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THE CLINICAL SIGNIFICANCE OF THE AUTONOMIC NERVES SUPPLYING THE VISCERA, AND THEIR RELATIONS TO THE GLANDS OF INTERNAL SECRETION

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When we consider how carefully the cerebrospinal nerves have been studied, and how important each small twig is for the clinical pathology of disturbances of sensation on the one hand or of motility on the other, and then turn to the paucity of studies bearing upon the nerves which supply the viscera, we cannot help being impressed with the contrast. The lack of knowledge in the latter domain is all the more striking when we recall that it is precisely with the viscera that we, as workers in internal medicine, are predominantly occupied; except for scattered and non-systematic observations, the field of visceral neurology has, clinically, until recently, remained practically unexplored. The nerves going to the internal organs have, however, during the past two decades, strongly attracted the activities of anatomists, physiologists and pharmacologists, and their researches have thrown a brilliant light into regions hitherto obscure. They have revealed a series of mechanisms which, though of considerable complexity, are proving to be of the greatest importance, not only for the functions of the viscera themselves, but also for those of the body as a whole. It turns out that the nerves supplying the viscera stand in a position intermediate between the cerebrospinal nervous system and the internal organs; both the central nervous functions and the visceral functions are to a large extent dependent upon the mode of functioning of the visceral nerves. The state of tonus in the visceral nerves is

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in turn apparently dependent first, upon the nerve impulses transmitted to them from the brain and spinal cord, and secondly, upon the action of chemical substances, including the so-called hormones, produced in various organs in the body, and especially in the glands of internal secretion. In the third place, the amounts of certain ions (Ca, Mg, Na, etc.) present in the medium through which the nerve terminals act upon the end-organ (smooth muscle; secreting gland) seem profoundly to influence the activities of the system concerned.

ARCHITECTURE OF THE VISCERAL NERVOUS SYSTEM.

It has been common to designate as the "animal," "somatic" or "cerebrospinal" nervous system the nerve paths related to the sense organs on the one hand and to the voluntary muscles on the other, and as the "sympathetic," "vegetative" or "visceral" nervous system the nerve paths which innervate the more automatic internal organs, especially all those organs containing involuntary muscle or secreting glands, or both. Thus the smooth muscle of the bronchi, of the stomach and intestine, of the blood vessels, of the skin, of the genital apparatus, and of the eye, are all so innervated, as are the secreting glands of the whole body—sweat glands, salivary glands, lacryman glands, mucous glands, gastric and intestinal glands, liver, pancreas, kidneys, and the glands of internal secretion.

The centripetal paths in the domain of the sympathetic nervous system are as yet but poorly understood, but the centrifugal paths, thanks to the researches of the histologists on the one hand, and the studies of physiologists like Gaskell, Langley, and their co-workers on the other, are now fairly well known to us. The centrifugal paths of the sympathetic system differ from those of the cerebrospinal system fundamentally in one point. In the cerebrospinal system the spinal cord is connected with a voluntary muscle fibre by means of a single neurone, the axis cylinder of which goes all the way from the anterior horn to the muscle without interruption. In the sympathetic system at least two neurones make up the path from the cerebrospinal axis to the smooth muscle or the secreting gland. Take, for example, the neurones connecting the spinal cord with a viscus. Of these two neurones, the first has a cell-body in the spinal cord, and its medullated axone (so-called preganglionic fibre) runs through the anterior root of a spinal nerve and through the white ramus communicans into the sympathetic system, there to pursue a course of variable length, sometimes passing through several sympathetic ganglia, in order finally to terminate in an end-

arborization (or synapse) upon the cell-body of the second neurone of the path, situated in some sympathetic ganglion. The axis cylinder of this second neurone is non-medullated and is known as a post-ganglionic fibre; it extends from the ganglion to the smooth muscle fibres, or to the secreting gland, which it innervates. Between the nerve terminal and the muscle or gland there seems to be an intervening substance (myoneural, or adenoneural); and in this medium the ions of calcium, sodium, etc., seem to exercise important functions.

It has long been known that many of the viscera receive nerve-impulses not only from the sympathetic system, but also through other nerve paths. Thus, though the heart receives impulses through the sympathetic which increase the rate of its beat, it also receives impulses through the N. vagus by which the rate of its beat is decreased. Similarly, the smooth-muscle of the gastrointestinal tract has long been known to be doubly innervated, contraction being stimulated through the N. vagus, and inhibited through the N. sympathicus. The smooth muscle which controls the size of the pupil is also doubly supplied; the pupil dilates when the cervical sympathetic is stimulated, and it contracts when the N. oculomotorius is excited. It remained, however, for later studies to demonstrate: (1) that such a double and reciprocally antagonistic innervation holds throughout the whole body as regards smooth muscle and secreting glands, (2) that each of the two innervating systems has a similar architecture, the centrifugal path in each system between the cerebrospinal axis and the periphery consisting of at least two sets of superimposed neurones. The two antagonistic systems taken together have been called by Langley the "autonomic nervous system." What was formerly called the sympathetic system is that part of the autonomic system which is connected chiefly with the cervical, thoracic, and lumbar portions of the spinal cord; while those parts of the autonomic system connected chiefly with the mid-brain (fibres running in the N. vagus in the N. oculomotorius), with the medulla oblongata (fibres running in the N. and N. glossopharyngeus) and with the sacral portion of the spinal cord (fibres running in the N. pelvius) are known as the "autonomic proper," or, better, as the "craniosacral autonomic system."*

In addition to these two sets of nerve fibres going to each viscus, some organs have an intrinsic nervous mechanism, partly subor-

*The anatomy and physiology are still further complicated by the fact that each of these two systems contains two sets of fibres—one "favoring" the main function subserved, the other "inhibiting" it. For simplicity of presentation, this point is not extensively elaborated in my paper.

dinate to the two autonomic systems, partly independent of them; the plexuses of Auerbach and Meissner of the intestinal wall may be cited as an example.

THE EFFECTS OF ELECTRICAL STIMULATION OF THE OPPOSING AUTONOMIC SYSTEMS.

In the region of the eye, electrical stimulation of the sympathetic causes dilatation of the pupil (*M. dilatator iridis*) and contraction of the orbital muscle, while electrical stimulation of the mid-brain autonomic (*N. III*) contracts the pupil (*M. sphincter iridis*) and causes accommodation spasm (*M. ciliaris*).

In the salivary glands, stimulation of the sympathetic arrests salivary secretion, while stimulation of the hind-brain autonomic (*chorda tympani*) causes profuse salivation.

In the cardiac area, electrical stimulation of the sympathetic (*N. accelerator*) causes tachycardia, while electrical stimulation of the hind-brain autonomic (*N. vagus*) causes bradycardia.

In the digestive system electrical stimulation (*N. vagus*) causes increased secretion and hypermotility, while excitation of the sympathetic diminishes secretion and leads to relaxation of the smooth muscle.

In the pelvic domain electrical stimulation of the *N. pelvicus* causes contraction of the detrusor of the bladder, while electrical stimulation of the sympathetic relaxes this.

CHEMICAL STIMULATION OF THE OPPOSING AUTONOMIC SYSTEMS.

The effects of chemical substances upon the autonomic nervous system as a whole and upon its various parts have been studied especially by the pharmacologists and experimental physiologists.

Nicotine acts up on each of the two antagonistic autonomic systems, interrupting conduction at the junction (synapse) of the pre-ganglionic fibres with the cell bodies of the neurones which give rise to the post-ganglionic fibres in the ganglia.

Certain chemical substances, however, show an elective affinity for one or the other of the two autonomic systems. For the sake of brevity, the craniosacral autonomic system is usually referred to as the "vagal system," since it includes the autonomic fibres of the *N. vagus*, while the cervico-thoraco-lumbar autonomic system is usually referred to briefly as the "sympathetic system."

Epinephrin, or adrenalin, heightens the activity of the organs innervated by the sympathetic proper, but does not directly affect the functions depending upon innervation by the vagal system. The administration of epinephrin, therefore, is followed by symptoms similar to these yielded by electrical stimulation of the sym-

pathetic (vaso-constriction, tachycardia, mydriasis, dry mouth, glycosuria, gastro-intestinal hypomotility); those who believe that adrenalin acts upon the sympathetic nerve speak of it as a definitely sympathicotropic drug; others believing that it may act on the myoneural or adenoneural junction rather than on the nerve itself, prefer the term "sympathomimetic" to the term "sympathicotropic" or "sympathicotonic."

Certain other drugs act almost as electively toward the vagal system as does epinephrin toward the sympathetic. They are the so-called vagotropic drugs, and include two groups. The members of the first group, including pilocarpin, muscarin, physostigmin, cholin and digitalis, stimulate the vagal system; they are "vago-mimetic," producing effects identical with those which follow electrical excitation of this system (miosis, salivation, bradycardia, gastric hyperacidity and hypermotility, pollakiuria). The members of the second or "vagoparalytic" group, including atropin, hyoscin and euphthalmin, seem to paralyze the terminals of the vagal system and lead therefore to effects similar to those resulting from electrical excitation of the antagonistic sympathetic system (mydriasis, dry mouth, tachycardia, etc.)

As yet no drug has been discovered which paralyzes the whole sympathetic system comparable with the general exciting effect of epinephrin. A drug known as ergotoxin, which has been studied by Dale, seems to paralyze especially the so-called favoring sympathetic fibres, but not the so-called inhibiting fibres.

The vagotropic drugs also act somewhat less generally throughout the whole cranio-sacral autonomic system than does epinephrin on the sympathetic proper; thus atropin acts more vigorously on the autonomic fibres innervating the head and the heart than upon the fibres situated more caudalward; it has relatively little effect upon the sacral autonomic fibres innervating the pelvic viscera. Again, pilocarpin exerts its maximal effect upon secretory fibres, having relatively little effect upon cardio-inhibitory fibres. Muscarin, on the contrary, inhibits the heart vigorously, and may cause standstill through vagus irritation.

From what has been said, it is obvious that in studying clinically a phenomenon in autonomic domains, we have to try to find out whether, in the doubly innervated organ, the effect is due to excitation of one system or to paralysis of the other system. A tachycardia, for example, might be due to stimulation of the N. accelerans, say by coffee, or to paralysis of the N. vagus. Again, a dilated pupil may be the result either of sympathetic irritation or or oculo-motor (autonomic) paralysis.

In addition to chemical stimulation by substances of exogenous origin, the antagonistic autonomic nervous systems are constantly being influenced by substances of endogenous origin originating in the body metabolism. Among the sympathicotropic substances of endocrine origin may be mentioned: (1) epinephrin, (2) iodothyrim, and (3) pituitrin. Many believe that the epinephrin (adrenalin), which is being constantly formed in the medulla of the adrenals and in the chromaffine system generally, is responsible for a continuous excitation (or perhaps sensibilization) of the sympathetic system proper. At any rate, epinephrin produces effects in the body similar to the effects of electrical stimulation of the sympathetic; it is thus a "sympatho-mimetic" substance, in the sense of Barger and Dale. The exact place of action is still in dispute, though the evidence favors the view of Elliott that it is neither in the nerve itself nor in the end-organ, but in a special structure intercalated between the two—in the case of smooth muscle at the "myoneural junction." Less general in their effects, but also, apparently, sympathicotonic in nature, are the substances iodothyrim and pituitrin. Iodothyrim, a hormone originating in the thyroid gland, has an especial effect upon the thoracic and cervical sympathetic, and leads, when present in excess, to tachycardia, widened lid slits, exophthalmos and hypersusceptibility of the pupils to epinephrin. Pituitrin arising in the posterior lobe of the hypophysis, causes vaso-constriction (other than renal), polyuria, and vigorous contraction of the bladder and uterus.

Among the vagotonic drugs of endogenous (or endocrine) origin may be mentioned cholin, which is formed in the cortex of the adrenals. Experiments with cholin show that it possesses an action very similar to pilocarpin. It is certainly interesting that one small organ like the adrenal gland manufactures in its medulla the substance epinephrin (adrenalin) which is sympathicotonic (sympathomimetic) in its effects, and in its cortex another substance, cholin, which is vagatonic (vagomimetic) in its effects. Extracts of the whole adrenal would, therefore, contain two substances which, as far as the two autonomic systems are concerned, tend to neutralize one another.

There are probably other vagotropic hormones formed in the body, but our knowledge of them is as yet very meagre. We know, for example, that the internal secretion of the pancreas antagonizes epinephrin (or the formation of epinephrin), a fact doubtless of importance in connection with the pathology of some forms of diabetes mellitus. Again, in congenital insufficiency of the chromaffine

system (status thymico-lymphaticus), or in acquired insufficiency of this system (Addison's disease), the craniosacral autonomic innervations are in excess of the sympathetic innervations, many think because of deficiency in the supply of the sympatheticotonic hormone, epinephrin.

In how far those sudden and violent excitations of the autonomic nervous system which accompany strong emotions are due to the intervention of the glands of internal secretion, and in how far they depend upon direct neural conduction from the brain, we are as yet but ill-informed. I need only remind you of the vaso-dilatation of the face in the blush of shame, of the stimulation of the lacrymal glands which yields the tears of sorrow, of the palpitation of the heart in joy, of the stimulation of the sudoriparous glands which precedes the sweat of anxiety, of the stimulation of the vaso-constrictors, the pupil dilators and the pilomotor in the pallor, mydriasis and goose-skin of fright, to illustrate some of these violent autonomic excitations. While we do not yet understand the exact mechanisms of association among the activities of the cerebrum, the endocrine glands and the reciprocally antagonistic autonomic domains and their end-organs, we can begin to see the paths which must be followed in order that more exact knowledge may be gained.

In the following table, compiled from the papers of several authors (Langley, Brodie and Dixon, Elliott, Dale, Meyer and Gottlieb, Eppinger and Hess, Fröhlich and Loewi, Biedl, Higier) the effects of electrical and chemical stimulation of the two autonomic systems are epitomized.

THE TONUS IN THE AUTONOMIC SYSTEMS, AND THE BALANCE MAINTAINED.

While the body is alive there is, constantly, a certain amount of activity in each of the antagonistic systems. In other words, a certain "tonus" prevails in each system, maintained (1) by stimuli arriving in the autonomic systems through neural paths, and (2) by direct chemical action (hormones) upon the systems. This matter of tonus* is very complex, since so many factors, neural and chemical, are involved, and since each system can be acted upon at any one of several points between the cerebral cortex and the end-organ (smooth muscle; secreting gland). The balance maintained normally between the two antagonistic systems is one of the most interesting of physiological phenomena. Think, for example, of the rate of the heart beat—how constantly it is maintained at a

*A distinction must, of course, be made between tonus and excitability.

given level in each individual when the body is at rest; the impulses arriving through the vagal system just balance those arriving through the sympathetic system, so as to maintain a rate of approximately seventy-two beats per minute. And a similar balance is maintained in other autonomic domains (e.g., pupils, bronchial musculature, gastric glands, gastro-intestinal muscle, sweat glands, bladder muscle, etc.).

This equilibrium is all the more remarkable when one considers how frequently it is temporarily upset in the exercise of physiological function. The play of the pupils with varying light, the watering of the mouth at the smell of savory food, the response of the heart to exercise and emotion, the flow of gastric juice on adequate stimulation, the opening of the bile duct at the call of the chyme, the transport of the colonic contents through one-third of the length of the colon through one vehement contraction every eight hours, the sudden relaxation of the sphincter and contraction of the detrusor of the bladder in micturition, the violence of contractions in the domain of the N. pelvicius in parturition in the female and in ejaculation in the male, come to mind at once as examples of sudden physiological overthrow of balance.

AUTONOMIC DISTURBANCES MET WITH CLINICALLY.

Since 1910 I have been interested in examining the patients in the medical wards of the Johns Hopkins Hospital with especial reference to pathological disturbances of innervation in autonomic domains. One of my associates, Dr. Frank J. Sladen, the resident physician of the hospital, has been my co-worker in this study and we have already published a preliminary report on the subject in the *Transactions of the Association of American Physicians*.

Among the patients suffering from so-called functional nervous disorders (neurasthenic, hysterical and psychasthenic states) or from disturbances of the glands of internal secretion (the thyro-pathies, diseases of the hypophysis, diseases of the chromaffine system, diseases of the genital glands, etc.), we have found a material very suited to our purposes, from which we have obtained a rich yield in "autonomic" symptoms.

On this occasion time will not permit of any extensive analysis of these cases. Suffice it to say that we have been impressed by the possibility of enrichment of the clinical histories in patients of these types by careful attention to the symptoms referable to abnormal autonomic innervation. We have been struck with the fact that when one abnormal autonomic sign is observable, a systematic examination of the viscera with autonomic innervations in

mind will almost always reveal a number of other deviations from the normal. The kinds of symptoms and signs observable may readily be deduced from an examination of the table given on page 116, in which the effects of electrical and chemical stimulation are recorded. For clinical purposes the following table of the more common symptoms resulting from pathological innervation of smooth muscle and secreting glands may be convenient.

a. SYMPTOMS AND SIGNS IN THE HEAD AND NECK.

(a) *The Eyes.* These include (1) myosis and mydriasis; (2) accommodation spasm and accommodation paralysis; (3) widened and narrowed lid slits; (4) Von Graefe's sign; (5) Dalrymple's sign; (6) infrequent winking (Stelwag); (7) insufficient maintenance of convergence (Moebius); (8) exophthalmos and enophthalmos; (9) epiphora and dryness of the eyeballs; (10) Loewi's test (positive adrenalin mydriasis); (11) Argyll-Robertson pupil; (12) anisocoria.

(b) *In the Nose and Mouth.* (1) excess of saliva with constant spitting; (2) dry mouth or xerostomia; (3) coryza vaso-motoria.

(c) *In the Skin.* (Vide infra.)

(d) *In the Meninges.* Pain of vaso-motor origin (cephalgia; hemicrania).

b. SYMPTOMS AND SIGNS REFERABLE TO THE RESPIRATORY SYSTEM.

(1) Laryngismus and laryngeal crises; (2) asthmatic attacks; (3) pulsus irregularis respiratorius; (4) Aschner's phenomenon (pressure on the eyeballs stimulating the first, the trigeminus and then, reflexly, the vagus and leading to arrest of respiration in the expiratory phase, with slowing of the pulse).

c. SYMPTOMS AND SIGNS IN THE CIRCULATORY SYSTEM.

(1) Tachycardia; (2) bradycardia; (3) changes in conduction time (dromotropic disturbances); (4) pulsus irregularis extrasystolicus; (5) angina vaso-motoria; (6) Aschner's phenomenon (vide supra); (7) changes in blood pressure; (8) peripheral hyperemias and anemias; (9) intermittent claudication; (10) dyspragia intermittens intestinalis; (11) acrocyanosis; (12) urticaria.

d. SYMPTOMS AND SIGNS IN THE DIGESTIVE APPARATUS.

(1) Esophagismus; (2) cardiospasm; (3) gastric neuroses (hyperacidity, achylia, gastrosuccorrea, pylorospasm, gastrospasm, gastric atony); (4) atonic and spastic constipation, diarrhea nervosa, colica mucosa, and sphincter spasm.

e. SYMPTOMS AND SIGNS IN THE URO-GENITAL SYSTEM.

(1) Retention and incontinence of urine; (2) pollakiuria and tenesmus; (3) renal colic; (4) disturbances of libido, of erection, of ejaculation and of orgasm; (5) uterine atony and certain menstrual disturbances.

f. SYMPTOMS AND SIGNS IN THE CUTANEOUS SYSTEM.

(1) Goose-flesh; (2) trichopilar crises; (3) contractions of smooth muscle of tunica dartos and of nipple; (4) hyperhidrosis and anhidrosis (unilateral or bilateral); (5) bromidrosis; (6) vasoconstriction (pallor); and vaso-dilatation (erythema); (8) dermographismus.

g. SYMPTOMS AND SIGNS REFERABLE TO THE HEMOPOIETIC, METABOLIC, AND ENDOCRINE ORGANS.

(1) Eosinophilia; (2) eosinopenia; (3) lymphocytosis; (4) status thymico-lymphaticus; (5) the pigmentations; (6) increased or diminished glucose tolerance (glycosuria); (7) increased or diminished fat tolerance (steatorrhea).

LOCAL AND GENERAL FORMS OF ABNORMAL VAGOTONY AND SYMPATHICOTONY.

Dr. Sladen and I in our studies have tried to find out whether or not the conception of a clinical abnormal vagotony or sympathicotony, as postulated by the Viennese clinicians, Eppinger and Hess, is justifiable. The experimental physiological studies and the pharmacological researches bearing upon the reciprocal control of the two antagonistic subdivisions of the autonomic nervous system to which I have already referred, having yielded such interesting results, an attempt at clinical application was almost certain to follow. For it would seem *a priori* not improbable that neural and chemical disturbances arising from various natural causes, and resulting in increased or decreased excitability or in too high or too low a tonus in either of the two systems, could be accountable for recognizable clinical symptoms.

While the writings of clinicians contain many instances of disturbance which we can now see belong to the autonomic domain, it is to Eppinger and Hess that we owe the establishment of the clinical conceptions of "vagotonia" and of "sympathicotonia"—conceptions which bring symptoms in widely separated parts of the autonomic domain together. They separate a so-called "vago-tonic constitution" from an outspoken clinical "vagotonia," the former being characterized by (1) a hyper-sensitiveness to pilo-

carpin, (2) a relative insusceptibility to sympathetic stimuli, and (3) various clinical symptoms indicating heightened tonus throughout the cranio sacral autonomic system. The sympathicotonic constitution, in turn, is characterized by (1) a hypersensitiveness to epinephrin, (2) a relative insusceptibility to pilocarpin and atropin, and (3) various clinical signs of heightened tonus throughout the sympathetic system proper.

Clinically, an outspoken case of vagotonia may include a varying number of the following signs (corresponding to stimulations of the craniosacral system):—small pupils, accommodation spasm, wide lid slits, salivation, epiphora, profuse sweating, reddened face, cold and moist hands and feet, bradycardia, pulsus irregularis respiratorius, bronchial asthma, eosinophilia, hyperacidity, gastrospasm, cardiospasm, pylorospasm, spastic constipation, biliary colic of nervous origin, anal-sphincter cramp, pollakiuria, and priapism.

In the studies made with Dr. Sladen, we found that in a certain number of cases a fairly general vagotonia or a fairly general sympathicotonia may exist, though local vagotonias and sympathicotonias are common; a large number of cases present vagotonic signs in one domain and sympathicotonic signs in another domain; and in some cases mixed signs in a single domain were met with.

We have used the pharmacodynamic method in the control of our cases. As a stimulant of the craniosacral (or "vagal") system we have given pilocarpin hypodermically in doses of 0.01 to 0.003 grams (grs. 1/6 to grs. 1/20), and as a paralytant of the same system, atropin hypodermically in doses of 0.001 to 0.00065 grams (grs. 1/50 to grs. 1/100). As a sympathetic stimulant we have used epinephrin (adrenalin) usually in doses of 1 mg. hypodermically. Some use for these tests 1 mg. atropin, 1 cg. pilocarpin and 1 c.cm. of adrenalin solution (1:1000)*.

We found some patients who reacted in an outspoken way to both pilocarpin and epinephrin, each of the two systems seeming to be hypersensitive. The pilocarpin-sensitive patients react with salivation, sweating, nausea, epiphora, flushing, and a fall in blood pressure. They react to atropin by palpitation, dryness of the mouth and throat, and precordial oppression. The epinephrin-

*Higier recommends systematic pharmacodynamic testing as follows: (a) Conjunctival instillation and subcutaneous application of epinephrin; (b) Subcutaneous injection of epinephrin, 0.01 m.g. per kg. of body weight three hours after swallowing 100 grams of glucose (to determine glucose tolerance); (c) Subcutaneous injection of atropin sulphate, 0.01 mg. per kg. of body weight; (d) Injection of pilocarpin muriate 0.1 mg. per kg. of body weight.

sensitive patients on being given epinephrin react with tremor, sense of cold, rigor, glycosuria and rise in blood pressure.

An analysis of the various pharmacodynamic reactions observed in twenty-one cases in this way will be found in our published paper. In six patients who exhibited marked sensitiveness to pilocarpin, the vagotonia varied somewhat in different domains, though, usually, the vagotonic signs were most marked in that portion of the autonomic domain to which belonged the clinical symptom which had first attracted our attention. Thus, for example, in a patient suffering from bronchial asthma, certain other symptoms in the hind-brain domain were conspicuous. In epinephrin-sensitive cases, also, there was no sure way of prophesying in what domains the sympathetic signs would be most conspicuous.

We also studied the correlation between clinical symptoms and pharmacodynamic autonomic reactions in another way. Taking the cases which clinically showed various vagotonic manifestations, we found that in twenty-eight instances the response to vagotropic drugs was positive in eighteen. Again, in thirty-one cases in which there were marked sympathetic signs of one sort or another observable clinically, twenty yielded a positive reaction on subcutaneous injection of epinephrin. We came to the conclusion, therefore, that a conspicuous vagotonic or sympathetic sign, as far as the material thus far studied is concerned, may also be a mark of a pilocarpin-sensitive or epinephrin-sensitive individual in about 64 per cent. of the instances.

As to whether an exaggerated tonus (or excitability) in one of the reciprocal antagonistic systems is accompanied by a diminution of tonus (or of excitability) in the other, our results differ somewhat from those of other workers. We found a harmonious agreement between the pharmacodynamic reactions and clinical manifestations in only seven of nineteen cases. In two patients who exhibited pilocarpin-sensitiveness the sympathetic signs were nearly as conspicuous as the vagotonic signs, and in three patients sensitive to epinephrin the clinical signs referable to heightened tonus in each of the systems were approximately equal. In five patients sensitive to epinephrin it must be admitted that clinically vagotonic signs predominated.

It is obvious, therefore, that the mere demonstration of pilocarpin-sensitiveness or of epinephrin-sensitiveness does not permit, in every case, of an immediate conclusion regarding heightened tonus in the vagal or in the sympathetic autonomic system. Nevertheless the setting up of a vagotonic type and of a sympathetic type

as schemata seems to us valuable and stimulating to clinical observation. The whole domain of visceral neurology should from now on be cultivated with more fruitful results, now that we begin to understand the relations of the viscera and their innervations to the central nervous system on the one hand and to the hormones arising in the endocrine glands in the other. In the pharmacodynamic tests we have, to use Januschke's fine image, tuning keys by means of which we can operate upon the complicated stringed instrument of the body, and voluntarily make one string tighter to increase its vibrations, or another looser to dampen its function.

Our studies lead us to agree with those who urge that the conception of vagotomy be not too rigidly defined; we must be prepared to meet with exceptions as yet difficult to explain, and with deviations from the pharmacodynamical reactions which might be expected. Certain of the hormones may be less elective than the physiologists have taught us to believe; thus the occurrence of vagotonic signs mixed with sympathicotonic signs in the forms of Basedow's disease accompanied by outspoken psychic disturbances (von Noorden, Jr., and others), demand more careful study. As Higier wisely remarks, the new conceptions of vagotomy and sympathicotony will doubtless undergo evolution like the majority of clinical conceptions in neurology. We can, nowadays, make a diagnosis of tabes, Basedow's disease, Parkinson's disease, or of multiple sclerosis, even in the absence of one or more of the original pathognomonic signs, or cardinal symptoms, described by their discoverers.

For therapy, as well as for diagnosis, clinical men will do well from now on to give due consideration to disturbances of the visceral nerves. In no part of internal medicine can more be expected from pharmacotherapy; we have at our disposal a host of agents—nicotine, atropin, pilocarpin, physostigmin, colchicin, adrenalin, cocaine, ergotoxin, calcium, to mention only some of them—which have already been shown to act more or less electively; may we not hope that our clinics may find out how effectively to use them and others still to be discovered, in regulating the functions of the visceral nerves in at least many of the instances when they are disturbed?

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**ADDRESS IN SURGERY—CANADIAN MEDICAL ASSOCIATION—
FRACTURES AND THEIR TREATMENT***

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It is a great privilege to be permitted to read an address on surgery at the annual meeting of the Canadian Medical Association. When your president, influenced largely, I think, by kindly feelings towards myself, invited me to read the address, in a moment of vanity I consented, and since then I have felt the responsibility more and more as the time of the meeting approached. I wish therefore to express my appreciation.

In the choice of a subject, I have been influenced largely by the fact that during the past few years, more especially since the introduction of radiography, the subject of fractures and their treatment is, perhaps, of more general interest to the members of this association, than many other subjects which might have been considered.

Time will not permit me to go into details as to the particular treatment of a particular fracture. My object is rather to consider the subject as a whole, and to make a brief review of the various methods in use, presenting a few of my own observations gathered from twenty-two years' experience as a surgeon and assistant surgeon to the Montreal General Hospital, which institution, from its situation in the centre of the largest city in our country, and within half a mile of the head of ocean navigation, has perhaps, the richest clinic in fractures in Canada.

It has been stated that in the midst of all the wonderful advances in medicine during the past thirty years, and more especially in the advances in the surgical treatment of diseases, our knowledge and treatment of fractures is much as it was in pre-Listerian days.

An exception is admitted in the treatment of compound fractures. The work of Sir William Macewan, in Scotland, Sir Arbuthnot Lane, in England, and J. B. Murphy, on this continent, during the past ten years, however, has drawn the attention of the profession to this subject, with the result that many radical changes have taken place, not only in our knowledge of bone regeneration and repair, but also in our treatment.

*Selected from the Canadian Medical Association Journal.

How far the introduction of radiography is responsible for the change it is difficult to say. It has at least added enormously to our knowledge and precision. In a brief review of the subject it is necessary to deal first with:

Repair.

It was formerly held that the periosteum was the most important tissue and that largely from it bone repair took place. Our treatment, therefore, consisted largely in attempts to cover divided portions of bone with its periosteal envelope. Where disease or injury to bone resulted in destruction of the periosteum and uncovering of the bone, we were taught to expect death of the bone at least in part. It is clearly demonstrated, largely through the experimental work of Macewan, that the periosteum itself cannot reproduce bone, and it acts as a mould, guiding and controlling new growth.

It has been a common clinical experience to find little or no callus thrown out over that portion of a fracture protected with untornd periosteum, or where a splint or other support pressed uniformly against a fracture with torn periosteum, and that in the same fracture with extensive laceration and destruction of the periosteum, producing large gaps, extensive, excessive, and irregular callus developed. Thus we learned the well-known rule of the carpenter, "the thinner the layer of glue the stronger the join," and efforts were carried out to limit and control excessive callus formation.

Our present knowledge of repair of bone may be briefly summed up as follows:

Hemorrhage, which is always present to a greater or less extent.

Inflammatory exudate of leucocytes, serum, and fibrin.

Proliferation of bone cells of osteo-genetic power (osteoblasts).

Formation of a matrix of proliferating blood vessels carrying osteoblasts.

Osteoblasts once formed proliferate rapidly, lime salts become deposited and new bone is formed.

During this process large cells, derived also from the bone cells, appear, called osteoclasts, which have the power of destroying bone, thus removing unnecessary callus.

These changes vary in individuals in accordance with varying conditions of health, and show greatest activity in the young. Thus we have great regenerative power in the young. Conversely, in older individuals, proliferation is less marked and the osteo-genetic cells more rapidly perform their evolution and become complete bone; proliferation ceasing before complete repair of a

destroyed portion of bone has taken place. Hence delayed, incomplete, and frequently non-union results.

While bone grows principally from epiphyseal cartilages, after their artificial removal, osteoblasts from the diaphysis in a measure fill the space, and while the process greatly lessens diaphyseal growth, it does not entirely cease.

The thanks of the profession are due to the British Medical Association for the report on the treatment of simple fractures recently published. This report has done much to remove many misconceptions, and I am glad to notice among its findings, that the non-operative treatment of fracture in children under fifteen years gives a high percentage of good results. Also that in children, with the exception of fractures of the forearm, open operation does not give better results than the non-operative.

Sufficient time has not yet elapsed since the publication of this report to allow a proper appreciation of all its findings. Much valuable knowledge, however, has been put before the profession. We may look forward with interest to the investigation of the American Surgical Association, the preliminary report of which was recently read at Washington by Dr. J. B. Roberts, chairman of the committee.

We may divide the treatment of fractures into four general groups:

1. Fixation with splints. Rest.
2. Fixation with splints and extension by weights as advocated by Buck many years ago, and also during recent times by Bardenheuer.
3. Ambulatory, mobilization, and massage.
4. Operative or open method.

From these various methods it is difficult to choose, but it is well to keep in mind their usefulness as adapted to the special features of a given fracture. Versatility is the successful instrument, and, for the average practitioner, no one plan should be adopted for routine practice; in fact routine practice may be said to be the cause of most of our failures. At the same time it should be the aim of each man to adopt a definite scheme of treatment and carry out its details sufficiently in each case to familiarize himself with its advantages and disadvantages.

Those of us who have had much to do with fractures become familiar with a certain line of procedure and gain a certain technique that may bring good results to us, which, when applied by others, may result in disaster. It cannot be too strongly stated

that for the man who sees only an occasional fracture the simplest form of splint, and rest combined with extension for certain fractures, will give the best results.

Splints and Rest.

This is the oldest form of treatment of fractures, and it is very accurately described in the earliest Egyptian medical records. The simplest forms are those made of a thin board, moulded plaster of Paris and poroplastic felt. As a rule, moulded splints, sold in sets for special fractures, are objectionable. Experience is required to apply them accurately, and, in the absence of the proper size, one is very apt to use the next available size, which may or may not fit the case. Moulded plaster of Paris, in the form of the Bavarian dressing, requires some experience to apply, but is a very desirable splint when accurately adjusted to the injured part. Poroplastic felt is an excellent, although somewhat expensive material, and is very easily moulded.

It is hardly necessary to point out the advantages of the use of such splints, chief of which is, that it enables one readily to expose the parts and replace them without discomfort to the patient, and at a cost of an additional strip of adhesive plaster or a bandage.

This method, combined with extension by weights, is perhaps the safest and more useful form of dressing for fractures of the long bones, more particularly of the femur, and I know of no better apparatus than Bucks' extension with coaptation splints and a long Liston splint. The dressing, while comfortable to the patient, necessitates almost daily attention, as the rapid atrophy of the thigh muscles requires that the coaptation splints be frequently tightened. As a rule sufficient weight is not applied. For an ordinary adult about ten pounds should be applied at first, rapidly increasing until spasm of the muscles has been completely overcome. This requires from four to eight days, and the weights can be increased up to thirty pounds. The weights need not be kept on continuously if the patient suffers from pain.

Coaptation splints should also be removed from time to time to allow massage of the limb, and more particularly gentle movement of the knee joint. After the spasm has been once controlled, the weights can be diminished. Care should be taken as has been frequently pointed out, that the splints should not be applied so firmly as to interfere seriously with circulation. In fractures of the shaft of the humerus, occasionally weights are required, but as a rule if the patient is allowed up every day, and the supporting sling is kept well down to the wrist and not near the elbow, the

weight of the dressings and the limb is sufficient to give the necessary extension.

Ambulatory.

I have had little experience with the ambulatory method in the treatment of fractures of the lower limbs. Their use requires very considerable experience. While the advantage to the patient of being able to be about and in the open air is undoubted, the control of the patient, and of his apparatus, requires more attention than is usually possible outside of hospital practice. My own practice is to get all patients, excepting those suffering from fracture of the femur, out of bed at the earliest date, while the patient is still in the fixation apparatus.

Bardenheuer Method.

This method, advocated many years ago by the great German surgeon, has many advantages, more particularly for those who have had an extensive experience. The apparatus is only comfortable when properly fitted and requires constant attention. When one has familiarized himself with the details, the treatment is an excellent one, and gives good results. However, it should not be used by a beginner. One great advantage of this method is, that the damaged limb is more or less exposed and the apparatus permits of lateral as well as rotatory traction, and Bardenheuer lays great stress upon the importance of taking advantage of this.

As a hospital man I should like to point out a not uncommon practice which has nothing to commend it, that of immediately replacing the displaced fragments of bone in cases of recent fracture, and applying an elaborate fixation apparatus, such as plaster of Paris dressing in cases which are immediately to be moved to a distant place, and where the patient will come under the care of another practitioner. Such cases seen as an emergency should be put up in the simplest form of dressing, and the patient should be told that the dressing is of a temporary character. It is well to supply a letter addressed to the physician who is expected to take subsequent care of the case, explaining what has been done.

Many instances have come under my notice where an elaborate dressing, such as I have described, has been applied, the patient departing at once and coming under the care of another practitioner. Often the second practitioner has not the moral courage to cut down the plaster of Paris dressing; he therefore assumes all responsibility of the case, and is certain to come into whatever censure may occur, without really having had anything to do with the actual replacement of the fragments and application of fixa-

tion apparatus. The laity should be taught that it is a fallacy to suppose that the so-called setting of a fracture should occur at once after an injury, without regard for the surrounding circumstances. It has been our common experience that many fractures are discharged with good alignment and apparently firm union, which seen many months later show marked angular deformity. While it is difficult to control the actions of patients, who have apparently fully recovered, more particularly those cases which are discharged from the public wards of the hospital and pass completely from the observation of the attending surgeon, we have perhaps not taken sufficient steps to protect our own reputations. All such cases should be kept as long as possible under observation, or until good bony union has taken place.

The old fashioned method of using a bedroom pillow supplemented with strips of board on either side is still an excellent dressing, especially in fractures of the leg. Plaster of Paris dressings are difficult to properly adjust, and should never be used until one has acquired considerable skill in their application. In my opinion there are certain parts of the body where plaster of Paris should never be used except by surgical experts, that is, in fractures of the shaft of the humerus and femur, and in obscure injuries about the elbow and knee joints.

Mobilization and Massage.

We owe very much to the French surgeon, Lucas Championnière, and while very few English-speaking surgeons have been daring enough to carry out his practice in detail, I think we have all appreciated the value of massage and frequent inspection of the injured limb, while at the same time using some definite fixation apparatus. Lucas Championnière has again and again drawn our attention to the fact, which I think had been previously mentioned by Thomas, of Liverpool, that too rigid fixation diminishes reparative bone production, damages the soft parts and stiffens the joints and tendons, so that the patient when at last freed from his dressings, suffers more in recovering the use of muscles and joints than from any other cause. The originator of this method has pointed out that the massage must be gentle and never carried to a point of producing pain.

Against this method, however, there can be little doubt that the early recovery which has been claimed for it is often at the expense of anatomical deformity. We must, however, always appreciate that to Lucas Championnière, more than any one man, we must acknowledge our thanks for the introduction of the combined methods now so universal on this continent.

The method of extension by the use of nails and traction apparatus, suggested by Steinman, and also the methods of Lambotte, of introducing pegs united to a frame held outside the wound, has very serious objections. The danger of an open wound through which is introduced a foreign object to the centre of a long bone, leaves a wide open door for infection.

Operative or Open Method.

No subject in surgery is engaging the attention of the profession at the present time more than the operative treatment of fractures, and before proceeding to discuss this method I will draw your attention to the following very important sections of the British Medical Association report:

Section 10. "It is necessary to insist that the operative treatment of fractures requires special skill and experience and such facilities and surroundings as will ensure asepsis, it is therefore not a method to be undertaken except by those who have constant practice and experience in such surgical procedures."

Section 11. "A considerable proportion of the failures of operative treatment are due to infection of the wound, a possibility which may occur even with the best technique."

Section 12. "The mortality directly due to the operative treatment of simple fractures of the long bones has been found to be so small that it cannot be urged as a sufficient reason against operative treatment."

Section 13. "For surgeons and practitioners who are unable to avail themselves of the operative method the non-operative procedures are likely to remain for some time yet the more safe and serviceable."

All operative procedures are becoming easier to an increasingly large proportion of our profession doing surgery, and the probability is that this applies also to the operative treatment of fractures. Mr. Robert Jones, of Liverpool, very tersely states "that the indications for operation will clearly differ from the individual standpoint of the surgeon and no rules can be laid down. The surgeon with the least mechanical resource will operate most frequently." Those who have seen Lane operate might be led to believe that the proceeding is a simple one, but this is not so; as many of you are aware, Sir Arbuthnot Lane has developed a technique and dexterity which perhaps is unequalled, therefore it follows that the proceeding is a rational one for him to carry out.

Personally I have had an open mind, and my practice has been to operate on cases which I was unable to reduce or retain in good position, more particularly in fractures in the upper part of the

humerus, upper part of the femur, both bones of the forearm and in spiral and oblique fractures of the tibia. My experience has been that the open method is a most satisfactory proceeding, and each operation becomes simpler to perform than the last. No one should operate without having a full supply of the heavy holding forceps, originally suggested by Lane and of which there are now a number of different types. The practice of Mr. Jones should also be kept in mind, that of keeping up extension by pulleys during the operation. A combination of these two measures makes the operation much easier.

The length of time for repair is undoubtedly longer, and each patient should be especially warned that the early mobility of the limb is due to the introduction of plates and not to bony union, so that such cases should be kept under observation for a longer period and external supporting apparatus should constantly be used. One case recently under my care has been very instructive, although the point is not new, having been referred to a number of times by others. A plate was applied to a fracture in the lower third of the tibia, and the patient discharged in a long plaster case. He returned once a month, the cast was removed and at first there was no movement; later, there was a little definite movement. An X-ray showed a rarification of the bone in the neighborhood of the top screw. I cut down and found the plate was almost embedded in new bone; the top screw was loose. I removed the plate and screws and put the patient in a new plaster cast; he returned in a month and had good firm union. This was a case where apparently the mobility, as suggested by Lucas Championnière, had finally resulted in union.

In the treatment of compound fractures I have found that the use of a plate or wrapping the bone in wires is of great value, but when such a proceeding is carried out the plate is only put in for the first few weeks to control the parts and must invariably be removed before the wound will, or is allowed to close. I have made it a practice in all cases of carrying out Lane's suggestion of covering the plate with muscle, fascia, or fat, and in one or two cases where this was not completely done, or where the parts tore away later, I found that I was obliged to remove the plate; in short the plate should never be allowed to lie exposed immediately below the subcutaneous tissue.

The Committee of the American Surgical Association, in considering the British report, points out that all methods of non-operative treatment have been grouped together in a comparison, and considers that a true estimate of the value of the non-operative

method should include a classification to the end that the best non-operative treatment could be laid before the profession. In this view I am in hearty accord, as I take it that the object of both reports is to place in the hands of the average man the most desirable method of treating non-operative cases.

The American report further points out that, on this continent, the usual treatment is not limited definitely to a fixed plan, but is a combination of several methods. The committee, therefore, in its primary report, believes that prolonged immobility with continued fixation by means of external splints, or apparatus, should be abandoned, and recommends that the treatment should depend upon three classes of practitioners:

1. The average general practitioner, unskilled in surgery as a specialty.
2. Surgeons with the usual facilities of small or cottage hospitals.
3. Surgical experts with adequate hospital facilities.

For the first they recommend the mixed method which is practically in use with most of us, laying stress on the importance of a general anesthesia for diagnosis as well as reduction, combined with the use of an X-ray. For the second class the report suggests that the operative treatment be restricted to especially rebellious fractures after the case has been watched for a few days. For the third group, early operation in all cases which cannot be properly reduced and maintained in good position.

Dr. Roberts has associated with him men of wide experience in the care of fractures and the final report will undoubtedly be a guide of great value.

In doing my first open operation for fracture of the patella many years ago, I was surprised to find the amount of hemorrhage and damage to the neighboring soft parts. Since doing the open method on apparently simple fractures of long bones, I have marvelled at the good results obtained in non-operative treatment in view of the extensive laceration of the soft parts, and the interposition of muscles and other tissues.

Radiography.

The value of the discovery of the X-rays in the diagnosis of fractures was early recognized, and it is hardly necessary at this date to refer to the great aid that has been given, not only in the diagnosis of the fracture, but as a guide to satisfactory treatment. It should be remembered, however, that many factors enter into the consideration of a given case. Two plates, one antero-posterior and one lateral, should invariably be used. The diagnosis should

not be limited to an examination of the plates but a careful examination of the injured limb should always be made. A second fracture in the same bone or a fracture of a neighboring long bone at a higher level may be present although not shown in the plate.

The possibilities for distortion in a given case depend upon the position of the fracture and the experience of the X-ray operator. The importance of this has not been properly appreciated, more particularly by general practitioners. Distortion of displacement is always present in fractures of the long bones and in fractures of the pelvis.

The public has much to learn in regard to X-ray distortion and it is difficult to know what our position should be in regard to showing plates to patients and their friends. These persons expect to see the plate and yet are not sufficiently experienced to appreciate the various conditions which exist in a given case. The impression is therefore left that the fractured bones may not be in good position, when in reality they are.

While it is quite possible to continue the treatment of fractures as in the past without the aid of X-rays, the general practitioner should not undertake the care of obscure fractures, more particularly those involving joints, without at least giving his patient the opportunity of going to some neighboring point where the use of an X-ray plate may be obtained. I, in common with others, have had a number of instances where acute synovitis has masked the presence of an important fracture. Only recently a case came under my observation, where the patient was unable to walk or to straighten out his limb some months after a fall which produced a severe synovitis of the knee joint. X-ray demonstrated the presence of an impacted fracture involving the articular surface of the tibia. I opened the joint and found a knob of callus in the centre of the joint displacing the semi-lunar cartilage, the knob was chiselled off and the cartilage removed.

Medico-Legal Aspects.

It is unfortunate that fractures have always been the source of much medico-legal anxiety to our profession. This has been made greater with the introduction of the use of X-rays. The time has come, I think, when this Association could quite properly investigate our position in regard to the courts and our patients, to the end that some definite legal method, fair to all parties, could be introduced into our court procedures. The situation could hardly be worse than at the present time where X-ray plates of fractures are passed about the court and interpretations taken therefrom, not only by the court, but by lawyers, jurymen, and others; this

without any effort being made to have the meaning of the plate explained by medical men competent to offer such information. As long ago as May, 1900, a report of the American Surgical Association stated that "Skiagraphs alone without expert surgical interpretation are generally useless and frequently misleading."

Dr. J. B. Murphy recently reported a dislocation of the shoulder joint where the head of the humerus was behind the glenoid fossa, yet the X-ray showed normal position. In a United States court recently a medical man was held responsible in damages to a large amount, not because the deformity resulting from a fracture was due to lack of skill, but because there was deformity, and the medical man had not recommended the use of an X-ray, although there was no X-ray apparatus in the town.

There is also the question of ethics to be solved. How far a medical man engaged in the practice of radiography is within his rights in selling plates showing fractures which have been under the care of other medical men without these medical men being consulted.

The development of workmen's compensation acts in our own, and other countries, where employers are responsible for the payment of compensation for injuries, makes the whole subject of fractures of greater interest than at any time in our history, and if the time has not yet come for defining our responsibilities it must be close at hand, and I trust this Association will not be behind other organizations in laying before the profession and the public the best means available for the treatment of fractures.

THERAPEUTIC NOTES

Sterility.—Rawls (*Am. Jour. Obs. and Dis. of Women and Children*) considers the intra-uterine stem gives as good results as cutting operations with less invalidism and no more liability to sequelae. It is applicable in all cases of antelexion with abnormal cervix except where the anterior wall is extremely shortened and the pathologic antelexion extreme.

Asthma.—S. H. Large (*Cleveland Medical Journal*) reports a case of asthma cured by the simple passage of a bronchoscope. The patient had had every possible operation on nose and throat. If, therefore, all lines of treatment fail to cure asthma, Large says to remember the bronchoscope.

Typhoid Fever.—I. Bram (*N. Y. M. J.*) uses moderate quantities of gelatine in typhoid fever patients and finds it tends strongly to the prevention of intestinal hemorrhage. Although it has been universally conceded gelatine possessed hemostatic properties its use in typhoid seems to have been overlooked. Gelatine also possesses nutritive properties. Pure, it is nearly colorless, odorless and tasteless. The colored ones on the market should be avoided. Bram further believes that olive oil should be employed throughout a case of typhoid. It should be given as a food in doses of one to three ounces, three times a day. As a laxative it has no equal in typhoid, and it is a valuable adjuvant in the diet. It also, from its bland laxative action, has a tendency to prevent hemorrhage.

Warts.—A. B. Cates (*American Practitioner*) cures warts by means of ethyl chloride, leaving no scar. By coagulating the blood in the vessels supplying the wart nutrition is shut off, and it consequently shrivels and drops off. The skin beyond the margin of the wart should be protected by a pledget of sterile cotton wet in cold water and drawn out in tape form and then wrapped around the wart. A fine stream of ethyl chloride is played over the wart until it is covered with frost. One or two applications will make most warts disappear. Moles and angiomas may be treated in a similar way.

Reviews

Handbook of Physiology. By W. D. HALLIBURTON, M.D., LL.D., F.R.C.P., F.R.S., Professor of Physiology, King's College, London. Eleventh Edition (being the Twenty-fourth Edition of Kirk's Physiology), with nearly six hundred illustrations in the text, many of which are colored, and three colored plates. Price, \$3.00 net. Philadelphia: P. Blakiston's Son & Co.

The reputation of the distinguished editor of this well-known and excellent book would be alone sufficient as a recommendation to teachers and students of physiology. Several sections have been entirely re-written, and the entire book has been thoroughly revised. There is a new chapter on reproduction and development. Practitioners who should keep themselves abreast of the times in physiology will find this admirable work in every respect complete and up-to-date.

Canada Monthly. London and Toronto: Vanderhoof-Gunn Company, Limited.

Amongst the many exchanges which come to our table, none is more welcome than that high-class Canadian periodical—*Canada Monthly*. With the August issue a new departure is noted, in that a change in form is presented—a 10 x 12 journal size superseding the old magazine form. The cover design is an artistic piece of work—a settler and wife in ox-wagon approaching the land of promise—the golden west. The frontispiece shows a challenging bull moose. In the place of honor is a highly entertaining article A Dollar and Costs—a pen picture by Robson Black of Toronto's noted Police Magistrate. The number is profusely and exceedingly well illustrated, and the special articles and short stories of the best. Physicians will find the *Canada Monthly* a welcome guest and in every way adaptable to the reception room table.

Dominion Medical Monthly

And Ontario Medical Journal

EDITED BY

Medicine: Graham Chambers, R. J. Dwyer, Goldwin Howland, Geo. W. Ross, Wm. D. Young.

Surgery: Walter McKeown, Herbert A. Bruce, W. J. O. Malloch, Wallace A. Scott, George Ewart Wilson.

Obstetrics: Arthur C. Hendrick.

Pathology and Public Health: John A. Amyot, Chas. J. C. O. Hastings, O. R. Mabee, Geo. Nasmyth.

Physiologic Therapeutics: J. Harvey Todd.

Psychiatry: Ernest Jones, W. C. Herrman.

Ophthalmology: D. N. Macleannan, W. H. Lowry.

Rhinology, Laryngology and Otol-ogy: Geoffrey Boyd, Gilbert Royce.

Gynecology: F. W. Marlow, W. B. Hendry.

Genito-Urinary Surgery: T. B. Richardson, W. Warner Jones.

Anesthetics: Samuel Johnston

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COMMENT FROM MONTH TO MONTH

The Social Evil is engaging the attention of strong-minded, honest, capable men and women in different communities. It is still another evidence of the tendency of the age—the prevention of disease, this time morally as well as physically. In fighting the social evil there can be no question of half measures. It must be thorough enough to wipe it out entirely.

No one knows better than the medical man of its widespread dissemination in every urban community or of its wholesale and lamentable results amongst the innocent; and, as has always been evidenced in any and every campaign for the prevention of any disease, the medical profession stand well to the front in the attack.

In tentative campaigns where isolated communities endeavor to clean up their own back yards, there must always be differences of opinion as to how best to bring about the desired reforms. One will pound away for segregation, whilst another, equally honest in his endeavor, will denounce segregation. There must be no regulation of vice. Its only remedy is extermination.

Where segregated areas are tabooed, the insidious private apartment and private house nestles alongside the home and the church; and the prostitutes driven out of one city find "homes" in another, probably not far away, where the moral sense may perhaps not be so keen.

Another community will favor the reporting of all infected persons to the Medical Officer of Health; and the cry will then be raised that the medical profession has been roped in to becoming

amateur detectives for the balance of the community, and the innocent sometimes suffer as well as the guilty.

Whilst Montreal, Toronto, Winnipeg, Vancouver might adopt different plans for getting rid of the social evil, it must be quite apparent that the collection of essential facts regarding this vice evil should be and must be the foundation upon which to find a solution of the whole problem. No true Canadian could take much pride to himself if Montreal were free and Vancouver or Toronto seething in corruption. The prosecution of any campaign must be upon broader lines than mere municipalities.

It appears to be either a question for the federal or at least the provincial governments to tackle. The extent of the evil should be known in town, city and rural communities, its breeding grounds, its results amongst the guilty as amongst the innocent.

When the movement for the eradication of the social evil first becomes established upon proper lines then will it go on to success. Scattered, haphazard methods cannot prevail.

Warts.—Theo. M. Kendall (*Med. Press and Circular*) has always found the ionic application of magnesia to be the most effective, so far as the electric treatment is concerned. He has also had great success with a pigment of papain and borax. A digestive action is set up and the warts always disappear.

When physicians desiring to sell their practice and property—one or both—list the same with the Canadian Medical Exchange, 205 Yonge Street, conducted by W. E. Hamill, M.D., medical broker, they can rest assured that their offer will only be presented to registered bona fide buyers who have bound themselves, in writing, as to secrecy and not to offer opposition if they do not buy. Every legitimate safeguard possible is thrown about vendors, so that a sale is effected with a maximum amount of speed and a minimum amount of publicity. Eighteen years of experience in medical brokerage has evolved a system for selling medical practices as near perfection as possible, and a short cut to the goal desired is available to those interested. A request to the above address will secure full information as to details.

Editorial Notes

NOTES ON THE INTERNATIONAL MEDICAL CONGRESS

Twenty-eight nationalities represented.

Seven thousand five hundred medical men present.

H. R. H. Prince Arthur of Connaught.—May I remind you that although the Congress is meeting in London, it is not England alone which is the host. Canada, Australia, New Zealand, South Africa and India are represented on the various committees together with Englishmen. (Cheers.) So it is really the Empire and not the United Kingdom which is giving this Congress, thereby forging another link in the Imperial ideal. (Cheers.)

Sir Edward Grey: Science is, in the true sense of the word, international. . . . In regard to the science of medicine and surgery, we all have an individual interest in your work to an extent that hardly exists in the case of any other science. . . . To your science we have learnt to look for something that comes home to all of us individually still more. To your science we have learnt to look for the relief of suffering, which takes from life one of its greatest terrors. . . . As regards the science of medicine and surgery I do claim that the public is teachable and not only well-disposed but grateful.

Sir Thomas Barlow, President: It is impossible even to enumerate the varied ways in which medicine has co-operated with economics, social legislation and philanthropy, which we sum up briefly as public health. The school house and the scholars, the home of the poor, the colliery and factory, the dangerous occupations, the sunless life of the mentally deficient have benefited, and will benefit still more, by its friendly invasion. And I venture to foretell that not many years hence every department of life and work shall be strengthened and purified and brightened by its genial and penetrating influence. . . . Every day we gain fresh help from the auxiliary sciences, and we realize more and more the unity and the universality of medicine.

The institution of a Medico-Legal Senate in Great Britain as exists in Hungary to replace the present "expert" opinion was again discussed in the section of Forensic Medicine. Dr. M.

Sebachter read the paper on "The Royal Medico-Legal Senate in Hungary." The plan had been approved by the last medical congress at Madrid, but no other government had so far adopted the plan of Hungary. The Medico-Legal Senate in Hungary has now been working twenty-three years. It consists of a president, vice-president and twenty members representing all branches of medical science. The questions submitted by the law courts for arbitration were reported on by the various members of the Senate delegated for that purpose by the president, at the sittings of the Senate. After the points had been discussed the report was considered as expressing also the opinion of the Senate, if approved of by the majority.

Sir Malcolm Morris: Our mission is the service of humanity. And at this juncture we can do no greater service alike to medical science, whose votaries we are, and to mankind, whose servants we claim to be, than to urge upon our governments the imperative necessity of taking systematic and thorough and vigorous action to suppress one of the greatest scourges of the human race—syphilis.

The following American and Canadian surgeons had conferred on them the Honorary Fellowship of the Royal College of Surgeons: Dr. W. G. Crile, Cleveland; Dr. H. Cushing, Harvard University; Dr. W. J. Mayo, Rochester, Minn.; Dr. J. B. Murphy, Chicago, Ill.; Dr. Francis J. Shepherd, Montreal.

Radium.—One of the most notable exhibits in the Congress Museum was a series of drawings and photographs showing the progress that has been made in the treatment of cancer by radium and X-rays. The illustrations were so lifelike that they could readily be used to replace the living patient in the instruction of students. Many of the photographs were from the laboratories of Drs. Wickham and Degrais, Paris.

Professor Kitasato: It has been discovered that disinfection that would kill the plague germ had no effect upon the flea. The disinfection of plague, consequently, should be insecticidal as well as germicidal. In Japan "Disinfectol," prepared from the by-products of camphor had been applied with satisfactory result. The rat-proof arrangements should, of course, never be neglected, for the exclusion of rats would actually clear the house of fleas.

Professor H. Cushing: But in the search for knowledge, the investigator did not exempt himself as a subject of so-called vivisection when the lower animals did not suffice for his purpose; nor would he even hesitate to endanger his life, whatever might be the ethics of the question, if thereby information was likely to be gained concerning some disease fatal to his kind. Men in the London School of Tropical Medicine had not hesitated to submit themselves to experiment. It did not seem to be realized by the opponents of such form of research as entailed experimentation upon animals how few individuals undertook it, for the work required elaborate preparation and expensive and delicate apparatus. The opponents of research need have no apprehension on the score of the infliction of pain nowadays.

Sir J. Crichton Browne: While the preventive side of psychiatric medicine, founded on the etiological study of insanity, was its most hopeful aspect, its therapeutical side must not be neglected. Notwithstanding the vast sums expended on their construction, and their improved administration, the rate of recovery in our hospitals for the insane had fallen during the last fifty years. The lowering of the rate was probably in some measure to be ascribed to the cumulation of chronic cases, and to the increased resort to these hospitals, in the case of patients whose age and mental and physical condition precluded all hope of recovery. But, allowing for all that, it was clear that there had been no notable or efficacious advance in the remedial treatment of insanity during the period named, and that there was need for increased strenuousness in that clinical, pathological, and psychological investigation of it which a Congress like this must stimulate. The general health prospect of the country was brightening all round, but over our hospitals for the insane there was a settled gloom.

Doctors and Temperance.—Two hundred doctors drawn from all parts of the world breakfasted one morning at the Grafton Galleries, the guests of the National Temperance League. Where were the other seven thousand three hundred—the morning after the night before?

Professor Paul Ehrlich: To prevent the spread of, and to heal, infectious diseases was at all times the highest aim of medical aspirations.

St. Paul's Cathedral.—The congregation at St. Paul's included the President of the Congress (Sir Thomas Barlow). A few of the delegates appeared in their scarlet academical robes.

Preaching from the text, "That there may be no schism in the body," the Dean of St. Paul's, Dr. Inge, declared that in their private practice doctors to a large extent had succeeded to some of the functions of the mediaeval priest. It was they who now heard the confessions of anxious and conscience-stricken penitents. "They are the modern father-confessors," he said. "Men and women who formerly went to the clergy now go to them. They had earned and they had received the confidence of all who were in trouble about their bodies, and of many who were in trouble about their souls. No one can speak too gratefully of the way in which this work has been done—of the skill, of the kindness, of the understanding, sympathy, and the charitable but not too easy-going toleration of human infirmities which the patient can depend upon receiving from his medical adviser.

"Nevertheless," he proceeded, "I do wish to put this question: Does the medical profession as a whole take its proper part in influencing and guiding public opinion in those matters wherein its members alone can speak with authority?"

There was no class of men who, in private conversation, talked more sanely and wisely than the physicians. Their freedom from prejudice and sentimentality was most refreshing, "but when a measure such as the Mental Deficiency Bill is before the nation, where is the medical profession?"

All those problems of heredity and environment in connection with the improvement of the human stock known as eugenics were attracting increasing attention, even among the independent working class. Would it not be possible for the medical profession to recognize that they were called to an even higher duty than that of saving their patients' lives to the last possible day?

In all Utopian dreams much stress was laid on the future resources of medical science, and the history of the last 100 years justified the hope that far more might be achieved in that way for human welfare and happiness than by political or economic changes. They might look forward to the time when many diseases which now ravaged humanity would have gone the way of leprosy and typhus; when some morally unobjectionable way of regulating the population would have been discovered, when the average health, strength, and vitality of the people would be greatly improved, and when those crimes and vices which cropped up to-day would be comparatively rare.

The human race of the present was a mere caricature of what it might be in the future if science were allowed to pursue her

beneficent course unchecked by that false humanitarianism which was kind only to be cruel.

The Canadian members of the medical profession who have been attending the International Medical Congress at a meeting held at the Imperial Institute on Tuesday morning, August 12th, unanimously passed the following resolutions:

Moved by J. T. Fotheringham, Toronto, seconded by J. M. Elder, Montreal.

"That we wish to offer to the President, Sir Thomas Barlow, to the Secretary, Dr. W. P. Herringham, and to the whole committee our hearty congratulations upon the great success which this meeting of the congress has attained under their kindly and able administration. But particularly as members of the great British family do we desire to express the sense of familiar, homely intimacy which is felt by all of us, enhanced as it is by the presence of so brilliant a gathering of the savants of other climes and races. For, as Canadians, revisiting the Motherland *coelum non animum mutamus*, we deeply appreciate the real significance of the idea expressed by His Royal Highness Prince Arthur of Connaught in his gracious address of welcome, that all of us of the Empire stood together as hosts to all the rest of those attending. We noted with pleasure the repetition of this idea by the President in his address.

On behalf of the Canadian ladies, we wish to thank the committee of ladies here for the profuse and well-ordered hospitality shown by them, and the many arrangements made for the comfort and entertainment of our wives and daughters.

"And as we part, each to his own work across the seas, we beg to offer all our kind hosts and friends in London our cordial felicitations, thanks and good wishes."

Moved by Dr. Jas. Third, Kingston, seconded by Dr. A. A. Reeve, Toronto.

"That the thanks of the Canadian Section of the International Medical Congress be tendered Dr. W. H. B. Aikins, Toronto, for his able services as Secretary of the Canadian National Committee during seven years and member of the Executive Committee of the Seventeenth International Medical Congress."

Moved by Dr. H. A. Bruce, Toronto, seconded by Dr. H. J. Hamilton, Toronto.

"That the Organizing Committee for Canada for the Eighteenth International Medical Congress to be held in 1917 be constituted as follows: Chairman, Dr. W. H. B. Aikins; Secretary, Dr. H. B. Anderson; the Deans of the medical faculties of the Canadian universities and the Presidents of the Canadian Medical Association for the years 1916 and 1917, with power to add to their numbers."

News Items

Dr. Simon J. Tunstall, Vancouver, has returned from Europe.

Dr. J. L. Chabot, M.P., has returned to Ottawa from England.

Dr. Geo. W. Badgerow, London, England, is visiting in Toronto.

Dr. W. C. Cousins, Ottawa, who has been seriously ill, is recovering.

Dr. M. O. Klotz, Ottawa, has been elected President of the Ontario Medical Council.

Dr. Marcellus, late of St. Luke's Hospital, Ottawa, is Chief Medical Officer at Port Nelson.

Dr. Glen Campbell, Vancouver, has been elected President of the British Columbia Medical Association.

Dr. A. T. Lomer, Montreal, has returned from Europe and assumed his duties as Medical Officer of Health of Ottawa.

Dr. A. Campbell Geddes, who has been Professor of Anatomy in the Royal College of Surgeons in Ireland, has been appointed Professor of Anatomy in McGill University.

The old Janes Building, at the corner of King and Yonge streets, has been torn down to make way for a new skyscraper, and Dr. Hamill, Medical Broker, has been forced to find new offices, which he has secured in the Bank of Toronto Building, 205 Yonge Street, opposite Eaton's. New telephone number, Main 3375. Those interested should make a note of this, as this local will not appear again.