the State.

The investigation should be carried out in three directions: (1) the physical examination—a purely medical concern; (2) the intelligence estimate through the use of such means as the Stamford revision of the Binet-Simon tests, etc.; and (3) the child's reaction to life—requiring mental exploration. In the last case Dr. Gordon said if clinics are established it must be borne in mind that only properly qualified workers should conduct the inquiry. The mind of the child is a delicately adjusted mechanism and cannot be too carefully handled; the greatest care must be taken that nothing shall be implanted which shall still further weaken control and upset the nice adjustment of impulses on which his or her sanity depends. The functions of such clinics will at first be purely advisory, and here the importance of sound advice is obvious.

In schools of all types are to be found children whose moral sense and will to work are so impaired that their time at school and probably at home is a succession of misdemeanours and acts of viciousness, a continued refusal to adapt themselves to social order; they are deaf to all appeals to reason. The investigation of the problems set by these children seems to be rightly in the hands of the psychologist, and the present inquiry is to learn to what extent mental exploration in the form of psycho-analysis can save the child by pointing out the cause and thus suggesting the remedy. Every speaker expressed the opinion that this inquiry should only be undertaken by a fully qualified specialist and should be limited to those children who were abnormal in their behaviour and in their response to the usual incentives to work.

Corrosion and Colloids.[1]

CORROSION is defined as the oxidation of a substance; it may be produced by chemical or electro-chemical means. The following facts are difficult to explain on a purely electro-chemical theory of corrosion: (*a*) Certain depolarisers do not increase corrosion, but actually inhibit it; (*b*) the conductivity of electrolytes is not directly connected with the amount of corrosion; (*c*) Lambert's pure iron is readily attacked by sodium chloride solution and dilute acids; and (*d*) the presence of ions of the corroding metal sometimes increases corrosion. The order of corrodibility of metals in distilled water, certain salt solutions, and non-electrolytes is different from their order in the electro-chemical list; this suggests that there are factors interfering with the electro-chemical action. Such factors are scale formation, and the nature and distribution of the products of corrosion.

The effects of strain and impurity in the metal are considered on the electro-chemical view to be of fundamental importance. Experiments on Lambert's

[1] Abstract of sixth report of the Corrosion Research Committee of the Institute of Metals, presented by Dr. G. D. Bengough and J. M. Stuart at the Swansea meeting of the Institute on September 20.

pure iron and lead showed that the effect of strain is a minor and ephemeral factor in corrosion in neutral solutions; a trace of impurity appears to assist local corrosion, but the amount of corrosion is not proportional to the amount of impurity. The effect of a trace of impurity is probably a trigger action. The main function of oxygen in corrosion is not that of a depolariser, but rather to oxidise the metal directly, and also in some cases the products of corrosion.

Two chief types of corrosion are distinguished: (*a*) The general type, usually characteristic of acid corrosion; and (*b*) the local type, usually characteristic of corrosion in water and salt solutions. The latter is generally characterised by the formation of an adherent scale on the metal, which may contain colloid. The significance of colloids in corrosion appears to be as follows: A metal immersed in water sends positively charged metal ions into the liquid, and becomes itself negatively charged. With commercial metals, the metal also becomes superficially oxidised if dissolved oxygen is present. The hydroxide produced can take up the ions given off by the metal, and thereby becomes a positively charged colloid. Some of this will diffuse away, permitting further reaction between oxygen and the metal surface. Oxidation stops until this hydroxide can pass into the colloidal state by acquiring positively charged metal ions. This, in general, does not take place till the colloid initially formed has diffused into the presence of electrolyte, when it is precipitated by the anion of the dissolved salt, the cation neutralising the charge on the metal corresponding to that on the colloid. Then the metal can send more ions into solution, and the uncharged hydroxide can acquire a charge. If the colloid produced can diffuse away, the process can continue and corrosion develop. If the colloid precipitates directly on the corroding surface it will, in general, adhere and stop corrosion. In the case of a corrosion pit, it is only when the colloid diffuses through an aperture in the gel-deposits at the mouth of the pit that it meets electrolyte and is then precipitated. Such precipitation merely thickens the external gel-deposits. The latter protect the metal surrounding the pit, and emphasise the local nature of the corrosion.

Vitamins.

THE Sections of Physiology and Agriculture of the British Association held a joint discussion on vitamins at Hull on Friday, September 8.

Prof. J. C. Drummond spoke of the great strides that have been made since the discovery of the vitamins by Hopkins in 1912. Both the existence and the indispensability of these substances are now generally accepted. The far-reaching importance of the qualitative composition of the diet of man and animals is being gradually appreciated, and the significance of those factors which exist in extremely minute amounts recognised. Three substances of the so-called vitamin class have been differentiated with certainty, and it is possible that more exist. They do not appear to be of one chemical type, and the only ground for grouping them together is that they occur, and are effective, in very small amounts. Parallel examples from the inorganic food constituents are known, such as the value of minute doses of iodides in the treatment and prevention of fœtal athyrosis in swine.

The green tissues of plants would seem to be the chief site of vitamin synthesis, although lower forms of plant life devoid of photocatalytic pigments can apparently produce the vitamin B. Plant tissues undoubtedly form the direct or indirect source of the vitamin supply of animals, but we are entirely ignorant as to the rôle of the vitamins in the plant itself.

Storage of the vitamin A may take place in the tissues, liver, and body fat of animals, and may serve as a reserve from which are drawn supplies to maintain the vitamin concentration of milk if the diet during the lactation period should be deficient.

In collaboration with Dr. Zilva a prolonged investigation of the origin of the large stores of vitamin A in cod-liver oils has recently been made. It has been ascertained that the marine diatoms synthesise the vitamin, and that it is transferred to the tissues of minute animals (plankton) which thrive on the unicellular plants. These in turn form the food supply of larger species, particularly small fish, which in their turn are devoured by the larger fish, such as the cod. Through all these stages there is apparently a transference of the vitamin, ending finally in the storage in the liver of the cod. The modern methods of manufacture of cod-liver oil do not appreciably lower the vitamin value, but there are wide variations in the value of different samples which are probably connected with the seasonal changes in the feeding habits or physiological condition of the fish. Considerable work has been done on the chemical nature of the vitamin A, but an isolation has not yet been made. It is very stable, except to oxidative changes, and passes into the unsaponifiable fraction of the oil. Cholesterol, pigments, and other fractions of this fraction may be removed without loss of potency.

Capt. J. Golding gave a number of illustrations of the value of the application of vitamin theories in practical pig-feeding. Frequently the usual type of pig diet is deficient in vitamins, particularly vitamin A, and the beneficial influence of cod-liver oil or of feeding on pasture or lucerne in such cases is remarkable. In the compounding of rations care should be taken to ensure an adequate supply of food-stuffs rich in vitamins, otherwise there is danger of subnormal growth, impaired resistance to infections, and disturbances of the power to produce and rear normal young. The majority of the cereal products are deficient in vitamin A, and the amount in the diet is not raised much by the use of separated milk. Such diets can be supplemented by small additions of cod-liver oil, 1-2 oz. daily for full-grown pigs, or by access to pasture. Cod-liver oil is also valuable in maintaining the vitamin value of the milk yielded by cows on winter rations in stall, which otherwise tends to fall. The administration of cod-liver oil, if of good quality, does not produce flavour or taint in pigs or milk and butter.

Dr. Atherton Seidell (New York) described his attempts at the separation of the vitamin B from yeast by chemical methods. By adsorption of the vitamin from yeast extracts on to fuller's earth, and extraction of the activated solid with alkalies under suitable conditions, considerable concentration of the active substance could be effected. The resulting extract when fractionated by precipitation with silver salts gave active fractions, but these have not yet yielded a pure substance.

Prof. W. D. Halliburton referred to the need for caution that enthusiasm for a new word such as vitamin did not overwhelm the importance of other dietary units. There must not be a loss of perspective in viewing the function of these newly