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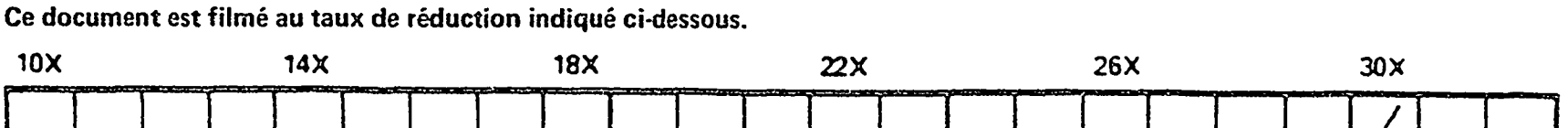

THE

# UPPER CANADA MEDICAL JOURNAL

OF

## Medical, Surgical and Physical Science.

## ORIGINAL COMMUNICATIONS.

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ART. XXXI.—*Morbid appearance in a case of Chorea—the connexion of this disease with Imbecility and an alteration in the Substance of the Brain, by* DR. WILLIAM AITKEN, M.D., *Demonstrator of Anatomy, &c.*

UNDER the above title I propose to publish in this JOURNAL the history of cases and dissections which may from time to time come under my notice, and which illustrate some of those principles of Pathology which have been established by anatomical and physiological study, or indicate methods of research, by which the existence of organic change may be demonstrated in cases thereto regarded as entirely of a functional character.

Convulsive diseases of the nervous system have hitherto, for the most part, baffled the attempts of the morbid anatomist to associate them with structural changes of a characteristic or constant kind: and the accounts of the pathological observations which have been made in these diseases, though very numerous, have not yet assumed the form of a pathological law, by which the occurrence of their symptoms may be explained. Such diseases as tetanus, hydrophobia, epilepsy, and cholera, particularly illustrate these statements.

It is obvious that the pathology of such diseases must be mainly grounded on the ascertained functions of the nervous system; and we may with confidence recommend the remarks made by R. B. Todd in the Lumleian Lectures for 1849, as clearly shewing the direction in which observation ought to be extended in such diseases, with the view of confirming or modifying opinions regarding their pathology.

As a comparison of the specific gravity of the central parts of the opposite hemispheres of the brain, in the case of cholera described in the following article, has furnished some unexpected results, I have deemed them worthy of being recorded; and it is hoped, that when its history, as detailed by Dr. Weir, is connected with some collateral details in the pathology of similar cases, and with the recently published and valuable records of the specific gravity of the cerebral substance in health and disease, some additional interest may be attached to a case, which otherwise is in no respect different from many which are already familiar to the profession.

As more fully stated in Dr. Weir's history, this case occurred in a female, aged 17 years, admitted to one of the wards in the Glasgow Royal Infirmary, 13th December 1852, with the characteristic symptoms of cholera in its most aggravated and acute form. Although previously healthy, she exhibited to the family with whom she lived as a servant various unusual symptoms of disease, both mental and bodily. She was observed to have little control over her limbs, and frequently complained of weariness and pain in the lower extremities. From her infancy she had been brought up in a benevolent institution; her parents, were both intemperate, and particularly the father, having died when she was young. Her disease terminated fatally on the 22d December, in about ten days from the first appearance of the acute symptoms.

*Examinaton of the body 20 hours after death.*—The cavity of the cranium in this case was the part to which our attention was more immediately directed, and it is more especially to the condition of the brain substance, that I mean to call attention; premising that no lesions of any moment existed in any other internal organ, and that the external surface of the body presented appearances of severe bruises and abraisons of the scarf skin, resulting from the injuries received during the more violent paroxysms of the convulsive movements. The pupils were unequally dilated; the left to about twice the diameter of the right, which measured about a tenth of an inch. Before removing the brain, it was observed that the contour of the left cerebral hemisphere projected considerably above that of the right side; the superficial vascularity was also greater on the left side. The brain weighed 46 ounces avoirdupois. A horizontal section through the cerebrum showed that its white substance was comparatively bloodless, while the grey matter was unusually distinct, from its ruddy appearance. The ventricles contained no fluid, and the sub-arachnoid spaces were also unusually dry. The nerves at the base of the brain were firm and natural in appearance. The arteries of the circle of Willis enclosed fibrinous congula.

In the absence of any marked organic disease in this case, it appeared to me desirable to have recourse to that kind of investigation which in diseased conditions of the liver, and alterations in the urine and kidney, had yielded such varied and remarkable results, more especially when studied along with the microscopic appearances of the objects of examination; and directing my enquiries to the central parts of the brain, as recommended by Dr. Todd, an accurate examination of their specific gravity was made.

Their specific gravity of the central masses was determined in two ways, 1st, by weighing the parts in air and then in water, and, 2d, by the gravimeter, employing in the latter method a strong solution of Epsom salts, which was gradually reduced by the addition of water, to the density of the portion of brain floated in it. In consequence of the uncertainty of the results obtained by suspending such a soft material as the brain both in air and in water, the observations from the gravimeter have been retained in preference to those modes by the hydrostatic method. The following results were thus obtained:—The specific gravity of the corpora striata, and thalami optici was different on the two sides of the brain; those on the right side were of the specific gravity of 1·025, those on the left side of 1·031, and this difference appeared from the hydrostatic experiments as well as from those made with the gravimeter, confirming in some measure the accuracy of the general result.

The vascularity also of these central parts of the brain, when compared with the grey matter of the spinal cord, which was healthy, was so well marked, as to leave no doubt of its abnormal increase.

Microscopic examination confirmed the existence of increased vascularity, for numerous capillary vessels, in usual abundance, existed in every section examined. Some of these were irregularly dilated, as in a varicose condition, and all were filled to a greater or less extent with the red corpuscles of the blood. The amount of granular substance in these parts of the brain on

both sides, appeared to be greater in proportion to the fibrous substance than in the same parts of healthy brain with which I compared them.

When removing the dura mater, it was observed to be more adherent than usual to the surface of the convolutions, on each side of the superior longitudinal sinus, by firm vascular connexions with the pia mater and Glandulæ Pacchionii. The sinus was turgid with blood and a decolorized fibrinous clot which filled its cavity. The veins on the surface of the convolutions were also much congested and turgid with blood, while the whole surface of the pia mater presented a bright rosy colour, from the increase in the number and size of the vessels visible to the naked eye.

*The following are the Measurements of the Head, Cranium, and Brain:—*

(*a*) Horizontal periphery of the head,.....20·5 inches.
(*b*) Horizontal periphery of the denuded cranium,.....19·25 —
(*c*) Horizontal periphery of brain *in situ*, and enclosed in dura mater,.....18 —
(*d*) Greatest antero-posterior diameter of skull,.....6·75 —
(*e*) Greatest transverse diameter,.....5·25 —

Nothing abnormal was observed in the nerve substance of the cord. Its sheath enclosed fluid in the usual quantity. All other internal organs healthy.

*Remarks.*—The morbid appearance of the body which have been found in cases of chorea, have not as yet thrown much light on its pathology. Sydenham, Cullen, Rostan, Bright, Stoll, Pinel, and others, who have had frequent opportunities of examining cases of this disease, failed to detect any other morbid appearances than those which were commonly seen in other affections of the brain and spinal cord. Accordingly, by one class of pathologists, chorea has been regarded as entirely a functional disorder, independent of organic change: and by another class it has been considered as associated with some other diseases, whose pathology is better known, either as a concomitant feature, or as a necessary consequence of their previous existence; such, for instance, as rheumatism and diseases of the heart.

Much evidence has been brought forward in favour of the humoral or rheumatic character of the disorder. Dr. Copland (*London Medical Repository*, vol. xv.) has the merit of having been the first to indicate the complication of chorea with that class of diseases; and his views have been subsequently confirmed by Drs. Prichard, and Roeser, and more recently by the elaborate researches of Dr. Begbie * and Dr. Seé. † Numerous instances have also been adduced by Andral, Bouillard, Bright, Mackintosh, Watson, and others, in which diseased conditions of the heart and pericardium have been attended with, or have given rise to, spasmodic diseases of the nature of chorea, paralysis, mania, or dementia; and the evidence of these writers is amply sufficient to prove, that a considerable number of individuals affected with chorea have suffered from cardiac or synovial rheumatism. But it is unquestionable that all have not so suffered: and indeed the history of the majority of the cases clearly shows that chorea has a more intimate connexion with mental disease, such as imbecility, or even insanity, than with perhaps any other morbid state.

The history of this case of chorea and the examination after death, as now described, present the following points of special interest in its pathology:—

1. The condition of slight mental imbecility which characterized the patient during the whole of life, and which appeared to be congenital, and probably hereditary.

2. The altered condition of the nervous substance, not indicated by any very obvious deviation from the healthy structure, but sufficiently manifest by various observations made upon the brain.

These observations are (a) *a difference in the comparative bulk of the two*

* Edinburgh Monthly Journal of Medical Science, 1847.
† Memoires de l'Acad. Nationale de Medicine, vol. xv. page 373. et seq.

*hemispheres of the brain;* (b) *a marked difference in specific gravity of the corpora striata and thalami optici of the opposite sides;* (c) *an increased vascular condition of the grey matter, and anæmic condition of the white.*

The previous state of our knowledge of the nervous diseases now under consideration has inclined pathologists to arrange them into three sets, namely:—(1,) Those in which anatomical lesions of the nervous substance have been ascertained to exist: (2,) Those in which no organic change of the nervous structures has yet been detected; (3,) Those chiefly of a mental kind, in some of which organic lesions have been observed, in others not. But a more complete examination by extended methods of research, may ultimately lead to considerable modifications of an arrangement which seems in a great measure founded on imperfect knowledge.

There is perhaps no class of diseases, the history of which abounds with more conclusive evidence of the advantages to be gained by extended and varied instruments of pathological research, than affections of the nervous system. If we compare the state of our knowledge of these diseases with that possessed by physicians a hundred years ago, it will appear that by improved methods of research and examination, diseases which were before unknown, or classified amongst those of the second and third order referred to above, come to find a place in the first, so as to increase the number of those in which an appreciable change of texture is apparent after death. It is a commonly received opinion, that fundamental derangement may exist without organic change; but when fundamental disorder is prolonged, as in the case of the heart, the structure of its substance becomes in some part or other organically changed. But although, in many instances, our means of observation are not as yet such as make it apparent whether a change of an organic kind, hitherto incapable of detection, may or may not precede a functional change, we are not, therefore, warranted in assuming that in cases of functional disturbance, organic change is always of secondary origin.

It is by no means intended here to assert that all diseases are essentially the result of structural alterations. But although in many instances these may be of a kind inappreciable by our present means of observation; and although hysteria chorea, epilepsy, and insanity, for the most part leave behind them no pathological change of a constant or characteristic nature, yet we are still so little conversant with the changes to which the organs involved are liable, that it is reasonable to believe that the delicate texture of the nervous system may be organically changed in some parts of its substance, although it may further be remarked, that the congenial nature of some of these affections, and the permanence of the functional derangement, add probability to the view of a coincident organic lesion. This remark applies particularly to mental diseases; and in reference to them it may further be stated that although marked organic changes often appear to be absent, yet even in the obscurer cases a morbid condition of the brain may be indicated by various observations of the following kind: namely, change of colour of the nervous texture; altered consistencies; abnormal vascularity; softening; increase or deficiency of size, or of specific gravity, congenital malformation. And although, also, it may be urged, that such morbid conditions of the grey matter of the brain, as well as other changes of the fibrous substance, are not significant of any fixed or particular form of mental or nervous derangement, yet it has been clearly shown that every variety of lesion has been associated with one distinct functional change, viz. *insanity.** Our knowledge of the physiology of the brain is not yet sufficiently far advanced, to state with certainty the varied conditions under which the different parts of the encephalon may be modified in their operations, by an alteration of structure in other parts of the nervous centres, more especially when such alterations are of congenital origin, and of gradual development. The compensating and vicarious powers of different organs and textures of the body, are also now so fully recognized, that every allowance must be made for the natural performance of function, although a part of the organ may be in a condition

*Hitchman, Pathology of Insanity. Psychological Journal, vol. iii. p. 519.

incapable of healthy action; and while the great variety of morbid changes which have been observed in hysteria, chorea, epilepsy, and cretinism might leave it doubtful whether any are constant, the congenital nature of these affections, along with the gradual and increasing development of the morbid symptoms, under various exciting causes, give great probability to the view that alterations of structure originally existing have only been increased and made more manifest by various excitants of the nervous system.

The observations of Drs. Howe and Knceland in the *American Journal of Medical Science*, contain abundant evidence confirmatory of these views, and bearing more immediately on the following points:—

1. The hereditary transmission of insanity.
2. The birth of imbecile children from imbecile parents, and from parents in whom the size of the brain is deficient.
3. The prevalence of hysteria, chorea, and epilepsy among imbeciles, and among children born of imbecile or dissipated parents.
4. The general coincidence of organic change of the brain and cranium with the affections of idiotcy and cretinism.

The history of this case of chorea, as given by Dr. Weir, shows that the treatment to which the patient had been subjected, particularly in early life, was calculated to induce disturbance of the nervous system, and to foster a predisposition to imbecility, while the following conclusions, derived from a comparison of some of the morbid conditions with well ascertained facts, tend to connect the organic changes with an imperfect condition of the functions of the brain.

The weight of the brain (46 ounces avoir.) is above the average weight of the female brain, as given by Dr. Reid, at the age of 17 years. The average circumference of the female head is ascertained to be 21·5 inches, and while the greatest circumference obtained from idiotic crania gives only 20·7 inches, it is evident that when we compare the size (46 ounces) with the dimensions given in the case before us, and also take into account the difference of specific gravity of the central parts of the brain on the two sides, it shows a disproportion between the weight of the brain and the capacity of the cranium—an observation which coincides with measurements made in a certain class of idiots: and if to the above mentioned changes of the specific gravity we add the increase of vascularity, we see more and more reason to conclude that some physical change has taken place in the texture of the brain, and more especially in the central parts.

A change of a morbid kind may exist in a single part, and may therefore be readily appreciated, or it may exist more generally diffused throughout the whole mass, and be only capable of detection by observation on large quantities. This is more particularly the case with vascular congestion of the brain, and more widely diffused changes in the vesicular elements of the nervous system. Of all the morbid changes associated with insanity, epilepsy, and chorea, there are none which occur with greater frequency than congestions in the nervous centres, either of a local or of a general character; while it is also the opinion of the most experienced physiologists, that congestions of a local kind may occur during life, without leaving any marked evidence after death of their previous existence. Other changes are of frequent occurrence, giving rise to symptoms similar in kind, although the morbid conditions of the textures may be different; and Dr. Bennett has the merit of clearly pointing out "that death may be occasioned by structural changes in the brain, which are altogether imperceptible to ordinary vision."* We must not, therefore, at once conclude that organic lesions are altogether absent, because appearances do not indicate any of those which have hitherto been familiar to us. Other methods of research may be in store, and among them observations to determine the specific gravity of parts not yet examined.

While anatomical and physiological observations assign to cerebral congestion a very prominent place in the pathology of insanity and convulsive

* Inflammation of the Nervous Centres, 1849

disease, an increase or diminution of the specific gravity of the brain is a no less certain index of some change having occurred in its structural elements.

The absolute weight and specific gravity of the brain have recently been the subject of observation in Germany, France, and Britain; and although some discrepancy is evident in the obtained results, yet they all tend to shew that any considerable change in the specific gravity of the cerebral substance is incompatible with a healthy exercise of the nervous functions.

Meckel affirmed that the brain of the insane was lighter than the brain of persons of sound mind; an observation since confirmed, and recently elucidated by M. Parchappe, in a memoir presented to the Academy of Sciences, where he shows the gradual decrease of the weight of the brain, in proportion to the successive degrees of loss of the intellect.

MM. Leuret and Mitive gave the mean specific gravity of the brain of an intellectual individual as 1·028, but this is a statement which recent observations have shown to be much below the average; a density, in fact, more frequently associated with an impaired mental capacity.

To Dr. John Charles Bucknill, Physician to the Devon County Lunatic Asylum, we are indebted for the first most extended account of the specific gravity of the cerebral substance, and its relation to diseases, more especially to atrophy and paralysis. The following are the general results of his observations, as detailed in the *Lancet*, 25th December 1852, and for the most part made upon patients labouring under the different forms of mental disease:—

1. Average specific gravity of healthy brain, 1.036.

2. In paralysis of a chronic character complicated with insanity, the specific gravity ranged between 1·036 to 1·046.

3. In some acute cases the specific gravity was as high as 1·052.

4. In paralysis terminating by coma, 1.040.

5. In paralysis terminating by syncope, or asthenia, 1 033 to 1·039.

6. In general terms a higher specific gravity was found when life terminated by coma, or asphyxia, than when it ended by syncope, or asthenia.

In addition to these observations, an able and elaborate paper has since been published by Dr. Shankey, in the *British and Foreign Medico-Chirurgical Review*, showing the relative specific gravity of the grey and white matter of the brain, and of so extensive a nature, as to furnish very copious data for comparing morbid states with the standard of health.

The following are the general results of his researches, as given in the *British and Foreign Medico-Chirurgical Review* for January, 1853, p. 257:—

"1. Mean specific gravity of the grey substance of the brain, in either sex, 1·034.

"2. In the earlier and latter periods of life the specific gravity of the grey matter is below the mean.

"3. The cerebral substance acquires its greatest density in males between the ages of fifteen and thirty, and in females between the ages of twenty and thirty.

"4. The density diminishes with prolonged illness.

"5. It decreases with lapse of time after death in the ratio of ·001 for every 24 hours.

"6. A density of ·006 above the average, indicates the existence of the following conditions during life:—Acute cerebral symptoms, or chronic disease with no cerebral symptoms, or only slight delirium; also with conditions associated with hyperæmia.

"7. Mean specific gravity of white matter 1·041."

The observations referred to above appear to have been made upon the brain as a whole; and, as the observations of Dr. Shankey show that no constant relation exists between the absolute weight of the brain and its specific gravity, it is necessary that we examine the brain as we do its anatomy, namely, by comparative observations on its central parts or ganglia. As I was not aware of the existence of any published accounts of the specific gravity of the brain substance at the time when the case of chorea now detailed came to be the subject of *post mortem* investigation, and

as the observations then made showed such a striking difference on comparing the specific gravity of the central masses of the opposite sides of the brain, I thought it right at the time to institute comparative experiments upon the brain of a number of individuals in this city. The observations I have made are of a similar kind to those recorded by Drs. Bucknill and Shankey; but while my observations have not so directly in view the determination of the specific gravity of the grey and white substance throughout the whole brain, they tend rather to detect any difference of specific gravity which may exist in individual portions of the cerebral substance, and which have been styled by some the *central ganglia*, and which are now generally regarded as parts more immediately related to the combined exercise of sensory and motor functions.

The following is a statement of the results of my experiments on the specific gravity of the central masses of the encephalon:—

| Age. Male. | Age. Female. | Disease at Death. | Weight of Encephalon in ounces avoir. | Cubic capacity of Encephalon in inches. | Specific gravity of Cerebrum. | Specific gravity of central parts. Corp. Stri. and Thal. opt. rt. side. | Specific gravity of central parts. Corp. Stri. and Thal. opt. left side. | Specific gravity of Cerebellum. |
|---|---|---|---|---|---|---|---|---|
| — | 17 | Cholera, | 46 | — | — | 1·025 | 1·031 | — |
| — | 30 | Morbs. cox. fatty liver, | 50·25 | 75·29132 | 1·033 | 1·045 | 1·045 | — |
| 26 | — | Typhus, (21st day.) | 54·25 | 84·15724 | 1·046 | 1·046 | 1·047 | 1·049 |
| 32 | — | Tumour of brain, | — | 80· | 1·035 | — | — | 1·043 |
| — | 36 | Dysentery, | — | — | 1·040 | — | — | — |
| 17 | — | Empyema, | 52 | 88· | 1·038 | 1·043 | 1·042 | 1·041 |
| 12 | — | Phlebitic deposits, | 43·12 | — | 1·030 | 1·040 | 1·041 | 1·038 |
| 47 | — | Tetanus, | 46 | 75· | — | 1·040 | 1·040 | 1·046 |

The observations in the foregoing table were made upon subjects within forty-eight hours after death, and the specific gravity taken by the gravimeter in a solution of Epsom salts, made of such density as to float the portion of the brain.

Of the six cases observed, four of them indicated a difference between the central masses of the opposite sides. The case of chorea gave the greatest, while only one of the others exceeded a difference of one degree upon the gravimeter. It was a cause of death from typhus fever.

In the case of chorea now detailed, we have little to indicate the real nature of the morbid change that has taken place. A diminution of density to a great extent, and that unequally upon the opposite sides of the brain of itself indicates some abnormal condition of the nerve substance, and the microscopic appearances clearly indicated an increased vascularity of the grey substance, and an amount of molecular (exudation or degeneration?) matter, which hardly left any vesicular nerve substance to be seen amongst the fine nerve fibres of the sections examined.

The morbid conditions which this case illustrates are also of some importance in a physiological point of view, inasmuch as they are not at variance with the views, expressed by Dr. R. B. Todd and Dr. Carpenter, and now very generally received, regarding the functions of the central ganglia of the brain,—namely, that these centres, consisting of the *corpora striata, thalami optici, tubercula quadrigemina, and the large mass of vesicular nervous matter connected with the convolutions of the hemispheres, and the substance of the cerebellum*, while they are the immediate seat of the origins of nerves, may be looked upon as parts where some changes in connexion with nerves are constantly going on, of a kind such that a result is expressed through "volition, perception, or emotion, or the balancing and co-ordinating of movements."

The evidence from this case, while it is not at variance, therefore, with opinions of a theoretical nature which are entertained regarding functions, at the same time coincides in some measure with the results of those experiments and observations in morbid anatomy, which prove that injury to

the optic thalami is productive of considerable disturbance to the movements of the body. In conclusion, therefore, this case seems to establish, for itself at least, *the existence of a primary morbid change having taken place in the central ganglia of the brain;* and, though there were no symptoms of a hemiplegic character recorded during life, yet the condition of the pupils may be considered as indicating a cerebral origin to the disease; and, when we also consider the extensive connexions and relations of these central parts, above, below, and on every side, an abnormal condition, such as has been described, may be fully sufficient to account for the characteristic phenomena of chorea, as well as the imbecile condition of the individual which her history records.

While the observations made upon this case are to be regarded as a contribution towards the pathology of chorea, the accompanying remarks have been made with the purpose of bringing more prominently into view an instrument of pathological research, whose importance has not yet been appreciated; and the observations cannot fail to show that a determination of specific gravity points out physical conditions of texture, which are of the utmost importance to pathology. The microscope has been unjustly and unnecessarily burdened with labour, and has been equally unjustly blamed and brought into unmerited discredit when it has failed to elucidate the nature or even presence of a morbid state, the existence of which could not be doubted, but which the sense of sight could not appreciate, even when presented in small quantities greatly magnified. In such an instance the microscope has been applied to uses, which it is not the nature or province of the instrument to detect. The gravimeter or hydrostatic balance, the microscope, the stethoscope, the pleximeter, are merely instruments of pathological research, each one adapted for the determination of particular classes of facts, and can only elucidate disease when they are brought to bear upon the physical properties of the textures, organs, and regions, the nature of which they are able to appreciate; and it is only from their *combined and appropriate* use that the science of pathology will be advanced.

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ART. XXXII.—*Case of Un-united Fracture of both Fore Arms, by* S. J. STRATFORD, (*M. R. C. S., London*), *Toronto.*

THE following case appears of a unique character, and may be found not uninteresting in detail. It is evidently dependent upon some peculiarity of constitution which has not been particularly investigated, and this case may serve to call attention to the subject:—

John Wallis, aged 42, a native of the south of Ireland, has been about eighteen months in this country, a shoemaker by trade, having owned a shoe establishment in Dunmanna, Ireland. He had enjoyed pretty good health before he came to this country, excepting that he had rheumatic pains across his hips and down his thighs, which appears to have been caused by fishing in fresh water. These pains used to return about every fourteen days, lasting for several, and then subsiding. When on the sea coming to this country, he appeared to become worse; he seemed extremely weak—was scarcely able to walk. His health appeared to improve while he resided in the township of

Haldimand, after which he went to reside with his brother in the township of Medonte, during the passage of Lake Simcoe he had a fit, supposed to be epileptic. He has been married about eight years, and has a family, the youngest only a year and a half old: latterly he has been separated from his wife, not being able to maintain his family. While living in the township of Haldimand he went with his cousin to Cobourg; it was very cold weather, and he was attacked with great pain in his arms; after he returned home, his arms swelled very much. About a week after, he was pulling off his boot, when his hand slipped against the arms of a rocking-chair on which he was sitting; upon examination he found that he had fractured both bones of the right forearm. He could shake the arm and make the bones rattle. Three or four days afterwards he went to a doctor at Baltimore, C. W., and had the fractured bones set, but no union ever took place, and the arm has continued swelled and has been comparatively useless ever since. He says that the left arm swelled after the pain on the cold days, but when the general swelling by degrees disappeared, he found that the ulna was fractured; he declares that he met with no accident, and was unconscious when the injury happened.

At the present moment the right arm is considerably swollen; about the middle of the arm there is a great thickening of the ends of the bones, a false joint having formed. There did not appear to be any tenderness on handling the part, and, save a considerable impairment of its strength and usefulness, the patient did not seem to complain of great inconvenience. In the left arm the ulna had also evidently been fractured, and was displaced, but was easily reduced, changing its position, however, upon the least movement of the arm. The upper extremity of the ulna could be felt projecting under the skin, at the back part of the arm; there was no swelling or irritation apparent in the part, a degree of inconvenience only being complained of. Among other things, the man complained of losing the substance of his body (as he expressed it,) which passed in his urine; he described it as a thick cloud in his water, often feeling like slime after he had urinated; he declared that he had no involuntary discharges of semen, to the best of his knowledge—consequently I made an examination of his urine, and found its specific gravity 1028. It had a dark straw colour, and under the microscope showed a vast amount of octahedral crystals of oxalate of lime in suspension, and abundance of epithelial scales; there was not the slightest appearance of spermatozoa, as I

had been led to expect from the man's declaration. The general appearance of the patient did not indicate any very marked debility of constitution; he was, however, evidently suffering from hypochondriasis to a considerable extent, which seemed to turn upon the supposed deficiency of his sexual powers He had been sent down from the township of Medonte, by Dr. Rankin, for me to endeavour to obtain his admission into the General Hospital: he was admitted. In a few days after I saw him in the streets, but could not learn the opinion of the medical officers, or the reason of his discharge.

Without doubt the disease was dependant upon some constitutional peculiarity, causing a brittleness of the bones, which seemed to have been augmented by intense frost. That any local inflammatory disease of the bone was present, progressing to the formation of matter, and the death of the bone, did not appear probable, as no matter ever made its exit from the part, while the evident want of sensibility forbade the idea that any such had ever existed.

How much the secretion of the oxalate of lime from the kidnies had to do with the disease of the bone, did not appear evident, although it was a mark of the degraded and altered condition of the blood. The presence of the oxalate of lime may doubtless present itself under many different circumstances in the urine. In some cases it may be shown to be the result of materials taken in with the food, as the rhubarb or pie-plant and the onion in man, and the sorrel in the horse, for example. In these cases the oxalate of lime, or the immediate elements from which it is formed, is present in the food, is absorbed into the blood, and is readily excreted with the urine. Crystals of oxalate of lime are easily shown to be present on the onion, and these in many cases constitute the crystals or raphides of plants—hence their presence in the blood and their excretion from the kidnies with the urine is easily accounted for. This condition I have found to be particularly frequent in the Spring of the year in Canada, at which time the rhubarb is so generally and largely employed as an article of food. When this condition of oxularia is present in a healthy subject, the effects produced are but temporary, and do not appear to assume any very great importance, the healthy condition and active function of the kidnies appearing to preserve the necessary balance, and prevent the undue accumulation of the salts in the blood. In cases, however, when the excretory powers of the kidnies are deficient, or an inordinate amount of this material collecting in the circulating fluid, it would appear

to be often a cause of severe disease; a condition of blood-poisoning equal to that present in acute rheumatism is developed, producing symptoms differing in character, but often as grave, and frequently far more intractable in their nature. This condition of the blood, upon due examination, will often be found to be the cause of the persistence of many cases of chronic gastritis, bronchitis, periostitis, and various neuralgic affections, and whether taken in with the food, or produced in the blood by the chemical changes which are constantly pregressing during the various processes of nutrition, it accumulates in the system principally from the inability of the kidnies normally to perform their functions, and it must be evident that until this power is restored (if such, from the condition of things, is possible), that the diseases caused by it will remain more or less permanent, or their liability to recur may be sufficiently intelligible.

That the patient was labouring under the effects of the oxalate of lime in the blood, and had done so in all probability before he left Ireland, was shown by the frequent return of the pains, and their disappearance after an effort of nature had encouraged the activity of the kidnies, and assisted its removal from the system. In this man the oxalate produced in the first place symptoms of sciatica; afterwards it caused hypochondriasis and inability to perform the sexual functions, but what effect it had in producing the marked brittleness of the bones, or the great swelling of the arms under severe frost, does not at the present moment appear.

# REVIEW.

PRINCIPLES OF PHYSIOLOGY, GENERAL AND COMPARATIVE.—By William B. Carpenter, M. D., F.R.S. F.G.S., *Examiner in Physiology and Comparative Anatomy in the University of London: Professor of Medical Jurisprudence in University College, &c., &c. Third edition, London, John Churchill, Princes Street, Soho*, 1851. 1080 *pages.*

The elaborate work before us is intended to present a compendium of the principles of Physiological science up to the present time, it is a compilation of the facts, data, and deductions on which that science is founded, carefully arranged and systematised, so as to bring into view, and make serviceable for reflection, the vastly extended series of the animated races which clothe, or inhabit our globe. Doubtless, the great end and aim in this investigation is the study and comprehension of the several functions which the varied structures of the human body present; these are often difficult to comprehend, from the simple observation of their individual processes; nay, there are many parts, such as the thymus and thyroid glands, on which the fullest light of science has failed to indicate their uses. This obscurity has, however, of late years, been considerably illuminated by the study of comparative Anatomy: here we may often trace from the general to the special form, while we constantly find in the lower grades of animated existence the rudiment or type of that plan which becomes more elaborate and complicated as we ascend the the scale; the investigation of comparative anatomy in these instances has been beautifully compared by the illustrious Cuvier to so many various experiments and demonstrations already prepared for us by the hand of nature, in which, from the veriest rudiments, we are led step by step to the comprehension of the more perfect organs; evincing also in the less complex organization, a simplicity of function that by degrees enables us to understand the complicated Physiological data. The study of individual development,—Embryology,—has also greatly assisted in the elucidation of Physiological facts, presenting us with data that very surprisingly confirm the truths of comparative Anatomy, as illustrative of the more complicated organisms proceeding from the more simple types. Again; the most powerful assistant in the wonderful progress that Ana-

tomical and Physiological science has made, and is still making, in our day, is the application of the microscope to the development of these hidden truths; without its assistance, these must have been still lost to the world of science; it has truly opened up a new and most extensive field for observation, that has produced the most glorious results. Only compare the study of Physiology but twenty years ago, and you will find it little more than the baseless fabric of a vision, when compared with our present knowledge. Still however, we believe that there are many great and mighty truths yet to be developed, many of which will doubtless grace the present century, now that the Baconian spirit of deduction is applied to the investigation of the many hundred thousand species of plants and animals that at present exist upon the surface of the globe, or whose exuviæ are disinterred by the geologist from the storehouse of organic remains. In the long series of these animated races we continually find that nature deducts or superadds the various parts, as it were performing experiments such as we would wish to do in our laboratory, until by accumulated experience we have, as it were, by synthesis, arrived at the truth. Such ample means for observation being in the hand of every student of nature, each individual who takes an interest in the Physiological science may, by the simple observation and collection of facts, add some data to the common stores of our knowledge. What a noble field is here presented to the industrious medical student in all parts of the world; a book which nature continually presents before him, in which he may read with ceaseless advantage the various data of Physiological truth, the very basis of his profession. If the facts above enunciated are really correct—and we firmly believe them to be so—the student in medicine should pay more attention to comparative Anatomy and Physiology than is now usual in our schools. If, as we have said, Physiology, or the knowledge of the structure and functions of the human body, is one of the bases on which the student must expect to raise his superstructure of medical knowledge, why should he not go to the book of nature, and practically learn the truths which are to guide him in future practice? To say the least of it, the study of this department is far too much neglected in the education of our youths,—a fault it would be well for our schools to correct.

The details of the work the author has divided into two books, one of which treats of general Physiology, and the other of special or comparative Physiology. Speaking of the objects of the work, Mr. Carpenter says, that "although the

"special object of the present treatise is the exposition of "purely Physiological principles, it seems desirable to "preface these by such an outline of the general structure "and arrangement, of the organs on which the phenomena "of life are dependent, as to render subsequent details "respecting their functions more intelligible. We shall "first consider, therefore, what then is peculiar in the "chemical composition and physical arrangements of the "particles of which organized structures are composed, and "in the forms which these fabrics present. The principal "varieties of the primary or elementary tissues of which "the more complex organs of plants and animals are "constructed will next be described, and compared with "one another. And thirdly, the general characters of the "principal groups in each of the animated kingdoms of "nature will be pointed out, the mode in which their "individual organs are arranged and combined will be "explained, and the relative position assigned. Although "such knowledge is readily accessible to the student of "natural history, the *embarras des richesses* may not be a "little perplexing to such as seek only the extent of it, "which will enable them to enter upon the study of "Physiological Science, without being immediately "checked by the want of this information." Such are the objects and intentions of this work, and we must candidly acknowledge that Mr. Carpenter has elegantly and judiciously fulfilled them. Led by the facts contained in the work, and the able deductions of Mr. Carpenter, we intend from time to time to make an epitome of some of the elementary truths of Physiology, and to present them to our readers, hoping it will serve to encourage in the medical student the study of this most pleasing and necessary science, while we flatter ourselves it will tend to elevate the taste and instruct the mind of the amateur in natural history.

It may be said that the laws of life are the especial objects of enquiry in all Physiological investigations, that the differences between inanimate bodies and living beings are sufficiently obvious to all observers, that scientific comparison is not necessary to discover such obvious distinctions. Upon close consideration we shall, however, find the comparison is necessary in the very first steps of our investigations. It has been said that in the inorganic kingdom permanence is the rule—change, the exception; that the particles of matter remain as coherent masses, unaffected by the lapse of ages: but in the domain of life, change is one of the most constant attributes of animated

structure; to be born, to grow, to arrive at maturity, to die, and to be decomposed into the original elements from which it sprung, is the history of every structure endowed with life; it is alike the destiny of the highest form and the most simple structure,—of the simple vegetable cell, and the ponderous accumulation of animal material which exhibits itself in the elephant and the whale: even man in his present rudimental form, or lava condition, is in a great degree comparable with processes which nature employs in the perfecting other organised beings. Take the metamorphosis of the insect for an example,—it is but a state of preparation for a change, of the beauties of whose form and the glories of whose developments, we can form but the faintest ideas. If then death and decomposition are the certain results of all animated beings, the power of reproduction must be their most marked attribute, for without this power plants and animals must cease to exist, and the world would become a barren void, shorn of its greatest beauties and perfection.

In what the essential principles of life consist is still hid in impenetrable mystery; like the principle of Gravity, the principle of Electricity, the principle of Magnetism, there is an unknown cause producing certain phenomena as yet imperfectly comprehended. Dr. Prout declares that the vital phenomena are to be attributed to the operation "of distinct intelligent agents, superior to, and "possessing the power of, directing and controlling the "common forces of matter;" that, he learns from the effects—effects which are the laws and phenomena of life, that cannot move or progress without these necessary agents. It is the duty of the Physiological student to compare these facts; doubtless at first sight they may appear far more difficult to comprehend than the kindred phenomena of gravity, electricity, or chemical affinity, from the intricacy of their combinations, and the complexity and style of their arrangements. When however, we investigate their laws, this complexity will in a great degree subside; still, however, leaving us in ignorance of the absolute nature of the controlling cause, the essential principal of life.

The process of Endosmose, and Exosmose, as explained by Dutrochet, would at first sight seem to indicate the operation of a far larger amount of physical force upon the compound organic structures of the animal economy, than was presumed by the aphorism above quoted from Dr. Prout to influence these structures; still, nevertheless, allowing to physical force a principle, the true cause of

which we are unacquainted with, a full latitude of operation, the capability of reproducing its like,—was there no other evidence of the agency of this controlling power present in the animal economy—would be sufficient evidence of the truth of Dr. Prout's declaration. The principle or cause, which impresses upon the Embryo—the character of its parent, throughout the vast chain of animated existence—must certainly be a controlling power of enormous import, and, in the animal and vegetable economy of most extensive influence. In opposition to this declaration of Dr. Prout, Mr. Carpenter maintains that there is no intelligent agency operating and controlling the forces of matter, but that it is a direct emanation from the mind of the Deity that influences all these operations, keeps them in continual motion, and directs all their actions; even in the simplest cell of a cryptogamic plant we find that it performs for itself all the functions of growth and reproduction. Still this original impress, this power of reproducing its like, is a prominent feature which has not apparently changed for countless ages, and in all probability will present the same feature as long as the present condition of things exists; that it is the original impress of the Deity upon matter is without doubt; an influence delegated to vital or physical laws, still keeping up the same round of actions and producing the same results, demonstrative of the controlling agency indicated by Dr. Prout. In our opinion the objection of Mr Carpenter is a distinction without a difference, serving to confuse this intricate and difficult subject, rather than to throw any new light upon the matter.

As presenting the latest and most comprehensive views of the component structure of organic fabrics, we propose to pass in review the several considerations offered by Mr. Carpenter, as presented in his views of the primary tissues of plants and animals, and shall return to the subject at every suitable opportunity that presents itself, until we have placed the whole subject before our readers; convinced that in this department of Physiological knowledge the greatest strides have been recently made, and that in them must exist the key to decipher the more elaborate and compound structures of animated nature. Mr. Carpenter truly says, "It is a fact now well established by micro-"scopic investigation, that just as the Chemist resolves "the countless substances formed in nature, or producible "by art, into a comparatively small number of ultimate "elements, each having its distinctive properties, so can "the Anatomist resolve the fabrics of plants and animals,

"whatever may be their dimensions, into a limited number "of elementary tissues, each having a structure peculiar to "itself."

Following up the proposed course of our subject, we proceed to commence with an abridged view

OF THE PRIMARY TISSUES OF PLANTS.

Among these, as the most predominent and important structure, Mr. Carpenter enters into the consideration of the history and structure of the cell formation in the vegetables, and shows in what essential particulars it differs from cells developed in animals. The cell-wall has been considered heretofore as a simple membrane, but it is now shown in many instances to consist of two layers of different composition and properties. We cannot do better than to present the latest ideas by an extract. "Although we have hitherto spoken of cell-wall as a simple membrane, yet it is now well known to be made up in most, if not in all instances, of two layers of very different composition and properties. The inner of these layers, which has received the name of *primordial utricle*, appears to be the one first formed, and most essential to the existence of the cell; it is extremely thin and delicate, so that it escapes attention, so long as it remains in contact with the external layer, and is only brought into view when circumstances occasion its separation from this; it seems to consist of an azotised compound, probably an albuminous nature; and it appears to participate actively in the vital operations of the cell. The external layer, on the other hand, though commonly regarded as the proper cell-wall, seems to be generated on the external surface of the primordial utricle after the latter has completely enclosed the cavity and its contents, so that it cannot be regarded as essential to the cell; it is usually thick and strong in comparison with the other, but it may possess various degrees of consolidation, from mere mucous to a firm tenacious substance; it is composed of cellulose, a substance nearly identical with starch; and it does not appear to take any active share in the vital operations of the cell, its principal office being to locate and insolate the matter it contains. This external layer may consist of many laminæ, the result of successive deposits from the surface of the primordial utricle, but it still usually remains readily permeable to fluids, although no pores can be distinguished in it under the highest magnifying power."

*(To be Continued.)*

# EDITORIAL DEPARTMENT.

## TO THE READERS OF THE UPPER CANADA MEDICAL JOURNAL.

As will be seen by the prospectus upon the cover of this Journal, a new series is now offered to the public, and Medical profession of Canada; as therein declared, it is intended to be a medium of communication for the profession generally; the organ for the maintenance and defence of their rights and privileges particularly. As such, it is hoped that the *Upper Canada Medical Journal* will continue to enjoy its former measure of encouragement; and while it is declared free and independent of every sectional view and interest, it is expected that it will obtain the patronage and support of *all* the profession, without reference to politics of any party or faction, and that it will be made the medium for recording the facts and deductions resulting from the practice and experience of the Medical Profession generally. It is certain that the profession numbers among its members in this part of the world many who are not to be excelled upon this broad continent; and it would be both a crime and a disgrace, that they should not have a means in which to enregister each bright thought, or commendable confirmation of the rapid and glorious progress which medical science is making in our day, for the want of having an opportunity to record their individual experience, or the details of their particular practice. It must not be said that the soil and climate of the New World, and especially of British America, the seat of true freedom, and the location of the truth, is inimical to the progressive development of medical science. The spirit of the age, and the democratic elements of our communities, it is to be hoped, will not become demonstrative of a degradation of the *professions*. We confess we have our fears from what we see around us; but at the same time our confidence in the sterling sense and truthful aspirations of the Anglo-

Saxon race is such, that we hope that any temporary abasement will, in the end, serve but to arouse and demonstrate their energy, and their indomitable determination still to move onward in the right paths of science and knowledge, that will at no distant day clearly evince that the medical profession of British America is not lacking for zeal in the prosecution of science, and that it will stand a legitimate comparison with the older institutions of Europe. Let us then hope that the pages of the *Upper Canada Medical Journal* will be graced by, and be found a ready medium for, the communication of facts and observations, not deficient in originality and importance with any upon the American continent. It is our design to encourage the publication of reports from the several hospitals of this province; these are now already many in number and considerable in extent, for so young a country. If we cannot prevail upon the medical officers of each institution to give us a record of the many interesting cases admitted and treated under their charge, we hope to encourage the students by suitable rewards to make a record of the facts for which they have paid their fees; and we shall consider ourselves happy if by such a stimulus we shall have been the means of impressing such facts upon the memory, or encouraging the young medical practitioner to reason upon the various cases presented to his observation, and thus give him confidence in himself, and habituate him to habits of reflection and research that shall greatly extend the range of his medical knowledge, while at the same time he will be obtaining by such practices a means of properly expressing his ideas. To every ardent and enthusiastic medical student, we flatter ourselves this will offer a means of distinguishing himself, that will be highly prized and readily adopted. We also hope to see the pages of the *Journal* graced with the records of the various Clinical and other lectures delivered at the various Colleges and medical schools of this province. In most cases, if these lectures are worthy to be listened to, they are not undeserving of record, as the personal practice and experience of the learned and

polished teacher, and truly we have many among us; so that we sincerely hope that a new era is about to dawn upon the medical literature of this province, which must be greatly benefitted by attention to this particular object, as it at once presents to view a ready collection of the most recent ideas and truthful facts of each particular science. All we can say is, that we shall be proud to offer the teacher an opportunity of showing that he has industry in the collection and facility in the expression of these facts, that shall convince any body conversant with the subject that he is worthy of the position he essays to hold. Such a course will be sure to reap its own reward in the increased number of medical students, and the honour and celebrity of his particular school. Indeed, we would like to see the matter taken up in a national point of view, so as to enable us to show to the time-honoured institutions of Europe, that medical men and medical literature have not retrograded by transplantation into another far distant, but virgin soil. It is also the intention, as heretofore, to give a selection from the periodical medical literature of the day, in which will be included the approved Clinical and original lectures of the most popular teachers. As such lectures generally contain the latest ideas, and a complete resumé of all the interesting facts on each particular subject, they must be very acceptable to the medical profession in this part of the world. These, with reviews of the most interesting and novel works on medical subjects that shall issue from the press, and with a collection of medical news, the passing events of the day, it is hoped will make the *Upper Canada Journal* worthy of the patronage of an enlightened public.

One of the objects that will be most zealously advocated by the *Upper Canada Medical Journal* will be an incorporation of the profession, that shall enable its members to regulate their own affairs. It is truly monstrous to observe the degraded position of the medical profession in Canada west; cut up into parties, and divided among themselves, they are perfectly powerless for good, and in far too many instances receive the scorn and contempt of the public,

although in most cases individually of the greatest merit, and not unfrequently deserving the fullest sympathy, and the richest encouragement from all who have the interest of suffering humanity and their country's good at heart. Why should the medical profession of Canada West be denied the same privileges which are enjoyed by their brethren in Canada East. It is a vast absurdity that in one section of the province the medical profession should be incorporated, and have power to control their own affairs, while it is denied to them in the other. The profession must be united, and loudly demand a union with their brethren in Canada East, if the Legislature persists in refusing them an act of incorporation, under which they may be permitted to place the profession in a more favourable position than that in which it now exists. Among the facts, it should not be forgotten, that a few years since an act of incorporation of the medical profession in Canada West was passed by both houses of the Legislature, but was disallowed by the Queen, at the instigation of the Royal College of Surgeons in London, who considered that it would abrogate their charter in this province. This was an act of interference in our local affairs, that for any other cause, and for a far less worthy object, would have raised the ire and indignation of the length and breadth of the land; but from the dissention and personal animosities of the members of the profession, and the want of a professional organ, it scarcely received a passing remark. At all events, it was an event truly to be lamented that the medical profession in Canada West, many of whom venerate the College of Surgeons in London as their alma mater, should have to look upon her as, if not the positive cause, certainly as one of the reasons for the present degradation of the profession in this region.

By the means above expressed, the *Upper Canada Medical Journal* will, in future, endeavour to cultivate medical literature, and if possible to raise the standard of medical and scientific intelligence in the province; and it is fervently to be hoped that it may be the means in some degree of combining the views and interests of the medical

profession, and of allaying and discouraging the political and private heartburnings and bickerings among its members which are so prevalent at the present day; and that it will assist to direct into a far nobler channel an activity so fruitless of private or public good, and help to lead to results that shall not be unworthy of attention and admiration in a cosmopolitan point of view. At all events, we sincerely invoke the aid and assistance of all true lovers of science in this part of the world, and the encouragement of every sincere philanthropist in the British American provinces, in the furtherance of our noble aim and object.

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## DR. MARSHALL HALL.

The Medical Profession of Toronto have been highly gratified by a visit to this city of the celebrated Dr. Marshall Hall. On Wednesday evening, 20th June, a public Soiree was given to him by the medical profession, at Ellah's hotel. At this meeting Dr. M. Hall demonstrated his peculiar views and discoveries of the nervous system, which have been lately so largely discussed in Europe. By a series of interesting experiments upon the living frog, he showed the nature of reflex action—as it is called,—that it had its seat in the spinal cord, and was entirely distinct from the other nervous centres. Having removed the head of the frog with a pair of scissors, and with it the brain, the centres of the voluntary system, so that all the power of sensation and voluntary movement was destroyed; by pinching the extremity of one leg, involuntary muscular action was immediately excited, and was so powerful, as, when the body being suspended by the hind leg, to draw up the whole body with violent spasmodic influence; that this influence originated in the nerves of the skin, was shown by removing a portion of that structure from the leg, when upon touching or pinching the part no muscular action occurred, although it was as active as ever in the limb which was still covered by that structure. The learned Doctor remarked that these facts clearly showed that the action began in the nerves distributed to the skin, and carrying the influence to the spinal cord, again diverged as from a centre, and excited the action of the muscles to an involuntary movement, completely independent of the will: demonstrating also, that most of the involuntary spasmodic affections of the animal frame had, in all

probability, their seat in the spinal system of nerves. Whether the nerves originated in the skin, or in the mucous membrane, the effect was the same spasmodic action; for that in no diseases purely of the substance of the brain, unaccompanied with pressure or irritation of the spinal cord, was there any symptoms of spasm or convulsions. He particularly instanced the dreadful malady epilepsy, showing that in all cases this disease was an affection of the spinal system of nerves, originating in the one extremity of system, and propagated to the other; so that we had an intense excito-motery influence produced without the person being conscious of the actual cause—in fact, an action similar to that which influenced the frog's leg. In the very worst cases of epilepsy the impression was upon the muscles of the neck, affecting the muscles of the larynx, causing a closure of the glottis, preventing the air passing down into the lungs, the necessary oxygenation of the blood, and the excretion of carbon from the lungs; this excretion being retained, became a source of poisoning to the blood, and when sent to the brain, acted as other deadly narcotic poisons, causing insensibility and temporary disease of the substance of the brain. If the amount of the spasmodic influence upon the muscles of the neck was even more extensive, the large veins returning the blood from the brain were compressed, and a condition similar to that of apoplexy was the result; this might possibly cause death. It lasted as long as the spasmodic influence continued, and returned at every epileptic attack: this being frequently repeated by degrees, brought on permanent disease of the substance of the brain, idiocy, and complete imbecility. To prevent these dreadful consequences, the Dr. stated that he had in some cases made an opening into the trachea, and had inserted a tube, so as to permit the patient to breathe, and to prevent the effects of the impure blood upon the brain; which, in some cases, cured the epileptic attack. Proceeding with his experiments, he also removed the head, and all the viscera of the frog, and with them the centres of the sympathetic nerves, and still the power of reflex action was present, apparently unimpaired by the condition. The heart continued to move after it was removed from the body, so also did the intestines, showing that their involuntary action was neither dependent upon the brain, nor the spinal system of nerves. The Dr. claimed to be the discoverer of the spinal system of the nerves, having been the first to show their distinction from the sympathetic system, which is supplied to the viscera to

combine their functions, and also from the brain, which is the centre of the nerves of sensation and voluntary motion. He would not allow that the beautiful discoveries of Sir Charles Bell had any connection with the system of nerves which he demonstrated; although pressed by one of Sir Charles's pupils to say if the corpora olivaria of the spinal cord, first demonstrated by that celebrated anatomist, was not the superior ganglion, or commencement of the very system of nerves which he had now been showing, and which Sir Charles Bell declared was a system entirely independent of the will, a species of reflex action connecting the mucous membrane of the lungs and the muscles of respiration. The nature and effect of the epileptic attack was in itself demonstrative evidence of the intimate connection of the nerves of respiration of Sir Charles Bell with the system of spinal nerves as explained by Dr. Marshall Hall; besides which the experiments and conclusions arrived at by Sir Charles Bell were so far philosophical that they explained the uses, as well as demonstrated the existence, of the system of which he spoke. Such however, is not the case with Dr. Marshall Hall, for although his experiments go to show the fact, as to the existence of the system of spinal nerves, he does not draw any conclusions as to their particular uses. To us it appears conclusive that they are one, and the same. That Sir Charles Bell led the way, and only partially opened to our view the magnificent discovery which Dr. Marshall Hall has more fully developed, at all events it is sufficiently clear that the gratitude of the profession is fully due to the learned Doctor, and we are ready to accord to him our best thanks for the clearness of his demonstrations, and the urbanity of his conduct, and trust that he may reap the due rewards of the undoubted merit of his noble discoveries in the lasting gratitude of the profession.

Most of the Medical Practitioners of Toronto were present at the Soiree; besides whom we observed several amatures, among them we recognised the Sheriff, one of the members for the city, and the new Attorney-General; all appeared extremely interested in the experiments, and in the clearness of the Doctor's explanations. After the demonstrations the evening terminated by an invitation to a supper. We found the table displayed in Mrs. Ellah's very best style, being loaded with all the delicacies of the season. Dr. King was in the chair. After supper many loyal toasts were drank with great enthusiasm; among others the Queen, Prince Albert, and the Royal Family, &c.: after these, Dr. King

proposed the health of our illustrious guest, which was duly acknowledged with all honours. Dr. Marshall Hall arose to return thanks, and said that he had been equally pleased and surprised to find in this distant part of Her Majesty's dominions a great material and social progress he did not expect to behold; indeed he had met with a reception in this city, which he could but characterise as truly British, more congenial to his tastes and feelings than he had yet met with on the continent of America. He was travelling for the benefit of his health, but he could not cease to regard with interest the condition of that profession, to the duties of which his whole life had been devoted, and he was delighted to see around so many intelligent and worthy disciples; after the compliments paid to him by the chairman, with regard to the demonstrations which he had the honour to make before them, he must say, that after a life of toil and application to this particular department, he claimed for himself the discovery of the reflex action of the nervous system; he fervently trusted that it would be found a step in advance of our anatomical knowledge, and be made a means of benefitting suffering humanity. From the character and learning of the Medical men whom he saw around him, he was impressed with the idea that science was successfully cultivated among them, and was shedding its benign influence over the profession generally, while the appearance of their great unanimity was clearly an evidence, that they sacrificed all selfish views at the shrine of science, and the public good, but he would ask what was the reason of the destruction of the Medical School in the Toronto University? Was it supposed that a knowledge of the Medical Profession could be gained without study, and that of the most laborious character? For his part, although of considerable age, he still looked upon himself as a student, and was willing and ready to learn; he could not believe that an enthusiasm, and love of study was to be excited in the mind of youth, unless it was directed by a proper course of teaching, such as a University or a proper school of medicine alone could develop; therefore he was sorry to find that a liberal Government could make so retrograde a movement, and thus attempt to sap the foundation of medical knowledge in this part of the world, by taking from the Medical Schools all encouragement, which it had always been the aim of the most enlightened statesmen to accord: he hoped that they would soon see their error, and hark back before it was too late, or at least encourage the development in the

Province, of some efficient and extensive Medical School, that should supply the place of the one destroyed. The learned doctor sat down amidst thunders of applause. Many other toasts were proposed, and speeches made, after which the company broke up at a late hour, evidently delighted with the conviviality and pleasure of the evening.

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## DR. HAMILTON'S ADDRESS.

We have to acknowledge the receipt of an "Address to the Graduates in Medicine," delivered at the University of Buffalo, by Frank H. Hamilton, Esq., A.M.,M.D., and confess that for many a long day we have not perused a more elegant or truthful epistle. It should commend itself to the Medical Profession in all parts of the world, as the only true basis on which the science can rest. If in this utilitarian age the practice of Medicine is degraded to a money-making trade, it must be pervaded by quackery and deception, it must become a curse rather than a blessing to mankind. When money is the only object sought, quackery must reign triumphant, and, like the fabled harpies of old, will surely soil and degrade the fairest forms, the most zealous intentions for good. We cannot refrain from presenting our readers with an extract from the advice and reasoning of the learned Professor:

Men are licensed to buy and sell merchandise; to build bridges; to construct turnpikes, canals and railroads; to open theatres, circuses, race courses, saloons for gaming and drinking, and in all this you understand the object to be one. It is gain! To make money and get rich; honestly, if they can, but at all events to get rich. They make no secret of their purpose. Each man has considered well the chances, and he has at length taken out that license by which, under approval of his conscience, he believes this object can be most certainly and most speedily attained.

Have you sought a license to practice medicine and surgery from such motives? and do you understand that to this end we have granted you academic honors and the witness of our seal?

Then do I feel myself instructed to disabuse you at once of your unfortunate mistake; and I must tell you plainly and without much waste of words you have totally misapprehended our meaning, and the value of our diplomas. You have spent much time, and labour, and money, I fear, for nothing.

If you desire the gauds and trappings of wealth; if you sigh for the day when you shall possess lands and houses; if you long to look upon large chests full of precious gold which you may call all your own; nay more, if you would live at ease, and dying you would know that you have left to your family that competence which shall secure them from want—why then turn back! It may not be even now too late. Tear up those useless parchments, and with a brave heart begin again.

It will never do, my good fellows; you have entered the wrong door. Yonder is your way! To the right; to the left; to the field; to the counter; to the bar; to the forum; to the mines go. Go where you may lift the

hod; go heave the hammer, and wield the sledge: go anywhere—but where we conduct you.

No, the diploma of the ale-house has but one meaning. It is an authority to sell for gain. To sell malt for money. And no man shall dare to interrogate the malt, nor inquire whether it carries into the thirsty veins of its consumers health or life: for good or for bad, it is a lawful trade, and a money making. *Caveat emptor.*

So also this your diploma has but one meaning. It is a command to give freely: to give health and life; to lengthen the threads and mitigate the pains of this present existence. Without one word of condition expressed or implied that the world will return you wealth or even honor. Missionaries are you, ordained and sent abroad, to minister to your fellow men.

It never has been, and never can be, that any mere selfish, sordid or mercenary purpose should find a place in the heart of the true physician. Such purposes and sentiments are as incompatible with a faithful performance of the duties now intrusted to you, as they would be with the obligations enjoined upon a missionary of the cross, or upon any other minister of the Gospel. A mercenary physician and mercenary clergyman, are alike unintelligible and paradoxical. They have alike mistaken their calling; or they have obtained their commissions surreptitiously, and hold them under a false pretense.

No doubt a physician has a right to be rich. Nobody has, perhaps, a better right: and some physicians are in the receipt of annual incomes which secure to them ease and elegance. But the number of these in proportion to the whole, is exceedingly small—too small to warrant any man in regarding our profession as one of the roads to wealth.

Whether this be so or not, whoever practices medicine and surgery for no other purpose than to make money, or with this as his chief purpose, is a positive curse to the people whom he professes to serve, and unworthy the honorable profession which he assumes to represent.

For my colleagues, therefore, I charge you not to be deceived, nor wilfully to deceive us, while, speaking in their stead, I counsel you, not how to make money by your profession, nor, indeed, how to get practice,—that is a matter which ought more to concern others than yourselves—but only how you can best serve those whom chance or choice has intrusted to your care.

If it were actually true that you are entitled to regard the practice of medicine in the light of a commercial adventure, and every consultation and prescription as an ordinary business transaction in which the first consideration ought to be whether it would prove remunerative in a pecuniary point of view, then I confess to you, frankly, I would not have you over-scrupulous in matters of taste, or of propriety, or of conscience even. I would counsel you in the language of Radcliffe to Mead, when the latter was about to commence practice: "There are two ways, my boy, for a physician to treat his patients, either to bully or cajole them. I have taken the former course, and have done pretty well, as you see; you may take the latter, and perhaps do equally as well."

The world does not lack for illustrations of the complete success of either of these modes: and I think it a matter of indifference which you choose to adopt.

In such a case I would charge you somewhat after this manner: Sirs, here are your licenses! there are your victims! In the trade which you are about to commence, experience has proven that knavery is often most successful; by which I mean to say, that it pays best. You will, therefore, practice such deceptions and impositions as you shall judge expedient, without much fear of exposure, and with a tolerable certainty of a fair cash return. "*Populus vult decipi, decipiatur*"—or, as it may read with a pretty free rendering—"All the world's an ass and he is a fool that doesn't ride it." This you will find a very convenient maxim, and particularly comfortable for the rider. You will not fail to adopt, and apply it to

practice whenever a suitable opportunity presents. And whenever one ass is tired, you will find another with his saddle, bridle and blinders on. Ride him also.

If you would be advised as to books, read Don Quixote. The less you know of medicine the better; and it is probable that all kinds of learning will prove a useless, and sometimes a troublesome incumbrance.

In short, if you would speculate advantageously upon the pains, and sufferings, and dying agonies of your fellow men, copy the examples which, without much pains to look, you can see everywhere around you. Renounce sense as well as science, honor and honesty, and with a shameless impudence practice wholesale upon human credulity.

Finally, and I am sure you will not think me unreasonable, renounce, also, the title which this your alma mater has now conferred upon you. Adopt any new title or name which may suit your fancy or interest, but let a decent respect for the mother who has nourished you, and whom you cannot certainly wish to wrong, preserve her from the mortification of being compelled to recognize and acknowledge her recreant and disgusting offspring.

Then we have done with each other, and no obligations remain. You wished to get rich, and I have told you how it may be done, so make the most of it; away—there's a purse full; take it—and may the Lord have mercy on your souls!

To the mind of the youth about to enter the Profession of Medicine, we would especially present the picture drawn by Dr. Hamilton, and would entreat the student to pause and consider the motives that have induced him to take the first step in the study of medicine, to consider well whether the holy mission of good to poor fallen man, to lessen and sooth his griefs, and assuage his pains, are the objects for which he essays to study the noble Art and Science of Medicine; if so, let him proceed onwards with deep humility and untiring industry, and he shall be blessed with a self-approving conscience, worth more than all the gold of Australia or California; but if his aim is only gain, and money, let him not desecrate a heavenly calling, or degrade the Science of Medicine with such base and grovelling motives, that bring but discredit upon a noble Profession; doubtless, in all cases the labourer is worthy of his hire, and if with zeal he learns the true principles of the science, and with kindness and judgment applies them, he cannot fail to reap a rich reward, an honourable distinction, and an abundant return for all his services.

To the public we would say, the encouragement of true science rests greatly in your hands; if you will not encourage truth and virtue, if you prefer to seek deception and countenance error, you must expect the just reward, unmitigated humbug and quackery.

In an especial manner this matter rests with the Legislature, and if the assembled wisdom of the country can make no distinction between science and deception, cannot understand the difference between a profession and a trade,

the degradation of the Medical Profession must rest upon their heads; they will contribute to convert into a curse what was designed for a public good; but if they will endeavour to encourage true learning, and discourage quackery, the community may expect a blessing in the gradual perfection of the science, and future generations gain the full advantages of Medicine as such.

## TORONTO GENERAL HOSPITAL.

Agreeable to the Act of the Provincial Parliament passed during the last Session at Quebec, the following Trustees have been appointed to the Toronto General Hospital, by the Government:—The Hon. C. Widmer, James Beaty, Esq., and John Doel, Esq.; by the Council of the City of Toronto, Mr. Bowes, the Mayor; and by the Board of Trade, Mr. Clarkson, the President.

The Trustees above mentioned have appointed Dr. Widmer, Consulting Physician and Surgeon; Dr. Telfer, Dr. Herrick, Dr. Beaumont, Dr. Hodder, Dr. Bovell, Dr. Aikin, and Dr. Wright, as the Hospital Staff. From these new appointments, we fervently hope that the frequent complaints of non-attendance of the Medical Officers, which have been so frequently reiterated of late, will be effectually obviated, and that the gentlemen so appointed, especially the latter portion of them, will prove a great advantage to the Student, and a benefit to the sick poor.

## COLLEGE OF SURGEONS AND PHYSICIANS, CANADA EAST.

The triennial meeting of the members of this corporation took place at Three Rivers, C. E., on the 13th ult. Dr. Morin, of Quebec, the President of the College, occupied the chair. The usual matters of routine having been gone through, the ballot was taken for election of governors to replace those whose term of office had expired. After which the newly elected governors met together, and their choice fell upon the following Gentlemen as office-holders.

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| *President*, | Dr. A. F. Holmes, | Montreal. |
| *Vice President* for Montreal, | Dr. Bouthillier, | St. Hyacinthe. |
| *Do.* *Do.* Quebec, | Dr. J. C. Fremont, | Quebec. |
| *Register* and *Treasurer*, | Dr. Walter Jones, | Montreal. |
| *Secretary* for Montreal, | Dr. Hector Peltier, | Do. |
| *Do.* Quebec, | Dr. J. Q. Landry, | Quebec |

We learn from the Secretary's report that during the three

years' incumbency of the retiring Board, 75 students presented themselves before the College for the granting of licenses, of which number 61 were admitted to practice as Physicians, Surgeons and Accoucheurs, 2 as Chemists and Druggists, and 12 were rejected. The number who presented themselves for preliminary, preparatory to their entrance upon their studies, was 70, of whom 60 were successful, and 10 deferred.

Dr. David of Montreal, seconded by Dr. Russell of Quebec, moved that a delegate be appointed by this meeting to attend the American Medical Association. This was assented to unanimously. The Secretary was directed to ascertain whether this delegate would be recognized as the representative of the College and allowed to take his seat as such.

The thanks of the Profession, both in the United States and Canada, are due to Dr. David, for his well-timed and judicious proposition. The period has arrived when territorial limitation should cease to exist as obstacles to the community of feeling and aspiration between the members of a wide-spread craft.—The meeting was a most harmonious and cordial one, and was wound up most agreeably by the discussion of the "good things bountifully supplied by 'mine host' of the Three Rivers Hotel."—*Nelson's American Lancet.* A.

## COLLEGE OF SURGEONS IN LONDON.

Foreign Medical Schools.—The Council of the Royal College of Surgeons of England has just placed the Royal Caroline Medico-Chirurgical Institution, and Royal Seraphimer Hospital of Stockholm, among the Continental Medical Schools, from which they are ready to receive Certificates of Professional education from candidates for their Diploma of Fellowship or Membership, in addition to those of Paris, Montpelliar, Strasburg, Berlin, Vienna, Heidelburgh, Bonn, Gottingen, Leyden, Leige, Pavia, New York and Philadelphia.

## DEATH OF MR. BRANSBY COOPER, F.R.S.

The Medical Profession and the Public generally will hear with great regret that this most estimable Surgeon expired very suddenly yesterday afternoon at the Athenæum Club. The deceased gentleman was the fourth son of the Rev. Samuel Cooper, the elder brother of the illustrious Sir Astley Cooper, and the grandson of Dr. Cooper, for many years Vicar of Great Yarmouth, in which town the

subject of this short and imperfect notice was born, on the 2nd of September 1792, and where, also, he received the elements of his general education, and at an early age entered the service of his country as midshipman in the "Stately," a 64-gun ship, under the especial care and instruction of the first Lieutenant, afterwards Admiral Fisher. The sea, however, not agreeing with his delicate health, he consented to return again to school, under the care of the Rev. Mr. Spurdens, of North Walsham, Norfolk. Having finished his education, he visited his uncle, Mr. (afterwards Sir) Astley Cooper, who was then rising rapidly in public estimation, and at his suggestion repaired to the Norwich Hospital, where he remained for two years, at the expiration of which time he came to London, and entered the house of Mr. Hodgson, then resident in the city, who subsequently attained considerable fame as an Operating Surgeon in Birmingham and Midland Counties, and to whose professional attainments Mr. Cooper was to a great extent indebted for his surgical acquirements. In 1812 he entered the army as Assistant Surgeon in the Royal Artillery, and immediately repaired to the Peninsula, where our troops were then vigorously engaged. He was present at the battle of Vittoria, the Pyrenees, Nivelle, Orthes, the siege of St. Sebastian, and the battle of Toulouse, Mr. Cooper was admitted a Member of the Royal College of Surgeons, in England, on the 5th of December 1823, having for three years previously acted as Demonstrator of Anatomy at St. Thomas's Hospital, and having already published his valuable treatise on the ligaments. In 1843 he was elected an Honorary Fellow of the College, and in 1848 became a Member of the Council. The lamented deceased had made some valuable contributions to the advancement of Surgical knowledge, especially in the "Guy's Hospital Reports." He was also the author of Surgical Essays, on the growth and formation of bone, on fractures in general, on dislocations, &c., and a separate volume on fractures and dislocations; and has shown his veneration for the memory of Sir Astley Cooper by editing his biography. Mr. Cooper was a most kind and amiable man, beloved and respected by his pupils and Hospital patients, with whose sufferings he sympathized. He has left a widow and a large family to deplore the loss of an excellent husband and father.—*London Times, Aug.* 18.

## TO CORRESPONDENTS.

"*A Practioner*" shall be attended to in our next number.

# SELECTED MATTER.

## A COURSE OF LECTURES ON ORGANIC CHEMISTRY

*Delivered in the Laboratory of the Royal Institution of Great Britain, by Dr A. W. Hofmann, F. R. S., Professor at the Royal College of Chemistry.*

### INTRODUCTORY LECTURE.

*Gentlemen:*

In commencing this series of lectures on organic chemistry, which must of necessity give only a partial and incomplete view of that vast domain of science, I think it will be profitable if I first direct your attention to the subjects which I have to bring under your notice, and to the point of view from which I intend to present them.

Those of you who are practically acquainted with organic chemistry are conscious of the vast extent which this branch of science has reached within the last few years; even those who have but a general acquaintance with the subject can hardly have failed to notice the discoveries made in this department, and all must see how vain must be any attempt to give a full and connected view of organic chemistry in a few short lectures. I am not here to give a systematic course, but to set before you a brief sketch of the most important discoveries in this branch of knowledge, discoveries of older date, the influence of which may be clearly and perceptibly traced in the present aspect of science, and also those very recent researches which, elaborated as they have been under our own eyes, have as yet had scarcely time to be fully appreciated, but which no doubt will materially affect the future progress of chemistry.

I have said that my course must be limited; still I hope to be able so to select my subjects, and to connect them with one another, and to illustrate them in such a manner that if any of you desire hereafter a more particular acquaintance with any portion of the science, you will always be able to recognise the true position of the knowledge which you seek to obtain; and, whilst advancing through the intricacies which may impede your progress, you will never fail in retracing your steps to one or other of the striking points of the science which in this course we shall explore together.

The subject of these lectures, then, gentlemen, may be designated the most important chapters in organic chemistry. Now, let me begin with some remarks on the use of this term. What is meant by this expression? What is the difference between organic and inorganic chemistry? In fact, does any well-defined boundary exist at all? It is far easier, gentlemen, to ask questions than to answer them. I might assume that every one here present could well distinguish an organic from an inorganic substance, that all of you understand well what is generally intended by the terms organic and inorganic chemistry. But let us not thus avoid questions, the answers to which will at once set before you the point of view under which I wish you to regard the subject of these lectures.

Organic chemistry is generally described as treating of the substances which compose the structure of plants and animals in contradistinction to the chemistry of minerals. In order to see how far we may avail ourselves of this definition, let us for a moment examine the substances of which plants and animals are composed. The ultimate analysis of vegetable and animal bodies has proved that their mass is chiefly composed of four elements, namely, carbon, hydrogen, nitrogen, and oxygen. Together with these four elements there occur, in smaller or larger quantities, sulphur, phosphorus, silicium, chlorine, iodine, fluorine, and the metals potassium, sodium, calcium, magnesium, and iron. From this fact, it is obvious that plants and animals have no special elementary constituents of their own, for all the

elements which have been enumerated are to be found in compounds of undisputed mineral origin. Nor could it be otherwise; both plants and animals derive their substance from the mineral world which surrounds them.

I have just now stated, that among the twelve or fourteen elements which have been mentioned, there are four which predominate in the composition of vegetable and animal matter; that is, if the vegetable and animal kingdoms be taken as a whole, and those individual plants and animals which exhibit a preponderance of some other element be regarded as exceptional cases. These four elements, let me repeat it, are carbon, hydrogen, nitrogen, and oxygen. They differ from the rest, not only by the prevailing quantity in which they are present, but also by the distinguishing peculiarities exhibited in several other points. If animal or vegetable matter be exposed to a high temperature, free access of atmospheric air being admitted, we find that a part of it is dissipated, while another portion cannot be volatilized, and is no longer affected by the process of heating. Now, analysis shows that in this case it is exactly the carbon, hydrogen, nitrogen, and, to a considerable extent, also the oxygen, which are carried off, while all the rest, whatever their nature may be, remain behind. Take as an illustration the bone of an animal. It contains carbon, hydrogen, nitrogen, oxygen, phosphorus, and calcium. The three former, together with a portion of the oxygen, are present in bones in the form of gelatin or glue; the rest of the oxygen, together with the phosphorus and calcium, in the form of phosphate of lime. Now, if this bone be heated in the air, the whole of the gelatin is gradually burnt off, nothing but phosphate of lime remaining behind. I hold in my hands two pieces of bone of about the same size—the one fresh, still contains the gelatin; the second has been subjected to the action of heat. They are very similar in shape and external appearance; a difference, however, will become at once perceptible if you compare their weights—the burnt being much lighter than the unburnt bone.

A similar behaviour is exhibited by all vegetable and animal substances. When submitted to combustion, their carbon is converted into carbonic acid, their hydrogen into water, whereby the greater part of their oxygen is volatilized; the nitrogen escapes as such, the rest of the elements remains behind, in the form of what is generally called the ash of animal or vegetable matter. And this effect is by no means exclusively produced by combustion. All vegetable and animal matter, when no longer under the influence of vitality, undergoes gradually a similar change, becoming subject to those grand processes of destruction, daily accomplished under our eyes, which are designated by the terms "decay" and "putrefaction." The ultimate result of these processes is similar to that of combustion.

We might accordingly distinguish the elements which enter into the composition of plants and animals as *volatilizable* and *fixed*, or, if you please, as *atmospheric* elements and *earthy* elements; for, when separated in these processes of destruction, the former mingle with the atmosphere, while the latter mix with the mineral matter of the soil. The distinction in vegetables and animals of atmospheric and earthy elements appears even more appropriate if we glance for a moment at the mode in which plants and animals are formed. The researches of agricultural chemistry have shown, that, while the growing plant finds ample stores of all its fixed elements in the mineral constituents of the soil, it is the atmosphere from which it derives its carbon, hydrogen, nitrogen, and oxygen,—the very elements which, as we have seen, the dying plant returned to the atmosphere. The animal, feeding as it does on plants, likewise receives, although less directly, its carbon, hydrogen, etc., from the atmosphere. The distinction of atmospheric and earthy elements, therefore, appears perfectly justified, whether we regard the ultimate results of their destruction.

Both the atmospheric and the earthy elements combine with each other to form a great variety of compounds, which are called the "proximate constituents of plants and animals." Starch, sugar, the various vegetable and animal fats, the great number of acids occurring in plants and animals, such as tartaric, citric, malic, benzoic, hippuric, and uric acids, the host of

alkaloids of a similar origin, such as quinine, strychnine, morphine, caffeine, urea, etc.; the various colouring matters, the essential oils and resins, etc., are among the endless variety of proximate constituents that are formed by the atmospheric elements. On the other hand, the earthy elements are associated to compounds less varied perhaps, but still presenting a considerable diversity of composition,—the sulphates of potassa, soda, and lime; the silicates and phosphates of these bases, the corresponding chlorides, etc. are the most frequently occurring forms in which the mineral elements either exist in vegetable or animal structures, or are left in their ash after incineration.

These results show that a great portion of plants and animals is made up of truly earthy substances. The necessity of these substances for the development of the animal frame has been long recognised. Their importance in respect to the growth of plants, neglected and underrated but a few years back, is now fully acknowledged, being strikingly illustrated both by the researches of the vegeto-physiologist, and the experience of the practical farmer; and, indeed, one of the greatest modern advances in the theory of manures is based upon the clear recognition of this simple but important fact.

The description of the composition and properties of these earthy compounds being given in every manual on inorganic chemistry, it is obvious that the definition representing organic chemistry as that branch of chemical science which treats of the substances composing the structure of plants and animals cannot be admitted without limitation.

But how is the definition to be limited? Are we to confine organic chemistry to the study of those substances which are combinations of the atmospheric elements—in fact, to the substances composed of carbon, hydrogen, nitrogen, and oxygen? A moment's reflection will show that a further restriction is still necessary. It has been already pointed out that a certain amount of oxygen forms part of those proximate constituents which consist of earthy matter. Again, the oxides of carbon, hydrogen, and nitrogen—viz., carbonic acid, water, and nitric acid—are found so generally diffused, and, moreover, in such enormous quantities in the mineral kingdom, that nobody has ever thought of considering these compounds as exclusively belonging to plants and animals, although, in smaller or larger proportion, they occur in their organisms. The compounds of nitrogen with hydrogen and carbon—ammonia and cyanogen—occur far less frequently in the mineral world; nevertheless, they have been observed under circumstances which so entirely exclude the intervention of plants and animals, that many chemists are inclined to attribute even to these substances a mineral character; while others are of opinion that these nitrogen compounds, and especially cyanogen, belong to the domain of organic chemistry.

You will perceive already, that considerable difficulties present themselves in drawing the line of demarcation between inorganic and organic chemistry. The very fact, that certain substances are considered by some to be organic, while others believe them to be inorganic, sufficiently proves that the division is rather arbitrary and artificial. It is obvious that this division was made at a period when the science had scarcely made sufficient progress to admit of a rigorous definition of the principles upon which this classification was based. In proportion as chemical science advanced, it became more and more difficult to maintain this division upon scientific grounds.

A great many attempts have been made at a rigorous distinction between inorganic and organic compounds. It has been proposed to confirm the term *organic* to substances which are exclusively generated by the action of vital processes in plants or animals; while such compounds were called inorganic as could be made directly, without the intervention of life, from the elements of which they are composed.

Now let us examine somewhat in detail the foundation upon which this division rests, and you will see at once that in the present phase of the progress of modern chemistry, this distinction, like the former, is perfectly untenable. It is well known that a great number of substances, which were

formerly exclusively derived from plants and animals, are now prepared in our laboratories by artificial means. I do not allude here to a great variety of metamorphoses or re-arrangements of the constituents of substances, which we are daily accomplishing in the laboratory, and which really are no artificial formations of vegetable and animal compounds, at least not from their elements. If we have succeeded in preparing œnanthic acid, which constitutes the *bouquet* of certain wines, from oleic acid, the principal ingredient of olive oil—if it has been possible to obtain the volatile acid of Valerian root, or the fatty acid of butter, by means of ordinary sugar,—we are still far from being able to build up these substances from their elementary constituents; for the power of inducing carbon, hydrogen, and oxygen to assume the form of oleic acid, or of sugar, is as yet possessed by plants alone. Again, the essential oil, to which the aroma of the spirea ulmaria (the queen of the meadows) is due, is no longer extracted from the flowers of this plant; we prepare it more conveniently, purer, and cheaper from salicin, the crystallizable principle of willow-bark. But are we, on this account, independent of the vitality of plants? Certainly not, we have only substituted one plant for another. The cases which I have just given you are only chemical transformations of one vegetable substance into another. If you compare the composition of the substances transformed with that of the products obtained, you will at once perceive that these changes invariably consist in the removal from the original compound of a certain quantity of carbon, of hydrogen, and even oxygen, frequently eliminated in the form of carbonic acid and water; that they consist in a simplification of the original compound, which, being generally of a complicated nature, is broken up into atoms of less intricate composition.

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| Oleic acid | $C_{36}$ | $H_{34}$ | $O_4$ |
| Œnanthic acid | $C_{18}$ | $H_{16}$ | $O_4$ |
| Sugar | $C_{12}$ | $H_{12}$ | $O_{12}$ |
| Valerianic acid | $C_{10}$ | $H_{10}$ | $O_4$ |
| Butyric acid | $C_8$ | $H_8$ | $O_4$ |
| Salicin | $C_{26}$ | $H_{18}$ | $O_{14}$ |
| Spirea oil | $C_{14}$ | $H_6$ | $O_4$ |

In all these transformations we descend from more complex to simpler compounds.

But it is not difficult to show that frequently we move in the opposite direction; that we actually can rise from the simple to the complex; that a variety of substances of vegetable and animal origin have in reality been compounded, if I may use this expression, from their very elements. Among these may be mentioned oxalic acid, the normal constituent of several varieties oxalis, rumex, and rheum, and the frequent product of the animal organism; formic acid, the acid exercted by certain species of ants; urea, the crystalline principle of the urine of the mammalia; and, lastly, acetic acid, which, in combination with potassa or lime, is present in the juice of a great many plants, and which the vegetable kingdom furnishes us more indirectly in the destructive distillation of wood, or in the acidification of alcoholic liquors, derived from sugar by the process of fermentation. All these and many other compounds, originally obtained with the aid of the vegetable or animal economy, are now produced without their assistance, by processes perfectly analogous to those which we are in the daily habit of performing in mineral chemistry. But how are these formations accomplished? I need not tell you, Gentlemen, that such remarkable results cannot be obtained simply by bringing the elements concerned into contact. By placing diamond into a mixture of hydrogen and oxygen, you will never produce either oxalic, formic, or acetic acid. These triumphs of constructive chemistry can only be reached through a series of circuitous processes. We have to follow the path which is indicated to us by the behaviour of the plant itself. The vegetable organism rejects the free nitrogen or oxygen of the atmosphere with which it is surrounded as unfit for its use; free carbon and free hydrogen are never presented to it in nature; but the combinations

which these elements produce with each other—carbonic acid, water, ammonia—these are the materials with which it works. Out of these simple materials it forms the endless variety of principles which chemists have discovered, and are daily discovering, in the study of vegetable structures. Now, we are ignorant of the means by which this is effected; but the recognition of the nature of the materials is not the less important.

In artificially building up these proximate principles, we have to avail ourselves of the simplest compounds of their elements, which are readily obtained. A careful study of the habits and propensities of these compounds has furnished us the means of producing further combinations, more complicated than the primary ones. Some examples will illustrate this mode of proceeding.

In one of my future lectures I shall have to describe to you the circumstances under which carbon may be made to combine with the nitrogen of the atmosphere, the result of this combination being cyanogen, or bicarbide of nitrogen. Cyanogen, when placed in contact with water, gives rise to a decomposition of the latter, the hydrogen of which uniting with the nitrogen produces ammonia, whilst the oxygen converts the carbon into oxalic acid; again, cyanogen may be united with potassium, forming the well-known substance cyanide of potassium, which may be likewise made to decompose with water. The nitrogen and carbon, as in the former case, combine respectively with hydrogen and oxygen, but we have at our disposal an additional element for the decomposition of water, namely, potassium. This is converted into oxide of potassium, and the hydrogen of the water, instead of being liberated, joins the carbon and oxygen, and thus formic acid instead of oxalic is obtained.

Cyanide of potassium, when fused with substances rich in oxygen, undergoes a further change; it is oxidised. The result of this change is the formation of a new substance, called oxycyanide of potassium, cyanate of potassa. The potassium in this salt is replaceable by other metals: by silver, for instance, or calcium, or sodium. You may replace it by ammonium. This simple series of changes places in your hands one of the most interesting products of the animal organism, urea. I have given to you only the mode of performing these changes. I might have delineated to you the exact quantitative proportions in which these metamorphoses occur; but as we shall shortly return to a detailed study of these compounds, I will confine myself to directing your attention to the formulæ of these substances, which exhibit to you at a glance how, from the very elements, we have risen to substances more and more complicated.

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| Carbon - - - - - - | C |
| Nitrogen - - - - - - | N |
| Cyanogen - - - - - - | $C_2$ N |
| Oxalic acid - - - - - - | $C_2$ $O_3$ HO |
| Formic acid - - - - - | $C_2$ $HO_3$, HO |
| Urea - - - - - - - | $C_2$ $H_4$ $N_2$ $O_2$ |

Let me give you another example, which is even perhaps more striking—the artificial construction of acetic acid; and as I may perhaps not find time to return to this question, we will examine the subject somewhat in detail. A current of sulphur vapour is passed over ignited carbon, when combination takes place, the result being bisulphide of carbon—an extremely volatile liquid, remarkable for its power of refracting light, and whose many and daily increasing applications have gained for it general attention.

| | | | | |
|---|---|---|---|---|
| C | + | 2S | = | C $S_2$ |
| Carbon | | Sulphur | | Bisulphide of Carbon. |

When exposed to the action of chlorine at a high temperature the sulphide is decomposed, and we obtain another liquid, the bichloride of carbon, corresponding in composition to the bisulphide.

| | | | | | | |
|---|---|---|---|---|---|---|
| C $S_2$ | + | 4 Cl | = | C $Cl_2$ | + | 2 S Cl |
| Bisulphide of carbon | | Chlorine. | | Bichloride of carbon | | Chloride of sulphur. |

Submitted to the influence of a powerful heat, this bichloride splits into free chlorine and several other chlorides of carbon, amongst which the chloride of carbon *par excellence*, the solid sesquichloride discovered by Mr. Faraday under very different circumstances, claims our special attention.

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 C Cl₂ | = | $C_2$ $Cl_3$ | + | C Cl | + | $Cl_2$ |
| Bichloride of carbon | | Sesquichloride of carbon | | Protochloride of carbon. | | Chlorine. |

If you expose these crystals covered with water, in which they are insoluble, to the direct action of sunlight, you will find that they gradually disappear, leaving an exceedingly sour liquid, which contains two acids, namely, hydrochloric acid and a substance very closely resembling acetic acid, but containing chlorine in the place of hydrogen: two atoms of the solid chloride of carbon and four atoms of water contain the elements of three atoms of hydrochloric acid and one atom of chloracetic acid.

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 $C_2$ $Cl_3$ | + | 4 HO | = | 3 H Cl | + | $C_4$ $Cl_3$ $O_3$, HO |
| Sesquichloride of carbon. | | Water. | | Hydrochloric acid. | | Chloracetic acid. |

A simple substitution of hydrogen for chlorine completes this series of chemical re-actions resulting in the artificial construction of acetic acid. This substitution is effected by potassium (to moderate the action, an amalgam of this metal is generally employed,) which, seizing as it were the chlorine, and simultaneously decomposing water, removes the former, whose place is forthwith taken by the liberated hydrogen, thus forming pure acetic acid.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $C_4$ $Cl_3$ $O_3$, HO | + | 6 K | + | 3 HO | = | $C_4$ $H_3$ $O_3$, HO | + 3 K Cl + | 3 KO |
| Chloracetic acid. | | Potassium. | | Water. | | Acetic acid. | Chloride of potassium. | Potassa |

And thus, remarkably enough, we meet, after nearly half a century, with a new result, emanating from Davy's grand discovery, a fact which is particularly interesting, standing as we do on the very ground on which this discovery was made.

Acetic acid by no means concludes this remarkable series of constructive metamorphoses. When this acid is combined with alkaline bases, and submitted in the form of a salt to the action of heat, we obtain a new body in the form of a transparent, very inflammable liquid, called acetone, of a more complicated composition than acetic acid itself, while an alkaline carbonate remains behind.

| | | | | |
|---|---|---|---|---|
| 2 (BaO, $C_4$ $H_3$ $O_3$) | = | $C_6$ $H_6$ $O_2$ | + | 2 (BaO, $CO_2$) |
| Acetate of baryta. | | Acetone | | Carbonate of baryta. |

Submitted to the action of sulphuric acid, acetone loses the elements of water, while a new complication takes place, not less than three atoms of this dehydrated acetone coalescing as it were in the new product of the re-action, which is known by the name of mesitilol, and which contains not less than eighteen equivalents of carbon.

| | | | | |
|---|---|---|---|---|
| 3 $C_6$ $H_6$ $O_2$ | = | $C_{18}$ $H_{12}$ | + | 6 HO. |
| Acetone. | | Mesitilol. | | Water. |

By treating this compound with fuming nitric acid, you succeed in introducing the elements of hypontric acid into the place of hydrogen, and obtain dinitromesitilol—

| | | | | | | |
|---|---|---|---|---|---|---|
| $C_{18}$ $H_{12}$ | + | 2 $NO_5$ | = | $C_{18}$ $H_{10}$ $N_2$ $O_8$ | + | 2 HO |
| Mesitilol. | | Nitric acid. | | Dinitromesitilol. | | Water. |

which, lastly, when submitted to the action of sulphuretted hydrogen, by virtue of a most curious process, with the details of which you will become acquainted by and by, is converted into nitromesidine, an organic body forming beautiful salts with the acids, and exhibiting, in its general character, the greatest analogy with those wonderful substances manufactured by the organism of plants, the vegetable alkaloids.

$C_{13}H_{10}N_2O_8 + 6HS = C_{13}H_{12}N_2O_4 + 4HO + S_6$

Dinitromesitilol. Sulphuretted hydrogen. Nitromesidine. Water. Sulphur.

Now let us glance once more at the series of substances which we have built up from the very elements, commencing with carbon and terminating with nitromesidine.

| | |
|---|---|
| Carbon | C |
| Bisulphide of carbon | $C\ S_2$ |
| Bichloride of carbon | $C\ Cl_2$ |
| Sesquichloride of carbon | $C_2\ Cl_3$ |
| Chloracetic acid | $C_4\ Cl_3\ O_3,\ HO$ |
| Acetic acid | $C_4\ H_3\ O_3,\ HO$ |
| Acetone | $C_6\ H_6\ O_2$ |
| Mesitilol | $C_{18}\ H_{12}$ |
| Dinitromesitilol | $C_{18}\ H_{10}\ N_2\ O_8$ |
| Nitromesidine | $C_{18}\ H_{12}\ N_2\ O_4$ |

A better illustration of the constructive powers of modern chemistry could scarcely be imagined.

Results like these fully establish the hope, that the progress of chemical science will gradually teach us artificially to produce the majority, if not all of the substances which are elaborated under the influence of vitality in plants and animals. The same occurrence probably will take place in vegetable and animal chemistry which has been witnessed with regard to minerals. How great a number of minerals have never been produced!—It is only within the last few years that the labours of chemists have been engaged in this line of inquiry, in which considerable progress has been already made by the united exertions of men like Bunsen, Ebelmen and Senarmont. The number of artificial minerals has been greatly increased, because the circumstances have been carefully examined under which these substances are formed in nature. In a like manner the daily increased attention paid to vegetable and animal chemistry cannot fail to produce shortly a similar result.

But even now we see clearly that a distinction of inorganic and organic compounds, on the ground that the latter are producible only by the aid of vital processes, is perfectly inadmissible. Compounds which but yesterday belonged to organic chemistry may become inorganic to-morrow.

All other attempts to draw a line of demarcation between inorganic and organic chemistry have proved equally unsuccessful. It is stated that the composition of organic compounds is generally far more complex than that of inorganic substances. If we admit that such is generally the case, we must not forget that, in pyroxylic spirit, in methylamine, in aldehyde, and in ordinary alcohol, we possess a series of substances hitherto exclusively produced with the co-operation of plants which are remarkable for their simplicity.

| | |
|---|---|
| Pyroxylic spirit | $C_2\ H_4\ O_2$ |
| Methylamine | $C_2\ H_5\ N$ |
| Aldehyde | $C_4\ H_4\ O_2$ |
| Alcohol | $C_4\ H_6\ O_2$ |

whilst in common alum,

Alum - $Al_2\ O_3,\ 3SO_3,\ KO,\ SO_3 + 24HO$

we have a compound containing not less than 71 individual atoms, not to speak of the highly complex expressions mineralogists are in the habit of presenting us with, such as that of potassa harmatome, or of the mineral tourmaline, which are respectively represented by the monster formula on the board.

Potassa Harmatome - $KO,\ SiO_3 + 2(CaO,\ SiO_2) + 4(Al_2\ O_3\ 3SiO_2) + 18HO.$

Tourmaline - $4\ Na\ 0,\ 12\ MgO\ 3\ Fe_2\ O_3,\ 29Al_2\ O_3,\ 48SiO_2\ 4\ BoO_3.$

Again, organic compounds are described as being very readily altered, their equilibrium being very easily disturbed by the slighest external influences. But, is it possible to imagine less stable substances than those fearful compounds of iodine and chlorine with nitrogen, which split into their constituents sometimes, as it would almost appear, spontaneously? On the other hand, some bodies, hitherto exclusively obtained from vegetable or animal structures, present a degree of persistence and stability which is truly marvellous. Napthalin and paranaphthalin, so generally appearing among the products of the distillation of vegetable matter, owe their formation to the very circumstances which destroy some of the most energetic compounds of mineral chemistry.

I should tire you if I were to enumerate all the characters of organic compounds which have been adduced as marks of distinction, but which, in reality, are found to fail; suffice it to say, that a limit between inorganic and organic compounds does not exist: that the separation of chemical science into inorganic and organic is by no means founded in nature, but that it is an artificial division, which, first made at a comparatively early period of the development of chemistry, is now retained for the sake of convenience only. There is, in fact, no difference in the general properties of mineral substances on the one hand, and of vegetable and animal on the other. Whether you consider their physical or chemical characters, you will find that both kinds of bodies are governed by the same laws. In both kinds you observe the three states of aggregation. They are capable of existing in the form of solids, liquids, and gases, and the temperatures at which the transition from one state to the other ensues, their fusing points, their boiling points, are equally fixed. If we meet with many vegetable or animal compounds, which are destroyed before they are converted into gases or even before they are liquefied, how large is the number of mineral substances which have been observed in only one or two states? In fact, the great majority are known to exist only as solids.

The faculty of assuming regular geometric forms, while passing from the liquid to the solid state, is equally possessed by both classes: they may be crystallised by fusion or by solution. There are so many familiar instances of this kind that it is scarcely necessary to call your attention to the specimens of spermaceti, (crystalized by fusion), of tartaric acid, of citric acid, and of sugar, which are exhibited on the table. Moreover, the crystaline forms which are thus produced appear indiscriminately among mineral and among vegetable and animal substances. You could not obtain, perhaps, a better illustration of this fact than by comparing these crystals of alum, the composition of which I pointed out to you in a former part of this lecture, with those of codeine, one of the alkaloids of opium containing only carbon, hydrogen, nitrogen, and oxygen; both substances crystallize in regular octahedra.

If many organic compounds, especially the more immediate constituents of vegetable and animal structures, such as albumin and fibrin, have never been crystallised, I need not remind you of the variety of mineral substances which are entirely destitute of crystallization, such as many metallic oxides, the compounds of phosphorus with boron and nitrogen, the various glasses, porcelain, etc.

Again, the chemical characters are essentially the same in substances belonging either to the mineral or to the vegetable and animal kingdoms, the same constancy, the same laws of composition, prevail in both classes. The rough classification frequently adopted for mineral compounds of acids, bases, and indifferent substances, founded as it is upon the behaviour of these compounds towards each other, is equally applicable to the proximate constituents occurring in plants and animals. These proximate constituents are likewise acids, bases, and indifferent substances. The vegetable acids combine indiscriminately with mineral and with vegetable and animal bases, whilst the latter unite just as well with the acids of the mineral kingdom. On addition of citric acid to nitrite of potassa, you displace the nitrous acid, which is evolved in the form of red fumes; in a solution of chloride of

potassium, tartaric acid produces the well-known precipitate of bitartrate of potassa, the hydrochloric acid being liberated. On the other hand, there are vegetable alkaloids capable of displacing the strongest mineral bases from their saline combinations. A solution of tetrethylammonium not only precipitates the oxides of iron, nickel, copper, exactly as potassa would do, but even baryta and strontia; and under certain circumstances it even displaces potassa itself, which, as is well known, is one of the strongest of mineral bases.

I am almost afraid, gentlemen, you will object to me, that in denying the distinction of inorganic and organic compounds, I lose the very ground upon which I stand, and that any other title for the lectures I intend to give you would have been better than the one which I have chosen.

But you will recollect, that, while denying the distinction on rigorous scientific grounds, I admitted already the great convenience of this classification. Indeed, the division into inorganic and organic chemistry will be always retained, if only for the purposes of instruction. The proximate constituents of plants and animals, simply as their composition may appear from their generally containing only four elements, present such a diversity of constitution, such a variety in their properties, such a complexity in their general behaviour, that the student who engages in this department should be prepared by a previous study of the simpler relations of inorganic nature.

The preceding remarks, although failing to establish a definite boundary-line between inorganic and organic chemistry, have nevertheless served, I hope, to limit to a certain extent the department which we are going to treat, and to familiarize you in some measure with the subjects which you may expect in the following lectures.

Were I called upon to express myself still more explicitly, I would say, I will give you "the chemistry of carbon and its compounds." In consequence of the never-failing presence of this element in all vegetable and animal structures, the number of the compounds of carbon is greater than that of all the other elements taken together. Owing to the fact of carbon being the characteristic constituent of the organs of plants and animals; owing to the number of its compounds; owing to the diversity, at the same time, and similarity of these compounds, and their peculiar differences from most other chemical substances, the history of this element deserves to be traced apart from all the rest.

On having the subject thus defined, you might perhaps expect a description of carbon itself, and of its simplest compounds, such as carbonic oxide, carbonic acid, bisulphide of carbon, etc., as the starting point of our inquiries. However appropriate and interesting such an introduction might be, the properties of these substances are already sufficiently known to you, being invariably described together with the compounds of the other elements. Moreover, our time is so limited, that it will be more expedient to proceed at once to the study of more complicated carbon compounds.—*Medical Times and Gazette.*

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CASE OF THE BENEFICIAL EFFECTS OF STRYCHNIA IN IMPAIRED SPINAL ENERGY.

*By Dr. Marshall Hall, F.R.S., &c.*

[In remarking upon this case, Dr. Hall says,]

Such cases occur from causes of nervous exhaustion, such as excessive study, muscular effort, sexual indulgence, &c.; and in such cases strychnia has appeared to me the appropriate and useful remedy.

This agent acts distinctly on the spinal marrow. In excess it induces spasmodic affection. It is therefore contra-indicated in cases of *irritation* of this nervous centre and of spasm. Its appropriate use is in spinal *exhaustion.* It constitutes one of our best tonics, improving the general health, and conducing to the recovery of strength and flesh.

I have given it in minute doses thrice a day, in the midst of meals, for

many months. The following is the formula which I have adopted:—R. Strychniæ acetatis, gr. i; acidi acetosi, ℥xx.; alcoholis, ʒij; aquæ distillatæ, ʒ vi. M.

Of this, ten drops, containing one-fiftieth part of a grain, may be given thrice a day; but I have generally begun with five, and gone on to fifteen.

In two cases only have I known it to disagree. It seemed to affect the head. In many the patient has improved in looks, as in general health and strength, without experiencing anything but good from it.

I am giving the strychnia a cautious trial in the epilepsy attended by pallor, thinness, and nervous exhaustion; in the paraplegia the result of sexual excesses, and in which neither pain nor spasm has occurred; and in the paralysis agitans.—*Lancet, Nov.* 27, 1852, *p.* 486.

[In another paper, Dr. Hall says,]

I have been recently engaged in some experiments on the effects of strychnia and their remedies. I can only give a brief notice of them at the present moment; on a future occasion I will give the experiments themselves, with their interesting details.

The effects of the acetate of strychnia show themselves under *two* forms or degrees, according to the dose of the poison in relation to the powers of the animal: these are—(1) the *milder*, and (2) the *severer*.

If a dog be placed under the milder form of strychnism, it passes into a condition of extreme spinal excitability. If, when in this state, it be continually excited, like the frog under a similar influence, it certainly dies; if, on the contrary, it be placed in a position of absolute quiet, it as certainly recovers—facts which suggest our principal of the treatment of tetanus and of hydrophobia.

If the animal be placed under the severer form of strychnism, a different series of phenomena occurs. In the violence of the paroxysm, extreme laryngismus, extreme efforts at respiration, apoplexy, asphyxia, death occur—unless one measure be adopted: that measure is *tracheotomy!*

Let alone the animal would infallibly *die*—of laryngismus: tracheotomy being performed, he lives!

But the patient affected with hydrophobia—and *all* hitherto so affected *have* died—have died of laryngismus. Now of laryngismus he *would not* die, if efficient tracheotomy were performed: would he then die of exhaustion.

I repeat that all patients afflicted with hydrophobia have died hitherto: that all have died of laryngismus; that of laryngismus they need not die, and will not die, if tracheotomy be performed!—that is, no patient need die from the cause from which all hydrophobic patients have died hitherto.

If tracheotomy be performed, will the hydrophobic patient die? This question cannot be answered without an appeal to experiment. As the animal affected with the severer form of strychnism was saved from the first effects of the poison, yet died afterwards of exhaustion, the hydrophobic patient may die of ulterior effects of the poison. Even then, the terrors of this most terrific of diseases—the fits of strangulation and of suffocation—will be averted.

From the experiments to which I have adverted two practical inferences are deducible:—

1. Let the tetanic patient be preserved from all external excitement absolutely.

2. Let the hydrophobic patient, whilst equally preserved from excitement, be submitted to efficient tracheotomy.—*Lancet, Feb.* 5, 1853, *p.* 128.

## ILLUSTRATIONS OF LARYNGEAL AND PHARYNGEAL DISEASES, WHICH ARE FREQUENTLY MISTAKEN FOR OR ASSOCIATED WITH PHTHISIS PULMONALIS.

*By Professor Bennett, Edinburgh.*

[In the first case related by Dr. Bennett, although no disease or abnormal sound could be detected in the chest, yet the patient, a gentleman, had hawked up from time to time a small clot of blood about the size of a pea. He remarks:]

The origin of the blood in this case appeared to me at that time to be very mysterious. It was not florid. There was no reason to suppose it to be of pulmonary origin. There was nothing in his voice to indicate laryngeal disease. I did not examine the pharynx, not being then aware of the importance which ought to be attached to it. I was consequently left in great doubt as to the origin of the blood, and of the best means of removing anxiety from my patient. My uncertainty, however, was partly dispelled by the following case:—

I was requested by an assurance office, in July 1850, to examine the chest of Mr. M., a merchant, aged about 30, who said he laboured under no kind of complaint, with the exception of occasional sore throat, and expectoration of mucus tinged with blood. He was tolerably stout, took long walks without uneasiness, and suffered from no difficulty of respiration or from cough Repeated examination of his chest failed to elicit any physical sign indicative of pulmonary disease. I therefore certified that his lungs were healthy. In October 1851, this gentleman called upon me again for advice, under the following circumstances. The soreness of the throat had latterly increased, and considerable cough was induced, after which he spit up mouthfuls of purulent matter, frequently tinged of a red colour. He brought me some of this sputum to examine, which consisted of mixed blood and pus, of a dirty brick-red colour. Examination of his chest again convinced me that the lungs were unaffected; but in the interval I had paid attention to the writings and practice of Dr. Horace Green, of New York: and I now examined his throat, when the cause of his symptoms was at once apparent. The fauces and upper part of the pharynx were studded over with nodular swellings, varying in size from a pin head to that of a pea. Many of them were bright red and fungoid in character, probably the origin of the extravasated blood, whilst considerable patches of purulent matter adhered to several parts of the mucus membrane. I applied a sponge, saturated with strong solution of the nitrate of silver to the affected parts. In three days he returned, having been much relieved, when the application was repeated I have not seen him since.

These two cases convinced me that certain symptoms which have hitherto been considered as indicative of phthisis might have their origin entirely in the fauces, pharynx, and upper part of the larynx. The cough so occasioned, with the purulent expectoration, often tinged with blood, frequently so resembles that occasioned by phthisis, as not only to induce alarm in the minds of the patients, but frequently to mislead the medical practitioner I have now met with many such cases, which have been mistaken for phthisis, and which have been treated for that disease without any effect, until local remedies were applied, when they for the most part disappeared, or became much better.

[In a second case, that of a female aged 25, there were all the symptoms of phthisis present—frequent cough with hemoptysis, copious purulent expectoration, night sweats, and loss of appetite with vomiting. On examining the fauces they were found covered with purulent mucus. The cough was also ascertained to be convulsive, and a ringing sound was heard over the larynx on inspiration. Laryngitis was the disease diagnosed. The solution of nitrate of silver (℥ss. to ℥j. of water) was applied to the fauces, and afterwards the sponge was introduced into the larynx, with some degree

of benefit. Blisters to the larynx were also applied; and as the disease seemed to have a syphilitic origin, iodide of potassium and bitter infusions were the internal remedies resorted to. This patient, though not cured, was considerably relieved. Dr. Bennett concludes by saying:]

The cases now given, with others that might have been adduced, have satisfied me that lesions of the pharynx and larynx ought to occupy the serious attention of the practitioner in all cases of pulmonary diseases, and that the following practical conclusions may be drawn from them:

1st. That not unfrequently diseases, entirely seated in the larynx or pharynx, are mistaken for phthisis pulmonalis.

2nd. That even when pulmonary phthisis exists, many of the urgent symptoms are not so much owing to disease in the lung as to the pharyngeal and laryngeal complications.

3rd. That a local treatment may not only remove or alleviate these complications, but that, in conjunction with general remedies, it tends in a marked manner to induce arrestment of the pulmonary disease—*Monthly Journal of Med. Science, Dec.* 1852, *p.* 513.

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STRANGULATED OBTURATOR HERNIA.—OPERATION.—REDUCTION.—FAVOURABLE PROGRESS OF THE PATIENT.

[*Under the care of Mr. Bransby Cooper.*]

An extremely interesting case of obturator hernia, in which an operation has been performed with successful results, has during the past week occurred under the care of Mr. Cooper, and we hasten to lay before our readers some particulars concerning it Instances in which protrusions of intestine at the aperture in the obturator membrane for the passage of the vessels and nerve are of extreme rarity, and the greater portion of those on record appear to have been discovered for the first time in the *post-mortem* room. The fatality of the lesion appears, however, to be connected rather with difficulties attending its diagnosis than with those appertaining to its treatment. As far as we are aware, in all the published cases, the return of the intestine was easily accomplished, the stricture being large and readily dilatable. In one recorded by Dr. Frantz, spontaneous reduction appeared to be accomplished. The patient, a woman, had suffered from pretty well marked symptoms of the affection for several days, which suddenly subsided immediately after she had felt a sensation as if something passed up from the locality of the obturator aperture. In another, which occurred to Dr. Garengeot, and was attended by a perceptible tumour, reduction was effected by means of the taxis. It is also mentioned in the interesting case in which gastrotomy was performed by Mr. Hilton, that the bowel was replaced by gentle traction, assisted by firm pressure in the groin, and without any necessity for resort to instrumental enlargement of the structure. Division of the upper edge of the stricture was, however, resorted to in Mr. Obré's case; (*) but even in this case, it is stated that the bowel was *not tightly* constricted. In the case we are about to relate it will be noticed that the bowel slipped up almost spontaneously during the examination of it by means of the finger. The circumstance, that this form of hernia is more frequent in women than in men, may doubtless be explained by reference to the peculiarities of pelvic conformation in the former sex.

It is evident in this accident the discovery of an external tumour must depend very much on the stoutness of the patient, for in a fat subject it must be nearly impossible to ascertain the existence of a protrusion so deeply

(*) Mr. Obre's case is peculiarly interesting, as being, we believe, the only one in which reduction was accomplished by operation with a successful result. It affords, in many particulars, a close parallel to the present one.

placed as the obturator foramen. In Mr. Cooper's case the patient was remarkably thin, yet it was only by a most cautious examination that the swelling was detected. Not, however, further to anticipate, we shall at once proceed to its details as given in the notes taken by Mr. Maunder, one of Mr. Cooper's dressers.

Mary Ann Neil, aged 49, the mother of several children, a thin and spare woman, was admitted on the 29th January, 1852, having suffered for three days with the symptoms of strangulated hernia. It appeared that she had been subject to a small protrusion of bowel at the umbilicus for ten years, and that for about two years she had worn a truss on account of it. For nearly five years she had been disqualified for any active employment by asthma. She stated, also, that repeatedly during the last two years she had suffered from sudden attacks of severe pain in the right groin, which were frequently attended with sickness. These paroxysms used to last usually about two hours, subsiding as they came on, somewhat suddenly. Her present illness commenced on January 15, in the evening of which day, whilst sitting at her sewing, she was suddenly seized with pain in the right groin of similar character to that of former attacks, and commencing deep in the groin and proceeding thence down the inside of the thigh. The pain was so great that she could not sit upright. Nausea and severe vomiting of bilious matter soon after came on, and continued with little intermission until the time at which she was brought to the hospital. On the following day she sent for a surgeon, who administered castor oil, which effected a full evacuation of the bowels. On the 18th the oil was repeated, but failed to produce any effect. Her pain continued unabated. On the 19th the dose was again administered, but soon after rejected by vomiting. The pain in the part was not so severe as before, but she had cramps in the extremities and continuous vomiting. In this condition, the bowels having been unrelieved for two days, and three days having elapsed since the beginning of the symptoms, she was brought into the hospital. On the 20th, her countenance was anxious, skin cool; pulse 100, small and weak: tongue covered with thick brown fur; abdomen tender; urine scanty.

Mr. Cooper saw her soon after admission. Having been informed that there were symptoms of strangulated hernia, without any tumour being discoverable, he at once instituted a careful examination of the whole abdomen. On exposing the pubes, a want of symmetry between the two sides was observed, which was apparently caused by the presence of a slight puffy swelling in the right groin. Pressure in this part confirmed this impression, and it was thought that a slight impulse might be felt on making the patient cough. Attempts at the taxis having failed, Mr. Cooper determined at once to perform an exploratory operation. An incision having been made over the seat of swelling, and the dissection performed as if for a case of femoral hernia, Mr. Cooper slit up the inner part of the sheath of the vessels, and passed his finger up to the crural ring. Nothing was found; the parts were in a natural condition, and now that, by the division of the skin and fascia, all tension had been relieved, the existence of any tumour at all became doubtful. On further exploration, however, Mr. Cooper discovered that the pectineus muscle, part of which had been exposed, was slightly bulged upwards. He at once expressed his conviction that there must be an obturator hernia, and having separated the edges of the pectineus brevis, he succeeded in exposing a small portion of the sac. By a transverse division of some of the fibres of the pectineus the whole sac was brought into view. The protrusion was about the size of the bowl of a dessert-spoon, and it felt soft and flaccid. Whilst being examined by the finger, it suddenly slipped up *en masse* into the abdomen. Immediately after the reduction was thus accomplished the woman expressed herself as being relieved from a sense of dragging and constriction which had existed in the abdomen. The parts were then brought into apposition, and supported by a wet compass and bandage. The patient was returned to bed, and ordered to take two grains of opium at once, with directions that half the dose should be repeated every four hours.

In the evening she appeared as comfortable as could be expected, and was quite free from nausea. It should here be noted, that no pressure was being applied to the tumour at the time the reduction was affected, it appeared to have been pressed downwards by the pectineus muscle, and after the division of that structure, was apparently free from constriction. Strictly speaking, it could scarcely be said to have been strangulated.

January 21.—Has slept fairly in the night, and has had no vomiting or nausea since the operation: pulse 120, full, and of good power; tongue brown and dry in the centre, white at the edges: skin moist; abdomen tolerant of pressure; bowels have not acted. Mr. Cooper saw her in the afternoon, and ordered a gruel enemena, containing half an ounce of castor oil, to be administered.

℞ Pulv. opii g. j., hydrarg. chlorid. gr. ss.; ft. pil. 4tis horis summend.

24th.—During the last two days she has somewhat improved, but the bowels have not as yet been relieved. Two enamata have been administered, but they failed to bring away fæcal matter; much flatus has, however, been passed per anum; the tongue is clean, not so red as it was, but still rather dry; pulse 110, soft and rather feeble; her appetite is returning, and, at her urgent request, she is allowed to take a small portion of mutton-chop. Rep. pil. 'n. et. m. summend.

26.—Although the bowels have not yet acted, she appears to be going on favourably, sleeps fairly, and enjoys her food. The tongue is less dry. The persisted constipation is probably to be explained in part by reference to the opium which has been prescribed with such beneficial effect, and in part by the fact, that the lower bowel was very freely evacuated on the day after the first occurrence of the symptoms.

We shall not fail, in our next number, to repeat the further progress of this very interesting case, when we hope also to add some further comments, which want of space compels us, for the present, to postpone.

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## WHAT IS TUBERCLE? WHAT IS PHTHISIS?

*By Dr. W. Jenner.*

[It is strange, says Dr. Jenner, that even at this day we are obliged to ask this question. Has it not been satisfactorily answered by every author who has written on this subject within the last quarter of a century? It would seem not, and therefore for our instruction, Dr. Jenner, in reviewing the works of Ancell, Cotton, Virchow, Henle, Reinhardt, and others, gives us an epitome of opinions held on the subject. He says:]

The opinions now held in regard of tubercle may be divided broadly into classes; the first is, that tubercle is an exudation essentially pathological in character. "It is beyond doubt," says Rokitansky, "that tubercle is an exudation." The second, that tubercle is merely a retrograde metamorphosis of pre-existing structures. This latter notion is strongly advocated by Virchow, in the papers before us.

The opinions referred to, however, readily admit of more minute division; and for the purpose of enabling us, in a subsequent article, to estimate what amount of the truth they respectively contain, we shall here briefly describe them under five heads.

1st. Tubercle is a specific exudation poured out under the influence of a special general pathological state: in other words, it is the local anatomical expression of a definite constitutional affection. Or, as Mr. Ancell says: "As healthy blood supplies a blastema or succus nutritivus for healthy nutrition, tuberculous blood supplies a tuberculous liquor from which tubercle is formed."

Lebert's statement, that he had discovered in tubercle a peculiar and distinctive microscopic element—a tubercle-corpuscle—appeared to give force to this view: and coinciding as it did with opinions previously entertained,

was received in this country as strong evidence in favour of the favourite creed. If this opinion be correct, tubercle ranks pathologically and anatomically in the same order as cancer, there being in both a specific constitutional disease, a specific exudation, and a specific or distinctive cell.

The truth or falsehood of this view will come hereafter to be examined.

2. Tubercle is a degraded condition of the nutritive material. Some pathologists, as Dr. C. B. Williams, refer tubercle to a degraded condition of the nutritive materials from which new textures are formed," and hold that tubercle differs from fibrine or coagulable lymph not in kind, but in degree of vitality and capacity for organization. Examined microscopically, tubercle contains, according to Dr. Williams, a few irregular-shaped, shrivelled cells, with imperfect nuclei, the main substance being composed of granular or amorphous matter. "No fibres are," he says, "perceptible."

3. Tubercle is composed of the products of inflammation. Reinhardt is at once the most recent and able advocate of this opinion, and the high reputation as a microscopical observer he enjoyed among those most intimately acquainted with him, recommends his statements to our attentive consideration. Reinhardt sees in tubercle only the products of chronic and repeated inflammations. In some cases of chronic pneumonia, Reinhardt found a gelatinous fluid in the cells and interstitial tissue, containing epithelium and pus. At a later period the epithelium was in a state of fatty degeneration; the interstitial tissue contracted; the cells lessened in volume; and, finally, a kind of cicatrix was formed. In various stages these states have been termed, respectively, gelatinous infiltration, gray tubercle, and tubercular cicatrix. In other cases of so-called yellow tubercle, Reinhardt found pus in the air-cells; the pus became thickened, dried up, and the nuclei disappeared. Shrivelled pus-cells, and not nuclei which have become free, form the so-called tubercle-corpuscles. Although Reinhardt considers that in some instances the tuberculous process arises from local causes—viz., hyperhæmia and recurrent inflammation; yet he admits that in many cases these indicate a state of dyscrasia.

4. Tubercle is composed of dead-tissue elements: Such is Henle's opinion. In the lungs, he says, tubercles are bloodless, dead (nekrotesche) lobules, gorged with the dried-up elements of the epithelium or with pus, heaps of granules and granular cells, and these dead lobules continue in connexion with the sound pulmonary tissue, as a withered limb may with the trunk.

"The corpuscles," he says, "which are found most frequently and in the greatest number in miliary and crude soft tubercle, and which have generally been described as specific, are the corpuscles named by me 'elementary corpuscles,' and they belong to that variety of these which is rendered pale and dissolved by acetic acid. I have proved," he continues, "that such forms arise out of cytoid corpuscles long exposed to the air." And, further on—"The microscopic analysis renders it probable that the nucleated cells arise out of the air-cells; it offers no explanation as to whether the cytoid corpuscle, the products of the development of which we find in the air-cells, arise out of bronchial mucus, or from the pus of circumscribed inflammation, or from extravasated blood."

Tubercle corpuscles have already been stated by Gulliver to be "effete and shrunken primary cells"—a definition which might be adopted by Henle.

These views of Henle agree in the main with those propounded, in 1843, by Dr. William Addison:—"A tubercle," says Dr. W. Addison, "involves or includes in its substance the vesicular structure of the lungs: minute bloodvessels, lobular passages, and air-cells, are all capable of demonstration on the dissection of tubercle under a Coddington lens; the bloodvessels are no longer permeable, but their presence may be demonstrated." Tubercles themselves are composed of abnormal epithelial cells. Henle maintains that gray granulations are imperfectly coagulated fibrine, and if they sometimes pass into yellow tubercles cannot be considered as their first stage. He discards the idea of a specific exudation, and advocates the opinion that the first change, as far as the lungs are concerned, is coagulation of blood in,

and obliteration of the vessels consequent on, defective capillary circulation, arising from imperfection of the respiratory movements.

5. Tubercles are composed of metamorphosed organized elements—a metamorphosis co-ordinate with the fatty and the waxy degenerations. This is the opinion of Virchow. His views are developed at some length in the papers placed at the head of this article; and as they contain much that is peculiar and novel, we shall enter into them somewhat fully.

To do justice to the opinions of Virchow, we shall first describe what we understand him to mean, and then give his own summary of his opinions in the words he has himself used in one of the papers above mentioned.

A tubercle is composed essentially of dead tissues, the death of the part being occasioned by the accumulation of cells amid its vessels, and consequent compression of those vessels, and cessation of the circulation through them. The cells which thus play so important a part in the formation of tubercle may have their origin,—

1. In the physiological cells of a structure or organ. The mode in which the increase in these cells takes place may, he says, be exquisitely perceived in the lungs. The first step in the tuberculous metamorphosis in these organs is an increase in the epithelium of the air-cells by endogenous formation. "I have seen," Virchow says, "cells with five large, oval, granulated nucleolated nuclei." Subsequently the "cells fall to pieces, a granular detritus is left, in which the nuclei remain for some time as shrivelled, irregular, opaque bodies, finally these also crumble, and an entirely amorphous, finely granular mass remains behind." It is these nuclei, shrivelled, irregular, and opaque, which, in Virchow's opinion, constitute the tubercle-corpuscles described by Gluge and Lebert. "*They are not*," he says, *exudation corpuscles*." "The peculiarity of the local process lies in the tendency of the organization, and by no means in a peculiar exudation." In *lymphatic glands* affected with so-called scrofulosis, there is hypertrophy of the elements of the part through indogenous nuclei formation. The cells enlarge to five or six times their normal size, and as many as twelve pairs of nuclei may be seen in the same cell. The nuclei probably increase in number by cleavage into pairs. What share an exudation takes in this change, Virchow says, he "cannot decide." Still he maintains that tubercle is not developed exudation, but merely metamorphosed pre-existing tissue-elements—elements to which, in their primary state, the name of tubercle could not be applied; and that, consequently, the tuberculous metamorphosis is not the mark of a specific process of a particular constitution.

2. The cells by the accumulation of which the vessels are compressed and death of the part produced, may have their origin in the endogenous development, or in atrophy of the cells of cancer, pus, or typhous matter, but not in their simple desiccation.

3. These cells may be developed in the fibrine poured out in what is termed tuberculous inflammation. Is the tubercle here formed directly of inflammatory exudation-matter? Virchow says, No: the whole mass of fibrine passes on to organization; but while "one part developes itself into uniting tissue and vessels, another forms nucleated and cellular formations, which rapidly increase by endogenous growth, so that their number at some points is very great, and the amount of the endogenous nuclei is occasionally even colossal." The subsequent steps of the process—*i. e.*, death of the part, disruption, atrophy, shrivelling, desiccation of the cells, are the same in all three cases.

But although all pathological and all physiological cell-growths may thus tuberculize, yet there is a local process which leads to the exudation of a material, the cells resulting from the development of which, whether they be physiological or pathological, so constantly tuberculise and lead to local death, that this may be said to be the ordinary termination of the process. This process, in the phraseology of Virchow, is tuberculosis; while scrofulosis is used by him to signify the constitutional state in which tuberculosis occurs.

To pass from the general state to the particular local lesion:

Scrofulosis is that constitutional affection which commonly leads to tuberculosis.

Tuberculosis is that local process in the ordinary progress of which there occurs an exudation of a material, nutritive or pathological, which develops into cells that tuberculize or undergo the tuberculous metamorphosis.

Tuberculization is the local process by which the metamorphosis of the elements of a part into tubercle is effected—*i. e.*, endogenous development, atrophy, shrivelling, and desiccation of the cells.

A tubercle is formed of the detritus of the metamorphosed and atrophied cells, with the remains of the vessels, &c., of the part in which they were seated.

It requires some little attention to grasp fully Virchow's meaning; and to those who have been accustomed to use the word "tuberculosis" to denote a specific constitutional affection, the employment of the term scrofulosis to express this state, and the restriction of the word tuberculosis to the local changes going on in a particular part, may be confusing; but a little consideration will prevent any misconception.—*Brit. and For. Medico-Chirurgical Review, Jan.* 1853, *p.* 184.

## CHLOROFORM IN SYMPATHETIC VOMITING.

*By Dr. Thos. Inman.*

[For this symptom two classes of remedies are generally resorted to—stimuli, or direct sedatives. One of the most valuable of these is creasote, but on account of its many disagreeable qualities, Dr. Inman suggests chloroform, in the dose of three or four drops, well shaken up with water, to be used in its place. He says:]

I do not know whether the suggestion is new; it was forced upon me by circumstances. A friend came to visit us across the sea, and suffered urgently from sea-sickness, which continued long after her arrival, to such an extent, that any motion of the body produced vomiting. Not having anything else in the house but chloroform, I gave some of that, and was gratified to find that its success was immediate. The next case was one occurring in the practice of a friend, where the vomiting had been kept up incessantly for three days, and where creasote had been unavailing. The vomiting was partly due to an overflow of bile, and partly to pregnancy: it continued, however, after the flow of bile had ceased, and was beginning to weaken the patient materially. The first dose of chloroform (five drops) checked the vomiting for six hours; there was then a slight repetition of the sickness, which, however, disappeared entirely after another dose.

The next case was one of vomiting from disorder of the liver. The first dose put a stop to the sickness, and had not to be repeated.

My next experience was in the case of the lady I first mentioned, who found it useful in preventing sea-sickness.

I have induced some of my friends also to try it, and they give an equally favourable report concerning it.

Its chief advantages over creasote are, its pleasant taste in the mouth as it goes down, and its not unpleasant flavour if it comes up again. The only point requiring attention is, that the mixture must be well agitated immediately before being taken, as the chloroform rapidly falls to the bottom of the spoon or glass.—*Med. Times and Gazette, March* 5, 1853, *p.* 252.