EYES AND EARS.

The eyes may become affected at an early stage by a choroido-retinitis, which may leave permanent changes easily recognized by ophthalmoscopic examination; and iritis, though rare, may occur during the eruptive stage. Interstitial keratitis is most frequent between the ages of 6 and 16, but may occur much later, and rarely earlier. It is highly characteristic of the inherited disease.

Like the eyes, the ears are attacked by different affections in the early and late stages. During the eruptive stage, otitis media may commence as an extension from the inflammation of the naso-pharynx, whilst during the second dentition a progressive deafness of labyrinthine origin may cause complete loss of hearing.

INHERITED SYPHILIS ATTACKING THE VISCERA.

Much work has been done in demonstrating the disease in the various viscera, not one of which appears to be exempt, and there is probably a large field still open here for further investigation. Enlarged spleen and liver associated with rickets may be proved almost invariably to be of syphilitic origin.

The disease attacks the various organs in two forms: as a small cell infiltration usually following the course of the vessels, which in its development and decline may lead to fibrosis and consequent atrophy; and as a gummatous tumour, which is less common.

When the inherited disease attacks both testicles or both ovaries at an early age, and brings about their fibrosis and atrophy, a condition known as "infantilisim" is produced at a period when the sexual characteristics should be pronounced.

THE NERVOUS SYSTEM.

Much difference of opinion exists as to the frequency of nervous disease dependent on inherited syphilis. Whilst some are inclined to attribute every conceivable weakness, paralysis, or mental defect to this disease, others regard the nervous lesions dependent on it as infrequent. A certain proportion of epileptics, deaf-mutes, and idiots, but not a large percentage, show signs of inherited syphilis. On the other hand, syphilitic endarteritis of cerebral vessels, gumma's on nerves, and sclerosis of brain and spinal cord have been observed by competent observers. One of the most interesting observations of late years is that some cases of hydrocephalus are dependent on inherited syphilis, and are curable by mercury.

THE NEED OF CRITICISM IN DIAGNOSIS.

In conclusion, I wish to insist on the importance of weighing carefully all the evidence before determining that a particular affection is due to inherited syphilis. Every deformity, from dislocated hip to cleft palate, all defects such as hernia, infantile paralysis of various kinds, and even naevi, have been described by various writers as dependent on inherited syphilis, and as if better to cover the anomalies the term "para-syphilis" has been invented to add to the confusion.

I need scarcely waste time in combating such crude generalizations as that "all rickets takes origin in syphilis," when any puppy taken from a litter and deprived of proper food and exercise will certainly develop this disease.

Equally crude statements have been made as to other diseases. We do not deny that persons whose constitutions have been weakened by disease are liable to produce degenerates in succeeding generations; but in future the most certain test of the disease being syphilis will be the presence of the *Spirochaeta pallida* in the part affected. This organism has an extraordinary persistency, producing local symptoms after lengthened periods, but happily we have in mercury and the iodides drugs which control its development and bring about its destruction.

The Temperance Summer School, organized by the Department of Scientific Instruction and Information (United Kingdom Band of Hope Union), will be held at Ardenconnel on the Gareloch, near Helensburgh, Scotland, from June 20th to July 3rd. The objects of the School are, first, to give some up-to-date and definite teaching to meet the educational needs of the day; secondly, to foster a spirit of comradeship and mutual help amongst temperance friends and workers; and, thirdly, to secure an enjoyable holiday trip. Full particulars as to terms, etc., will be sent on application to the Director, Walter N. Edwards, 60, Old Bailey, London, E.C.

THE MEDICAL INSPECTOR OF SCHOOLS
AS A PSYCHIATRIST.

By T. S. CLOUSTON, M.D., LL.D.,

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THE Medical Inspector of Schools has come on us so suddenly at the last that it is very doubtful whether his vast potentiality and the significance of his work are at all realised by the mass of our profession. It seems to me that next to the medical officer of health he may turn out to be the greatest health boon which Parliament has bestowed on the people of this country. One sees that many questions will have to be solved as to the right sort of man for the place, as to how he ought to be educated, what he ought to know, to what things he ought to direct special attention, and in what special relationship he is to stand to the School Board, the Education Department, and the profession of medicine. It will be of enormous importance that a general public interest should be taken in him and his work. That of itself would be an education to the general public. I hope his reports will always be published in the newspapers and that they will be intelligently discussed there. Of the hundreds of medical men who will be appointed inspectors, most, we trust, will be wise men, but it is certain that some will be foolish and many will be faddists. The principle laid down by the Board of Education under the head of "Character and Degree of Medical Inspection" seems sound enough. Few medical men will object to the following paragraph:

From what has been said it will be clear that the fundamental principles of Section 13 of the new Act is the medical examination and supervision, not only of children known or suspected to be weakly or ailing, but of all children in the elementary schools, with a view to adapting and modifying the system of education to the needs and capacities of the children, securing the early detection of unsuspected defects, checking incipient maladies at their onset, and furnishing the facts which will guide the education authorities in relation to physical and mental development during school life. . . . The training of the mental faculties must not be divorced from physical culture and personal hygiene. It is these primary requirements which must first receive attention.

To some of us who have been members of the medical profession for many years, and who have witnessed the governmental ignorance and public indifference of a quarter of a century ago in regard to medical views of education, such a paragraph is both surprising and most welcome. It should be the source of the profoundest thankfulness to all doctors and to all those of the public who believe in the great mission of modern medicine. In an article in the *Times* of November 25th, 1907, the following paragraph, which may be taken as representing the views of the intelligent layman, occurs:

The general principle underlying the memorandum is that the actual work of school inspection must be carried out in intimate conjunction with the existing public health authorities and under the thorough supervision in each locality of the medical officer of health, but subject to the control of the medical department of the Board of Education, instead of to that of the corresponding department of the Local Government Board. The result aimed at is clearly the harmonious co-operation of educational with sanitary authorities, with security against injurious neglect of the essential requirements of either. In other words, school hygiene is, to be treated as an integral portion of the sanitary administration of the country, but still as a branch of that administration for which the aid of special knowledge is required.

These references to "mental development," to the "mental faculties," and to the requirement of "special knowledge" in the school inspector brings me to the object of this paper. General cleanliness, body-nutrition, the eyes, the ears, the throat, the chest, and the teeth will all have to engage the attention of the school inspector. But the dominating organ of all—the brain—may stand some chance of being neglected, though it is the organ which is to be chiefly educated, and which should be most of all in evidence.

Referring to public health as it has hitherto been studied, we may look in vain in any of its textbooks for any reference to the mental health of the community as requiring attention or preventive measures. It may well be that if the attention of the future medical inspector of schools is not strongly directed to the brain of the child, he may be in danger of neglecting it in his investigations

into the condition of school children, as mental hygiene has been neglected in our public health practice. I would make an earnest appeal to our medical officers of health and to the medical inspectors of schools who are to be, that, although the mental functions of the human brain in health and disease are the most subtle of all the studies that he may undertake, not to neglect them. I do not claim for a moment that the data to be used by the school inspector or the medical officer of health in regard to mental facts are anything like as exact and easily applicable as the data of chemistry and bacteriology, but I do maintain that there are relevant facts and data in existence which could be used for the public benefit. I would go the length of saying that mental medicine and mental hygiene are of such infinite importance to the well-being of our community, young and old, that they should be made an essential part of the department of public health and of school inspection. Does it seem unreasonable that the medical officer of health should study the mental effects of environment on our young population? Should he not take into his consideration the social customs of the community as affecting their mental condition? When he has to do with the tramp, for instance, the clothes, the dirt, and the carrying of infection are now chiefly investigated, but those are secondary as compared with his mental condition, which is the root of the real danger to society. When the school inspector comes to know his work, after he has examined the things easy of access, such as the eyes and the chest, would it be too much to expect that he should psychologically investigate the brain action of the school children? I admit that he would have to make troublesome and often difficult excursions into the heredity, the habits, and the home life of many of the children, and especially into those of them with small or ill-shaped heads, deformed ears, too closely-set eyes, unsymmetrical features, and high palates—in short, the stigmata of nervous and mental degeneration. A study of Dr. Warner's investigations into those signs of degeneration in London school children would form a sound basis of such studies. I admit that to examine, let us say, the power of attention and the faculty of imitation in a number of children would take time, and would involve special knowledge, but I cannot imagine anything more illuminating to the inspector or more useful to the school teacher than such an examination thoroughly made.

It is difficult to lay down definite rules universally applicable for promoting mental hygiene in the education of children, and for detecting the indications which should point to its special necessity in certain of them. Such hygiene cannot be dissociated from the healthy performance of the functions of the whole body. The solidarity of body and mind must be the primary axiom for any one who undertakes such work. The existence of an obviously bad heredity, especially of a bad nervous and mental heredity, must first be taken into account. The environment of the child at home in a large sense and its effects must next be well considered. A child out of a poor home, with parents of rough manners and vicious habits, tends against mental hygiene, even if there is the best original constitution. Deficiency of food and warmth go against brain and mental development at that age. The want of moral and religious training are strong factors against that mental inhibition which is at the basis of all such hygiene. Idiosyncrasies of mental constitution, deficient power of attention, lethargy, want of the imitative and play faculties, too great impulsiveness of action by the brain, morbid fearfulness, morbid unthinking impulsiveness, exaggerated reactive tendencies, absence of the moral sense, are all matters of the very highest importance when considering the mental hygiene of the child at school. A grasp of at least the principles of modern psychology and sociology should be required of every medical school inspector.

The bodily stigmata of degeneration, to which I have alluded, may be present without much actual mental enfeeblement or mental perversity in some cases. They often indicate mental potentialities and risks rather than mental actualities. The instinctive power of reverence, and the intense desire to please are faculties in children the lack of which indicates some morbidness; and means that they will be bad to teach. A child that is a cynic or a critic is in an unhealthy condition. I was lately much

impressed with the intense enthusiasm of the mass of 150 boys and 150 girls of the lowest class in Edinburgh excited by an enthusiast in music with a special method of teaching it, who seemed to hold most of them in the hollow of his hand. They did not question his methods nor doubt his theories, though he told them that they would be fine men and women, good patriots, and successful in all their games if they followed his musical methods. The *non sequitur* did not occur to any of them. When I mention that among the 150 boys there were only two who wore linen collars, the social class from which they came will be understood. Among the 300 there were perhaps from 30 to 50 who were not carried away by this enthusiast, and those I put down as the helpless, the "ne'er do wells," and the criminals of the future. A normal child's brain should react quickly to almost every influence in heaven and earth, good or bad, in some degree. At that age the impressions that are every day recorded and put by for future use may be counted by the hundred. Those impressions should be rightly made at the time, and most of them should be so arranged that they form right associations with each other. They are not like so many peas in a bag, unconnected and independent. They should be like the bricks in a scientifically constructed house, every one having a relation to every other and its ultimate object. The mental effects of outside influences and impressions on the child's brain—and by outside I mean those from the rest of the body as well as from the environment—must not only be taken account of, but the constant effect of the brain reaction from those impressions on the nutrition of the body and on the functions of every individual organ should ever be kept in mind.

The modern science of child study and our knowledge of the psychology of the child as it is related to the psychology of the fully-developed man and woman are as yet almost in their infancy, but the students of this branch of science are now numerous and keen, and they are building up a mass of facts. Their conclusions, so far as they go, cannot be disregarded by any competent school inspector. Every year they widen in their scope and become more definite.

One of the most difficult problems of modern preventive medicine—the eradication and mitigation of bad hereditary qualities through the right application of antagonistic influences and environments—should be greatly helped by the new medical school inspector. Such evil hereditary influences mostly show themselves in the growth and developmental periods, and it stands to reason that it is during those periods also that they can be antagonized, if this be possible. It must never be forgotten that heredity, even of the worst kind, is at some period of the life of the child chiefly a potentiality. Two influences largely tend to bring it into actuality: the stress of the natural processes of development from a lower into a higher condition of brain and mental action, and the constant efforts of the organism to adapt itself to its environments, particularly those environments which are antagonistic to health. The highest psychological faculty is that of inhibition or control. The combined studies and efforts of the parents, the teacher, the school inspector, and the psychologist will be needed to teach us in the first place precisely the laws through which inhibition is developed in the young brain, and the principles which should guide us in educating that great faculty on right lines. The man who could teach us the way to secure only a very little improvement in the self-control of mankind would bring us nearer to a moral and social Utopia. It is quite certain that the faculty of control has an absolute relationship to its brain basis. Any attempt unduly to force it before that basis exists usually has the opposite effect to that which is aimed at. On the other hand, the absence of attempt to educate or develop control tends towards an ultimately atrophied conscience, a poor moral sense, and an unsuccessful conduct of life.

The medical school inspector of the future will need the help of most of the specialities of medicine. He will especially require psychiatric help, for the reasons I have stated. Most of us psychiatrists are already officials receiving public money and bound to do what we can for the public who pays us. We are ready to give him the help we can. We publish annually reports which I fear do not effect as much for the mental hygiene of the community as they might. It would help us to be more systematic and to be

less desultory in our observations if we knew that we were a part of a great organized system for the education and for the mental and bodily health of the community. The master mind will come in due time which will be able to generalize on our isolated facts and observations, if the facts are true and the records of the observations are intelligible and honest. We could tell the medical inspector of schools a great deal about the peculiarities and the risks of the children of the insane, the children of criminals, and the children of the degenerate and feeble in mind. We could tell him also a good deal about the children of the drunkard. We need ourselves to know much about the real origin and the preliminary symptoms of the mental diseases we have to treat, which we only see when fully developed. I believe the school inspector, if he is the right sort of man, will be able to help us in regard to this momentous point. To prevent and even to diminish mental disease would be an enormous gain to the community. To do this I believe we need to begin almost from the birth of the child who is predisposed to it. If the medical school inspector can help society in this way he will become the most effective of practical psychiatrists.

THE CRITICAL SOLUTION POINT OF URINE: A NEW PHYSICO-CHEMICAL METHOD OF EXAMINATION.

By W. R. GELSTON ATKINS.

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In order to determine the efficiency of a kidney as an excretory organ, the most exact method is the determination of the total solid content of the urine as shown by the depression of its freezing-point below that of pure water. This lowering of freezing-point was first fully investigated by Raoult, who showed that for moderate concentrations the depression was strictly proportional to the molecular concentration—namely, the number of gram molecules per litre—for non-electrolytes.

Its application to the examination of urine and blood has proved very useful and reliable, but the time required for carrying it out constitutes a serious drawback when only one or two specimens are to be examined. The following method is brought forward in the hope that it may prove to be of service in cases where great accuracy is not essential and saving of time an advantage. The method is capable of giving very accurate results, but this requires a tedious operation, involving the plotting of a curve from temperatures taken in a bath cooling very slowly.

OUTLINE OF CRITICAL SOLUTION POINT THEORY.

Consider two liquids not completely miscible at room temperatures, such as phenol (m.p. $40^{\circ}\text{C}.$) and water. If small quantities of these two substances are shaken together a white emulsion is obtained; this on standing separates into two layers, a lower one, consisting of phenol with some dissolved water, and an upper one of water with some phenol dissolved in it. If the temperature be now raised, the quantity of each dissolved in the other increases till a temperature is reached at which the two dissolve completely in one another, or, in other words, become completely miscible; on cooling even a tenth of a degree a separation again occurs, a white foggy emulsion is formed, and on standing the two layers separate out as before. The temperature at which the two layers become homogeneous depends upon the proportions of water and phenol initially present, and rises in the case of water as the amount of phenol is increased until a mixture is reached which remains in the two separate phases at a higher temperature than any other mixture of the two components.

The composition of this mixture is known as the "critical concentration," and the temperature at which the liquid becomes homogeneous is called the "critical solution temperature." The "critical solution temperature" is the temperature at which the two phases have the same composition and same properties. Accordingly it is the highest temperature at which any particular mixture of the two substances can exist as two separate phases. At the critical concentration and critical solution temperature the volumes of the two phases, water in phenol and phenol in water, are seen to be equal in the test tube.

At the critical temperature the two phases have the same surface tension, and are therefore completely miscible; at a temperature very slightly below the critical temperature the surface tensions of the two phases are almost equal, consequently the meniscus between them is flat. As the homogeneous mixture cools, at a temperature very little above the critical temperature a beautiful opalescence, blue by reflection, brown by transmission, is seen.

If now a series of mixtures of water and phenol be taken and the temperatures at which the two phases, of which each mixture consists, become one homogeneous phase, be determined, and the values thus obtained be plotted on squared paper as ordinates, while the corresponding percentage compositions of the mixtures be taken as abscissae, a curve is obtained, the highest point of which gives the critical solution point (Fig. 1). This curve is somewhat flat at the top, which means that the composition of the mixture may be slightly altered to one side or the other of the critical concentration without altering the temperature of miscibility much—about $1^{\circ}\text{C}.$ The blue opalescence is still obtained, but it is not as beautiful as at the critical point itself.

Fig. 1.—C, Critical solution point.

The addition of a very small quantity of a third substance to any mixture of water and phenol raises the temperature at which the two phases become homogeneous, provided the added substance be freely soluble in water and almost or quite insoluble in phenol, or vice versa. If the added substance be freely soluble in both, then the temperature at which a homogeneous mixture is obtained is lowered. Thus, by adding a small quantity of sodium oleate to a mixture of phenol and water, it is possible to obtain a very strong solution of phenol, homogeneous at room temperatures. Lysol, the disinfectant, is prepared in this way.

In the case of a third substance much more soluble in water than in phenol, if curves constructed as described be plotted when one of the pure liquids is replaced by a dilute solution of the third substance in that liquid, the general outline of the original curve is followed, the ordinates of temperature being everywhere longer and markedly so in the crest region. In each of these curves there is a critical point, but it is no longer the highest temperature, as in the case of pure water and phenol; accordingly it must be recognized by the beautiful opalescence and equality of volume of the layers (Fig. 2).

The rise of critical temperature for dilute solutions, say 1 per cent., is roughly proportional to the number of gram molecules of the substance added with regard to its own solvent. Thus in the curves the concentration of the third compound is constant, proportionally to the amount of its own solvent, but is necessarily quite variable to the total amount of the two liquids taken together.

This rise in the critical solution temperature is very great, an amount of solid sufficient to depress the freezing point of water $0.5^{\circ}\text{C}.$ will raise the critical temperature of a mixture of water and phenol about $4^{\circ}\text{C}.$ This rise, therefore, which can be readily determined to one-tenth of a degree, gives the same accuracy as the freezing point.