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VOL. VI.

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Review of the Physiology of the
Thyroid Gland

By W. E. GIBSON, '37

OUR ideas are as yet far from clear as to the exact relation of the endocrine glands to each other. However, it is becoming more evident that the individuality of man with his specific physical, mental, nervous and behaviour patterns, which all combine to make up his individual self and personality, is somehow linked up with the structure and functional activity of the endocrine glands. It may be that the near future will give us the solution of the complicated inter-relationship of the glands of internal secretion. Collip¹ has postulated the theory that for each hormone there is an antagonistic, inhibitory or anti-hormone and as proof brings forth the anti-thyrotropic hormone which he has isolated. The presence of this hormone has been demonstrated by other workers² as well, but there is still much controversy over the fact that every hormone has such an anti-hormone. For the present, however, we must base our knowledge of the problem on a few facts and several well-supported theories.

The thyroid is, of course, only one of the links in this chain of endocrine glands and in discussing its functions we must remember that the thyroid develops from the pharyngeal part of the fore-gut, that the gland possesses an enormous capacity for increasing and decreasing its functional activity as shown by modifications in size, weight, microscopical appearance, iodine content and blood supply, also that hyperplasia is indicative of hyperactivity of the gland but not necessarily hyperfunction.

BIOCHEMISTRY

It is a well-known fact that the thyroid is intimately associated with iodine metabolism. In man the thyroid weighs from 20-25 grams and the maximum iodine storage is from 10-15 milligrams. According to Marine³ the iodine content varies with the amount of stainable colloid and inversely with the degree of hyperplasia. There is also a definite seasonal variation in the iodine store.⁴ This is lower in the early months of spring and higher in the late summer and autumn. According to

Klein⁵ an intercurrent respiratory infection may cause a decrease in the colloid storage and bring about a hyperplasia. Thompson⁶ has experimental proof that the normal function of the thyroid also depends upon the proper relation between the intake of calcium and iodine.

The iodine present in the thyroid gland is in firm organic combination and is actually a constituent of the characteristic protein which Oswald named thyroglobulin. Exactly how iodine is synthesized physiologically into thyroxine has not been determined but Harington⁷ postulates the theory that iodine on reaching the thyroid is first introduced into a molecule of tyrosine to form 3:5 di-iodotyrosine. Part of the latter will be converted into thyroxine and another part will be linked with the thyroxine so formed together with other amino acids to form the true active principle of the gland. This active principle will then in turn be built up into the molecule of thyroglobulin and stored as such in the form of colloid until it is released in accordance with the metabolic demands of the body. Salter and Lerman⁸ recently suggested that when di-iodotyrosine is combined in peptide linkage with other amino acids in a long chain to form a natural peptone and then when several such peptone chains are recombined by peptic synthesis to form a molecule of colloid dimensions the resulting artificial protein will be as active as the natural colloid. This would suggest that the therapeutic administration of iodine tends to synthesize and store the hormone rather than cause its release.

Over 10 years ago Plummer and Mayo⁹ demonstrated the advantages of iodine administered pre-operatively in cases of hyperthyroidism. This is now a routine measure in almost every clinic. The iodine can be administered in almost any form, but Harington¹⁰ recently pointed out that di-iodotyrosine has the twofold advantage in that iodism can be avoided and that iodine is supplied to the thyroid in the form in which it is needed. The effect of iodine is seen in the rapid involution of glandular hyperplasia and the storage of colloid. Marine¹¹ suggested that the rapid swelling of the acini owing to colloid storage under iodine medication impairs the out-pouring of secretion due to pressure on the vascular and lymphatic systems. The great affinity for iodine of the hyperplastic thyroid serves as a basis for the tolerance test of Perkin.¹² This worker and his colleagues observed that the administration of Lugol's iodine to hyperthyroid patients did not elevate the blood iodine level as high as did the administration of the same amount of iodine to normal individuals. Watson¹³ modified this test by injecting the iodine intravenously and determining the subsequent diminution of the artificially raised blood iodine. In patients suffering from hyperthyroidism the rate of reduction is increased.

THYROID-METABOLISM

Metabolism implies the sum total of chemical changes which occur in the organism. These changes involve not only oxidation and reduction but also the anabolism and catabolism of a large number of chemical compounds. The metabolic phenomena characteristic of changes in

thyroid activity can be measured only as they are reflected in the total displacement of certain equilibria, such as oxygen consumption, carbon dioxide production, glucose tolerance, iodine tolerance, nitrogen balance, creatine metabolism and blood lipids.

The most characteristic physiological effects of thyroxine are that it increases after a latent period of 12 hours or more the oxidation in the body of proteins, fats and carbohydrates and that it also increases the excretion of certain minerals, notably calcium. Total thyroidectomy has been shown to produce a marked fall in oxygen consumption. Conversely, the injection of thyroxine into normal animals results in a sharp increase in the oxygen demand. The exact means by which thyroxine increases the oxidative processes in the cells is unknown, but Dye and Waggener¹⁴ found a decrease in the indophenol oxidase of all tissues in thyroidectomized lambs and dogs. Davis^{15, 16} and others showed that the effects of thyroxine are not dependent upon the integrity of the nervous connections. These workers conducted experiments *in vitro* and found that the effect of thyroxine is restricted to intact cells and that minced tissue does not respond.

Aub¹⁷ and others investigated the problem of the relation of thyroid activity to calcium metabolism and their results demonstrate conclusively that increased thyroid secretion caused a striking increase of calcium excretion. The elimination of calcium was increased despite the intake and showed no relation to the level of the blood calcium. This suggested that the excess calcium excreted was endogenous in origin and probably derived from the bones. This is substantiated by the finding of osteoporosis¹⁸ in long-standing cases of hyperthyroidism.

Falta¹⁹ in 1905 advanced the theory that the pancreas and thyroid were antagonistic. Bodansky²⁰ confirmed Falta's view by demonstrating that thyroidectomized sheep were more sensitive to insulin than normal animals. Bodansky explains this on the fact that the thyroid hormone promotes the mobilization of liver glycogen. It follows that the hypoglycaemic action of insulin is increased after thyroidectomy and decreased by thyroid feeding. Another explanation is that the thyroid sensitizes the tissues innervated by the sympathetic and the glycogenolytic action of adrenalin is increased.⁵² Abrams and Gilligan²¹ on the other hand have evidence to show that there is no antagonism between the internal secretion of the normal human thyroid and the pancreas. Despite this fact, the balance of the evidence seems to be in favor of a pancreatico-adrenal-liver relationship.

The subject of cholesterol metabolism has always been perplexing and is still very controversial. The precise role of the thyroid in relation to cholesterol is a topic of much argument. McGee²² reaffirms the opinion of Bloor²³ and others²⁴ that the variations in the majority of normal series of blood cholesterol levels are too great to allow unqualified interpretations of the levels in a disease state. In spite of this Hurxthal^{25, 26, 27} and his co-workers have demonstrated that hyperthyroidism causes a drop in blood cholesterol while hypothyroidism

brings about a marked elevation. Hunt and Hurxthal²⁸ believe that this hypercholesterolaemia of thyroid deficiency may be partly due to the retention of cholesterol through decreased secretion in the bile and lowered excretion in the intestinal tract. These authors maintain that the variations in blood cholesterol are due to variations in thyroid activity and not to variations in total body metabolism. This is shown by the fact that hypometabolism from other or unknown causes is usually not associated with the abnormally high blood cholesterol levels that are found in myxoedema.²⁹ Further that an elevation of metabolism by dinitrophenol is not accompanied by a corresponding drop in blood cholesterol as it is in hyperthyroidism.³⁰ From the clinical standpoint, Chamberlain, Jacobs and Butler³¹ feel that a total blood fat elevated above a normal 700 milligrams per 100 cc. indicates hypofunction of the thyroid and below 400 milligrams indicates hyperthyroidism. The depression of the basal metabolic rate following the administration of iodine to hyperthyroid patients³² is paralleled by an increase in the total blood lipoids.

A close relationship has been observed to exist between the total endogenous nitrogen excretions of mammals and thyroid activity.³³ It has been shown both experimentally and clinically that operative removal of the thyroid gland leads to a reduction or complete cessation of creatine excretion and that it promptly returns after the giving of thyroid extract.^{34,35} Even thyrotropic hormone produces a significant increase of creatine excretion.³⁶ Iodine administered to thyrotoxic patients also reduces the creatinuria and improves creatine retention.³⁷ Thorn³⁸ believes that this improvement is probably secondary to the improved metabolic rate. According to Smuts³⁹ the endogenous catabolism of an animal, regardless of species, may be estimated from its basal heat production as accurately as the latter may be estimated from its body surface or body weight.

The inability to stand heat and cold as is seen in hyperthyroidism and myxoedema respectively is in all probability related to the increase and decrease of the metabolic rate. Coincident, however, with dysfunction of the thyroid there is an instability of the heat regulating centre. This can be demonstrated by the administration of hyperpyretic drugs which produce a rise in temperature out of proportion to their normal effect.⁴⁰

INTER-RELATIONSHIPS OF THE THYROID

Thyroid-Pituitary

It is impossible at the present time to consider any one of the endocrine glands without first considering its relation to the anterior pituitary—the master endocrine gland, so called because of its control over the functional activity of the other glands of internal secretion. The inter-relationship between the thyroid and anterior pituitary has been repeatedly shown, but it was classically demonstrated by the work of P. E. Smith.⁴¹

The anterior pituitary liberates a specific chemical entity known as the thyrotropic hormone. Collip and Anderson⁴² have isolated this hormone and have found it to be very unstable, completely inactivated by boiling for three minutes at pH 5 and to deteriorate rapidly. Repeated injections of emulsions of anterior pituitary which contain this thyrotropic factor produce the following effects in young susceptible animals:

1. Hypertrophy and hyperplasia of the thyroid.⁴³
2. An increase in the metabolic rate.⁴⁴
3. An increase in the heart rate.⁴⁵
4. Exophthalmos.⁴⁶
5. Reduction in the iodine content of the gland.⁴⁷
6. An increase in the alcohol insoluble iodine of the blood.⁴⁸
7. An increased excretion of calcium by the intestine.⁴⁹

Pituitary cachexia (Simmond's Disease) which is the antithesis⁵⁰ of clinical acromegaly shows a diminished excretion of the thyrotropic hormone. This results in a diminution of the basal metabolic rate, subnormal temperature, hypoglycaemia, trophic changes in the skin, mental torpor and involutions changes in the thyroid.

A number of workers including Collip¹ who have made repeated injections of anterior pituitary emulsions over a long period of time have noted a decrease in the size of the thyroid and a decrease in the metabolic rate. This brings us back to Collip's theory of antihormones. The exact nature of this antagonistic substance is unknown but it does not seem possible that it is a true antibody in the immunological sense. However, it may be that the anti-serum contains an inhibitory principle elicited from another unknown source.⁵¹

Thyroid-Adrenal Medulla

Asher and Flack⁵² first put forth the view that the thyroid hormone increases the excitability of the sympathetic nervous system or sensitizes in some way the tissues innervated by the sympathetic so that they become more susceptible to stimulation by adrenalin. Zuntz and La Barre⁵³ demonstrated that injections of thyroxine caused a hyperglycaemia in the course of from three to six hours but that this did not occur if the adrenal veins were ligated just prior to the injections. They substantiated in this way the view of Asher and Flack that the thyroid in some way enhances the response of the animal to adrenalin. The effect of adrenalin upon the blood sugar of animals treated with thyroxine is proportional to the store of liver glycogen.⁵⁴ Thus, as long as there is glycogen stored in the liver the adrenalin hyperglycaemia is exaggerated. When liver glycogen has been depleted adrenalin has but little effect on the blood sugar level.

Crile⁵⁵ studied this thyroid-adrenal relationship and he came to the conclusion that the thyroid builds up the potential in the cells and increases the conductivity of tissues. He compares the thyroid to the components of a battery and argues the thyroid alone, like the battery, cannot discharge the potential which it builds up. The nervous-adrenal

system is the wire that completes the circuit and so becomes the discharging mechanism. This is confirmed by demonstration that an injection of adrenalin actually does discharge the potential. From the clinical aspect he has shown the potential to be high and the conductivity to be increased in hyperthyroidism, both being diminished in myxoedema.

Thyroid-Adrenal Cortex

There are only two facts elucidated to this date that we can use as evidence for the existence of a thyroid-adrenal cortex relationship:

- (1) A child in the early post-natal period shows an increase in its heat production and coincident with this there are involutional changes in the adrenal cortex.⁵⁶ We know that heat production is under the control of the thyroid and therefore we can make the presumption that the activity of the thyroid is inversely proportional to the activity of the adrenal cortex.
- (2) Trauma to the adrenal cortex is followed by an increase in the basal metabolic rate. Marine and Baumann⁵⁷ observed that previous thyroidectomy prevents this rise in metabolism due to adrenalectomy. Their interpretation of these results is that the adrenal cortex and sex glands acting through the anterior pituitary exercise some regulatory or inhibitory control over the thyroid. When this control is sufficiently depressed or withdrawn the activity of the thyroid is temporarily increased.

Thyroid-Gonads

There is abundant evidence to show that the thyroid exerts a marked influence over gonadal activity and the following facts strongly suggest that the anterior pituitary is the intermediary in this mechanism. Total removal of the sex glands in the dog, rabbit and rat usually leads to a slow involution of the thyroid.⁵⁸ Da Costa⁵⁹ and Carlson found that desiccated thyroid in large doses retarded the sexual maturation of white rats, while small doses tended to accelerate it. Similarly, Van Horn⁶⁰ found that the feeding of thyroid extract caused these animals to go into a dioestrous state. He explained this on the fact that the increased metabolism incident to the hyperthyroidism is instrumental in the "washing out" of oestrin and so keeps the amount of this hormone below the threshold required for the production of an oestrous condition. This author also found that hyperthyroidism in female rats is associated with an increase in the gonad-stimulating power of the anterior pituitary. This, too, was explained on the elimination of oestrin, the latter being kept below threshold value and therefore the gonadotropic hormone of the anterior pituitary was not correctly counterbalanced. Aldrich⁶¹ and others feel, however, that the thyroid does not exert any direct hormonal action antagonistic to the internal secretion of the sex glands.

Thyroid-Thymus

Several workers^{62, 63} have found that the feeding of desiccated thyroid to guinea pigs with atrophic thymus glands is followed by an

increase in the weight of the thymus and microscopical regeneration of thymic structure. Rollandt's and De Waele⁶⁴ working with rabbits found an increase in metabolism after thymectomy. They injected thymic extracts into thyroidectomized animals and found a decrease in metabolism. They also demonstrated that thyroxine had a more profound effect in thymectomized animals. The conclusions from these results were that the thyroid and thymus were antagonistic and that the action of each gland was masked by the other in young animals. In such clinical conditions as Grave's Disease or acromegaly there is usually an accompanying hypertrophy of the thymus.⁶³

Thyroid-Nervous System

Gordon and Kuskin⁶⁵ found that mental retardation occurs more frequently in association with congenital dysthyroidism than in any other endocrine disturbance. There is much clinical and experimental evidence to support their view. According to Krasnogorski⁶⁶ the insufficient production of thyroid hormone in an individual greatly influences not only cortical but also infracortical reflexes. As a result of this, in myxoedema, the secretory unconditional reflexes are decreased and the motor reactions are slow and weak. In severe untreated cases of hypothyroidism the same characteristic changes in cortical activity are found as in congenital idiocy. An insufficient thyroid supply also results in marked impairment of the activity of the associative mechanisms of the cortex. Myxoedematous children cannot make adaptations to environmental conditions as normal children do by the formation of new conditioned responses. This same author found that children with normal or increased thyroid activity tended to be normal mentally. Richter⁶⁷ observed extreme fluctuations and irregularities in the daily activities and food intake of rats when total or nearly total extirpation of the thyroid was performed. He suggested that these cyclical phases after thyroidectomy may be a clue to the origin of some of the very regular phasic disturbances seen in psychiatric patients.

Thyroid-Kidney

This relation is still very obscure and some authors are doubtful if any exists. It has been noted nevertheless that there is an actual increase in the blood volume in hyperthyroidism while dehydration is characteristic of myxoedema. Several cases have been reported in the literature of improved water elimination in chronic parenchymatous nephritis after the administration of desiccated thyroid. Liu⁶⁸ in his cases found that thyroid therapy caused rapid disappearance of edema, reduction of albuminuria and subjective improvement. An explanation of these effects has not been forthcoming.

Thyroid-Hemopoiesis

A review of the literature will reveal a great deal of controversy over the precise relation of the thyroid to the blood forming organs. Latta and Benner,⁶⁹ experimenting with albino rats, found an early steady rise in the percentage of erythrocytes and an increase in the splenic pigments when thyroid extract was fed to these animals. Clinical

hypothyroidism⁷⁰ shows a decrease in the red and white cell count, diminished haemoglobin, low color and volume indices. In hyperthyroidism^{70, 71} on the other hand there is a normal red and white cell count. Some observers have noted that an increase in thyroid activity is accompanied by an absolute and relative lymphocytosis together with an absolute and relative decrease in the polymorphonuclear cells. Operative removal of the thyroid will decrease the lymphocyte count and increase the number of polymorphonuclear leucocytes. Stone⁷² and MacKenzie⁷³ concur in the belief that the anemia of hypothyroidism is simply a manifestation of a depressed haemopoietic system due to the sluggish oxidation present in all tissues.

Goldzieher and Hirshhorn,⁷⁴ in attempting to elucidate the exact influence of hormones on the reticulo-endothelial cells, found that the storage of iron in the Kupffer cells of the liver was increased after thyroid administration.

SUMMARY

This paper was written for the purpose of explaining on a physiological basis some of the facts presented on clinical examination of a patient with abnormal thyroid function. The mass of literature is enormous and no attempt has been made to cover it all. Many of the theories presented are the subjects of considerable controversy, however the author has made an effort to present only those that have received support. The conclusions that can be derived from this article may be summarized as follows:

1. That calcium in addition to iodine is essential to the normal structure and function of the thyroid.
2. That an artificial protein very similar to the natural colloid can be synthesized.
3. That the action of thyroxine is restricted to normal intact cells but is not dependent upon the integrity of the nervous system.
4. That the activity of the thyroid can be measured on oxygen consumption, carbon dioxide production, glucose tolerance, nitrogen balance, creatine metabolism and blood lipids.
5. That the anterior pituitary can influence the functional activity of the thyroid and that this thyrotropic hormone has an antagonistic hormone.
6. That some of the dysfunctions of the thyroid and their subsequent symptoms may be explained through its relation to other endocrine glands.
7. That the thyroid may be intimately associated with some psychoses and that it is definitely responsible for certain behaviour changes.

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Mental Aspects of Health

By DOUGLAS J. WILSON, M.A., Ph.D.

THE topic here under discussion forms part of the much broader topic, namely, the relationship between body and mind. Throughout the history of thought men have speculated as to the relationship between those factors which seem quite definitely organic in nature, such as physiological changes and those which have been described as mental, or, in more recent times, psychological. The result of such speculations has been the formulation of three or four well-defined principles of inter-relationship.

It is beyond the purpose of this paper even to mention these body-mind theories. Rather it would seem profitable to present one view that is rapidly gaining ground. This view may be called the organismic view. According to this view we should consider the human organism as a complete unit. A good way to emphasize this point of view is for us to remind ourselves that the word "health" and the word "whole" come from the same etymological roots. To be healthy, therefore, actually means to be whole. From this point of view it is practically impossible to separate factors of maladjustment which we call physical from factors of maladjustment which we call mental. Health and personality are developments of the adaptation of the organism to the totality of living.

A few years ago I had the privilege of conversing with a brilliant young medical man who had served as assistant to Lord Horder, then physician to the Prince of Wales. This young man discovered, upon examining the record cards of Lord Horder, that on seventy-four per cent the famous consultant had written, "I can find nothing organically wrong with this patient," or words to that effect. It is true that we have to recognize that Lord Horder would probably receive patients from all over the British Isles whom other medical men had given up in despair; the percentage probably represents, therefore, an abnormally high figure. Be that as it may, the fact remains that most medical men meet, in their daily practice, those people who are maladjusted and yet whose cases cannot be diagnosed as organically diseased. These people are nevertheless unhealthy, if we recollect that we have identified health with wholesome adjustment.

We are going to assume, then, for purposes of discussion, that there is no clean-cut distinction between mental and physical processes. Laboratory evidence has accumulated to show that whenever so-called mental processes are operative they are accompanied by, and indeed may depend upon, physical action in the nature of physiological activity, either implicit or overt. Extremists there have been who have overlooked this close and intimate connection. There have been those, for example, who, having specialized on one organ or part of an organ, have completely ignored the fact that the organ belongs to a person. This person's private

attitudes, fears, likes and dislikes, and a host of other intangible forms of adjustment, have been quite ignored. This state of affairs constitutes one of the grave difficulties in clinical practice in this age of intense specialization.

The other extreme is illustrated by the individual who believes that all bodily or organic disorders are directly the result of mental happenings and that a complete readjustment is possible in all cases by a changed mental outlook. Recently I attended a meeting where we were informed as to the cause of various bodily ills. We were told that all disorders were created by negative thought waves. One of the prize examples, given in all good faith by an individual who seemed to be otherwise intelligent, was that of a woman who suffered very grievously from sore feet. All the medical practitioners, looking as they had for some physical or physiological cause, had been unable to effect a cure. Leaders of this sect, however, quickly discovered that this woman was constantly saying that she could not understand certain things. She could not understand the gold standard, peace treaties; in fact, any new topic that was mentioned brought forth the characteristic response that she could not understand it. This had the effect, we were told, of setting up negative thought waves in the direction of the organs of the body which stand under, which, of course, would be the feet. This is but one example of the kind of quackery that has developed as a result of stressing one side of the unfortunate dichotomy, body and mind. The view which we are presenting here is based on the notion that it is the organism as a complete unit that may be maladjusted. Sometimes the tensions which are developed as a result of this maladjustment may express themselves in disabilities which we have classed as bodily; in other instances, the prolonged tensions may manifest themselves in disabilities which we have for convenience called mental. But the transition between the two is so gradual, and the fusion of the two is so complete, that it is almost impossible in many cases to distinguish them.

With this statement of our point of view let us now discuss those aspects of complete adjustment which we shall continue to call mental, with particular emphasis upon the medical man as an agent in the promotion of wholeness. Three topics suggest themselves: first, the prevention of ill health; secondly, the recovery and maintenance of health; and, thirdly, practical applications for the practitioner in this programme.

PREVENTION OF ILL HEALTH

Specialists in child psychology have revealed that many of the maladjustments from which older children and adults suffer may be directly attributed to faulty habit formation. Faulty eating habits have in many instances produced digestive disorders. Poor habits of sleeping have resulted in chronic insomnia for which, years later, a frantic search would be instituted to discover the bodily cause. A splendid example of a physical disability arising quite definitely from poor training programs in childhood is the problem of enuresis. It is reported in

some researches that about four per cent of the public school population suffer from incontinence. In experience which we have had with Juvenile Court boys it is discovered that this percentage rises to about ten, showing that the chaotic jumble of poorly formed habits which produced, eventually, some form of delinquency was also manifesting itself in a physical act which on the surface would seem to indicate some bodily disorder. As a matter of fact, it has been reported that when all cases requiring surgical treatment have been dealt with we still have over ninety per cent of enuresis patients to deal with. Moreover, it has been found that even with the low-grade feeble-minded, this disability can be overcome in less than a year by supervised training programs. Enuresis, therefore, is becoming more and more a problem for the psychologist rather than for the medical man.

The same situation occurs, very probably, with relation to other maladjustments commonly looked upon as physical. For example, high blood pressure, which is characteristically combatted by dietary changes, has now been experimentally related to faulty habits of relaxation. Those habits of relaxation can actually be broken down and more desirable habits built up.¹

It is safe to conclude, therefore, that many of the organic disorders which we meet in adults and older children are due, in large part, to inadequate or uninformed training during early childhood. The prevention of ill health will have to begin gradually, with orderly, disciplined, and balanced training of the bodily habits.

The second major consideration in the prevention of ill health will be that of the expression of personality that is possible to a given individual. If conditions become intolerable, the mounting tension may find expression in a variety of ways. Among those that have become most familiar to us are rationalizations, sublimations, and other round-about methods of escape. In some instances these personality maladjustments have expressed themselves in symptoms which are quite definitely physical in nature. Recently a public school teacher interviewed me about a girl still in her 'teen age. This girl fractured her arm and received first-class medical attention. To all outward appearances the arm mended satisfactorily and yet the patient continued to report pain. She travelled from doctor to doctor, but always with the same result. Gradually the joints of the arm stiffened. At last the medical practitioner decided to resort to surgery. It was found, however, that, as soon as the patient was anesthetized, the joints became pliable. With returning consciousness the arm again stiffened. There is no question that this case, and it is typical of a great many other so-called functional disorders, is a case for psychotherapy, and very probably the cause of the trouble will be some form of personality maladjustment. Headaches become very convenient avenues of escape from awkward social situations. The individual who can invent an objective test for headache will confer a great benefit on both medicine and psychology! Many forms of invalidism quite apart from definite

malingering can quite likely be regarded as symptomatic. Sometimes the empty or the distorted personality, as the case may be, may seek expression in what one might very easily call a doctor complex. Running from one consultant to another, visiting this hospital and that, becomes part of the individual's routine life. Usually, though not always, such people are those who have never learned what to do with their leisure time and who have money enough to spend on their various explorations after health. The training program, then, which we referred to in the last section, applies as forcibly here, namely, in the training for a well-rounded wholesome personality. This may be done by developing interests and hopes and other means of expression that will yield to the unique impact of a given personality.

The third item in the prevention of ill health will be in the direction of more formal education. We all recognize today the power of suggestibility. Upon this factor of suggestibility depends the success of patent medicines and quacks. Fortunately we know some of the underlying factors in suggestibility. Let us review a few of them.

Suggestibility is usually strongest in young people and in inexperienced people, and is heightened in proportion to the prestige of the sources. Perhaps we have all found that it is impossible to read through a patent medicine almanac without believing, before we have gone far, that we must surely suffer from a great variety of disorders. It has always been difficult for me to understand how some of the medicines advertised realize what their task is. They are said to be able to correct so many disabilities that it would almost require omniscience on the part of the drugs concerned to determine the particular task they have to fulfill! Education for health will be designed to combat suggestibility. This can be done by attacking the very sources of suggestibility which we have outlined. Inexperience can be counteracted by reliable knowledge. Information coming from reputable authorities will be more than enough to offset the prestige of the sources of anxiety.

Another direction that education will have to take will be in overcoming inertia; despite the noble efforts of such commercial companies as the large insurance corporations, the general public is not yet trained for a systematic examination by competent authorities. Unless there is the prompting of actual pain or other discomfort, the usual tendency is to avoid dentists and medical men. Gradually, however, the emphasis must change from regarding these professions as primarily therapeutic to regarding them as prophylactic. Education then as a formidable opponent to ill health, will be directed against ignorance and inertia, and, above all, irrational fears.

RECOVERY AND MAINTENANCE OF HEALTH

Turning now to the second major division of our subject, namely, the recovery and maintenance of health, it is possible, I believe, to speak more briefly. The recovery and maintenance of health will be accompanied by a complete revision of some habits of living. The task of the medical man or of the nurse is not merely to readjust an individual. It

should include also a revision of habits which will reasonably insure continued favourable adjustment. It is true that re-education is always more difficult than education, but it is not impossible. The proverbial saying that old dogs cannot be taught new tricks has been definitely exploded in recent years, particularly by the work of Thorndike.¹

The revision of habits must have always as its ultimate aim the well-being of the complete personality. Fears which have developed may be very difficult to overcome, but the effort to establish confidence at least ought to be attempted. There is an element of faith in the nurse and in the medical man which counts for a great deal and, indeed, has been asserted to be a critical variable in some recoveries. Emphasis upon poise and calmness must, I think, be increased. Above all, ways and means must be discovered for adequate expression of the personality. Within the past few years we have had the privilege of seeing on the screen the play entitled "The Barretts of Wimpole Street." Here we find a young woman exhibiting marked invalidism who suddenly shakes off this morbid behaviour as soon as a new factor enters, in this case the coming of a young man into her experience. She is transformed almost immediately from one who is quite irresponsive to medical treatment to one who is alert and eager for activity. In this connection we might remind ourselves of the statement of Sir George Newman, referring more specifically to nurses, that the task of the public health nurse is "to emancipate the hidden splendors of the personality." This attitude is certainly as applicable to medical men. There is no question that, if personalities that go to make up our society can be better adjusted, a great many of even our so-called organic disorders would disappear.

APPLICATIONS IN PRACTICE

The last major division which we proposed to discuss was the place of the practitioner in this program. He has a very large share in the process of prevention of ill health through his contacts with the public. The medical practitioner may very easily become one of the chief agencies of education in ways of wholesome living. The place of the doctor in the recovery of health will again be reinforced by suggestion. The nurse is attired in a standard uniform and the problem of her personal appearance is not necessarily as acute in meeting her patients as is that of a physician. Little signs of efficiency, marks of skill in the medical art and precision in craftsmanship, these will all have their effect upon a patient who is absorbing clues from all directions. The poise of the doctor, the dignity of his carriage, and the general atmosphere of equilibrium which he should strive to manifest, will also go far towards creating a confidence on the part of the patient which we have suggested as desirable.

It has been my observation that medical men do not always have sufficient time for relaxation. This militates against those characteristics of performance which I have outlined. In these days of sanitation and hygienic practices it probably goes without saying that the

practitioner's appearance must be one of scrupulous cleanliness. Such matters as these may sound trivial, but when you consider that your patient is an intact, complete individual these items, small as they may be individually, have a cumulative value in the direction of recovery.

By way of summary I shall review some of the major points which we have raised. I have suggested that you are dealing, in your profession, with persons and not merely patients, people who are active in thought if not in body, and not merely passive. You are not called upon to assist in the treatment of *an* appendix but rather in the treatment of *somebody's* appendix. There is always that personal factor which cannot be ignored. To reinforce this view I shall include a quotation from Dr. C. M. Campbell:

"It is better to think of the physician as a man whose business it is to treat not symptoms or diseases, but sick people. The patient is more than a group of symptoms, more than a collection of interesting juices; he is a living individual with a most complicated pattern of reactions, and the physician who overlooks this pattern may find the symptoms intractable, the disease unintelligible. Headache may be a reaction to eye strain, but it may be a reaction to a mother-in-law; pain in the back is sometimes explained by an X-ray plate, but sometimes by unwillingness to work; indigestion may be more closely related to a troubled conscience than to poor cooking; palpitation is not always an indication of organic heart disease—it may be the expression of the romance of life gone astray. Not that the situation is always simple; the patient with organic heart trouble may have romantic longings; a bad cook may conspire with a troubled conscience to ruin the digestion. The extent to which a man is disabled depends partly on the nature of his disease, but perhaps more on the way he reacts to it."¹

We must abandon the view that we are dealing only with a physical body. It is true that your major emphasis will be with this phase of the individual's adjustment, but we must always bear in mind that this physical body is closely inter-related with a whole collection of wants, desires, frustrations, and other psychological complications. Healing thus means the recovery of wholeness, and complete readjustment of total life patterns. Prevention of maladjustments can be effected by ways that we have suggested, and the recovery of adequate adjustment can be accelerated by similar efforts.

¹C. M. Campbell—"The Minimum of Medical Insight Required by Social Workers With Delinquents." *Mental Hygiene*, 4, 1920, pp. 513-4.

¹E. L. Thorndike: 1928; "Adult Learning."

¹E. Jacobson, 1934: *YOU MUST RELAX*, chapter 14 "High Blood Pressure." See also this author's more technical work, "Progressive Relaxation."

The Criminal as a Patient

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PUBLIC interest in crime is greater today than at any other period, for we are slowly awakening to the realization that we are all deeply and actively involved in this problem. We are learning that what society does, or does not do, may be powerfully effective in the causation of crime. We must pay the bills, bear not only the terrific financial burden, the property loss, but the cumulative cost of wasted and perverted lives which become the centres for social contagion. We need to examine our attitudes in the light of recent knowledge. Through the centuries the dominant trend of thought has coloured each generation's reasoning. We like to think that we are a part of a rational, fact-respecting age, but many of our most far-reaching actions are based on remnants of dead philosophies.

Anthropologists tell us that primitive tribes recognize as crime only what they construe as injury to the group as a whole. They have no conception of punishment. The one who has broken the tribal taboo can no longer be considered as one of the group. We behave in this way; you do not; therefore, you are no longer one of us. Modern society retains something of this attitude in refusing to assimilate the man who has "done his time," in considering as forever different from its own members the man who is branded a convict.

Murder was once a private matter for individual or family revenge. Feuds begun over trifles were continued for generations because revenge was considered a moral obligation which no brave man would dare to evade. We still feel a moral obligation to even the score by inflicting injury through the proxy of our courts upon the individuals who have injured us by injuring one of our group.

Flagrant abuses went on for years before ways were devised for restricting vengeance so that only an eye would be taken for an eye, and not a whole head for a tooth. At first the avenger was required by his neighbors to announce his intention and then to secure their permission. It occurred to someone that duplicating injury was fruitless. Why not demand of the guilty instead of an eye a sum of money which could be used both to appease the avenger and pay the court? But personal injury was increasingly recognized to be not an individual or even a family matter since the repercussions affected everybody. Crime required social control.

Only the long history of abuses can make us realize why the men

of the classical school in the latter part of the eighteenth century were known as humanitarian reformers when they insisted that all offenders be treated alike in accordance with the crime committed, regardless of circumstances. They believed that the criminal perpetrated his offence deliberately for pleasure and that punishments should be carefully graded so as to neutralize the pleasure which had been derived, with enough additional pain supplied to act as a deterrent. This was the period when political philosophers declared, "all men are equal." The assumptions upon which our legal system still operates belong to that time rather than to our own. We still act as though we believe their contentions, namely, that all persons have equal knowledge of right and wrong, and that right and wrong are absolutes; that everyone may be expected to have knowledge of the consequences of his conduct; and that the criminal deliberately chooses the wrong because it pleases him to do so. We have developed scientific habits of thought, in striving to understand the causes of physical phenomena; tardily we have come to utilize the same technique in regarding the mind of man. We now know that those three assumptions based on the premise of equality of knowledge, judgment, and choice are all psychological fallacies. We know that no two individuals, except identical twins, have the same hereditary equipment, and that no two people, without even that exception, pass through the same moulding by life's experiences. Gradually it is dawning upon us that the only way to treat people equally is to treat each one differently.

It was in the last decade of the nineteenth century that thought began to focus on the criminal rather than the crime. An Italian prison physician, Caesar Lombroso, thought that his prisoners were different from other people; that criminals were a type, and that this type was inherited. An English physician, Charles Goring, tested the theory by minutely examining 3,000 English prisoners. Then he similarly examined 3,000 graduates of Oxford and Cambridge. Taking the groups as a whole, he could find no differences characteristic of the prison population except decreased weight and height which he attributed to malnutrition. We still hear people saying, "but he doesn't look like a criminal."

In a scientific age we are more interested in understanding the causes and development of phenomena than in proclaiming moral judgments. We know that there are in all of us natural tendencies which if left uncurbed, unorganized by social education, unprovided with wholesome outlets would lead inevitably to anti-social behavior. People inherit weaknesses which predispose them to disease, but wise hygienic living may keep them all. Not one of us is invulnerable. People inherit types of mind which make them highly susceptible to moral weakness in the face of stress, but compensations may forestall a breakdown. Who of us is beyond deteriorating influence? We are all different. Our social inheritance is as varied as the biological. What forces taught you

to be law-abiding? You have no right to assume that they were similarly operative in every life. We are not all living in the same world, or the same century. We are not only ignorant of how the other half lives, but also of the motivating forces of our neighbour's life. Crime is caused. The causes arise in the inter-play of social and individual factors; they grow from failures of the home, the school, the neighbourhood, industry, our commercialized recreations, and the whole complex we are pleased to call civilization. We are *all* implicated in and indicted by each social failure revealed by our criminal courts; for criminals are made.

Society must be protected. It formulates into laws those customs it regards as essential to the welfare of the group. Because they are first customs, they are common knowledge to most people. The exceptional one who breaks them may have an exceptional life.

If we are to accept the challenge of the crime problem, we must try to understand the life of the individual who is forcibly brought to society's attention by an act which we must regard as a symptom of an underlying maladjustment. The understanding required is not sentimental; it involves processes similar to the physician's technique: scientific methods of investigation, diagnosis, and treatment.

We must investigate then the criminal as we would a patient who comes to our office complaining of a pain in the abdomen. Here we would take a history to find out the duration, the precipitating causes, as well as any associated symptoms of the disease. The majority of lawbreakers come from poor hygienic surroundings and have loose moral views. We know that certain diseases such as syphilis, epilepsy, and encephalitis produce changes in the individual that may precipitate anti-social conduct.

If the criminal has a mental age of 10 and a chronological age of 25 years, should we consider him capable of adult responsibilities? Modern workers in criminology are recognizing more and more the necessity of evaluating the lawbreaker's background in association with the criminal act. In each case we must know his family history, his physical, mental, and social development, and the meaning to him of his experiences in the past and present before we can arrive at a diagnosis. Is this an impracticable ideal? No; these methods are proving their worth in the hands of specialists adept at winnowing significant facts. Can we afford to employ specialists in criminology? We cannot afford to do without them if lawbreakers are to be set free in the community.

Our laws were made for crimes. They operate on people we call criminals. How successful would be our treatment of disease if we classified our patients in terms of the most conspicuous symptom which had brought them to our attention! John Brown has a pain in his head. Says the medical judge, "Thirty days in hospital ought to teach you not

to be a headache." If his headache is due to a slight disturbance of his physical condition it will disappear quickly; if its cause is serious, mere residence in the hospital will not cure it. Almost inevitably he will come out weaker than when he went in. And when his next symptom appears, without further investigation of the casual factors or realization of the failure in the previous treatment, society cries, "send him back for a longer time."

Criminals are people who have disobeyed the formulated and supported laws of our social system. Invalids are people who have disobeyed the natural laws of health. We are apt to think that the latter have been acted upon by disease to which their systems had no immunity. Neither group has understood the progression of circumstances which has led to this end-condition. Neither group has been in possession of the materials of freedom from which to make a choice. Diagnosis involves an understanding of causes which have produced this wholly individual situation. Almost invariably they lead back to childhood difficulties.

The age of greatest frequency of conviction has been descending in both Europe and America. Sheldon Glueck and Eleanor T. Glueck in their study of *Five Hundred Criminal Careers* made a composite individual from the averages of their findings. This lawbreaker is an habitual criminal before he enters the reformatory,—“comes from a family containing other criminals, a large, illiterate, and impoverished family living in a congested city area. He is American-born, of foreign parentage. In 60 per cent of cases, he comes from a broken home. In 80 per cent of cases, he leaves home before he is 18 and begins to wander from place to place, working irregularly for short periods at unskilled low-paid jobs, which he has left school at 14 or 15 to pick up. By his 16th year his delinquencies have begun.” These young people do not change suddenly from wholesome childhood to lives of crime. Case histories reveal that almost invariably habitual criminality has begun with juvenile delinquency. Like many diseases, hope of cure parallels time of discovery and beginning of treatment.

Anti-social attitudes may be deeply ingrained before a child reaches juvenile court. Habitual stealing, lying, truancy or disobedience may be symptoms of serious social maladjustment. Stealing may be his expedient, a way out, for a child with either inferior or superior intelligence. We must know the level of his intelligence, what particular habit formation is lacking, and the nature of the disturbed relation between him and his parents or associates, as well as what he hoped to gain by his action. Has he done this to revenge, to humiliate, or to obtain the satisfaction of “slipping it over”? Is he trying to gain response, recognition, security, or new experience? Many children resort to flight whenever confronted with any unpleasant, fear-producing or difficult situation; and this tendency may develop so that the individual will avoid situations demanding effort, or responsibility.

Another type of child may become too dependent upon others, using his parents as a substitute for his conscience, and originality. Psychological patterns of jealousy, envy, hate, fear, antagonism, revenge, love and egocentricity are well known to everyone. These patterns are frequently the underlying causes in delinquency and crime. These emotional patterns often result from developing experiences the child has lacked. It may be the lack of love, a lack of security, a lack of understanding, or a lack of wholesome childhood outlets that precipitates an unwholesome pattern of behaviour in a child.

Therapy of crime, like that of other diseases, should comprise both preventive and curative measures. It is believed that the proportion of criminals in civilized countries is on the increase. Moreover, there are more laws to break than ever before. In the past, punitive measures have been mainly relied upon for the correction of crime. Might we not suspect that our methods have been faulty? The criminal himself, and the crimes he commits, have received the attention of society. On the other hand, the causes that produce the criminal have been practically ignored, so far, at least, as any rational attempt to correct them is concerned.

Medical science has of recent years increased its value to society through greater knowledge of disease. This advancement has come from more accurate study of the causes of disease and the development of preventive medicine. It is obvious that improvement in the management of the crime problem must come from an increase in our knowledge of the crime, study of the criminal himself, and a more enthusiastic attempt to prevent crime by remedies suggested by the knowledge of the causes operating in each case.

The background of all human beings includes wishes, urges, and drives that do not always accord with the formulated desires of organized groups of society. As for what we should do with him, we must first determine whether this individual can be returned to society. His prognosis is of infinitely more moment than his crime, or the punishment we may feel he richly deserves, but which may make his social adjustment impossible. It is easy to justify our own actions. Few people can accept punishment without antagonism. Antagonism widens the chasm between the culprit and the society that would chasten him. He must feel himself a part of the social group before he will behave socially. His return should be based on the probability of his success as a social person rather than on the enormity of the act he has committed. Different investigators have worked out, for the guidance of judges, prognostic tables which, although rudimentary, are based on scientific findings and have more reliability than the arbitrary periods set by law in a confused assumption that a term of years incarceration will act as punishment, deterrent and cure. But people who inhibit anti-social acts only through fear are unreliable and dangerous. More-

over, the dangers of deteriorating the individual by punishment are greater than the likelihood of benefit. Warden Lawes of Sing Sing states he does not believe in punishment. Penologists have discovered that the hope-of-reward principle is of more definite value in reformation. This attempt to demonstrate to the prisoner that socially acceptable thinking and acting are profitable, is meeting with success. If he is returned to the society where he failed, the prisoner must go back equipped with some of the means of success, *e.g.*, self-respect, a job through which he may maintain physical and mental health, the capacity to develop the affections of others to sustain him, the perception not only that crime does not pay, but that he can be happy in a social way. What treatment we use will influence the rest of a person's life. We cannot commit a delinquent event to one of our juvenile "correctional" institutions and expect it to do the rest, for after leaving there the boy or girl is confronted with an even more difficult task of reorientation.

Normal children need not become delinquent if we will take the time to study their personalities and potentialities and aid them to develop themselves. Juvenile delinquency is a result of neglect on the part of society on the one hand, and of the parents on the other. Juvenile offenders are much better handled by parental guidance even if it be the "parenthood of the state" through the juvenile court, than by the police. Many arrests have followed the perpetration of some childish prank. Most adults can recall offenses of their own that would have obtained for them similar treatment had they been detected.

The school undertakes to furnish an appropriate environment for the child to learn adjustments to society. Matters of compulsory attendance, school failure, and the hazards involved in truancy are merely surface phenomena which challenge us to consider why the child must go to school and if the school is meeting his needs. Educationalists have been changing their emphasis from the subject to the child they are teaching. They realize that around the child converge a series of groups: the family, the neighborhood, the church, and the gang or play groups which are also teaching and leaving an impression in proportion to the interest they excite or loyalty which they inspire. If we find a child who is playing truant, then we must discover in what way the school is not fulfilling its purpose for him. In retrospective study of case histories, we find that truancy is frequently the first sign of delinquency that later develops into a criminal career.

Sterilization of degenerate criminals who are to be returned to society in no way compares in severity with imprisonment for life, which the law does not hesitate to impose for the protection of the public. It is obvious that the application of sterilization to the criminal would require great discrimination and should be made under strictly scientific supervision, for we have no evidence that criminality is inherited. It is socially defined. When any social system has progressed so far that there are no slums, it will have done much to reduce its proportion of

criminals. Morality and self-respect are destroyed where squalor, dirt, and poverty are combined.

A large group of individuals are thrown into the hands of the law, primarily because of a frank attack of mental alienation or indirectly because their constitutional make-up leads them into constant conflicts with the dictates of society. There are also psychoses which develop as a result of conflicts with the law and penalization. We find that such people fill the criminal departments of our Ontario Hospitals. It is safe to say that if our criminals were more closely studied, more of them would be placed in our mental hospitals and fewer in our penal institutions.

Nothing less than a patient, penetrating course of friendly psychological analysis by proof of personal interest and friendship can be expected to pierce the wall of defence and defiance which the prisoner builds around himself. But such a procedure is unheard of in the modern prison, even where a psychiatrist is present. For he is concerned rather with the routine of examining and classifying inmates on their admission than with the much more important therapeutic possibilities of the individual prisoner. Psychiatry or any other art purporting to deal with stresses and strains of human mind will go nowhere until a serious effort is made to experiment with different methods of psychotherapy and methods of re-habilitation.

When readjustments in our economic system permit interesting work to yield a measure of the satisfactions of contemporary life, when security is provided and expanding leisure permits self-development; when there is greater knowledge of the psychological necessities of human life and provision for education of the emotions and the sensations, as well as the intellect and physique, people will still be confronted with conflicts, but there will be greater provision for guidance of the weak-willed, and anti-social behaviour will tend to be neglected for a more satisfying life within the group. Already there is a hopeful sign in the dropping rates of juvenile delinquency in England, the United States, and Canada.

Two Common Diseases of the Thyroid*

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WHEN the Executive invited me to present a paper at the Noon Day Study Club, I selected a topic which I found to be a little too extensive, so I decided to limit my discussion to two common types of goitre, namely, adolescent goitre and Graves's disease.

My discussion of these diseases or pathological conditions is largely built around the routine examination, diagnosis and treatment as practised in the Montreal General Hospital Goitre Clinic under the supervision of Dr. E. M. Eberts. Points which I mention or stress I do not consider to be indisputable. There undoubtedly has been, and still is, considerable controversy among authorities over various aspects of thyroid disease, but general rules which, if adhered to, will undoubtedly give gratifying results.

Probably the superficial position of the thyroid made it the first ductless or endocrine gland to be recognized as a site of disease and the enlargement of goitre was described in the first century of the Christian era. It seems strange now that, although ordinary goitre was so long known, the striking features of exophthalmic goitre were not recognized until the 19th century. This can be accounted for, I believe, in the fact that goitrous enlargement of the thyroid was so familiar that the symptoms of hyperthyroidism were regarded as complications of the goitre.

Iodine in the treatment of goitre has an interesting history. As far back as the 12th century, seaweed and burnt sponge were employed to cure ordinary goitre and soon after iodine was isolated early in the last century, it was similarly used but with such enthusiasm that its tonic effects led to its unpopularity and disuse; and in the last quarter of the last century it went entirely out of fashion, so much so that at a meeting of the Royal Society of Medicine in 1921 it was not mentioned. However, soon after this, its use was revised as the result of the efforts of Dr. H. S. Plummer, and since that time Iodine has gradually gained its present status in the treatment of thyroid disease.

It is not the purpose of this contribution to discuss questions of pathology or etiology in detail, but rather to indicate the various means available in the treatment of goitre. *Juvenile or adolescent goitre*, though usually a transient affection is of surgical interest for two outstanding reasons:

- (1) Because it occasionally assumes toxic features with the ultimate development of Graves's disease.
- (2) Many patients with adenomatous disease give a history of goitre in adolescence. It is likely that the functional and circulatory changes present at that time, produced in the gland pathological changes which later in life under the stimulus

*Read at the Noonday Study Club, London, Ontario.

of overwork, pregnancy, or infection, or because of continued iodine shortage, developed into adenomata.

The enlargement of the thyroid in adolescent goitre is due to a colloid storage and involves to a varying degree both lobes of the thyroid and the isthmus. The consistence is soft and only rarely is a bruit heard, but if such occurs be suspicious of an onsetting Graves's disease. There are no clinical signs of hyperthyroidism and the Basal Metabolic Rate is normal or slightly subnormal.

Four theories of causation are worthy of comment:

- (1) Earth and water theory that peculiar geological features render water goitrogenous.
- (2) Toxic infective theory that goitre is due to specific flora, toxins of which affect the thyroid gland.
- (3) The theory of iodine deficiency.
- (4) The theory of multiple causation with such factors as diet, overwork, insufficient hours of rest, rapid growth, combined with iodine deficiency or water pollution, which probably is the most reasonable theory.

From the above theories one concludes that the prevention of adolescent goitre depends upon a sufficient quantity of iodine in the food and water and the elimination of bacteria from these substances; also upon the control of the energy output and the maintenance of a physical reserve adequate for the needs of the period of growth and development.

In doing away with these factors under which juvenile goitre develops, one lessens the incidence of Graves's disease and also forestalls those cases of adenomatous disease which have their beginning in the derangement of the gland at puberty.

Iodine has become a universal practice in the treatment of adolescent goitre. Although there is a fair percentage of cases, probably 15 to 20 per cent., in which the gland does not recede to normal, the majority show marked improvement with iodine and the number who develop goitre, while taking iodine, is practically inappreciable as compared to the benefits derived in most cases.

In the Montreal General Hospital Goitre Clinic it was found that when thyroid extract was given before or with the iodine the gland diminished in size more rapidly than when iodine alone was used.

The routine is to give a patient of normal weight, between the ages of 14 and 16 years, one grain of thyroid extract (whole gland) daily before breakfast for one week. At the end of this time, if there is no increase in pulse rate and no loss of weight, the course is repeated. With or following the course of thyroid extract, iodine in the form of Lugol's solution is given, one minim daily, in alternate months. The Lugol's is omitted during the four summer months when green food is more plentiful.

Cod Liver Oil, owing to its high iodine and vitamin content, is prescribed during the winter months.

A printed form is given each patient covering hours of rest, diet and exercise.

Constipation should be corrected if present. The water, if questionable, should be boiled.

Basal metabolism estimations should be taken where there is any suspicion of altered thyroid function.

When there is swelling sufficient to cause tracheal compression and stridor, the patient should be kept in bed and receive thyroid extract and iodine.

The length of time iodine should be continued in the treatment of adolescent goitre is frequently asked. If, at the end of two years, there is no palpable evidence of enlargement and the patient has acquired satisfactory habits as regards diet and rest, iodine may be discontinued, but if enlargement persists iodine should be continued indefinitely. Women who give a history of having had adolescent goitre should be given iodine throughout pregnancies and periods of lactation.

Graves's disease may be a transition from adolescent goitre but is usually a distinct entity. There is a predisposition to the disease in certain families and it is often of the same type in members of the same family. The outstanding factors determining the onset are pregnancy, miscarriage, lactation, influenza, focal infections, physical and mental strain, and acute mental trauma, financial or social.

The chief age incidence lies within the third and fourth decades, although the disease may occur in childhood and is not uncommon in persons over 40 years of age. The sex ratio of females to males is commonly quoted as 5 to 1.

There exist several clinical types of Graves's disease. Since the introduction of the determination of the patient's metabolic rate, several so-called larval forms have been recognized. I refer to the cases which show some tachycardia and tremor, with or without enlargement of the thyroid gland and a persistently elevated basal metabolism. It is important to recognize these cases as they frequently go on and develop the typical Graves's syndrome; whereas with rest and iodine they might have yielded very promptly.

It may be well to mention here the cases of thyroid enlargement associated with nervousness, tremor, some tachycardia and incapacity for effort in which, however, the B. M. R. is persistently normal. The thyroid in these cases usually diminishes in size rapidly with small doses of Lugol's solution and one gets the impression that the underlying cause is an unstable sympathetic nervous system.

From the standpoint of early recognition, the fulminating type is of the utmost importance. In such cases the patient becomes acutely ill with excessive tachycardia, vomiting, diarrhea and mental irritability frequently in the form of delirium, hallucinations, sometimes acute mania. Enlargement of the thyroid may not be evident at this stage, but if iodine is not promptly administered a fatal issue may be the result.

Another type is that in which the cardiovascular phenomena predominate. The usual symptoms of toxicity are present but are overshadowed by the rapidity of the heart rate. In these cases iodine seems to be of comparatively little value, but should be administered in doses proportionate to the B. M. R. Sedatives such as bromides and luminal should be given in fairly large doses and the patient kept absolutely quiet. Care should be taken to avoid all effort on the part of the patient, even to the extent of having her fed by the nurse. Digitalis should of course be given, if indicated.

The common type of Graves's disease is that which develops with gradual onset over a period of from three to six months, becoming chronic with periods of relapses and remissions. It is usual for the enlargement of the gland to become noticeable within three months of the onset of symptoms, but occasionally it precedes them by weeks or months. The degree of enlargement has no bearing whatever on the severity of symptoms. Definite ocular signs, widening of the palpebral aperture (Stellwag's sign), lagging of upper lid (Von Graefe's sign), stare and lack of convergence (Moebius sign), make their appearance within three months of onset of symptoms and absence of wrinkling of the forehead (Joffroy's sign) is generally present. Exophthalmos usually develops a little later.

Other symptoms soon manifest themselves and the patient becomes extremely restless and emotional. Mental irritability may or may not be marked. The expression is apprehensive and face often flushed. The skin is moist and sweats are frequent. The appetite is increased, but in spite of this, weight is lost. Diarrhea and vomiting may be present in severe cases. Tremor of the hands, lips and tongue is usually shown fairly early. Palpitation and precordial thumping is almost a constant complaint. The heat intolerance varies directly with the level of the B. M. R.

In Graves's disease the enlargement of the neck is generally uniform. The gland is not tender. There is generally a visible pulsation and a bruit frequently is heard over the superior thyroid vessels. The pulse rate varies from 100 to 140 per minute and in most cases it is regular unless of longstanding duration, when auricular fibrillation may have developed.

In the conservative treatment of Graves's disease, rest, iodine and sedatives are the important factors. Under this routine the disease, as a rule, will cease to progress in severity and improvement will be noted. In some cases the improvement continues steadily and complete recovery occurs in the course of several months. Much more commonly, the recovery is only partial. If, at the end of six months, the condition is not favorable to an early return to health, relapses are sure to flare up. To restore health and efficiency and to avoid the cardiovascular complications that occur when the disease persists for any length of time, it is necessary to reduce the amount of functioning gland tissue. This is most effectively accomplished by means of thyroidectomy, but it can

also be brought about by irradiation of the gland by means of X-Rays or radium. At present, X-Rays are preferable to radium, chiefly because experience in the use of X-Rays has been greater.

Treatment by irradiation takes months to accomplish what surgery can do in a few weeks, and is much less reliable, frequently failing entirely. Practically the only argument in favor of irradiation is the fact that it is less dangerous to life, but the operation has been so perfected in the last five years that it is now almost free from danger. Therefore, if the required surgical help is available operation is the best method of treatment.

End results from thyroidectomy have proved so conclusively that it is the surest hope of permanent recovery that in the Montreal General Clinic the patient is given no option between surgery and irradiation.

A comprehensive physical examination is essential to treatment.

Rest, iodine and sedatives are again mentioned as the outstanding factors in preoperative treatment. In the clinic it is routine to prescribe five minims of Lugol's solution, well diluted, three times a day with or after meals. When the metabolism is estimated every 4 to 6 days, the dosage is altered according to the rate. If between 50 and 80 per cent above normal, the dosage is increased to 10 minims three times a day, and if above 80 it is increased to 25 minims t.i.d. In critical cases with vomiting, diarrhea, etc., iodine is given by the intravenous route in doses of 20 minims in 300 cc. glucose-saline every six hours. Morphine is added to the milder sedatives and ice packs are given twice daily for ten minutes at a time.

In the surgical treatment of Graves's disease, attention should be drawn to the following:

- (1) The time at which the operation is performed. In the average case a week's course of Lugol's solution suffices to bring the B. M. R. down, to bring about a corresponding improvement in the pulse rate, to lessen restlessness and abolish anxiety. This is usually a safe time to operate but in cases where there has been marked failure of nutrition, operation should be postponed until there is a definite gain in weight.
- (2) The extent of surgical interference. The operation should be drastic if best results are to be obtained. A partial thyroidectomy has excellent immediate effects but the patient will always suffer a relapse later. In all except the milder types of the disease at least 9/10ths of the gland should be removed and sometimes more.
- (3) The posterior border of each lobe should be left behind in such a way that the recurrent laryngeal nerves and the parathyroids are undisturbed. The whole of the isthmus should be removed leaving the trachea exposed and thus removing an unsightly lump in the middle of the neck.
- (4) The operator should never attack the operation with the fixed idea of completing the operation at one sitting. Guided by circumstances, one can often avoid fatalities by doing a preliminary

ligation or unilateral lobectomy. Nothing is ever lost by proceeding in stages; so never adhere to any set plan.

- (5) Attention should be given to the cosmetic results. The ability of a thyroid surgeon is judged not by the reduction in the B. M. R. but by the nicety of the scar.

The essential pre-operative treatment is, as follows: On the day prior to operation, the hair is washed as a safeguard against infection. The Lugol's is doubled on the day before, the day of and for a few days after the operation. On the evening before, the patient is given $1\frac{1}{2}$ grs. of nembutal and the neck is prepared with the usual antiseptics. The patient is induced to take glucose drinks up until two hours before the operation. One-half hour before going to the operating room, $1\frac{1}{2}$ grs. of nembutal are given and 15 minutes before, 3 grs. of nembutal. Occasionally, in a very nervous patient this is supplemented by morphia and hyoscine. The objection to morphia is the nausea and vomiting it often produces on the table in female subjects.

Local anaesthesia is by all means the method of choice; 1 per cent novocaine for the skin and 0.5 per cent for the deeper structures.

It is needless to enter into the discussion of details of the operation. Points which should be remembered are:

- (1) The collar incision should be placed so as to give one an adequate exposure of the upper poles.
- (2) The platysma muscle should not be divided, as this is the reason for a wide unsightly scar.
- (3) One should not hesitate to divide the prethyroid muscles if slight retraction does not give adequate exposure.
- (4) The vessels of the upper pole must be securely ligated and the apex removed, as failure to do this is the commonest cause of recurrence due to the hypertrophy of the stump with a rich blood supply. Excessive haemorrhage is now rare and nine times out of ten it is due to inadequate exposure.
- (5) In most cases a cigarette drain with wick soaked in adrenalin should be inserted into the bed of the operation.

Following operation, pain and restlessness is controlled by morphia or heroin P. R. N.—6 oz., or 5 per cent glucose is given by rectum with Lugol's and digitalis when indicated, until the patient can swallow. Four to eight ice bags are placed about the chest. Cough is controlled by codeine. Liquor ammon. acetatis in 1 to 2 dram doses loosens mucus and affords the patient ease in expectorating when there is any tracheitis. A rapid pulse or one of weak volume is helped by the administration of 10 per cent glucose in saline intravenously, 200 cc. every three to four hours rather than 1,000 cc. at a time.

Iodine medication, varying from two to five minims, morning and evening is continued for 10 weeks after the operation. All patients are given a bitter tonic before meals and iron after meals. Rest in bed for one month following operation and up and about gradually for the second month is prescribed. The reason for this is the fact that many

cases, although clinically normal, prove upon exertion to suffer an impairment of functional reserve and if too much stress is placed upon the thyroid remnants, compensatory hypertrophy may ensue leading to a recurrence of symptoms. Following operation, patients should be protected from the factors which we believe are responsible for the initiation of Graves's disease—e.g. pregnancy should be avoided for two years, teeth and tonsils should be removed if infected, ample hours of rest provided and physical exertion avoided.

“GOING—GOING—”

“Top off, half gone, all gone” of the fairy-tale about the cat and the bowl of cream might be used to describe what is occurring with regard to diphtheria, at least in most enlightened communities.

A few years ago, it was proclaimed that diphtheria could be prevented; to-day we can say that diphtheria is being prevented and that, in a number of places, it has actually been banished.

This is one of the most remarkable achievements of our age. For centuries, diphtheria was a menace to child life, taking a heavy toll year after year. Then came diphtheria antitoxin, one of the great discoveries of the latter part of the past century. Antitoxin saves life; when it is given at the onset of the disease, its use has preserved many thousands of lives.

In spite of the benefits of antitoxin, deaths continued to occur because, for one reason or another, there was delay in its use. Furthermore, antitoxin could not control the spread of diphtheria.

Then came the great discovery that, through the use of a new substance, diphtheria toxoid, diphtheria could actually be prevented. This meant that children could actually be protected and that parents need no longer fear that their little ones would contract diphtheria.

This prevention is not a theory. It is a well-tried, practical method. Thousands of Canadian children have been immunized against diphtheria. They have received the necessary injections of toxoid and, as a result, their bodies are capable of overcoming any diphtheria germs with which they may come in contact.

For parents, the important points to know are, first, that it is only the children who have been immunized who are protected. Unless your child is one of these, then your child is still being exposed to all the dangers of diphtheria.

The second point is that diphtheria occurs most commonly and is most fatal during the earliest years of life. This means that children should be immunized before they are one year old, as otherwise they may contract the disease. To delay means taking a chance for which there is no justification. To act promptly gives your child the protection to which he has a right, and ensures that he will pass through his early childhood unharmed by diphtheria. Do not delay; lose no time; act now!

Prescriptions and Prescribing IV.

Incompatibilities

By R. A. WAUD, M.D., M.Sc., Ph.D.

University of Western Ontario Medical School

THIS paper will deal with some of the more common incompatibilities likely to be encountered in ordinary compounding.

Drugs are said to be incompatible when they are incapable of existing together without undergoing interaction, either chemical or physical; when they are immiscible or insoluble, or when they antagonize one another in action. An incompatibility is said to be chemical when it involves a chemical interaction; physical, when there is a change in physical state, such as precipitation or liquefaction; pharmaceutical, when the preparation is unslightly or nauseous; and therapeutic when the actions of the ingredients are antagonistic. These classes usually overlap each other.

A knowledge of chemistry, miscibility, solubility and pharmacology forms the basis of avoidance of incompatibilities. Here the various incompatibilities will be considered according to the main classes of drugs and preparations.

Acids—All common acids, except hydrocyanic, decompose the carbonates and bicarbonates with the liberation of CO_2 . Mineral acids often displace the organic acids from their salts while organic acids, except acetic, when combined with an alkali generally precipitate the heavy metals from their aqueous solutions. Glycyrrhizin is precipitated from solution by many acids.

Alkalies—Free bases (ammonia, etc.), alkaline carbonates (sodium carbonate, etc.) and hydroxides precipitate the alkaloids from their salts in aqueous solution. Alkalies also react with chloral hydrate to form chloroform.

Alcohol—Precipitates albumin, gums, such as acacia and tragacanth and many inorganic salts from their aqueous solutions. To precipitate the acacia the resulting mixture must contain from 30 or 40% alcohol before a permanent precipitate results.

Alkaloids—Generally speaking the salts of the alkaloids are soluble in water while the free base is not, but the salts of alkaloids with most organic acids, except those contained in the B.P. are insoluble in water. Alkaloids are precipitated from their salts in aqueous solution by the alkaline carbonates and hydroxides and by free bases. Salicylates, bromides, iodides and benzoates precipitate most alkaloidal salts from their aqueous solutions. Tannic acid precipitates alkaloidal salts from their aqueous solutions.

Chlorates and other oxidizing agents may explode when triturated with organic or readily oxidized substances. For example a few grains of potassium chlorate when rubbed with tannic acid will produce a violent explosion sufficient to shatter the mortar.

Iron Salts are precipitated from aqueous solution by alkaline hydroxides and carbonates and by nearly all vegetable drugs because of their tannic or gallic acid content. Ferrous salts give white precipitates with tannic and with gallic acid which turn black on standing due to their conversion into the ferric state.

Volatile Oils—The volatile oil contained in a spirit is thrown out of solution by water in the case of all official spirits except those of nitrous ether and ammonia.

Mercury is incompatible with alkaloids, glucosides and a long list of other substances. *Fixed oils and fats* form soaps with alkaline hydroxides, metallic oxides and lime water. *Resins* are precipitated from their alcoholic solutions by the addition of water. *Water* precipitates alkaloids, some glucosides neutral and bitter principles, resins and resinous matter, fats and fatty matter from their alcoholic solutions. *Epinephrine* is decomposed by alkalies, alkaline carbonates and hydroxides. *Glucosides* are decomposed by mineral acids, alkalies and ferments.

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Abstracts

THE TREATMENT OF ACNE

By SIR ERNEST GRAHAM LITTLE

The Practitioner; xliii; 5; 1936.

The term acne is now best restricted to the follicular inflammation of the skin known as acne vulgaris, found in young people chiefly in second and third decades of life and associated with the presence of the bacillus acne which is thought by some to be identical with the bacillus of seborrhoea.

Acne vulgaris is one of the commonest of skin diseases and is much more important than most practitioners realize, especially in the psychological effects which it may produce. As it is a disease of early adolescence, it is too often treated lightly by practitioners.

A symbiosis of pyogenic organisms with the bacillus acne is extremely frequent, and the pyogenic infection is considered to be secondary. The secondary infection is most frequently caused by staphylococcus albus, less often, aureus. There is always a close connection between the advent of puberty and the development of acne. This point is taken into account by Darier, who believes that the presence of bacteria is accidental and he declares that "acne localized on the chin in girls and young women is an almost certain indication of an utero-ovarian disorder." Thus he has no use for vaccine therapy, but urges endocrine treatment by ovarian, suprarenal, pituitary and thyroid extracts. The spontaneous disappearance of acne vulgaris in middle life is hard to explain.

In the treatment, any focus of infection such as septic teeth or tonsils should be removed. A vaccine should be used containing the acne bacillus as well as the pyogenic bacteria. The dose should be worked up quickly to 500 million acne bacilli and 1,000 million of the staphylococci and the patient kept on this dose. Plenty of exercise and plain living are

very helpful and the use of vitamin A preparations are useful in increasing the resistance to infections.

Besides vaccine treatment, local treatment should be carried out with one of the forms of sulphur, resorcinol, phenol or salicylic acid. If there is pustulation of the "blind boil" variety a small incision should be made. X-ray treatment should be used in the most obstinate cases and then preferably only on the covered parts of the body. If pustulation does not take place, mechanical evacuation of the follicle with a comedo extractor is indicated.

Acne vulgaris tends to disappear in the third decade, but sustained, careful and intelligent treatment can undoubtedly shorten the term of the disfiguring disorder.

H. NORRY, '38.

ACUTE STREPTOCOCCAL INFECTIONS OF THE MIDDLE EAR

By MOLLISON

B.M.J.; 3951; 615; 1936.

A discussion held in 1930 at a meeting at the Ear and Throat Sections of the Royal Society of Medicine contained very valuable information as to the way in which the streptococcus arrived in the middle ear, causing an acute otitis media.

Mr. Barwell stated that the spread of inflammation to the ear was caused by continuity along the mucous membrane to and along the Eustachian tube, or by discharges from a septic focus in the nose being blown through the Eustachian tube into the tympanum.

The commonest cause of acute ear infection is from an acute infection of the entire respiratory tract such as is found in the common cold, tonsillitis, influenza, or streptococcal infections after the removal of tonsils. Particularly is this the case if the antrum becomes infected.

Other causes are measles, scarlet fever, fresh water bathing and the use of nasal douches. The nasal mucus acts as an antiseptic and when removed or diluted by the use of water loses this property. The virulence of the streptococcus may be enhanced by the presence of another micro-organism or by the virus of the common cold.

Prophylaxis—

Infected adenoids and septic foci in the nose and para-nasal sinuses should be removed. Patients who are susceptible to colds and acute ear infections should have a course of anti-catarrh vaccine treatment. Patients who are shown to be susceptible to haemolytic streptococcus by the Dick Test should be immunized against this organism.

Treatment—

In cases of acute otitis media and mastoiditis, incisions should be made in all cases of pain, obvious general bulging of the membrane and high temperature. A midnight operation is unnecessary. The patient should be treated in the following way:

- (a) Make cultures of the serosanguinous fluid.
- (b) Give the appropriate serum.
- (c) Take a blood count.
- (d) Group blood with a view to possible blood transfusion.

Marked advance has been made in the treatment of severe cases of otitis media with complication of mastoiditis, by the use of blood transfusions and pent-nucleotide injections.

J. C. MACWILLIAM, '39.

INEQUALITIES OF THE FEMORA

By E. N. WARDLE

The Clinical Journal; 2000; 9; 1936.

The fact that inequalities occur in the length of the femora for no obvious cause in a great proportion of individuals is now quite established. However, the symptoms accompanying such asymmetry have not received the attention they deserve.

In a series of thirteen cases, seven of the patients had pain in the back or leg and two of them had associated scoliosis. Three had scoliosis unassociated with pain. One had a limp, another com-

plained of pain in the foot and had a pes cavus, while the last had an internal derangement of the knee. Careful examination in all these cases revealed no other symptom for the pain and deformity except inequalities in both legs averaging $\frac{5}{8}$ inch.

The aetiology of this inequality is unknown, but the following treatment is advocated giving in the main success and relief of symptoms.

1. Conservative—involving compensatory alteration to the shoes using a $\frac{1}{4}$ " cork insole.
2. Radical—lengthening of the affected femur by osteotomy.

3. Lumbar ganglionectomy—resulting in increase of blood-supply, the principle being that hyperaemia due to infection sometimes increases the length of a limb.

The latter has not yet been accepted and the conservative method is enjoying most favour at present.

Therefore, it is very important that the lower limbs be measured in all cases of pain in back or leg, and deformity of the spine for which no obvious cause can be found.

SYDNEY LURIA, '38.

DIPHTHERIA IMMUNIZATION

By T. ADAM

The Clinical Journal; 1996; 5; 209; 1936.

The question of immunization against diphtheria has come into greater prominence on account of the recent increased incidence of diphtheria in Great Britain.

The spread of diphtheria is not at all analogous to that of smallpox. Every case vaccinated against smallpox is not only rendered immune, but ceases entirely to be a danger to others, in the way of harbouring and spreading the specific infection of smallpox. That is far from true with diphtheria, because cases immunized against it often continue to be carriers. Further, the bacilli in many of such cases take on a more virulent form, so that carriers may be a greater danger to others than before. The author states that the results obtained by certain observers rather indicate that the rapid transference of Schick-susceptibles into Schick-immunes by artificial immunization augments the carrier rate for virulent diphtheria bacilli, and increases diphtheria morbid-

ity among the unprotected members of the community.

The author believes that were diphtheria immunization generally affected among children of the pre-school age, and backed up by a 70 to 80 per cent immunization among school children, diphtheria would become a very rare disease. However, experiences with regard to vaccination indicate that such a scheme could not, without compulsion, be accomplished in diphtheria immunization, and public opinion, in Great Britain at least, is distinctly against compulsory measures.

A. WILENSKY, '38.

CONTINUOUS ACID ADSORPTION
BY ALUMINUM HYDROXIDE
DRIP IN THE TREATMENT
OF PEPTIC ULCER

By WOLDMAN AND ROWLAND

Review of Gastroenterology; 3; 1; 1936.

This article outlines a treatment of peptic ulcer designed to eliminate the disadvantages of medical ant-acid treatment, which are:

- (a) Alkalosis — contra-indicated in cases of renal damage.
- (b) Secondary acid secretion.
- (c) Intermittency—a long night period without neutralization of acid secretion.
- (d) Long period of treatment—average about 40 days.

Apparatus: Consists of an elevated water bottle with tube outlet and clamp leading to a lower bottle which is connected with a siphon system filled with 800 cc. of a 1% Aluminum Hydroxide suspension and which leads by a Levin nasal tube to the stomach. The flow is regulated to 5 or 6 drops per minute.

Action: Aluminum hydroxide is an amphoteric substance in colloidal suspension. Its action in the stomach is both physical and chemical. The physical action is an adsorption of Hydrochloric acid, followed (when heat and concentration are increased) by chemical union. It is not absorbed in any appreciable amount from the gastro-intestinal tract, and does not irritate either the gastro-intestinal or urinary tracts. It does not change the carbon dioxide combining

power, or the pH of the blood.

Advantages:

- (a) No alkalosis results.
- (b) Since intermittency is eliminated, secondary secretion does not occur.
- (c) Frequent feedings are not longer necessary.
- (d) A constant achlorhydria is produced.

Results:

- (a) Gastric and duodenal ulcers are healed in 7 to 14 days.
- (b) Relief from night pain is obtained.

ARTHUR VOGELSANG, '38.

THE MISUSE OF TANNIC ACID

By FREDERIC TAYLOR

J.A.M.A.; 106; 14; 1936.

The fallacy of using tannic acid in the treatment of second degree burns or those less severe is clearly demonstrated in this article. The author bases his conclusion on the observations of tissue changes occurring in the burned and subsequently tanned skin.

When skin is burned a varying thickness of epithelium is necrosed. If this involves only the superficial layers, regeneration takes place quite rapidly from the remaining germinal layers. When the latter is also destroyed, regeneration takes place from the depths of the hair follicles and sebaceous glands, where the growth of epithelium proliferates over adjacent granulation tissue, thus eventually covering the entire surface.

The action of tannic acid applied to the burned area in which viable islands of germinal epithelium still survive does not limit itself to the dead tissue. The tannic acid continues to penetrate and "tans" the underlying viable epithelial cells, the very cells that might have taken such an active part in the regeneration of the surface epithelium. Repair is thus delayed.

Therefore, for the milder and less severe burns the author suggests:

- (1) Bland dressings of saline solutions.

- (2) Dilute solutions of Sodium Hypochlorite.
- (3) Ointments.

These are administered until it can be determined just which epithelium will survive and which will die. Coagulation treatment should be reserved for the most severe types of burns.

HERBERT J. LIPSON, '38.

THE GOLD TREATMENT OF RHEUMATOID ARTHRITIS

By HARTFALL AND GARLAND

Lancet 230; 26; 1459; 1936.

The authors record the results of 374 cases of rheumatoid arthritis which they have treated by the injection of gold salts. Special reference is made to 300 cases which received at least one full course of treatment.

Treatment—

A course of treatment consists of weekly injections of from 0.05 g. to 0.1 g. of the gold salt (gold sodium thio-sulphate) until a total of 1 g. has been given. This course should be given at least twice, with an interval between courses of 12 weeks. Injection may be by either the intravenous or intramuscular route. The authors made no attempt to modify the dosage with regard to the weight of the patient on the metallic gold content of the various gold salts used.

Reactions—

Slight painful exacerbations in the joints were frequent, especially during the first half of the course of injections. However, the authors are of the opinion that such reactions show a favourable prognosis.

Toxic reactions occurred in 88 cases in the series, or about 37%. These fell into two main classes: cutaneous—

erythema, pruritis or desquamation, and alimentary—sore mouth, vomiting or jaundice. The jaundice was of a transient nature and left no hepatic damage.

Four deaths, all in middle aged women, were believed directly due to the treatment. All four developed aplastic anaemia as a direct effect of the drug on the haemopoietic tissues. Dysphagia and oesophageal ulceration were also present in these cases. These fatalities were considered examples of gold idiosyncrasy.

They found that injection of the gold dissolved in calcium gluconate, as recommended by H. J. Williams, had no effect in reducing the toxic symptoms.

Results—

The authors found that in nearly every case treated, no matter how hopelessly crippled the patient was, there were some joints where the process was still active and responsive to treatment.

In the following table, the term "cure" refers to complete freedom from pain and disability other than that due to bony ankylosis. Any cases falling short of this standard, but still showing most dramatic results, are termed "marked improvement."

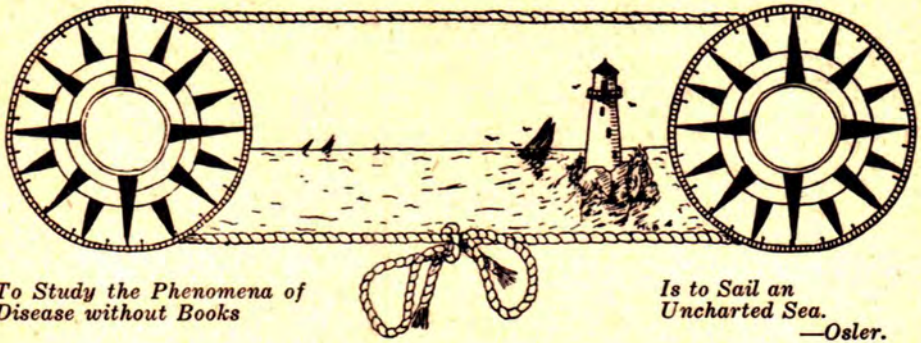
Result	Cases	Per Cent
Apparent Cure.....	25	8.3
Marked Improvement...	208	69.3
Slight Improvement.....	45	15.0
No Improvement.....	17	5.6
Worse	1	0.3
Died	4	1.3

In addition, there was a noteworthy improvement in the patients' general health.

The authors consider the only contra-indications to this form of therapy are gross hepatic or renal disease.

They conclude that gold therapy is the most notable advance in the treatment of this hitherto incurable disease.

J. B. TINDALL, '38.



*To Study the Phenomena of
Disease without Books*

*Is to Sail an
Uncharted Sea.*
—Osler.

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- Bailey—Emergency Surgery; 2d ed. 1936.
 Beck—Obstetrical Practice. 1935.
 Begg—Faith Healing. 1932.
 Boyd—The Pathology of Internal Diseases; 2d ed. 1935.
 Boyd—A Study of the Simile in Medicine. 1936.
 British Medical Directory. 1936.
 Brown—Psychology and Psychotherapy; 3d ed. 1934.
 Bull—From Medicine Man to Medical Man. 1934.
 Chamberlain—Symptoms and Signs in Clinical Medicine. 1936.
 Christopher—A textbook of Surgery. 1936.
 Christopher—Minor Surgery; 3d ed. 1936.
 Codman—The Shoulder. 1934.
 Cushing—From a Surgeon's Journal. 1936.
 Delafield & Prudden—Textbook of Pathology; 16th ed. 1936.
 Dodge—Medical Mycology. 1935.
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Editorial

IT has been asked that I draw your attention to some phases of the study and practice of medicine, which lie on the side lines of the routine study and pursuit.

You are now all about to pass from the confines of your Alma Mater to put into use the learning you have so far acquired and to add to this store by continued study, while the buffeting, to which you will be subjected in life, will round out an education in the great school of experience.

No doubt some of you already have plotted out a course along general or some special lines. Under any circumstance I would suggest that, in addition to your hospital internship, you would be well advised to spend some time in general practice. By doing this you would get a much better perspective of disease in its varied relationships. You would also acquire ability to adapt yourselves to emergencies and to the unusual.

All this time, well selected books should be your constant companions. Particular attention should be paid to the subjects of applied anatomy and applied physiology, general pathology and pharmacology, as these are the sound bases of all practice. A good general knowledge of these will enable you to think more clearly of your problems and to discuss them with enlightenment.

Before long you will be looking around for a place to set up in practice. I am often asked the question, "Where can I locate?" My reply is always—find where you want to live, or shall I say, where you have an "attraction," and settle down to work. Your success should not be measured by the financial emolument you pile up, but rather by what you have added both to the science of medicine and the prestige of the Profession, and to what extent you have contributed to the sum total of human health and happiness and the elevation of the general plane of the human intellect. You should be leaven in the community.

Of necessity, medicine must necessarily have a monetary value, but be heedful that this phase does not become too absorbing.

This element naturally brings to our mind the possibilities, to some

From an address given by Dr. J. A. Macgregor to the final year at their annual banquet.

of the Profession at least, of State Medicine. To some of the public and to some of the Profession this might solve an economic problem, but I fear it will tend to make us simply units in the wheel of a huge machine. In this way progress would tend to be crushed and individuality lost. The incentive to progress would be sadly lacking.

Your relation to your patients and the rest of the Profession should stand for some serious consideration. With regard to this, the application of the principles of the Golden Rule should supply a solution in most difficulties.

A word about consultations—let me say that you seldom lose anything by suggesting one. By all means sense the presence of any unusual concern, the possibility of any slight loss of confidence or of dissatisfaction before either, the latter especially, appears in the open. The advice of a consultant can be suggested, in most instances, without creating any alarm on the part of the friends or the patient, and their respect for you and confidence in you will in no way be impaired. If there is any unconcealed dissatisfaction, and another opinion is suggested, or more definitely demanded, one can be quite sure that your status in that home is seriously undermined, if not lost entirely.



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