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*Shakespeare and Biological Science

D. FRASER HARRIS

(One of your editors during the recent time-honored domestic disturbances commonly called "house or spring-cleaning" was asked, "Why are you saving this old University magazine?" The reason is being republished as he believes many of the associates and students of the late Professor Fraser-Harris would be pleased to reread something from the pen of their old friend.)

THREE hundred years ago this year the most remarkable Englishman that ever lived, died. In a sense it is no exaggeration to call William Shakespeare the most remarkable of Englishmen; for if one man wrote all the plays and poems attributed by critics to William Shakespeare, and if that same man possessed only some knowledge of practically every subject under heaven, which apparently he did possess, and at the same time did not own a book or leave a single manuscript behind him, then he was the most remarkable Englishman of all time. Whether the plays were the work of one man or of twenty men, there is no denying that they exhibit in their author or authors a surprising amount of learning in ancient history, English history, state-craft, the life of courts, folklore, law, botany, zoology, physiology, psychology and state-craft.

Shakespeare has been called a complete intellect; and this would be justified if one contemplated only the profundity of his knowledge of human nature in all ages and at all social levels. Nothing that has ever passed through the human mind seems to have escaped him. It is easy to draw up a catalogue of the mistakes and anachronisms of Shakespeare; but were the list ten times the length it is they would be all atoned for by the penetration of his instinct and its unerringness wherever the workings of the human mind are concerned.

If in biological science Shakespeare did repeat the mistaken notions current in his day, it may be none the less interesting to examine some of these in detail, and, by the light our modern knowledge of life possesses, endeavour to understand what phenomena it was that engaged Shakespeare's attention.

I pass by altogether the numerous allusions both to bodily and to mental diseases: these have been exhaustively dealt with by writers eminently qualified to treat of them. At present I would rather draw attention to the physiology and psychology in Shakespeare's writings. Naturally the question arises, did Shakespeare know the physiology current in his day, and if so, did he give expression to what was generally believed, or as regards the matter of that science, as in so much else, did he transcend the views current in his time and flash forth beyond them in prophetic prevision?

It happens that Shakespeare lived at a time when most momentous discoveries were taking place in physiology. It so happens that Shakespeare and the world-renowned Dr. William Harvey, the discoverer of the circulation of the blood, were contemporaries for some 38 years of their lives, for Shakespeare was born in 1564 and died in 1616 while Harvey was born in 1578 and died in 1657. Harvey was 38 years old when Shakespeare died. By 1616 Harvey had not, however, announced his epoch-making discovery, which was not published until 1628 and even then not in England but at Frankfort-on-the-Main.

It is rather curious to remember that the earliest writings of Harvey known to contain any description of the circulation of the blood in which the heart

is regarded as the central power for it, are dated 1616. These are none other than Harvey's manuscript notes for his Lumleian lectures, the first of which he delivered at the College of Physicians on April 16, 1616. These precious leaves, accidentally discovered, have been bound together and now repose in the British Museum.

Seeing that Shakespeare died on the 23rd of April, 1616, it is at once apparent that he could have known nothing of the Harveian views on the circulation of the blood, the starting point of modern physiology, for the "Exercitatio de motu cordis et sanguinis in animalibus" was not printed for twelve years after that date. Thus Shakespeare could not have known of his great contemporary's discovery, because he died twelve years too soon. Neither could Shakespeare's son-in-law, Dr. Hall of Stratford-on-Avon, have told him of it, as some have thoughtlessly suggested he might. For one thing, Hall did not marry Shakespeare's daughter until 1607. Some uncritical writers have assumed that Shakespeare must have known of the circulation of the blood because he was a contemporary of Harvey. The two great men may never have met. Harvey was a student of medicine at Padua from 1598 to 1602, the very time when Shakespeare was at the height of his activity. But even if they did meet, the young doctor was not in the least likely to discuss with the great actor his revolutionary view of a matter of pure physiology. If Harvey discussed so technical a subject before he gave it to the world, it would be exclusively with his medical brethren. We should expect from *a priori* considerations, without examining Shakespeare's works at all, that their author was not acquainted with the new views concerning the circulation of the blood. Close examination of his writings confirms this in the fullest manner.

If Shakespeare then did not know the Harveian doctrine, what view did he know? The reply is that he evidently held the views which had been taught in the medical schools of Europe for 1400 years, the views of Claudius Galen, that great dictator in all matters medical.

The Galenical notions of the movement of the blood can be understood only after still earlier views are comprehended.

The distinction between arteries and veins was made before even the time of Aristotle. Shortly after the death of Aristotle, Erasistratus (300 B. C.) of Alexandria taught that blood for the nourishing of the body travelled up and down the veins only; whereas in the arteries "vital spirits" alone were found. Erasistratus thought that arteries during life did not contain blood because after death arteries are found to be empty. Galen made the discovery by vivisectional methods that the arteries contain blood during life. According to Galen the veins contained "crude" blood, the arteries pure or spirituous blood, that is, blood mixed with vital spirits. The Galenical doctrine of spirits, on which learned Europe subsisted for a millennium, was fairly complicated, as it recognized no less than three different kinds related somewhat in the following manner. The food in the intestine was supposed to be absorbed into the liver, where it was elaborated so as to be possessed of "natural" spirits. This crude blood then passed to the right side of the heart, into which all the veins of the body opened. This blood still crude was supposed to nourish the body by passing up and down the veins as with the ebb and flow of a tide. Its natural spirits in modern terminology would be equivalent to "powers of nourishing". Most of this crude blood was supposed to percolate through invisible pores in the septum, dividing the right from the left ventricle of the heart, only a little of it going by the pulmonary artery

to nourish the lungs. In the left ventricle the blood was supposed to be mixed with air drawn in in the act of breathing. Aristotle taught that the inspired air was needed to cool the "innate heat" of the heart; Galen adopted this view and added another result of the mixing of blood and air, namely, the elaboration of "vital" spirits. The great arterial vessel of the body, the aorta, arises from the left ventricle, so that blood, plus vital spirits, passed by the arteries to the tissues and organs to confer on them the powers of performing their specific functions. The vital spirits, therefore, promoted functional activity. Finally, said Galen, blood plus vital spirits is carried to the brain—an organ which Aristotle declared was cold and bloodless—and there becomes the seat of the production of a third order of spirit—the "animal". This production of animal spirits went on in the ventricles or cavities of the brain. These animal spirits, which as a term survive only in colloquial English, were to Galen what nerve-impulses are to us; but they were a great deal more, for they were the very instrument of the soul itself. The word "animal" does not in this connection mean "belonging to a beast"; it means pertaining to the soul or anima, the Latin equivalent for the Greek *psyche* life or soul. The full Latin expression is *spiritus animalis*.

The animal spirits of Galen are equivalent to consciousness in modern language, and to motor and sensory innervations as well. Such is a simplified account of the doctrine of spirits which was the orthodox medical teaching as late as during the life time of Shakespeare. It persisted in common parlance until long after, for in the reign of Queen Anne (1708) the "Daily Courant" advertised a perfume as efficacious because "it increases all the spirits, natural, vital and animal", which is quite in the Galenical order.

Shakespeare was perfectly familiar with at least the names of Hippocrates and Galen. In the "Merry Wives" (Act III, Sc. 1) we have Sir Hugh Evans, in speaking of Dr. Caius, saying:—

He has no more knowledge in Hiboocrates and Galen,
—and he is a knave besides.

Both Aesculapius and Galen are mentioned by the host in Act II, Sc. III, of the same play. In *Coriolanus* (Act II, Sc. 1) we have the phrase: "The most sovereign prescription in Galen." Shakespeare was evidently also aware of the reputation of Paracelsus as the leader of a school of medical thought, as it happens, a virulently anti-Galenical one. Galen and Paracelsus are mentioned in the same line in Act II, Sc. 3, of "All's Well"—

Both of Galen and Paracelsus.
Of all the learned and authentic fellows.

Seven Doctors of Physic are to be found in Shakespeare's plays: Dr. Caius, a French physician, in the "Merry Wives"; Dr. Butts, physician to Henry VIII; two doctors in "Macbeth"; Cornelius, a physician in "Cymbeline"; Cerimon in "Pericles" and a doctor in "King Lear".

Efforts have been made to identify Shakespeare's Doctor Caius with the distinguished Englishman, Dr. John Key (Johannes Caius). Besides that Dr. Caius died 28 years before the "Merry Wives" was written, the Caius of the play is a Frenchman who cannot pronounce English correctly, a sort of character not at all resembling the learned and serious founder of the college at Cambridge and the President of the College of Physicians at

London. The notion that Shakespeare's amusing doctor is the great Frenchman, Sir Theodore de Mayerne, is not much more likely.

Let us now examine the passages in which mention is made in some sort or other of blood, blood-vessels or heart.

In "Love's Labour's Lost" (Act. IV, Sc. 3) we have the expression: "The nimble spirits in the arteries", a direct echo of the Aristotelian-Galenical teaching.

The veins are mentioned much more frequently. In King John (Act III, Sc. 3) we find the expression "blood . . . runs tickling up and down the veins". The interest in this is, of course, the phrase "up and down", which is precisely what was taught as regards blood in veins before the uni-directional flow of blood was demonstrated by Harvey. The pre-Harveian notion of a tide, that is, an up and a down, a to and fro movement in the veins is exactly reproduced in this passage. In the same play we find the line—

Whiles warm life plays in that infant's veins,

and must at once be reminded of the exceedingly old belief that the life was pre-eminently in the blood. Not only do we have in Scripture the phrase, "for the blood is the life", but also in the Hippocratic writings the same idea. The Hippocratic writer based his belief on the familiar observation that when the blood has run out of the body of a slaughtered animal the animal dies.

Once more in the same play we have this idea quite distinctly put (King John, Act V, Sc. 7):

"The life of all his blood is touched corruptibly."

Possibly the best known passage in which the movement of the blood is alluded to is in "Coriolanus" (Act I, Sc. 1), where Menenius Agrippa, a friend of Coriolanus, speaking of the belly, says:—

True it is . . . that I receive the general food at first
Which you do live upon, and fit it is,
Because I am the storehouse and the shop
Of the whole body: But if you do remember,
I send it through the rivers of your blood
Even to the court, the heart—to the seat o' the brain,
And through the cranks and offices of man,
The strongest nerves and small inferior veins
From me receive that natural competency
Whereby they live.

Now, while it is quite absurd to see in this not only modern physiology but a prophetic vision of Harvey's discovery, the passage is not wanting in biological interest. The general idea of the abdominal viscera receiving food and working it up into blood destined for the nourishment of the whole body, including the nerves, is in this passage, and is so far physiologically correct. But undoubtedly it is the phrase "rivers of your blood" that should arrest us, for, if literally accepted, it does indicate the notion of a flow in one direction only. The flow of a river is the very opposite of a tidal flow.

To insist, however, that because Shakespeare used the expression "rivers of blood", he actually foresaw the discovery of the circulation is to read a great deal too much into this passage; possibly Shakespeare meant no more by "rivers" than if he had said "streams". If we had none other than this

passage to go upon, we might admit that Shakespeare had before him the Harveian notion of a flow only in one direction; but in the light of what he writes in Act V, Sc. 1,

The veins unfilled, our blood is cold, and then
We pout upon the morning, are unapt
To give or to forgive; but when we have stuffed
These pipes and these conveyances of our blood
With wine and feeding, we have suppler souls
Than in our priest-like fasts.

We cannot but believe that Shakespeare held no view other than the Galenical one of his own day, namely, that the veins, not the arteries, convey the nourishment to all parts of the body. The revivifying effect of alcohol, taken with food, is fully appreciated.

Shakespeare certainly held what Harvey so greatly emphasized that the heart is the chief organ in the vascular system. This is clearly intended in Falstaff's harangue about Sherris wine in Henry IV, Part II: Act IV, Sc. 3:

"The second property of your excellent sherris is,—the warming of the blood; which, before cold and settled, left the liver white and pale, which is the badge of pusillanimity and cowardice: but the sherris warms it, and makes it course from the inwards to the parts extreme: it illumineth the face; which, as a beacon, gives warning to all the rest of this little kingdom, man, to arm; and then the vital commoners and inland petty spirits muster me all to their captain, the heart."

There is much in this of correct physiology; the allusion to the pre-eminence of the heart has quite the modern ring.

The association of a pale or white liver with cowardice is of long standing. The ideas are not so absurd as one might at first think: for a perfectly bloodless liver is pale, of a grey brown colour. Now the exhibition of violent and aggressive emotions is always associated with a determination of blood to some part of the body, so that a bloodless and therefore pale liver might somehow be related to the opposite of aggressiveness.

This is not, however, the interesting thing in Falstaff's speech; it is the place he gives the heart, for the pre-Harveian physiology by no means gave the heart its important place in the bodily economy. One of Harvey's predecessors is vascular discovery, M. R. Columbus, denied the heart even to be muscular. That distinguished man of science, Steno, was violently criticised for his irreverence in asserting that the heart—the seat of the soul—was in its essence none other than a common muscle.

One of the main contentions of the Harveian physiology was that the heart was dynamogenic for the whole circulation. Every artery is filled, said Harvey, by blood forced into it through the compulsion of the cardiac beat. To Harvey, the heart was a force-pump, and the problem of the circulation was one in haemodynamics, to use a modern term. Harvey combated the old view that the arteries actively suck in blood as a bellows does air. Undoubtedly the arteries are living tubes, but they expand not in virtue of their vitality but by the blood-pressure within them acting against their force of elastic recoil.

Shakespeare seems to have had an inkling of the pre-eminence of the beating organ in the chest; he knew not only fairly accurately where the

heart beat was, but how emotions directly affected it, as when Macbeth exclaims,

Whose horrid image doth unfix my hair,
And make my seated heart knock at my ribs.

One of Shakespeare's allusions to blood reaching the heart has been made a good deal of by certain writers on the history of physiological discovery. The passage is in Julius Caesar (Act II, Sc. 1), where Brutus exclaims:—

You are my true and honourable wife;
As dear to me as are the ruddy drops
That visit my sad heart.

All that this asserts could be known from observing slaughtered animals, namely, that blood is in the heart; and yet some writers have gone so far as to maintain that Shakespeare anticipated Harvey in the matter of the discovery of the circulation. This must be put down to excess of hero-worship.

There is, however, quite a striking passage in "Measure for Measure" (Act IV, Sc. 3) where the heart is mentioned in a new connection:

Lucio: O pretty Isabella; I am pale at mine heart to see thine eyes so red.

The thought in Shakespeare's mind was probably that the emotion of sorrow or sympathy blanches the heart in the same way that some emotions blanch the skin of the face. While the literal physiology of this is incorrect, there is the recognition of the important effect of psychical states on the condition of the heart.

Before passing on to Shakespeare's allusions to the nervous system and to psychological considerations, we might notice some phrases which refer to subjects of distinct physiological interest. For instance, when it is said in Richard II (Act I, Sc. 3),

Things sweet to taste prove in digestion sour,

we have a remark in agreement with the latest results of physiological chemistry. The sugars, it is now believed, in being digested, pass through a stage of lactic acid; in other words, a sour stage.

The expression, "life-preserving rest" (Comedy of Errors, Act V, Sc. 1), is an excellent physiological description of what rest really means. Rest is essentially recuperative; all work, nothing but activity, would wear out the organism; it must rest in order to live, therefore rest is "life-preserving".

The exact physiological condition in starvation could not be put better than in the line in Coriolanus (Act IV, Sc. 2),

I sup upon myself, and so shall starve with feeding.

In inanition the body lives on itself, as it is said; what is actually happening is that the heart and central nervous system are living on the fat and muscles of the body. The former two—the noble tissues—are living at the expense of the rest of the body; it is, therefore, physiologically correct to say that in starvation there is feeding.

No less interesting than Shakespeare's allusions to the vascular system are those to the nervous. In his day, unlike ours, all emotional conditions were not at once referred to the cerebrum and so disposed of; there was a complicated distribution of them amongst the various viscera. Even much

later than Shakespeare's time, the seat of the soul was held to be in the heart; for instance, by Vico (1678-1774). Descartes assigned it to the pineal gland; Van Helmont placed it in the pylorus or "pit" of the stomach. Although Aristotle said the soul was in the heart, other Greek thinkers placed it in the diaphragm (phren); hence "phrensy" (frensy) or madness of the soul; hence also "phrenology", a discourse on the supposed localization of things mental. From time immemorial, emotions have been associated with viscera, as in the Old Testament where bowels yearned, and in the New, where there were bowels of compassion. Everybody knows that the spleen was the seat of anger, for we yet speak of a splenetic, meaning an angry man, and a "fit of the spleen", meaning of rage.

Curiously enough, love was placed not in the heart but in the liver. Shakespeare adopts this localization when he makes Pistol say (*Merry Wives*, Act II, Sc. 1) that Falstaff loves Ford's wife "with liver burning hot".

We have seen that whereas Aristotle placed the soul in the heart, Galen placed it in the brain; and Shakespeare, if he consciously followed any school of thought, was Galenical rather than Aristotelian, for he makes Prince Harry, in *King John*, say of the King:—

It is too late, the life of all his blood
Is touched corruptibly, and his pure brain
(Which some suppose the soul's frail dwelling place),

and so on, as though it were not yet decided to be but some supposed it in the brain.

Possibly one of the most remarkable of all the passages of biological significance in Shakespeare is in "*Love's Labour's Lost*" when Holofernes, speaking of ideas, says:—

"These are begot in the Ventricle of memory, nourished in the womb of pia mater, and delivered upon the mellowing of occasion."

Holofernes is a schoolmaster and therefore presumably represents a learned man, and certainly here his allusions are sufficiently erudite to puzzle a good many fairly well educated people.

The "Ventricle of memory" is a phrase borrowed from the Arabian doctors of medicine who held that the brain possessed three cavities or ventricles in which the three subdivisions of the chief soul resided. The anterior was related to sensations, the middle to imagination, the posterior to memory. (Modern anatomists describe five cerebral ventricles.) These views were adopted by the theological Doctors of the Church in the Middle Ages. They were one of the beliefs against which Andreas Vesalius, the father of anatomy, particularly inveighed in his celebrated treatise the "*De Corporis Humana Fabrica*", published in 1543. In dealing with the brain he wrote—"I wonder at what I read in the scholastic theologians and the lay philosophers concerning the three ventricles with which they say the brain is supplied." "He then," says Sir Michael Foster, "goes on to ridicule the views held by these philosophers, namely, that a front ventricle is the receptacle of sensations which, passed on to a second ventricle in the middle of the head, are there used for imagination, reasoning and thought, and that a third ventricle near the back of the head is devoted to memory." Shakespeare adopts the unscientific terminology of the pre-Renaissance writers in the matter of mental states related to cerebral ventricles.

The expression "nourished in the womb of pia mater" is certainly obscure. "Pia mater" is the name given by anatomists to the highly vascular and soft membrane which, closely investing the brain and central nervous system, conveys to it the nourishing blood-vessels. It does in a sense nourish the brain, and, therefore, metaphorically might be said to bring to development anything functionally related to the activity of the brain. Whether or not Shakespeare knew of the anatomy of this membrane it is impossible to determine; but assuming that ideas are "begot" in a cerebral ventricle, it would be permissible to continue the simile and regard them as nourished by the membrane that nourishes the organ of thought. The completion of the analogy between giving birth to a child and bringing forth a thought is, of course, thus possible. The passage is very striking and shows Shakespeare familiar with at least the anatomical terminology of his day.

The allusions in Shakespeare's writings to the activities, both normal and morbid, of the central nervous system are quite as interesting as those relating to the heart and blood-vessels. The symptom of giddiness is mentioned several times in the plays.

In King John (Act IV, Sc. 2), for instance, we have the line:—

Thou hast made me giddy with these ill tidings.

Sudden violent emotion is very liable to produce giddiness; but few persons except those trained in physiology could explain exactly how this is so.

The emotion, usually of an unpleasant kind, arises on its physical side as an excitement of certain cells of the cortex cerebri; these cells discharge impulses to the nerves of the heart, which have the effect of making the heart-beats ineffective (inhibiting them) for driving enough blood to the brain and central nervous system. The result of this is a general lowering of blood-pressure, so that the cells of the central nervous system, whose duty it is to innervate the muscles engaged in balancing the body, do not now get enough blood. The body, therefore, sways and tends to fall, and the subjective sensation accompanying this disturbance of equilibrium is a feeling of giddiness. Cerebral anaemia, in short, produces giddiness. It also produces loss of function in the sensory cerebral centres, and chiefly in the centre for vision, so that the person affected suffers from imperfect sight.

This is interestingly noted in Henry IV (Part II: Act IV, Sc. 4) where King Henry says:—

And now my sight fails and my brain is giddy,—

Shakespeare correctly attributing the giddiness to the organ involved. Shakespeare has not failed to note the subjective sensations which a giddy person experiences in that stable, external objects seem to be moving round him and particularly in the direction opposite to that towards which he last moved. Thus we have in "The Taming of the Shrew", (Act V, Sc. 2):—

He that is giddy thinks the world turns round.

The complete physiological explanation involves the knowledge of so much anatomy that it will not be attempted here.

Hamlet (Act III, Sc. 4) makes a remark in reference to the functional activities of the nervous system of so profound a character that we hesitate to believe that Shakespeare really knew all it involves:—

Sense, sure, you have,
Else you could not have motion.

The principle that sensory impressions must precede motor in the education of the nervous system, is now regarded as of immense practical importance. It is a fact which, of course, could not have been known to Shakespeare that those tracts in the central nervous system which subserve sensation are developed functionally a considerable time before those which subserve movement.

Shakespeare's marvellous observation had, however, shown him the truth of this important generalization without the possibility of his having any acquaintance with the physiological bases for it.

As one would be prepared to find, the more exclusively the topic has to do with the human mind, the more penetrating is Shakespeare's treatment of it.

The oftenest quoted example of this is the psychic blindness of Lady Macbeth:—

Doctor: You see her eyes are open.

Gentlewoman: Ay, but their sense is shut.

That the eyes are open is not enough to ensure vision unless the centre for vision in the brain is also in activity, is the physiology underlying this passage.

It is a state of mind-blindness, the result of extreme abstraction of the attention, a condition analogous to the state of the brain in hypnotism where a person can, by suggestion, be made blind although his eyes are open. Lady Macbeth is described as "fast asleep" but with open eyes. This is not natural sleep, for in it the eyelids are always closed. Shakespeare correctly describes a condition popularly called "trance" where, although the eyes may be open, there is no vision in the unconscious brain behind them.

Shakespeare clearly believed the brain to be the organ of the formation of images, or ideas. One more example of this may be given from the "Merry Wives" (Act IV, Sc. 2):—

Ford: Well, he's not here I seek for.

Page: No, nor nowhere else, but in your brain.

Coloured after-images or, as some call them, the results of retinal fatigue, are also alluded to in one of the plays. In "The Taming of the Shrew" (Act IV, Sc. 5) Katherine says:—

Pardon, old father, my mistaking eyes

That have been so bedazzled with the sun

That everything I look on seemeth green.

This is a literal experience known to many: if the eyes are over-stimulated by exceedingly bright sunlight and one goes indoors suddenly, everything takes on a rather ghastly greenish hue.

The last passage involving biological interest we may take from Hamlet (Act I, Sc. 5) where the ghost remarks,—

The glow-worm shows the matin to be near,

And 'gins to pale his uneffectual fire.

A minor point of interest is in connection with the paling of the light because of the dawn. The light of the glow-worm in common with all lights would begin to appear paler as the morning daylight increased. More technically, the light of the glow-worm is relatively feeble owing to the stimulation of the retina by a much intenser light. It is the same phenomenon as the

extreme paleness of the moon's light when seen during the day. But there is a much more interesting word in this passage, the word, "uneffectual" as applied to the "fire" or light of the worm. Surely Shakespeare means to convey the notion that the "fire" of the glow-worm is uneffectual because it is unaccompanied by heat. Now, the fact has been established only quite recently that when organisms emit light, it is by an oxidative process known as chemi-luminescence, in which the chemical energy is used directly for conversion to light-energy without passing through the stage of heat. In this sense, then, the light of the glow-worm is an uneffectual fire, because being accompanied by no heat it could set fire to nothing. Fire which will not set fire to anything is indeed uneffectual.

It need hardly be pointed out that it is only Nature that has succeeded in producing light without heat. Mankind has never yet achieved what man so greatly desires, a source of light without an accompanying very high temperature, for the heat generated along with the light is wasted energy as far as illuminating purposes are concerned. The spectrum of animal light shows it to be devoid of vibrations both towards the red and the violet end of the spectrum, it is therefore chemically inert, which is another aspect of its ineffectiveness.

Aspects of Fatigue and Nerve Conduction

C. B. WELD, M.A., M.D.

THE changes in muscle with the development of fatigue we have all studied. The lengthening of the latent periods, the weakening of contraction, the accumulation of lactic acid and other such physiological changes are more or less familiar. However they do not tell the whole story of fatigue; one remembers that when a muscle is stimulated through its nerve, signs of fatigue develop before the muscle itself is fatigued. This phenomenon has been ascribed to fatigue of the neuromuscular junction or to changes in chronaxie, according to one's viewpoint, and there is failure of some of the nerve impulses to reach or activate the muscle. The circulation to the muscle too is important in delaying fatigue and this not wholly in supplying oxygen or nutritive substances and in removing metabolic products. Furthermore one wonders how important a part these more or less truly muscular reactions play in the "tiredness" or "fatigue" which besets that great group of mankind engaged in sedentary occupations, and the question seems to be complex and not too clearly answered.

In recent years certain contributions have appeared in the technical literature which perhaps bear on this problem and may be worth recounting.

The volume of blood passing through a muscle during its contraction has been determined by various methods for some years and conflicting results reported. These differences have been largely cleared up by the work of Kramer and Quesnel (*Pflüg. Arch. ges. Physiol.* 1937, 239, 620) and of Bulbring and Burn (*J. Physiol.* 1939, 95, 203) using experimental animals and in humans by H. Barcroft and Millen (*J. Physiol.* 1939, 97, 17). The latter workers report that in the human as long as the strength of the contraction is less than one tenth maximal there is an immediate hyperemia of the muscle, which seems to be of functional value because the strength of contraction soon fails if there has been a previous arrest of circulation. If the strength of the contraction is a fifth or more of the maximal, the blood flow through the muscle, if any, is of no functional importance, for the duration of the contraction is not affected by previous circulatory arrest. In this case hyperemia develops after the contraction. The other workers have found with animals that tetanic contractions reduce the blood flow through the contracting muscle for about five seconds but that if the tetanus is prolonged beyond this period the blood flow increases despite the tetanus, provided that the blood pressure is normal.

However there are other factors, for even though the circulation through the muscle does improve with exercise, signs of fatigue do appear. The failure of the muscle contraction can however be delayed by adrenalin administration or by sympathetic activity; the strength of the muscle contraction indeed can be largely restored by these means even if it has already failed. This has been explained on the basis of the improved blood circulation to the muscle which is usually brought about by adrenalin but the improvement in contraction is also shown even when the circulation is not allowed to increase. The currently

accepted explanations are that the adrenalin acts directly upon the muscle to improve its contraction and that it also affects the neuromuscular junction so as to allow more nerve impulses to pass through to the muscle and to activate it. There seems no reason to doubt these conclusions which are based on strong evidence, but Bulbring and Burn (J. Physiol. 1939, 97, 250) have within recent months produced evidence that brings in an additional explanation.

They have shown that the conductivity of the nerve trunk itself is improved by adrenalin and by similar agents and that some nerve impulses are thereby enabled to reach the muscle which would otherwise be ineffective. They believe that an improved circulation of the blood to the nerve itself is the cause of the better conduction. Whether this is the explanation or not, the improved conduction is interesting and rather unexpected.

In their experiments the hind limb of the dog was perfused with defibrinated blood into the opposite external iliac artery, and the motor *nerve roots* were stimulated. The perfusion would thus be expected not only to give blood to the muscle under test (gastrocnemius) but also to the nerve trunk from the pelvis down while circulation to the upper part of the nerve and its roots would probably be deficient. In keeping with this is the observation that failure of conduction rapidly develops when the motor nerve root is stimulated while if the sciatic nerve trunk is stimulated conduction remains normal. On the other hand if the perfusion is made into the femoral artery in the thigh, and the proximal part of the nerve thus partly deprived of its blood supply, then stimulations applied to this region of the sciatic trunk soon fail to be conducted to the muscle. Addition of minute amounts of adrenaline, pituitrin, or dihydroxyphylethylamine to the perfusing blood restores within a few seconds the conductivity of the nerve. Ergotoxine which abolishes the vasoconstricting action of adrenaline also abolishes its action in improving the nerve conduction. Thus far the evidence suggests that the clear cut improvement in nerve conduction following administration of adrenaline and such agents may be due merely to the resulting rise in blood (perfusion) pressure and a better blood supply to the nerve. That the story is not so simple is shown however by the finding that even if the perfusion pressure is not allowed to rise adrenaline still improves nerve conduction, and that a mechanically produced increase in perfusion pressure and blood flow fail to improve the nerve conduction in the absence of such an agent as adrenaline.

The animals in the above experiments cannot of course be considered as normal, nevertheless that part of each nerve not actually receiving a blood supply was *in situ*, and was in contact with body fluids. As an excised mammalian nerve, kept in Ringer's solution, retains its conductivity for a considerable time and as the energy requirements of a nerve are so small, it had been expected that there would be no failure of nerve conduction. Nevertheless failure of conduction did rapidly develop and was rapidly restored to normal by the agents described. Whether or not such a state of affairs will occur in the intact animal is not yet clear but in view of these experimental results it must be considered quite within reason and indeed probable.

The failure of the passage of nerve impulses across synaptic connections such as from one neurone in the central nervous system to another is a common enough observation. A neurone may at one time be so responsive as to be readily excited by the arrival of one or two nerve impulses while at another time its threshold may be higher and many nerve impulses may be required to stimulate it. This altered threshold can be perhaps the result of fatigue but

it is more commonly due to inhibitory processes (inhibitory reflexes are as readily demonstrable as excitatory reflexes); that it may also be due to circulatory changes seems to have been demonstrated by Adrian and Moruzzi. (*J. Physiol.* 1939, 97, 153).

These authors simultaneously recorded action potentials in anaesthetized animals from the motor cortex and from the pyramidal decussation in the medulla. They report a spontaneous activity of the motor area—modified as would be expected by sensory impulses—which is synchronised with action potentials in the pyramidal tract. For the most part this continued pyramidal discharge is infra-liminal for the motor nerve cells of the spinal cord, but abrupt stimuli cause convulsive movements. The importance of the cerebral circulation and the condition of the cortex with respect to edema, and anemia etc. in the transmission of nerve impulses is well exemplified by the following quotations from these authors. "We have come to expect a discharge in the pyramidal tract whenever the cortex appears to be in good condition." "In unfavourable conditions (low blood pressure, etc.) the pyramidal discharge may fail although surface potential waves can still be recorded from the motor area. A temporary dissociation can be produced by a period of cerebral anemia."

To summarize, it may be said that reflex activity or an ordinary motor nerve mechanism may fail because of failure of passage of the nerve impulses across unusually resistant synaptic barriers. That the nerve impulse may fail to pass through the nerve fibre itself, even when it has actually started down the fibre, is a more radical thought but it is a phenomenon which under not too drastic experimental conditions clearly seems to exist. Alterations in the blood supply to the nerve structures seem at least in part to be responsible for this failure of nerve conduction through a fibre as well as for increasing the resistance of synaptic barriers.

In endeavoring to find an explanation for the lassitude and the partial failure of muscular contraction ascribed to fatigue when no real muscular fatigue is possible and for such conditions as the functional anaesthesias and functional paralyses, one must consider these phenomena. Nerve impulses arising either from cerebral activity or from sensory or reflex mechanisms may fail to be transmitted along their pathways and the failure may occur either at synaptic junctions or along nerve fibres, and this failure is due at times at least to circulatory derangement. It may well be that in these and similar conditions the vascular supply of the nerve itself should be given a greater importance than it has been given in the past.

The Maritime Medical Conference

Moncton, April 29th and 30th, 1940

THE three Eastern Divisions of the Association, namely, Nova Scotia, Prince Edward Island and New Brunswick, were invited to convene a Maritime Conference in Moncton, N. B., on Monday and Tuesday, April 29th and 30th, 1940.

The first such conference was convened in Moncton on March 24th and 25th, 1927, at which time twenty-one delegates attended. On this occasion, when the first session was convened on Monday afternoon, forty-nine delegates were present which number was increased to sixty-five for the banquet and evening session which followed.

The meeting was called to order by the General Secretary who invited the conferees to choose a Chairman and a Secretary. Dr. K. A. MacKenzie, of Halifax, immediate Past President of the C.M.A. was elected Chairman, and Dr. E. S. Giddings, Secretary of the P. E. I. Division, was elected Secretary.

Upon taking the Chair Dr. MacKenzie called upon Dr. Frank S. Patch of Montreal, President of the C.M.A., to address the meeting. Dr. Patch spoke briefly, extending official greetings to the conferees and expressing the hope that the deliberations would be fruitful. Dr. Patch was most cordially received. Dr. T. H. Leggett of Ottawa, Chairman of General Council, fully intended being present. His absence, due to illness was greatly regretted. The conference instructed that a telegram of greetings and good wishes for a speedy recovery be sent to Dr. Leggett. The absence of Dr. Gray of Milltown, N. B. due to illness was also regretted.

The Agenda included the following—

Places, Dates and Speakers for This Year's Annual Meetings of the Divisions

Considerable discussion took place under this heading with regard to the desirability of the three Divisions holding their meetings in sequence in order that the cost entailed to the C.M.A. in providing a travelling team of speakers might be kept as low as possible. It was finally agreed that, commencing next year, the three Divisions would hold their meetings in sequence in July; and furthermore, it was unanimously agreed that it be recommended to the three Divisions that the three Maritime Divisions meet conjointly every three years with the first such meeting to be held in Halifax in 1942.

For the current year, New Brunswick and Nova Scotia will meet in sequence in August; but, owing to arrangements which have already been completed, the Prince Edward Island Division will meet in July which is in conformity with the By-Laws regarding the date of meeting of that Division.

FEDERATION

What Can Be Done to Strengthen Organized Medicine Not Only in Each of the Three Maritime Provinces But in Canada as a Whole?

Reports from the three provinces indicated that strong efforts were being put forward continuously to persuade every eligible practitioner to belong to the C.M.A. It was pointed out, however, that to some the amount of the

fee might appear to be large, and that there must be no compulsion or coercion in bringing members into the fold. There was no doubt, however, in the minds of the conferees present, as to the desirability of membership being increased, and each Division is doing its utmost to strengthen national membership within the provincial boundaries.

MEDICAL LEGISLATION

Anything Which May Be of Interest Not Only to the Provinces But to Canada as a Whole

Dr. C. J. Veniot of Bathurst, N. B., a Member of Parliament for Canada and Chairman of the Association's Committee on Legislation, opened the discussion by referring to the activities of his Committee which watches all health legislation arising at Ottawa.

Medical Legislation in the three provinces would appear at the moment to offer no serious problems. Reports would indicate that where the irregulars have made attempts to be recognized, their contentions have been intelligently and acceptably offset to the end that no unfavourable legislation has been granted.

MEDICAL RELIEF

What Is Being Done in the Three Provinces?

It would appear that the profession is providing, gratuitously, needed medical services to relief recipients. In discussion, emphasis was placed particularly upon the growing amount of free work which the profession is doing in the public wards of the hospitals. The curve is steadily upwards and members of the hospital staffs feel keenly that the line must be drawn somewhere and that soon. The Honourable Dr. Davis, Minister of Health for the Province of Nova Scotia, speaking on his own behalf only, stated that he felt that both the profession and Governments would be well advised to study the needs of those persons who cannot pay for medical care and that a solution of the problem should and could be found. He pointed out, however, that the Government of the Province of Nova Scotia had not undertaken to provide money for medical relief as the problem was not an acute one in that province.

NATIONAL EMERGENCY

Medical Activities in Relation to the War

Considerable discussion took place on this item. The General Secretary of the C.M.A. presented the results of the Questionnaire Survey which information was received with interest. Opinions seemed to be divided on the extent to which cooperation had been developed between our Contact Men and the respective D.M.O.'s. In the main, the Contact Men felt that the relationship was reasonably satisfactory, while some of the conferees stated that they did not believe that the fullest use was being made by the military authorities of the C.M.A. machinery. The discussion served a useful purpose in bringing out points relative to present recruiting of Doctors, the necessity of Doctors being patient until a demand is made for their services, and a reassurance that recognition, by the authorities, of the Canadian Medical Association in medical military matters, was a fact.

PUBLICATIONS

This item provoked some interesting discussion. For many years the Nova Scotia Division has published an excellent monthly Bulletin. Neither New Brunswick nor Prince Edward Island publish a Bulletin but periodically New Brunswick does issue a *News Letter*. Nova Scotia would be favourable to the extension of its **Bulletin** to cover the three provinces. It was agreed that the suggestion be carefully studied in the three provinces.

RADIO

Observations With Regard to Medical Broadcasts: Should They Be Continued?

The Conference had no observations or suggestions to make on the Radio activities of the C.M.A. Some few had heard the broadcasts from time to time. Any comments which were expressed were to the effect that this is an effort designed for the public, and, therefore, is perhaps of less direct medical concern.

CANCER

Attention was redirected to the desirability of Study Groups being established in all hospitals of 100 beds and over, and of the profession doing all in its power to support the efforts of the Canadian Society for the Control of Cancer.

POST-GRADUATE LECTURES

During the seven year period from 1926 to 1932, inclusive, in which post-graduate speakers were provided to all parts of Canada by the C.M.A., due to the generous provision of \$210,000 by the Sun Life Assurance Company, it was disclosed that the following program had been carried out in the Maritime Provinces:

Summary of Post-Graduate Work in Maritime Provinces as Accomplished by Means of the Sun Life Assurance Company's Grant, 1926-1932

Province	Speakers	Addresses	Total Cost
New Brunswick.....	91	332	\$15,613. 15
Nova Scotia.....	83	368	15,299. 39
Prince Edward Island.....	51	151	8,104. 61
Total.....	225	851	\$39,017. 15

Expenditure represents 19% of total funds (\$210,000) available during the seven year period.

Medical population of the three Provinces 797.

Canadian Medical population 11,509.

Completed from official reports of the provinces 1939.

Most unanimously, the conferees agreed that the extramural post-graduate program was one of the finest things that had ever happened within the provinces, and, although the lectures had not been available for several years past, it was felt that the value to the profession was still apparent. The Conference passed a strong resolution urging the C.M.A. to do all in its power to bring about a resumption of this program at the earliest convenient date.

MEDICAL ECONOMICS

The high light of the two-day conference was the Monday evening banquet session which was given over entirely to a discussion of medical economics. The speaker of the evening was Mr. Hugh H. Wolfenden, F.I.A., F.A.S., F.S.S., consulting actuary, who, in a most informative address defined Health Insurance and State Medicine, outlined the plans in various parts of the world, described conditions existing on this continent and indicated the course of study being pursued by the Association's Committee on Economics. A keen discussion followed Mr. Wolfenden's presentation, it being clearly evident that medical economics is just as live an issue in the Maritimes as it is in other sections of Canada.

Dr. Arthur Van Wart of Fredericton presented some very interesting observations with regard to studies on the subject made by the Divisional Committee in New Brunswick. Various other speakers made contributions with regard to local efforts, but of particular interest was the presentation by Dr. Tompkins of Glace Bay who spoke on the Cooperative Scheme at the coal mines whereby, by payment of 40 cents a week, a worker and his family are entitled to complete medical and hospital service. The Conference agreed that strong study groups should be established in the three provinces with such subsidiary study groups in cities as seemed to be indicated. Mr. Wolfenden assured the Divisions that the Committee on Economics would be most happy to cooperate with the study groups and, in turn, would look to them for considerable help in elucidating this whole problem.

Before the Conference adjourned on Tuesday noon, appropriate votes of thanks were extended to Dr. MacKenzie and Dr. Giddings, who acted as Chairman and Secretary respectively, Dr. Patch, Mr. Wolfenden and the General Secretary for their presence at the meeting; and to Dr. Atkinson and the Moncton Medical Society for the splendid manner in which they had carried out the local arrangements.

T. C. ROUTLEY,
General Secretary,

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It is to be distinctly understood that the Editors of this Journal do not necessarily subscribe to the views of its contributors, except those which may be expressed in this section.

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SUMMER is here. With it comes the intense upward curve of the highway crash chart, and those Highwaymen, ever present, riding merrily in attendance,—Maiming, Crippling, Death.

Upon perusing the figures, one is startled at the realization of the vast part played by the inebriate driver in swelling the number of accidents yearly encountered by the highway police.

It is with this in mind that one delves a little deeper into the various features of the situation. One learns how often a driver is apprehended at the scene of a crash and who is manifestly "slightly intoxicated" and yet, after medical evaluation, goes Scott free. The physician did not feel able to take the responsibility of incriminating the suspect for "he could perform all the tests"—and therefore, legally, was not drunk.

This is a singular situation. The constable had discharged his duty, has presented the suspect for trial saying, "If you do not find him intoxicated, then, he, of course, goes free". Here one is to be governed not only by the sense of fairness to the culprit whose only crime may be the lingering odour of an impotent social drink, but also by one's definite and sincere obligation to society. The accurate delineation of an inebriate under these circumstances is just as integral a part of saving life and limb as is the Profession itself.

The various tests for intoxication fall miserably short both in accuracy and wieldability. Only the physician who has been confronted with the ordeal of having to label a friend, or a man of family responsibility to whom a car is livelihood, knows how desperate is the effort to be fair and yet not compromise with ideals.

This responsibility will some day be humanely obviated when, instead of wondering how so obviously tipsy a gentleman can so easily walk a straight line, or in amazement, watching the comparative dexterity and ease with which the suspect might do a series of typewriting tests, one shall repair, with utter detachment, to some practical manner of blood testing device, which will point its mechanical finger in an impersonal and accurate manner to the degree of intemperance.

There is, now, a colormetric determination test used in some states in the United States, but it has been found vulnerable in the acid test—the court of law. One day, mayhap, some enterprising medical supply house will take time from adding embellishments to already servicable and accurate articles to do work in this field of endeavor.

The relationship of various blood alcohol levels and the reaction of the central nervous system to these changes have been the object of intense and accurate investigation during the past few years. Granting that there is a normal alcohol content of the brain tissue of .0025%, then as the blood level rises to .1%, the individual reveals no external manifestation of the influence of alcohol. At .25%, however, there is a marked sense of aggressiveness and loss of responsibility. At the .3% stage, the full effect is telling with an apparent loss of coordination and a removal of most inhibitions and loss of equilibrium.

With these physiological reactions so well defined, we see how scientifically and easily we might render accurate, and unbiased service in the meting out of justice, when the correct blood testing device evolves.

These thoughts are not penned with the zeal of a W.C.T.U. worker. They are an exhortation, to the minority who do and the majority who do not come in daily contact with drunken driving, to refresh the old and acquaint themselves with the new methods of checking inebriates and their capabilities (or lack of them) and—"to hew to the line—."

D. K. M.

WHERE IS THE VOICE OF THE C. M. A.?

TO the non-military mind it seems unbelievable that on entrance into the Royal Canadian Army Medical Corps no distinction is made between the experienced and the inexperienced, between the professor with his many years of teaching reinforced by the higher academic qualifications and his pupil of last month: one and all enter the service with the self-same standing, the rank of lieutenant, the lowest in the commissioned scale. No man becomes recognized by his colleagues as peculiarly well qualified in any branch of medicine without hard work involving great expense. Such men are even classified by the public, although doubtless their more discerning and less emotional colleagues judge with greater sureness. That the Army lumps all qualified medical men would appear to be the case; whereas, common sense suggests that the previous training, experience and professional standing of a doctor should determine his rank on entering the Army. In a word, a physician's pre-Army preparation for his particular role is equivalent to many years of a combatant officer's Army training. The following communication has directed our attention to this important matter.

It is passing strange that the Royal Canadian Army Medical Corps accepts into its ranks members of the medical profession whether they be just out of college, or have been in practice for several years, or have become specialized in a particular branch of medicine, on exactly the same footing to begin with, i.e., the rank and pay of a Lieutenant. This condition continues for a period of three months when after passing qualifying examinations he becomes a Captain. Surely some years of

practice and experience have a value which while difficult to estimate in dollars must be of use in the Army. The profession recognizes the fact; it is difficult to understand why the Army does not do likewise and compensate accordingly.

The man who is a specialist in some particular line of medicine has spent much time and money, and if he has been at all successful, has assumed heavy obligations for his future financial and social security and for the education of his family, in the form of Life Insurance, and the ownership of a home with its encumbering mortgage. Now when this man is asked by the Military Authorities to join the Army for some particular task which they have in mind for him, he is faced with a difficult decision.

His desire to do something for which he is fitted in this hour of National Emergency makes him want to accept the assignment with all alacrity. The big drawbacks are these financial obligations. How are they to be met under the existing circumstances? This is his individual problem, get out of it as best he can.

The Canadian Medical Association which is now a unified body, capable of speaking with one voice, should it so choose, has here a clear duty to perform in the protection of its members. Could they not interview the Department of Defense, through their Advisory Committee and have some of this ridiculous injustice rectified?

We all expect to make sacrifices for our country and are glad to do so but they could be made in a more equitable way. Here is an excellent opportunity for the C. M. A., and their General and Local Advisory Committees to do a real service to the profession in a very tangible manner and show that they stand for something in a real way.

H. W. S.

Province Wide Allergy Service Suggested

One of the most distressing illnesses, both to the doctor and the patient, with which we have to deal, is asthma. Many a young person is more or less incapacitated and his life made miserable.

Personally I have endeavored to fortify my knowledge of modern treatment by reading, much useful information can thus be gained. But there is a practical side which requires considerable clinical work.

For the person who can afford the services of a consulting specialist, adequate examination and treatment is available. There remains the large majority who are unable to avail themselves of this opportunity.

These examinations are of necessity costly, due to the price of equipment, extracts, syringes, etc. They are time consuming for a general practitioner especially as he is usually required to examine these individually. It has occurred to me that either the Government hospitals might provide this examination, or better, one specialized in this art might occasionally tour the Province and examine these patients in groups, when it could be done conveniently and relatively quickly. Would it not be possible for our Divisional Health Officers to add this to their armamentarium?

J. C. W.

CASE REPORTS

DYSPEPSIA

Carbohydrate—Intestinal

Married man, age 38 years, first seen two years ago. Family history good. Habits good. Smokes cigarettes moderately. Jaundice age 19 years. Since teen age has been troubled with constipation, hemorrhoids, coated tongue, prolonged attacks of abdominal distention with associated distress. The latter was accompanied by audible rumbling from gas in the bowels. Frequently at night the discomfort was so considerable that he would roll against the side of the bed and knead the abdomen, in an effort to obtain relief. On more careful enquiry I learned that a portion of the stools was occasionally frothy in nature, though usually firm and difficult to pass. The quantities of flatus expelled were practically odorless. With the escape of this gas there was immediate partial or complete relief of symptoms.

Examination. Well nourished young man, weight 175 pounds, of stated age. Physical examination: Heart, lungs, abdomen, urine, blood count, haemoglobin, normal. Tongue large, coated, tooth marked. Anus—internal and external haemorrhoids. Blood Pressure 116/76. Nervous system—normal.

X-ray Examination. G. I. Series—No obvious pathology was reported, though the colon is large and there is considerable gas in the ascending colon. Gall Bladder—stained poorly suggesting chronic disease. Repeat was advised, but as yet has not been done.

Chiefly from the history and symptoms, the possibility of a carbohydrate intolerance was suspected. He was advised to follow a diet which consisted largely of bacon, eggs, fish, meat, butter, fruit, milk with a very limited quantity of starchy foods, as potatoes, carrots, onions, parsnips, green peas, rice, breads, biscuit, cereals, candy. A marked improvement in his condition followed within two days. Except for occasional variations from the prescribed diet, he has been comfortable, and as he now states, the accumulation of flatus is now little more than an average individual. Constipation is now successfully taken care of with Mucara (J. Wyeth). At least until the Gall Bladder X-ray is repeated, we have to accept chronic disease here, though the carbohydrate dyspepsia appears to be the predominating factor.

Discussion:—The explanation of this condition appears to be a hypermobility of the small intestine. This allows time for the digestion of fats and protein but only a small portion of the starchy foods, especially those that are contained within their cellulose envelopes. Many of these undigested starch grains reach the caecum and ascending colon, where they form an excellent culture medium for the enterococci. There follows an active fermentation with an increase in the number of bacteria together with the production of large quantities of carbon dioxide and organic acids. This patient mentions the frothy stool and especially the volumes of almost odorless flatus. The constipation in the large bowel is apparently largely due to the drying effect of the ever present gas. This adds to the discomfort in two ways,—

(1) in partly obstructing the passage of flatus, (2) further dilating the already distended colon. Laxatives, as cascara, etc., aggravate the condition by further irritating and speeding up over an already overactive small intestine. Petroleum oil probably impedes the activity of the digestive juices in the bowel. The non-irritating vegetable mucilages are of benefit.

The patient relates the following amusing story. One day his young daughter, in her bedroom for her afternoon nap, heard someone in the bathroom, thinking it was her mother she called, "Mummie, Mummie!" Soon there was a characteristic report from voided flatus. The child then recognizing her error called, "Daddy, Daddy!"

JOHN C. WICKWIRE M.D.,
Liverpool, N. S.

Thyroid Extract in Apnoeic Prematures

On the strength of an article, in the February issue of the *Canadian Medical Association Journal*, by Dr. Wm. Wilson, Windsor, Ontario, I submit the following two cases.

Dr. Wilson, in his excellent setting forth of the cardinal points in caring for the premature infant, made note of the administration of thyroid as advised by Moncrieff (*Arch. Dis. Child*) 1938, 13; 57. This substance is not used to make up a deficiency, but to hasten maturation with its accompanying improvement of the essential functions, for instance, respiration, heat regulation, etc.

Shortly after reading his article, I had occasion to ponder over a twin, the smaller of a 2 lb. 2 oz., 2 lb. 10 oz. pair. These babies had been ejected prematurely into this wintry world at seven months.

Desperately feeble, the weaker one clung tenaciously to life. It was carefully governed by all principles relative to the usual care of prematures but in spite of this it soon developed the ominous signs of an impending termination to its respiratory efforts. Severe apnoeic attacks became alarmingly frequent, characteristic of end-picture in these fatal cases, with the blue dusk of cyanosis spreading over the entire body surface.

Thyroid extract, gr. 1/20 per pound body weight, daily, was commenced at this point and continued for two weeks. At the end of this period the baby had not only developed a normal state of health and comparative vigour, but had overtaken its twin in stature.

The other case was likewise a twin pregnancy. The one twin had ceased to live at the third month. There had been a vigorous haemorrhage at that period.

This twin pregnancy was artificially terminated by induction at 6/ months due to an impending eclampsia.

The living twin scaled two pounds, four ounces and after the third day it developed the dread apnoeic attacks. The spells of blue respiratory indifference in such a fragile frame were, at the best, disquieting. As thyroid extract seemed the only plausible addition to the existing regime, it was initiated.

At the end of a two week period we viewed a healthy, active-in-all-departments, premature baby.

These two children, mentioned in the above cases, have continued to develop in the fashion according to Luke 2-52—"In wisdom, stature and favour with God and Man". I attribute it to thyroid medication.

D. K. MURRAY, M.D., Liverpool, N. S.

*Some Liverpool Chronicles

JANET E. MULLINS

DRUGS AND DRUGGISTS

IN the good old days, which included practically all of the first hundred years, 1760-1860, of the settlement of our County of Queens, the doctors were the druggists and each imported, made, and dispensed the drugs required by his patients.

No one of the Proprietors of the Township of Liverpool followed the profession of pharmacy though it was well recognized previous to 1760. In fact there is not a chapter in our local histories devoted to what we regard as the all important subjects of surgery, medicine and drugs, in consequence of which information on these subjects is meagre and the sources widely scattered.

Thomas Akins in a document in the Nova Scotia Archives lists the settlers of Halifax in 1749, stating the profession of each. Among the professions named are "apothecary, chymist and surgeon, apothecarie's mate, chymist and druggist." Whatever difference in profession these terms implied a knowledge of one alone does not seem to have equipped a man to carry on ye olde time drugstore, the Colonial pharmacy. The word, pharmacist, does not appear in the Akins list. It may be mentioned here that Daniel Hay, a surgeon-apothecary—the first of his profession who had a medical practice in the Dominion of Canada—was one of the fifteen men forming the first social club in Nova Scotia, the "Order of Good Times." The date was the winter of 1606-7.

That no doctor's or druggist's name is included in the Liverpool Proprietors' list does not imply that the settlers were without medical attention, for in early documents there is mention of this or that doctor, but one infers that they were birds of passage and not permanent residents. However, the health of the community did not suffer in their absence, for, so primitive were their methods, and so haphazard their medicines that the people were as well versed in them as they.

It was quite natural that our early doctors should be natives of New England, since the Town was settled from the New England States. A statement of the training they received for the practice of their profession will indicate the equipment they had for healing the sick. "Before the American Revolution there were no medical schools in what is now the U. S. A. A prospective leading medical light, say of the Atlantic States, went to Europe and studied there under leading doctors for three years, probably paying each of his instructors \$30.00. There was no necessity for medical study at home previous to his three years abroad. The schools attended were located at London, Glasgow, Edinburgh, Antwerp, and sometimes Vienna. They were catch as can places, the professors, the outstanding physicians of their day, working on an individual basis. The student selected his own instructors, his own courses. Certificates of attendance took the place of credits towards a degree. The college was loosely organized. Admission cards of one student

who was in Edinburgh in 1758 still exist. They are written on playing cards with the university seal affixed. The seven of diamonds admitted the young student to the Royal Infirmary inspection, and the deuce of hearts permitted him to attend the anatomy lectures.

If a student of those days were less ambitious instead of the European course he could take service of three or more years with a doctor at home, known as a Preceptor, and learn from him all the deadly devices of brews and boluses, and hack saw surgery with which doctors used to decimate the population of those days, and then go forth with a certificate and a new suit of "clothes," which was the complete course provided in most of the Colonies. Or, he could save all that trouble by hanging up a sign and educating himself on the patients as he went along.

Those boys who earned their profession abroad brought back an appalling amount of the standard pharmaceutical junk of Europe. Medical practice in the 18th century was still mixed up with the dark of the moon, powdered toads, passes in the air, and things like that. The home-folks added these superstitions to their own misinformation, and buttressed the result with the ignorance of the Indians.

Mental healing must be given a larger share of credit for their successes than they realized. Their victims believed that they knew their business. The doctors believed that goat's droppings would cure disease. So they fed the droppings and the victims believed they were being cured. These well-meaning swindles were abetted by authorities in American therapy, and backed by mammoth European reputations.

Bleeding was a universal practice. Leeches were fastened to the patient's nostrils and ears. If this did not suffice veins were opened and, as a last resort, arteries. If the patient survived the doctor got the credit; if not, Divine Providence took the blame.

Even after medical colleges were well established far into the 19th century, the Preceptor system for training new doctors continued. The students were really apprentices, and kept the status of servants to their masters from the time they entered their service, till they became of age.

There were no specialists. The practising doctor had to know surgery and pharmacy—indeed had to collect his own herbs on occasion. Apothecaries could furnish such standard drugs as quinine, epicae, calomel and perhaps a supply of dry toads and distilled fish worms. But for the awful brews prescribed by James' Dictionary of Medicine a deep grounding in botany was necessary, and doctors were about the only botanists we had. They mixed this expert knowledge with the lore of the medieval witch-doctors to produce truly astounding results.

The students had to learn the Latin names of all the weeds and of the reptile and insect live stock "decocted" with them. They had to know how to collect and prepare them and when to administer them. They had to know as much anatomy as the naked eye could perceive backed by a good butcher knife; be familiar with such crude surgical technique as then existed. These were matters of pure education to be attended to between times of cleaning the office, currying the doctor's horse, shoveling snow in the winter, attending their masters on their rounds and getting them home from parties. A lifetime seems too short to acquire such a warehouse of facts and keep it in working order.

Young Americans who went to Europe for training set up practice in the larger seaboard communities. In the hinterlands any one who wished to be a doctor was a doctor by the wish, and no one asked any foolish questions as to his medical knowledge.

Of one such in our own County it is written that he was called "Doctor," and rode with saddle-bags although he could not back them up with any regulation parchment. When he amputated a finger the job was done with a mallet and chisel, and after the thing was wrapped up nature was supposed to take her course and complete the job, which she generally did. He was a dentist whose whole equipment was an instrument that was a cross between a gimlet and a lumberman's canthook, and operated like a patent stump lifter. In some cases, with spleenish patients who bragged a good deal about bodily troubles that the "Doctor" could not nail down on some offending organ, he burnt on leg or arm a furious blister that gave them something definite to think about and localized their trouble. This the "Doctor" called an "issue".

In his saddle-bags in intimate association with his surgical apparatus were his "drugs" in their musty and dusty wrappings. His was a common practice. He knew nothing of invisible germs, nor antiseptic bandages, nor other uses of antiseptics for the lack of which most wives died young. Solitary indeed was the early settler who did not have at least two wives lying beside him in the churchyard. A perusal of inscriptions on many tombstones in the old cemeteries of the County will confirm this statement. The old "Doctor" lived till he was ninety, a testimonial in flesh and blood of the acceptance and rightness of things as they were.

Well past the first quarter of the 19th century when a doctor arrived at the bedside of a patient, as a rule, the afflicted person was immediately in greater peril than before, as no treatment was founded on the knowledge of the disease or the certain operation of the remedies. Then, too, in the absence of the use of disinfectants the doctor more often than not left with the unlucky invalid the germs of dangerous diseases. Simeon Perkins in his diary states an instance. In 1776 H. M. S. Senegal on a visit to our harbour had several cases of small-pox on board. The surgeon came on shore to make a professional call on a citizen who was suffering from a sore leg. A few days afterwards he called again and found that the patient had the small-pox, the germs of which he had brought to him from the Senegal. Seven days later the diary records, "Mr. Jonathan Crowell" (the stricken man) "departed this life." A remedy in frequent use in cases of small-pox, one of the three most common diseases, was a "tea" made from the droppings of sheep and goats both in their fresh and dried state. As late as 1874 the keeper of a pest house on Western Head road dosed his patient, a sea captain, with this "tea". It is not strange that he died.

The second of our common diseases was scarlet fever of which often a score died in the frequent epidemics. What need for a pharmacy to furnish drugs when you had only to dig in your garden to get a supply of angle worms to make poultices to lay on the victims' little stomachs "with the approval of Dr. Woodbury", or other physician established here at the time?

In place of the aspirin tablet, the bottle of vapex, a hard cold was tackled with a hot brick, a tub of hot water and a bundle of thoroughwort.

Tea was kept for use in cases of fever in adults and was considered a potent remedy.

Our diarist records reading in the Mass. Gazette, 1775, "a remedy for a type of bleeding recommended by the great Robert Boyle, Esq. Take new churned butter without salt, and skim off the curd part. When melted over a charcoal fire, give two spoonfuls of the clarified remainder twice or thrice within the day." No doubt Simeon Perkins gave the townspeople the benefit of his reading.

A raw salt herring and tow soaked in ancient goose grease were remedies for sore throat or diphtheria, the third common disease that "carried off" the little ones in great numbers during this period so-called "good old times". No wonder mothers bore so many children since so few lived to be adults.

With home remedies so much in use it is not a matter of wonder that the County during many years had no drug stores, that certified doctors, discouraged, did not remain and that some were jailed for small debts.

Early in the 19th century the status of the American medical student was changed through state associations looking to higher standards, and medical training made advance in method though not in content. Chemistry, physiology, microscopy, still had no place in the student's career. By 1850 it was no longer necessary to go to Europe for a grounding in the fundamentals. The medical profession from an easy-going gentleman's vocation became the rock-ribbed science of the present. Following Joseph Lister's development of the technique of antiseptics, and Florence Nightingale's pioneer work in hospitalization, the old pharmacopias with their medley of weird roots, powdered toads and assorted droppings retired from the libraries, and the medieval doctor lost his sway for the first time in history.

After the death in 1812 of Simeon Perkins, whose diary covered the period from 1766 to that date and was the source of information regarding the lives of Queens County people, the records are meagre until the appearance of the first Liverpool newspaper in 1854.

When imported drugs began to supersede home remedies doctors kept their own supply for dispensing, as they do to a certain extent at present.

In addition to the household remedies previously mentioned the following were in common use throughout the County:—

tansy for poultices; mullein leaves steeped in vinegar for sore throat; salt pork was bound on the throat as a poultice and placed on open wounds; a steeping of juniper was used for kidney trouble; princess pine and black dandelion for tonics; sulphur and molasses for a spring cleaning of the system; a peeled onion heated and placed to the ear cured earache; a piece of camphor ice in a bag hung about the neck was thought to prevent diphtheria; a piece of yarn tied about the wrist was "good for" rheumatism; or a sprain; red flannel on the chest cured a cold; broken bones were pulled into place by main force; black-berry root cured diarrhoea.

An early drugstore in this County was kept by Dr. Inglis Van Buskirk. In 1853 it occupied the site of the present Town Hall. Dr. Van Buskirk was a practising physician as well as a druggist.

In 1842 the Rev. Gaskell kept a drugstore in Milton at Moose Hill Corner.

A Mrs. Albert Turner had a general store in the same vicinity and kept a line of medicines.

Later a Mr. Samuel Freeman and his son Frank, a registered druggist, sold drugs and groceries. On the death of the elder Freeman his son moved to New Glasgow where he had a regular pharmacy for several years, later moving to Halifax where he engaged in the drug business until his death. In 1850 Dr.

Henry G. Farish came to Liverpool from Yarmouth and engaged in the practice of medicine. He carried his own supply of drugs and was known to make pills.

About the same time Crosseup's drugstore occupied the site on Main Street of John E. Seaman's dry goods store. George M. Crossecombe was proprietor of the "Anglo-American Drugstore" in 1854. In the same year "two local druggists advertised in Liverpool, namely, Wm. M. Starr and John W. Scott. Both of these had a number of patent medicines in addition to the usual stock which all the druggists would carry, e. g., Devines' Compound, Pitch Lozengers, Tooth Ache Drops, B. O. E. G. C. Wilson's salve, Composition Powders, Dr. Hough's Bone Linament, Croup Syrup, Wine Bitters, Jaundice Bitters, Vegetable Expectorant, Catarch Snuff, Sugar coated pills that operate without pain, Yankee Extract for removing stains, grease, paint, or tar from all kinds of cloth or silk, Neuropathic Drops, an invaluable remedy for the immediate relief of pain (it surpasses all other remedies), Anti-Scorfula syrup—the matchless purifier of the blood."

Between 1850 and 1860 James L. Hemeon, son of Adam Hemeon, came to Liverpool and opened a drugstore in his residence opposite the Baptist Church. This was burned in 1856. He then occupied the Gould store in front of the rectory, and later moved to the south side of Main Street opposite the Knaut property.

About this time George Henderson carried on a drug business in a store near the George Snaddon Block. He died in 1889 and his stock was purchased by Arthur H. Hutchins who came from New Glasgow. He greatly improved the premises and made the store one of the finest in the Province.

When James L. Hemeon died Mr. A. H. Hutchins purchased his stock and placed his brothers, Charles and Edward, in charge of the store. Edward later went to the Canadian West and Charles carried on the business till his death in 1918. The stock of Charles Hutchins was purchased by J. J. Kinley of Lunenburg, who placed several managers in charge, the last being C. W. Bishop. In 1921 C. W. Bishop took over the stock from Mr. Kinley and conducted the business until the building and store were destroyed by fire. Mr. Bishop then reopened his drugstore in the Kempton Block, later moving to the Wigglesworth Block, and, in 1933, to his present location in the Hatt Block.

In 1916 H. D. Madden, formerly of Amherst, N. S., opened a pharmacy in the Harrington building, and in 1920 he moved to his present location in the Forbes Block.

About 1914 Dr. C. B. Trites opened "The Liverpool Drug Store" in the Seldon Block, and carried on until the stock was destroyed by fire about two years later.

In 1928 Lawrence Seldon opened a drugstore at the corner of Main and Gorham Streets where he still carries on a successful business.

In 1928 H. D. Madden and S. R. Forbes opened a drugstore in Brooklyn, Queens County. In 1934 Mr. Madden sold his interest to Mr. Forbes.

About 1928 W. F. Porter, who conducted a drug store in Lawrencetown, N. S., transferred his business to Caledonia, the first of the kind to be operated in this section of the County. At the end of a year the stock was removed and the store closed.

Correspondence

Dartmouth, N. S., April 28th, 1940.

Editor, "THE BULLETIN", Halifax.

The historical sketch "Early Physicians of Colchester" published in a recent issue of THE BULLETIN was very interesting. In early years in my home glen I often heard the names of at least several of the doctors mentioned. Both Dr. "Will" and "Dave" Muir were widely known. In that place Dr. Suther, though long dead, lived on in the Christian name of at least one man whom I can recall and there must be many still living, descendants of Colchester, who bear Christian names as tokens of gratitude to the one or the other of the Muirs.

Dr. David B. Lynds was of an older generation and apparently "the memory of him was forgotten" before my time. Thomas Miller records his genealogy in detail in his "First Settlers". Somewhere, perhaps in Eaton's "History" I have read that he received his medical education in Philadelphia and that he was the very first native born son of Nova Scotia to receive a medical degree. My own interest in him arises from the fact that he attended my great-grandfather "in his last illness". Sometime ago, in the Court of Probate records at Truro I came upon the account which Dr. Lynds rendered for his services on that occasion, to the administrators of my ancestor's estate. This ancestor was a mariner. In November 1811, at or near Maitland he fell from the yard arm of his ship, falling overboard and striking on the bow of a small boat that was floating alongside. He received a severe chest injury. He was taken to his home near Shubenacadie where he died a week or ten days later. The following is a copy of the account which Dr. Lynds rendered to the estate. It is quaintly worded and itemized and is I think somewhat unique among medical records—for which reasons I venture to submit it in full.

Mr. George Burrows or John Peppard,
for the Estate of The Late Deceased Samuel Burrows
for Medicine & attendance in his last illness
To Doctor David B. Lynds Dr.

1811

Nov. 15th	To a Blistering plaster for his breast.....	4- 3
	To an Anodyne and Febrifuge Draught, 2/3, repeated, 2/3....	4- 6
	To a Paper of Cough & Expectorating Ingredients for a pint of Boiling Water 4/5½, repeated, 4/5½.....	8-11
	To a Blistering plaster for between his shoulders.....	4- 6
	To 12 papers Febrifuge powder @ 1/3 each.....	15- 0
	To 6 papers of Anodyne & Sudorific powder @ 1/6 each.....	9- 0
	To 3 oz. Perpetual Ointment.....	3- 9
	To a paper Tonick & Stomach Ingredients.....	4-10½
	To 1½ oz. Best Peruvian Bark.....	5- 7½
	To an Emetick.....	1- 6
	To 2 papers of Vermifuge @ 1/3 each.....	2- 6
	To a visit and attendance all night, etc.....	3- 0- 0
	Amount.....	£6- 4- 5¼

This account was not attested but in those days apparently doctors' accounts were never (?) disputed and I was pleased to note that it was paid promptly and in full.

The history of such a case, in 1811, makes plain the rationale of the treatment adopted. I am sure that there was nothing left undone. My only doubt hinges upon that "Perpetual Ointment". I imagine it was a vesicant applied to prolong the effect of the blister—a giant ancestor as it were, of our "Capsolins" and "Thermogenes". But I boggle at its *perpetual* qualities. My dictionary gives "destined to be eternal" as an equivalent of that adjective and a family pride makes one condemn the whole "3 oz." of the ointment as an undeservedly severe treatment even for my ancestor—but perhaps it was a soothing and not a thermogenic agent that was used.

In another "Account Book" kept in Musquodoboit, in 1824, I find Dr. David Lynds the recipient of six pounds currency "for his attendance upon David McKeen lately Deceased". This David McKeen owned lands and a mill on the Mill Brook at Upper Musquodoboit. He was of the McKeen family of Colchester and was closely related to the McKeens of Mabou. Several of the McKeen family of Mabou were born in Musquodoboit and I imagine that all the representatives of this well known family, of whom Dr. Morrison wrote in your last issue, were of Colchester origin.

Yours

M. G. BURRIS.

CENTURIES OF USE

Medication which has been in use for centuries—in fact since the earliest recorded periods of history—and still continues to have the most widespread use, must be looked upon, not so much as medication that has "proved" itself, but as one of Nature's fundamental curative measures. Reference is made to the use of *Heat*. Even in the lower animal kingdom, when disease overtakes them creatures instinctively seek the healing rays and warmth of the sun to help them to overcome their afflictions.

Of the many forms of heat therapy available to the medical profession, physicians will find Antiphlogistine one of the most useful. It combines both prolonged moist heat and supporting medication.

During the summer months the physician is often kept busy treating skin lesions and other injuries to the tissues, as the result of outdoor sports and pastimes. The heat and medication of a good dressing of Antiphlogistine is a satisfactory method of treating such injuries. It provides in modern-form one of Nature's oldest methods of overcoming inflammation and associated pain.

PRACTICE VACANT

A practice is for sale in a town of 1500 in New Brunswick, industries lumbering and coal mining, surrounding country agricultural. Practice \$6,000.00 to \$8,000.00 cash. Protestant preferred. Doctor wishes to vacate. For further information apply to the Secretary.

Department of the Public Health

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 Morton, A. McD., Halifax (Mepy).
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 MacLellan, R. A., Rawdon Gold Mines
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 Churchill, L. P., Shelburne. (Mepy).

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MacMillan, C. L., Baddeck, (Mepy).

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 (Argyle Mepy).

Those physicians wishing to make use of the free diagnostic services offered by the Public Health Laboratory, will please address material to Dr. D. J. MacKenzie, Public Health Laboratory, Pathological Institute, Morris Street, Halifax. This free service has reference to the examination of such specimens as will assist in the diagnosis and control of communicable diseases: including Kahn test, Widal test, blood culture, cerebro spinal fluid, gonococci and sputa smears, bacteriological examination of pleural fluid, urine and aeces for tubercle or typhoid, water and milk analysis.

In connection with Cancer Control, tumor tissues are examined free. These should be addressed to Dr. R. P. Smith, Pathological Institute, Morris Street, Halifax.

All orders for Vaccines and sera are to be sent to the Department of the Public Health, New Provincial Building, Halifax.

MEMORANDUM—from Regina and District Medical Society

"Daily the profession is importuned by costly advertising, samples, and optimistic Detail Men, to prescribe innumerable specialities of the many Pharmaceutical Houses operating in Canada. The result of these methods has been to undermine the teaching and standards of the science of pharmacology and therapeutics, and leave the profession in a very confused state of mind regarding treatment by means of drugs and combination of drugs. The multiplicity of trade names adds again to this confusion and altogether it is obvious that an intolerable situation has arisen which continually tends to increase. The retail druggist is forced to stock these many specialities, whose popularity by the prescribing physician wanes shortly after the visit of the Detail Men, thereby increasing the cost of prescriptions to the patients, as so frequently the shelves of the druggist are filled with proprietaries no longer used. It is obvious that this condition must be brought under control and it would appear that the only agency capable of its control is the Medical Profession. The protection of standards of drug value, the re-establishment of the science of pharmacology and therapeutics, demands a sincere effort being made to this end.

"It is, therefore, proposed that the Medical Profession set up a pharmaceutical house of their own, the capital stock of which will be held by the various Colleges of Physicians and Surgeons of the nine Provinces, on a pro-rata registration basis, and that the details of procuring the necessary premises, equipment, etc., the details of administration, the details of co-ordination or co-operation, with other units of the drug trade, both manufacturing, distributing and retail, be referred to the Canadian Medical Association with the request that they investigate the feasibility of this suggestion.

"It is further pointed out that the Pharmaceutical Houses have reaped a very rich reward from their business. The possibility that a co-operative Canada-wide Pharmaceutical House of the set-up indicated might in time be able to materially contribute to research and further profits may be allocated to the establishment of benevolent or pension funds for the various provinces.

"Be it resolved that we endorse in principal

1. That the Medical Profession in Canada establish a Pharmaceutical House.
2. That this be established on a co-operative basis owned and controlled by the Medical Profession through their legal representatives, the Provincial Divisions of Canadian Medical Association, or Provincial Colleges of Physicians and Surgeons.
3. That the details of such a scheme as suggested are beyond the capacity of any one Provincial body, and, therefore, must be investigated by a Committee of the Canadian Medical Association.

"We therefore move

1. That the above memoranda and resolutions be referred to the Council of the Saskatchewan Division of the Canadian Medical Association with the request that they be submitted to—
 - (a) As many District Societies as can rapidly be done.
 - (b) Executives of the Division of the Canadian Medical Association in the four Western Provinces.
 - (c) The Canadian Medical in time for the meeting in June, at Toronto."

OBITUARY

MAJOR-GENERAL G. L. FOSTER, C.B., M.D., C.M., F.R.C.S., LL.D., distinguished Nova Scotian and Director General of the Canadian Expeditionary Forces in the first World War, died suddenly at his home in Wolfville at six o'clock on May 17th, following a two days' illness. He was born in North Kingston, King's County, 76 years ago.

Death was due to a heart ailment, from which he had been suffering since a severe attack of influenza suffered in London in 1918. This condition had been seriously aggravated by an operation last June when one leg was amputated. The operation was made necessary when General Foster, while driving his car on a country road near Springfield, Annapolis County, suffered a broken blood vessel. He crawled some distance and then lay on the ground for several hours before assistance came. During the last few months he had been able to travel around in a car and appeared to be enjoying good health.

The brilliant career of General Foster included medical practices at Canning and Halifax; medical officer with Col. Sam Steele's army company which maintained order in the Yukon; Chief medical officer for the permanent Canadian force at Halifax and later at Toronto; Chief Medical Officer for the C.E.F. in France, 1914-1916; Director General C.E.F. in London, 1916, to close of the war. After the war until his retirement in 1921, General Foster was in charge of medical health services for the Canadian army medical service at Ottawa.

Honored By King

In 1915, General Foster was made a Commander of the Bath by his late Majesty King George V. McGill University honored him with the degree of Doctor of Literature. He was made a Fellow of the Royal College of Surgeons, previous to the first World War.

The son of the late George and Almira Foster, General Foster after receiving his early education in the North Kingston school attended Dalhousie University, and took his medical degree from New York Medical College now Columbia University in 1896. He was an interne in Bellevue Hospital, New York for some years.

On returning to Nova Scotia, General Foster opened up practice in Canning in 1897. There he married Miss Jeanette Wickwire, a sister of the late Hon. H. H. Wickwire, Nova Scotia's first Minister of Highways, and Major F. W. Wickwire, Kentville. She died three years ago. By this union there were two sons, Captain H. W. Foster, now overseas, with the First Canadian Division, and G. L. Foster with the British Army in France.

He went overseas as assistant director medical service in September 1914, with rank of Lieut. Colonel. He was senior medical officer in France with the rank of Colonel, 1914-1916, and was promoted to Major-General and Director of all Canadian medical overseas service headquarters in London, 1916.

General Foster's second wife who survives, was the former Miss Agnes

Roop, Clementsport. Also surviving besides his two sons are a sister, Mrs. Frank Palmer, North Kingston, and a brother, W. W. Foster, Halifax.

Moved To Wolfville

General Foster, following his retirement, resided in Kentville up until a few years ago when he took up residence in Wolfville.

Funeral services were held at Kentville on May 20th.

With eight non-commissioned officers of the Royal Canadian Regiment as pallbearers, the body was taken from the church and placed on a gun carriage and then taken to The Oaks Cemetery for interment. Leading the procession were detachments of the Halifax Rifles, the Princess Louise Fusiliers, the Royal Canadian Army Medical Corps, the Royal Canadian Army Service Corps, Aldershot Camp platoon, and the Halifax Rifles Band with black draped instruments.

Leading the officers was Lt.-Col. H. W. Murdoch, V.D., Camp Commandant, Aldershot.

Following the benediction the firing squad of the P.L.F. (M.G.) in charge of Sergt. E. T. Church fired the salute of three volleys over the grave after which the last post was sounded by Cpl. C. H. Creelman, P.L.F.

Honorary pallbearers were: Lt.-Col. H. M. Logan, Aldershot Camp; Major F. W. Wickwire, Kentville; Dr. F. V. Woodbury, Halifax; Frederick Palmer, North Kingston; Reginald Roop, Canning; and three nephews, W. N. Wickwire, Halifax; J. L. Wickwire, Middleton; George Foster, Kingston.

The pallbearers were warrant officers Charles R. Rines, A. J. Blanchard, A. Gabeineut, Sgt. Majors H. Milton, C. E. Rangers, C.Q.M.S., E. J. Pickard, George Burke, Sergt. D. W. Burns. The Halifax Rifles Band was led by Bandmaster Warrant Officer A. W. Coakley, V.D.

Lt.-Col. C. H. MORRIS, M.D., V.D., Great War Veteran and one of Nova Scotia's most highly esteemed physicians passed away at his home on May 22 following a brief illness.

Dr. Morris was born in Walton, Hants Co. and received his Arts degree at Mt. Allison and Dalhousie. Following his graduation in Medicine from McGill University he took up practice in Windsor. At the outbreak of the last war he offered his services and was commissioned with the Canadian Medical Corps. He served in France, Gallipoli, Egypt and Macedonia and was mentioned in dispatches by Sir Ian Hamilton and Lord Milne. In 1917 he was invalided home and on his return was first officer commanding Camp Hill Hospital and later Assistant Director of Medical Services Military Dist. No. 6. until May 1920, when he returned to Windsor to again take up practice.

He was extremely interested in the returned men and at the time of his death was President of the Hants County Branch Canadian Legion. Dr. Morris was also active in church work and was Chairman of the Board of Directors of St. John Presbyterian Church.

Dr. Morris was a man of fine moral character actuated by the highest ideals, loved and respected by all who knew him. He represented all that is best in the medical profession and to many of his associates, patients and friends his place can never be refilled.

He is survived by one daughter Clare, Mrs. J. F. Puddicombe, Ottawa and two sons, Gilbert on active service and Dr. David Morris, Windsor. His wife, Jean and his eldest son Dr. Geoffrey predeceased him.



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Personal Interest Notes

THE Provincial Government recently announced the appointment of Dr. John B. Reid of Truro, Dr. Daniel MacDonald of Sydney and Dr. F. G. MacAskill of Glace Bay to the Provincial Medical Board.

Dr. and Mrs. F. G. MacAskill of Glace Bay attended the Convocation of Acadia University at Wolfville in May when their daughter, Betty, graduated.

Dr. C. C. Archibald of Truro has received word that his nephew, Dr. Reginald Archibald, has been awarded a United States National Fellowship, value \$1800, and will be at the Rockefeller Medical Institute at New York for the coming year. Dr. Archibald graduated in Science from the University of British Columbia and in Medicine from the University of Toronto. He is a son of Dr. Eben and Mrs. Archibald, formerly of Truro, now in Vancouver, B. C.

The BULLETIN extend congratulations to Dr. and Mrs. D. K. Murray of Liverpool on the birth of a daughter on May 17th, and to Dr. and Mrs. G. A. Winfield of Halifax on the birth of a daughter on May 20th. Dr. Winfield is at present in England attached to the Medical Corps of the Canadian Active Service Force.

Dr. R. G. A. Wood of Lunenburg is attending refresher courses in New York and Cleveland and will attend the annual meeting of the Canadian Medical Association in Toronto.

Dr. and Mrs. G. W. T. Farish of Yarmouth returned home early in June from a three weeks visit to Boston and Montreal.

Dr. and Mrs. T. F. Meehan of Glace Bay have returned home after spending a short vacation in Halifax.

Dr. G. V. Burton of Yarmouth has purchased the home of Sheriff Roy C. Fraser at Hebron, Yarmouth County, and will occupy it in the near future. He will remain in general practice in Yarmouth and will occupy the same offices as at present which will be enlarged to include most of the ground floor of his present home on Main Street.

THE CHILDREN'S MEMORIAL HOSPITAL, MONTREAL

The Annual Post-Graduate Course which has been given for the past three years will not be held this year. It is not the intention of the Children's Memorial Hospital to discontinue the course, but rather to postpone it, due to the war and to an extensive building programme, which the hospital at present has in hand. As soon as conditions permit, the course will be resumed with improved facilities.

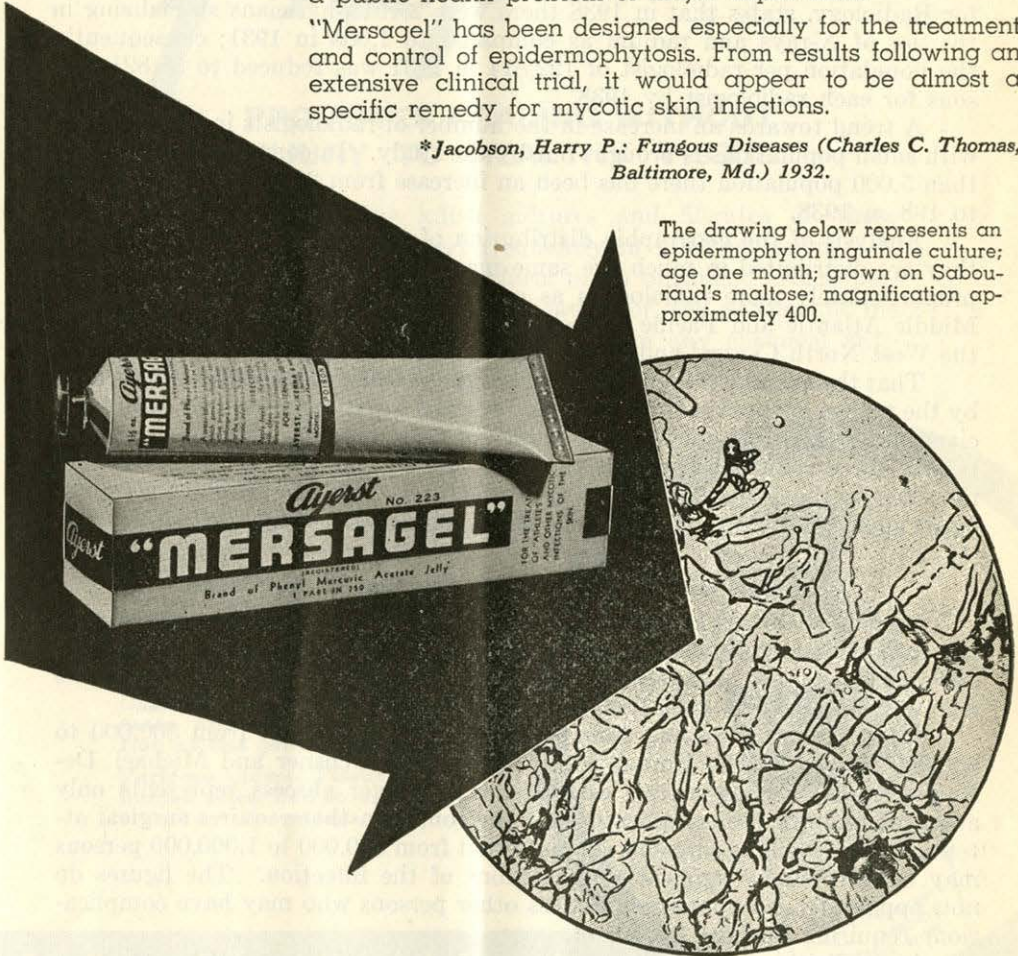
EPIDERMOPHYTOSIS

According to Jacobson*, approximately one-third of the populace suffers from skin conditions of mycotic origin. As physicians know, the commonest type encountered is epidermophytosis interdigitale (so-called "Athlete's Foot") which infection, because of its wide incidence, now presents a public health problem of major importance.

"Mersagel" has been designed especially for the treatment and control of epidermophytosis. From results following an extensive clinical trial, it would appear to be almost a specific remedy for mycotic skin infections.

*Jacobson, Harry P.: *Fungous Diseases* (Charles C. Thomas, Baltimore, Md.) 1932.

The drawing below represents an epidermophyton inguinale culture; age one month; grown on Sabouraud's maltose; magnification approximately 400.



"MERSAGEL" consists of phenyl mercuric acetate, a powerful fungicide, incorporated in a water-soluble, jelly base. When applied to the infected areas, it exerts an immediate and prolonged action, killing the causative fungus and, at the same time, soothing the affected part. "Mersagel" is non-toxic, greaseless, odourless, easy-to-apply and will not stain the clothing.

Literature will be forwarded on request

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Number Practising Radiology Has Doubled in Seven Years

The number of radiologists in the United States has more than doubled within the seven-year period ending in 1938, indicating a more wide-spread availability of radiologic services, according to a report by the Bureau of Medical Economics of the American Medical Association, published in *The Journal* of the Association for September 2.

The report, prepared from data collected by the Inter-Society Committee for Radiology, states that in 1938 there were 2,191 physicians specializing in the use of X-rays and radium as compared to 1,005 in 1931; consequently the population per radiologist of 122,614 in 1931 was reduced to 58,821 persons for each radiologist by 1938.

A trend towards an increase in the number of radiologists in communities with small populations is brought out by the study. In communities with less than 5,000 population there has been an increase from 28 radiologists in 1931 to 198 in 1938.

Analysis of the geographic distribution of radiologists shows that, while they are distributed in much the same manner as other specialists, there are proportionately more radiologists as compared with other specialists in the Middle Atlantic and Pacific states and proportionately fewer radiologists in the West North Central and East South Central states.

That the hospital is an integral part of the practice of radiology is indicated by the replies of those radiologists who returned questionnaires. Of 840 physicians, 802 stated that they were members of hospital staffs. Six hundred and twenty-three radiologists stated that they were heads of the department of radiology in the hospitals in which they practised. However, 610 of the radiologists maintain private offices outside the hospitals.—*The Diplomat*. Nov. 1939.

Infection with *Endameba Histolytica* Wide-spread

From 5 to 10 per cent of the population of this country is infected with the endameba histolytica, Dr. Charles Franklin Craig, of Tulane University, declared at the medical symposium at Duke University. In some parts of the country the infection runs from 30 to 40 per cent of the population.

Liver abscess, resulting from this infection, may affect from 300,000 to 600,000 persons in the United States, Drs. Alton Ochsner and Michael De-Bakey say as a conservative estimate. Since liver abscess represents only about one half of the complications of the condition that requires surgical attention, these Tulane surgeons estimate that from 500,000 to 1,000,000 persons may be affected by surgical complications of the infection. The figures do not, apparently, account for countless other persons who may have complications requiring medical treatment.

Appendicitis, massive hemorrhage, perforation of the intestines with resulting peritonitis, brain abscess, spleen abscess, lung affections, and skin ulcers and abscesses are a few of the twelve conditions, including liver abscess, that they list as complications from infection with this parasite.

The vast majority of these infections are not accompanied by symptoms of dysentery, Doctor Craig pointed out. Dysentery is characteristic of serious infection, but most infections have milder symptoms, which are generally mistaken for signs of some other condition. To avoid confusion, the infection should be called amebiasis and not amebic dysentery.

The infection is by no means limited to the tropics, and while it is most prevalent in the southern states of our country, enough occurs in the North for public health officials and physicians to be on the watch for it and plan control measures.—*The Diplomat*. Nov. 1939.

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Refrigeration Aids Treatment of Human Cancers

Refrigeration, involving "artificial hibernation", is a helpful aid in the treatment of human cancer, although not a cure, Dr. Lawrence W. Smith, of Temple University, reported at the recent meeting of the American Association for Cancer Research. This low temperature "cold" treatment tried on more than thirty cases of inoperable cancer, Doctor Smith reported, gave these results:

Prompt reduction in pain; reduction in size of the local lesion; general improvement in the patient's condition; tendency toward healing of ulcerative and fistulous lesions; and a retardation in recurrences and in the rate of growth of such recurrent lesions.

The refrigeration treatment is applied locally directly to the cancer, or the temperature throughout the body generally is reduced by artificial hibernation. The treatment is based on evidence that temperature is an important factor in the activation of embryonic cell growth and that there are very definitely "critical levels of temperature that have a much narrower range for young cells like cancer cells than for adult differentiated cells.

Doctor Smith suggests that refrigeration treatment should be made a definite part of cancer treatment, not as a cure in itself, but as an adjunct to X-ray treatment and surgery.—*The Diplomat*, February, 1940.

Malaria Map May Change in Ten Years

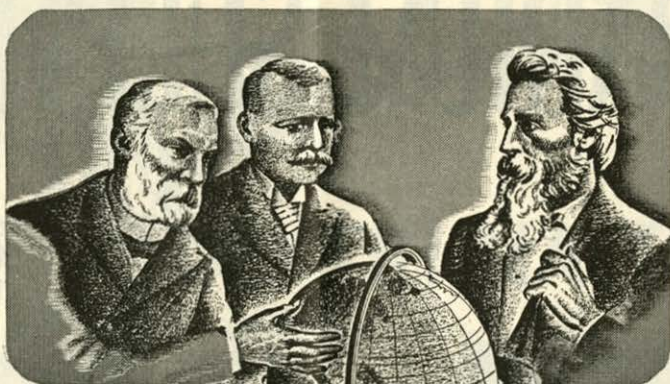
A complicating factor in the problem of malaria control is the fact that the malaria map of the South may be considerably changed within the next ten years, as a result of both natural and man-directed forces. This point was brought out by Dr. Ernest Carroll Faust, of Tulane University, in his report to the recent meeting of the National Malaria Committee.

Doctor Faust has noted a marked tendency for the disease to spread from heavily malarious zones to adjacent territory, in which the malaria mosquitoes breed but in which the population is presumably less immune to the disease than it is in regions where malaria is always present.

Life insurance companies, Doctor Faust found from questioning their medical directors, consider malaria the only special insurance hazard in the South to-day, with the possible exception of pellagra. On the other hand, Doctor Faust pointed out, the rates for deaths from homicide, suicide, and other external causes are substantially higher in the South than in the nation as a whole.

About four out of every one hundred persons in the South has malaria every year, a total of at least 1,500,000 annual cases, Doctor Faust estimated. The disease fluctuates about every five to seven years, Doctor Faust pointed out. The last peak in deaths from malaria occurred in 1933-1934, since which time there has been an appreciable decline. Another increase may be expected in another year or two.

The most encouraging feature of the situation to-day, Doctor Faust said, is the greatly increased interest and activity of state departments of health in the development of full-time divisions of malariology for making county- and state-wide surveys of all aspects of malaria, with a view towards control of the disease.—(From *The Diplomat*, February, 1939).



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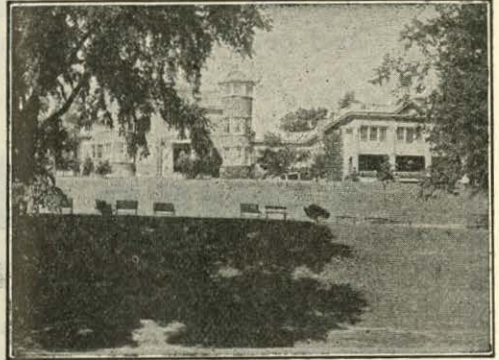
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