ORIGINAL COMMUNICATIONS.

THE RELATIVE MERITS OF EMPIRICISM
AND RATIONALISM IN THE PRESENT
STATE OF MEDICAL SCIENCE.

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[Read before the Medical Society of London, March 25, 1854.]

It has been observed by many of the most profound thinkers on the subject of mental philosophy, that, however much the mind of man, whether considered generally or individually, may seem to change, there are and ever have been present in it certain principles, which, when separated from the other principles with which they are combined, are found to be pure elements, as ancient and universal as man himself, unchanged and unchangeable.

The union of the elements of a material substance constitutes the mass, which may and will vary in properties, even though the elements shall be the same. In like manner, the union of the mental elements constitutes the mind; and hence there arises a vast variety of mental constitutions; the varieties, however, being at all times semblances rather than realities—differences in degree rather than in kind. It is not my province in this place to read a chapter on metaphysics, to examine how far the mental strength depends on development or soundness of the material organisation, or whether the combination of the first principles of the mind ever leads to the development of a compound, performing simple functions. But this I would point out; that there are two forms of mental agency which appear more or less in every man, and which, whether first or second principles, are perhaps the most marked of all the mind's faculties, and, as history fully proves, the most ancient. The agencies to which I refer are, 1. The *speculative*, or that which leads man to inquire into causes; and 2. The mere *observing* faculty, by which he is led to put down what he sees, and remain contented.

We are accustomed sometimes to designate these mental principles by certain general names. The man who evidences the first, or speculative attribute, in a high degree, is called a *rationalist*; the second, or mere observer, has the term *empiric* applied to him. And in every department of knowledge, whether politics, religion, the sciences, or even the arts, we constantly find the influence of these agencies in every country, in every race of men, and through every period of time: and if there is one branch of knowledge more than another in which the speculative and empirical tendencies stand out most strikingly, it is the healing science. The history of medicine abounds in proofs of this fact.

It will be well for me, before proceeding further, to define clearly the meaning I wish to attach to the two words which I shall so often repeat—*empiricism* and *rationalism*. The word *empiricism*, then, I shall always use in its strict literal sense, and as it was understood by the great nation from whom it has been derived; viz., as a system based on the mere observation of facts without deductions, and on experiments made at hazard, without any precise or preconceived object. By *rationalism*, on the contrary, I understand that mode of inquiry in which observations are made for the purpose of being reasoned on, and where experiments are performed as the means to an end, and as a test of the truth of what has been conceived beforehand. I am particularly anxious that these two definitions should be steadily kept in view, since the remembrance of them will tend to make clear much that would otherwise appear obscure and paradoxical in the sequel.

Returning to our subject, and going back not less than 1800 years, and taking up the works of an author who still remains popular in medicine—the illustrious Celsus—we find an introductory chapter almost exclusively devoted to the subjects of rational and empirical medicine. These subjects are treated of, too, in such a manner that no modern writer need be ashamed of it as an exposition of the

science of medicine as it now is. Indeed, the remarks made by Celsus are so curious, and his deductions are so remarkable, that I shall not apologise for giving a brief outline of his observations.

Commencing with a description of the divisions in medicine, he describes the sects: 1. The rationalists; 2. The empirics; and 3. A middle sect, who adopt the principle of culling from both the others. Speaking of the rationalists, he says:

"Those who profess rational medicine assert that the following points are necessary: a knowledge of hidden agencies, of evident causes, after these of the natural actions, and finally of the internal parts. They call those hidden causes in which the inquiry is from what principles our bodies are formed, and what produces health or disease; for they believe it impossible that he can know how to cure diseases, who is ignorant of their origin.

"At the same time, they do not deny that experiments are necessary; but they assert that even these cannot be approached except on some rational principles. Sometimes new forms of disease arise, in which experience has as yet shown nothing; and hence it is necessary to observe their origin, without which no mortal man can know why he should use one remedy rather than another."

I have extracted these sentences as best showing what were the leading doctrines of the rational school of early medicine; but the entire description must be read to be properly appreciated.

Celsus next describes the empirics:—"On the other hand", he observes, "those who call themselves empirics (*ἐμπειρικοὶ*) embrace the evident causes as necessary; but they assert that the inquiry into obscure causes and natural actions is so far futile, since their nature cannot be understood. And that these things cannot be understood, is plain from the discord between those who have written on them; for why", continue the empirics, "should we believe Hippocrates rather than Herophilus, or Herophilus rather than Asclepiades? If arguments are to be followed, those adduced by all seem plausible; if the methods of treatment are to be carried out, patients were brought back to health by all of them: hence it would be improper to detract anything from the good faith or authority of any one. . . . Sometimes, again, the causes of a disease are obvious; but the treatment is not learned therefrom. And if an evident cause does not furnish this knowledge, much less can that which is placed in obscurity. . . . Aid must therefore be sought from certain and explored sources—that is, from the lessons taught by experience in the treatment of disease, as is the case in all other arts. For a farmer or a pilot is not made so by disputations, but by experience. . . . The empirics inquired also "whether rationalism teaches the same thing as experience, or something different; if the former, it is superfluous; if the latter, it is opposed to experience." They appear to have taught the necessity, not of inquiring into the nature of the corporeal functions, but into the means of restoring the body to health when diseased: "for it does not matter", they observed, "what causes a disease, but what cures it . . . nor how a man breathes, but what will relieve difficulty of breathing."

Having thus described the two distinct sects, Celsus next shapes his remarks with consummate ability, and endeavours, from the contrary opinions which he has previously given, to extract truth, and to develop doctrines "not devoted to either opinion, nor too much differing from both; but in a manner midway between the opposite opinions". "For even philosophers", he observes, "do not understand by their science, but follow out by conjecture the causes of health and of disease. . . . And when the knowledge of anything is not certain, conjecture regarding it cannot discover a certain remedy. And it is true, that nothing conduces more to the rational art of medicine than experience. And there are many things which, although they have no direct reference to an art itself, yet aid by stimulating the intellect of him who follows the art. And in this way the study of natural philosophy, although it does not constitute a physician, yet renders a man more fit to practise medicine.

... Information must be sought, not from hidden causes (for these are doubtful and uncertain), but from those which can be ascertained by experience—the evident causes ... for from these the indications of treatment are often to be deduced." Finally, having reviewed the opinions of Erasistratus, and of the methodic sect, of which Themison was the founder, Celsus thus sums up his view of the manner in which the science of medicine ought to be investigated and practised:

"Hence, returning to my proposition, I consider that medicine ought to be rational, but to be deduced from evident causes; the obscure causes being removed, not from the consideration of the practitioner, but from practice itself."

If I or any other person were ever so much inclined to add to these descriptions of Celsus, the attempt would be idle; for they are as applicable to the medical world of to-day as they were in the time when Celsus wrote and Augustus reigned. It is my object, however, to test the relative merits of these two systems; and, as I cannot do so better than by bringing examples of each, I will select a few brief illustrations, taking first the general labours of distinguished medical writers; and secondly, instances of a few important practical applications derived from rational and from empirical sources.

It would be possible to select from those names which shine most brilliantly in the annals of medicine, numerous representatives both of the rational and of the empirical systems. On the rational side, indeed, some have been so far led away in their attempts to found a purely rational system of medicine, through the general application of theories deduced from individual and separate facts, that they have brought their department to the confines of folly, and have thus checked, instead of forwarding, the objects they had in view. In this way failed the chemiatic school of Sylvius, and the iatromathematical school of Borelli, Winttingham, and others, who sought to explain everything upon statical and hydraulic laws. But, at the same time, such failures must be set down to the credit of intemperately enthusiastic men, and not to the fault of the rational system, as I have defined it; for we discover that, whenever this system has been pursued by men in whom the possession of the higher mental faculties has been combined with and tempered by sufficient industry for obtaining a due amount of facts on which to reason, the grandest and most useful results have followed as an inevitable consequence.

As an example of this, I cannot direct attention to a clearer instance than that presented in the writings of our own immortal Harvey. Throughout all the writings of this surprising genius, the reasoning and observing faculties hold an equal and foremost rank. In his work on the *Circulation of the Blood*, the rational process is worked out in the plainest manner. His letters to Riolan, taken in an abstract point of view, and separated from the subjects of which they immediately treat, are nothing but an able defence of rational principles, founded on observed facts; while, whenever he speaks of the practice of medicine, and promises the work on *Medical Observations and Pathology* (which, to the great loss of the world, never appeared), he is always indirectly referring to—I had almost said boasting of—the possibility of placing the practice of medicine on the basis of reason.

The names of Haller, the Hoffmanns, William and John Hunter, and many others, are at immediate command, as representatives of the Harveian school.

As a representative of the empirical sect in medicine, no better example can be selected than that of a close follower and countryman of Harvey, the scarcely less distinguished Sydenham. The works of Sydenham are lasting monuments of the worth of empirical observation. Harvey makes it the rule to reason on, criticise, and make deductions from what he observes; Sydenham lets the observation stand for what it is worth, and makes it the exception to deduce or analyse. A brief extract from the preface to the third edition of his *Observationes Medice* will show most forcibly the turn of mind of this great man.

"Moreover, in writing the history of diseases, every philosophical hypothesis which has preoccupied the judgment of the writer must be laid aside; and when this is done, the obvious and natural phenomena of diseases, however minute, must be noted most accurately.... For it can scarcely be said to how many errors these physiological hypotheses have given a handle, while writers, whose minds they have imbued with their false colouring, attribute to diseases such phenomena as never existed except in their own brains, but which ought to be apparent, if the hypotheses, which these writers maintain as granted and established, were confirmed by truth."

I do not mean to assert that Sydenham never attempts to reason on what he observes; for it is scarcely possible to imagine any one to be a mere observer of facts, without any attempt to reason on them. But it is the empirical turn of mind that predominates in the writings of Sydenham, and that constitutes their great value in medical science.

Passing from men to practices, let us glance at the rational and empirical systems of medicine, as they are developed in the application of remedies to the cure of diseases. It is but due to the followers of Podalirius and Machaon, who cured only by the knife and medicaments (*tantummodo ferro et medicamentis*), to say, incidentally, that the rational system of medicine has its true development in their department alone. After a careful study of the treatment of those diseases which fall purely under the hands of the physician, I am bound to assert that I cannot find one example which can be claimed as having been based, in the first instance, on purely rational grounds, and supported afterwards on the same grounds. It is all secondary or pseudo-rationalism in medicine; as I shall by and bye show.

But in surgery there is no lack of treatment based on observation and pure reason. And I do not doubt that the superior popularity of surgery over medicine, in the eyes of the multitude, rests on this fact alone; for, whenever the principles of sound reason are brought into play, they enable their possessor to appeal to the senses, and frequently to correctly predict results—two irresistible arguments.

There can, perhaps, be no better example of a form of treatment founded on a rational basis, than the operation for cataract: where, with skilful hand, the surgeon extracts from its case the opaque natural lens, and supplies its place by an artificial one. It is obvious that every step of this process is rational; and more, that the results of the operation are such as no mere empiricism could master; since to appreciate it, and indeed to invent it, must have required an intimate acquaintance not merely with the anatomy of the visual organ, but with all those theoretical and rational views included in the beautiful science of optics.

The operation for hernia is another example of a surgical operation founded on rational principles of the most obvious kind. When we ascertain that a patient has hernia, we do not merely attempt to relieve the symptoms by the empirical administration of medicines to arrest the vomiting, open the bowels, or relieve the pain; but we at once proceed to remove the cause of these symptoms, by relieving from its incarceration the displaced and strangulated bowel.

The ligature of arteries, in order to arrest hæmorrhage, is another instance of the kind; and the principles on which it is founded are so obvious as to require no explanation.

The treatment of fracture is also founded on reason, and is probably one of the oldest examples of rational medicine. Empiricism can scarcely be imagined to have operated either in this or in the preceding instance. In fracture, the fact that the limb was shortened, and that its motion tended to reproduce the deformity, must have at once suggested to the surgeons of a very early period the necessity of restoring the limb to its natural condition, and retaining it therein by proper apparatus. Hence, on turning to the works of Hippocrates, we find him describing the treatment of fracture with no affectation of novelty.

In the treatment of aneurism by ligature and by com-

passion, the surgeon acts on rational principles. He seeks to obstruct the supply of blood to the aneurismal tumour, and to impart to new vessels the function which is inadequately and dangerously performed by the diseased trunk.

In like manner, the principles of midwifery are, as a general rule, built on reasonable grounds. The rules for conducting labours are sufficiently few, simple, and practicable; and the instruments employed by the obstetrician are in most cases admirably adapted for their purpose, and imply much forethought, and acquaintance with mechanical principles, with which rational medicine has always most kindly blended.

But if the practice of surgery and of midwifery is so much indebted to rationalism, the practice of medicine is not less indebted to the empirical line of observation. Illustrations of empirical knowledge in the practice of medicine are very numerous. As a familiar instance, the employment of quinine in intermittent fever may be adduced. It is an example of empirical—and successful empirical—practice; and one which shows most forcibly how far we are from being yet able to establish a rational system for the administration of medicines. For not all the rational principles which we have possessed, or now possess, would ever be able to make such a discovery as that of the efficacy of quinine in ague; since such a discovery implies much more knowledge both of the body and of those agents which act upon it than we possess; so that the empirical fact is, as far as it goes, just as useful as the rational deduction.

Parallel with the employment of quinine in ague, we may place that of iodine in glandular diseases. It must have been empirical observation that first dictated to those subject to bronchocele the use of burnt sponge as a remedy in this disease. Then iodine was discovered; and was found, also from empirical observation, to be a remedy for bronchocele. By an extension of its use, it has been applied in other glandular swellings; while, by a still further extension, it has been considered a remedy for the constitutional state with which glandular enlargement is connected.

In short, almost all medicines which have real efficacy in medicine claim their parentage from empirical observation; that observation being as a general rule not systematical, but accidental.

Thus vaccination classes rightly as an empirical discovery, and as one which no rational process could, so far as we yet see, have worked out; while, if any example from more modern times be required, the application of certain volatile agents for the removal of pain during surgical operations is an instance which will at once be recognised.

Hitherto, I have endeavoured to throw out in strong relief the two leading systems of medical science, which have existed and now exist. I have tried also to define the limits of each system; and, by a selection of particular illustrations, to demonstrate the relative value of each. I cannot, however, but observe, that the distinctions which have been made are not such as appear at first sight, or as would attract the attention of the majority of observers. For, as we move among men, we find that there is not a more decided *rara avis in terris* than either the pure medical rationalist or the empiric. Indeed, the two systems are so thoroughly and systematically blended in the teaching of our schools, that we are unable to make a distinction between them. What rationalist, for instance, would, for the mere sake of sticking to his colours, forbear to make known any important new empirical fact with which he might become acquainted? And what empiric, even the most fervent, would hold back an useful and reasonable suggestion which might occur to him when in a speculative mood? In short, we find that the rational and empirical forms of thought are, in everything that relates to medicine, united in the most intimate, and often in the most singular bonds.

Thus, on some occasions, an empirical fact is made the basis of a kind of *pseudo-rationalism*.

Quinine cures ague: that is an empirical fact merely; but out of it there arises an inference (and an inference is always a reason), that because ague is intermittent, and

quinine its remedy, other diseases of an intermittent character will give way to the same remedy.

The administration of purgatives to remove obstructions in the bowels, and of emetics to evacuate poisons and offending matters from the stomach, is another instance of *pseudo-rationalism*; since the act is rational, while the knowledge that purgatives or emetics will produce their special effects, is founded solely on empirical observation.

The discovery of the stethoscope arose from an empirical observation, though it has since been turned to many rational uses.

Conversely, a rational pursuit now and then tends to an empirical fact. Thus Galvani, while pursuing his strictly chemical studies, fell accidentally on one of the most curious and empirical (because unexplainable) physiological phenomena with which we are acquainted, and which has had its influence in the practice of medicine.

Thus empiricism and rationalism, however different they may be in the abstract, are united and inseparable. And I am sure that the more we encourage this union, and keep each system in its legitimate bounds, the better it will be for our science, and the better for suffering humanity. If the empirical observation of a Jesuit travelling in the lands of the Incas has furnished a cure for ague; and if by the operation of simple reason and prescience, the most beautiful instrument in nature has become so well understood that it may be taken to pieces and repaired by human skill; shall we not continue to have faith in each system, and recognise both as necessary to the progress of knowledge?

It is true, indeed, that if our science were of less practical importance than it is, if it were even astronomy or geology, we might afford to discard empiricism, and, like philosophers, bide our time for the full development of truth through the agency of reason. But this is not the case; the problems which we have to solve are immediate, and concern the nearest and dearest interests of mankind. In these, we have often laid before us certain marked phenomena of such a nature that, by whatever means the difficulty that surrounds them may be finally overcome, neither empiricism nor rationalism will be able to lay any general claim to the credit which will attach itself to the discovery. The most rational observer on any disease, for instance, writes down empiricism when he describes the symptoms from which his inferences may be drawn; and the most empirical recorder of facts cannot proceed far with his task without treading on rational grounds; for, whenever he says, that "such and such symptoms were observed by me," there is implied in his remarks a knowledge of the fact that he has been speaking of phenomena different from those which occur during health; and hence he also indicates that the process of comparison has been gone through—which is, and ever must be, a rational process.

I notice this mixture of empiricism and rationalism brought out most forcibly and peculiarly in the views that have been so warmly expressed by innumerable authors on the subject of cholera and its treatment. One man gives calomel in this disease; another bleeds; a third administers astringents; a fourth gives stimulants; a fifth applies external warmth to the body; and a sixth uses all these means, on the grounds that the enemy cannot receive too many shots. But every one of these individuals, except perhaps the last, either bases his treatment on some theory, or invents a theory after the application of the medicine. The invention of the theory after the application of the medicine is, however, quite the exception; for, however much any one may be inclined to do nothing else but record facts, but few now have the daring to practise empiricism purely, and to administer medicines without having some preconceived views on the subject, and some expectations as to the results which will follow.

It is curious to observe that, by this train of thought, we are but brought back to the point at which Celsus in his day arrived—that the eclectic or methodic sect are the most reasonable and sound thinkers on medical subjects. For we cannot but observe that rationalism, when most usefully carried out, includes an important element of em-

piricism—observation; and that empiricism, when in its work-day dress, and when it means anything, carries with it a fair store of inference, so that the two principles need in no way be thrown in direct antagonism to each other.

In conclusion: I have endeavoured, in writing these observations, to look the subjects before me fairly in the face, and to state without bias or prejudice what has occurred to my mind. And, as I am anxious that the Fellows of this Society should have the different topics of this paper laid open freely for their discussion, I may perhaps be excused for summing up in the following brief sentences:—

I. That the rational and the empirical forms of thought are inherent in man's nature, and will always manifest themselves in medical science, as in every other department of human knowledge.

II. That the term *empiricism*, in its simple sense, implies a system based on the mere observation of facts without deduction, and on experiments made at hazard without any precise or preconceived object: that *rationalism*, in its strictest sense, implies that mode of inquiry in which truth is obtained by the influence of reason on observation, and where experiments are performed as the means to an end, and as a test of the truth of what has been conceived beforehand.

III. That instances may be found, in which the most distinguished individuals in the records of medicine have been the pure representatives of each of these special systems.

IV. That many important points in practice have emanated from the rational and the empirical modes of thought: the rational applications being most obvious in surgery and midwifery; the empirical in medicine.

V. That empiricism and rationalism, though in direct opposition as principles, are often blended in medical science: an empirical fact being frequently the basis of a pseudo-rational deduction; and *vice versa*.

VI. That from this last statement the inference is clear, that empiricism and rationalism are both necessary to the progress of medicine; and that the more closely they are connected, turned mutually to useful account, and kept within their legitimate bounds, the more rapid and safe will that progress be.

VII. That although the rational mode of inquiry may have called into play higher faculties of the mind than the empirical, it has, by its extravagances, failed as yet in doing more for medical science:—a fact which should always be kept in mind by its enthusiastic and exclusive advocates.

VIII. I cannot lose this opportunity of observing, that whoever would properly understand the precise value of empiricism and rationalism, must submit himself to the task of going through a comprehensive course of study on the history of medicine—a subject which, to our dishonour as scholars, and to our loss as practitioners, does not receive from us that regard which its importance deserves.

11, Alfred Street, Bedford Square, 28th March, 1854.

CLINICAL NOTES ON CHOLERA.

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[Continued from page 222.]

II. HISTOLOGY AND CHEMISTRY OF THE EVACUATIONS.

I. *The Stools.* Whether the cholera seizure is sudden, or preceded by a premonitory diarrhoea of greater or less duration, the first alvine discharges usually present similar characters to the evacuations in simple diarrhoea, both in external appearance and in microscopical and chemical characters. They are more or less fluid, have a brownish-red or yellow colour, and are semifluid and foetid. They gradually, however, become paler in colour, more fluid in consistence, and of lower specific gravity, and lose their foetus; till, as the disease becomes more marked and col-

lapse sets in, the so-called "serous" or "rice water" stools appear. Neither of these terms appears to me to give a good idea of the physical characters of the collapse stools of cholera; but, as it is convenient to use one or other of these words, I shall prefer the latter, simply, however, as a designation in common use. If the "rice water" evacuations be collected in a urineglass and allowed to stand at rest a few minutes, they speedily resolve themselves into a supernatant fluid and flocculent sediment.

The fluid portion somewhat resembles whey in colour and consistence, is turbid and opalescent, has frequently a very faint greenish-yellow tinge, and a mawkish, disagreeable smell, but possesses none of the foetus usually characteristic of faeces, and indicative of putrefaction, incipient or advanced. This absence of faecal odour has been, by some, attributed to the deficiency of bile, the decomposition of which has been regarded as the source of the peculiar smell of human and other faeces; for it has been found that there is little or no foetid odour in abillious stools, e.g. the clay coloured faeces of jaundice. It has been stated by chemists that the silver and lead test papers show the absence, in the fresh collapse stools, of sulphuretted hydrogen and hydrosulphuret of ammonia. Though almost devoid of odour when first evacuated, these stools soon become foetid from decomposition of their albuminous constituents. When filtered, even after the application of heat, the physical characters of the fluid portion are little altered. The specific gravity has ranged in the cases seen by me from 1005 to 1015, the average being 1010; the fluid is, therefore, not much heavier than water, and greatly less dense than the alvine discharges of most diseases with which we are acquainted. It has uniformly exhibited more or less of an alkaline reaction to test paper, and usually gives evidence, on the application of heat, of the presence of *albumen*. It is important, in testing the presence of albumen by means of heat, to bear in mind that the alkalinity of the fluid requires its previous acidification by acetic or some other acid, in order to insure the precipitation of the albumen. Many authors deny the existence of albumen in the "rice water" stools: in certain cases, the proof of its presence is somewhat difficult, from the degree of opalescence or alkalinity of the fluid, etc.; but, that in almost every case it is present to some extent, I think easily admits of demonstration. M. Mialhe states that, instead of albumen or fibrin, the existence of which he has never been able to detect, he has invariably found a substance differing somewhat from both, which he designates "*albuminose*", and which he says is "the final product of the digestion of albuminous articles of food." The chief ground of the differential diagnosis between this substance and ordinary albumen is, that the former is not coagulated by heat and nitric acid. In my own experience, I have seldom or never failed in producing either an increased opalescence and turbidity, or a distinct flocculent precipitate by these reagents; and this result, I believe, agrees with the great mass of evidence on this point. I am therefore compelled, on M. Mialhe's own grounds, to come to an adverse conclusion. Though albumen may be said to be invariably present, its presence is by no means a distinguishing feature of cholera evacuations, i.e. it does not furnish a means of separating the alvine discharges of cholera from those of other diseases. A series of experiments made with the liquid defections of other diseases led me to believe that albumen is very commonly found in the fluid portion of faeces, both in health and disease; for, on filtering the discharges in diarrhoea, etc., and applying heat and nitric acid in the ordinary way, I very frequently indeed found an albuminous reaction. I found it present *inter alia* in the stools of the following cases, which occurred in the Royal Infirmary of Edinburgh.

CASE I. *Chronic Diarrhoea of Phthisis.* Dr. Andrews' ward. The discharge was very foetid, semifluid, of a stone colour, and alkaline. It contained a few prismatic phosphates, potato cells, and other vegetable debris, but no "annular bodies".

CASE II. *Chronic Diarrhoea of Phthisis.* Dr. Keiller's