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AN ADDRESS

INTRODUCTORY TO

A COURSE OF LECTURES

ON

The Institutes

OF

MEDICINE AND MEDICAL JURISPRUDENCE.

1627

BY JOHN BELL, M.D.

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*An Address introductory to a Course of Lectures on the Institutes of Medicine and Medical Jurisprudence. By JOHN BELL, M.D.**

IN the scheme of instruction in the PHILADELPHIA MEDICAL INSTITUTE, my department is the Institutes of Medicine and Medical Jurisprudence.

Under the first head are comprised *physiology, hygiene, and pathology*, to which many have added *therapeutics*; but this is a latitude of interpretation which I do not conceive necessary on the present occasion, although I shall take the privilege of making frequent therapeutical application of physiological and pathological principles.

The usual import of the term institutes, signifying the principles and fixed laws in legislation or science, is asked for on the present occasion in reference to medicine, however rash or presumptuous we

* This address was first delivered in April 1825.

may thereby appear to the sceptic and the mathematical philosopher. We must, indeed, be prepared at the very outset to encounter all the false reasonings, misplaced pleasantries, and heartless sneers, which, from a reinote period to the present day, from Pliny to Moliere and Rousseau, have been adduced against the certainty and utility of medicine. For this negation once proved, it would be an ungracious, as well as hopeless and useless task, to speak of medical institutes or principles.

But prior to any attempt at defending ourselves from unjust and illiberal attacks, by setting forth the strength and variety of our resources, we will entreat our assailants to grant a truce, while we glance around and inquire into the pretensions of the advocates of other intellectual pursuits, to certainty of rules and uniformity of results.

We shall pass over, without summoning to our aid the melancholy truth, that every thing of which human nature attempts to take cognizance, is but dimly seen, and imperfectly understood. We would rather first listen to the astronomer's triumphant exclamation, when he points to the starry heavens, and revolving suns, and worlds innumerable. Behold, says he, the power of the deity, and at the same time the evidence of man's persevering and successful inquiries: the revolutions of the several planets, the orbits of yonder moon, as well as of this earth which we inhabit, and all their countervailing forces, laid down with a calculating precision, a mathematical accuracy, which leaves no room for doubt: eclipses foretold; change of seasons, and succession of day and night, the rise and fall of the waters of the ocean, all made clear to every, the meanest capacity.

Let us, in reply, be permitted to allude to the lapse of ages, ere such a monument of intellectual prowess could be raised; and in the mean time how many centuries of vain gazing at the heavens indulged in by the astronomers of Chaldea and Egypt! how many absurd hypotheses from Ptolemy to Tycho Brahe! how few useful additions from the time of Thales and Hipparchus down to that of Copernicus and Galileo, embracing a period of nearly two thousand years! How recently have method and rigorous calculation been introduced by a Kepler* and a Newton. But a century has

* We may form some idea of the state of astronomical science anterior to the

elapsed since the illustrious Englishman closed his truly brilliant career. Of his successors in the path of discovery, and expounding the secrets of the heavens, Euler, La Grange, and La Place; the two latter may be regarded as our contemporaries. From the earliest epoch, beyond historical record itself, astronomy has been a favourite pursuit; and yet it is only within the last half century that by its aid the navigator can fearlessly sail from shore to shore, and calculate, with tolerable accuracy, his situation and distance from land; and after all, the determining the longitude is a problem but partially solved. In fine, we must not forget, that notwithstanding all the boast of geometrical and analytical demonstration, some of the calculations most abounding in successful results have been formed on the Newtonian *theory* of gravity, on the assumption of a fact, without a knowledge of its nature or cause. Much yet remains unknown, and sincerely as we congratulate astronomers for what *has* been accomplished in their science, we cannot forget the thousands of years during which it was nearly stationary, and astrology, worse than ignorance, reigned paramount.

If next we look to chemistry as one of the exact sciences, and ask its votaries what are their pretensions for triumphing over us, we shall be promptly told, that nothing is by them admitted but what can be demonstrated by experiment; that the composition of bodies is ascertained by analysis, and their elements displayed to the senses; consequently every fallacy is avoided. But it is not a sufficient claim to the elevation of any study to the dignity of a science, that a great number of facts are rendered evident, and experiments made and recorded; without these be of sufficient moment, and possess such a co-ordination and regular sequence, as that we can deduce therefrom positive principles and maxims—institutes, if you will—which, taken from the known, shall be applied to and explain the mysteries of the unknown. If deductions, thus made, are of certain and invariable application, they constitute an exact science; but if they admit of many, I may say any, exceptions, they merely form a

time of Kepler, who died about the middle of the seventeenth century, from the language held by that wonderful genius:—"It has pleased the Lord," said he, "to wait five thousand years for an astronomer like myself, and I can therefore well afford to wait a few hundred for proselytes to my doctrine: but eventually they must come."

theory. Now, barely alluding to the long series of ages, from Aristotle to Paracelsus, when the four elements were received as demonstrated, as a truth which could not be doubted, and hastily glancing at the centuries of alchemical absurdities, we willingly come down to the present brilliant era of chemistry. We will admit the variety and number of the facts disclosed by this study, and the value, nay, glory of their application to the wants of life, to the abridging labour, and ornamenting and embellishing all the works of man. If, however, we ask for the fixed principles of chemistry, we fear the reply will not be very satisfactory. We shall be told of elements to day, which will be proved compounds to-morrow; we shall find laid down rules for explaining the various changes in bodies, to which are exceptions in the very one chosen for illustration. This year we have one supporter of combustion, the next gives us several; nor can we see any evidence of fixity in a science, the nomenclature of which is undergoing such repeated alterations. We all know the singular spectacle presented to the scientific world, of the then two most celebrated chemists of Great Britain, at direct variance of opinion, respecting what is now called chlorine; the one in London affirming that it was a simple, the other in Edinburgh equally confident that it was a compound substance; and each explaining on his own theory, with plausibility and seeming correctness, all the phenomena produced by its combinations with other bodies. Respecting galvanism and electricity, the explanations are, for the most part, hypothetical. Even where analysis is used to determine the composition of bodies, it is most usually destructive, and cannot receive the support of subsequent synthesis. Chemistry ought not then to be called with propriety an exact science. It is as yet but approximative, partly demonstrative and partly conjectural. But let no one rashly venture to criticise chemists for frequent changes, and convert that into a pretext for censure, which is the strongest claim to our admiration of men, whose untiring zeal is ever prompting them to catechise nature, and render her oracles clear and satisfactory.

We will next concede our admiration to the laborious and minute observations, the travels and researches of the students of mineralogy and geology, without, by any means, admitting their pretensions as cultivators of an exact science. Facts they have in abundance, such as the chemical composition and geometrical form

or crystallization of many minerals ; but definite arrangement does not exist : we wait, perhaps in vain, to see the conflicting theories of Werner, Haüy, and Berzelius, in mineralogy, reconciled and moulded into a doctrine or code, harmonious in all its parts, and which shall guide the inquiries of the tyro, and obviate the doubts and objections of the teacher. It is with a peculiarly ill grace (and yet it is done), that the geologist can venture to reproach the physician with the uncertainty of his profession, or the opposite theories which have been held and taught in our schools. To say nothing of the many and various speculations respecting the mass of our globe, whether its gravity increases as we approach its centre to such a degree as to be there equal to that of lead, or whether it be hollow or occupied by water or fire, we find in the discussions on the strata which can be subjected to observation, discrepancies of opinion so great as to be almost ludicrous. Thus, whilst one learned professor holds up to his auditors certain pieces of rock as having assumed their present form in consequence of disintegration, and subsequent combination and crystallization, by the agency of water, another, of not less learning and pretensions, in a rival school, will very gravely assure us, that the state in which we see the specimens, similar in every respect to the foregoing, and the stratification of the rocks from which they were taken, are the result of previous liquefaction by fire. Here then we have Neptunian and Plutonian, the advocates of fire and water, each calling natural philosophy and chemistry to his aid, and attempting to prove by them the correctness of his opinion ; and yet these are among the gentlemen who, forsooth, very charitably, sneer at us, and laugh as far as politeness admits, at the discussions between humoralist and solidist.

To the followers of natural history, whether zoologists or botanists, we have no exception to take, so long as they occupy themselves in describing the external characters and habits of animals and plants. It is only when they would aim at elevating their studies to the dignity of a science, by classification and method, that we become sensible of their weakness. An Aristotle, a Buffon, and a Cuvier have accomplished wonders in the description and arrangement of the animal kingdom ; to Tournefort, Linnæus, and Jussieu we cheerfully award the palm of genius and discriminative observation in their systems of the vegetable : but imperfection is still affixed to the labours of these mighty names.

We too have our physiological characters and phenomena, our

symptoms of diseases, and accurately drawn descriptions of their progress and termination, yet no merit is conceded to us ; and we are only reminded of the imperfect nosological systems of Sauvages and Cullen, and the theories of Boerhaave, Hoffman, Brown, and Rush.

After all, from no class of men do we so frequently hear all the changes rung of uncertainties, fallacies, and contradictions in medicine, as from our brethren of the profession of law. They pity us, to use a mild phrase, that we are deprived of evidence to substantiate facts ; that we cannot on this evidence positively and determinately decide, like their judges, and record our decisions to serve as sure guides to our successors. In the fulness of their compassion they seem to forget the law's delay, and its worse than uncertainty. While listening to them, we should be tempted to imagine that they were governed by a system of jurisprudence founded on the nature of man, and adapted to all his wants ; and of such general and universal application, that the law in it was clearly defined, and the penalties for breaking it laid down with such precision, and so extensively promulgated as to do away with all pretext of ignorance,—affording a sure protection to person, possession of property, and enjoyment of social rights, shielding innocence from persecution, and bringing condign punishment on crime. In what age or land shall we look for the original of this flattering picture ? To have its full value, we ought to see it in the world entire : or has it been the work of civilisation and refinement alone ? Shall we go back then to the period of Egyptian power and lore, and seek for it in the frightful despotism of her princes, and the superstition, ignorance, and debasement of her people, under the more immediate sway of a selfish, heartless, and intolerant priesthood ? Where was the consistency or protection of law then ? Are we to look for it under the monarchs and satraps of Persia and the east, whose word was law ? Was it found in Greece, the land of arts and arms, of sages and of heroes, where a legislator in Lacedæmon sanctioned theft ; and in Athens, where disinterested services and tried patriotism were rewarded with banishment, and exalted philosophy with hemlock ; while property was placed at the disposition of an ignorant dicast. So far, at least, we think, without presumption, that medicine will not suffer by comparison with law ; and that Hippocrates may be advantageously put in the scale of comparison with Solon and Lycurgus.

The Romans, during the time of the republic, seemed to suffer

equally, first, from their want of laws, and afterwards from those borrowed from Greece. Nor were the endless differences, and often bloody struggles, between patricians and plebeians, consuls and tribunes, likely to remedy the evil, or give greater support to justice, by the enactment of good laws. We learn, however, that their subsequent accumulation under the emperors (so great as to form camel loads) compensated most fully for earlier tardiness in legislating; and the evil became of such magnitude as to call for the codes of Theodosius II. and Justinian. But the remedy came too late, and was too imperfect to introduce order and justice in the place of general confusion, and open venality and corruption. It was left under the form of digests, institutes, pandects, and decretals, as a legacy to the modern nations who sprang up from the barbarian conquerors of the Roman empire. What are their laws, or what is jurisprudence now among them? Let the feudal privileges, customs having their origin in barbarism, the claims of aristocracies, military, civil, and ecclesiastical, and royal decrees, all having the force of law in most parts of Europe, be the reply to this question.

In France, the revolution swept away her laws of custom, of province, and of nobles, and in their stead she is now blessed comparatively with the code Napoleon, more adapted to the age we live in, and to common sense and equity. In England, from whom we have borrowed so much, we know by the confession of her own jurists, that her laws, common, statute, canon, and civil, are in such number, and particularly the two first mentioned, common and statute law, so masked by circumlocutions and technicalities, as to render it impossible for any man, during the longest life and with the most unwearied industry, to become acquainted with them; and without the fear of overcharging the picture, we may add, even with their titles. That they are frequently oppressive and vindictive is known to all; nor is it a fact of less notoriety that they are occasionally at variance with the plainest dictates of common sense. They too often give facilities for ingenuity to entrap innocence, and to throw a cloak over guilt. The mysteries of sham bails and sham pleas will very well compare with our *lædantia* and *juvantia*, or efforts to discover what will benefit a disease by knowing what is injurious to it: and indeed the fictions in law are, to the full, as puzzling and pernicious as the theories of medicine. Not all the drugs of an apothecary will so enfeeble the stomach of a patient as a chancery suit

the mind and heart of the poor suitor, who commits himself to its decision, or rather the promise of its decision. It may be bad taste, but I would prefer, for my own part, lingering with uncured dyspepsia to sinking under a broken heart. Is not the very title of a court of equity a satire upon other courts of law; yet before a poor suitor can have justice, it must be determined whether his case is to be governed by the rules of law or the rules of equity*.

We may estimate the *simplicity* and *certainly* of the law from some facts recorded by an elegant scholar, himself a lawyer (Butler). A gentleman wished a will made by which he could settle six estates of unequal value upon six sons and their heirs male, with certain restrictions in case of death, so that the estate in this latter case should go to one of the other sons. To have given full effect to this will, it would have required as many provisos as there can be combinations of the number six, which amount to seven hundred and twenty†.

Now, gentlemen, we shall hardly be accused of presumption in asserting, that we can cure any disease with as much certainty as a lawyer can make a will, if we are allowed seven hundred and twenty provisos to shield us from blame in case of failure. As to the *economy* of the law, we learn from the same writer, that if a deed, which he was instructed to prepare, had been executed in all the forms, the expense of necessary stamps would have amounted to ninety millions seven hundred and twenty two thousand pounds sterling, somewhere about the moderate sum of three hundred and sixty five millions of dollars. The fact is, that the lawyer and jurisconsult have the same problem of human nature to solve with ourselves: they may substitute what they call principles in its place, write them in blood, and decorate them with punishment and torture, but their legitimate success is not the more assured.‡

* Butler's Reminiscences, p. 40, Phil. edit. † Op. cit. p. 53—4.

‡ In a recent appeal before the house of lords, the earl of Eldon, in moving their lordships to make an order in the case, mentioned some extraordinary instances of discrepancy between the judges on questions of law. "The late lord Thurlow, said lord Eldon, sent a question, at one time, for the opinion of the court of king's bench, when lord Kenyon was chief justice of that court. Lord Kenyon returned an answer to the question, but it was so little satisfactory to lord Thurlow, that he sent it back to lord Kenyon, with a request that it might be reconsidered. Lord Kenyon was somewhat surprised at such a proceeding;

You will, I am sure, gentlemen, receive these remarks with the same spirit in which they are delivered ; not for accusation or invective, but for the promotion of candid inquiry ; the result of which shows that medicine is not so comparatively uncertain and fallacious as many intelligent and well intentioned persons would fain persuade us. With the hope of silencing those who, puffed up by the imaginary security of their own defences, still would rail at our weakness, I will adduce a few additional opinions of the philosophical and the learned on causes and certainties. First, we may say with CONDILLAC, that we know not the nature of things ; but it is also equally evident, that we know not a few of the relations which they have to us. In fact, to use the language of a celebrated teacher of mathematics, if we except the mutual causality and dependence of the terms of a mathematical demonstration, I do not think that there is any other causality in the nature of things, wherein a necessary consequence can be founded. What, as has been observed by a learned divine, are the laws by which matter acts on matter, but certain effects which some having observed to be frequently repeated, have reduced to general rules. Thus, as we find it elsewhere remarked, the laws of attraction and repulsion are to be regarded as laws of motion, and these only as rules or methods observed in the production of natural effects, the efficient and final causes whereof are not of mechanical consideration. Attraction cannot produce, and in that sense, account for the phenomena ; being itself one of the phenomena produced and to be accounted for. Finally, the great Locke himself, educated a physician, holds for us this consolatory language :—the communication of motion by thought, which we ascribe to spirit, is as evident as that of impulse, which we ascribe to body :—constant experience makes us sensible

but he did reconsider the subject, and the result was, that he gave a second opinion directly opposite to the first. I myself," added the noble earl, "at one time requested the court of king's bench to certify to me their opinion as to the estate which some person took in some lands. The court of king's bench were unanimously of opinion that he took an estate in fee. I was not satisfied with this opinion, and I therefore sent the question to the court of common pleas, who were unanimously of opinion that he took *no estate at all* in the lands in question. Now, I was impertinent enough to think that they were all wrong, and I made an order directly opposite to the opinions of both courts ; and, what is very extraordinary, my decision satisfied all the parties concerned."

of both these, though our narrow understandings can comprehend neither.

Carefully abstaining then from any speculations or disquisitions on the nature or first causes of the life which animates the frame of man, or of the mind which guides its movements and actions, it shall be my endeavour in these lectures, 1. To point out to you the phenomena of life as we are made sensible of them, and the modifications arising from difference of organization or intimate structure of the several parts of which the body is composed; as well as those successive changes and alterations depending on age and external agencies. 2. To direct your attention to all the means by which the health of the body, as a whole, and the integrity and energy of function of each of its organs are preserved. And 3. To indicate that trouble and disorder in the various parts of the body, separately and conjoined, by which it deviates from the healthy standard or natural state.

In the accomplishment of the first part of our task, we shall be led to study Physiology, which may briefly be defined as a knowledge of the qualities and order of the phenomena of the body in a state of health. In the second, we go over the subject of Hygiene, or the method of preserving health and prolonging life. The third branch is Pathology, or a knowledge of the animal body in a state of disease or death.

Both physiology and pathology suppose a knowledge of function, the first of healthy, the second of diseased; and both of course presume a previous acquaintance with the anatomy or structure of the human body. As has been very correctly remarked, dissection, and the various auxiliary processes employed by the anatomist, are the only means of learning the structure of living beings: observation and experiment the only sources of our knowledge of life. These are the tests or criteria on which we must depend, and to which we must always refer. No position respecting structure can be listened to unless it admits of verification by appeal to anatomy; no physiological statement deserves attention unless it be confirmed by observation.

When we examine the human body, we find it in one sense a machine constructed on the most exact mechanical principles, and of course for the correct understanding of its movements we must be acquainted with the principles of mechanics. Considered in another point of view, we find fluids of different kinds circulating

through tubes of various diameters, to be explained in part by a knowledge of hydraulics.

The transparent parts of the eye act on the rays of light, according to the common laws of optics, and bring them to a focus, so as to form an inverted picture of the object on the retina just as well in the dead as in the living organ, provided their transparency be unimpaired ; of course the phenomena of vision cannot be explained without a knowledge of the principles of optics.

Surrounded as the human body is by an elastic fluid, the air, the supporter moreover of respiration, and subject to various changes in respect of gravity, heat, moisture, and other qualities, which have great influence on the constitution, it is necessary to be informed of the nature and properties of this fluid, the knowledge of which constitutes the science of pneumatics.

Again, various changes are induced upon the fluids from chemical principles. The researches of chemistry into the composition of the fluids and solids of the animal frame, and comparative examinations of them under the different circumstances of age, sex, climate, food, mode of life, and the various incidents of disease, have thrown great light both on the healthy and disordered actions of our frames. In fine, many important points in physiology cannot be understood, nor the nature and results of many animal processes appreciated by a person unacquainted with chemistry.

But, gentlemen, while we thus freely admit the utility of the physical sciences, let us not overrate their importance, or think that we can, by a knowledge of them, form a correct estimate of the powers and movements of the animal frame. So far from this being the case in all, we cannot apply such knowledge to the explanation of any one function or process in the living body. We cannot, for instance, forget the totally opposite results at which different mathematical physiologists arrived in treating of the same functions. One estimated the force of the heart as equal to 180,000 pounds ; another reduced it to eight ounces. Nor can we, with any precision, calculate by the aid of hydraulics the quantity and momentum of blood circulating in the vessels of the body, varying as it must in these particulars according to the amount of nervous influence on the heart and blood-vessels, to say nothing of the elasticity of these latter. Any attempt, moreover, to explain the operations of the nerves and muscles and glandular secretion, by chemical agencies, or resolving life into a mere play of chemical affinities, or making it

depend on electricity, galvanism, and magnetism, must lead to regrets at time mispent and labour lost.

Physiology has been much more sensibly indebted for its advancement to a knowledge of the comparative anatomy of animals, especially the mammalia, or those which most resemble man in their structure. Several important discoveries have been made or illustrated by experiments on brutes, such, for example, as those relating to the circulation of the blood, respiration, muscular motion, the functions of the nervous system and absorption, together with the effect of various medicines. Here, again, we must beware of giving too much importance to this branch of natural history; otherwise, in place of proof, or fair illustration, we are misled by remote analogies. Thus, because the gizzards of the gallinacæ have a prodigious triturating power, and correspond in a measure to the stomach in man, it was hastily and erroneously inferred that digestion was effected in the latter by mechanical attrition. On similar grounds it has been argued, that the arteries of man, and the mammalia generally, must have a contractile power, because in some worms without a heart the vessels carry on the circulation alone: but the whole economy is too different in the two instances to admit of inferences from analogy.

The same remark applies with much force to the experiments made on cold blooded animals, in which nervous power and the circulatory apparatus are so different from those of man. Even in the warm blooded or mammalia, most nearly approaching to man in organization and functions of parts, there are very notable differences in their capability of being affected by certain medicines and poisonous substances, some of them eating with impunity what would soon prove fatal to us.

The vivisections, or experiments made on living animals, instructive as they have been found, are liable to lead to numerous and serious fallacies of induction. The alarm and terror of the animal, which is the subject of experiment, so soon as it is tied, or its rage and violent efforts to escape, destroy the habitual order and harmony of its functions. And how much greater must this disorder be when the scalpel is applied; we then have loss of blood, cutting of nerves, prostration of vital power, and perhaps convulsions; difficulties which must impede the successful prosecution of the experiment and complicate the inferences that might be drawn from it. Parts cut or tied unintentionally, and so many others de-

stroyed as to force the remaining ones to take on vicarious and unnatural action, are additional obstructions. Fearing that I might discourage you from a judicious, and properly matured course of experimenting, I shall not on this occasion lay much stress on the contradictory opinions held by many physiologists, each of whom insists on his being the results of experiments.

Surgery, and the various injuries and mutilations of the human body, of which it attempts the relief, has proved of essential service to the progress of physiology; and hence the practice of the former, and the successful study and advancement of the latter, have been so often carried on by the same individuals.

Pathology also has in part repaid the debt to physiology, by showing to what extent an organ is capable of performing its function, when curtailed of its proportions or suffering in texture. It is thus we have learned that the power and extent of vision are nearly as great with one eye as with two; that a portion of one side of the brain may be destroyed, and the process of intellect not much affected; and that one lung may be useless by hepatization or destroyed by ulceration without respiration being materially impaired.

From what has been already advanced, we may, I think, divide physiology into two branches; or, in other words, the actions and functions of our organs may be studied in two separate ways. The first is prosecuted by means of the different aids furnished by other sciences, and comparative anatomy and experiments on living animals; it consists in examining whatever is mechanical in the movements of each part, such as determining the force, direction, and effects of the contractile motion of the digestive tube, assigning to the stomach its share in vomiting, analysing all the circumstances which modify the course of the blood, and demonstrating the activity or passiveness of the arterial canals, noticing the causes of the movements of elevation and depression of the encephalic mass, explaining the mechanism of the senses, as of seeing and hearing, &c. The works of HALLER, BARTHEZ, LE GALLOIS, RICHERAND, and MAGENDIE, abound in analyses and explanations of this part of the study of man or branch of physiology, which, however amusing, is not that which will most safely guide and enlighten the medical practitioner. It is to him a matter of comparative indifference to learn how the stomach and heart contract, or arteries act: what it behoves him to know, with the most rigorous exactness, are the

causes which accelerate, retard, or pervert, the movements of these parts: how, and under what circumstances, an impression produced on one organ is transmitted to, and felt in others more remote. With this view we must watch and analyse the effects which all surrounding bodies produce on the human frame, discover on what parts they more especially exert their action, seize by continued and attentive observation the most transient signs of the excitation of such part, and appreciate the modifications which age, sex, temperament, and idiosyncrasies produce in the general or local phenomena. Such is the true physiology of physicians; as exact and positive as the former, though demanding more time, patience, and rigid intellectual scrutiny. To it also belongs to inquire into the laws of the union between the mind and body, the effects of culture and education, civilization and refinement upon the constitution, also into the power of habit, the effects of enthusiasm, and force of imagination.

So soon as we define hygiene to be that branch of the institutes of medicine which points out the means of preserving health and prolonging life, we become immediately aware of its close connexion with physiology. We cannot treat of the former without a knowledge of the latter. The directions for selecting a healthy residence, using nutritive diet, and taking suitable exercise, must presume some knowledge of respiration, and the changes which the air undergoes in the lungs; or speaking less equivocally, the manner in which the lungs are affected by certain airs; also an acquaintance with digestion, and the influence of muscular motion on the other functions. In fine, to preserve health we must know in what it consists, which can only be learned by physiology.

The study of hygiene will be very materially promoted by a perusal of the narratives of voyages and travels in other and distant countries, whereby we become familiar with the effects of different climates and articles of food; but for the knowledge of which we should have entertained erroneous notions acquired in our own limited sphere of observation and experience. Information thus obtained will be found of safer and more practical application than that derived from experiments on animals, or on a few individuals in the immediate circle of our acquaintance. Animals have appetites and tastes so different from our own as to require nutriment of a totally opposite kind from that which we use ourselves. Thus, what inference can be drawn, for our benefit, from such experiments

as those of MAGENDIE, to ascertain the nutritive properties of certain articles, as sugar, butter, or oil, given for some days in succession to dogs. These animals sank under such food, and straightway it was inferred that it could not minister to our support. But why so strangely forget, that a dog is an animal essentially carnivorous, however much his tastes may be modified by domestication; and that of course flesh is intended by nature to be his food. We might with equal propriety give to herbivorous animals, cows for example, mutton chops or portable soup, and deduce as a consequence, from their pining away under such a diet, its inapplicableness to nourish man, who, be it remembered, is omnivorous or polyphagous, living on fish and whale oil in the arctic, and rice and bananas in the torrid zone.

One of the most valuable and delicate applications of hygiene, or at least of our knowledge obtained by the study of it, is to the convalescent from acute diseases, or the invalid suffering under chronic ones, when the organs are too feeble to take on their pristine physiological energy, and require of us the nicest discrimination in adapting to them diet and exercise calculated to bring them back to their healthy state. It is then that we desire to know the average salutary and digestible nature of articles of food, as ascertained by a long and careful observation of what had been used and tolerated in health. This apparently obvious and simple guide is, however, too often overlooked, and the patient or convalescent is made to take ingesta which would prove too stimulating to a person in full health. Thus, for example, to how many persons in chronic maladies or in a state of convalescence is not chocolate recommended for diet; and yet very little attention will satisfy us, that of twenty persons in the enjoyment of full vigour of constitution, it will disagree with ten of them, and give rise to flatulences, indigestion and other unpleasant consequences.

Pathology, the third branch of the institutes of medicine, and the end and object of our studying the others, has been already defined. It embraces the consideration of all the changes taking place in the human body, from its first deviation from a healthy or physiological state, through disease, on to entire recovery or death; and marks the appearances of the organs after this last sad termination. It of course includes the study of the causes, as well as the symptoms or diagnosis, the signs or prognosis, and the alterations discernible in *post mortem* examinations.

Ætiology, or the knowledge of the causes of disease, resolves itself into two parts. In the first we note all the external agencies which affect man; climate, atmospherical vicissitudes, localities, habits induced by civilization, including the effects of vicious education, professions and trades, also of the ingesta or various kinds of food, and of the percepta, or the passions in their extremes. This part is of course closely connected, and almost blended with, hygiene, and shall be treated of accordingly. The second division involves the inquiries into the part or organ first and most materially impaired in structure or function, and the lesion of which keeps up the morbid actions of the rest of the body. Here we find ourselves necessarily involved in the observation of symptoms, or symptomatology, so as to deduce from the outward evidence the inward suffering. As the disease advances, the symptoms become more equivocal and complex, and are presented to us in the character of certain physiognomical traits or signs which aid us in the foretelling the termination of the malady in health or death; or in other words, establish its prognosis. Such is semeiology or semeiotics.

It is in estimating the value of symptoms and signs, and determining thereby the organ primarily or principally diseased, that pathology is enlightened by physiology, and in its turn proves so serviceable a guide to Therapeutics. The symptoms of diseases are in fact but the expression of the difference which exists between the healthy or physiological, and the morbid or pathological state; and it becomes us if we would act on the principles of sound logic to scrutinize a disease, not so much for what it seems to be, as in its disabling the animal economy from affording the manifestations of a healthy state.

Let us develop still further this proposition. The means by which our organs manifest their sufferings are reducible to the following: first, pain; second, alteration of their function; third, sympathetic phenomena, which are the consequences of their correspondence of action with other parts.

We may illustrate this by tracing the conversion of physiological into pathological phenomena, or rather the transition from the former to the latter. Pain is but an exaltation of the natural sensibility of a part, and is in its intensity in disease proportionate to the latter in health, whether one or the other be excited by direct impression or sympathetic action. We all know, for example, the great sensibility of the stomach, and how variously, but still plea-

surably it is affected by different ingesta, solid and fluid. We know also from personal experience and feeling, how promptly pain may be produced in it.

Let us suppose now two persons of the same habits and tastes, both enjoying good health, and both, after long and somewhat fatiguing exercise, sitting down to their repast. The one takes food of the usual kind and quantity, with water for his beverage; he soon experiences his customary renovation of strength and corresponding pleasurable sensations diffused through the whole frame, which are productive also of mental satisfaction. After a little longer lapse of time, with a feeling of some fulness about the gastric region, he has also the skin somewhat warmer than before, his heart beats quicker, respiration is a little accelerated, with a sense of fulness about the head, and some drowsiness. Soon however, this state yields to one of vivacity of thought and movement, consciousness of strength and ability to undergo fatigue. All these constitute a circle of physiological actions, of the stomach, the heart, lungs, skin, brain, and muscles. Variation of sensibility, but no pain, is experienced.

We will now imagine the other person, companion of the one just mentioned, who, in place of taking his usual repast, attempts prompter renovation of his powers by richer and more stimulating articles of food than common; washed down by several glasses of wine. For the first few minutes he seems inclined to triumph over his friend by boasting of the exhilaration which he enjoys. Soon, however, the excitation exceeds the line of comfort and health. There is a heat and pain in his stomach, burning of the skin, violent palpitations of the heart, and hurried breathing; the vessels of the head are turgid, and throb violently; the eyes are injected, and complaints are uttered of acute pain in the head. After a time, the stomach, irritated and pained, ejects its contents, and partial relief is experienced; the skin is moister, and the secondary irritation in the heart and brain less: but now follows general languor, disinclination to muscular effort, depression of spirits, and impaired function of the senses, which are in a state of undue excitement; the eyes are watery, and intolerant of light, and the ears of sound; the sense of taste is vitiated; and we find the tongue loaded with a whitish yellow mucus.

Here we have a circle of actions of the same extent as the foregoing, and formed of the same organs; but sensibility is exalted

into pain; this is followed by disturbance of function, and a number of deviations from the healthy standard, in parts remote from but sympathizing with that first affected. The state is, in fine, changed from physiological to pathological. Would we record what we have just seen, we begin with ætiology, or causes of the disorder, and refer the external ones to the ingesta taken in excess, and of improper quality; the internal ones are the troubled actions taking place in the stomach, and morbidly affecting it. If required to prove this we refer to the well known and acknowledged physiological phenomena, already described, following the moderate excitation of this viscus; and we feel ourselves justified in commemorating the present condition of it by all the changes which have met our senses, and which we note down under the head of symptoms.

Do you desire a picture marked by stronger features and darker shading? we present you a person bent forward and unable to support himself; the face alternately pale and flushed; the eyes half open, injected, and filled with tears; the borders of the eyelids of a deep red, voice nearly extinct, respiration short, frequent and laborious; a sensation at the stomach as if it were consumed by fire, constant spitting, hiccup, nausea, vomiting of brown or bloody matter; lips, tongue, and throat, inflamed; black and fetid alvine discharges; thirst inextinguishable; great heat over the whole body; urine red, bloody, and in small quantities; occasional delirium and convulsions. You inquire into the cause of this person's horrible situation, and you learn that he has swallowed arsenic: death soon relieves his agony. We have watched and recorded attentively the symptoms; we have seen pain and great disturbance of function in many organs. Our object now is to try their value by examining the subject which has expired, and noting down the organic changes. We knew during his life time the first link in the chain of morbid derangement of function, and we find now, on examining the stomach, that its inner surface is covered in part with red spots of different degrees of intensity; in part with black patches; while in other places it is entirely corroded; that the small intestines exhibit somewhat similar appearances; the lungs are gorged with blood, and their inner surface inflamed; so also is the whole lining membrane of the throat and œsophagus, and even the inner surface of the bladder is red and engorged.

We learn, after a time, by examinations of this kind in deaths from different causes, that after the greatest distress and suffering

of the digestive organs, associated with cough and fever, there is often no structural alteration found, except in the lining membrane of the intestinal tube and lungs. In our endeavours to trace the chain of causation, we have noted the symptoms, seen the changes after death, but still waver. We look now to the guidance of physiology, and inquire whether organs have coats or membranes differing in appearance, structure and vital properties; and if so we ask which is the one dominant, or on the excitation of which the action of the viscus depends: next we desire to ascertain, whether different organs performing different functions have a common coat or coats which possess the same appearance and vital properties. We are soon led to answer affirmatively to both these questions, and, as illustration, point out the outer membrane of the eye, the same which lines the eyelid, descends with the lachrymal duct into the nose, is expanded over all the nasal cavities, lines the mouth and the canal leading to the ear, is extended to the fauces, pharynx, œsophagus and the intestinal tube on to the rectum: again, from the fauces it passes down into the larynx and lines the cavity of the lungs. So far it is a continuous membrane, and the knowledge of this fact and of its properties removes the feeling of surprise at the consentaneous action in health and disease between the different organs which it covers and lines; as, for example, the stomach and lungs. But there is yet another division of it which lines the urinary organs in both sexes, and the urethra in the male, and the vagina, uterus and fallopian tubes in the female. Between these parts and those formerly noticed there is also a remarkable sympathy; they act on and are acted on by them.

The pathologist, thus enlightened, does not lose his time in framing arbitrary divisions of diseases, according to the organ or the nature of some leading symptoms, but with a comprehensive eye examines the morbid changes in a separate structure or tissue, and seizes the key to unlock the mysteries of morbid functions. He can at once make the most prompt and beautiful application of his acquirements to the treatment of disease. Is it purulent ophthalmia, catarrh, indigestion, diarrhœa, dysentery, irritation of the bladder or urethra, or fluor albus; he sees but a disease of the mucous membrane, which will be relieved by the same medicines and remedial means. So the serous and other tissues are studied in the same way. Who does not acknowledge in these principles a guide more safe and easy than any hitherto followed for the writer on the *matéria medica*? Led on by these means, he sees in mercury, pro-

perly administered, a useful remedy for certain morbid conditions of the entire mucous membrane, whatever may be the organ it is in union with, as in the terebinthinate class, balsams, &c. he will find useful aids to check and correct the enfeebled state of this membrane and the profluvia accompanying it. Tartrite of antimony again would seem to be the agent best adapted to control the morbid excitement of the serous tissue, as in pleurisy, &c. But I must not attempt any further applications, and hasten on to a conclusion by saying a few words on medical jurisprudence.

This science, sometimes called *legal medicine*, points out the application of the knowledge and precepts in the different branches, principal and accessory, of medicine, to the elucidation of questions of law and right, which are to determine the punishments for attempts affecting or endangering the health and life of a human being. The medical jurist to an exact knowledge of the various branches constituting medicine, properly so called, must add an acquaintance with natural philosophy, chemistry, and natural history, and even with the civil and criminal laws of the country in which he resides. The effects of external violence, as of wounds, are to be accurately traced by the physician, who is to note the succession and order of parts wounded, and be aware of the course he is to pursue in probing or dilating. Anatomy and surgery must then of course aid him with their lights, while by an intimacy with chemistry he discovers the means of suspending or preventing death from poisons; or if death takes place without his cognizance, he can determine by suitable tests the presence or absence of a poison in the stomach, for example; and also speak as to the changes of appearance and structure produced by these means. To him likewise the community looks for a decisive opinion of the true state of the mind in all those cases in which pleas of insanity are urged by the friends of an unhappy individual either to shield him from the penalty of some rash and cruel act, or for the purpose of subjecting him to a strict surveillance and partial confinement, as one no longer master of his actions, nor entitled to receive and transfer property. In this department of medical jurisprudence great advances have been made during the last half century; with the effect of making the interests of the individual under mental alienation compatible with the tenderest aspirations of humanity, while society at large is protected from any sudden interruption of its tranquillity.

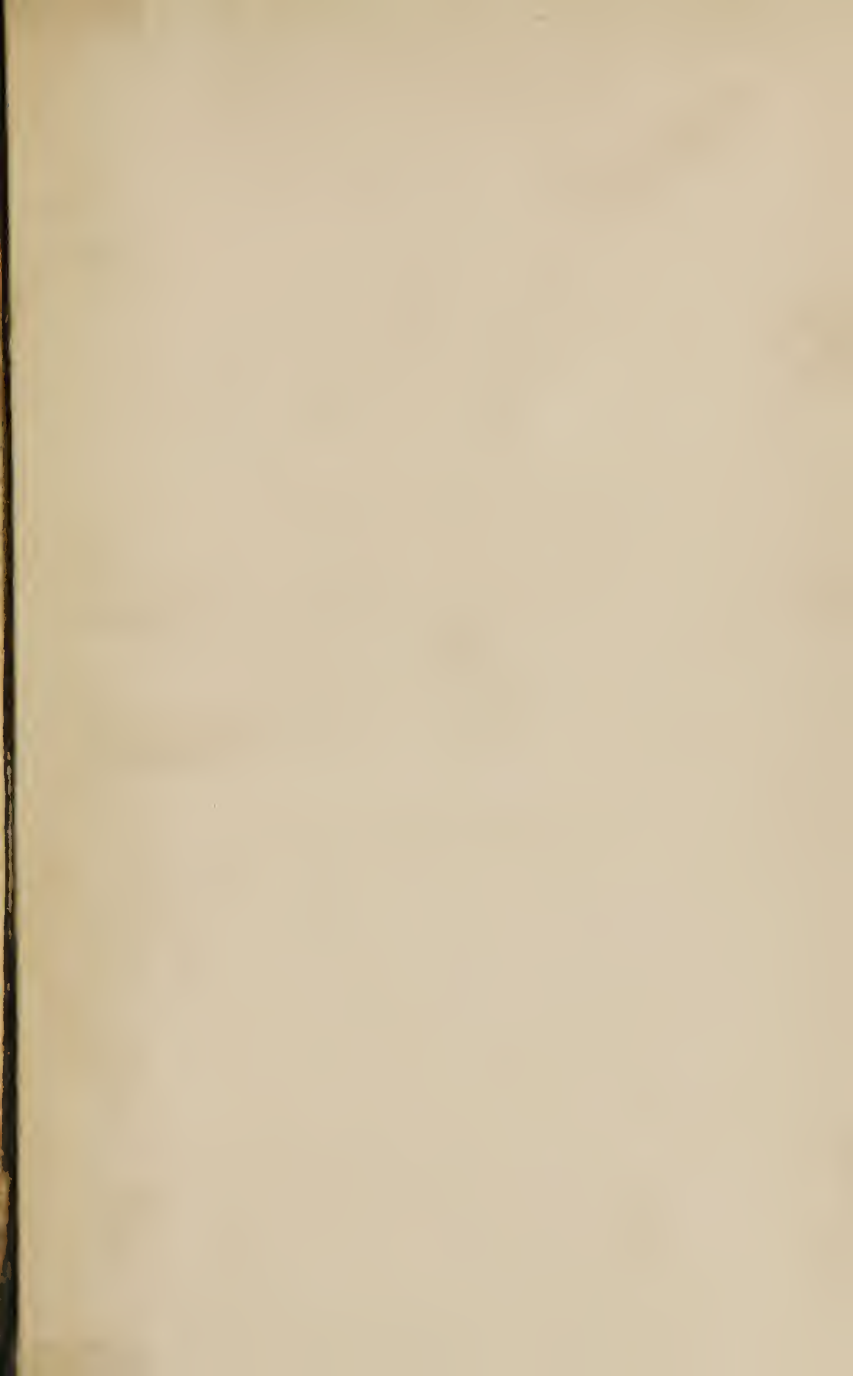
Imperfect, gentlemen, as is this sketch of the outlines of the in-

stitutes of medicine and medical jurisprudence, enough, I hope, has been traced to give you an idea of the ampleness of their resources and the magnitude and variety of their applications. They require that we shall have visited the halls of every science, and selected from them some maxims and rules for our after use ; they invite us to look abroad on nature, to invoke her in her calm as well as in her troubled movements, whether we be amid the elemental strife, or gazing at the bright Favonian sky.

In the grove, or on the mountain top, or by the rippling stream, we have Hygieia for our guide. With her we may study the harmonies of the vegetable and animal creation ; and learn what will nourish, what heal, or what destroy in the former, and the preserving power of instinct and mute expression in the latter. Looking around on our own species, we gaze on youth and beauty, the vermeil lip, the rosy cheek and sparkling eye, not as sensualists, or idle dreamers ; but to see the signs of health, to contrast them with melancholy's pale and withered face and tottering form ; the stamp of suffering and disease. We watch the artless smiles and ready gambols of childhood, the impetuous and enforcing look and gesture of youth, and the sedate collected features of age, as physiognomists, anxious to catch the most evanescent expression of affection, fond and confiding, or of passions dark, wasting, and suspicious : for to us often belongs the task of administering to a mind diseased, while we at the same time alleviate the body's sufferings. Not idly or uninstrucively then do we study and admire the wonders of the imitative arts by which the canvas is made to glow with innocence and love, or to present with startling truth, the care worn lineaments of crime, and the pangs of remorse. Not in vain for us ought the epic and dramatic muses to utter in harmonious numbers the sentiments of high toned resolve, meek-eyed devotion, guilt for a while triumphant by its violence, or ensnaring innocence by the aids of fraud and hypocrisy. All this is human nature ; and if we are the high priests in the temple on whom devolves the task of replying to the piercing cry of pain, the desponding murmurs of wasting disease, or the maniacal shout, whose very echo makes hope turn pale, we must first have received the confessions of human infirmities, and become possessed of the reasons of every deviation from health and happiness.

How alluring, and yet how philosophical, that beautiful fiction of Grecian mythology, by which Apollo was made the tutelar divinity

of poetry, the fine arts, music and medicine. Why should we sever the bonds of relationship thus deliberately formed and solemnly sanctioned, even though *we* no longer bow to him of the unerring bow? Let but our efforts be at all commensurate with the benevolence of our calling, or the nobleness of our purposes, and our success cannot fail to be as signal as our reward will be great.



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