

The second attack was more persistent, but a change of air hastened his recovery. There remains to this day still some dropping of the left big toe. This patient's hands looked hornified (keratosis) and his feet swollen, red, and tender. He suffered from obstinate constipation, and this constipation was a puzzling feature in many other cases, almost negating idea of As. It may be that the sugar in the beer combines with the As to form some definite compound, as it is known to do with calcium and lead, which compound may have a secondary constipating effect. Or the constipation may be a feature of the neuritis, due to partial paresis of the intestinal nerves, as is known to occur in the peripheral neuritis due to excessive use of sulphonal, in which condition obstinate constipation is also a prominent symptom.

Type 3.—M. R. is seized with violent pain in the left hypochondrium of a persistent character, associated with continued vomiting. The tongue is coated with white fur. The bowels at first purged, but subsequently constipated. There is great cardiac weakness and tendency to syncope. The skin has been noticed to have grown darker in colour of late. After a similar attack in the summer for which no cause could be assigned, the patient had an irritable skin eruption which left brown stains. This patient was very ill, and only improved when the catamenia was established. A relapse was brought on during the first attack after taking a glass of beer. There was no uterine flexion, nor lameness of any kind. I regard this case as an instance of the cumulative effect of a drug taking on violent action at the menstrual period, when drugs are ill borne. This patient drank three glasses of beer daily. They kept a cask of ale in the house. I had a specimen examined, and the analyst reported that there was a very appreciable quantity of As present, and this was confirmed by Messrs. Rimmington. This patient's husband was an interesting case whom Dr. Churton kindly saw with me.

Twelve years ago his testes were removed for tubercle. He had been able to do odd jobs ever since—gardening and the like. Although not robust, was not laid up until this summer, when he was employed as greenkeeper to one of the bowling greens. He became very weak in the legs. In a sunless summer he was noticeably tanned; his feet became blistered and desquamated, and his eyes red and weak. He could not wear his boots because his feet were so red and swollen and tender. At this time he was drinking five or six glasses of beer at the least most days.

He did not come under my care or give up work until the beginning of December, when he had synovitis of the left knee-joint; the effusion was purely serous. Patient was then bronzed all over, the pigment being most pronounced over the knees, ankles, about the genitals, pubes, and axillæ. There was no staining of the buccal mucous membranes, knee-jerks were absent, and there was great muscular tenderness.

There was some purulent expectoration, but no bacillus tuberculosis could ever be found in expectoration nor in his urine. Arsenic was looked for in his urine, but not found. Temperature at the last ranged about 100°. No physical signs of tubercle in chest. There was no mental hebetude, and great tendency to syncope and some retching. The patient died after a month's illness. Unfortunately no post-mortem could be obtained, and the coroner did not consider an inquest necessary. I certified, query tuberculosis of suprarenal capsules and arsenical poisoning

from beer-drinking. I much regretted not being able to verify the diagnosis.

There are so many inquests to be held at Manchester and elsewhere in connection with arsenical poisoning, from which, I believe, we shall glean very valuable information which may modify our views, not only on alcoholic neuritis, but on bronzing of the skin. From evidence that we have received, sulphuric acid has been made from arsenical pyrites for many years past, and it is probable that arsenical contamination has to a less extent been present in some brewer's sugar from time to time, whenever the exigencies of the manufacturer prompted, or the custom of the trade permitted, arsenicated sulphuric acid to be supplied. The malt and hops have also been shown not to be above suspicion.

It is a curious circumstance of some significance that the London School of Neurologists have contended that alcoholic neuritis was the manifestation of spirit-drinking, and was not often seen in beer-drinkers, whilst the Manchester School held that peripheral neuritis was commonly and mostly seen in beer-drinkers. Some of the cases of neuritis were probably examples of the compound toxic effect of alcohol and As and influenza in varying proportions. We are getting to recognize more clearly that the human body may have more than one specific germ or toxin at work or at rest, exercising their lethal effect at one and the same time. Similarly, to what we see takes place in our gardens, in the soil of which many varieties of both flowers and weeds can grow side by side or follow in successive crops. Again, one toxin may augment the effect of another toxin, just as drugs with similar physiological actions augment each the others action.

And just as when a patient is under the influence of lead a very slight indiscretion in diet is sufficient to produce an attack of gout, so when there is As in the beer small doses of the augmented fluid will produce peripheral neuritis, which singly neither the alcohol nor the As would be sufficient to produce. We must from this experience be more ready to recognize that uncomplicated, simple, pure, and classical varieties of disease are the exception rather than the rule, and are mostly met with in our text-books.

Not many women came under medical observation for various reasons—one was that they did not want to be known to be beer-drinkers, another reason was that they did not belong to sick clubs and would therefore have to pay for medical advice.

"Arsenic" is frequently given as a blood tonic, but this epidemic must shake our faith in its virtues, because, although so widely drunk, there have been no indications of improved blood value in any of the beer-drinkers, such as increased robustness or improvement in wind, in limb, which both they and their neighbours would have noticed, had the arsenicated beer had such a tonic effect upon them. In conclusion, I would remark that the public owe a deep debt of gratitude to Dr. Reynolds, which ought to be officially recognised.

THE PHYSIOLOGY OF THE DUCTLESS GLANDS.

So much has been heard of late, and we may add so much has been hoped, regarding the efficacy of organotherapy, that it is as well to remember how little we know regarding the various "extracts" of the different organs which are now so often employed in the treatment

of disease. In an article on "The Physiology of the Ductless Glands," Dr. John Rose Bradford¹ describes the activities of glands as taking three forms: excretion, external secretion, and internal secretion. The fundamental distinction between an excretion and a secretion would seem, he says, to rest in the fact that in the former the products of the excretion are not elaborated by the activity of the gland protoplasm but are simply removed by it from the blood stream. Thus we may describe glands as having one or more than one of these three functions. Some glands confine their activity to the production of an external secretion, as for example the salivary glands; others, such as the thyroid and the supra-renal, produce simply internal secretions so far as is known at present; others possess not only an external but an internal secretion. The most conspicuous instance of this is the pancreas. The same is also true of the liver, since the biliary function is very largely a secretion, and the glycogenic function of the liver is essentially of the nature of an internal secretion. The kidney is a most marked example of a gland having an excretory function.

Many glands whose normal activity is secretory, may under abnormal circumstances also excrete. Thus the salivary glands will excrete iodide of potassium when this is present in the blood stream, and the liver will excrete a large number of drugs and toxic substances which are being absorbed from the alimentary canal.

In many glands the phenomena of secretion are under the control of the nervous system, as, for example, in the case of salivary and sweat glands. In the process of external secretion there is a gradual elaboration or storing up in the secreting cell of an antecedent of the specific constituent of the secretion. This is a slow process which is carried on especially during the periods of rest. But at the moment of secretion there is a sudden conversion of this antecedent into the actual constituent, and at the same time a considerable elimination of water, and these latter processes are especially under the control of the nervous system.

This nervous influence is accompanied by changes in the blood-vessels, but in the case of external secretion there is good evidence that these two processes, the vascular and the nervous, although occurring together, are essentially independent. In the case of the internal secretions the part played by the nervous system is more obscure, but in certain glands, as, for instance, the liver and even the thyroid, there is evidence that excitation or destruction of nerves and nerve centres is capable of producing profound effects on the activity of the internal secretion. When we come to consider what are these internal secretions, we find Dr. Bradford saying that they seem to be substances required for the physiological activity of certain specific tissues of the body; thus the glycogen and sugar elaborated by the liver are especially required for the metabolism of muscle, the thyroïdin elaborated by the thyroid may be especially necessary for the maintenance of the normal activities of the central nervous system, and the material formed by the supra-renal would seem to be required, or at any rate to be very necessary, for the maintenance of the activity of the involuntary muscular tissue of the blood-vessels.

Thus we see a strict analogy between internal and external secretion, the substance produced being in each case manufactured by the gland cells, and required for the performance of function by other organs; in the one

case, however, being transported to these distant parts by the blood-stream, in the other being carried there by special ducts provided for the purpose.

There is this contrast, however, to be drawn between them, namely, that an external secretion contains in most cases a member of the group of ferments, and only in a few instances contains a definite complex substance, whereas in the case of internal secretions it is more usual for the substance to be of the latter nature, and it is only in exceptional cases that it is of the nature of a ferment. In regard to the rôle played by these substances which form the essential parts of external secretions, evidence chiefly centres round the thyroid gland, in regard to which there is much, both clinical and experimental, to show that diseased condition may be produced either by the arrest of the secretion or by its formation in excessive amount, or, perhaps, owing to its containing abnormal constituents. Cretinism, myxœdema, and exophthalmia goitre afford illustrations of these points.

When we turn from the thyroid to other glands the rôle played by these in the production of disease is much more obscure. It has been supposed that some of the phenomena of Addison's disease can be accounted for by the suppression of the internal secretion of these glands, and no doubt the circulatory weakness and general muscular debility seen in this malady may be thus accounted for, and there are other points which seem to confirm this hypothesis. On the other hand no physiologist has been able to produce any condition closely analogous to Addison's disease by lesions of the supra-renal, nor is the use of supra-renal extract of much service in the treatment of the malady, and it seems impossible at the present time to give a complete explanation of the pathology of Addison's disease based on the known functions of the supra-renal. In regard to other glands both the physiology and the pathology of internal secretions become less definite, and there is room for great difference of opinion in the interpretation of the phenomena, as is seen every day in the discussions concerning the processes engaged in the production of glycosuria.

So far as morbid anatomy is concerned there would seem a close relation between the pituitary body and certain diseases of the skeletal structures, but at the present moment there is no physiological evidence to show in what way diseases of the pituitary body give rise to these disorders of nutrition, and it is to be noted that the pituitary body has been completely removed without producing any such changes.

As to the kidney, it is clear from Dr. Rose Bradford's own experiments that the renal tissues must have some other functions than those of mere excretion, but they do not afford conclusive evidence of an internal secretion, and treatment with renal extracts has not hitherto been followed by any great success.

Again, there is much to support the presumption of an internal secretion by the testes and ovaries in the results which are known to follow removal of these glands; but then, while it is possible that such efforts as these may be dependent on internal secretions, it is also possible that they may be produced in some remote way through the intermediation of the nervous system. A great deal has been done lately, and is now being done, in the treatment of disease by the administration of organic products, but when we find people arguing by analogy from thyroid to supra-renals and other glands, and then

to extracts of organs which are not glands in the ordinary meaning of the term, it is well to turn to Dr. Bradford's calm review of the whole subject from the stand-point of the physiologist, from which we see that however much

we may hope, and however astutely we may guess, our *knowledge* on the subject of organo-therapy does not at the present go very deep.

¹ Practitioner, April.

PROGRESS IN STATE MEDICINE.

Tuberculosis.—Swithinbank,¹ discussing dust in relation to tuberculosis, states that by far the greater proportion of infection is due to small particles of the desiccated phlegm of consumptives carried to and fro with the dust by air currents. This danger is ever present and real until consumptives realise that they are a standing danger to the community by their promiscuous spitting in streets and other public places. The bodies examined at the Morgue, death being from violence or causes entirely apart from tuberculosis, show that half of those who have passed thirty years of age had cicatrised tubercles in the lungs. Marked decrease in the habit of spitting will be effected when the danger is instilled into the public mind. Common sense and education of the young will do the rest. Cornet, of Berlin, confined at different levels forty-eight guinea-pigs in a room the carpet of which had been smeared with the phlegm of a patient suffering from advanced tuberculosis of the lungs. The phlegm was allowed to dry and the carpet then vigorously brushed. Of the forty-eight guinea-pigs introduced forty-six became infected with tuberculosis. In France notices against spitting are being affixed in public places, railway stations, streets, and in places of entertainment. The railway companies are seeking powers, through their by-laws, to eject from their premises people guilty of the habit. Wet swabbing and the use of wet cloths is to supersede the brush on platforms and in carriages. Spittoons in prominent places are already provided at some of the stations. Cushions, carpets, and hangings are to be properly beaten in enclosed spaces. Blankets and rugs used by passengers are to be disinfected after each journey.

Girdansky² refers to the fact that the bacilli do not enter the lungs of healthy persons directly from the lungs of the sick, the breath of tuberculous patients not being infective. The danger is from the dried bacilli floating about attached to minute particles of dust. He attributes the production of this dust not so much to every-day traffic aided by the action of the wind, as to the over-energetic use of the housewife's broom. The larger dirt is removed at the expense of the air being filled with infected dust. He maintains that sweeping breaks up all dried sputum and other excretions, thus setting free the micro-organisms in them, transmuting them from a low innocuous latent state to a more virulent condition. These bacilli are kept floating in the air from the repeated use of the broom. Therefore the broom must be abolished; the carpets being breeding grounds for vegetable parasites should be replaced by a healthier substitute. Cleansing of floors and streets should be accomplished with mops, showers and sprinkling wagons. All floors and floor coverings of the home and street ought to be so constructed as to allow of this method of cleansing.

Rube³ draws attention to the sanatoria provided for the working classes in Germany. Statistics of the Imperial Board of Health showed that 343 people died in 1893, between the ages of 15 and 60, out of every 1,000, of tuberculosis; and the statistics of the Imperial Board of Insurance which dealt with 158,000 cases from 1890 to 1895 show that out of every 1,000 sick cases recorded

between the ages of 20 to 30, tuberculosis was responsible for 542. By law every workman and workwoman from the age of 16, who earns not more than £100 in the year, is compelled to insure with the State. About 35 millions out of a population of 53 millions derive support from this law. The State insurance institutes, of which there are 31, are allowed to build sanatoria for the treatment of the insured. Forty-five sanatoria now exist, and it will soon be possible to treat yearly 20,000 patients in Germany, each for about three months. Most of the patients return home cured; the remainder having been trained in hygienic methods are not so likely to be injurious to others. Figures show that 65·7 per cent. of 2,259 patients who left the different sanatoria were able to take up their former trade, 6·5 per cent. had to find more suitable occupation, 12·8 per cent. could partly follow their former vocation, whilst only 15 per cent. were sent home unfit for work. Early diagnosis is essential for successful results. The State Insurance Institute, Hanover, has treated up to the present 5,000 of their insured patients, who are carefully watched as to their state of health and earning capacity for five years after leaving the sanatoria. The figures for 1892-3 prove in satisfactory manner that the expenses incurred in these years throughout the treatment of the insured have been amply covered by the saving in pensions.

At a meeting⁴ held in support of providing a sanatorium for the counties of Gloucester, Somerset and Wilts, for the open-air treatment of poor, but not rate-aided consumptives, Crichton-Browne stated his belief that the sanatorium treatment had come to stay. It would accomplish good results if kept well under medical control and free from commercial entanglements. It seemed clear that if cases in the first stage of consumption were thoroughly treated in good time, 50 per cent. of radical cures would be effected, and a marked improvement in another 25 per cent. The scheme for carrying on the sanatorium when built, was that each of the three counties should provide from £300 to £400 per annum; the rest they hoped to get by persuading the poor to form themselves into groups of 300 in the different towns and districts, each member to pay a penny a week, in return for which each group would have a claim upon the sanatorium to send three or four patients to be treated.

Parker⁵ thinks that little headway will be made in this country against tuberculosis until there is uniform action. The best preventive measures are notification of phthisis and free disinfection of infected dwellings vacated by consumptives. These would facilitate adequate sanatoria being provided for the curable cases, and isolation homes for the incurable. Attention would be more directly called to overcrowded, badly-ventilated dwellings, and improved subsoil drainage would be provided for the damp districts. All rooms occupied by consumptives should be frequently cleansed. Patients not under the charge of a medical man should be dealt with by the medical officer of health. The objection to notification as being a breach of medical confidence can be overcome by securing the