Medicine & the allied sciences : an address delivered before the Medical Society of King's College, London, on the 13th of October, 1870 / by E. Buchanan Baxter.

MEDICINE & THE ALLIED SCIENCES:

AN ADDRESS

DELIVERED BEFORE THE MEDICAL SOCIETY OF KING'S COLLEGE, LONDON,

On the 13th of October, 1870.

BY

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"Non eloquimur magna, sed vivimus."—MINUC. FELIX.

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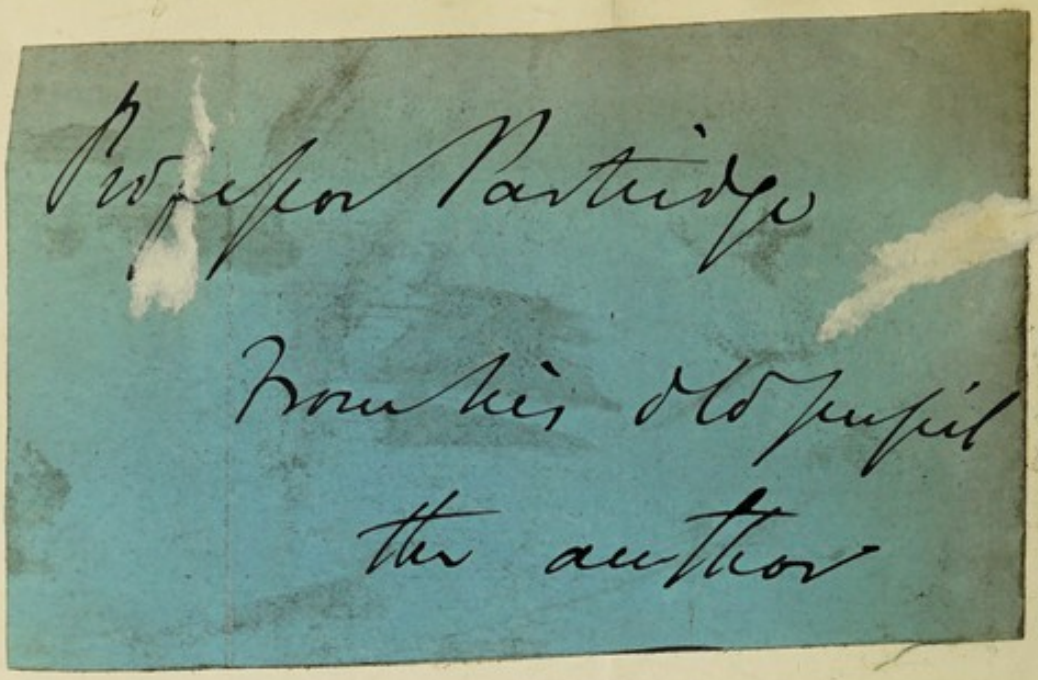

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MEDICINE AND THE ALLIED SCIENCES.

Mr. President and Gentlemen,—The addresses annually delivered before this Society on the occasion of its entering upon a new lease of activity, have been of two kinds. First, those which have dealt merely with its machinery; the number of its members, the work they have done, in short, its temporal prosperity; secondly, those which have been devoted to a discussion of some one of those questions, of greater intellectual moment, on the due answering of which its future progress and utility depend.

The former have necessarily sinned by repetition. No fertility of verbal resource can enable a speaker to amplify the few terse sentences of the prospectus, and the figures of the annual report, in more than a certain number of ways. The latter course is the one I have chosen to pursue.

I propose to inquire what is meant by the words "medicine and the allied sciences", in our prospectus. Any vagueness which may exist on this point ought to be cleared up; and, judging from my own experience, I should say that the words conveyed very different and very contradictory notions to different minds.

The majority of those who consult our prospectus would probably assume, at first sight, that the "allied sciences" were those which had been admitted from time to time into the curriculum of professional study, and which had come to be indispensable preliminaries to the attainment of a licence to practise. This was probably the idea floating in the minds of those who originally drew up the document.

Here is a list of those "sciences" or parts of sciences on which distinct courses of lectures are delivered at this, as at most other schools of medicine, at home and abroad. I have not attempted to classify them: for I hardly think any classification of them possible. They are written down in the order in which they are usually studied.

TABLE I.

Anatomy—Descriptive and Surgical.
Physiology—including Histology.
Chemistry—Theoretical.

Botany and Vegetable Physiology.
Materia Medica and Therapeutics.
Practical Chemistry.

Principles and Practice of Medicine.
Principles and Practice of Surgery.

Morbid Anatomy.
Midwifery.
Forensic Medicine.
Hygiene.
Comparative Anatomy.

It is hardly necessary for me to take up your time by pointing out that botany, for instance, is not a distinct science, but one separated from biology only for the sake of convenience. That "Materia Medica" is a medley of all sorts of facts about all sorts of things, without any more subtle bond of union than the *British Pharmacopœia*. That chemistry is unintelligible without physics, and that physics is conspicuous by its absence from the list. That histology is a part of anatomy, not of physiology,—and so forth. Our curriculum is like the British constitution: it was not made, but it grew up by a series of accidents. Such a mode of origin may, for aught I know, be admirable in the case of a constitution; but it is radically bad in what professes to be a *system* of study. Its inefficiency is best shewn by the fact that nearly all those who succeed at last in gaining some knowledge of the various subjects I have enumerated, succeed by neglecting the prescribed curriculum, or rather by modifying it to suit themselves, in defiance of regulations and examining boards. The existing order does not, therefore, shed much light on the question before us. We must go farther in our search.

The first step towards the utilisation of human activity, whether individual or collective, is the accurate determination and regulation of the objects to be attained. A disorderly activity in matters of the intellect is akin to fuss in the field of practice. And systematic thinkers abhor the one as much as men of action abhor the other.

We have before us a heap of stones. Each individual stone is more or less cut and polished; but they stand in no apparent relation to one another. We are the architects; we bear in mind the one prominent fact, that the therapeu-

tic faculty is to be the keystone of our arch; it has to crown our edifice. In the light of this architectural conception, things will grow more plain.

The servants of every great art have two duties to perform. On the one hand, they have to raise themselves, as practitioners of that art, to the highest pinnacle of perfection attainable in their own day. On the other, they are bound to advance, by various tentative endeavours, the different departments of that art, and so to make their successors perceive a higher practical ideal than they themselves had put before them.

It is but seldom that any one man succeeds in both these tasks; by attempting both, he cuts himself off, as a rule, from success in either. I put this broadly, though I am well aware of exceptions.

How are these functions to be harmonised? They cannot find their balance in the individual; they must find it in organised associations. Collective effort, by forces working in parallel, perhaps remotely convergent lines, is the characteristic of all societies.

What is true of all arts, is true of *medicine in its practical aspect*, which is, to my mind, neither more nor less than the art of healing. To cure disease, to prevent disease, to alleviate pain, to prolong life;[1] these are its alpha and its omega. So far, therefore, it is an art, and not a science; its aim is immediate usefulness, not any addition to the speculative treasures of the race; it is to be judged by its results, taken one by one, not on *à priori* grounds; its progress is irregular; it advances quite as much by what may be called accidents, as by any valid processes of induction. It has winnowed and garnered the collective experience of many centuries,—of centuries pre-scientific as of centuries scientific. It had its dawn in times far beyond the scope of historical inquiry. It borrowed from nomad hunters, who went naked and worshipped bits of wood and stone, from demigods and heroes, from Chaldean astrologers, from the serpent-charmers and dervishes of the East, from the witches and the alchemists of the Middle Age, as to-day it borrows from the chemist and the physiologist. It pillages them all, but is identified with none.

Whole schools have seceded from the true faith; or, rather the true faith has grown dim and hard to be recognised under clouds of error. Mesmerism and electro-biology are examples of its aberrations towards miracle, iatromechanics,

[1] See Sir William Jenner's *Practical Medicine of To-day*, p. 26.

and iatrochemistry, towards physical science; the school of Paris went one way; the school of Montpellier went another way. Amid all this, however, the true light continued burning. The old problem which confronted Hippocrates, and mythic heroes many centuries before Hippocrates, confronts their followers still. Here is a man who suffers; how can he be relieved?

The solution of this problem concerns therapeutics or practical medicine, and perfection in this we have, all of us, to strive after. But medicine has another and perhaps more rapidly progressive aspect,—progressive because it is within the domain of those methods which have been formulated for the use of other sciences,—but which are inapplicable, or nearly inapplicable, to therapeutics. A high degree of perfection in the therapeutic art is vouchsafed to few; and it cannot, or can but very partially, be handed down by those who have acquired it, to their successors. This is one great cause of its unprogressive character. Scientific medicine, or pathology, on the other hand, is a branch of the mother science, biology; any forward step in this may be considered as so much gained for the future. Successive generations start at different points in pathology; in therapeutics they are nearly on a level.[1]

The point on which I wish to insist is this. The *advancement of medicine*, at the present day, depends mainly on scientific investigation,—on investigation conducted according to the received methods of biology; *the perfecting of the individual practitioner*, on clinical study. With the latter, science has little or nothing to do; with the former, its connection is most intimate. I have already said that few, if any, men may hope to succeed equally in both of these departments.

Do not mistake my meaning. I do not advocate spe-

[1] The above statement, perhaps, requires a little development. It is not meant to be asserted that no advance has been made in therapeutics since the earliest days of medicine, but that such progress as there has been, was accidental, and therefore not connected by indissoluble bonds of association with pathology. Such therapeutic measures as were accidentally hit upon, may subsequently have become rationalised, and thus added to the permanent stock of our knowledge; others, again, had a directly scientific origin, and so had their permanence guaranteed from the first. What I want to insist upon is the perishability of the most valuable empirical results, as compared with those which admit of being incorporated into a systematic scheme of any sort. Examples of such forgotten methods, some of which have been revived, while others are lost to us for good, are more numerous in the history of medicine than in that of any other art.

cialism in anything,—least of all in education. Nothing but evil would result from the training of two sets of workers: one, whose duty it should be to subordinate pathological phenomena to a strictly scientific method; the other, to apply the results of previous investigation to practice. The immediate consequence of such a scheme would be—a body of pedants on the one side, a body of quacks on the other. Such divisions arise inevitably; but it is on all grounds better that they should arise for the future, as they have arisen in the past—without any pressure—spontaneously. Technical education,—I use the word education advisedly, as opposed to mere instruction,—should embrace all the aspects of the art for the due exercise of which it professes to train servants; and medical education ought, therefore, to include the art of medicine and the science of pathology.

To return. Pathology is a branch of biology, and the correlative of physiology. A real knowledge of it pre-supposes, therefore, a previous acquaintance with the laws and methods of biology, though not necessarily with the details —the facts from which these laws and methods have been inferred.

How is biology to be defined? A perfect definition, outside the domain of mathematics, is scarcely possible. "To define, is to select from among all the properties of a thing, those which shall be understood to be designated and declared by its name; and the properties must be well known to us before we can be competent to determine which of them are fittest to be chosen for this purpose."[1] And the more complex the phenomena with which a science deals, —the farther and the wider it protrudes its tentacles in search of pabulum,—the more difficult does it become to fix its boundaries by the hard verbal fence of definition.

The word itself came into use about the year 1802; it was employed simultaneously by Treviranus and Lamarck. The former defines it as "the study of the forces and phenomena of life, of the conditions and laws permitting the existence of such an order of things, and of the causes to which it owes its existence". This definition is a little too metaphysical for our present needs, drawing, as it does, a line between the causes on the one hand, and the conditions and laws on the other. It is perhaps better to define a science by defining its object. If life is organisation in action, biology aims at a knowledge of the structure of

[1] Mill, *Logic*, vol. i, p. 1.

living things, and of the laws which regulate their activity. The word structure is here used in its most extensive signification—a signification which is special to the matter in hand. It includes chemical as well as mechanical composition, potential as well as actual organisation. The reason for this large, though not vague, employment of the term, resides in the fact that phenomena undoubtedly vital, are exhibited by matter which cannot be shewn to possess any organisation, so far as our present methods of investigation enable us to see. Organisation taken strictly, implies differentiation. And in the simplest forms of living matter,—in the Bathybius,—in the Amœba,—or, to go lower still, in the monads and bacteria among whom the secret of the origin of life still lies hid, no such differentiation can be made out.

It follows immediately from the above definition that the phenomena with which biology is concerned, are of two kinds, or rather admit of being considered in two ways. The first is the inquiry into structure,—the structure of organisms as they happen to be at any given moment; the second, into function,—the operation of any organism as a whole, or of its organs taken separately. The first is the statical, the second the dynamical aspect of the science. The first embraces morphology (the study of form) and classification, which is now almost universally morphological, or founded on resemblances and differences of form. The second comprises physiology or the action of the organism upon its environment, and the reaction, whether friendly or hostile, of the environment upon the organism; the latter branch of knowledge having been much studied, but not as yet possessing a familiar name.

By referring to this table (see table II) you will see how the specialities which have grown up one by one, according as expediency or accident dictated, without reference to any leading conception whatsoever, may be grouped under the great divisions I have enumerated. Those of them which form a part of the existing Medical Curriculum are printed in different type from the rest. They form no inconsiderable proportion of the whole.

It is clear, that many phenomena are continually taking place in living beings, whether animal or vegetal, which are directly reducible to the laws of chemistry and physics,—the laws which regulate the existence of inanimate matter.

The changes taking place in the air during respiration, the forces concerned in the propulsion of the blood through

the organs and tissues of the higher animals, the principles on which the contraction of muscles gives rise to the various movements of the body; such are almost uncomplicated examples of phenomena purely chemical or purely physical which take place in living beings. Why is it, then, that we require a new science—a science concerning itself with living things as such? Why cannot the phenomena be grouped under the laws which regulate the molecular affinities of unorganised matter, or their coarser, physical properties?

TABLE II.

Biology.

(a) Statical.		*(b) Dynamical.*	
Morphology.	*Classification.*	*Physiology.*	*Mesology.*
Vegetal Anatomy (Organography).	Zoological.	(Action of organism on its environment.)	(Reaction of environment on organism.)
Comparative Anatomy.	Botanical.	Vegetal.	Hygiene.
Descriptive Anatomy, including Histology.		Animal.	Climatology, etc.
Palæontology, etc., etc.		sc. Comparative.	
Morbid Anatomy.		Human.	
		Pathology or Principles of Medicine.	

This question is shelved by the "matter and force" school, now predominant in science. They cut the Gordian knot by sweeping away biology as an independent science. "All the phenomena of living things," say they, "are rapidly becoming more or less complex problems in molecular physics." The confidence with which this phrase is put forward, almost surprises one into accepting it; on closer inspection, it turns out to be an assertion transcending the bounds of legitimate analogy, in so far as it is intelligible, but having a residuum which is shrouded in the murky cloud which epigrammatic utterances—like the cuttle fish—leave behind them in self-defence.

If I am asked what constitutes a living being—what is its *differentia?* I answer boldly, the property of absorbing matter from its environment, of assimilating certain por-

tions of that matter and rejecting the rest, and of converting the retained material into matter like itself,—into its own tissues. That is one thing. The other is the property which is common to all living organisms (apart from certain pathological exceptions), of reproducing organisms like themselves. These two properties may be predicated of all living matter, as such; they can be predicated of none other. And the laws regulating these two phenomena, or sets of phenomena, can be known only by direct observation; any attempt to deduce them from those of chemistry or physics being futile.

I have implied, what, perhaps, is already evident enough, that I am a panspermatist: a believer that every living particle must spring from a pre-existing living particle, and cannot be formed *de novo*. But it is not necessary to hold this doctrine in order to recognise the essential distinction between biology and the less complex sciences. Whether we believe in spontaneous generation or no, we must admit that no simplification of the laws of development, for example, can possibly bring them under those of chemical affinity.[1]

Let me illustrate my meaning.

A particle of jelly-like matter, consisting of C, H, O, and N, when placed under certain conditions, becomes transformed, step by step, according to known laws, after a known interval of time, into a tadpole. A similar particle—so far as our analysis can go—under analogous conditions, becomes a snail. What known law of physics or of chemistry can, I will not say explain, but even illustrate by a remote analogy, this curious and unique phenomenon?

Such phenomena as these are in no way affected by the belief that the original particle of jelly formed part of the tissues of a frog or a snail, or that it resulted from the spontaneous union of certain atoms of its constituent elements under the influence of molecular motion,—force of any kind,—heat, light, or electricity. And so it is that the independence of biology as a science is guaranteed, whether the panspermatists or the heterogenists ultimately gain the day.

[1] Since this address was written, Professor Huxley, in his Address as President of the British Association for the Advancement of Science, has applied the names Biogenesis and Abiogenesis to the conflicting theories concerning the origin of living structure; these terms are so necessary and so simple that they must henceforward become the common property of those who take an interest in such inquiries.

A knowledge of biology, then, is not to be obtained save by an immediate study of living organisms. But since, as we have seen, many of the processes which take place in them are chemical or mechanical in their nature, the study of biology must pre-suppose a certain degree of knowledge of those sciences which stand lower in the scale,—lower, that is, in regard of the number and complexity of the phenomena with which they deal;—higher, as regards the extent of surface covered by their generalisations. The study, therefore, of pathology involves a preliminary study of chemistry and physics; but of chemistry and physics only in their more abstract and general features. A biologist need not have performed an analysis or solved a problem by Ohm's law.

Here the existing notions are confused in the extreme. Chemistry, for instance, as it is now taught to the student of biology, is an indiscriminate medley of general principles which it is essential that he should know; and of practical details, with the vast majority of which he has no concern. Certain processes employed in the detection of poisons are required by the toxicologist; certain others by the pharmaceutist; a few more by the physiologist and the pathologist. But all of these, put together, make up but a small fraction of the numerous details introduced into the most approved manuals of scientific chemistry. The manufacture of a tallow candle is doubtless an important branch of human industry; but, unless it illustrates some general law, it is so much useless lumber in the brain of a biologist.

Physics, dealing with the coarser properties of matter,—less complex than chemistry,—essential to the due understanding of the latter science, but needing no light for itself save from mathematics, and that higher branch of applied mathematics which deals with the movements of the heavenly bodies,—is treated differently by different educating bodies. At Cambridge it grows into an unnatural prominence: the University of London demands it: the medical schools in connexion with the University repudiate it unanimously. It fortunately happens, as I said before, that chemistry is unintelligible without some previous acquaintance with physics. The teacher of chemistry, therefore, is obliged, whether he like it or no, to begin his course with a separate one on this subject. Many manuals of chemistry still retain a series of introductory chapters on heat, light, electricity, and so on. In the more modern text books this anomaly is gradually disappearing. It is as though a Professor of Arabic

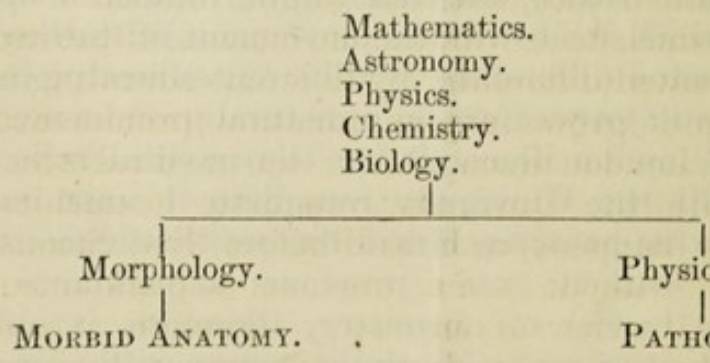
were obliged to begin his course by teaching his class to spell their mother tongue.

But below all these, older and more perfect than any of them, essential to the due mastery of all, stands mathematics. For her what provision is made? None. The schoolboy acquires a certain routine habit of manipulating numerals,—an art which is sufficient for the duties of the counter,—but which has no nearer relation to the science of number and magnitude, than a knowledge of how to slaughter an ox bears to that of anatomy. Of all the gaps left in the medical intellect this perhaps is most to be deplored; for it is one which is rarely, if ever, filled up in after life.

After what may seem, at first sight, to have been a long digression, but what really is bound by the links of just and logical transition to the question which I first set myself to solve, I return to that question.

I have pointed out, clearly enough, I trust, that in my opinion medicine has two aspects,—the scientific or theoretical, which is coextensive with pathology in its widest sense,—and the practical, the therapeutic art. I have shewn that these two divisions, though often, nay, almost always separated in the minds of individual men, according as their character or the circumstances in which they may happen to be placed, lead them to prefer the analysis of science or the synthesis of art, are and ought to be considered together when men join their efforts in societies such as the present. I have endeavoured, also, to give a clear notion of what I, for one, mean, when I speak of "Medicine and the allied sciences." The table to which I now direct your attention (Table III) exhibits those sciences in their natural

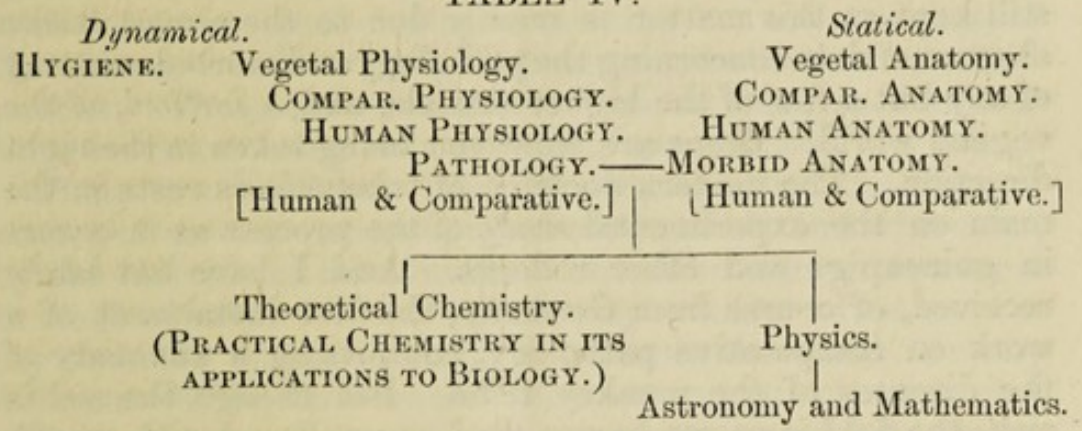
TABLE III.



order of complexity;—mathematics, the simplest and most general, leading up to biology, the most complex and special, under which the scientific part of medicine, pathology, with its statical correlative, morbid anatomy, is situate. I now

ask you to turn to this other table, in which I have arrayed these different sciences and branches of science in the order of their relative importance as regards the medicine of to-day.

TABLE IV.



In the centre are the two great departments of scientific medicine. In a secondary place we have human anatomy and physiology, comparative anatomy and physiology, hygiene, and chemistry in its applications to biology. All these are printed in a type differing from the rest. For it is here that I would draw the line, at least for our society. All other sciences, whatever their intrinsic moment, and their great though remote influence upon the matter in hand, must, for the sake of convenience, and having regard to the limitations of human effort, and the time vouchsafed to us, be put aside.

I ought, perhaps, to advert to what may have appeared to some of you new and strange. I mean the introduction of the words "Human *and comparative*" after each of the central groups. The innovation is not so great as it seems. Though the matter is one respecting which most of our systematic treatises maintain a discreet silence, yet accurate thinkers have for many centuries recognised that the study of the functional and structural anomalies of other living organisms besides man,—whether these be animal or vegetal, —formed an integral part of pathology as a science. Even the oldest writers on medicine refer to observations on lower forms of life. It is natural, that, when the human body, as such, was held to be something intrinsically different from, and superior to, the body of an ape, men should have felt an almost instinctive repugnance to bringing them together, even for the sake of scientific completeness. To-day, however, no such prejudice exists; or it is, at all events, much modified. Without for a moment doubting that the elaborate psychical organisation of the human subject, under the influence of hostile conditions, may and does react upon the

functions and structure of other organs and tissues, no one would venture to assume that any difference existed between the inflamed lung, or the contracted kidney, of an Oran Outan, and that of a Newton or a Dante. What silence is still kept on this matter is mainly due to the almost entire absence of data concerning the pathology and morbid anatomy of any but a few of the higher animals, and, *à fortiori*, of the vegetal world. Steps are, however, being taken in the right direction. The modern doctrine of tuberculosis rests in the main on the experimental study of the process as it occurs in guineapigs and other rodents. And I have but lately received, of course from Germany, the first instalment of a work on comparative pathology, comprising a summary of the diseases of the monkey tribe. But though the soil is rich, the field is as yet barren, and encumbered with virgin forests of ignorance and prejudice.

So much for the "collateral sciences." I turn now to medicine as an art,—to therapeutics. A scientific study of pathology is essential to the practice of healing; it is essential to its advancement; but it does not include it.

Pathology deals with disease; therapeutics with the patient. It is strange to hear men falling again and again into the old blunder,—talking of a "science" of therapeutics. Such a science does not exist; and never will exist, unless some hitherto unforeseen improvement take place in the faculties of man. A science implies generalisations of progressive simplicity,—laws,—the power of certain forecast. Of these characters the healing art has not got one. "Ask me *how* I do it, not *why* I do it," was Trousseau's dictum. This is the opposite of what any teacher of a *science* would say.

Again, the art of therapeutics as at present studied, embraces little beyond a knowledge of the properties of certain drugs. This would be legitimate, so far as it goes, if all drugs were specific. But all the specifics we possess may be enumerated on the fingers of one hand. Any old woman, with a little practice, would be able to use specifics as well as a physician. But a physician has to do far more than this. Boerhaave's great aphorism amounts nearly to a repudiation of specifics: "I have never known a single remedy," he says, "which did not owe all its virtue to its timely use." ("Nullum pro certo se cognovisse remedium, nisi solo tempestivo usu tale fieret.")

Drugs have constant properties; their action on the healthy organism, apart from idiosyncracies of constitution, is fixed and determinate. Strychnia, in a certain dose, will always

cause tetanic spasms ; belladonna will always dilate the pupil. The study of these properties pertains however to physiology, and is concerned only in a secondary way with therapeutics. The *therapeutic* efficacy of any given drug varies not only with the disease, pathologically speaking, but with the stage of the disease,—with its complications,—and with the individual patient. These variables are far too complex to admit of their resultant being reduced to any general law.

There is a particular form of neuralgia, which, when it occurs in certain patients, is cured, certainly and with ease, by the chloride of ammonium. The same form of neuralgia in another subject is only affected by arsenic. It is easy to say that the disease, though apparently the same, is really different in the two cases. But we cannot ascertain any difference, beyond the difference in reaction to certain drugs. And pathology will never penetrate farther into the *vera differentia* than a simple statement of this fact.

But therapeutics is much more than even a practical knowledge of how and when to employ certain drugs. Every measure which gives relief or restoration to a sick person, or saves one still healthy from being attacked, comes under this head. The illogical absurdity of separating surgical and obstetrical appliances from those which are dignified as medical, needs no comment. A splint for a broken leg, a pessary for a retroflexed uterus, are neither more nor less therapeutic measures than a dose of quinine for an attack of ague. In fact, the artificial division of this subject into medicine, surgery, and obstetrics, is not defensible on any grounds save those of a provisional expediency. No man can draw a certain line between them, as it is. There was a time when the division did not exist ; and there may come a time when it will exist no longer.

With regard to the majority of us, it is perhaps as well that circumstances combine with reason to make such specialisation impossible. The general practitioner remains, and will always remain, the type of the *therapeutes*,—the physician in the true sense of the word. To him the art is everything ; the science, *per se*, very little. It is not his aim to extend the boundaries and to solve the problems of pathology : he works for the present, not for the future; to him the patient is all in all ; he asks *how* he may do a thing, not *why* he is to do it. And in the field of practice the specialist can do no more : his degree of merit is fixed by the same standard. The only apology for his existence lies in the greater opportunity which comparative leisure affords him for the prose-

cution of the theoretical branches of medicine; for pathological and necroscopic inquiry, and the cultivation of those collateral sciences whose progress reacts so immediately on that of ours.

It may be urged by some, that the intellectual habits engendered by the cultivation of medicine in its scientific aspect, are antagonistic to those which are required for its practical applications. To a very small extent this may be true; but only to a very small extent. It may seem at first sight otherwise to those who look upon the object of science as the acquisition of absolute truth, and who contrast her splendid and far-reaching generalisations with the intellectually meagre and empirical results of clinical inquiry. But a deeper scrutiny serves to shew that different as may be the methods, the results are of nearly equal absolute worth. "Science," as Professor Huxley has said in his metallic way, "is the domain of orderly mystery." And practical medicine, it may be added, is the domain of mystery which is *not* orderly. Of the real nature of things we are ignorant, and no seeking on our part is ever likely to penetrate this awful veil. We can but watch phenomena within phenomena, and so arrive at a few generalisations, which we call laws, and which help us to see into the immediate future.

Up to this point, we have been considering our anarchical "system" in its relations to our society, as a means of acquiring a certain knowledge, certain special powers: and we have seen how far short it falls even of this relatively humble end. But to us it is much more than this. To nearly all of us it is an educational instrument in the widest sense,—our only chance of culture. To nearly all of us, medicine is not only an occupation, but a life. And in the recognition of this,—that our occupation and our life are one, lies at once the acknowledgment of our shortcomings, and a ground of hope for farther action. Stronger motives than those of mere ambition or curiosity stimulate us to exertions, which, but for them, would seem too hard. The mastery over the past is of no avail, save inasmuch as it gives us a key to the future. We should be like those early voyagers, who, starting from their well-known home in some Northern island, were drawn ever onward by the vision of some mythic Eldorado or Fountain of perpetual Youth: this indeed they never reached; but in their passage through warmer seas, into the atmosphere of the unknown, they were not left without reward; for every morning brought with it new horizons, every night, new stars.