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Contributors

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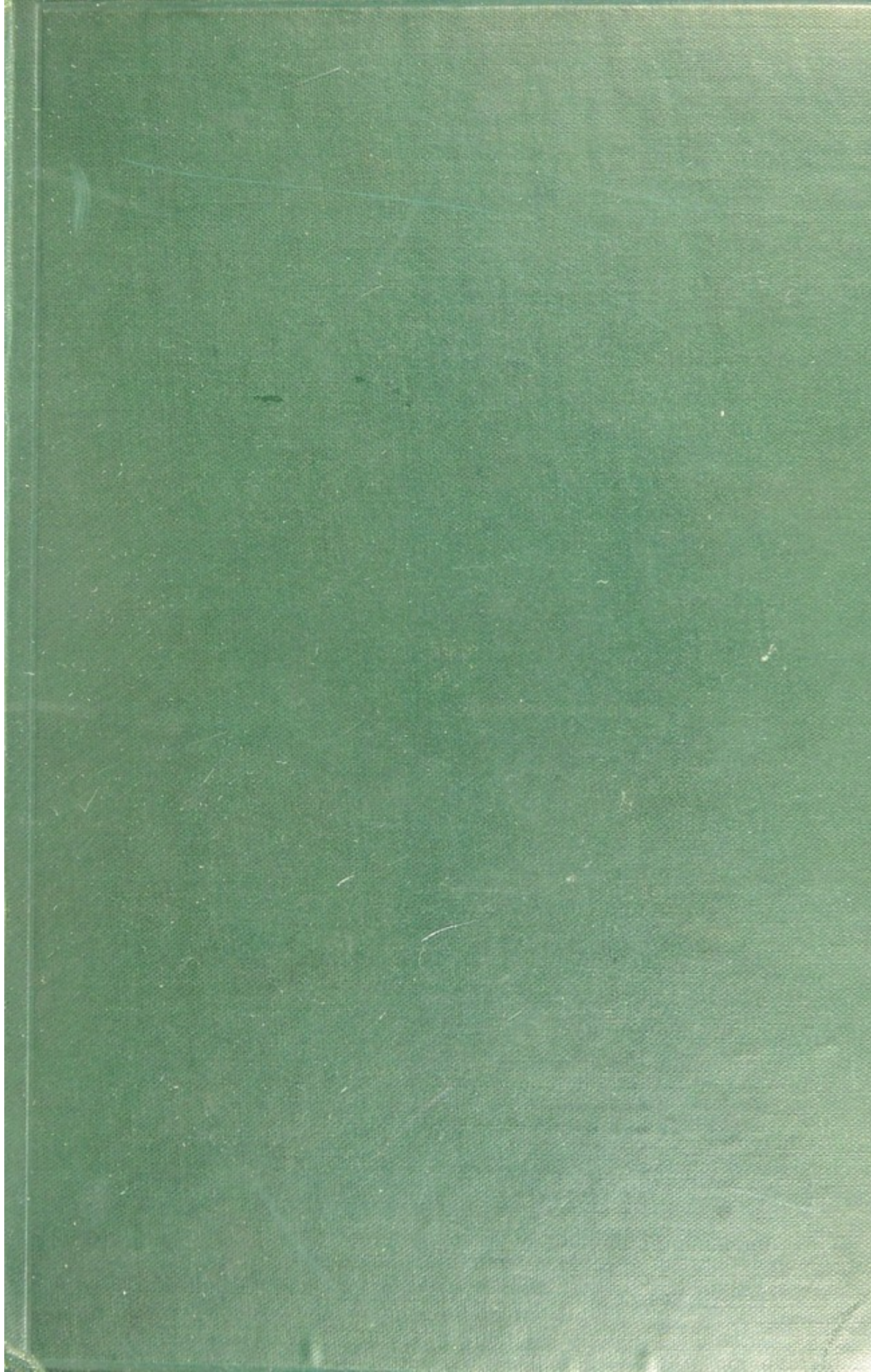
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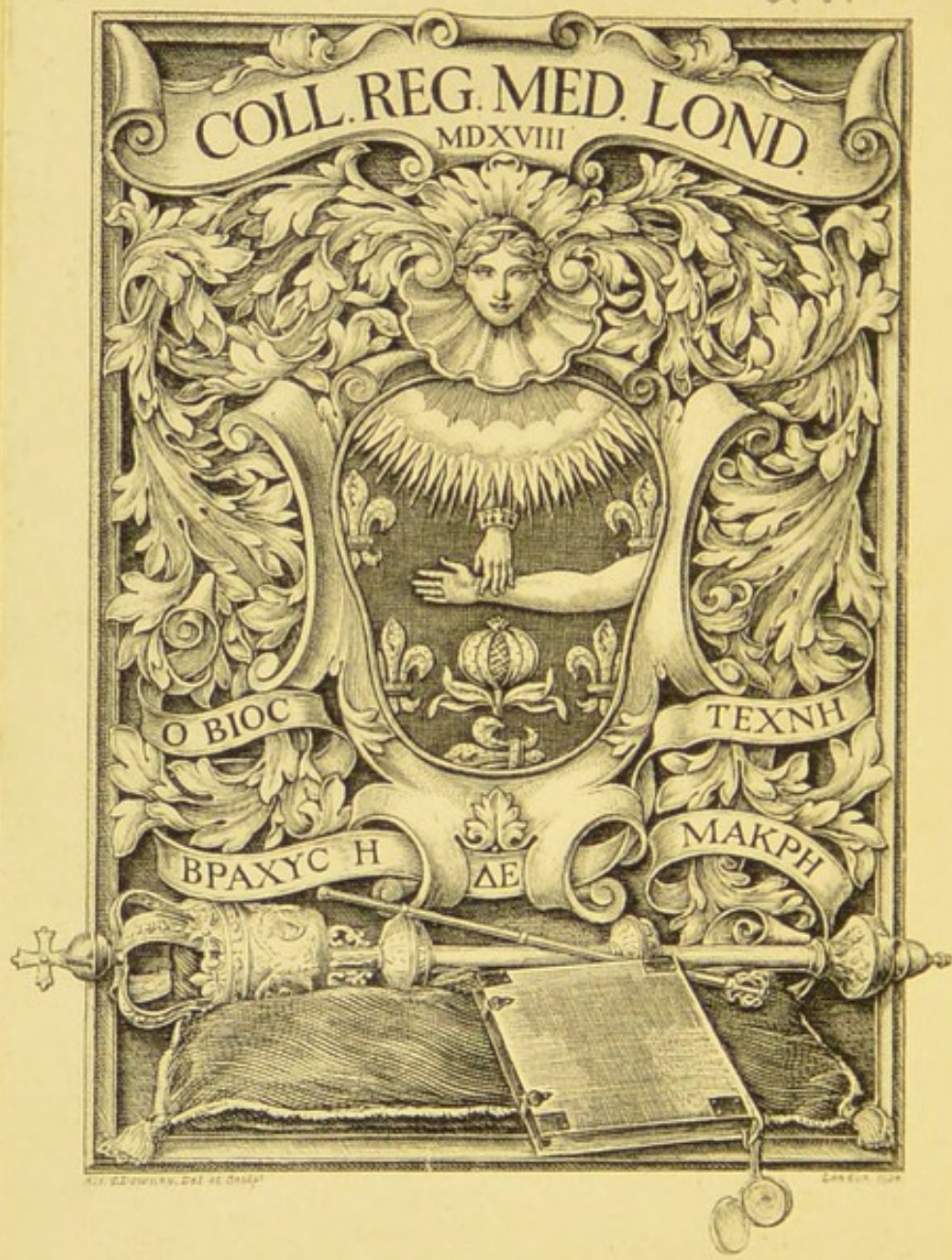
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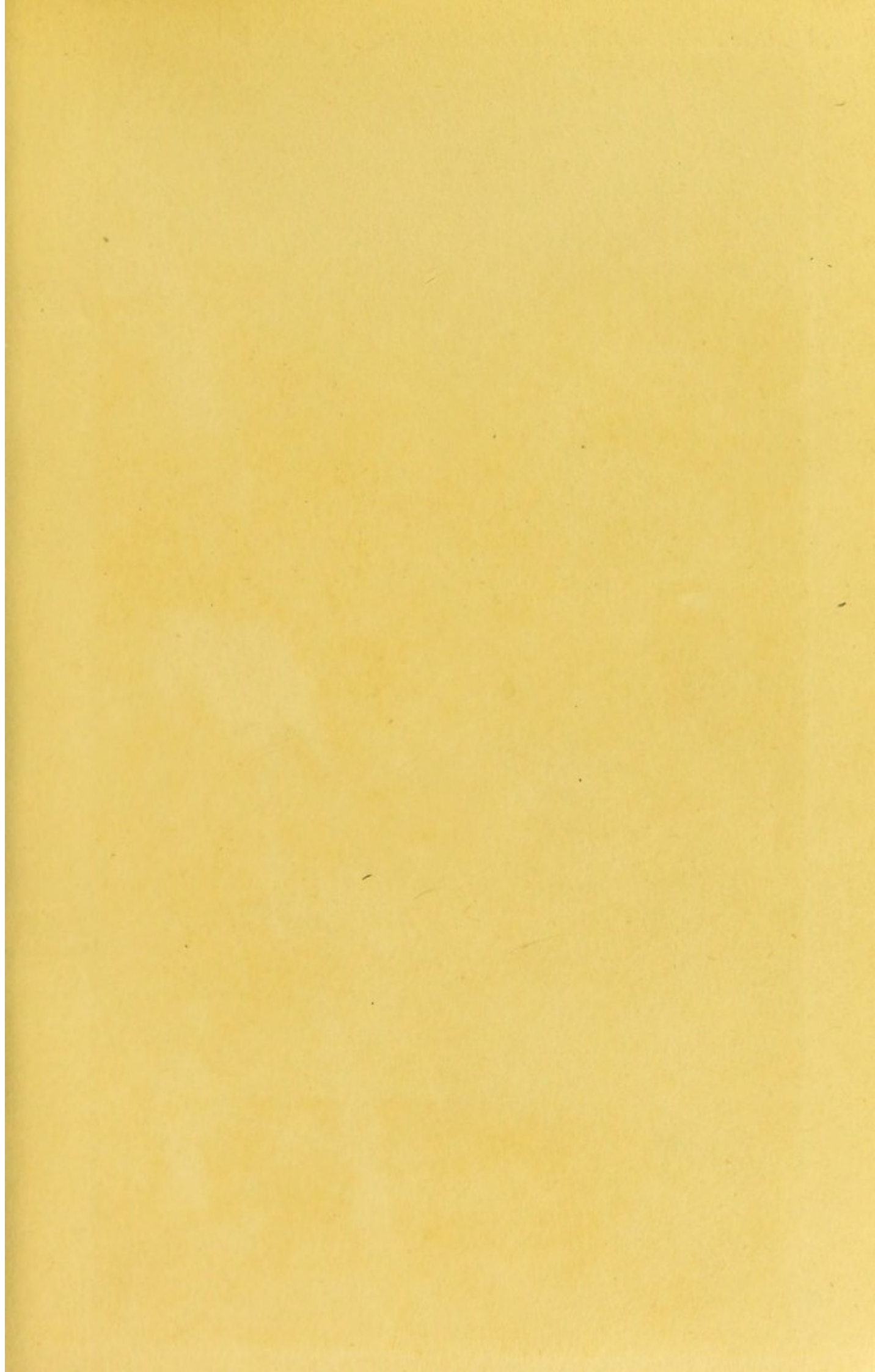


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THE RELATION OF
MEDICINE TO
PHILOSOPHY

THE RELATION OF MEDICINE
TO PHILOSOPHY

THE HISTORY OF THE
CITY OF BOSTON

THE RELATION OF MEDICINE TO PHILOSOPHY

BY

R. O. MOON, M.A., M.D. OXON., F.R.C.P.

PHYSICIAN TO THE NATIONAL HOSPITAL FOR DISEASES OF THE HEART
ASSISTANT PHYSICIAN TO THE ROYAL WATERLOO HOSPITAL



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THE RELATION OF
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PHILOSOPHY

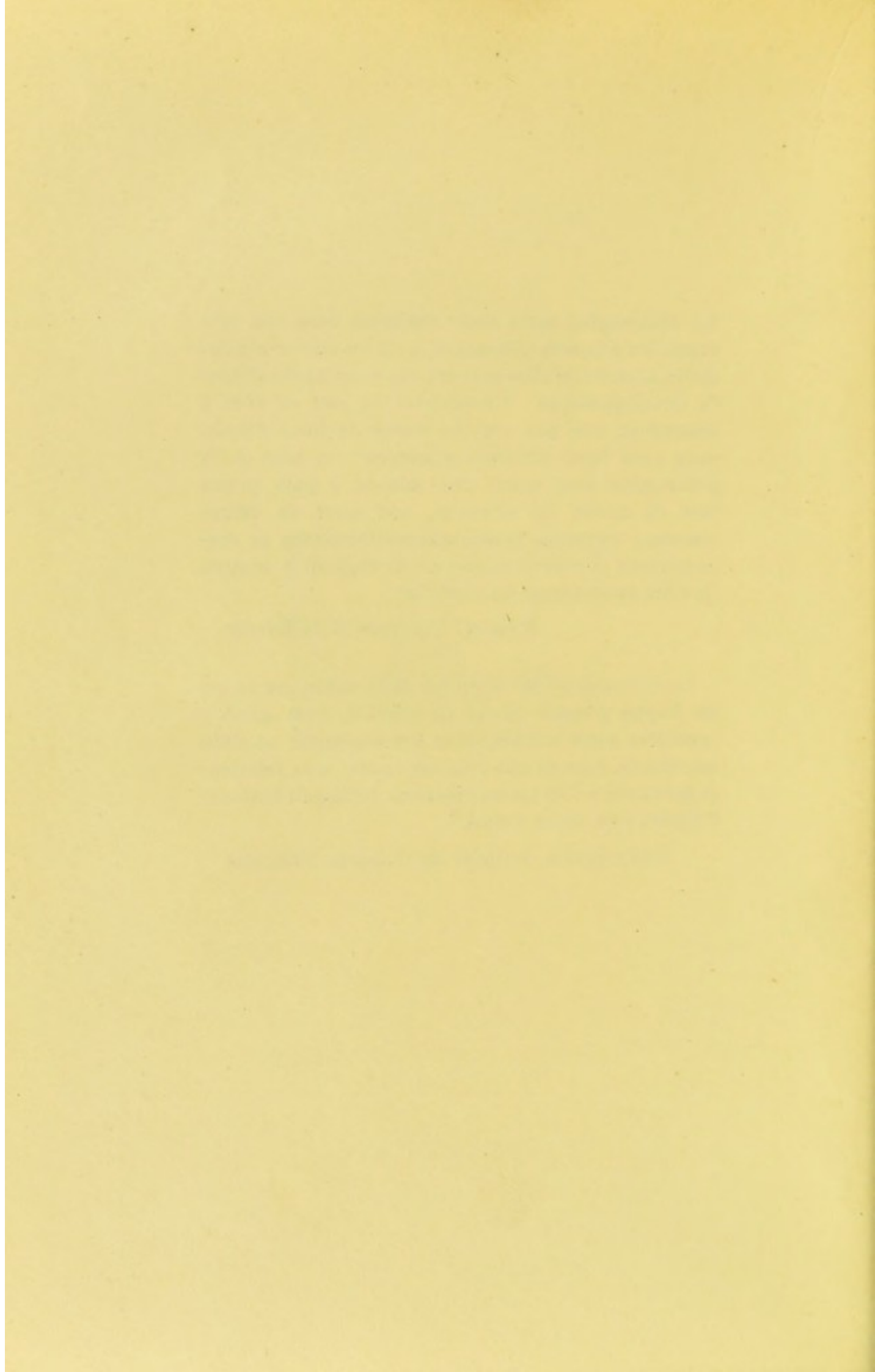
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LA Philosophie après avoir renfermé dans son sein toutes les sciences naissantes, a dû les voir se séparer d'elle, aussitôt qu'elles sont arrivés à un degré suffisant de développement. Viendra-t-il un jour où elles y rentreront, non pas avec la masse de leurs détails, mais avec leurs résultats généraux ; un jour où la philosophie sera moins une science à part qu'une face de toutes les sciences, une sorte de centre lumineux où toutes connaissances humaines se rencontreront par leur sommet en divergeant à mesure qu'elles descendront aux détails ?

RENAN, *L'Avenir de la Science.*

Le vice radical des histoires de la médecine et qui les frappe presque toutes de stérilité, c'est qu'on y considère notre science, dans son ensemble ou dans ses détails, comme une création isolée, sans relations ni parenté avec les autres créations de l'esprit humain : "Proles sine matre creata."

DAREMBERG, *Histoire des Sciences Médicales.*



PREFACE

THIS little book, of which the first three chapters have already appeared in the *British Medical Journal*, and which I am allowed here to reproduce, by the kind permission of the Editor, does not profess in any sense to be a History of Medicine. With that we are already furnished, on a large scale in the shape of Haeser's encyclopædic work, and on a smaller scale in Withington's most illuminating *History of Medicine from the Earliest Times*. To both of these works I am very largely indebted, as also to Kurt Sprengel's *History of Medicine*, the references to which are taken from the French translation by Jourdan (1815).

Its object is rather to show, by taking various important epochs in the history of the world, how intimately medicine has been bound up with the current thought and philosophy of the day; how medicine no more than art can work away by itself, uninfluenced by the intellectual *milieu* in which it finds itself. We shall thus see why some epochs have been peculiarly favourable to the progress of medicine, others as markedly the reverse. Speaking generally, medicine has advanced in periods of great intellectual activity, and remained in a state of stagna-

tion during times of intellectual torpor ; though this rule must not be taken too absolutely, as there have been times of great intellectual awakening which have given an unbridled licence to the imagination, and this has almost invariably led medicine off on a false track. It seems to me that this way of looking at the history of medicine may not be unhelpful in the practice of our profession, enabling us perhaps to come to the study and observation of disease with a broader outlook. The rise and fall of so many systems and methods of treatment, while inculcating a prudent scepticism, need not make us despair. The great advantage which truth possesses over error is that it may be discovered again. The study of the history of medicine has this advantage over that of art, that it is progressive, for "Il n'y a pas précisément de progrès pour l'art ; il y a variation dans l'idéal. Presque toutes les littératures ont à leur origine le modèle de leur perfection. La science, au contraire, avance par des procédés tout opposés."¹ Thus, though we are rightly and reasonably proud of the achievements of medicine in the nineteenth century, which it has shared with science generally, we feel that we may make one further demand of it : What is the result of all this progress ? is it really the amelioration of the human lot, or is it only the setting of a larger number of ingenious puzzles—knowledge for the sake of knowledge, art for art's sake—is that the conclusion of the whole matter ? Happily, no. Knowledge

¹ Renan, *L'Avenir de la Science*.

is for the sake of life. The end of life is living—not indeed τὸ ζῆν, but τὸ εἶ ζῆν.

That the progress of medical science has enormously reduced the death-rate no one can possibly deny. The cry occasionally heard, that there is a vast increase in diseases which were never heard of before, is purely absurd; this increase of disease is merely increase in the differentiation of disease. Because at one time the word *fever* served to cover almost every affection in which the pulse and respiration were quickened and the skin hot, the sum total of disease has not been increased by giving different names to the various fevers. To take a more technical instance, the disease of the nervous system called "Disseminated Sclerosis" will almost undoubtedly be divided up with increasing knowledge into several diseases of the spinal cord, but the sum total of diseases will not be larger. There is, however, just this much truth in the outcry, that as man's life has become more complex with advancing civilisation, so the possibility of minor oscillations from complete adjustment to the environment becomes increasingly great; it is more difficult to be perfectly healthy, because a higher standard of health is required by modern life. This is particularly seen in the case of insanity; for civilisation, by increasing the number of social and moral rules to be observed, increases the possibility of their infraction.

Modern medicine has been so much engaged in tracking out the minutiae of disease, that it has failed

to give as much attention to health in general as was the case in bygone days. Former epochs of medicine, with their vast generalisations, co-extensive with the whole of life, had not got enough positive knowledge about the human organism to justify such generalisations. Just as the French Revolutionists thought that society could be reconstructed *de novo* from first principles in accordance with reason, without having any knowledge of the laws of the historic growth of society, so the system makers of medicine endeavoured to lay down laws for human life without having any sufficient knowledge of the mechanism of the human organism.

Plain living and high thinking must ever be the rule of the wise, but the attempt to return to the simplicity of the savage, or even to the elementary life of a more primitive people, is neither possible nor desirable; the plain living of many nations, who are called blessed because they have no history, is associated with very jejune thinking, or with no thought at all. No members of the great nations of the West can wish to return to such a condition of things: the increasing complexity of thought and feeling should rather be welcomed as differentiating man further and further from the brutes that perish; yet, on the other hand, the increasing complexity of his physical or animal life is just what should at all hazards be avoided. Here he may wisely imitate the savage, for thus he will have the strongest basis on which his intellectual and moral life may develop; for

surely the object of life is to combine the simplicity of the savage with the subtlety of the sage. Medicine, therefore, in order to take its proper place in the social organism, must embrace the whole of life and be prepared to suggest the type of intellectual as well as other activity suitable to any given patient, just as it would prescribe for a bodily ailment. To some extent this method was practised by the Jesuits; but with them the object was to produce a special kind of character with a view to a highly definite end, whereas in our case it would simply be the endeavour to enable each individual to make the best of his life. To preserve life must ever be the honour and duty of the physician, but to make life livable should be his aim also. If life has lost its savour, how is it to be lived? In a too exclusive pursuit of health, may we not lose the object of life, "et propter vitam vivendi perdere causas"? The function of the poet, Goethe tells us somewhere, is so to represent things that we may find life tolerable; and the physician, in providing for the health of the body as a sort of indispensable prerequisite, must ever have before his mind that wider outlook which shall enable him to cope with the *tædium vitæ*, *Weltschmerz*, *maladie de l'infini*, or by whatever name we like to call those ills which seem inseparable from the travail of an advanced civilisation struggling to a new birth.

The first part of the report is devoted to a general
 description of the country and its resources. It
 is followed by a detailed account of the
 various tribes and their customs. The
 author then discusses the political
 organization of the country and the
 relations between the different
 tribes. He also mentions the
 various wars and conflicts which
 have taken place in the country.
 The second part of the report
 is devoted to a description of the
 natural resources of the country.
 It mentions the various minerals
 and metals which are found in
 the country. It also mentions the
 various plants and animals which
 are found in the country. The
 author then discusses the
 various industries which are
 carried on in the country. He
 mentions the various trades and
 professions which are followed
 by the people of the country.
 The third part of the report
 is devoted to a description of the
 climate and the seasons of the
 country. It mentions the various
 winds and storms which blow
 in the country. It also mentions
 the various diseases which are
 common in the country. The
 author then discusses the
 various methods which are used
 for the cultivation of the soil.
 He mentions the various crops
 which are raised in the country.
 The fourth part of the report
 is devoted to a description of the
 population of the country. It
 mentions the various tribes and
 their numbers. It also mentions
 the various cities and towns
 which are situated in the country.
 The author then discusses the
 various causes which have led
 to the increase of the population
 of the country. He mentions the
 various improvements which
 have been made in the country.
 The fifth part of the report
 is devoted to a description of the
 government of the country. It
 mentions the various laws and
 regulations which are in force
 in the country. It also mentions
 the various officers and
 functionaries who are employed
 in the government of the country.
 The author then discusses the
 various reforms which have
 been introduced in the country.
 The sixth part of the report
 is devoted to a description of the
 commerce of the country. It
 mentions the various articles
 which are exported and imported
 in the country. It also mentions
 the various markets and fairs
 which are held in the country.
 The author then discusses the
 various causes which have led
 to the increase of the commerce
 of the country. He mentions the
 various improvements which
 have been made in the country.
 The seventh part of the report
 is devoted to a description of the
 education of the country. It
 mentions the various schools and
 colleges which are situated in
 the country. It also mentions
 the various methods which are
 used for the instruction of the
 people of the country. The
 author then discusses the
 various causes which have led
 to the increase of the education
 of the country. He mentions the
 various improvements which
 have been made in the country.
 The eighth part of the report
 is devoted to a description of the
 religion of the country. It
 mentions the various religions
 which are followed by the people
 of the country. It also mentions
 the various temples and churches
 which are situated in the country.
 The author then discusses the
 various causes which have led
 to the increase of the religion
 of the country. He mentions the
 various improvements which
 have been made in the country.
 The ninth part of the report
 is devoted to a description of the
 arts and sciences of the country.
 It mentions the various arts and
 sciences which are followed by
 the people of the country. It
 also mentions the various
 institutions which are devoted
 to the study of the arts and
 sciences in the country. The
 author then discusses the
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THE RELATION OF MEDICINE TO PHILOSOPHY

CHAPTER I

THE RELATION OF EARLY GREEK PHILOSOPHY TO EARLY GREEK MEDICINE

THE tendency of modern civilisation towards a minute and elaborate specialisation is apt to make us forget that there was a time when such important branches of human activity as religion, philosophy, and medicine were hardly separated from one another. In the earliest days of ancient Greece the mind ranged with equal energy over every field of human knowledge ; priests, philosophers, and doctors had not yet become differentiated into their several castes. To map out, divide, and to some extent isolate the several provinces of the human mind was therefore an important problem for the early Greek thinkers. In the world of art a somewhat similar state of things existed, for we find music, dancing, poetry, painting, sculpture, and architecture inextricably blended together, so as to form one harmonious whole. All these several arts, in accordance with the Spencerian doctrine of a prog-

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ress from homogeneity to heterogeneity, have gradually become separated, and have developed along their own individual lines to some extent independently. Hence it has resulted that, in considering a picture or a statue, it scarcely occurs to us to regard the propriety of the architecture of the room or gallery in which it is exhibited, any more than, in listening to a great singer, it has been customary to give particular heed to the words of the song. In this region of art, however, Wagner, some fifty years ago, undoubtedly effected a vast revolution, and attempted, with what amount of success the annual pilgrimages to Baireuth bear witness, to reintegrate the several arts and to bring them all harmoniously to the service of his emotional expression. On this very account he has been stigmatised by Dr. Max Nordau as a degenerate of a particularly evil type.

The most enthusiastic Wagnerian and keen advocate of this reintegration and co-ordination of the arts would probably admit that music, dancing, poetry, painting, &c., had derived the greatest benefit from their long period of isolated development, and consequently had been able to rise to a far higher pitch of excellence than would have been possible had the differentiation never taken place.

If this be true in the sphere of the arts it is surely not less so in that of medicine, philosophy, and religion, and it is interesting to consider how far medicine was attaining to an independent and separate existence in the early days of Greek civilisation,

The close connection of medicine with religion has been characteristic of all primitive races, and the Greek formed no exception to the rule. The earliest records of Hellenic life show that the power of healing was an attribute of all the gods, though possessed in a pre-eminent degree by Apollo, Artemis, and Pallas. Rather later, in post-Homeric times, the gods had begun to specialise, and Asclepius appears as the sole god of healing, while medicine was practised by the priests of his temples, who were known as "asclepiads." The astonishing intellectual activity of this gifted race is shown by the way in which medicine emancipated itself from the trammels of religious formalism and superstitious belief at a very early stage of its development. When compared with Egyptians, Indians, or Babylonians, the contrast is the more striking. That the Greeks were as profoundly susceptible to religious mysticism as the Orientals, the strange society of Eleusis amply testifies; but they differed from the Orientals in the natural force and versatility of their intellect, which made them impatient of truths sanctioned only by external authority.

This emancipation of medicine from religion was due largely to the speculations of the pre-Socratic philosophers, but their usefulness to medicine has perhaps been rather undervalued owing to other evils which they brought in their train, and more particularly the excessive employment of the deductive method. Their tendency to be for ever finding

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the general in the particular, and then making most sweeping deductions, was doubtless inimical to a sober and steady pursuit of medicine. On the other hand, though the conclusions to which this method led were only too often fanciful and absurd, yet it was certainly better than having no method at all, as was the case with the other nations of antiquity. At all events, it furnished a strong stimulus to intellectual activity, which is an essential pre-requisite to any sound progress, whether in art or science.

One of the earliest signs of interest in medical, or rather physiological, matters is the saying of Anaximenes that the world breathes. He considered that just as man is kept alive by drawing in draughts of air, so the world is kept going by the draughts of air which it inhales from the infinite mass beyond the heavens. This philosopher, who flourished 550 B.C., believed that air was the ultimate substance out of which the whole world was made, just as Thales had held water to be the primary substance. In this instance, we have an argument from the microcosm to the macrocosm, and Anaximenes utilises his physiological observation of breathing to support his cosmological theory.

Heracleitus of Ephesus (*fl.* 500 B.C.) exercised a great influence upon succeeding philosophers, and even upon Plato, who was a Heracleitean in his youth. Medicine, too, was affected by his doctrines, as we gather from various passages in the *De Diæta* of Hippocrates. His leading ideas are well known; thus:—

“All things are in constant flux, and nothing has permanence; man cannot descend twice into the same stream, everything is continually passing over into something else, and this proves that it is one nature which assumes the most opposite forms, and pervades the most various conditions . . . all comes from One, and One from All.”¹

To this philosopher the world was an eternally living fire, certain measures of which were always being kindled, while like measures were always being extinguished, and so the constant flux of things was kept going, and yet the world in appearance was relatively stable. This theory of the cosmos was applied by Heracleitus to man, who, like the macrocosm, is made of fire, water, and earth; but as in the case of the world the fire is the only important element, and is identified with the one wisdom, so in the microcosm fire alone is conscious. When it has left the body, the remainder, the mere earth and water, is altogether worthless. The fire which animates man is subject to the “upward and downward path,” just as much as the fire of the world; and again, we read in the *De Diæta* that “all things are passing, both human and divine, upwards and downwards.” We are just as much in perpetual flux as anything else in the world. We are not the same for two consecutive instants. The fire in us is perpetually becoming water, and the water earth; but as the opposite process goes on simultaneously we appear

¹ Zeller, *Outlines of Greek Philosophy*.

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to remain the same. Man, like the world, is subject to a certain oscillation in his "measures" of fire and water, which gives rise to the alternations of sleeping and waking, life and death. Sleep was produced by the encroachment of moist, dark exhalations from the water in the body which causes the fire to burn low. In a soul where the fire and water were evenly balanced, the equilibrium would be restored in the morning by an equal encroachment of the fire on the water. The Heraclitean idea that the "unseen harmony" of the universe and man was maintained by the strife of opposites not unnaturally gave rise to some strange views on dietetics and medical treatment.

Pythagoras (*f.* 550 B.C.) was the most famous of all these early thinkers, and his influence upon medicine has certainly been the greatest. Strictly speaking, his position is not quite analogous to that of the other Ionian philosophers; for he was not only a philosopher but also a religious leader, the founder of a brotherhood and teacher of a "way of life." His position is rather more comparable with that of Confucius and Laotsze in China, with whom, indeed, he was contemporary. The fame of Pythagoras has been kept alive rather by his religious and moral teachings than by the remarkable speculations on number, although at present we are more immediately concerned with these. This Pythagorean doctrine of number has often been misunderstood. When Pythagoras said "things are numbers," he was making an attempt to explain the sensible world from a sensible

origin, it was not an idealistic hypothesis. Numbers to Pythagoras were not abstract as they are with us, though it is difficult for us to think of them as being anything else. Aristotle tells us that these numbers were intended to be mathematical numbers, but that "they were not separated from the objects of sense"; they could not, therefore, be mathematical numbers in the ordinary sense of the term, inasmuch as bodies were made up of them. In reality these numbers of Pythagoras were spatial numbers—that is, their points had magnitude, their lines breadth, and their surfaces thickness. Thus, while a modern geometer regards a line as having only one dimension, the Pythagoreans identified it with the number two. They considered that numbers were built up of geometrical figures, that they were portions of space cut off and limited in a variety of ways. The properties of number were studied by means of geometrical constructions. The Pythagoreans spoke of square and oblong numbers, and they called odd numbers "gnomons."¹ Being unable to distinguish ideal or intelligible numbers from sensible or materialised numbers, they were forced to identify with magnitudes purely ideal things, such as justice, which was described as an equal number multiplied by an equal—that is, one of the first two square numbers, four and nine—because it returns equal for equal.

Medicine was undoubtedly influenced by this doctrine of the importance of number, and from it origi-

¹ Burnet, *Early Greek Philosophy*.

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nated the medical teaching of "critical days." It is worth noting, also, that Empedocles, who was influenced by Pythagorean teaching, speaks of the fetus being formed in the womb on the thirty-sixth day, and completed on the forty-ninth, and was probably led into this speculation by the fact that these numbers are the squares of 6 and 7 respectively. To this number 7 Pythagoras and his disciples attached a special importance; perhaps their medical studies had led them to observe that the second teeth came out at the seventh year, puberty synchronised with the fourteenth, and the beard appears at the twenty-first.

In the matter of practice the Pythagoreans influenced medicine in the direction of diet and gymnastic treatment; their school used poultices and salves very little, still less internal medicaments, and least of all the knife and cautery. Many physicians gave in their adherence to this school of thought, of whom the best known is Alcmaeon of Croton.

Empedocles of Agrigentum (*fl.* 460 B.C.), in addition to being a philosopher, was also a practical physician, and Galen ascribes to him the foundation of the Italian school of medicine. Certainly some of his doctrines were more favourable to the scientific study of medicine than those of his predecessors. For instance, "we must not attempt to construct a theory of the universe offhand, instead of simply trying to understand each thing we come across in the way in which it is clear."

“We must not reject the assistance of the senses, for they are the only channels through which knowledge can enter our minds at all; we must make use of them all, and neglect the testimony of none, not even that of taste.”

Here, indeed, we seem to breathe for a moment something of the atmosphere of modern science. Various physiological or quasi-medical speculations have come down to us from Empedocles. Thus, with regard to respiration, he said, “We breathe through all the pores of the skin, not merely through the organs of respiration.

“Alternate inspiration and expiration of the breath are caused by the movement of the blood from the heart to the surface of the body and back again.

“All things draw breath and breathe it out again. All have bloodless tubes of flesh extended over the surface of their bodies, and at the mouths of these the uttermost surface of the skin is perforated all over with pores closely packed together, so as to keep in the blood while a free passage is cut for the air to pass through. Then, when the yielding blood recedes from these, the bubbling air rushes in with an impetuous surge, and when the blood runs back it is breathed out again.”

Tears and sweat arise from a disturbance which curdles the blood; they are, so to speak, the whey of the blood. Again, perception is caused by the meeting of an element in us with the same element outside; our knowledge varies with the varying con-

dition of our bodies. To his views as to the dates of the formation of the fetus we have already referred in discussing Pythagoras, but in this connection may be mentioned his curious description of the secretion of milk: "On the tenth day of the eighth month the white pus (*πύον*) arises," which clearly means the mammary secretion.

He discovered the labyrinth of the ear by dissecting goats; he also perceived that in plants two sexes are combined, but thought that they came into being in an imperfect state of the universe, and that the distinction of the sexes was the result of the gradual differentiation brought about by the entrance of hate into the world. He further held that love was the principle which was capable of bringing the four elements into union, but he regarded it from an entirely physiological standpoint, and so considered that it was the same impulse to union as is implanted in human bodies. Here, again, we have an instance of a physiological observation being employed in the explanation of the cosmos.

With Anaxagoras of Clazomenæ (*fl.* 450 B.C.) we come to the end of the pre-Socratic philosophers. He occupies among them a most honourable position; he was the teacher of Pericles, and Aristotle speaks of him as "the only sober man amongst drunkards." It was he who introduced the idea of mind (*νοῦς*) as the cause of motion among the elements, and has therefore been credited with the introduction of the suprasensible into philosophy. This, however, may

be going too far, and there is some ground for supposing that the *νοῦς* of Anaxagoras was only a highly differentiated kind of matter; that, in fact, he conceived of it as a body, and substituted it for the love and hate of Empedocles, which had been introduced in order to explain the source of motion in the world.

Whatever may have been the precise meaning which Anaxagoras attached to mind, he certainly considered that it was the same in all living creatures, both in the animal and vegetable kingdoms, and that the different grades of intelligence depended entirely on the structure of the body. Plants he regarded as animals fixed in the earth. His interest in physiology is shown by his theory that sensation implies pain, for all unlike things produce pain by their contact, and this pain is made perceptible by the long continuance or by the excess of a sensation. In man even sensible perception is the work of mind, but as it is effected by means of the bodily organs it is therefore inadequate.

Such were some of the random philosophical speculations which affected the development of Greek medicine prior to the advent of the master mind which was to bring some kind of order out of this heterogeneous collection of generalisations.

Hippocrates, as we all know, stands in the same relation to medicine as Homer does to poetry and Herodotus to history. His title to this proud position was earned not so much by any special observations,

valuable as some of these undoubtedly were, far less by any such epoch-making discovery as distinguished our English Harvey, but because, in the words of Celsus, he separated medicine from philosophy.¹ He continued the emancipation from religion which had already been in part accomplished by the dissolving influence of the sixth-century philosophers, saying that one disease is no more divine or human than another, but that each occurs in accordance with Nature (*κατὰ φύσιν*).

But, above all, he was the first to start medicine on an independent line of its own and to free it from the somewhat crude speculations of these early Ionian philosophers on the one hand and the sterile theories of the Eclectics on the other—sterile for all purposes of immediate medical advancement, but fruitful indeed for the birth of metaphysics in the future. For here it may be well to point out that by philosophy in this connection we are not meaning metaphysics, for they, in the strict sense of the term, hardly existed before the time of Plato and Aristotle. The latter tells us that the pre-Socratic thinkers had no conception of reality except as cognisable by the senses (*Περὶ μὲν τῶν ὄντων τὴν ἀλήθειαν ἐσκόπουν, τὰ δ' ὄντα ὑπέλαβον εἶναι τὰ αἰσθητὰ μόνον*).

Their philosophy could not be of much direct assistance to medicine in its early stages before anatomy, and still less physiology, had been seriously

¹ Primus quidem ex omnibus memoria dignis ab studio sapientiæ disciplinam hanc separavit.

studied, while on the other hand the influence of medicine on philosophy was certainly at times far from favourable. Thus, from the time of Thales to that of Plato and Aristotle, philosophy, with many ups and downs, had gradually advanced to the foundation of a stable metaphysics, in which it was recognised that there may be realities of which the senses could never conceivably take cognisance. For the purpose of this kind of progress the mere accumulation and observation of facts can be of little use, however beneficial for the advance of medicine. In fact, the influence of medicine was sometimes directly harmful to advance in metaphysics; thus, at a time when all philosophic progress was necessarily in the direction of pluralism, which culminated in the atomic theory of Leucippus, the medical theorists of the day opposed this, believing that a monistic foundation of the universe was required by medicine, as otherwise it would be impossible to understand how one thing could do good or harm to another.

Hippocrates was considerably influenced by all these speculations, nor did he brush them aside as useless, but he showed that the observation of individual facts was the only method of proceeding in order to obtain any real progress in medicine.

It seems not unnatural to inquire how it came about that medicine, having once been set upon the right line of progress by Hippocrates, did not continue steadily upon this more scientific course. One reason would seem to be that Hippocrates perhaps

hardly realised the importance of his own work on its theoretical side. He had been led to a careful observation of facts by the naturally practical bent of his genius, and not because he fully comprehended the importance of the inductive method for the study of medicine. Then, too, being a practising physician, and actually busied with technical matters and the collection of facts, he had not time or occasion fully to set forth the theory of his method as a logical instrument for the purpose of scientific progress. Bacon, on the other hand, when, nearly two thousand years later, he forged anew the weapon of inductive reasoning, lent the whole weight of his genius to the formulation of his method; so that though to some extent he busied himself with the practicalities of science, we cannot say that there are any special observations of value made by him, or that he benefited any one science in particular.

Another reason which prevented the method of Hippocrates from being carried out by his medical successors was the growth and development of metaphysics under the inspiration of Plato and Aristotle. Their highly imaginative philosophy drew away to itself many of the ablest minds in Greece, so that the more prosaic inductive method, whether as applied to medicine or anything else, fell more and more into the background. Then came the gradual decay of Greece, and the decadence of all philosophic forms of thought. With the advent of Galen (*f.* 160 A.D.) came an immense stimulus to the study of medicine.

He was a man of vast erudition and immense medical knowledge, and to some extent he revived the Hippocratic tradition. But, in addition to the great contributions which he certainly made to medicine, he also wrote extensively on philosophy, and endeavoured to unite medicine with the metaphysics of Plato. This unfortunate move arrested the further progress of medicine for more than a thousand years. The system of Galen was taken as a gospel by the Arabian physicians, and the extraordinary reverence for external authority in matters intellectual characteristic of this people, combined with the growing powers and influence of the Church, stifled all independent thought, and consequently all medical progress, until the dawn of the Renaissance.

The aim of Galen was praiseworthy enough, but it was premature, for medicine at that time had not been working long enough in isolation to render fruitful such a union with religion or philosophy. As in all ages, however, the contemporary religious and philosophic thought of the day has had an influence at least unconscious upon medical practice, the question arises whether the time may not now have arrived for making the relationship more definitely conscious, and effecting for medicine that co-ordination with religion and philosophy which Wagner accomplished for music with the sister arts.

CHAPTER II

POST-HIPPOCRATIC SCHOOLS OF MEDICINE IN RELATION TO CONTEMPORARY PHILOSOPHY

IN the last chapter we attempted to explain the relation of early Greek philosophy to early Greek medicine. Continuing the same line of inquiry, we now propose to see how far the schools of medicine immediately succeeding Hippocrates were dominated by the philosophic influences of the time, and were indeed the expression of them. Goethe says somewhere that there is a certain logic in the actions of men and women which enabled him in his youth to write correctly about things of which he had no experience, but which, on growing older, he found out to be true. Similarly, in reflecting on the history of the art of healing, we are led to conclude that there is a logical bond between the various activities of the human mind, so that a subject such as medicine, independent as it may seem, does not grow up and develop in isolation, separated off from the other creations of mental energy, but is of necessity connected with the prevailing philosophic theories of the day. Periods of constructive medicine are the outcome of periods of constructive thought, so that we must not

expect any serious advances in the former when the latter is in a state of stagnation.

The death of Hippocrates (357 B.C.) coincided with the decadence of philosophy and the corruption of morals which ensued after the battles of Leuctra and Mantinea, when Greece fell into a general condition of intellectual flabbiness and moral laxity. From this mental paralysis medicine assuredly did not escape. Instead of advancing soberly along the path traced out for her by Hippocrates, she embraced wild theories and absurd practices. During the five hundred years which elapsed between the death of the great physician of Cos and the advent of Galen it would seem that medical knowledge was in the trough of the wave. No striking discoveries were made or illuminating principles enunciated during that period; men either lost themselves among the hill-tops of speculation or were engulfed in the quagmires of doubt. The lack of intellectual fibre so characteristic of this epoch was reflected in the medical schools, for when one department of a nation's mental life suffers, the whole is apt to suffer with it.

The first of the medical schools of this period to become famous was that of the Dogmatists. The name is not very happily chosen, but it was given to them by Galen, and has been followed by subsequent writers, so that it must be adopted for the sake of convenience. Roughly speaking, they

occupy the century from the death of Hippocrates to the establishment of medical schools at Alexandria (357-264). The earlier representatives of this school, namely, Dioxippus and Praxagoras of Cos, followed closely the doctrines of their master Hippocrates; they accepted his medical teaching without, however, in the least imbibing his spirit of sober scientific observation. Thus they adopted his humoral pathology and made it a most essential part of their system. According to this theory, all diseases are explained by a mixture of humours which are four in number, namely (1) blood, (2) yellow bile found in the liver, (3) mucus in the head, (4) black bile in the spleen. The medical treatment based upon this was that medicines work upon the predominating cardinal humours, some expelling mucus, others removing bile, &c. This theory controlled medicine for more than ten centuries, and eventually only gave way to the most modern views. Far more important for this school, however, was the influence of the Platonic philosophy. Having taken as their motto the saying of Hippocrates that "the physician who is also a philosopher is Godlike,"¹ they proceeded with commendable zeal to try and earn this title by a careful study of the *Timæus*. This famous dialogue of Plato became their text-book of philosophy, and with disastrous results, for this work, though described by Jowett as obscure and

¹ Ἴητρος γὰρ φιλόσοφος ἰσόθεος. Hippocrates, *Περὶ εὐσχημοσύνης*.

repulsive to the modern mind, had the greatest influence over the ancient and mediæval world.

“The obscurity arises from the attempt to conceive the whole of Nature without any adequate knowledge of the parts, and from a greater perception of similarities which lie on the surface than of differences which are hidden from view. The conception of the world as a whole, whether a person or an animal, has been the source of hasty generalisations, yet the general grasp of Nature led to a spirit of comprehensiveness in early philosophy which has not increased but rather diminished as the fields of knowledge have become more divided.”¹

The Dogmatists had the acumen to perceive that a science of medicine must be based upon physiology; their error consisted in attempting to erect a complete edifice before there were materials suitable or sufficient for the foundation. The highly imaginative temperament of Plato led him into numerous fanciful speculations in physiology as in other matters, which his more prosaic followers regarded as intended to be rigidly scientific truth, whereas Plato himself probably looked upon them only as points of view or understood them in a metaphysical sense. Many instances occur in the New Testament where the humble followers of the Founder of Christianity put constructions upon His sayings which astonish us by their naïveté and literalness.

Apart from the general spirit of the Platonic philo-

¹ Jowett's Introduction to the *Timæus*.

sophy, the following specific doctrines in particular influenced the Dogmatists :

1. General scepticism as to the reality of sensible objects which are in a state of perpetual flux.
2. Life consists in spirit and in fire ; the heat of the blood is the source of the fire.
3. The want of proportion in the physical elements of the body is the immediate cause of all diseases.
4. The doctrine of final causes introduced into physiology.

Such fantastic conceptions, as may readily be supposed, led them into strange errors. Thus we find the intense admiration for Plato induced Dioxippus to defend the absurd notion that liquids passed into the lungs ; while Praxagoras, who realised that the nerves were the organs of sensation, though he did not invariably distinguish them from blood-vessels and ligaments, placed their origin in the heart because Plato regarded that organ as the centre of sensation.

This school attached great importance to the ether, and here we find the influence of earlier philosophers :

“All space between heaven and earth is filled with a subtle vapour which is for mortals the principle of life and the cause of disease.”

Pythagoras had thought the motive force of the body was aërial ; Anaxagoras assigned to the ether a perpetual movement, while Heraclitus and Democritus regarded the soul as identical with the ether. The influence of Pythagoras was further seen in the importance attached by this school to the number 7

and its multiples. Thus they thought that some of the solid parts of the child were already formed at the end of the twenty-eighth day, and that the fetus had reached the size of a bee on the thirty-fifth. The effect of this number was supposed to make itself felt not only before birth, but through the whole course of life.

Another striking factor in the development of this school was the influence of the Sophists. This had the effect of giving an enormous importance to the power of talking, so that to be a skilled rhetorician was a sure passport to success as a physician. The ability to argue with ingenuity and subtlety about disease was thought more highly of than the possession of any practical knowledge. Men preferred frivolous speculations to careful and deep researches. Words have at all times exercised a great dominion over mankind, and the devil, in the form of Mephistopheles, was fully alive to this when he says to the student in *Faust* :—

‘ Denn eben wo Begriffe fehlen
Da stellt ein Wort zur rechten Zeit sich ein.’

The ancients, however, were much more subject to this influence than the moderns, and were easily led astray by false analogies.

The later members of the Dogmatic school came under a very different influence, namely, that of the Stoics, and they endeavoured to apply the principles of Zeno to physiology and pathology. The natural result of this was to give a materialistic turn to the

Dogmatists, for, according to Stoicism, "all that exists is for that very reason matter, since bodies only are a reality." The animal body they regarded as the result of forces purely mechanical. The soul even has a corporeal nature; it comes into being with the body in the physical mode of generation; but the material is a part of the divine fire which descended into the bodies of men when they first arose out of the ether. This fire of the soul is nourished by the blood, and the governing part of the soul has its seat in the heart, the centre of the course of the blood.¹ This teaching of the Stoics was rather a violent change from the Platonic philosophy, and indeed the way in which the Dogmatists veered from one pole of thought to another helps to account for the fact that their practical contribution to medicine was so comparatively small.

Their great merit as a medical school lies in the fact that they made an attempt to found a scientific medicine. They continually sought for the hidden causes of disease, and though often their efforts were sufficiently fantastic and absurd, they kept alive faith in the powers of reason without which any scientific advance is impossible. The attempt to form a complete system of medicine was premature so long as the knowledge of the parts was so meagre and imperfect.

¹ Zeller, *Outlines of Greek Philosophy*.

THE EMPIRICAL SCHOOL

In sharp contrast with the school of the Dogmatists came the school of the Empirics. It arose in Alexandria about 280 B.C., and its founders were Philinus and Serapion, the pupils of Herophilus, whose name is well known, at least to all students of anatomy. Just as the Dogmatists regarded Plato as their philosophical guide, so the Empirics took Aristotle as their intellectual leader. The word "empirical" in connection with medicine has an evil connotation. We must not suppose, however, that this school was empirical in the ordinary sense in which every ignorant and uneducated person is an empiric. The empiricism of this school and that of the vulgar have this much in common, that by each reasoning is banished from medicine. In the case of the ordinary man this arises from ignorance of the art of reasoning, whereas the physician of the Empirical school reasoned in the most subtle fashion so as to prove the futility of all reasoning. Readers of *Marius the Epicurean* may remember the passage in which Pater describes his hero as devoting a great metaphysical acuteness to proving metaphysical speculation impossible or useless :—

"Abstract theory was to be valued only so far as it might serve to clear the tablet of the mind from suppositions only half realisable or wholly visionary and leave it in flawless evenness to the impressions of a direct and concrete experience."

Something of this kind constituted the intellectual background of the Empirical school at Alexandria.

Several influences contributed to bring this school into being :—

1. Reaction against the Dogmatists.—A natural disgust was felt at the constant succession of theories founded on an absurdly small number of observations and at systems which had far outrun positive knowledge ; the general confusion was increased by the subtleties and sophisms with which each opinion was defended.

2. The immense commerce of the Ptolemies had brought to light a large number of new medicines, and we may assume that the market was flooded with them. The ancient vendor of drugs had this advantage over his modern counterpart, in that kings and princes took an interest in medical remedies which not even the most versatile of monarchs in our own day attempts to imitate. Thus Attalus III., King of Pergamus, studied poisons and their antidotes, even making experiments with them on condemned criminals. Nicomedes, of Bithynia, also employed his royal leisure in the study of medicines. Best known of all these royal patrons is, of course, Mithridates, King of Pontus. He is said to have taken a poison and an antidote every day in order to render himself immune to poisons. He also wrote a book on medicines and poisons. It is hardly astonishing, therefore, that many doctors thought more about trying new reme-

dies than attempting to understand the nature and cause of disease.

3. The influence of Pyrrho and the Sceptics, who numbered many physicians in their ranks.—Pyrrho (*fl.* 340 B.C.) had accompanied Alexander to the East, and there, by means of the philosopher Anaxarchus, who went on the same campaign, he became acquainted with the Eleatic school of thought. This school, as represented by Parmenides, had constantly opposed the knowledge which comes to us by the senses to that which we acquire by the powers of the mind. Hence it was easy for Pyrrho to believe that the one avenue to knowledge was as uncertain as the other. To the Pyrrhonists it seemed impossible to know the true nature of things, for perception only shows us things as they appear, and not as they are. The only correct attitude, therefore, which a man can adopt is that of a suspension of judgment (*ἐποχή*). This philosophy of Doubt had the effect of limiting investigation to the narrow sphere of sense knowledge. Sterile and unsatisfactory as such an intellectual standpoint must necessarily be in many aspects, its influence on medicine was, in a certain measure, beneficial. For, at least, it drew men's minds away from the speculative fog in which the school of the Dogmatists was fast losing itself, and brought them back to the humble task of observation, which must ever be the true foundation of such a science as medicine. The Empirical

school, therefore, limited the task of medicine to practical ends only, regarding it as futile to press forward to the ultimate causes of phenomena. They paid special attention to the totality of symptoms, without occupying themselves either with the nature of disease or its causes. According to them, medicine is concerned with the cure, not the cause, of disease; they did not want to know how we digest, but what is digestible. They adopted the unanswerable attitude of the practical man "that diseases are not cured by eloquence, but by remedies" (*morbus non eloquentia sed remediis sanari*), and "that a man does not even become a farmer or a pilot by arguing, but by practice" (*ne agricolam quidem aut gubernatorem disputatione, sed usu fieri*). They defined disease as "a union of symptoms which are observed always in the same way in the human body." The whole art and science of medicine became, therefore, reduced to a system of therapeutics. Three different methods were employed by them for finding out what particular treatment would get rid of a particular set of symptoms:—

- (1) A man's own observations—autopsy.
- (2) Learning from his contemporaries and predecessors—history.
- (3) In the case of new and strange diseases, by drawing conclusions from those most similar to them—analogy.

These three methods were known as the Tripod of the Empirics. Later on a fourth method was added called "Epilogism": this was the process of inferring preceding events from the present symptoms. Thus the empiric might conclude from the extreme inflammation of a wound that it had been poisoned, and treat it accordingly, without falling into the dogmatic heresy of looking for hidden causes. Since the main object of medicine was not to understand disease, but to remove it (*non interesse quid morbum faciat, sed quid tollat*), they regarded the study of anatomy as superfluous, and some had the energy to write treatises showing it to be unnecessary. One other intellectual influence affected the Empirics, and that was the Aristotelian logic with its definitions and syllogisms. In spite, then, of their very practical maxims, they expended as much mental energy in word-splitting, definitions of the pulse, &c., as ever the Dogmatists had done in their speculations as to the hidden causes of disease.

Empiricism by imperceptible gradations easily passes into charlatanism, and even this famous school resolved itself eventually into a search for specifics, the immediate result being the introduction of numerous strange drugs, for example, hare's heart, camel's brain, &c.

THE METHODICAL SCHOOL

Intermediate between the schools of the Dogmatists and Empirics came that of the Methodists. This name is doubtless more familiar to English ears as the sobriquet jestingly given by a Christ Church undergraduate to the small group of friends who gathered round the brothers Wesley in Oxford in the middle of the eighteenth century, on account of their regular manner of life and behaviour.¹ The name as originally given had, of course, reference to intellectual and not moral qualities. It was not very appropriate, though the founders of this school did perhaps commit themselves to a more definite and precise theory of disease than either the Dogmatists or Empirics had done.

The chief philosophic influence which guided the Methodists was that of the Epicureans; in fact it would hardly be too much to say that their whole system was the application of Epicureanism to medicine. The great exponent of this doctrine was Asclepiades of Bithynia, who, though not usually regarded as the founder of the Methodical school, was certainly its immediate forerunner; and, indeed, Themison of Laodicea, to whom is ascribed the honour of founding the school, was actually his pupil. Asclepiades, like the Epicureans, taught

¹ "One person with less irreverence and more learning, observed, in reference to their methodical manner of life, that a new sect of Methodists was sprung up, alluding to the ancient school of physicians known by that name."—Southey's *Life of Wesley*.

that the body of man was made up of innumerable atoms with pores. Health (*συμμετρία*) consists in the size, mass, arrangement, and movement of the atoms being normal and the width of the pores being normal. The object of the physician was to prevent the wrong relationship of the atoms to the pores; thus few medicines were required, and certainly none of a drastic nature, but the application of ordinary physical, mechanical, and dietetic measures. The foundation of this school synchronises with the migration of medicine from Alexandria to Rome as the centre of intellectual activity. Medicine was indeed long in making her way into Rome. Such an art was regarded not only as unnecessary for a strong and manly race like the Romans, but also as a despicable pursuit only practised and required by the effeminate and degenerate Greeks. Cato was the coryphæus of this particular Chauvinism, for to him the Greeks and all their works were hateful, and he would have echoed the cry of the Trojan Laocoon, *Timeo Danaos et dona ferentes*. Some of his utterances seem to recall the strictures of Plato on physicians;¹ nor have such strictures ceased entirely in our own day. To Asclepiades is due the credit of having forced a way for medicine into Rome; but it had to

¹ "Well I said and to require the help of medicine, not when a wound has to be cured or on occasion of an epidemic, but just because by their lives of indolence and luxury men fill themselves with waters and winds, as if their bodies were a marsh, compelling the ingenious sons of Æsculapius to find names for diseases, such as flatulence and catarrh; is not this, too, a disgrace?"—*Republic*, Bk. iii.

appear along with literature and rhetoric in the garb of the philosophy which corresponded with the prevailing taste. This highly accomplished physician, who among other things was renowned for his eloquence, had the astuteness to perceive how the medical prejudices of the Roman citizens were to be combated, and therefore he founded a system of medicine quite opposed to the Hippocratic and all previous teaching, which he used to ridicule, but in harmony with the general point of view of Roman life and thought, which was at that time mainly Epicurean though to some extent Stoical. Having thus, as we have seen, based his medical theory on the doctrines of Epicurus, he allowed his practice to be determined largely by the principles of Zeno. His aim was to bring back to the Romans the old manly life which they had lost, and which they all the more keenly sought to recover. His therapeutic measures were therefore entirely in accord with this object, so that he used to recommend:—

1. Less food and drink.
2. Rubbing the body.
3. Active and passive movements.
4. Great use of cold water, especially rain baths.

Themison of Laodicea and his successors continued this Epicurean teaching of Asclepiades; but they neglected the atoms and concentrated their attention on the pores, an abnormal condition of which is the cause of disease. The pores, according to them, are

either in a state of too great relaxation (ῥύσις) or too great contraction (στέγνωσις); later there was added the idea of a mixed condition (τὸ μεμιγμένον). It was these three fundamental forms of disease which made up the famous "communities" (κοινότητες) of this school. Every illness is the expression of a "community" governing the whole body, the character of which may be recognised from the general condition of the body, and specially from the condition of the secretions. Therapeutics in their hands became a very simple matter; in any given case of illness it was only necessary to decide whether the pores of the body were contracted or relaxed, and then to apply either laxative or astringent remedies accordingly. For the latter object they employed cold air and water, vinegar, alum, lead and chalk, while their laxative remedies consisted in venesection, cupping, leeches (which were first introduced by this school into European medicine), also poultices, fomentations, and warmth generally. Purgatives they rejected, maintaining that they only substituted the opposite form of disease. It will thus be seen that in therapeutics the school adopted the principle of *contraria contrariis curantur*, which is analogous but antagonistic to that of Hahnemann and homœopathy. Such a theory as this must often have landed its exponents in a practical absurdity, as when the stricter members of the school held that even in cases of poisoning it was not necessary to consider the poison, but only the state of contraction or relaxation of the pores it might have

produced. Fortunately, perhaps, for the patients, common sense frequently prevailed, so that the Methodists were not always consistent in the application of their principles. Thus Celsus gives us an instance of the physician Cassius, who, when summoned to a patient seized with fever and very thirsty, recognised that the condition had supervened on a drinking bout and made him drink cold water; when the water by mingling with the wine had tempered the force of it, he slept and sweated, so that the fever was removed. In acting with such readiness, the physician did not trouble to consider whether the body was contracted or relaxed, but he was guided by the cause which preceded the onset of the evil.¹

The Methodists, as the medical exponents of the popular philosophy of the day, had their full share of intellectual pride; thus Thessalus of Lydia, one of the most distinguished members of the school, considered that nothing had been known in medicine before his time. Reversing the famous aphorism of Hippocrates, he held that art was short and life was long, and undertook to teach his pupils medicine in six months; and on a monument in the Appian Way he styles himself "Conqueror of Physicians" (*ἰατρονίκης*). On the whole, the Methodists had closer intellectual affinities with the Dogmatists than with the Empirics. Like the former, they reasoned on general pathology, and admitted different classes of pathological states—for example, "the contracted"

¹ Celsus, Lib. i.

and "the relaxed"—but they refused to search after hidden causes, confining their attention solely to such causes as were evident. Vague and uncertain as these pathological states undoubtedly were, they did at least constitute the basis of a medical system, whereas the Empirics rejected all system. There was, however, this in common with the Methodists and Empirics, that each school allowed itself to be guided by the general concourse of symptoms; but the Empirics admitted no reasoning between the symptoms and the line of treatment to be adopted, whereas the Methodists argued back from the symptoms to the state of the pores, and adapted their treatment accordingly. They both agreed in disregarding the study of anatomy.

The history of these three schools does not present us with any great names or epoch-making discoveries, and on the whole medicine cannot be said to have made any serious advance in the period with which we have been dealing. A reason for this may be found in the fact that the centre of gravity of philosophic thought had shifted from the purely scientific contemplation of the world to the solution of practical questions, and philosophy became mainly valued as providing men with a refuge against the miseries of life. Interest became concentrated on the individual, and ethics took the place of physics. The Stoics and Epicureans seem to have accepted any view of physics which came easily to hand, without devoting their whole energies to the comprehension of the cosmos,

as the pre-Socratic philosophers had done. Like Plato, they probably regarded the consideration of physics as a rational pastime only.

The most useful results would seem to have emanated from the Empirical school, perhaps because they were less dominated by theory; at the same time, from a wider standpoint, such a school must always be inimical to the ultimate progress of medicine. Some system must surely be better than no system, for at least it admits the possibility of a rational co-ordination of knowledge. Without a belief in the uniformity of Nature, which is hardly possible on a basis of pure Empiricism, all science becomes a phantasmagoria of strange images, medicine a congeries of ill-assorted facts, and life itself intolerable to a rational being.

CHAPTER III

THE RELATION OF GALEN TO THE PHILOSOPHY OF HIS TIME

THE wonderful medical system of the great physician of Pergamos which dominated the civilised world for some fourteen centuries, was no exception to the rule that medicine, like the other arts, reflects the mental temper of its time. To the student of medical history, it must at first sight be a matter of no small astonishment that a single man, who was admittedly not of transcendent genius, should have remained an absolute dictator in the medical world for so long a period, particularly when many of his statements would seem to be especially easy of disproof. It is therefore worth while inquiring what were the intellectual forces which moulded the mind of Galen, and what were the circumstances which contributed to giving him this extraordinary pre-eminence.

Born at Pergamos (A.D. 131), we are told that he had a most complete and elaborate education. At the age of fourteen he began to attend the various schools of philosophy in his native city. Here he became initiated into the idealism of Plato, the realism of Aristotle, the scepticism of the Epicureans, and the materialism of the Stoics.

This education continued for the space of three years, and thus was laid a broad philosophic basis for his future intellectual development. On this basis of philosophy his later medical studies were built up, and every part of the superstructure remained in intimate relation with the foundation. At the age of seventeen, his father, Nicon, who was an architect and a very learned man, decided in consequence of a dream that his gifted son should enter the profession of medicine. Accordingly young Galen was handed over to the most distinguished teachers of the medical art. In spite, however, of the ability of individual teachers, the whole condition of medicine was in a state of hopeless chaos. The various schools which had sprung up after the death of Hippocrates were more intent upon scoring verbal triumphs over their opponents than upon either advancing medical science or curing their patients. Of these schools—namely, the Dogmatists, Empirics, and Methodists—we have given some account in a previous chapter. But in Galen's time there had also developed a school of Eclectics and of Pneumatists; the latter were, in fact, a further extension of the Dogmatists, and so tenaciously did they hold their opinions that it was said they would rather betray their country than renounce their theories. Galen determined not to identify himself with any of these conflicting systems, but set himself the task of attempting some kind of unification of them all. As a philosopher, the Empirical school with its

negation of knowledge could have little attraction for him; the Methodists, with their crude applications of Epicureanism to medicine, were still more repugnant, and Galen was never tired of fulminating against them. It was, then, with the Dogmatists and Pneumatists that he found himself most in harmony, for their systems did at least permit medicine to be rational.

The first important reform which Galen effected was the assertion of the importance of anatomy, in contradistinction to the prevailing doctrines of the Methodists and Empirics, according to which it was entirely superfluous. He saw the obvious absurdity of attempting to have any sound knowledge of disease without knowledge of the structure of the human body. The necessity of studying anatomy he further emphasised by his numerous dissections and anatomical descriptions. He was the first to describe the *platysma*, *interossei*, and *popliteus* muscles, also the "ductus arteriosus" and the three coats of the arteries. If nothing else had come down to us but his anatomical studies, he would still take a high place in the history of medicine. Without entering further upon this part of his work, it is sufficient to say that most of the anatomical errors for which he was attacked by Vesalius and the modern anatomists arose not from mistaken observations, but from the fact that all his dissections were made on animals, the dissection of the human body being then impossible. Galen imagined that what was true of

animals in the matter of anatomical structure would be equally true of man ; this was the source of most of his mistakes.

Passing next to physiology, he stands out as the first experimental physiologist in the history of medicine. He was the first to demonstrate that the arteries contained blood and not air, and his work on the nervous system, in which he distinguished between sensory, motor, and mixed nerve trunks, is a model of scientific excellence.

These researches in physiology and anatomy would cause Galen's reputation with the modern world to stand much higher than it does, were it not that they were so closely interwoven with his philosophical speculations. On the other hand, the enormous influence which he began to wield over the civilised world some thirty years after his death cannot be attributed to his scientific works alone ; it was much rather by his philosophical writings, which to the modern world would seem foolishness and an impediment to true knowledge, that he attained to his extraordinary position of eminence in the Middle Ages.

As has been shown in a previous chapter, one of Hippocrates's chief titles to fame is that he separated medicine from philosophy, and Galen in the main took Hippocrates for his pattern and master. He wrote commentaries with warm approval on nearly all his works, accepted his humoral pathology, and to a large extent his therapeutics.

With regard to philosophy, however, though it would not be fair to say that he reversed the process of Hippocrates, he certainly endeavoured to bring it into closer harmony with medicine. In attempting this he was doubtless influenced by his early education and by the high estimation in which philosophy was held, for there were already several well-established philosophical systems in existence which have become famous for all time. Just as from time to time in the world's history there have been men who aimed at bringing religion into closer touch with the scientific and philosophic thought of the day, so Galen seems to have been desirous of carrying his own special art into a higher region on the wings of philosophical speculation.

In philosophy Galen was to some extent an eclectic; in early life he tells us that he had natural leanings to the sceptics, perhaps the form of philosophy most attractive to early youth; from this he tells us he was preserved by his natural good sense and his love of geometrical demonstrations; at the same early period his unusual precocity led him to write a commentary on the dialectics of the Stoic Chrysippus.

But undoubtedly the philosopher who had the greatest influence upon Galen was Aristotle, and these two names were continually coupled together throughout the Middle Ages. This influence was twofold: in the first place, it made Galen aspire to occupy the same position of legislative authority in the region of

medicine which Aristotle held in the whole sphere of human knowledge; secondly, he adopted from Aristotle certain definite principles which had a most direct bearing upon his work. Of these principles the most important was the doctrine of final causes. "Nature makes nothing in vain" (*μηδὲν μάτην ποιεῖν τὴν φύσιν*) had been the *ex cathedrâ* statement of Aristotle, in which, indeed, he was only following the firm belief of Plato. Convinced of the wisdom of these two great philosophers in all matters, Galen regarded this unproved statement as a law of the universe, and proceeded to show that every structure and function of the human body subserved some profound end—that, in fact, the aim or object of any structure was the cause of its existence. For instance, Aristotle and Galen said that man has hands because he is the wisest of animals; whereas the earlier philosopher Anaxagoras, more in accordance with the spirit of modern science, had said that man was the wisest of animals because he had hands. Galen was never tired of bursting forth into pæans of praise of the Creator for His profound wisdom in the construction of the universe: "The Father of all Nature has shown His goodness in providing wisely for the happiness of all His creatures in assigning to each what could be really useful to it. Let us then magnify Him by hymns and psalms. He has shown His infinite wisdom for arriving at His beneficent ends, He has given proof of His omnipotence in creating everything in perfect conformity with its destiny. It is

thus that His will has been accomplished." ¹ In his work *De usu partium* he endeavours to prove that all the parts of the body have been so well constructed, and in such exact relation with the functions they have to perform, that it is impossible to conceive any better arrangement; anatomy and physiology simply appear as two methods which lead to the proof of the wisdom of Nature. This unfortunate doctrine that Nature makes nothing in vain inevitably withdraws the mind from the sober investigation of facts, and induces it to accept arbitrary solutions of scientific questions in order to establish the theory. The absurdity of trying to discover the functions of an organ from its structure is at once seen if we ask ourselves how it would be possible to deduce the functions of liver, spleen, or pancreas from their structure.

In describing the hand, Galen says that the muscles and tendons of it are marvellously arranged in number, form, and strength, so as to fulfil all the functions with which it is entrusted, and that the Creator could not conceive an instrument of greater perfection: nothing is wanting, and nothing could be added to improve it. This is the clearest evidence of the supreme wisdom. What is our astonishment, after this panegyric, to discover that Galen has all the time been describing the hand of an ape, which, by lacking the opponens pollicis muscle, is quite incapable of executing the various functions of the human hand! Again, he

¹ *De usu partium*, Bk. iii.

calls us to observe the great wisdom of Nature in having provided the brain with two coverings for its protection—not with one only, nor with more than two—because the brain and the skull being substances of an opposite character, Nature inserts between them two membranes, which are of an exactly intermediate texture between the hardness of the skull and the softness of the brain. But what are we to say about the supreme wisdom of Nature when a third membrane—the arachnoid—is discovered? The result of this teleological reasoning is to make the wisdom of God depend on the fallible investigations of man; since, if we make belief in the wisdom of God depend on the supposed adaptation of organs to functions, what was true yesterday may become false to-day, and so divine wisdom becomes dependent on human knowledge.

Fortunately for physiology, he did not follow Aristotle in his views of sensation. The latter regarded the heart as the seat of the sensitive soul, and the brain as of secondary importance, because it was the coldest part of the body, being devoid of blood, and having for its chief or only function the cooling of the heart. Into this great error Aristotle had been led by his metaphysical notion that the sensitive soul was indissolubly connected with heat, and therefore could not have its seat in the coldest region of the body.¹

By a lucky chance Galen inverted this view, and by taking the brain as the seat of sensation, was

¹ *Harvey and Galen*, Payne.

enabled to make his valuable discoveries in the nervous system. On questions of ethics he agreed with Aristotle in regarding virtue as a mean between two extremes. He was also influenced by the categories of Aristotle, and accepted his doctrine of the four causes. But in many minor matters Galen often found himself at variance with the peripatetic school of Aristotle, and complained that, though they discoursed about anatomy, he could not persuade them to dissect and so have ocular demonstration of his anatomical descriptions.

The influence of Plato upon Galen was only less than that of Aristotle. He adopted the Platonic tripartite division of the soul, in accordance with which the soul in its rational aspect (*ψυχὴ λογιστική*) had its seat in the brain, in its aspect of courage (*ψυχὴ θυμοειδής*) in the heart, and in its aspect of desire (*ψυχὴ ἐπιθυμητική*) in the liver. He wrote a commentary on the *Timæus*, and expended much energy in trying to prove the agreement between Plato and Hippocrates, and uniting them both in substantial harmony with Aristotle. Plato probably affected Galen more by the general spirit and temper of his writings than by any specific doctrines. Certain traces of mysticism; the belief that some truths are immediately clear to the intelligence without the intervention of the senses; the following outbursts of praise in honour of the Creator—"True piety does not consist in sacrificing hecatombs or in burning a thousand precious perfumes in His honour, but in

recognising and proclaiming aloud His wisdom, His omnipotence, His love, and His goodness":¹ all seem to have the Platonic ring.

As to the popular philosophies of the day, his antagonism to the Sceptics and Epicureans, as exemplified in the doctrine of the Methodists, was very pronounced. With Stoicism, which was then fashionable in court circles owing to Marcus Aurelius, he was much more in sympathy, and some of his doctrines seem based on that philosophy. Thus he adopted their doctrine of the "Pneuma," which in some Stoical writers appears to be synonymous with the deity; it seems, in fact, to be the soul of the universe, and related to the world as the soul is to the body of man. "The force of the soul is due to the Pneuma, which is carried to the brain with the blood after having been prepared by the vital spirits." This explains why changes in the soul follow on general changes of the body, and why all opinions are the result of our physical condition. As expressed by Athenæus, one of the leading members of the Pneumatist school, which Galen was inclined to favour, "The Pneuma is the world soul, the living self-conscious god, from whom the souls of men, animals, and plants emanate, also the maker and fashioner of all matter." The health as well as the disease of the body was determined by the Pneuma; it was supposed to pass from the lungs to the heart, and then to be spread all over the body by means of the arteries.

¹ *De usu partium*, Bk. iii.

The pulse was thought to be due to an automatic movement of dilatation on the part of the Pneuma contained in the arteries. On the other hand, he did not hesitate to oppose Stoic doctrines, for we find him maintaining that "qualities are not corporeal" (*ὅτι αἱ ποιότητες ἀσώματοι*), in direct contravention of Stoic teaching.

Though Galen was a very distinguished physician in his lifetime, and attended two emperors, his real fame hardly began till some thirty years after his death. It was owing mainly to the philosophers that his reputation was spread abroad, and it was the philosophical part of his medical system which caused his general acceptance in the succeeding ages. Few thought of imitating the really scientific part of Galen's labours, and giving the same attention to anatomy and physiology which he had given. Thus they accepted without questioning all his anatomical observations, not realising that his dissections had been made on animals only, and the descriptions taken as applicable directly to the human frame. So strikingly was this the case that when Vesalius in the sixteenth century began to point out some of the errors which had hitherto been implicitly accepted, the ardent defenders of Galen maintained that the structure of the human body must have changed. Massaria of Pavia in the seventeenth century said he would rather err with Galen than be right with any other physician. Thus after his death the inquiring and scientific spirit of Galen retreated more and more

into the background among his successors, while his systematising, organising, and, if we may so express it, intellectually bureaucratic spirit came to the front.

It would seem that in the intellectual world no less than in the physical the soil is as important as the seed, and so it came about that the scientific investigations of Galen, falling upon an unfavourable soil, took no deep root and led to no further researches in anatomy and physiology, until the revival of learning at the Renaissance stimulated men's minds afresh to the original pursuit of truth. On the other hand, his philosophical speculations seemed to harmonise with the requirements of his age. For that age felt the want of authority in matters intellectual no less than in matters political. In the world of politics men had grown weary of the civil wars and party strife, which, beginning with the struggle between Marius and Sulla, continued on between Pompey and Cæsar, had been only finally brought to an end by the battle of Actium (31 B.C.). Power then gravitated more and more into the hands of one man, and the people loved to have it so. Similarly, in the intellectual sphere the barren strife of rival philosophic schools, more intent upon verbal triumphs than upon the solid acquisition of knowledge, produced a feeling of weariness and exhaustion which made men ready to welcome with open arms any co-ordinating, authoritative system of knowledge, and it was just such a system which Galen was well able to supply. Probably for the time being this constituted an advance

in both the intellectual and political worlds ; at least it gave time for the confused and shattered forces to recuperate themselves. But in the long run such centralising systems, except as temporary bulwarks against political or intellectual anarchy, can never be very favourable to human progress. For the firm domination of a central authority in matters intellectual dries up the springs of original thought, just as it paralyses in the political world the initiative and native vigour of the average citizen, and consequently we get an unprogressive and unilluminating period in the history of civilisation. Even with a sage upon the imperial throne and the central government devoted to the good of the people, yet it has been well said that the age of the Antonines was one in which no man of spirit would have wished to live.

Medical knowledge being essentially progressive, systems of medicine can never be permanent, but are of course useful as gathering together our knowledge and providing a sound basis from which further scientific advance can be made. The astonishing thing about the medical system of Galen lies in the fact that it lasted for such a prodigious length of time, and to this we think the political and intellectual circumstances of the age which saw its birth largely contributed. Progress of any kind has been due to a very small number of races out of the vast family of mankind, and among these few races the actual number of persons who make any serious effort to advance knowledge is exceedingly small,

so that there is always a tendency, even among the more intellectually active nations, for the effort to be relaxed and the pursuit of knowledge abandoned. To the vast majority of mankind thinking is an extremely difficult and unpleasant process, and anybody who can provide a decent escape from this painful duty will usually find a ready acceptance.

Unconsciously Galen flattered this common instinct of mankind. His was not one of those minds which arouse, fertilise, stimulate, and invigorate the spirits of men; rather was his the kind of mind which seeks to bar all avenues to further progress by the elaboration of a system. His numerous writings, on which he spared no pains, and which were extremely well written; the complete and rounded-off character of his conclusions, which seemed to furnish an answer for every question, a solution for every difficulty; the complicated logical apparatus which accompanied them, together with his vast and grandiose philosophic conceptions, all contributed to give to him an almost papal dignity and infallibility in the mediæval medical world. Later, too, when the torch of civilisation passed to the Arabs, his system came among a people peculiarly fitted by their natural temperament and religion for the acceptance of authority; consequently with them Galen obtained a renewed lease of life. What the people of those ages failed to realise was that medical science must of necessity, as Plato would tell us, be immersed in the particulars of sense, and although philosophy may

widen its conceptions and invigorate its tone, no amount of speculation or metaphysical reasoning can be a substitute for the exact and detailed knowledge which is so essential a part of medicine. Just as a man who is navigating an unknown and winding river may profitably ascend from time to time a neighbouring height and, surveying the surrounding country, take stock of his position and general direction, yet if he does not come down to the river's edge and note each shoal and rapid, current and sandbank, his boat's voyage will be endangered or indefinitely delayed—similarly, it is helpful in the sphere of medicine at times to scale with Galen the breezy heights of philosophy and view the position of our art in the light of the economy of the whole universe; but unless we descend to the particulars and methods of medical science no serious advance will be made, and, like the successors of Galen in the Middle Ages, we shall be tied and bound by the fetters of a philosophical system which, though it may have at first illuminated medicine, eventually becomes an obstacle to all progress.

CHAPTER IV

INFLUENCE OF EARLY CHRISTIANITY ON MEDICINE

WE have alluded in the last chapter to the general decadence into which medicine, together with science and philosophy, sank after the death of Galen, and have referred briefly to some of the possible causes of its fall. One cause, however, which by many has been regarded as the most important of all, remains for a somewhat longer discussion, namely, the rise of Christianity. Though it was not till the year A.D. 313, when the edict of Milan gave civil rights and toleration to the Christians throughout the Empire, that Christianity became the official religion of the State, yet long before that the small band of those who originally followed Christ had been increasing gradually in numbers, influence, and power, stimulated rather than deterred by the obloquy and persecution with which successive emperors had pursued them, till by the commencement of the fourth century they had become the most important political factor in the Empire. In the vast network of ecclesiastical machinery, with all its pomp and complicated ceremonial, which now overspread the civilised world, a Christian of the first century might have found it hard to recognise much trace of the lofty spiritual

teaching of his Master. Consequently, in ascribing any particular result to Christianity, we must remember that this name stood for a variety of influences, beliefs, and dogmas, which cannot in any fairness be said to be of the essence of the teaching of Christ, although they may have seemed to be compatible with it.

Among such influences was Judaism, which, if not very important in the political world, was of the greatest significance in the realm of thought. The Jews during their captivity in Babylon had come in contact with a variety of ideas which were quite foreign to the Mosaic law and their own theocratic government. We learn from Josephus that they adopted the magic of the Chaldees, and the opinions, fables, and usages of Oriental nations generally, but especially those of the Medes and Persians. Thus some of them were deeply impressed by the tenets of the Persian theosophy, and gave themselves up to the contemplative life. These ideas and tendencies were further accentuated by their sojourn in Egypt under the Ptolemies, and especially in Alexandria, where they came in contact with Platonism.

One of the most interesting sects of the Jews were the Essenes, who appear to have originated about 150 B.C. The name and origin of this sect is obscure, but the former may be derived from a Chaldee word "asa," meaning "healers," and in some way they appear to have been a medico-theosophical sect. According to Josephus, they studied the virtues of

roots, herbs, and stones in order to apply them to the treatment of diseases; at a later date they were regarded by the common people as capable of casting out demons and healing diseases. Their manner of life and customs recall the Pythagorean brotherhoods; the sacred oath, the seclusion in monasteries, the asceticism, the purity of body and spirit to which the associates were obliged to conform, all seem to concur in connecting this theosophical sect of the Jews with the ancient philosophical school of Magna Græcia.

The relation of the Essenes to Christianity was close and important; John the Baptist and even Christ himself are said by some to have issued from their ranks. It was this sect which gave birth to that curious compilation known as the Cabbala,¹ a mixture of Zoroastrian chimæras, Pythagoreanism, and Judaism. These strange mystical doctrines invaded the whole domain of the sciences and became united with medicine in the most intimate fashion. The Essenes held that in treating disease the main point was to set in motion the forces of the superior worlds which corresponded to the disease in question; this could only be done by him to whom the Cabbala has procured the knowledge of these worlds, and who by his piety and contemplation is rendered worthy of communicating with the celestial powers. These qualities were thought to be far more essential for

¹ The Cabbala substituted an immanent God, a God who is in nature and one with it, for the strict monotheism of the Jews.

the exercise of medicine than all earthly wisdom, which often fails us. Hence it is easy to understand the hatred which learned Jews of this sect bore to ordinary doctors.

Another influence which, by certain superficial resemblances to Christianity, tended to obscure the original purity of that religion was Neo-Platonism. The founder of this New Platonic School was Ammonius Saccas (fl. A.D. 200). He allied the teaching of the Aristotelian with that of the Platonic school, and endeavoured at the same time to unite it with the mysterious doctrines of the Orientals and also with Christianity. The earliest germs of this philosophy are to be found in the writings of Philo—the learned Jew of Alexandria (fl. A.D. 20), who sought to combine Judaism with Greek philosophy—and also in the writings of Noumenios of Apamea (fl. A.D. 150), who represented the more Christian aspect of Neo-Platonism. Though the foundation of his views was based on Platonism, “he also drew inspiration from the Magians, Egyptians, and Brahmins, and even from Moses (he speaks of Plato as a *Μωυσῆς ἀπτικίζων*).”¹ It was Noumenios who originated the doctrine of a second God, who proceeded from the Supreme Being and was the Demi-urgos or Creator of the World.

The Neo-Platonists, taking the ancient “emanation” teaching of the Indians and Persians, imagined that from the eternal source of light genii emanated, to whom man becomes equal by leading the con-

¹ Zeller's *Outlines of Greek Philosophy*, p. 314.

templative life. Of these genii there was an incredible number; all the phenomena of nature, and, in particular, diseases, were attributed to them. They have no body, but their light surrounds certain objects, as the reflection of the sun is seen in the water though it is not contained therein.¹ The mystical character of this doctrine found eloquent expression in Plotinus (*f.* A.D. 250), the most famous representative of this school, who regarded the final end of all philosophy as a union of human wisdom with the divine, and, as a means to that end, the falling into the inward contemplation of God. He could ascribe no definite property to the Deity, for the Deity is that which is above all being and all thought. As there could be no self-consciousness in God, so His personality is denied. Happiness, according to Plotinus, consists in thought, and the first condition of it is liberation from the body and all that is connected with it. In his view, it is the union with the body which is the source of all the evil in the soul, and every activity has a higher value in so far as it brings us less in contact with the world of the senses. Sensuous perception gives us but dim traces of truth. Mediated thought (*διάνοια, λογισμός*) and dialectic stand on a far higher plane; they have to do with ideas and the essence of things. But higher than these is the self-intuition of the thinking spirit, which is at the same time an intuition of the divine. This, however, admits of a distinction between the mind and the

¹ Kurt Sprengel, *Geschichte der Medizin*, sect. v. ch. 7.

intuition. The highest point is not reached until we are completely buried in ourselves and elevated even above thought, in a state of unconsciousness, ecstasy (*ἔκστασις*), and singleness (*ἄπλωσις*), suddenly filled with the divine light. Thus we become so immediately one with the primal being that all distinction between it and us disappears.¹

Porphyrus, the disciple of Plotinus, declared all knowledge to be contemptible except in so far as it accomplished the inner union of man with God. By Iamblichus (*fl.* A.D. 380) this teaching was brought into harmony with what was regarded as the highest wisdom among Chaldeans, Jews, and Greeks.

From the foregoing it would appear that the great influence on medicine in the early centuries of the Christian era was Orientalism. The constant stream of immigration from the East into the Roman Empire at this epoch brought with it a variety of new ideas, which, mingling as they did with Greek philosophy, already bereft of much of its native virility, practically overwhelmed it, so that mystic contemplation became the predominant note of the philosophic teaching of the time. Doubtless in pre-Christian eras Pythagoreanism contained much mystical teaching, and in Plato there are many mystical passages in the *Dialogues*, while even Aristotle esteemed the life of pure thought as the highest. But now Eastern philosophy, with its strong belief in the contemplative life, became absolutely in the ascendant. Christianity certainly

¹ Zeller's *Outlines of Greek Philosophy*.

tended to reinforce this standpoint, with its teaching of a future world and the importance of the spiritual life ; still no such great stress is laid upon the mystical union with God as we find in Neo-Platonism. But apart from the special views of Neo-Platonism as to the union with God being the end and aim of life, Eastern philosophy has always been unfavourable to science and the full exercise of the discursive reason, and countries or epochs in which Eastern influence has predominated have been stricken with intellectual sterility. The external circumstances of the time were still further favourable to the contemplative life and the spread of a theosophical system. Thus the existence of despotism was inimical to the study of philosophy and the sciences, for the only means of obtaining riches and honour was by intriguing for the favour of the despots. The imperial tyrants showed either an insensate hatred of philosophy or a blind partiality to superstition ; thus, while Domitian had a number of men put to death simply because they bore the title of philosopher, and Caracalla burnt the writings of Aristotle and ordered all the Peripatetic philosophers to be exterminated, Claudius erected a statue in honour of the magician Simon, and even the enlightened M. Aurelius, before undertaking any enterprise of importance, continually held counsel with the Chaldeans.

The effect of such a condition of things upon medicine may be easily predicted ; most of the medical writers who succeeded Galen were frigid

compilers, quite devoid either of original conceptions or the power of systematic observation. The theosophical speculation which was now in the ascendant maintained with Zoroaster "that many cures are effected by the help of trees and herbs, some by the knife and others by the word, for the divine word is the most sure means of healing diseases, by it the most perfect cures are obtained." Christians and pagans were alike in laying stress upon the importance of words for expelling demons; according to Iamblichus, words which are devoid of meaning were specially efficacious for this end, and hence presumably the potency of the famous "abracadabra." Most effective of all, however, were words from Oriental languages, and some physicians of the time of Galen even imagined that they increased the therapeutic power of their medicines by giving them Babylonian or Egyptian names. Marcellus Empiricus (*fl.* A.D. 400) seems to have surpassed most of his contemporaries in the strangeness of his remedies; for instance, in order to cure an ulcer of the eyelid it was necessary to take nine grains of barley, to touch the ulcer with their ends, and say each time: *φεῦγε, φεῦγε, κρίθη σε διώκει* (English, "Fly, fly, a barley corn is pursuing you"). If the ulcer was on the right eye, one had to touch it with three fingers of the left hand, spit, and say three times: "Nec mula parit, nec lapis lanam fert; nec hinc morbo caput crescat, aut si creverit, tabescat." He also restricted the preparation of medicines to certain days of the week. To preserve

oneself from inflammation of the eyes, one had to pay attention to a falling star and to count as quickly as possible from its appearance till its disappearance ; as many numbers as one could count in the time, so many years would one be free from this affection.¹

We gather from Gregory of Nazianzen that already in the second century of the Church the special gift of healing was attributed to martyrs and their relics. This belief of the Christians in the power of producing miracles, and their alliance with the ideas of the pagans, gave rise to the most pernicious errors, gross prejudices, and opinions devoid of all sound sense, which dealt a mortal blow at the sciences and brought on the thick darkness of barbarism. Much of the opposition of Christianity to science and philosophy sprang from the fact that these were so closely associated with paganism, although in reality they were only an accident, and certainly not the essence of the pagan religion.

While no impartial observer could maintain that Christianity was mainly responsible for the intellectual obscurantism which characterised the Roman world during the first few centuries of our era, it must at the same time be acknowledged that the new religion did little to dissipate that mental darkness. It would be an entire mistake to suppose that the downfall of paganism when Christianity became the State religion brought about the downfall of philosophy and science, because the decadence of in-

¹ Kurt Sprengel, *Geschichte der Medizin*, sect. vi. ch. 1.

tellectual life had set in long before the time of Constantine. No rehabilitation of paganism would have renewed the mental vigour of the Empire. We may judge of this to some extent by the reign of Julian the Apostate. This prince indeed was distinguished by his moral rather than by his intellectual superiority. On the whole he exercised a wise clemency towards the Christians, and tried to model his character largely on the philosophic doctrines of the Stoics. Intellectually, however, he was the slave of the crudest superstition of the time, and though the decided opponent of Christianity, no one sank deeper into that intellectual obscurantism of which Christianity has so often been accused than the Emperor Julian himself. He was imbued with a blind partiality for Neo-Platonism, and most of the philosophers who inundated his court were celebrated by their passion for magic and the theurgic arts. He chose his favourites among the sages who were deeply skilled in the occult sciences of magic and divination, and every impostor who pretended to reveal the secret of futurity was assured of enjoying the present hour in honour and affluence. For the purely intellectual schools of thought, such as the Epicureans and Sceptics, he had a most unphilosophic hatred. As Gibbon has so well expressed it, "By a strange contradiction he disdained the salutary yoke of the gospel while he made a voluntary offering of his reason on the altars of Jupiter and Apollo."¹

¹ *Decline and Fall of the Roman Empire*, ch. xxiii.

He even gave his adherence to the view that not only is the pride of the gods gratified by the devotion of mankind, but also that their grosser parts derive some nourishment from the fumes of sacrifice. It does not require much knowledge of Plato and Aristotle to realise the enormous gulf which separated Julian from the pure fountain of Greek philosophy, which he was ambitious of restoring. His paganism was simply an eclectic amalgam of Eastern superstitions unskillfully welded into union with the mythologies of Greece and Rome.

Oribasius of Pergamos (*f.* A.D. 360) was the favourite physician of Julian, and he helped to strengthen the emperor in his appetite for the marvellous. Julian made him quæstor of Constantinople, and sent him on an important occasion to Delphi to consult the oracle, from which he received the celebrated answer that henceforth the oracles would be dumb. Oribasius was banished by the succeeding emperors Valentinian and Valens, but was recalled later on when they found that they could not dispense with his medical services. He made copious extracts from Galen, and in fact from all the great Greek writers on medicine, but there is hardly a trace of any originality to be found in his works. He did, however, inculcate a few special gymnastic exercises, and also described the cases which are suitable for venesection, and the best situation for doing it. Compared, however, with other physicians in this decadent era, Oribasius was a miracle of scientific

sanity. Thus Marcellus of Sido (*fl.* A.D. 150) wrote forty-two books on medicine in hexameter verse, of which two fragments have come down to us, one giving a description of a particular kind of melancholy known as lycanthropia,¹ the other describing the various fish which are useful in medicine. Vindicius (*fl.* 370), the physician of Valentinian, wrote a poem on treacle. Sextus Placitus Papiensis (*fl.* 350) tells us of various remedies drawn from the animal kingdom; we can appraise their value by the following examples: "The heart of a hare to be applied to the neck in quartan fever; in order to be free from attacks of colic for the rest of one's days, one should boil and eat immediately a new-born puppy." When attacked by an acute fever one should cut a splinter from the door beneath which a maniac has passed, and say at the same time, "Tollo te ut ille febris liberetur."

Though very many of the Christians, no less than the pagans and Jews, gave themselves up to magic with a zeal which threatened the total annihilation of science, and a certain sect of Christians—the Ophianians—established the worship of serpents, yet in justice to the orthodox Church in her official capacity it must be admitted that she always repelled the absurdities of magic, and openly bore witness to the horror with which they inspired her, while the first Christian emperors had issued severe edicts against all kinds of divination.

¹ Haeser, *Geschichte der Medizin*, vol. i. p. 340.

The ineptitude of human reason in the light of divine revelation, the vanity of things temporal compared with things eternal—views such as these could not but be unfavourable to the progress of so mundane a science as medicine. It does not seem to have occurred to the early Christians that whatever may be the truth about first causes, as indicated by divine revelation, the inquiry into secondary causes, with which alone medicine is concerned, is neither foolish nor impious; the vanities of the present world were exchanged not for the sublime metaphysical realities of Plato, but for the somewhat crude materialism of another world. There is no reason to suppose that this attitude of the early Christians was in any way representative of their Founder, but it was rather due to the natural dislike of thinking which is characteristic of the vast majority of mankind, but specially of those who are dominated by Eastern influences. Although the influence of Christianity upon medicine, viewed as a science, was unfavourable, there was another aspect in which this influence was wholly beneficent. Pagan philosophy, with its eye fixed upon the State, took but small account of the individual, so that the poor, the sick, and the aged were apt to be regarded as useless encumbrances. Certainly in the ancient world there were no settled institutions or hospitals for the care of the poor and sick, but to some extent the existence of slavery served to protect those who were in excessive wretchedness. "Valetudinaria" were infirmaries for slaves who were

exhausted by overwork, yet so little human relationship was there between man and man that Cato recommended the sale of old and worn-out sick slaves. The best evidence of the fact that the ancient world was ignorant of hospitals in our sense of the term lies in the amazement of the heathen when they beheld the first institution of the kind, and by the zeal of the Emperor Julian to do likewise. "We see," said the pagan Emperor, "what makes the enemies of the gods so strong, their humanity to strangers and the poor, and their holiness of life. It is a shame to think that the Galilæans practise their mercy not only on those of the same faith, but even on the servants of the gods." This large-minded charity of the early Christians was certainly a new feature in the pagan world, and must have aided powerfully in the spread of the Gospel. The care of the sick appeared to them as one of the works most pleasing to God; and many religious men and women took over the care of the sick for their life's work.

In the quite early days of Christianity, in consequence of the persecutions to which they were subjected, the Christians were able to do but little in the way of establishing institutions of mercy; but when they obtained the dominion of the heathen world, and the treasures of the heathen temples flowed in to their congregations, then there arose institutions for the sick and poor on a truly magnificent scale. Even in the time of St. Chrysostom (*f.* A.D. 390) the

churches of Constantinople had to support daily 3000 poor, not counting prisoners, strangers, and lepers. The first great establishment for the sick and poor was made by St. Basil, Bishop of Cæsarea (370-379), and it was regarded as more wonderful than the pyramids and colossus of Rhodes. Into this vast almshouse (*πτωχωτροφείον*) were gathered together vast numbers of the poor, the fallen, the sick, and afflicted from all parts of Christendom. St. Basil himself was very liable to illness, and had himself studied medicine, which he declares to be the noblest of all worldly professions.¹ He did not, however, believe that all diseases are produced by nature, or even by our own vices and bad habits; "some are sent directly from God Himself as trials of our faith or punishments for some forgotten sin, and whenever we are conscious of this we should not go to a physician, but bear patiently the chastening of the Lord till He sees fit to remove it." Christianity bore witness to the value of each individual life in a manner quite unknown to the pagan world, which had permitted to the father the right of killing or exposing his new-born child. To prevent this Nerva had given lands to the poorest inhabitants, and Trajan had insisted upon 5000 children being publicly supported. The care of abandoned children was among the most important duties of the deaconesses in the early Christian communities, but it was not till the Council of Nicæa in the fourth century that foundling

¹ Withington, *History of Medicine*, p. 121.

hospitals were systematically established, which have continued since then in the Christian world. Eudocia, the wife of Theodosius, erected in Jerusalem hospitals as well as churches and cloisters. We know further from the Justinian code that money was often left to found hospitals. The care of the sick in these hospitals was entrusted to monks and "Parabolani,"¹ who regarded it as a divine service and a means of assuring their salvation; these latter also sought out the sick and tended them in their own houses, specially at times of epidemics; unfortunately, they too often degenerated into being the body-guards of turbulent bishops, and, leaving their peaceful duties among the sick, employed physical force to assert or refute some theological doctrine. It was this appetite for religious controversy as much as anything else which, by absorbing the intellectual energies of the age, had so sterilising an effect upon the progress of science. Such controversies were, of course, due to rival sects within the Church, and at this distance of time seem peculiarly unedifying.

While the value attached by Christianity to the individual lives of the most wretched and outcast of mankind gave rise to the beneficent institutions we have described, the truths of Christianity, being primarily concerned with and designed to meet the spiritual necessities of man, could not be extended

¹ Probably derived from *παραβάλλεσθαι*, "to throw oneself into danger," because it was very perilous to tend the sick during an epidemic (Kurt Sprengel, *Geschichte der Medizin*, sect. v. ch. 8).

to the phenomenal world without disastrous results. Whatever unfavourable influence Christianity may have exercised on the development of medicine and science generally, was due to the confusion of thought which induced the officials of the ecclesiastical hierarchy to apply the truths which deal with a world unconditioned by time and space to a world which is so conditioned.

CHAPTER V

ARAB MEDICINE AND ARAB PHILOSOPHY

THE rise of the Arabian Empire, associated as it was with the revelation of a new religion which overspread a large portion of the surface of the globe, introduced a fresh and alien element into the worn-out civilisation of the Old World. Everything went down before this young and vigorous conquering power, with its simple if somewhat crude watchwords. In consequence of this energy and success in the material world, as contrasted with the general supineness of the Dark Ages, the value of the Arabian civilisation to the mental development of mankind has been rated too highly. Subsequent generations have attached to the medicine and philosophy which flourished under the sway of the Arabs an importance they are far from deserving. To this day we gaze with admiration at the wonderful architectural remains of the Arab dominion in Spain, we read of sciences being encouraged and magnificent libraries being founded by the haughty caliphs, and we fondly imagine that all this meant a great deal of intellectual ferment and activity. As a matter of fact it meant nothing of the kind. The founding of Bagdad in the middle of the eighth century, in spite of the six

thousand savants attracted to the town, the opening of the library at Cordova (915), in spite of its 600,000 MSS., requiring forty-four volumes to catalogue them, the possession by private individuals of libraries containing 100,000 volumes, represented far more the love of grandeur, inherent in the Oriental potentate, than the hungering and thirsting after knowledge characteristic of the Western mind. The founding of universities and the opening of libraries do not necessarily imply any real interest in the intellectual life; at one time it may be a mere matter of fashion, at another simply a means of fostering and improving the practical arts.

That a vast amount of energy was devoted by the Arabs to the study of medicine is amply attested by the voluminous writings of their physicians, but this constitutes no evidence of any serious interest in matters intellectual. For medicine is a subject which will always appeal alike to the smallest and to the greatest mind; here the crudest materialism may join hands with the loftiest idealism, and the untutored savage seeking a salve for his wound may seem to be engaged on the same task as the philosopher who is trying to solve the mystery of pain. Neither medicine nor philosophy were native products of Arab civilisation, for both were borrowed from the Greeks; on neither was set by it the seal of any original thought.

Slowly filtering through a variety of tortuous channels, the philosophy and medicine of Greece came to the Arabs strangely altered from their ori-

ginal purity. Their first teachers were the Nestorian Christians, who, having objected to the expression *θεοτόκος* (Mother of God) as applied to the Virgin Mary,¹ had been expelled by the Orthodox Church (A.D. 431). Thus excommunicated, these unfortunate heretics, shut off from the teaching of theology, betook themselves to the study of medicine. The main scene of their labours was Edessa, a town of Mesopotamia, celebrated for the famous portrait of Christ, supposed to have been painted by St. Luke and sent by the Saviour Himself with a letter to Abgar, King of Edessa. Here they established a school of medicine which for a time rivalled that of Alexandria. But even this apparently innocent and useful occupation did not escape the jealousy of ecclesiastical orthodoxy, and in 489 the Emperor Zeno, at the instigation of the Bishop Cyrus, published an edict ordering the school to be closed and the heretics to be banished from the Empire; thus their lecture-halls were destroyed, and from the materials was built a church dedicated to Mary, "the Mother of God," in defiance of the detested opinions of the Nestorians. The latter fled to Persia, where they were favourably received, and chose Gondisapor

¹ "Nestorius revered the Blessed Virgin as the Mother of Christ, but his ears were offended with the rash and recent title of Mother of God, which had been insensibly adopted since the origin of the Arian controversy; as patriarch of Constantinople he preached against the use or abuse of a word unknown to the Apostles, unauthorised by the churches, which could only tend to alarm the timorous, to mislead the simple, to amuse the profane, and to justify by a seeming resemblance the old genealogy of Olympus" (Gibbon, *Decline and Fall of the Roman Empire*, ch. 47).

as their medical centre, where a university already existed, apparently in the hands of the Zoroastrians. The town was built on the model of Constantinople, and the doctors established a school of Hippocrates there. In this school many Persians and Arabs were trained, the professors for the most part being Nestorian Christians, who taught theology as well as medicine and other sciences. Here was a public hospital at which young doctors learned to treat disease, but they were only admitted after passing certain examinations, which involved reading the Psalms of David, the New Testament, and various prayers. These heretical Christians, however, seem to have been liberal enough to allow the pagan philosophers to take part in the teaching, and as Nestorianism had spread to India and China, even Hindu physicians appeared as professors at Gondisapor. "Thus there were gathered into one town the ancient knowledge of the East, the remains of Greek thought, and the most liberal-minded of the Christians." ¹

On the surface, nothing could have seemed more favourable for the advance alike of medicine and philosophy. What development might now have ensued in these two spheres of intellectual activity, but for the advent of Mohammed and the Koran, it is useless to discuss. If, however, it be true that in the long run every nation has the government which it deserves, so certainly it seems that every

¹ Withington, *Medical History from the Earliest Times*, p. 127.

nation adopts the religion suited to its mental temper. Consequently, when we speak of the effect of Moham-
medanism upon the progress of medicine and philo-
sophy, we must not look upon it as a force acting
ab extra, but rather as being intimately bound up
with and giving expression to the natural temperament
of the Arabs. Now, that temperament instinctively
craved for authority, and it was because Mohammed
could so amply satisfy this craving that the success
which he obtained at first with his own people was
so enormous. Once welded into unity by this means,
they were enabled to overcome every obstacle by
the fire of their enthusiasm, the simplicity of their
life, and the certainty of their convictions. It would
be a mistake to suppose that the speculative activity
of the Arab was crushed out by the iron fetters of
the Koran. Doubtless, for the true Mussulman, in
comparison with the Koran there was no need of
human wisdom or secular knowledge; yet had there
been no Koran the average Arab would not have
shown any great intellectual appetite. Before the
advent of Mohammed, "in the time of Ignorance"
as they termed it, the only sciences cultivated were
those dealing with genealogy, to enable them to settle
family disputes, such knowledge of the fixed stars
as might help them to foretell the weather, and the
interpretation of dreams. The Koran merely elevated
into a virtue the innate intellectual sluggishness of
the Arab by condemning to hell and eternal punish-
ment the small number of enlightened Arabs who

might have occupied themselves with philosophy, and who would doubtless anyhow have been socially ostracised and subjected to the petty persecution of obscurantist zeal.

Such being the natural temperament of the Arabs, by an unerring instinct they seem to have sought out and selected the physician among the Greeks who most readily satisfied this yearning for authority, and therefore they took Galen as their model and guide in matters medical. But they did not imitate his strenuous method and mental processes ; they simply accepted his conclusions without verification as constituting a permanent body of medical truth. His all-embracing system, which had an answer for every doubt, a solution for every difficulty, was just what they required ; here was the high-priest of medicine, and his writings a veritable Koran for the healing art. In so far as the Arabs possessed any medicine unborrowed from the Greeks, it was a pure empiricism. All the means for curing diseases were indifferent, and by preference they employed superstitious formulae in order to exorcise the demons which they thought to be the cause of most diseases. Though the main influence on Arab medicine was undoubtedly Greek, it was so in the letter only, and not in the spirit. For the true Greek spirit never descended or could descend upon the followers of Mohammed. No Arab knew anything of Greek in the original ; at most, Greek writings had been translated into Syriac and thence into Arabic, so that the chances

of textual error were considerable. Then, too, it was not the authors of the most glorious time of Greek history who were translated—not Homer, Æschylus, Euripides, or Thucydides, &c. Even with Aristotle their acquaintance was third-hand, for it was the Aristotle only of the Alexandrines whom they knew, and his works had become an unrecognisable caricature by means of the pseudo-Platonic, Judaic, and Christian dogmas with which they were overlaid.¹ This Arabianised Aristotle passed into the service of the Koran, just as with the Jews he passed into the service of the Talmud, and with the Christians into that of the Church. The only natural history which was translated was that of Dioscorides; the writings of Theophrastus and Aristotle's history of animals were not translated.

Of all the sciences connected with medicine, the most fundamental—namely, anatomy—was the one which least engaged the attention of the Arab professors. Not only was the practical detailed work of this science repugnant to their temperament, but the dissection of human bodies defiled the Mussulman, and was rigidly forbidden by his religion. For the Mussulman believes that after death the soul does not leave the body suddenly, but passes by degrees from one member to another, and finally into the breast; so that to dissect a dead man would mean cruel martyrdom to him. Besides this the Moham-medans, borrowing the idea from the Jews, think that

¹ Haeser, *Geschichte der Medizin*, vol. i. p. 555.

the dead are judged in their graves by two angels—Nakkir and Monker—at whose tribunal they must appear erect; hence the dead body must be whole in order to submit to the judgment.¹ As the Koran forbade the representation of living beings, Arab medicine had to dispense with the necessary anatomical models. Consequently anatomy could make no advance, and for all that they did know they were still dependent on Galen. One Arab physician—Abdollatif—did indeed establish the true principle that anatomy is not to be learned from books only, and that the dogmas of Galen must yield before an autopsy; but he found few disciples, although he had the merit of discovering two mistakes in the anatomy of Galen. Thus he pointed out that neither the inferior maxilla nor the sacrum were made up of several bones, as Galen had maintained. This observation he was able to make without defiling himself with dissection, by chancing to come across a heap of skeletons, which he carefully examined. He expressed the intention, if Providence permitted, of writing a book of revised anatomy, comparing Galen with nature. Had he been able to accomplish this, doubtless many other Galenical errors would have been brought to light, and some of the work of the Italian anatomists of the Renaissance might have been anticipated.

To the study of chemistry and pharmacy there were not the same obstacles, and to them the Arabs

¹ Kurt Sprengel, *Geschichte der Medizin*, sect. vi. ch. 5.

devoted extraordinary zeal. Much of the attraction of chemistry was doubtless due to the vain hope of transmuting the metals. There was even a chemical society at Fez, thus contemptuously described by Leo Africanus: "There is a most stupid set of men who contaminate themselves with sulphur and other horrible stinks. They are wont to meet in the evening at the principal mosque, and there dispute over their vain imaginations."¹ Their writings on materia medica were most voluminous, and those of Mesüa the younger (1015) formed the foundation of the western pharmacopœias, and were consulted up to the beginning of the eighteenth century.

One of the best-known Arabian physicians was Rhazes (*fl.* 850-920), who is still famous for having been the first to discriminate between measles and smallpox. In his youth he devoted himself to music, but abandoned this in order to apply himself to medicine, which, together with philosophy, became the main object of his studies. He distinguished between febrile and non-febrile heat; for the latter, he says, may follow a drinking-bout, but is not fever. He also distinguished between the laryngeal and the recurrent laryngeal nerve. Like Hippocrates, he attached great importance to prognosis, and wrote a book of aphorisms modelled on that of the great Greek physician, in which, with all the emphasis of the Oriental, and in a mystic style, he sets forth the great discoveries he has made, and shows a predilec-

¹ Withington, *Medical History*, p. 169.

tion for astrology. His pathology was the same as that of Galen, combined with some principles of methodism. In philosophy he was a great student of Aristotle, but has been accused of misunderstanding the Peripatetic system, which caused him to throw himself into the arms of Pyrrhonism. Following the fashion of the age, however, he preferred the philosophy of the Neo-Platonists to that of all other sects, and he tried to unite it with scepticism. He must have been a great student of the works of other physicians, for we find him saying: "He who reads attentively and meditates on the writings of former doctors acquires in the short space of a lifetime more knowledge than he could get together by tending the sick for several centuries; for it is impossible for one man, however long his career, to arrive at the greater part of medical truths unless he profits by the experience of his predecessors." His books, which were largely derived from the physician Oribasius, were dedicated to the enlightened Caliph Almansor, who had incurred the hostility of the orthodox by favouring philosophy, and thus diminishing the authority of the Koran. Rhazes received the post of director of the hospital at Bagdad. It is related of him that when asked to choose a site for the hospital, he hung up pieces of meat in various parts of the city, declaring that the one in which putrefaction last appeared would mark the most suitable position.

More famous than Rhazes was his successor, Avicenna (*fl.* 988-1036), who rivalled Aristotle and

Galen in his prolonged influence over the scientific world. His youth was characterised by an extraordinary mental activity. He tells us that when he experienced great difficulty in understanding a thing he prayed to God to give him part of His wisdom, and his prayers were always answered. The *Metaphysics* of Aristotle was the only book he could not understand; after having re-read it forty times he threw it aside, full of vexation with himself. According to him, "Medicine is no hard and thorny science, like mathematics and metaphysics, so I soon made great progress"; and indeed such seems to have been the case, as at the early age of eighteen he performed an important operation on the Caliph Nukh.

The great system which he elaborated, called "The Canon of Avicenna," prevailed in the medical world for six centuries. The reason for the remarkable success of his system, which was out of all proportion to its intrinsic merit, lies in the fact that the mediæval mind regarded medicine as an apparently fixed body of unchanging truth, and the various scattered medical doctrines were collected by Avicenna into one vast corpus and set forth with great lucidity and logical cogency. He dispensed with every kind of research, and this particularly suited the temper of the Middle Ages, when even the habit of thinking was lost. Science limited itself to possessing the knowledge acquired by the ancients, and the Canon contained nearly all that had been said up to that time by Greek and Arab physicians.

Avicenna was greater as a philosopher than as a physician, his object being to reconcile the doctrines of Aristotle with those of Galen, just as St. Thomas Aquinas two centuries later reconciled them with the Catholic Church.¹ In speaking of the causation of disease, he discusses not only the primitive, antecedent, and conjoint causes of Galen, but also the material, formal, efficient, and final causes of Aristotle. This combination was very impressive to the mediæval physician, who held that where Aristotle and Galen differed none could decide, and that where they agreed none could dissent. He compares the doctor to the priest, and says that the former, like the latter, employs reasoning but little ; however, they may both be considered as philosophers, and in that capacity they have a right to reason. He himself uses this privilege of philosophers, but is seldom original ; he is always influenced by Galen, Aetius, or Rhazes ; when he forsakes them he follows Aristotle.² His ignorance of anatomy and natural history was astonishing. He had odd ideas about vital spirits, and in general upon hypothetical aerial substances which preside over sensation, and when disturbed give rise to melancholy. He showed more insight in pointing out the difference made by climates to remedies ; thus he says that the purgatives of the Greeks should not be used in Persia, and that scammony becomes entirely inactive in Bokhara. From the time of

¹ Withington, *Medical History*, p. 153.

² Kurt Sprengel, *Geschichte der Medizin*, sect. vi. ch. 5.

Avicenna dates the absurd custom of gilding and silvering pills, which arose from the idea formed of the energetic properties of gold and silver. This strange prejudice caused the precious metals to be used for the manufacture of cauterising instruments, and Albucasis wrote a celebrated book in which he combats this prejudice, saying that iron, far from being inferior to gold and silver, is, on the contrary, the most suitable metal for surgical instruments. Stagnant and futile as the intellectual life of the Eastern Caliphate seems to have been, contact in Spain with an Aryan civilisation poured new life into the dried-up springs of Arab thought. Two striking names appear before us as representative of medicine and philosophy in the Western Caliphate of Spain—namely, Averrhoes and Maimonides—who gave evidence of mental activity and speculative daring quite alien to the genius of the Koran, and certainly in direct hostility to it. The seed which was then sown fell upon stony ground, as it was not until the Renaissance that medicine could shake itself free from the shackles of mediævalism.

Averrhoes (*d.* 1200) was a native of Cordova, and his father was high-priest of Andalusia. In his youth he studied law and theology, but soon turned his attention to philosophy and medicine, learning the elements of the latter from Avenzoar, the physician of Seville. He threw himself ardently into the study of Aristotle, whom, however, he appears often to have misunderstood by relying too closely on the commentators—Ammenius and Themistius—who were

attached to the doctrines of the Neo-Platonists; consequently his theories had much analogy with the pantheism of the Alexandrine Greeks. He raised up a great storm of opposition, being accused of attacking the precepts of Islam, while the orthodox Christians charged him with horrible crimes and blasphemous discourses. In medicine as in philosophy he kept closer to the Arabianised system of Aristotle than to that of Galen. He wrote a small treatise endeavouring with moderation to overthrow the Galenical system, and to establish in its place that of the Peripatetics, making, with Aristotle, the heart the origin of the whole vascular system and the seat of sensation. Averrhoes tried to base the doctrine of Aristotle upon a new and more solid foundation, and to combine the dialectic of the Greeks with medicine. His medical treatise was translated into Latin and known as the *Colliget*, in which he applies the Peripatetic philosophy to the healing art. He said that no one could understand his book without being initiated into the mysteries of dialectics. For the most part his writings are lucid and logical. He taught the doctrine of a Universal Reason (other than the individual reasons), indivisible but shared in by all, and denied the immortality of individual men. He expounded the Koran according to Aristotle, and so founded a Moslem philosophy of religion which gave rise to many heresies. In opposition to Arabian orthodoxy, Averrhoes appeared on the side of reason as the defender of philosophy.

The other famous name was that of Maimonides (Moses ben Maimon). He was born at Cordova (1135), and there, under the most distinguished Arabic masters of the time, he devoted himself to the study of medicine, theology, and Aristotelian philosophy. Though Jewish, his family outwardly conformed to Mohammedanism; but when a decree went forth that all Jews and Christians must accept Islam or leave the country, he emigrated to Egypt and became physician to the reigning sultan, Saladin. His medical works, which were numerous, do not show any special originality; perhaps the best known is the book on poisons and their antidotes, a more or less popular work, being a sort of first aid to the poisoned. He wrote also about phthisis and other diseases of the lungs, a book on diet conceived entirely in the Hippocratic spirit, and commentaries on the aphorisms of Hippocrates. The value of Maimonides to medicine does not consist, however, in his medical writings, but in the fresh and enlightened spirit which he introduced into the barren speculation of that gloomy age. He was famous as a philosophic champion of reason, and endeavoured to explain the Bible by the light of reason, with which, as the highest divine gift in man, nothing really divine could stand in contradiction. The miracles themselves, though not always traceable to their immediate cause, yet cannot be wrought in opposition to the physical and everlasting laws of nature. Where a literal interpretation of the Bible jars on the feelings of

reverence towards God, there an allegorical explanation is adopted without hesitation. He believed in the freedom of the will, and held that Providence reigns in a broad manner over humanity; but he utterly denied the working of Providence in the particular events which befall the individual, who is subject above all to the great physical laws, and must learn to understand and obey them. The soul, and the soul only, is immortal; the reward of virtue consists in the soul's bliss in a world to come, while the punishment of vice is the loss of the soul.

Such were the advanced views of the last great physician who wrote in Arabic, which four centuries later were to inspire the noble philosophy of Spinoza; but upon medicine the effect was only indirect, as helping forward the time when men should see, in the words of Bishop Butler, "that things are what they are, and the consequences of them will be what they will be."

CHAPTER VI

VARIOUS INFLUENCES AFFECTING MEDICINE IN THE MIDDLE AGES

TO the physician of the twentieth century the study of medicine as practised in the Middle Ages can hardly but seem a peculiarly barren and futile occupation ; for the epithet mediæval, when applied to anything connected with the physical sciences or medicine, carries with it the idea of all that is fantastic, absurd, and obscurantist. Doubtless the mental energies of the physicians of that epoch were in no way inferior to those of our physicians to-day, but they were crippled by an erroneous method and hampered by a false doctrine ; starting from the outset on a wrong scent, it is hardly surprising that but little of permanent value was brought back from the pursuit of truth in matters medical. The fatal doctrine of the dualism between the soul and body, received by tradition from the early Christians, who regarded their living bodies with contempt, had permeated the intellectual world of the Middle Ages. Their activities were, in consequence, largely busied with the salvation of the soul and the affairs of the inner life, so that the sciences devoted mainly to the study of the body seemed mean and of little worth.

Medicine would, indeed, have played an even more subordinate part in the Middle Ages had it not been for the fact that it was practised by many of the clergy ; while high dignitaries of the Catholic Church, and even popes, deigned to interest themselves in it from time to time. But the attempt on the part of the Church to embrace all knowledge, both human and divine, and to make *ex cathedrâ* pronouncements upon subjects which could only be comprehended by the long result of time, had obviously a paralysing effect upon all patient effort directed towards the understanding of the objective world. At the same time the Church, by thus making herself the arbiter of all forms of knowledge, did at least bear witness to the essential unity of human life and human knowledge, without which conception, all comprehension of the universe becomes impossible. As we have said in an earlier chapter, it is an obvious necessity for the attainment of ultimate truth that all the several arts and sciences, following the evolutionary law of progress from homogeneity to heterogeneity, should, for a time at least, shut themselves into their separate compartments, and there, quietly working away, bring eventually the results of their labours before the master science of philosophy, in which will be mirrored the essential unity of human knowledge based upon a firm foundation. The mediæval physicians were so much impressed by the idea of the unity of all knowledge, that they failed to see the importance of ensuring a sound groundwork for each particular

department of knowledge. Immersed as they were in abstract speculations, they did not perceive that the aim of medicine was, in the words of W. Pater, "to make the body the quiet handmaid of the soul," and that this must be done, not by ignoring the body, but by understanding it. Their imperfect estimate of the value of the body made them less strenuous in tracking out the sources of disease and less careful of life in general. Even the great attention which, as we shall see, was bestowed upon lepers in the Middle Ages, sprang not so much from natural feelings of humanity, as from the belief that care thus bestowed had a special value in the sight of God and would help in forwarding the salvation of those who practised it.

The Universities.—An important influence, which infused an invigorating energy into the heavy and stagnant intellectual atmosphere of the Middle Ages, was the rise and development of the universities in Europe. These admirable institutions did more, perhaps, towards stimulating interest in medical studies than in any other spheres of mental activity. Italy rightly claims to have been first in the field as regards the founding of universities. Their special excellence lay in the fact that they were largely non-ecclesiastical in origin; they constituted the earliest beginnings of that spirit which asserted the possibility of some intellectual life outside the ordinances and enactments of clerical authority. The need for some scientific culture, which for centuries had been represented

entirely by the clergy, was now gradually making itself felt in wider classes.

These early Italian universities, originating from the laity, were comparatively democratic in character, electing their own Rector and perhaps their teachers, and receiving their privileges from the Emperor. In England, France, and Germany, on the other hand, the universities arose out of the cathedral schools, and were quite under the dominion of the ecclesiastical hierarchy. Of all these early universities, the most celebrated from a medical point of view was that of Salerno. Its origin is veiled in a mythical gloom; probably it already existed in the ninth century, but even in the tenth nothing certain was known of its foundation. Doubtless it was an entirely secular institution, and probably arose from a union of doctors settled in the town. Some of these doctors appeared as teachers, and their example was followed by jurists and philosophers, so that gradually a university was developed which embraced the whole circle of learned knowledge with the exception of theology. Its secular character is further attested by the fact that among the teachers were women, the wives and daughters of the professors, whose activity was not confined to gynæcology, but ranged over the whole field of medicine. By the eleventh century the reputation of Salerno had so far increased that princes of State and Church came there to seek medical advice, and it was even consulted by Robert of Normandy in consequence of a wound received in battle.

The great merit of the University of Salerno lay in the fact that, in an epoch of endless chaos and confusion, it provided a city of refuge for the healing art, and was not unjustly called the *civitas Hippocratica*. It was the only city in the western world where the higher medical culture could be obtained. Its reputation was still further enhanced by the decrees of the Emperor Frederick II. That enlightened monarch refused to permit any one to practise medicine in the kingdom of Naples before he had been examined by the medical college of Salerno. This examination consisted in explaining publicly parts of Galen, Avicenna, and Hippocrates; the candidate was also questioned on the *Physics* and *Analytics* of Aristotle. A further enactment resolved that "as progress in medicine is impossible without a knowledge of logic, no one should be allowed to study the art of healing who has not devoted at least three years to reading logic." Needless to say that no practical acquaintance with disease was required in these examinations. For a long time the medical school of Salerno held firmly to Greek medicine, even at a time when Arab philosophy was reigning supreme elsewhere, and its fame in medical history is largely due to this fact. Gradually, however, Arab influence began to undermine the Hellenic traditions of Salerno. The inspirer of this new influence was Constantine the African, who, having visited the Arab schools of Bagdad, India, and Egypt, and having spent thirty-nine years in wandering through the most remote

regions of Asia, finally took refuge at Salerno, becoming the private secretary of Robert Guiscard, Duke of Apulia. He then devoted the remainder of his days to translating Arab writings, the study of which at Salerno from that time became more fashionable than that of Greek and Latin literature. In the thirteenth century the victory of the Arabs over the intellectual world was complete, and by the middle of the fourteenth century the ancient fame of the school of Salerno was irreparably lost. Shorn of its ancient splendour, it lingered on till the nineteenth century, when Napoleon abolished the university by a stroke of the pen. The weak point of this school was its ignorance of anatomy; doctors were quite satisfied if they merely knew the names of the different parts of the body. In diagnosis they considered the examination of the pulse and uroscopy to be most important. Their therapeutics, so long as they followed Hippocrates and Galen, were largely dietetic, but when Arab medicine obtained the upper hand there was an enormous influx of new drugs. A high development of the art of cooking for the sick seems to have been reached; also attention was paid to the comfort of the sick-room, which was cooled by a method of letting drops of water fall and evaporate (*ejus aeris infrigidatio magis confert ægrotanti quam medicina interius recepta*).

The rise of other universities helped to throw Salerno still further into the background; thus, Bologna, Padua, Montpellier, and particularly Naples, all became serious rivals for medical supremacy.

Bologna, as a university, rose into importance as the fame of Salerno waned. It represented the conservative aspect of medicine, still clinging to the old Greek ideals which Salerno had forsaken for Arab learning. The most famous exponent of this school was Thaddæus Florentinus (*f.* 1260), who was famous both as a practitioner and dialectician. Up to the age of thirty he remained absolutely uneducated, gaining his livelihood by selling candles at the church doors. His most important works consisted in commentaries on Hippocrates and Galen, which were written in Italian, and so constituted him one of the early founders of the Italian written language. His *Regimen Sanitatis*, which was a prose paraphrase of the famous *Regimen Salernitanum*, was written in Italian, and, it is interesting to note, on account of its style, was violently attacked in the *Convito* by Dante, who was a political enemy of Thaddæus. One of his works written in Latin ends with the following words, showing the difficulty with which literary composition was conducted in those days: "Scio tamen, quod de his obscure dixi; sed fessus sum et deficit charta."¹ Another famous physician of this school was Dino di Garbo, who was a favourite of King Robert of Sicily. Of him it was said, "Secutus est Galenum sicut evangelium," thus exemplifying the conservative traditions of his university.

In contrast to Bologna, the University of Padua—famous to us in England as the medical school

¹ Haeser, *Gesch. der Med.*, vol. i. p. 701.

where our illustrious countryman Harvey studied—represented a decided movement towards progress, as might have been expected from its liberal-minded founder, Frederick II. (1221). At the head of this school was Petrus Aponensis (1250–1315), better known as Peter of Abano. He spent many years of his life at Constantinople, where he attained to an exceptional knowledge of the Greek language. He then taught in Paris, where, being suspected by the Dominicans as a heretic and a supporter of magic, he was persecuted, and in consequence fled to Padua. Here he had a great following, and a new medical professorship was specially founded for him. But after his death his bones were dug up and burnt; his sentence of condemnation was publicly read; his memory was devoted to eternal infamy and his wealth (which was great) to the use of the Church. One can hardly be surprised that he came into such sharp collision with ecclesiastical authority when we consider the audacity of some of his views. Thus he denied the existence of the devil, and suggested that the case of a patient who lay in a trance for three days might help to explain some Christian miracles, even the raising of Lazarus. In physical and chemical knowledge he far surpassed his contemporaries; he knew that the atmosphere had weight and that the equator was inhabited. He recognised the brain as the origin of the nerves, and the heart as the starting-point of the blood-vessels. After the manner of his time, he discussed such

questions as whether fire is hot, whether pain is felt as pain, whether the head was intended for the brain or the eyes, whether we should sleep on the right or left side, and how often in the day we should eat.¹ He received the title of Conciliator from his book, *Conciliator Differentiarum*, which was designed to settle by means of scholastic dialectic all the philosophical and medical questions which agitated the thirteenth and early part of the fourteenth centuries.

The fourth great university was at Montpellier, which had come into existence in 738, with a population consisting of Spanish refugees, Jews, and Arabs. The university there was established in 1180 by William IV., Count of Montpellier, but its most brilliant representative, Arnald of Villanova, we shall defer describing till we come to consider the effect of scholasticism on medicine.

The Crusades.—A new and important influence was experienced by the medical art in the Crusades, which affected it in a variety of ways.

(1) The Crusades dealt a violent blow at the feudal system, since every man who fought under the banner of the Cross ceased to be under the jurisdiction of his baron, so that there was a general increase in freedom, and consequently zeal for the arts. The number of doctors who were not monks became much larger than before, and in particular the Crusades afforded an opportunity to many young surgeons of obtaining, on the battlefields of Pales-

¹ Withington, *History of Medicine from the Earliest Times*, p. 202.

tine, independent experience and practical skill in the treatment of wounds and disease.

(2) An increased intercourse with the East, introduced by the Crusades, led to an increase in superstition; because in the East men found the opportunity of satisfying their taste for the marvellous, and the translations of Arabic books of medicine and philosophy were welcomed with open arms. As has been remarked by Daremberg, that these Arab translations should have been received with such blind and unreflecting enthusiasm at the moment when the Western world was hurling itself against the followers of the Prophet is indeed an extraordinary phenomenon. To the increasing commerce with the East may also be traced the increase in the partisans of astrology, who became more numerous than those in Arabia. In addition to this, a vast number of foreign drugs were introduced from the East, while those that were indigenous fell into disuse.

(3) Great increase in the number of the hospitals. This arose partly because the Crusaders wished to imitate the Orientals, who greatly multiplied their hospitals, partly because leprosy, which increased considerably after the Crusades, rendered hospitals more necessary. Hence was formed the order of the Knights Templar, who to their twofold character of knights and monks added the labours of doctors, and treated without fee or reward all sick pilgrims. The cloaks of these knights were the symbols of

their true profession, for they had the same form as those which drape the ancient statues of Æsculapius and Hippocrates.

(4) Leprosy had doubtless been known in Europe prior to the Crusades, but owing to them it became distinctly more prevalent. This malady was carefully observed by the European physicians, and much better descriptions of the fever which ordinarily accompanies the invasion of leprosy are given by the English and French writers than by the Arabs; for the genius of observation belongs to the West rather than to the East. In accordance with popular belief, leprosy was thought to be sent immediately from God, and it was regarded as a means of putting the soul in the way of salvation and of becoming the favourite of God and His saints. This point of view not unnaturally led the devout to think that one could not better mortify and sanctify oneself than by tending a leper. St. Louis visited the leper hospital every three months, and kissed the hands and feet of the lepers. Henry III. of England did the same thing for the lepers every Maundy Thursday.

The curious sanctity which was thought to attach to the leper is shown by the story of Bruno, Archbishop of Toul (afterwards Pope Leo IX.), who received into his house a leper whom he had found wandering about in the streets. After bestowing on him every care, and even giving up to him his bed-chamber, on the following morning when he entered the room he found that the sick man had disap-

peared. To the mind of the archbishop, the most natural interpretation of this apparent ingratitude was that Jesus Christ had taken the form of a leper in order to appear to him. In the face of customs and ideas such as these, one can hardly be surprised that leprosy became so widespread and committed such extensive ravages. Other causes which may have contributed to the dissemination of the disease were (*a*) the general use of woollen clothing, linen being a comparative rarity; (*b*) the public baths, which were so much regarded as a matter of absolute necessity that the fact of Henry IV. forbidding their use contributed largely to the famous excommunication which was hurled against him.¹

Sometimes the lepers accumulated such extraordinary wealth that Philip V., King of France, accused them of fomenting a rebellion, and wished to burn them all and confiscate their goods. The police regulations made against leprosy were in the main an imitation of those in the laws of Moses.

Scholasticism.—The strange medley of Aristotelianism and Arab philosophy which we understand by Scholasticism took its rise in the eleventh century. The place of St. Augustine and John de Damas, who had hitherto dominated the opinions of men, was now taken by Aristotle; not, however, the serious and systematic philosopher of the ancient world, but an Aristotle transformed by distorted translations into an Oriental anchorite; the pure Hellenic

¹ Kurt Sprengel, *Gesch. der Medizin*, sect. vii. ch. 3.

spirit was drowned in a sea of mystic commentaries, suited, no doubt, to the temper of the Neo-Platonists, but insupportable for any one who is endowed with a sane reason.

The great problem of Scholasticism, according to Victor Cousin, originated from Porphyry in the third century, who remarked on the difficulty of settling the question as to whether genera and species have a real objective existence or are merely abstractions of the mind. Put briefly, the problem was whether our general notions of such things as man, dog, table, have any objective reality. Those who considered that they did possess such objective reality were known as Realists, while their opponents were termed Nominalists. The great importance assumed by this controversy between the Realists and Nominalists lay in the question of the doctrine of the Trinity. The Realists maintained that on the principles of Nominalism the doctrine of the Trinity was irrational and inconceivable. If, on the other hand, our general notions have an objective reality, then as from the totality of men we have an objective unity man, so from the divine Trinity of Persons we can conceive a divine unity of substance. But if, as the Nominalists maintained, general notions are mere names, then the doctrine of the Trinity in Unity becomes absurd. Naturally enough, of these two theories the Church adopted that of Realism, which harmonised with the religious tendencies of the Middle Ages. Nominalism may therefore be taken as representing the more

liberal and free-thinking spirit, and as such was championed by Roscellinus (*fl.* 1050); while Realism, which was more consistent with orthodoxy, found as its exponent William of Champeaux (*fl.* 1100). A pupil of the latter was the famous Abélard, who, however, did his best to refute the teaching of his master, and startled the world by a celebrated pamphlet in which he selected 158 points of Christian doctrine and arrayed the opinions of the most revered authorities on each. From this it appeared that the statements of St. Paul, Augustine, Gregory, Jerome, Athanasius, and others were so contradictory that no doctrine was left on which an intelligent believer could rest. Although the writings of Abélard were burnt and he himself prohibited from teaching, the new spirit which he infused into the controversy was never exorcised till the final triumph of Nominalism in the person of William of Ockham. The great importance of Abélard lies in the fact that he was firmly convinced, and publicly taught, that a faith can only be well assured which is founded on reason. "Understand that thou mayest believe," was his motto—not, Believe that thou mayest understand.

Much of the energy of the later Scholastics was expended in trying to harmonise the Christian doctrine of the resurrection and the immortality of the soul with the teaching of Aristotle, which, when expounded by Averrhoes, seemed to deny it. In this sphere of constructive energy Thomas Aquinas, most famous of Scholastic teachers, was the leading

spirit. According to his fundamental principles, faith and reason occupied two separate and distinct spheres and neither could conflict with the other. His capacious mind did not disdain to have views on medicine. He maintained that the heart was the source of all movement and the brain the seat of all sensations, whereas Aristotle had sought for the cause of sensation in the heart itself. He considered the soul to be united to the body as the substantial and not the accidental form. The hair-splitting disputes and subtle argumentations on the nature of universals and kindred abstractions, which engaged and delighted the most ingenious intellects of that time, rendered any advance in experimental philosophy almost an impossibility, so that one cannot feel astonishment at the comparative barrenness of medicine during these centuries. For the Scholastic controversy mingled even with the practical details of medicine; thus, in considering whether a decoction of barley-water was suitable for people affected with fever, it was concluded that such a beverage would not be useful, because it was a substance while fever was an accident. Our English Gilbert shows the influence of Scholasticism in his definition of fever, which he describes as "unnatural heat starting from the heart and propagating itself into the arteries so as to trouble the bodily functions." He further quaintly tells us that he is disposed to recommend the curative method of Hippocrates, but prefers to follow that of the moderns rather than be accused of

eccentricity.¹ Again we find Peter of Abano discussing whether pain constitutes a disease or only an accident ; he distinguished between material and formal pain.

For the most part doctors, like other professional men in all times, were found on the side of orthodoxy, and embraced the doctrines of Realism ; in their zeal they went so far as to instigate Louis XI. to proscribe the Nominalists by a severe edict. Though this decree was soon afterwards revoked, it had had the effect of preventing the Nominalists, or the party of liberal thought, from obtaining any foothold in France, and they accordingly passed into Germany. Scholasticism exhibited in an extreme degree the strange deficiency of the Middle Ages in common sense. This was to be supplied to them in no unstinted measure by our own country, in the person of Roger Bacon. Born in Somersetshire (1215) of a noble family, he embraced all the knowledge of his time, metaphysics, language, natural philosophy, and theology. His shrewd common sense, which amounted to genius, opposed Scholasticism with all its might. In his opinion Scholasticism had falsified philosophy, theology, and natural science ; this had been caused by four fundamental errors which vitiated the whole system—

- (a) The respect given to worthless authorities.
- (b) Clinging to deeply rooted prejudices.
- (c) The prevalence of the opinions of the uncultured masses (this seems prophetic of the *idola fori* of his greater namesake).
- (d) The presumption of the human spirit.

¹ Kurt Sprengel, *Geschichte der Medizin*, sect. vii. ch. 6.

According to Bacon, in order to renew the sciences and re-establish them on a sound basis, investigation must everywhere go back to their origins; thus in language to Greek and Oriental idioms, in theology to Holy Scripture, and in natural science to observation. He maintained that mathematics were the basis of natural science, and that experiment was the only means of discovering the processes of nature. He himself possessed an extensive knowledge of physics and chemistry. Such knowledge, however, did not prevent him from retaining a firm belief in the Elixir Vitæ, alchemy, and astrology—in fact, he declared the latter to be the basis of medicine; but it is only fair to add that he was under the impression that this science was based upon experience. A certain halo of romance surrounds the name of Roger Bacon, and tradition credits him with the invention of gunpowder, spectacles, and the telescope. However this may be, his chief title to fame, like that of his famous namesake the Chancellor, rests on the efforts which he made to free the human mind from entangling error and set it on the right path for attaining truth, rather than on specific contributions to science as such. The world has not forgotten his wise advice to study mathematics as the most certain means of acquiring exact ideas in all branches of human knowledge, which was certainly to bear fruit long afterwards in a somewhat unexpected sphere in the hands of Descartes and Spinoza. Bacon held that there was no better way of forming and purifying one's taste than

by the continual reading of the ancients, but he cautiously adds that one should not push respect to idolatry: "Non oportet nos adhærere omnibus quæ audimus et legimus, sed examinare debemus distric-tissime sententias majorum, ut addamus quæ eis defuerunt et corrigamus quæ errata sunt."

Another powerful opponent of Scholasticism came somewhat later in the person of Arnald von Villanova (1235-1312). Born in Spain and educated mainly in France, after occupying a professorial chair at Barcelona he spent some time at Montpellier, Bologna, Rome, Naples, and finally at Palermo, thus becoming acquainted with most of the leading universities. He maintained that medicine was a science, and even in its empirical parts it rested on a rational basis. Consequently he endeavoured to establish medicine on general principles instead of on the confused, disconnected particulars found among the empirics; for Hippocrates and Galen he had the greatest reverence, in particular preferring the latter to Avicenna and the Arab physicians, with the exception of Rhazes, whom he calls "Vir in speculati-one clarus, in opere promptus, in iudicio providus, in experientia approbatus." Realising the importance of diagnosis in medicine, he held that only mild and indifferent means should be employed so long as the diagnosis was uncertain. Like the school of Salerno in its best days, he emphasised the importance of dietetics, especially when dealing with children and young people. "The modest and wise physician

will never hasten to pharmacy unless compelled by necessity." The extent of his intellectual activity is shown by the fact that he was a doctor in theology, philosophy, law, and medicine, and was also acquainted with Arabic, Greek, and Hebrew. His violent attacks on the friars made for him numerous enemies, who convicted him of fourteen deadly errors, one of which was "that works of mercy and medicine are more acceptable to God than the sacrifice of the altar"; accordingly they called upon the Pope to deal with the heretic after the customs of the Church. But Clement V. having profited by the medical skill of Arnald, and even encouraged his chemical investigations, turned a deaf ear to these entreaties; and when he heard of his death he issued an encyclical informing the bishops of Christendom of the death of that pious and learned physician, and bade them search for a medical work of Arnald's which had been dedicated to himself, threatening with apostolic anathema any one who should conceal or destroy it. Arnald was a great student of alchemy, and thought that the Arabs in alcohol had made some approach to the discovery of the Elixir Vitæ. He pointed out the property possessed by alcohol of extracting the essences of herbs and roots, and laid the foundation for the tinctures of our modern pharmacopœia.¹ He did not escape from a belief in astrology, which captivated some of the best spirits of that curious age—in fact, he regarded it as an

¹ Withington, *History of Medicine*, p. 198.

essential branch of the healing art. To every hour of the day he attributed a special force, which, according to the decision of the horoscope, influenced different parts of the body. Venesection was not to be undertaken on any day indiscriminately, but under a particular constellation. Above all, the aspect of the moon was important; thus, the most suitable moment for venesection was when the moon was in the sign of Cancer, but when that planet was conjoined with Saturn all action of medicines was arrested. In his pamphlet *De Judicii Die*, published in Paris, he prophesied from astrological grounds the coming of Antichrist, the Last Day, and a general persecution of the Church.

More rational are his observations on the dangers of practising paracentesis without due consideration; also on the utility of the sulphurous baths of Naples for calculus. He further advises that aperients should not be administered in quartan fever, as they only increase the intensity of it.

One of the most distinguished followers of Arnald was Raimund Lull (1235-1315) called *doctor illuminatissimus*.¹ Born at Palma in Majorca, he spent his youth in dissipation, but subsequently became a Franciscan, and as a penance for his former iniquities, imposed upon himself the task of converting the Mohammedans. For the success of this project he learnt Arabic, and persuaded the king (Sancho) to found a school in which that language should be

¹ Kurt Sprengel, *Gesch. der Med.*, sect. vii. ch. 7.

taught by the Franciscans. Although extraordinarily ignorant, not even knowing Latin, he had the gift of talking on every subject, and so appeared to the Mussulmans as a universal sage. He was credited with possessing vast erudition, but his writings on medicine are those of a layman; he was specially renowned as an alchemist, and during his stay in London it was rumoured that he had changed fifty thousand pounds of mercury into gold for King Edward I. Much of his life was spent in lecturing against the Arabs, both at Naples and Rome, and in particular in Paris he directed his eloquence against the teaching of Averrhoes. Finally he suffered martyrdom, by stoning, on one of his missionary journeys to Africa.

Lull was the great representative of mysticism, whose home was in Spain, where the superstitions of the Cabbala were zealously studied. Mysticism now began to permeate medicine, leading to the view that the only way to arrive at the knowledge of nature and her innermost being was by a devout sinking into God and a pure mode of life.¹ By such means the great philosophical problem—namely, the finding of the philosopher's stone—was to be solved. When possessed of this, one would obtain health, long life, enormous riches, and remedies for all the ills of both body and soul. Lull is believed to have invented a machine for the acquisition of knowledge, which, perhaps, might have anticipated the

¹ Haeser, *Gesch. der Medizin*, vol. i. p. 728.

Novum Organum; at any rate, in departing from scholastic logic, and in his zeal for a true interpretation of nature, he was a forerunner of Francis Bacon.

It has been well said by Daremberg that "le moyen-âge s'est pris d'enthousiasme pour une médecine de quatrième main."¹ It would be easy to comprehend the mediæval reverence for Arabic versions of Galen and Aristotle, had they possessed no other ancient medical writings; but it so happened that they did possess the works of Celsus, as well as translations of Dioscorides, Soranus, Oribasius, Paul of Ægina, Alexander of Tralles, Galen, and Hippocrates; yet these were rejected *in toto* and the Arabic versions of Aristotle and Galen preferred. This was due in part to the natural predilection of the Middle Ages for all that was dark and obscure; the fact that a book was enigmatic was a certain recommendation to popularity. It was an age which saw cryptic meanings in sentences, words, and even letters or vowel points; perhaps, too, it may have been a deliberate policy to make all knowledge difficult and even inaccessible. The modern idea of spreading knowledge and the means of obtaining it as widely as possible would have filled the mediæval mind with horror. Men in that age were by no means convinced of the utility of truth; they were also much impressed by the idea, which is not wholly unreasonable, that truths grasped from the outside by common minds, without a sound comprehension

¹ Daremberg, *Histoire des Sciences médicales*, ch. xiii.

of their meaning, are of little real value—in fact, little better than error. But then, until some educational efforts have been made it is impossible to tell what minds are capable of intellectual illumination. Then, again, the priestly caste which dominated the Middle Ages had a vested interest in darkness, and enhanced their own intrinsic importance by keeping the rest of the world in ignorance. Since few men of any pretensions to learning were to be found except among ecclesiastics, the influence of the Church on science generally, and on medicine in particular, was enormous, and on the whole, in spite of some liberal-minded popes, inimical to their progress. The necessity felt by most physicians of connecting medicine in some way with a theology which was rigidly fixed by stereotyped rules made serious advance in that science well-nigh impossible. The mediæval mind shrank from becoming immersed in a chaos of particulars, from which the more audacious modern thinker feels confident of evolving some kind of order. Put briefly, the essential difference between mediæval and modern medicine lies in the fact that whatever theories the modern physician may propound, whether as a result of patient investigation of facts or the sudden intuition of genius, the ultimate test of truth in his case consists in the power of his hypothesis to explain the facts, whereas, in the case of the mediæval physician, the main criterion of truth was that his hypothesis should harmonise with certain theological dogmas.

CHAPTER VII

MEDICINE AND THE RENAISSANCE

THE Renaissance, like the advent of Christianity and the French Revolution, forms one of the great turning-points in the history of the world, when a definite step forward is taken, from which there is no going back; on each of these occasions mankind has entered upon a veritable *Vita Nuova*. If Christianity brought deliverance to the soul of man, and the French Revolution emancipation to the body politic, it was the task of the Renaissance to confer the priceless boon of intellectual liberty. Whether we regard the taking of Constantinople by the Turks or the discovery of America as the most important event in the external world which ushered in this remarkable epoch, the essential point about the Renaissance is that it meant the rediscovery of the possibilities of human life. As the scholar of the fifteenth century studied the newly found treasures of Greek learning, slowly there dawned upon his mind the fact that there had once been an epoch in which mankind had lived an open, free, and joyous life, untrammelled by the authority of kings and unfettered by the ordinances of priests; dimly he felt that hitherto the powers and faculties of men had been cabined and

confined, and that human life had been shorn of half its beauty by the total neglect of the intellectual life. With the ingenuous ardour and childlike simplicity of some primitive race which hastens to seize the beads, knives, looking-glasses, and other curious products of Western civilisation from the ship stranded on its coasts, so did these men of the Renaissance ransack libraries, palaces, and monasteries for the tattered and mildewed manuscripts which were to reveal to their astonished gaze a mental world as different from their mediæval life as that of modern Europe is from the life of the African savage.

Already in the fourteenth century new modes of thought had begun to assail the venerable beliefs of a thousand years. Scholasticism, which, as we have seen, was an attempt to codify all existing knowledge under certain laws and formulas and so to reconcile it with the one Truth, had fortified the old mediæval conception of a universal empire and a universal church. But now Scholasticism had begun to give way, driven from its position by the new intellectual force known as Humanism, which took its origin in Italy from a new feeling for the greatness of Rome. Little by little the barriers imposed upon the free exercise of reason were broken down, and it came to be recognised that there had once been a time when men had used all their faculties without fear or reproof; not restricted to certain paths or bound by set formulas, but freely seeking for knowledge in every field of speculation

and for beauty in all the realms of fancy.¹ It was thus that Humanism made its appearance, bringing a claim for the mental freedom of man and the full development of his being, while the old Scholastic philosophy lost its power over the feelings and imaginations of thoughtful men. The task of the Humanists was to recover a lost culture and to diffuse a liberal spirit. The essence of Humanism has been well defined by W. Pater as "the belief that nothing which has ever interested living men and women can wholly lose its vitality—no language they have spoken, nor oracle beside which they have hushed their voices, no dream which has once been entertained by actual human minds, nothing about which they have been passionate, or expended time and zeal."

Chief among the early Humanists, and their most brilliant representative, was the poet Petrarch (1304–1374). His fame and popularity in his lifetime were extraordinary. The most powerful monarchs of the day competed for the privilege of his presence at their courts, and so exceptional was his position that he was able to say that princes had lived with him, not he with princes. He was the founder of modern classical culture, and it was his example of the loving preservation of books which probably gave the first incentive to that passion for collecting manuscripts which was to bear such rich fruits in the following century. Petrarch was the great opponent of Scholasticism, and the chief founder of scientific

¹ *Cambridge Modern History*, vol. i. p. 532.

criticism; he attacked logic and dialectics as not being philosophy, but only its instruments. Beneficent to medicine beyond all measure as was the mental temper which Petrarch championed, it is curious to reflect how he himself was never weary of abusing medicine and physicians. Thus he tells us that medicine must take a very low place, as only subserving the life and health of the earthly body; that medical philosophy is only a perverted Aristotelianism, and that to base everything on the authority of Hippocrates and Galen was manifestly absurd. He complained further of the arbitrary character and contradictions of the medical dietetics and of the wretched state of medicine under the influence of the Arabs, specially under that of Averrhoes, which caused doctors to attach importance to alchemy and astrology. Petrarch does not seem to have realised the possibility of medicine as a science; nor did he perceive that medicine, in protecting and maintaining the bodily health of the individual and the whole nation, was capable of becoming an important means to the attainment of the ideal aims of existence. Doubtless as a layman it was not easy for him to recognise the germs of a new life which were springing up in medicine as in other departments of human knowledge; in his view medicine was still in bondage to the Arabs, for whom he had a most cordial detestation and contempt. "Odi genus universum (Arabum), vix mihi persuadebitur ab Arabibus posse aliquid boni esse."

With the revival of learning came a renewed study of Plato, which constituted one of the most striking features of the Italian Renaissance. The leader of this movement was the celebrated humanist Marsilio Ficino (*d.* 1460). This remarkable scholar had been appointed by Cosmo de Medici to be president of the classical academy at Florence, an institution having for its aim the diffusion of Platonic doctrines. Similar academies were founded elsewhere at Milan and Mantua, under the protection respectively of the illustrious families Visconti and Gonzaga. In these places a formal cult of Plato was established, including ceremonial observances. Thus they kept his birthday with a banquet, after which some portion of his works was read and discussed. On the anniversary of his death his bust was crowned with flowers, and a lamp was kept burning before it.¹ This renewed study of Plato freed men's minds from the cold and stereotyped formulas of the Aristotelian and Arabic schools of philosophy. The sublime idealism of the Platonic school contributed more than anything else to the awakening of torpid minds and the revivifying of dead hearts.² In another direction, however, its influence was less favourable to the advance of medicine and the sciences generally. The delicate elements of a subtle mysticism which may be found in the dialogues of the great Athenian philosopher easily pass into the ecstatic excesses of

¹ *Cambridge Modern History*, vol. i. p. 560.

² Haeser, *Geschichte der Medizin*, vol. ii. p. 6.

the Alexandrine school, which lend themselves more readily to popular exposition, and as at Alexandria the students of Plato became Neo-Platonists, substituting intuition for reason, so again at Florence the study of Plato gave birth to "the Mystics," who devoted themselves to the investigation of the Cabbala and the forged theosophic fragments of Orpheus, Pythagoras, and Hermes Trismegistus. Another famous humanist whose vast erudition comprised studies of this kind was Pico della Mirandola (*f.* 1480). He has sometimes been described as the last of the schoolmen, whom he resembles in his attempts to reconcile the Catholic theology with mediæval philosophy. Possessed of a profound knowledge of the Bible, the Cabbala, and Platonism, he proceeded to interpret the Mosaic text by the Neo-Platonic doctrine of the microcosm and macrocosm, and maintained that in natural magic was to be found the strongest testimony to the truth of the gospels, thus hoping to reconcile the philosophers with each other and all alike with the Church. For he seriously and sincerely entertained the claims on men's faith of the pagan religions, and believed that the accounts which pagan philosophy had given of the origin of the world might be harmonised with the account given in the book of Moses—that, in fact, the *Timæus* and Genesis were two aspects of the same explanation. Moses, he thought, was possessed of a secret wisdom which he only spoke of dissemblingly. "In explaining the harmony between Plato and Moses, Pico lays

hold on every sort of figure and analogy, on the double meanings of words, the symbols of Jewish ritual, &c. Every object in the material world is an analogue, a symbol or counterpart of some higher reality in the starry heavens, and this again of some law of the angelic life in the world beyond the stars. There is the element of fire in the material world; the sun is the fire of heaven; and there is, in the super-celestial world, the fire of the seraphic intelligence. But behold how they differ! the elementary fire burns, the heavenly fire vivifies, the super-celestial fire loves." But Pico, as a true child of the Renaissance, made man the centre of the universe, and thus protested against that tendency of mediæval religion to depreciate man's nature, to sacrifice this or that element in it, to make it ashamed of itself, and to keep the degrading or painful accidents of it always in view, and sought to help man onward to that reassertion of himself, that rehabilitation of human nature, the body, the senses, and the heart and the intelligence, which is the great characteristic of the Renaissance.¹

This thirst after mystical and occult knowledge, in spite of the general intellectual awakening, was eminently favourable to those two superstitions—astrology and alchemy—which are so continually to be found dogging the steps of advancing science. At this epoch astrological calendars were formed which had a great influence on medicine. Of these

¹ W. Pater, *The Renaissance*, pp. 42 and 47.

some prohibited the administration of medicines when the moon was in the sign of Aries, Taurus, or Capricornus, because, being ruminating animals, all medicine given at such times tends to return to the mouth. The astrologers issued directions as to the proper times for saying one's prayers, and Jerome Cardan seriously declared that 8 A.M. on 1st April was a peculiarly appropriate moment for offering petitions through the Blessed Virgin. Even the illustrious Marsilio Ficino did not escape these superstitions. He wrote a book full of formulas indicating the method of preserving health and prolonging life by the aid of astrological knowledge. Thus he advises the use of pills compounded at the time of the conjunction of Jupiter and Venus. The preparation of gold was regarded by him as an admirable means of prolonging existence, and he recommended old men to drink the blood of young men so as to keep off the period of their death. James Ganivet, professor of theology at Vienne, sought for the causes of epidemics in the conjunction of the planets, and maintained that every town had its sign and planet; thus Vienne was ruled by the planet Saturn and the sign Libra, while Lyons was under the influence of Venus. He attributed all the diseases of every individual to the constellation at his birth.

A few savants, and among them Pico, had the courage to unveil the absurdity of this pretended science, and Gerson deserves our admiration for having declared war against all superstitious methods

and for having written one of the best works which has ever appeared in demonstration of the futility of astrology. Apart from these more serious aberrations, this renewed study of Plato indirectly led to Quietism, which can hardly be favourable to the advance of science, though it may not prove an actual hindrance. The great mystical teachers of the time were Eckhard, Tauler, Ruysbrook, Gheert de Grote, and Thomas à Kempis. For them "God alone is"; things only exist in so far as God is in them; the man who is thoroughly interpenetrated with the spirit of God has no other duty but to die to all earthly things and become absorbed into God. To minds imbued with doctrines such as these, human science is indeed a vain thing, and medicine, occupied as it is with the health of the body, perhaps the vainest of all.

It is now time to turn to that aspect of the intellectual activity of the Renaissance which was to prove so fruitful to medicine. The renewed study of the classics led in the field of medicine to the investigation of the writings of the Greek and Roman physicians, and with extraordinary zeal doctors betook themselves to the study of language and became erudite philologists; many of the learned professions were filled by doctors, who devoted much energy to the elucidation of the text of the ancient physicians. In these learned studies Thomas Linacre, founder of the Royal College of Physicians, and himself physician successively to Mary and Elizabeth, bore an honourable and distinguished part. A pupil of the Greek

Chalkondylas and a friend of the brilliant Politian, he translated some of the works of Galen into Latin which has been admired for its purity and elegance. From these studies in philology arose a general spirit of criticism. This spirit was most conspicuous in the sphere of religion, where efforts were made to arrive at an authentic text of the Old and New Testament, and one of its most striking results was the exposure by Laurentius Valla of the forgery of *The Donation of Constantine*. This celebrated document, manufactured by some apostolical scribe of the Vatican in the eighth century, was published to the world by Adrian I. when exhorting Charlemagne to imitate the liberality and revive the name of the great Constantine. "According to the legend, the first Christian emperor had withdrawn from the seat and patrimony of St. Peter, declaring his resolution of founding a new capital in the East and of resigning to the popes the free and perpetual sovereignty of Rome, Italy, and the provinces of the West. The contemporaries of Valla were astonished at his sacrilegious boldness, yet such is the silent and irresistible progress of reason, that before the end of the next age the fable was rejected by the contempt of historians and poets and the tacit or modest censure of the advocates of the Roman Church. The popes themselves have indulged a smile at the credulity of the vulgar, but a false and obsolete title still sanctifies their reign."¹

The further discovery of the forgery of the works

¹ Gibbon, *Decline and Fall of the Roman Empire*, ch. 49.

which passed under the name of Dionysius the Areopagite, constituting as they did a meeting ground of Christian theology and Greek philosophy, was additional evidence of the triumph of the critical spirit.

Looking back through the vista of the ages, it seems to us hardly credible that medicine could have been taught and practised from the time of Galen till early in the sixteenth century without any serious attempt having been made to study anatomy, so essential does an adequate knowledge of the structure of the human body seem to be for any rational and scientific study of disease. The answer to this puzzle lies in the fact that the mediæval mind never thought about there being any such thing as a science of medicine, or if it did conceive of such a possibility, the idea was held to be sacrilegious. Disease, like poverty, was to be always with us, and any attempts to comprehend the causes of these two most undesirable companions of our life would have seemed like an antinomian attack upon the established order of things.

Doubtless in the later Middle Ages some efforts had been made to study anatomy; thus Mondino (*f.* 1300) of Bologna had given a new stimulus to anatomy by the dissection of human bodies, which was a great innovation; but the result of his labours had been small, and men contented themselves merely with the inspection of the outer parts of the body and a superficial investigation of the organs enclosed in

the large cavities, in order to confirm, but never to criticise, the correctness of the descriptions of Galen. It is true that Alessandro Achillini of Bologna, one of the most learned Averrhoists of his time, Professor of Philosophy and later of Medicine at Bologna, described the ileo-cæcal valve and the origin of the common bile duct in the duodenum. Then again Alessandro Benedetti, professor at Padua, had an anatomical theatre freshly built every year, where his lectures were even attended by the Emperor Maximilian, to whom he dedicated his great work on anatomy, which, however, contained nothing that was not to be found in Galen.

But it was from the advent of Vesalius and the other great Italian anatomists that the real renaissance of medicine is to be dated; now at last the writings of Galen were to be vigorously criticised and the anatomical beliefs of nearly fourteen hundred years seriously impugned.

Vesalius was born at Brussels in 1514. Educated at Louvain, he acquired there a thorough knowledge of Greek, Latin, and Arabic, as well as mathematics. At the age of eighteen he went to Montpellier, and then to Paris, where he studied anatomy. This science, however, was still based on the dissections of animals, and when on rare occasions the human body was dissected, this was done in so entirely superficial a manner that Vesalius said he would have preferred the instruction of a butcher. In spite of these inadequate opportunities for scientific study, he acquired so extensive a knowledge of anatomy that

he became professor of it in Padua when he was only twenty-three. Six years later, before he was thirty, he gave to the world his famous book, *On the Structure of the Human Body*. An enormous sensation was made by this work, and the effect produced by it was almost equal to that of Harvey's discovery of the circulation of the blood. In the preface of his book he makes a bitter complaint about the decay of all branches of medicine. "Dietetics are abandoned to cooks, the teaching of drugs to apothecaries and surgery to barbers. Professors think it beneath their dignity to take a knife in their hand." Above all, anatomy was in such a low state because Galen, who had never dissected a human body, was regarded as an absolute authority. The great work of Vesalius, then, was to overthrow the anatomy of Galen by substituting the anatomy of man for that of the ape. His description of the heart leaves little to be desired, and in particular he set aside the old error of the permeability of the ventricular septum; he describes the change in the shape of the heart during systole and diastole, and the arrangement of the valves and their functions. As regards the brain, he confines himself to representing it as the central organ of sensation and movement; the question of the significance of the same for the activity of the soul he abandons to the philosophers; but he was the first to draw attention to the difference between the grey and white matter of the brain. Vesalius also studied to some extent the functions of the body, but he did

not emancipate himself from the belief that blood is formed in the liver. The mistakes which he made in describing the eye were due to his following the example of Galen in dissecting the eyes of animals instead of men. Needless to say, such a complete upsetting of the ordinarily received views on anatomy stirred up the most violent opposition. His former teacher, Sylvius, went so far as to describe his illustrious pupil as an "insane innovator whose poisonous breath infected the whole of Europe." The Emperor Charles V., who seems to have regarded Vesalius with as much horror as Luther, thought it necessary to ask the theological faculty at Salamanca if it were lawful to dissect human bodies, and the answer of the faculty came that it was admissible. After passing some time at Madrid in the service of Philip II. of Spain, where he experienced the jealousy and hatred of the Spanish doctors, he betook himself to Jerusalem, and died on his way back in a shipwreck off the coast of Zante (1565). Other famous anatomists of the time were Eustachius and Fallopius—names now familiar to every student of medicine. An unexpected assistance to these anatomists was rendered by the famous painters of that age. Anatomical studies were regarded as an indispensable basis of their culture, and some drawings of Raphael show that the most ideal of all painters did not disdain to make use of human skeletons in the composition of his groups.¹ Michael Angelo busied himself in the

¹ Haeser, *Geschichte der Medizin*, p. 27.

cloisters of San Spirito at Florence with the study of the muscles of men and beasts under the guidance of the anatomist Columbo, a pupil of Vesalius. The great Leonardo da Vinci, whose universal genius embraced all forms of knowledge, belonged to the first anatomists of his time, and is even thought to have understood the systemic circulation. In some sense he was a forerunner of Vesalius, for he showed that science comes by observation and not by authority. He knew the anatomy of Mondino, and probably also that of Galen ; but, not content with authority, he practised dissection himself, and indeed suffered in consequence, for it was these anatomical investigations which caused the withdrawal of papal favour and Leonardo's departure from Rome in 1515. He agreed that it would be better for the student to watch a demonstration in anatomy than to see his drawings, "if only it were possible to observe all the details shown in these drawings in a single figure ; in which, with all your ability, you will not see nor acquire a knowledge of more than some few veins, while, in order to obtain an exact and complete knowledge of these, I have dissected more than ten human bodies, destroying all the various members, and removing even the very smallest particles of flesh which surrounded these veins without causing any effusion of blood other than the imperceptible bleeding of the capillary veins." ¹

Another powerful influence towards intellectual emancipation was the Reformation, which in the

¹ *Leonardo da Vinci's Note Books* (M'Curdy), p. 6.

sphere of religion established the right of man to private judgment and abrogated the authority of popes and councils. By a natural sequence of ideas, authority in matters of science became weakened, and insensibly was recognised the right of every man to investigate nature independently. The supreme importance of doing so for the attainment of scientific truth was not realised till the advent of Bacon and a later age. Luther himself had a high opinion of the importance and dignity of the medical profession; his own wife practised the healing art, and one of his sons, on the advice of his father, devoted himself to medicine, became a physician at Gotha, then later at Berlin and Dresden. Mingling with what Matthew Arnold would have considered the somewhat crude philistinism of Luther was a vein of mysticism, which caused him to hold alchemy in great reverence, not only on account of its utility for medicine, but owing to its beauteous and glorious resemblance to the resurrection of the dead on the Last Day. On the other hand, Luther's friend Melanchthon, as an Aristotelian, repudiated the doctrine of alchemy, but had a firm belief in astrology, which, owing to its close connection with mathematics, was considered by many of the most acute intellects of the day to be an exact science. Certainly the teaching of Luther and Melanchthon found numerous and keen disciples among doctors, especially in the newly formed Protestant high schools at Wittenberg, Marburg, and Jena. But

after all the world moves slowly, and old mental standpoints are with difficulty outgrown ; much pain and anguish had to be endured before real intellectual liberty could be born. Thus some of the reformers seemed bent on merely substituting one form of dogmatism for another, and in matters of science were as obscurantist as the most uncompromising of popes. The classical instance of this in medical history is the case of Michael Servetus. This martyr to science was born in 1509 at Villanova in Arragon. He first became notorious by writing against the Trinity and professing the Socinian heresy, which alienated him from the leaders of the Reformation ; he then studied medicine at Paris, and settled down later as a practising physician at Vienna. Here he made his demonstration of the pulmonary circulation, recognising the impermeability of the ventricular septum ; but he cannot make the least claim to the discovery of the circulation of the blood, for he still believed that the greater part of the blood was formed in the liver, which then poured itself into the right side of the heart, and from thence passed into the veins ; he was still under the impression that the arteries were filled by a *spiritus vitalis*, which he regarded as a kind of vapour (*quasi ex puriori sanguine lucidus vapor*). His distinguished position as a man of science did not save him, however, from the odium aroused by his heretical views on the Trinity, and after engaging in controversy with Calvin he was brought to trial in Geneva at the instance of

that gloomy fanatic, condemned to death, and burned alive in 1553.

It has been well said that the Renaissance of the fifteenth century was in many things great rather by what it designed or aspired to do than by what it actually achieved. This is undoubtedly true of medicine, for, with the exception of a truer conception of anatomy—an important exception certainly—the actual achievement was not great. Yet before the minds of men dimly hovered the vision of great possibilities. Men no longer felt that the whole field of science had been accurately mapped out and surveyed; above all, a spirit of scepticism had arisen. The great Galen had been found to have made erroneous statements about human anatomy; was it not possible that he had made mistakes about other things? Could his physiology be implicitly trusted? For a while longer it was so trusted, till men realised that as observation had been necessary for the proper knowledge of anatomy, so experiment was equally necessary for physiology; these being the two foundations on which any sound system of medicine must rest. When once the principle of infallibility in matters of religion had been challenged by Luther, the same principle in every sphere of knowledge was put upon the defensive, and the great superstructures which had been reared upon authority began to totter and crumble, sapped and mined by the spirit of criticism and revolt which was abroad in every field. As in human affairs there is no principle which is

wholly bad or wholly good, so in any great reform or uprooting of long-established beliefs it is more than probable that the good seed will be plucked up with the tares. Thus we shall see that medicine, though freed from the entangling fetters of a worn-out tradition and set upon a new course along which progress alone could be made, at first, like a ship suddenly relieved of a cargo from which she was sinking, drifted before every passing wind and crossing current, and temporarily embraced doctrines no less irrational than those which she had discarded.

CHAPTER VIII

PARACELSUS AND THE MEDICINE OF HIS TIME

THE process of reaction against authority in medicine, which had begun with the earliest dawn of the Renaissance, took its most extreme and violent form in the person of Paracelsus. Round this strange, mysterious figure has gathered a halo of romance which a cold examination of his writings is far from justifying. As representing, however, an important phase of thought and feeling in the history of medicine, it is worth considering how far he was the exponent of contemporary influences and what modes of thought converged in him. His writings admirably exemplify for us the great principle that life is a strife of opposites; only when we see some principle carried to an absurd length do we fully realise "the falsehood of extremes"; this is often observed in the realm of politics, but Paracelsus seems a good instance of it in the world of thought. He set himself in opposition to authority, not merely because it fettered the free development of the human mind and hampered the advance of truth, but simply because it was authority; like St. Just, who demanded the death of Louis XVI., not for any specific wrongdoing, but for the crime of being a king. Such an

attitude must inevitably lead to chaos, because it regards freedom as an end in itself rather than as a means to a complete and harmonious form of life. The motto of Paracelsus is indeed characteristic of him—"Nemo sit alterius qui suus esse potest."

Theophrastus Bombastus von Hohenheim, surnamed Paracelsus, either as a Latin translation of Hohenheim or, more probably, as meaning to denote his superiority to Celsus, was born at Einsiedeln in Switzerland in 1490, just seven years after the birth of Luther and Raphael. His father, a physician, had him at an early age instructed in medicine. When he was sixteen he studied at the University of Basle, and in particular enjoyed the chemical teaching of the celebrated Neo-Platonist Trithemius. There has been much dispute about the character of Paracelsus, but most writers are now agreed as to his goodness of heart and enthusiasm for the happiness of men. He held a high opinion of the dignity and worth of the medical profession. His thirst for knowledge made him wander through a large part of Europe, visiting the most famous universities, where he gained a knowledge of natural history, chemistry, and metallurgy. After ten years of foreign travel he returned to Basle, obtaining the post of physician to the town. A year later he appeared as a teacher of the university, and dramatically opened his first lecture by burning the books of Avicenna and Galen, declaring that his very shoe-strings knew more than these two physicians. At

Basle he seems to have been a great success, both as a teacher and as a physician; while there he entered into correspondence with Erasmus. After two years, however, he forsook Basle, the immediate cause of his departure being a quarrel with the Canon Cornelius von Lichtenfels, who, having been cured of some abdominal pain by three opium pills, refused to pay the fee of 100 gulden which had been previously agreed upon.¹ After this he wandered about in Bavaria, Switzerland, Moravia, and the Tyrol, finally dying at Salzburg in great poverty.

Like all prophets of revolution, Paracelsus was filled with a sovereign contempt for learning; he prided himself on having read no book for ten years, and he would hardly ascribe value to anything except his own writings, for which he anticipated immortality.

The great error of the medicine of his day consisted in the excessive stress laid upon speculation, combined with the study of books. This was fully recognised by Paracelsus, who said, "Lesen hat kein Arzt nie gemacht, aber die Praktik, die gibt ein Arzt." "Der erst Schulmeister der Arznei ist der Corpus und die Materia der Natur." The only ancient physicians for whom he professed any respect were Apollo, Machaon, and Hippocrates. The vials of his wrath were poured out upon Galen and Aristotle, whose works till recently were only

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 75.

known through the distorted medium of Arabic translations glossed over by the Scholastic philosophy, being thus poles asunder from the true Galen and Aristotle which the labours of the New Learning were bringing to light. We have seen how the anatomy of Galen had been already discredited by the discoveries of the great Italian anatomists; it remained for Paracelsus to give the death-blow to his physiology and therapeutics, so that the whole tottering edifice of Galenism crumbled into ruin. But how different was the method of Paracelsus from that of the Italian anatomists! Largely it consisted in shouting at the top of his voice and denouncing in crude and coarse terms the traditional medical writings, which, with all their errors and absurdities, contained more of genuine physiological truth than could ever be claimed for the system of Paracelsus. His aim and object were to dethrone ancient medicine, and more particularly the medico-philosophical amalgam of Galen and Aristotle, and erect in its place an entirely new medicine, thus substituting one system for another. Had he been entirely successful in this, the advance of medicine would indeed have been small; we should merely have had Paracelsism instead of Galenism. Fortunately, many of those who joined with him in the attack upon the worn-out physiology of the ancients had no intention of following him in his crude substitutes for it; but having thus cleared away the rotten foundation, it became possible, as we shall

see later on, for a more enlightened age to build something satisfactory on a new basis.

A certain parallelism between Paracelsus and Martin Luther naturally suggests itself, and if with Matthew Arnold we regard the latter as the philistine in religion, undoubtedly Paracelsus offers us a classical instance of the philistine in medicine. But, speaking generally, the leaders of the Reformation did not show so much intemperate zeal as the reformer of medicine. Doubtless the reformers in religion, in so far as they endeavoured to destroy the power of the Roman Catholic Church merely in order to erect in its place the Bible with its verbal inspiration, were merely substituting one fetish for another ; but in maintaining the right of private judgment they laid the foundation of the doctrine of general toleration, which slowly and painfully permeated the best minds of Christendom, though in practice it is hardly carried out even to this day. With Paracelsus, on the other hand, it was not a question of reforming medicine, but of the abolition of the entire existing medical system and the substitution of a brand-new one coined in the recesses of his own fantastic brain. Such principles as observation, experiment, and the inductive method, which are the master-keys for unlocking the secrets of nature, would have been anathema to him.

From the Revival of Learning, which we have discussed in a previous chapter, flowed two main streams of tendency. On the one hand, the humanistic studies

taught men to use their senses and reason in a way they had never done before ; on the other, there was a great outburst of Neo-Platonism and an enthusiastic pursuit of the theosophical doctrines so intimately connected with the old Alexandrine school. It was by this latter tendency that Paracelsus was entirely dominated, so that he was quite incapable of appreciating the work of the Italian anatomists, whom he called "Italian jugglers." The influence of Neo-Platonism is clearly seen in his teaching of the unity of nature, which has emanated from God and is penetrated by Him. In every creature the heavenly fire and the astral balsam are at work. Man unites in himself all the particular forms of external nature—is, in fact, a microcosm ; external nature is the outer man. He calls nature visible philosophy, and philosophy invisible nature. Christ was a ray of the majesty of God, an emanation of the primitive light. The end of life is the intimate union with God, the father of all good spirits. Man invents nothing ; the devil invents nothing ; it is God only who unveils all to us by the light of nature.

The physiology of Paracelsus consisted largely in the explanation of the functions of the body by the laws of the Cabbala. Anatomy, as ordinarily understood, excited his supreme contempt, though it was just at that moment that the Italian anatomists by their labours were overthrowing a part of the Galenical superstition, but Paracelsus described his own anatomy as being "not the dissection of bodies, which is a

boorish anatomy, but the anatomy of the essence—*i.e.* an analysis, imaginary rather than chemical, of the intimate composition of man with its mystical ingredients, salt, sulphur, and mercury, which were the three ultimate substances, and not the four elements of Empedocles." This kind of anatomical knowledge, he considered, was acquired not so much by the intellect as by the illumination of the Holy Spirit. Medicine itself rested upon four pillars :—

(1) *Philosophy*. "This is the gate of medicine, and they who go not in thereat climb in by the roof and become thieves and murderers." By philosophy he means the whole circle of the sciences, physical and magical, but especially the latter.

(2) *Astronomy*. "No one can be a good physician who is not skilled in astronomy. The heavenly bodies cause diseases by their exhalations—as, for instance, the sun by excessive heat—and it is no use trying to cure an astral disease while its star is in the ascendant. He considered that there was an intimate connection between the sun and the heart, the moon and the brain, Jupiter and the liver, Saturn and the spleen, Mercury and the lungs, Mars and the bile, Venus and the kidneys. He was, however, an opponent of astrology, saying that a child's mother is its planet and star ; one cannot say that man acts in accordance with Mars, but rather that Mars acts in accordance with man, for the latter is more than Mars and all the planets.

(3) *Alchemy*. "Without a perfect knowledge of

alchemy, the physician will use all the resources of his art in vain." He regarded as alchemists all who attempt to improve natural substances. Thus the baker who makes bread out of corn, and the vine-grower who produces wine from grapes, is as much an alchemist as the Archeus, who transforms food into flesh and blood. The Archeus was a kind of demon who presides over the stomach, and is occupied with separating the poison of the food from the nutritive portion of it, and giving to the alimentary substances the tincture in virtue of which they become capable of assimilation. This Master of the Stomach who changes bread into blood is the type of the physician, who ought to come to terms with him and accord him his assistance; for the Archeus alone can cure diseases.

(4) *Virtue*. The virtuous only are permitted to penetrate into the innermost nature of man and the universe.¹

Therapeutics constituted by far the most important part of the medical teaching of Paracelsus. His remedies for disease are the Arcana. Now the Arcana were such substances as, by their indwelling hidden virtues (*qualitates occultæ*), either arouse the torpid therapeutic power of nature or extinguish and destroy the essential condition of the disease. The important problem of therapeutics is to discover specific remedies. For this he relied largely on his doctrine of signatures. Thus the appearance of

¹ Withington, *History of Medicine*, p. 256.

plants indicates their utility in disease. The topaz and the juice of the celandine are useful in jaundice ; but yellow substances are also beneficial in heart disease, yellow being the colour of the sun, which rules that organ. He asks, "Why is the frog so strangely made except that he should be a remedy for the plague. Therefore he has his signature thereto ; for see, as disgusting as is the plague, so disgusting is the frog also."¹ In this therapeutic doctrine of signatures we see the forerunner of the modern doctrine of Homœopathy. The theosophical standpoint of Paracelsus shows itself in his belief that healing medicines were created for the sake of the diseases, that where certain diseases are found the corresponding remedies grow. The whole world is a chemist's shop and God is the highest chemist.² Certain morbid conditions he compared or identified with natural phenomena ; thus dropsy was a microcosmic flood, atrophy a microcosmic drought. The four kinds of colic were compared with the four directions of the wind, and apoplexy with lightning. Mania becomes more intense during the full and new moon, because the brain is the moon of the microcosm. By continually comparing the microcosm and the macrocosm, one acquires the great advantage of rendering all the sciences useless. The system of Paracelsus contained no new or hitherto unknown

¹ Withington, *History of Medicine*, p. 268.

² In the Museum at Nürnberg there is to be seen a curious old picture representing Christ as a chemist, with His hands spread out on the apothecaries' jars labelled Patience, Pity, &c.

principle, but he recommended medicines derived from the mineral kingdom, and particularly metals (*e.g.* iron, lead, copper, antimony, and mercury), instead of the useless syrups and decoctions then in vogue. He also studied a large number of remarkable diseases, and specially those within the domain of surgery.

Paracelsus showed no profundity of thought, but extraordinary vigour in his writings, which he addressed rather to the multitude than to the learned, and on that account made use of German instead of Latin, which constituted a most radical innovation. It is not surprising, therefore, that he had a large number of disciples; for the most part they were Germans, and without any education or acquaintance with the sciences, who threw themselves into the arms of a mystical system because they found in it a means of supplying their ineptitude and want of instruction.

Not unnaturally, the famous society of the Rosicrucians became earnest and devoted followers of Paracelsus. By them he was termed "the noble and beloved monarch, the German Hermes, the Philosophus Trismegistus, our dear preceptor and king of arts, Theophrastus of blessed memory and immortal fame."¹ According to tradition, they had already existed for nearly a hundred years before his birth. The society is supposed to have originated with a German named Christian Rosenkreutz in the fourteenth century, who instituted it after having learnt at Fez

¹ *Paracelsus*, A. E. Waite.

and in Egypt the high philosophy of the Easterns. The Rosicrucians were credited with being adepts in the Hermetic mysteries, including metallic transmutation and power over elemental spirits. They aimed at a general reform of the arts and sciences, especially of alchemy and medicine, posing as professors of the healing art. In fact, by the rules of their order they were forbidden to exercise publicly any other profession but that of medicine, and were not allowed to take any fee from their patients.¹ One is almost surprised that the society did not become more numerous, in view of the great attractions held out to members, which amounted to nothing less than knowledge divine, immense riches, a life exempt from disease, perpetual youth, and the philosopher's stone. As might be expected, this society dispensed with all study, and professed the greatest contempt for all knowledge acquired by toil and reflection instead of by inward illumination. Without exception they derived all sciences from the Bible, and, after the manner of the Christian Scientists, healed all diseases by faith and imagination.

Such a society seemed just made for the carrying out of the doctrines of Paracelsus, and it was indeed largely instrumental in spreading them throughout Europe. His medico-philosophical views found numerous adherents, and they were not confined to the medical profession. Thus Valentine Weigel, a fanatical preacher near Chemnitz, was firmly con-

¹ Kurt Sprengel, *Geschichte der Medizin*, sect. ix. ch. 3.

vinced of the parallelism between the macrocosm and microcosm. He maintained that knowledge of the human body should be derived from that of the universe, because Heaven is the father and Man the son. Like Paracelsus, he despised all human sciences, since he believed that all knowledge proceeded from an internal illumination. He regarded the number 666, already employed by St. Irenæus of Smyrna, as the union of knowledge and wisdom. Egidius Gutmann of Swabia was another follower of the teaching of Paracelsus. He claimed to possess the Elixir Vitæ, which ennobles men, heals all diseases, and enables one to manufacture gold. According to this *illuminé*, faith only is necessary in order to fly through the air, to transmute metals, and to know all sciences.

More celebrated and influential than the foregoing, however, was Oswald Croll of Hesse, physician to Prince Christian of Anhalt, and even Councillor of the Emperor Rudolph II. His great object was to unite the new teaching of Paracelsus, on the one hand, with the Calvinistic doctrine of grace and immediate inspiration of God, on the other hand, with the writings of Hippocrates. We are indebted to him for a *Pharmacopœia-Basilica Chymica*, in which are introduced many new drugs and others which had fallen into disuse. He repeats the doctrine of the macrocosm and microcosm, speaking of the latter as the son. "Man can produce miracles by his thought alone; in working them he is entirely passive, shows no action ;

he knows nothing of what is happening—grace permeates him and makes him a part of everything. All medicines work in virtue of the magnetic force which they have received from the stars, and of which their sensible qualities are only the signatures; every plant is a star, and every star a plant. He was a great believer in the doctrine of signatures; thus, the leaves of the small leek have some resemblance to the gums, therefore they must be an excellent anti-scorbutic. The flowers of the lily resemble drops, therefore they must be useful in gout (*gutta*); the roots of the bryony imitate a swollen foot, therefore they are good for the dropsy.¹

Though the enthusiasts for the new medicine of Paracelsus were for the most part to be found in Germany, yet in England there appeared one famous exponent of the doctrine in the person of Robert Fludd, who was also among the first disciples of the Rosy Cross. Born in 1574 and a contemporary of Bacon, he was entirely unaffected by the teaching of the great English philosopher, but endeavoured to proclaim a Neo-Platonic system, in which man, the microcosm, is regarded as analogous in a physico-spiritual sense to the universe or macrocosm. According to him, heat and cold are the basic powers of nature, and he brings the most important diseases into relationship with the chief directions of the wind. In his view the special cause of disease was the fall of man. The only remedy for disease is prayer and the

¹ Kurt Sprengel, *Geschichte der Medizin*, sect. ix. ch. 3.

favour of God. In spite of these mystical views on medicine, we find him inventing an instrument so prosaic as the thermometer for determining the heat of the blood.

Other disciples of Paracelsus were Peter Severin, a Dane, physician to the King of Denmark, who derived all diseases from germs which took their origin in the fall of man; and Gerhard Dorn, a physician at Frankfurt, who thought all knowledge of nature was to be derived from the first verses of Genesis.

To the credit of medicine and science, it must be said that the tissue of irreconcilable absurdities which so largely represents the system of Paracelsus was not suffered to pass unchallenged in the sixteenth century. First and foremost among his opponents was Andreas Libavius of Halle, whose great merit consisted in taking chemistry out of the hands of charlatans and developing the outlines of this science in a clear, simple manner, while ridiculing the Paracelsists on every occasion. But the main opposition came from France, and in particular from the University of Paris, so long the home of dogmatism, infallibility, and intellectual obscurantism generally. This school opposed the medical innovations of Paracelsus, not on account of their intrinsic absurdity, but simply because they were innovations. Had the system of Paracelsus been a miracle of scientific accuracy, it would have met with no less opposition from the school of Paris. For this school, more than any other in Europe, was tied and bound to the Galenical tradi-

tion. Here the New Learning had made but little progress, and unorthodoxy in medicine seemed fraught with almost as much danger to the whole fabric of society as unorthodoxy in religion.

It is interesting to find the famous Rabelais in the ranks of the reactionaries, solemnly lecturing at Montpellier on the aphorisms of Hippocrates and the *Ars Parva* of Galen, but he probably did not take himself very seriously in these medical discourses. More important were the attacks made on the Paracelsists by Jean Riolan, the declared enemy of Mazarin, the Jesuits, surgeons and chemists, and by Gui Patin, renowned for his heroic venesections, practised on infants three days old, and for his employment of senna (saigner and senner).¹

It was in Italy, however, that the doctrines of Paracelsus met with the least favourable reception, and this for two reasons. As the original seat of the New Learning which was gradually spreading over Europe, there existed in Italy a higher level of culture and enlightenment than elsewhere, which was proof against the crude, bombastic self-assertion of Paracelsus. Secondly, the opposition to Galen and Scholasticism generally was undertaken with far better taste and judgment by one of their own countrymen in the person of Jerome Cardan.

This celebrated physician and philosopher was born ten years later than Paracelsus at Pavia in 1501. Later on he became Professor of Mathematics

¹ Haeser, *Geschichte der Medizin*, vol. ii, p. 118.

at Milan, at the same time following the practice of medicine, in which he seems to have obtained such a reputation that he was invited to Scotland to attend Archbishop Hamilton, whom he cured of asthma. In 1559 he became Professor of Medicine at Pavia, and later at Bologna, where he was imprisoned either for heresy or debt. When released from prison he betook himself to Rome, received a pension from Pope Gregory XII., and died there in 1576. It has been asserted that he put an end to himself by starvation in order to fulfil a prediction which he had made as to the time of his death.

Cardan appears to have known nothing of the teaching of Paracelsus and his disciples, but his own philosophic standpoint was based upon Pythagorean and Neo-Platonic conceptions. Thus he says, "In the whole creation there works the world-soul, animating everything." Changes in nature follow the laws of number, to which God Himself has submitted His works, as shown in the return of certain numbers in the movements of the planets. He regarded heat and light as fundamental forces, and held that there were only two elements—namely, heat and moisture—cold and dryness being negations. With the inspiration of genius he perceived that water was a composite body, though two centuries were to elapse before it was recognised as the union of two gases. He considered that all beings have souls, and that even in plants the passions of love and hate are at work—a doctrine strangely reminiscent of Empedocles. "Man

is not an animal, but 'all animals'; he is, on a higher plane, an epitome of the whole animal life." The soul of man, by means of its understanding (*ingenium*), is superior to all animals, and can outwit them all; hence man should be described as "animal fallax." He believed in the immortality of the "mind" (*mens*), but, like Plato, held that God had only a fixed and definite number of such "minds," and consequently he adhered to the doctrine of the transmigration of souls.

Cardan continued throughout his life a devout Catholic, and remained so far untouched by the ideas of the Reformation that, without subjection to authority, he found church and religion alike unthinkable. Better, he said, to have no church than one which is not respected. Since philosophy is exclusively occupied with science and theory, it cannot attack the church, which is a practical institution. For a small privileged class of savants, Cardan held that the utmost freedom in speculation should be allowed; but to the general public, occupied as it is with the affairs of practical life, no such privilege should be accorded. To maintain a sharp distinction between the savants and the laity, he thought that all scientific disputes in the mother tongue should be prohibited. The common people should be forbidden to dispute about religious subjects, *nam ex his tumultus oriuntur*.¹ Here we see the principles of the Roman Catholic Church applied to knowledge generally,

¹ Erdmann, *Gesch. der Philosophie*, vol. i. p. 529.

which would have the effect of erecting a priesthood of science, or, in more modern phraseology, the deification of the expert. This horror of the *profanum vulgus* meddling in matters too high for its proper understanding did not prevent Cardan from holding rather advanced views as to political authority. Thus he says that laws have only a binding force when they harmonise with religion and philosophy; it is legitimate to break laws and murder tyrants, just as one gets rid of diseases, even though they are permitted or ordained by God. His love of truth was honest and sincere, and to his motto, "Veritas omnibus anteponenda neque impium duxerim propter illam adversari legibus," he was steadfastly loyal.

Paracelsus was a true child of his age. Though he has been regarded as the great reformer of medicine, who overthrew Galenism and Scholasticism, yet the fundamental weakness of Scholasticism he entirely failed to perceive. That weakness consisted in the constant effort to embrace heaven and earth in an exhaustive comprehension, which naturally made some system a prime necessity. The human mind has an ingrained appetite for system, rule, and authority. Paracelsus, having destroyed one system, was quite ready with another one to put in its place—*uno avulso non deficit alter*. It is difficult now to realise the extraordinary ferment taking place in men's minds at the end of the fifteenth and beginning of the sixteenth century. The New Learning, with its revelation of an intellectual life hitherto undreamt of; the dis-

covery of the New World, with the strange, mysterious civilisations of Mexico and Peru disclosed by Cortez and Pizarro ; the universal passion for foreign travel, which brought men in contact with races, manners, and customs hitherto unknown ; above all, Luther's bold challenge to the Pope, who had seemed till then to the greater part of the Western world an essential part of a permanently fixed order of things : all this gave rise to a wonderful mental elasticity, a great scepticism towards all that was old, a great credulity towards all that was new, with a feeling that anything might be possible, even the medical philosophy of Paracelsus.

CHAPTER IX

THE EFFECT OF PHILOSOPHY ON MEDICINE IN THE SEVENTEENTH CENTURY

IN the annals of medicine the seventeenth century will always be famous for the great discovery of Harvey, which revolutionised men's conceptions of physiology, much as the discoveries of Copernicus revolutionised their conceptions of astronomy. Three great thinkers illuminated the intellectual life of this century, and fundamentally altered its ideas both on science and philosophy. Least of all could medicine remain unaffected by the far-reaching speculations of Bacon, Descartes, and Spinoza.

The inspirations of genius know no law, and it were idle to conjecture how far the discovery of the circulation of the blood was indirectly brought about by the author of the *Novum Organum*. We know that Bacon was the friend and patron of Harvey, but it is probable that the latter was more influenced by the conversation and general mental temper of the philosopher than by actually studying the *Novum Organum*; indeed, we are told that Harvey did not value very highly Bacon's systematic reasonings, as he said of him, "He philosophises like a Lord Chancellor." The inductive method, which Bacon

somewhat pompously styled "the New Testament," had indeed been used from the foundation of the world, or at least since men began to reason at all; it is identical with the *ἐπαγωγή* of Aristotle, but its true significance had not been fully appreciated. Doubtless it would be a mistake to suppose that such discoveries as those of Copernicus, Galileo, or Harvey were more likely to be made by the inductive than the deductive method; for the discoverer does not as a rule sit down in cold blood to consider which logical method he shall employ for the investigation of nature, any more than a Giotto, in composing his fresco, consciously goes through the elaborate reflections detailed for us by Ruskin. As a matter of fact, it would seem that the deductive method, owing to the greater opportunity it affords for the play of the imagination, would be more likely to unlock the secrets of the universe. Hitherto the mistake had been not so much the use of the deductive method as the entire omission to test the truth of the premises, and the inadequate application of the method of verification. The imagination ran riot, major premises based on theological dogmas were put forward, and the strangest conclusions reached, which were never questioned because the syllogistic ratiocination had been correct.

Bacon was the first to draw attention to the fact that, in spite of the great geniuses of antiquity and the large amount of intellectual effort expended, the actual amount of positively ascertained truth which

had floated down the stream of time from the ancient world was surprisingly small, and that very little had been added to it during the Middle Ages. This he thought must be due to a faulty method of investigation. In part he was right, but it was not the whole truth of the matter. The fact is, the ancients, if we except the pre-Socratic philosophers, did not feel strongly about the importance of knowledge of the external world, as they were almost wholly absorbed in questions of ethics and politics. As typical of this attitude we may quote the following passage from the *Phædrus*: "PHÆDR.—I always wonder at you, Socrates; for when you are in the country, you really are like a stranger, who is being led about by a guide. Do you ever cross the border? I rather think that you never venture even outside the gates. SOC.—Very true, my good friend; and I hope that you will excuse me when you hear the reason, which is, that I am a lover of knowledge, and the men who dwell in the city are my teachers, and not the trees, or the country. Though I do indeed believe that you have found a spell with which to draw me out of the city into the country, as hungry cows are led by waving before them a bough or a fruit. For only hold up in like manner a book before me, and you may lead me all round Athens, and over the wide world."¹ Then, again, in the Middle Ages the rulers of the Church were under the impression that the religious life of Christendom was bound up, not only with certain spiritual truths, but

¹ Jowett's translation, vol. ii. p. 107.

with definite views as to the course of external nature ; consequently the free investigation of the world was only possible within the limits of fixed theological canons.

The great merit of Bacon's method lies in the fact that it assures the stability of science though it may not have materially aided in the immediate discovery of the truths of science. Above all, his doctrine of the four kinds of *idola* did much to free men's minds from the various prejudices which beset them, while by the importance he attached to facts and the stress laid upon careful and correct observation, he arrested the progress of error. There is some truth in his contention that "Aristotle corrupted natural philosophy with logic, being all along more solicitous how men might defend themselves by answers, and advance something that should be positive in words, than to come at the inward truth of nature."

Not unnaturally Bacon exaggerated the virtues of his own child, and seems to have been under the impression that the making of discoveries was largely a mechanical matter. Thus he says: "Our method of discovery in science is of such a nature that there is not much left to acuteness and strength of genius, but all degrees of genius and intellect are brought nearly to the same level. (*Nostra vero inveniendi scientias ea est ratio, ut non multum ingeniorum acumini et robori relinquatur; sed quæ ingenia et intellectus fere exæquet.*)"¹ He believed that the facts might be

¹ *Nov. Org.*, I. App. 61.

collected by one set of people and the inductions made by another, but this has not been the method of science. It is not the mechanical colligation of facts which gives rise to the great discovery, but the happy guessing (*εὐστοχία*) or fortunate *aperçu* of the genius which suddenly lays bare the hidden secrets of nature. A serious defect of Bacon's method was the failure to take into consideration the "plurality of causes," the existence of which is one of the main difficulties obstructing the progress of medicine. Then, again, the importance of the deductive method was not fully realised by Bacon owing to his want of mathematical knowledge, for it is in those sciences in which mathematics play a part that the deductive method becomes specially valuable. It has often been remarked that Bacon, though the father of modern science, himself made no important contribution to scientific discovery. His aim was rather to secure the bases of all sciences than to concentrate himself on any single one, to map out the course for the future torch-bearers of science rather than to be a torch-bearer himself. The great and lasting effect which he had upon medicine by turning men's minds from vague speculations, and directing them to observation and experiment and the importance of common things, will appear presently.

Descartes has been justly called "The Father of Modern Philosophy," and he too, like Bacon, was engaged in fashioning a method for the comprehension of the universe. The thought of Descartes, though

clothed in less grand and noble diction, was more subtle and profound than that of Bacon. He was a mathematician and metaphysician, and set himself deliberately to find a new method which would solve the problem of the nature of knowledge. After passing through a period in which he doubted everything, he at last came to the conclusion that the only thing about which he could have no doubt was his own existence, because of the power of thinking. Hence the famous phrase "cogito, ergo sum." Starting thus with consciousness as the basis of certitude, the method of certitude he found in mathematics, which were to disclose the hidden meaning of nature. Descartes considered that the ground of the certainty of the proposition "I think, therefore I am" lay simply in the fact that one sees clearly it must be so, and therefore he enunciated the rule that things which we conceive very clearly and distinctly are all true. Hence the ultimate test of truth is intrinsic, not extrinsic. An idea shows itself to be absolutely true by its own clearness and distinctness, and does not depend on any external criterion. The essence of matter he considered to be "extension," which is not resolvable into ultimate atoms, but is infinitely divisible and is homogeneous throughout the universe; the apparent varieties of matter being distinguished only by the different division and movement of its parts. The essence of mind or soul was thought, which can in no way be predicated of matter; hence mind and matter, or, as

Descartes expressed it, "thought and extension" are wholly separate from one another, neither can act upon the other, a union could only be effected by God. Since thought is essential to true existence and animals do not think, they have therefore only a corporeal existence. He indeed pronounced the lower animals to be mere "automata," in whose nature processes which go forward consciously in us are simulated by a clock-like mechanism. His followers carried out this doctrine with logical strictness, and used it as an excuse for cruelties to dumb animals because they only had sham feelings. Descartes, however, had not intended to withhold from animals the power of sensibility, but only that of self-consciousness, in that while they see, and feel, and hear, they do not *know* that they do so or reflect upon what it means, but are carried impulsively to the appropriate objects or through the appropriate experience. He speaks of their cries of joy or pain, and of "acting" on their hopes and fears of bodily pleasure or pain, which is the principle of all training of animals.¹

Descartes, more fortunate than Bacon, made several happy discoveries, as, for instance, that "action and reaction are equal," that heat is motion, and motion changes itself into heat; also he showed how geometrical curves could be expressed by algebraical symbols. He discovered the equality of the angle of incidence and reflection, also the refraction of light, and suggested the law of the conservation of

¹ Martineau, *Types of Ethical Theory*, vol. i. p. 145.

energy. Like Bacon he excluded final causes from his conception of nature, saying, "God pursues objects in the corporeal nature, but it is presumptuous to try and learn the same. Most objectionable of all is the pride which regards man as the end of nature." The doctrine of final causes has indeed nearly always proved an obstacle to science, yet it is worth remembering that both Cuvier and Owen claim to have derived assistance from this doctrine in making their discoveries.

Descartes did not confine himself to metaphysical and mathematical studies, but physiology and pathology came within the sphere of his considerations, and for eleven years he busied himself with anatomical studies. As a result, he believed that the soul is everywhere in the body, but that its immediate effects proceed from the pineal gland. Here the soul, besides its own processes of pure understanding, imagines and perceives; the medium of its sensations being nerves running from its seat in the brain to every part of the body. The movements propagated from the peripheral extremities to the central spot excite different sensations, partly according as the nerves are different, partly as the motion in the same nerve is of a different kind. The varying state of the blood affects the nerves with different kinds of motion; if it be pure and well-tempered it quickens their sensibility and gives them an action which excites natural joy in the soul, if it be gross and sluggish a heavier movement ensues which carries a feeling of depression to

the soul. Whenever, from any other cause than the state of the blood, these different movements are imparted, the corresponding feeling will recur. When, for example, we contemplate the arrival of some good, this imagination does not in itself carry the feeling of joy but sends the "animal spirits" on an errand from the brain down the muscles to the insertion of the heart nerves, which are then, through dilatation of its cavities, affected by the special motion felt as joy at the headquarters of the soul. This joyous sensation, however, is to be distinguished from another and purely intellectual joy of which the soul *per se* is susceptible: if we are told a piece of news, the soul first considers whether it is good or bad; if good, then is it affected by a "spiritual joy" so completely independent of bodily changes that the Stoics did not deny it to their "wise man," exempt though he was to be from every passion. But, as soon as this joy passes from the understanding to the imagination, the process just described is set a-going which terminates in the sensational consciousness.

Descartes regarded the nourishment of the body as an entirely physical process, depending on the fact that the vessels, like a fine sieve, only allow the most delicate particles of the food-stuffs to pass through them.

The influence of Spinoza upon the medicine of his time was far more indirect. Unlike Descartes he seems to have taken little interest in the sciences, with the exception of optics. For a time he corre-

sponded with Oldenburg, the first secretary of our Royal Society, who used to send him the treatises of Boyle as they were published, and try to enlist his interest in the air-pump and other kindred subjects. Though living close to, and in some correspondence with, the great physicist Huyghens, he seems to have known nothing of the latter's pendulum clock or perceived the importance of his neighbour's discoveries. Spinoza, like Descartes and Bacon, rejected final causes, and, impressed by the certainty afforded by mathematical truth, employed the geometrical method of the former as the best means of comprehending the problem of the universe. He perceived, however, the logical weakness of the Cartesian dualism, and asked himself "What is the noumenon underlying all phenomena?" This, he concluded, was "substance," which embraced within itself all thought and being, and was in fact identical with "God," from whom the whole world of nature could be deduced. Thus this one eternal and infinite substance united, in the form of "attributes," the two separate existences of thought and extension, or mind and body, which Descartes' system had kept apart. The relation, then, of the material universe to God was that the universe constituted one aspect of God's infinite attribute of extension, he is the identity of the *Natura Naturans* and the *Natura Naturata*. Absurd as was the charge of atheism with which Spinoza's philosophy was long branded, and remote as his metaphysics are from materialism as ordinarily understood, yet there

is little doubt that the immediate effect of his speculations—by rejecting the idea of design in nature, free will, and the thought of a possible beyond the actual, and by reducing moral relations to natural necessity—was to reinforce the materialistic deductions which flowed from the systems of Bacon and Descartes. So great a weight of philosophical genius thus thrown into the scale, leaning towards apparently materialistic conceptions of the universe, was doubtless a powerful aid to science, and perhaps helped on the great advances of medicine which distinguished the seventeenth century, by making men feel that in the humble, patient, prosaic method of unravelling the secrets of nature they had the express sanction and warm approval of the most illustrious thinkers of their time, to whose more profound speculations they paid but little heed. When there was so much leeway to be made up by science and medicine, a physician at that time might well have excused himself from metaphysical speculation in the words of Goethe a century later :—

“Mein kind Ich habe es klug gemacht
Ich habe nie über das Denken gedacht.”

Harvey's great discovery is too well known for us to dwell upon here. In his early study of the heart so complex did its mechanism seem to him that he began to think “that the motion of the heart was only to be comprehended by God.” By degrees he came to see that the heart was not mainly an organ of suction but one of propulsion, for its work consisted not in

sucking in air from the lungs but in driving blood, by its contractile power, through the body. He also showed that the active part of the heart-beat was the systole and not the diastole as had been previously taught.¹ The experimental work of Galileo, whom Harvey probably knew, doubtless determined the main direction of his physiological method. The discovery of the circulation of the blood has generally been regarded as a particularly fine example of the inductive method, because the complete proof of it was not found till a later date. Harvey, from certain definite observations, induced the fact that there must be a connection between the arteries and veins, but the actual connection by means of the capillaries was not demonstrated till four years after his death by Malpighi (1661), aided by the invention of the compound microscope. Similarly Kepler induced the fact that the planets moved in elliptic orbits, from observation of some of their known positions, though all the points of the ellipse were not observed. As the old Galenical anatomy had been destroyed by the researches of Vesalius and the other great Italian anatomists, so now the brilliant discovery of Harvey set aside for ever the physiology of Galen. After the publication of his epoch-making work (1628), his practice is said to have diminished, and people were near to thinking him mad, but he lived to see the complete triumph of his doctrines, which were defended with energy by Descartes. However much Harvey may

¹ *Cambridge Modern History*, vol. v. p. 726.

have owed to the popular philosophical speculations of his time, there is no doubt that his scientific method harmonised with the materialistic doctrines of Bacon and Descartes, and thus gave a great impetus to mechanical conceptions of life. It came to be thought that all bodily processes took place in accordance with known laws of physics and chemistry. Hence in medicine arose two schools, known to fame as the Iatro-chemical and the Iatro-mechanical. The leader of the Iatro-chemical school was Sylvius (Franz de la Boë), whose name is known to every student of anatomy from his researches on the brain. Born at Hanau, in 1614, he received his scientific education at Sedan, then a Protestant town; after visiting various Dutch and German towns, he took his degree at Basle and settled down to practise at Hanau. Later he was called to fill the vacant professorship of medicine at Leyden, which he occupied for fourteen years, and there gathered round himself an incredible number of students. He was a man of great personal attraction; not only one of the handsomest men of his time, but famous for the accuracy of his knowledge, his eloquence, and unwearied zeal for science and the welfare of mankind, besides which he had a most attractive cheerfulness, taking for his motto "*Bene agere et lætari.*" The great aim of Sylvius was to find a scientific basis for medicine. He perceived that only in connection with anatomy and clinical experience could medicine properly flourish. Consequently he laid great stress

upon the importance of anatomy, and was one of the early defenders of Harvey's discovery. But his greatest interest lay in chemistry, and here he seems to have studied the works both of Paracelsus and Van Helmont. Realising that a salt was made up of an acid and an alkali, he endeavoured to explain nearly all chemical phenomena, both in the living body and outside it, as the result of the actions of acids and alkalies. Fermentation was to him the same thing as effervescence, and he regarded digestion and most of the changes in the body as a series of effervescences aided by precipitations. Nowhere does Sylvius appeal to any spiritualistic forces; chemical action seemed adequate to explain all the phenomena of the living body, and the chemical action which he met with there he considered to be identical with the chemical actions seen in the beakers and retorts of the laboratory.¹ To the spleen he ascribed a great significance, mainly because in size and shape it was subject to great changes, while of all parts of the body except the heart it was least subject to a disease. Such a view is the more surprising as he was aware of the fact that the spleen could be removed from dogs without causing the least disturbance. Sylvius was therefore called "Patronus lienis." The function of the spleen was to prepare a finer sort of ferment, a kind of tincture, which should contribute to the fermentation of the chyle. The object of the respiration was to moderate the effervescence of the blood

¹ *Cambridge Modern History*, vol. v. p. 731.

in the right heart, which was caused by its innate heat working through the medium of the bile. He supported the doctrine of innate heat by the assumption of a higher temperature in the arteries than in the veins. Fever was caused by an unaccustomed effervescence of the blood of the heart, through the influence of one or more morbidly changed basic fluids. He regarded the increased frequency of the pulse-rate, and not a rise of temperature, as the most essential symptom of fever.

In therapeutics he made use of alteratives, by which he understood such medicines as improve either the consistence of the fluid elements of the body or the sensible properties of the same. The most important alteratives were such as worked upon "the vital spirits," *e.g.* ætherial oil, ammonia, and opium. Some of his prescriptions have survived almost to our own times, the most famous being the Elixir Proprietatis, which was largely used up to the middle of the nineteenth century, and which closely resembled the "aromatic sulphuric acid" of our present pharmacopœia.¹ More useful, perhaps, than all the theories and observations of Sylvius was his introduction of the habit of clinical teaching in the University of Leyden, which he thus describes: "In my teaching of the students I led them by the hand, so to speak, to medical practice, making use of a method unknown at Leyden, and perhaps elsewhere, that is to say, I took them every day to the public

¹ Withington, *Medical History*, p. 312.

hospital. There I put before their eyes the symptoms of the diseases; I made them hear the complaints of the sick, then I asked them their opinion, and the reasons for that opinion, on each affection which we observed, on its causes and rational treatment; each time there was a difference of opinion among them I settled the difference by suggesting various other arguments as sound as was possible, then I gave my own judgment on each point. With me they witnessed the fortunate result of treatment, when God granted to our cases a return of health, or were present at the examination of the body when the patient paid the inevitable tribute to death.”¹

The teaching of Sylvius spread all over Europe, for it seemed the solution of the problem of scientific medicine. Most of his disciples came from the Netherlands and Germany, and the school was still further developed by Theodore Graanen, who succeeded Sylvius as professor of medicine at Leyden, and tried to unite his teachings with those of Descartes. In England powerful support was given to the Iatro-chemical doctrine by Willis (1622-1675), justly famous for his researches on the blood supply of the brain. Destined originally for theology, owing to the persecution of the Anglican Church during the Commonwealth he betook himself to the study of medicine, became professor of natural philosophy at Oxford, and later practised as a physician in London with most brilliant success. He regarded “spirit”

¹ Daremberg, *Histoire des Sciences médicales*, vol. i. p. 571.

as the element which conditioned the activities of bodies, the most general form of this activity is "fermentation," which constitutes the molecular movement of bodies. Fermentation is defined as "an internal motion of the particles of any body, tending either to the perfection of the same body or because of its change into another." Health and disease depend upon the normal or abnormal course of these fermentations, and the physician may be compared to a brewer or vintner, whose business is to watch the process and to prevent or correct any irregularities.¹

To "the animal soul" he attached special significance, regarding it as the product of the fiery elements (*flammea substantia*) of the blood and the spirit of the nerves. He considered that the animal soul was the essential cause not only of normal life processes, but also that it was often the immediate cause of recovery from disease (*non raro ope medica agit*).²

We must now turn to the other great school of medical thought—the Iatro-mechanical, which took its origin from the physical methods of investigation then coming into vogue. An important precursor of the school was Santorio Santoro (1561–1636), professor of medicine at Padua and Venice. He seems to have been a sort of scientific St. Simeon Stylites, as he passed thirty years of his life both working and sleeping on a weighing-machine of his own invention,

¹ Withington, *Medical History*, p. 313.

² Haeser, *Geschichte der Medizin*, vol. ii. p. 383.

which enabled him to discover the insensible perspiration of the skin: it was a very crude method, as the evaporation from the lungs could not be separated from that of the skin. He also expressed a wish that every one could have a similar machine, for not only are changes in weight among the earlier signs of approaching illness, but by taking his meals in such a chair a person would be guarded against irregularity in the quantity of his food, which is one of the most fertile causes of disease. He also devised various ingenious instruments, in which he was doubtless assisted by the famous Galileo. Thus his thermometers, which he declares will be invaluable in cases of fever, are imitations of the air and water instrument invented by Galileo, slightly altered in shape to adapt them for being held in the mouth or applied to the skin. So, too, his pulsilogium is an application of Galileo's principle of the pendulum to measure the rate and regularity of the pulse.¹

But the real founder of the Iatro-mechanical school was Borelli (1608-79), who was Professor of Mathematics first at Messina, then at Pisa. Following strictly the philosophic teaching of Descartes, he tried to show that the body was a machine and physiology merely a department of physics. In this he had great success with his book, *On the Movement of Animals*, in which he demonstrated that walking, swimming, flying, &c., are mechanical processes, the muscles and bones playing the part of strings and

¹ Withington, *Medical History*, p. 315.

levers, which forces could be estimated mathematically. These mathematical conceptions of the body led him to make some strange statements; thus he thought that the heart expels the blood not so much by contraction as by a swelling up of the walls of the ventricles, just as a bullet is shot from a gun by the expansion of the powder, and the forces employed are not dissimilar, for Borelli calculated that each heart-beat overcomes a resistance equal to 180,000 lbs.

This application of physics to physiology and medicine was carried on by Bellini (1643-1704), of Florence, who at the early age of nineteen published his remarkable book on the structure and functions of the kidneys, and became later one of the most distinguished clinical physicians of his time. In his teaching of inflammation and fever he lays stress on the mechanical disturbances of the movement of the blood, especially the friction of blood in the walls of the smaller blood-vessels and the consequent stoppages (or congestions).

Nowhere did this Iatro-mechanical school find more favour than in England, as might be expected, perhaps, in the country of Bacon and Harvey. William Cole of Bristol (*fl.* 1670), the friend of Sydenham, combated the doctrines of the chemical school and enunciated a mechanical view of fever, which he regarded as the effect either of retained excretory products or of substances produced in the body itself (auto-intoxication) blocking the finest pores of the vessels, and first producing a disturbance of the

nervous parts and then, after their passage into the blood, a febrile temperature.

The most celebrated, however, of this school was Archibald Pitcairne of Edinburgh (1652-1713). Originally devoting himself to theology, and then to law, he finally studied medicine at Montpellier. In 1692 he went as a lecturer to Leyden, and numbered among his audience the famous Boerhaave ; but, being unsuccessful as a lecturer, he returned to Edinburgh. Pitcairne was the most decided opponent of the application of philosophy to medicine, and he was equally hostile to the chemical school. According to him, all the differences in physiological and pathological processes depended on the different diameters of the pores in the particular organs. The fundamental causes of all animal movements are the heart, the circulation, and the nerve spirits ; the latter by their streaming into the muscles cause motion, by their streaming back to the brain sensation. Bodily heat comes from the friction of the blood against the vessel walls. Digestion was regarded as a purely mechanical process, due to the rubbing action of the stomach, which effected a trituration of the food.

We have thus seen how the great thinkers of this century, and particularly the fashionable Cartesian philosophy, powerfully affected the study of medicine, leading men to conceive the possibility of a science of medicine based upon mathematics, physics, and chemistry. The immediate result was, on the whole,

encouraging, as certain aspects of the bodily mechanism, depending purely on physics, were clearly determined; the application of chemical ideas was less satisfactory, simply because chemistry itself was entirely in its infancy and rested on a very slight basis of ascertained fact. Gradually as these methods worked themselves out, they were found to lead to an unduly narrow conception of life, unsatisfying alike to science and philosophy.

Standing outside and apart from all this medical ferment which we have been considering is Van Helmont, whose system we cannot pass over altogether in silence. Unaffected by methods of physics or chemistry, unmoved by the exhortations of Bacon, the speculations of Descartes, or the discoveries of Harvey, Van Helmont pursued the even tenor of his way, evolving largely from his inner consciousness a new medical system. As an opponent of Galen, and as helping to batter down that time-honoured system, he harmonised with the spirit of his age; but in his attempt to substitute one system for another, like Paracelsus, he entirely failed to perceive the essential vice of the system he was attacking.

Van Helmont was born at Brussels, in 1578, of a noble family. His youth was characterised by an insatiable thirst for knowledge, and he was much influenced by the lectures of Martin del Rio on magic; but, finding there no permanent satisfaction, he betook himself to the philosophy of the Stoics, in which he hoped to find inward peace. Realising,

however, that this was not to be reconciled with Christianity, he turned aside to more worldly studies, and buried himself in law and political science. Next he directed his attention to botany, and began to think of taking up medicine. For a long time he hesitated, fearful lest so plebeian an occupation would be a stain upon his illustrious ancestry. Receiving, however, an inspiration from his guardian angel, Raphael, who apparently took no cognisance of his noble pedigree, he finally adopted the medical profession, expecting to find therein a complete satisfaction alike for his thirst after knowledge and his love of mankind. With amazing diligence he devoured medical works, both ancient and modern, reading Galen twice and knowing the aphorisms of Hippocrates by heart. He then began to give a course of lectures on surgery, at Louvain, till he felt that his experience was insufficient. By degrees he became disquieted with what he saw of medical practice, and the study of mystical books, such as those of Thomas à Kempis and Tauler, decided him to abandon medicine altogether. He then left his native land, intending never to return, and wandered through Switzerland, Italy, France, and England. Meeting with an alchemist he turned his attention to chemistry, and began in this direction new therapeutical methods. He returned therefore to Brussels in 1605, married, and settled down to a life of study and medical practice till his death in 1644.

In the system of Van Helmont we again trace the

influence of Neo-Platonism, which from time to time seems to reappear in the history of medicine. The basic principle of this system was the unity of nature, which is the free creation of God, whose breath fills all creatures with life. Nature, however, was not regarded as a completed thing, but as something which was continually passing away; but, by the power of the Creator, being continually formed anew. The body of man is under the control of two souls: (1) The immortal, which is derived from God, (2) the animal soul, which comes through sin. Like Paracelsus, he has the doctrine of the Archeus. Now the Archeus Influxus governs and controls the whole bodily organism, working always according to a fixed plan, or "seminal idea," impressed by the Creator. This Archeus is not the soul itself, but is the organ of the same, and has its seat in the stomach and spleen. The various parts of the body have a local Archeus called the Archeus Insitus, which is, of course, dominated by the chief Archeus Influxus. What precisely the nature of the Archeus was Van Helmont does not tell us, but he appears to have conceived of it as a kind of æther-like structure. Van Helmont considered that there was no essential difference between the conditions of normal and morbid processes. Whatever causes healthy actions in the sound, the same causes vitiated actions in the diseased. "Disease is a morbid idea, conceived by the Archeus either through his own infirmity or from the action of some harmful agent, which causes him to deviate from his

normal course and act in another way, but always according to some fixed and specific plan." Fever is the effort made by the chief Archeus to get rid of some irritant, just as local inflammation is the reaction of the local Archeus to some injury. He considered that the true seat of fever was not in the heart, as the Galenists taught, but in the stomach, small intestine, and spleen; the nearer the fever is to the pylorus the greater the danger. Asthma in women, he said, depended as a rule on the uterus, in men on a spasm of the bronchi, and therefore it is related to epilepsy. He makes the very suggestive remark that "dry asthma" deserves the name of epilepsy of the lungs. His therapeutics consisted in a union of Hippocratic medicine with a belief in the arcana. Strongly opposed to venesection, which he thought likely to weaken and irritate the Archeus, he combated also the Galenic theory of purgatives and the use of nutrient enemata, which were very common in his time. The main principle of therapeutics was to pacify the Archeus. Like Paracelsus, he believed that each country produced the special medicines suitable for its own diseases, and therefore that it was unnecessary to import foreign drugs. He would, doubtless, on this principle have rejected quinine, for he declares "it is inconceivable that the merciful Father of mankind should have been less merciful to his European children before the discovery of the Indies than afterwards." On some occasions it seems to have been legitimate to frighten the Archeus; thus

Van Helmont tells us that dropsy is not due to a disease of the liver, as was formerly supposed, but to the wrath of the Archeus presiding over the kidneys, who may be reduced to order by frightening him. This can be accomplished by tying a snake round the patient's waist, and applying live toads to the region of the kidneys.¹

Apart from such absurdities, we must recognise that Van Helmont was the most important naturalist of his time. He also discovered carbonic acid, and knew that the gastric juice contained an acid ; further he was possessed of a thorough knowledge of anatomy.

Though regarded by the Catholics as a heretic, he was in fact one of the greatest religious enthusiasts, the most learned of all Theosophists, and a firm believer in the Catholic faith ; much indeed of his contempt for the teaching of Galen arose from the fact that the latter was a heathen. Van Helmont was a great believer in divine inspirations, and relates how one day he beheld his own soul like a shining crystal, and that all his doctrines had been worked out in a dream. "From God alone do men receive intellectual and moral enlightenment." His enthusiasm for the well-being of mankind was boundless ; for him medicine is the office of love and pity, the final task of all knowledge, and the practice of Christian duty. If we are prepared to say with Daremberg, "Il ne peut sortir rien de bon de la methode a priori,

¹ Withington, *Medical History*, p. 308.

ni rien du bon du mysticisme,"¹ for medicine, then indeed must we condemn absolutely all the system and theories of Van Helmont. On the other hand fanciful explanations in medicine, as in other things, are often stimulating and fertilising, and are perhaps better than none at all. In all scientific discovery imagination is a most important factor, and though in the past it had often run riot, losing itself and misleading others in wandering mazes, yet with the advent of Bacon, Descartes, and the scientific method its excesses could be checked, and the world is more likely in the future to suffer from too little rather than too much imagination.

¹ Daremberg, *Histoire des Sciences médicales*, vol. i. p. 538.

CHAPTER X

THE INFLUENCE OF PHILOSOPHY ON MEDICINE IN THE EARLY PART OF THE EIGHTEENTH CENTURY

THE speculations of Bacon and Descartes, together with the brilliant physiological discoveries of the seventeenth century, had, as we have seen, given rise to the Iatro-chemical and Iatro-mechanical schools of medicine, which professed to find in the laws of chemistry and physics a solution for all problems connected with the body. The inadequacy of such conceptions was early recognised by physicians like Sydenham and Boerhaave, who were, in consequence, led to disregard all theories about medicine and to betake themselves to the old Hippocratic method of observation. Sydenham, indeed, has been termed the modern Hippocrates, and enjoyed the greatest reputation both on the Continent as well as in his own country. He reproached most physicians for either giving a blind confidence to the authority of the ancients, or accepting with credulity the novel doctrines of more modern writers. He was of opinion that the main error with regard to medicine lay in the fact that man had hitherto regarded diseases as being thoroughly abnormal and lawless phenomena, whereas the first requirement was to

classify diseases according to their distinct species with the same care that botanists employ in the case of plants. Contemporary with Sydenham, and possessed of the same mental temper, was Boerhaave. This celebrated physician was born in 1668. In early life he studied theology, and cherished the hope of combining it with the healing art; but on finding himself denounced as a follower of Spinoza, he abandoned theology and devoted himself to the practice of medicine. In this field of activity his success was astounding, students flocking from all parts of Europe to hear him lecture at the University of Leyden, so that he was justly described by Haller as "*communis Europæ præceptor.*" For Sydenham no less than for Hippocrates he professed the greatest enthusiasm, but differed from the former in thinking that medicine could be developed into a science by the equal use of clinical experience and the advancing knowledge of anatomy and physiology. Like Sydenham, however, he laid the greatest stress on observation and clinical investigation. Boerhaave did, indeed, make some attempt to unify conflicting medical systems, but in their confusion he thought the most certain guide to be the history of medicine; "the light of truth and the guide of life, she alone enables the physician to judge without prejudice of the old and the new." The physical method can only enlighten us as to the material processes of the body, not as to the soul's activity; for the final metaphysical and first physical causes are undis-

coverable, and have no significance for the medical profession.

Health he regarded as consisting in the normal action and reaction between the solids and fluids of the body. In disease the vessels may either be relaxed, giving rise to passive congestions, or constricted so as to produce obstruction and suppression of secretions; while in other cases there may be abnormal acidity of the humours, or their circulation may be impeded by an excessive viscosity.¹ Inflammation, he thought, arose from the friction of the arterial blood stagnating either in the arterial endings or in the lymph vessels. Boerhaave felt strongly the necessity of medicine being based upon physiology, but his energies were directed less to founding a system than to arousing and spreading abroad a desire for exact medical investigation. He said that he wished to make good practitioners, not men of learning.

The beginning of the eighteenth century had outgrown to some extent the philosophical systems of Bacon and Descartes, and their somewhat mechanical views of life were opposed by the celebrated theories of Leibnitz. This illustrious philosopher was born at Leipsic in 1646. In quite early life he became noted for the vast range of his knowledge, and was indeed regarded as a prodigy of learning—*pro monstro erat*. His was one of those encyclopædic minds to which nothing comes amiss. Well versed in jurisprudence, he became also famous in mathematics as the dis-

¹ Withington, *Medical History*, p. 325.

coverer of the differential calculus. Unlike Bacon and Descartes, he had a great admiration for Aristotle, and indeed for the ancients generally, of whom his knowledge was profound. Even the schoolmen, contemned as they were by the founders of modern philosophy, he knew how to appreciate, recognising in their methods a cogent and ingenious logic, though resting on premises unproved and frequently absurd. Like his immediate predecessors, he was convinced that natural processes must be explained mechanically, but in order to act mechanically the things of this world must be conceived as having such an original constitution as will make it intelligible how they can act according to certain fixed laws—*i.e.* the fixed laws must be the essence and very nature of the things themselves. No one understood better than Leibnitz the difference between the scientific and the philosophical treatment of a subject. He was emphatic in recommending the reduction of all scientific discussions to definite terms, but he was aware that such definitions suffice only for classifying phenomena—they cannot make them intelligible to us. Though entirely in harmony with the masters of modern science as to the right methods of scientific research, he saw that to rest contented with those methods would be to lose that which ancient philosophy had established, and which he himself admired in Plato and Aristotle—namely, the ideal and spiritual view of things. Consequently his philosophy attempted to reconcile two ways of looking at

things, the ancient and the modern, the theological and the mechanical, the religious and the scientific. He wished to give all possible scope to scientific research, all possible breadth to knowledge, but not less did he wish to give all possible depth and reality to religious belief.¹

His system was therefore, to some extent, a compromise. He reintroduced into philosophy the idea of Substance which underlies all phenomena; then he fell in with the old views of the atomists. But the atoms which he regarded as the ultimate basis of all existence were not, like the atoms of Epicurus, physical and extended particles, but they were rather centres of force, and had the powers of self-activity. Leibnitz spoke of them as monads, and endowed them with the depths of an internal life. Though in extension they were simply analogous to mathematical points, their intension was infinite, like that of the human mind. A monad includes within itself its whole past, future, and all Being; consequently all Being is present in every monad, not really but ideally. Every monad is a concentrated universal, and would therefore lose nothing if all the other monads were destroyed. As in the centre of a circle all the radii come together, so does the monad contain everything or express everything; each is a living mirror of all Being. The monads therefore differ *toto cælo* from the material atoms of Democritus and Epicurus; they should rather be compared with souls, spirits, or even with God.²

¹ *Leibnitz*, by J. T. Merz.

² Erdmann, *Gesch. der Philosophie*, vol. ii. p. 150.

The body of man he regarded as a complex of separate monads, but the soul was a single monad, the substantial centre of man's being. Plants and stones are monads, but in their case the perceptive faculty of the monad is more or less blurred or slumbering. Elements of mysticism and Neo-Platonism are certainly to be found in the system of Leibnitz. Thus in a letter to Prince Eugene he says that all the simple substances to which he gives the name of monads have emanated from God, as from the primordial unity, and that all the forces of these monads are imitations of the infinite force of the Divinity. In this we may easily recognise the Neo-Platonic system of emanations.

The body of man is a complex of monads, which it contains as a fish-pond contains fish. The soul does not receive its impressions immediately from the body, but, from the beginning of its existence, it contains within itself all the ideas which ought to develop in time and in a determined order. The soul is, in fact, a spiritual automaton. Its operations are not mechanical, but it contains within itself all that is beautiful in mechanics.

The old-standing antagonism between faith and reason was not, according to Leibnitz, founded in the nature of things, the essence of which is harmony and order; thus arose the celebrated doctrine of the pre-established harmony, the soul and body being compared to two clocks wound up to keep exact time with each other. These metaphysical speculations of

Leibnitz did not prevent him from taking an active interest in practical medicine, of which he had the highest opinion, speaking of it as an art "*qua nulla est præstantior neque difficilior.*" He was decided in demanding for medicine an exact method of treatment, and he regarded as the surest supports of medicine mathematics, physics, chemistry, and the microscope. He even founded a workshop for making microscopes. He was also anxious for the composition of a contemporary Medical History and for noting down accounts of epidemics, which he thought might be the joint work of many authors, thus anticipating the modern "system of medicine."

Among the intimate friends of Leibnitz was the celebrated physician Hoffmann, whose name is perpetuated to this day in the British Pharmacopœia under "*spiritus ætheris compositus*" or Hoffmann's anodyne. Born at Halle in 1660, Hoffmann early conceived a great passion for mathematics, which he retained throughout his life. In 1684-86 he travelled in France and England, entering into close relationship with Robert Boyle. At the age of thirty-four he obtained the chair of Medicine in the University of Halle, where his lectures aroused the greatest enthusiasm. His increasing reputation caused him to be summoned to the Court of Berlin, where he was physician to Frederick I.; but after three years' stay there he became tired of what he describes as the "*splendida miseria*" of Court life and returned to Halle, where he remained continuously till his death

in 1742. The medical system of Hoffmann was to some extent a revolt from the mechanical schools of medicine; but his rupture with them was less pronounced than that of his famous contemporary Stahl, of whom we shall speak presently. Enjoying the friendship of Leibnitz, he was much influenced by his philosophy, though he did not rise to the abstract height of regarding everything as Force, Conception, and Soul; nor could he embrace the ideas of spiritualism, newly strengthened by the doctrine of monads, so far as to renounce entirely the teachings of the Iatro-physical school. Hoffmann held that the universe was pervaded by an æther-like vital fluid, which supports all life, fills the juice of plants, &c., appears in all parts of the body, and especially in the blood. From the æther in the brain are developed "the nerve fluid," "the breath," and what the ancients called the "anima vegetativa." In order to set this æther in motion, Hoffmann ascribed to each æther monad an idea of its end, and therefore an independent power of motion, in accordance with the philosophy of Leibnitz.¹ Life consists in the continual movement of the heart and arteries; plants do not live because they have no heart; but to this one might easily reply that invertebrates have no heart, though it would be impossible to refuse admitting that they had life. If, on the other hand, an internal movement is the basis of life, then the earth and sea are alive, for they are subject to the most remarkable

¹ Haeser, *Geschichte der Medizin*.

movements. All diseases are caused by faults of movement, which may be too strong or too weak. Excessive motion produces spasms, and too little motion atony; the former are to be combated by sedative medicines, the latter by tonics.

Here we see the old "methodical" doctrine of Tone reappearing. But Hoffmann also considered two other sources of disease—namely, altered humours, which were to be met by alteratives; and deficient excretion, which was to be treated by evacuants. Several diseases he attributed to the planets and constellations, maintaining that the periodicity of diseases depended on the phases of the moon. His credulity is further displayed in that he considered the devil and demons to be capable of producing certain diseases.¹ In the way of treatment he was a great believer in dietetics, and tried to cure various sthenic affections by exercise, diet, and cold water. He often recommended wine, and in cases of gout employed large doses of Rhine wine. Hoffmann's system became widely diffused and extremely popular, largely because it was for the most part fairly comprehensible and easily carried out in practice. He was under the impression that medicine might become an exact science, not less susceptible of a logical and geometrical precision than a branch of mathematics. Though he maintained that the human body was a machine, he confessed that mechanism alone could not explain everything, but that a

¹ Kurt Sprengel, *Geschichte der Medizin*, sect. xv. ch. 11.

“superior principle” is at work which exercises a potent influence over all parts of the body. This principle, which we might hastily be inclined to identify with the soul, does not work with pre-meditation or reflection, like, for instance, the soul of Stahl, but is restrained by fixed and immutable laws. If we inquire the nature of these laws according to which this strange principle works, we are told that they are the laws of the “higher mechanism,” which have not yet been discovered! This was indeed a sad lapse from the rationalism of Leibnitz.

Contemporary with Hoffmann, and born in the same year (1660), was his rival, Stahl. After receiving a strictly religious education, Stahl studied at Jena, under Wedel, and then at the request of Hoffmann was summoned to Halle as Professor of Theoretical Medicine. Here, however, he met with but little academic success, and a gradually increasing friction between him and Hoffmann led him to accept the post of Court physician at Berlin in 1716, where he remained till his death in 1734. Like that of Hoffmann, the system of Stahl combated vigorously the tenets of the Iatro-mechanical school. While more profound in his conceptions than Hoffmann, Stahl was infinitely less practical in applying them to medicine. He was one of those reformers, endowed with a gloomy and melancholic temperament, who expend an excessive amount of energy in abusing their predecessors and contemporaries, and imagine

their system to possess an extraordinary novelty by the simple expedient of paying no attention to anybody else's work. "Medicine," he said, "is the science of life, and we have now only mechanics and chemists." "Where the physicist ends, the physician begins." In his lectures on medicine he proposed to banish from the medical art the sciences foreign to it—namely, chemistry, physics, and anatomy. He denied that chemistry had any application whatever to vital phenomena; and as to anatomy, he declared the knowledge of the finer anatomical relations of the body to be for a doctor not only superfluous but harmful. This perhaps is the less surprising when we realise that he attached but small importance to the bodily side of life. He considered that the body as such had no power of movement, but that it had always to be set in motion by immaterial substances. All movement is a spiritual action. The cause of the activity of the organised body, which watches over its preservation and the integrity of its compound nature, is an immaterial being which he termed the "soul." This soul is the "nature" of the ancients, which he considers to be proved by its etymology—*e.g.* ψυχή = φύσις ἔχων. To it he attributes all involuntary movements of the body, but he does not allow it either reflexion or the intimate knowledge of its actions. The functions of the soul take place, he says, *a ratione* (λόγῳ) not *a ratiocinio* (λογισμῶ). He failed to perceive that in this conception of the soul it differs in little but

name from the Archeus of Van Helmont. He remarked that we have a number of obscure sensations, and that many of our actions are performed without our having any consciousness of them. These obscure sensations, he suggests, are the shadows of a former consciousness possessed by man before the fall. The endeavour to make the soul direct the movements of the body as a sort of *deus ex machina*, independent of mechanical laws, was in opposition to the philosophy of Leibnitz, who pointed out that the laws of the body are those of motion, while the laws of the soul are moral laws. The soul, according to Leibnitz, was non-material and the prime "entelechy" or realisation of the body; but the body is possessed of a second entelechy, namely, the force of movement. Stahl's answer to this was to give the soul extension and material being, saying that he only expected immortality by divine favour.

Stahl, as a firm believer in the doctrine of final causes, was much influenced by theological and teleological points of view; thus he held that the bodily organs live only through and for the soul—they are, in fact, not exactly alive, but inspired with a vital principle. "The life of the body has significance only in so far as it subserves the objects of the soul." While anxious to free medicine from the domination of chemistry and physics, he was yet obliged to make certain concessions to the Iatro-mechanical school. Thus he adopted the doctrine of Tone—*i.e.* the general property of organic parts to expand and contract—

which was regarded by the Iatro-physicists as the basis of physiology.

A special difficulty about Stahl's system was to explain the phenomenon of death; for if the substance of the body is being continually renewed by the action of a soul which is immortal, there seems no obvious reason why it should not go on for ever. Stahl overcomes this difficulty by saying that the soul leaves the bodily machine either because it has become unworkable through some serious lesion, or because it does not choose to work it any longer; though he admits that the tendency to putrefaction, which the soul is always endeavouring to avert, increases with age, and may finally become irresistible, so that the soul is by no means omnipotent. It does, however, try to preserve the body as long as possible, and most so-called diseases are efforts in this direction. Thus the natural tendency of the blood to putrefy having become increased, the soul perceives this and at once proceeds to counteract it by more rapid circulation and excretion, which give rise to the whole class of fevers, these being efforts, so to speak, on the part of the soul to protect the bodily organism. Consequently animals, not having an intelligent soul to perceive the approach of dangers, are less subject to febrile diseases; at the same time they have shorter lives.

Stahl considered that plethora of blood was one of the most common causes of disease, because man as a rule eats more than is necessary for the

adequate nourishment of the body. He attributed gout, hæmorrhoids, stone, and melancholy to the slow passage of the blood through the portal vein.

His therapeutics, as may be supposed, were somewhat nihilistic. Believing, as he did, that the soul, in spite of liability to error, knows more about the body than the most skilful physician, the latter could only watch and assist its efforts. Fevers are not to be treated unless we can remove their cause. Hence he rejected quinine. He regarded opium as harmful, for it tends to deprive the soul of its control over the body. Finally, he contented himself with dosing all his patients with salt and water, which could not do much harm, and might help to counteract putrefaction.¹ In mental diseases he realised the importance of psychic treatment—in fact, he seldom made use of anything else.

Stahl's system, doubtless, suffered much by contrast with that of his brilliant rival Hoffmann. Like a true pietist, Stahl had a sovereign contempt for learning, which made him expend fruitless energy in attacking theories which he did not understand, and caused him to write in a style at once crabbed and obscure. Hoffmann, gifted with less insight and not attempting to penetrate so deeply into the primordial causes of things, was extremely erudite, and embroidered his copious and easily flowing writings with numerous quotations from non-medical authors, which assisted

¹ Withington, *Medical History*, pp. 335, 336.

in keeping medical speculation in the main stream of philosophic thought.

In spite of its obscurity and practical inapplicability, the system of Stahl found numerous followers after his death. Of these some were mere imitators of Stahl, while others lost themselves in mysticism and theosophy. But his teaching would hardly have become so widely diffused had it not been taken up by several distinguished English physicians, and made to harmonise with the English Iatro-mathematicians. This school, which prided itself on following strictly the laws of Newton and submitting all the mechanical actions of the body to mathematical calculations, realised that everything connected with the body cannot be explained on mathematical principles. Like Newton himself, they found themselves obliged to distinguish between the efficient cause—*i.e.* the mechanical movements themselves—and the final cause. Consequently they were ready to welcome some principle of action which was outside and superior to matter. This the "soul" of Stahl easily supplied to them, and being men of learning and capacity, they were able to give to it a firmer psychological basis.

George Cheyne (1671-1743) was one of the first of this English school to accept the principles of Stahl. He maintained and proved the insufficiency of mechanism for explaining the functions of the body. His writings on the theories of disease were a combination of the doctrines of Newton and Stahl.

The powerful influence of Newton's works in all spheres of thought is shown by a book of a friend of Cheyne's, John Craig by name, entitled *The Mathematical Principles of Christian Theology*.¹

More celebrated was Richard Mead (1673-1754). Son of a Presbyterian minister in Stepney, who had fled to Holland owing to the religious persecution in the reign of Charles II., he studied first at Leyden, then at Padua, finally settling down to practise in Stepney, becoming physician to St. Thomas's Hospital in 1703 and physician to George II. in 1727. In his practice he followed the tenets of Stahl, while in theory he adopted the Iatro-mathematical doctrines. For him the most important proof of the supremacy of the soul was the promptitude and certainty with which nature cures the most dangerous illnesses. Like Stahl, he was careful not to suppress a fever, which he regarded as the effort on the part of the soul to combat some more dangerous malady.

Robert Whytt (1714-66) was another distinguished advocate of Stahl's doctrines, though he very much limited the importance of the soul by ascribing to it sensation rather than reason. He starts from the principle that the motor force of muscles is communicated to them by the nerves, because the irritation of the latter gives rise to more violent convulsions in the muscles than when they are stimulated directly. The soul is always the prime cause of movement; it

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 608.

increases the influence which the nerve fluid exercises on the stimulated muscle.

In France, ardent defenders of the system were found in François Nicholls and in Boissier de Sauvages. The former went so far as to attribute all the changes of the body and all violent actions to the anger of the soul; the latter speaks of the soul as acting by means of a nerve fluid which is a kind of electric liquid. He also endeavoured to classify diseases from the standpoint of natural history, and the botanical system of Linnæus served him as a model. In spite of the many distinguished disciples of Stahl whom we have just detailed, opposition to some of his metaphysical conceptions very readily arose, and materialism returned to medicine, taking for its basis the views of Hobbes.

According to this famous philosopher, substance and body are synonymous words, and all bodies are endowed with a more or less pronounced sensibility. A zealous partisan of these views was Offray de la Mettrie, who endeavoured to prove the material nature of the soul. Man himself he regarded as a machine, which only differed from other bodies in that the material was more ripe. For him soul was a term devoid of sense, and he did not find the slightest difference between the functions and mechanical movements of the body.

This defender of materialism deserves so little esteem that Voltaire described him as "un fou qui écrivait jamais qu'après avoir égaré sa raison dans

le vin." He had begun life as a theologian, then betook himself to medicine and studied at Leyden under Boerhaave, but occupied himself more in propagating materialistic views of life than in the practice of medicine. In Haller's doctrine of irritability he found additional proof of the non-existence of the soul, much to the chagrin of its famous author.¹

The period we have just been considering was hardly a brilliant one in the history of medicine, yet it formed the prelude to the unwearied labours of a Morgagni and a Bichat, which, synchronising as they did with the intellectual ferment that preceded the French Revolution, established medical science upon a secure basis of ascertained facts, thus rendering possible the great discoveries of the nineteenth century.

It is difficult to appraise aright the influence of Leibnitz upon this period. Undoubtedly it rescued medicine from that purely mechanical view of all vital phenomena which was fast sterilising all further progress. Had his doctrine of monads fallen upon a more favourable soil than that of the gloomy and saturnine Stahl, results might have been different. As it was, Stahl, without fully understanding the philosophy of Leibnitz, thought that he had found in "the soul" a principle ready to hand which would explain everything. Consequently anatomy and all detailed study of physics and chemistry became matters of supererogation, and an entirely new system was

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 581.

heralded forth. We may see in Stahl the natural successor of Paracelsus and Van Helmont, without the grossness and crudity of the former or the imaginative insight of the latter. The general result of his system, as of all systems, was not favourable to medicine; his speculations lacked the verve and brilliancy of his prototypes, so that, while provoking opposition, they failed to stimulate thought.

CHAPTER XI

INFLUENCE OF CONTEMPORARY THOUGHT ON MEDICINE IN THE SECOND HALF OF THE EIGHTEENTH CENTURY

BEFORE we consider this period a few words must be given to the great Haller, whose all-embracing genius sets him on a pedestal by himself, somewhat apart from the main currents of thought in the eighteenth century.

This distinguished physician (1708-77) was one of those intellectual giants, like Aristotle, Leibnitz, or Goethe, whose lot it has been to accomplish excellent work in the most diverse fields of activity. As a poet Haller has been regarded as one of the pioneers of that great literary outburst which culminated towards the end of the century in the masterpieces of Schiller and Goethe. As a botanist he was among the foremost of the day, being surpassed only by Linnæus.¹ Even in this region his aims were loftier than those of his illustrious Swedish contemporary, for it was his endeavour to make a natural instead of an artificial classification of plants. For us, however, his interest consists in the new light which he threw upon medicine by his researches in

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 569.

physiology. Like Boerhaave, he sought to establish medicine on a new and sound basis, by means of the natural sciences, history, and observation. Being a decided opponent of the Iatro-physical school, he regarded the application of physics and chemistry to organic processes as thoroughly inadmissible; to penetrate into the ultimate causes of living processes he held to be quite impossible: "Ins innere der natur dringt kein erschaffner Geist." Like all true reformers of medicine, Haller realised the importance of anatomy, and in the school of Albinus became an excellent dissector, busying himself with the study of the brains of birds and fishes. Gradually, however, his interest in anatomy waned as he became more and more attracted by physiology, which he spoke of as "Anatomia animata." He devised plans for the complete revolution of physiology, but made the mistake of fixing too rigidly the physiological properties of muscle before knowing its anatomical structure.

The basic substance of the animal body, he considered, was gelatine, of which alone the lower animals consist, while the higher have in addition earth, air, and iron. From this mixture arise the fundamental forms of all animal changes, namely, "the fibres"; these in turn consist of small invisible structures, which can only be seen by the eye of the mind—"invisibilis ea fibra quam sola mentis acie attingimus." But the fame of Haller as a physiologist rests on his discovery of the irritability of muscle, which he regarded as exclusively the property of

muscle, while sensation was purely the property of nerves. This muscular irritability is, doubtless, nothing more than contractility, and he thought that this power resided specially in the gelatine. He did not realise that nerves also are irritable, but, unlike muscles, they do not manifest this irritability by contracting, but by transmitting along themselves, without any visible change of form, certain molecular changes which we call nervous impulses.

The phenomena thus ascribed by Haller to irritability were regarded by Stahl and his school as due to the streaming in of vital spirits into the muscle fibres. This irritability is best developed in the organs which immediately subserve the support of life—*e.g.* the heart, diaphragm, intestines, and muscles of the blood-vessels; of these the inner surface of the heart is specially irritable. The voluntary muscles, on the other hand, are only roused into motion by the activity of the soul.

The most violent attacks on the teaching of Haller came from the practising doctors, who relied upon their observation of the great irritability of inflamed mucous and serous membranes. At the head of these opponents was Anton de Haen; but he made no effort to confute Haller's numerous and carefully made experiments, appealing merely to clinical experience and traditional opinion; in fact, Haller's opponents did not think of repeating his experiments, which to the modern mind would have been the most obvious way to convict him of error.

Robert Whytt of Edinburgh wrote in opposition to this new doctrine. For him, the fact that frogs when decapitated showed signs of consciousness, and jumped about in a purposive manner, was a clear proof of the omnipresence of the soul. In the contraction of a muscle, when stimulated, he saw an arrangement of the soul for ridding itself of an oppressive stimulus. But in spite of all opposition Haller's theories gradually triumphed, and the method of experiment which he had employed for the purpose of demonstrating them was at length recognised as the only means of creating a really scientific physiology.

The latter half of the eighteenth century will be ever memorable for the extraordinary intellectual ferment in France, which culminated in the great Revolution. For the first time in the history of the world, men made a deliberate effort to break absolutely once for all with their past traditions and historical continuity. The whole existing fabric of society had been undermined by the scoffing sarcasms of Voltaire and the burning indignation of Rousseau. A stupendous effort was made to go back to first principles and to reconstruct society afresh on a basis of reason. The French Revolution is a striking instance of the *a priori* method run mad. Take, for instance, the famous opening sentence of Rousseau's *Contrat Social*, "Man was born free, but is everywhere in chains," which sent a thrill of enthusiasm through Europe. Could any proposition be more absurdly

untrue? But in those days of excitement nobody stayed to examine premises. The rigid uncompromising logic which characterised the devotees of the goddess of Reason, with their ready-made formulas and cut-and-dried Constitutions, was naturally impatient of the dualism of sensibility and irritability which had been introduced by Haller, and sought rather for some simple unifying principle in medicine. This desire found satisfaction for itself in the system of the Scotch physician Brown, which we must therefore spend some time in considering.

Brown (1735-88) was born at Preston in Berwickshire of poor parents, but as so often has happened in Scotland, he received a good education. At first his stepfather intended to make him follow his own trade, which was that of weaving, but his superior abilities destined him for the ministry of a dissenting Presbyterian sect. While studying for this purpose at Edinburgh he attended lectures on medicine, and became a sort of private tutor to medical students, and in 1761 was made a member of the Royal Medical Society. At first he enjoyed the friendship of Cullen, then at the head of the medical profession in Edinburgh, who employed him to teach his children and to go over his lectures with the students. By degrees, however, it became apparent that Brown, so far from believing in the doctrines of Cullen, was actively opposed to them, so that their earlier friendship was changed into enmity, and Brown traced all his future misfortunes to the malevolent machinations of Cullen.

Not till the age of forty-four did he obtain a medical degree, and then only at the small University of St. Andrews. Finally he abandoned Edinburgh for London, where he found himself obliged to go to prison for a debt of £250. He is said to have been offered a post at the court of Berlin, and also one at the University of Pavia; but both fell through, owing, in his opinion, to the intrigues of his enemies. He died a few years later in 1788.

Few medical systems have ever been so simple and easy of comprehension as that of Brown. According to his theory, the animal body possesses a property called "excitability," which, when acted on by stimuli, gives rise to excitement or, in other words, to life. Moderate excitement is equivalent to health; too much or too little is disease, which has to be treated by regulating the stimuli. Excitability is a mysterious something possessed by all living beings, which is continually being used up and renewed during life, and which varies inversely with the stimulus. Death occurs when the stimulus sinks below a certain level, or when it is so violent as to exhaust the excitability.¹ The seat of this excitability is in the nerves and muscles, which together are understood as the nervous system. Since everything depends upon irritability and excitability, knowledge of the structure and functions of the organism has only a subordinate significance; anatomy, therefore, as we have seen in the case of other system makers, falls into the

¹ Withington, *History of Medicine from the Earliest Times*, p. 346.

background. Every organism possesses an inborn quantity of excitability, which Brown speaks of as a power of nature; he had, however, no belief in the healing power of nature. The great charm of the system was its simplicity and practical applicability. Thus all diseases are divided into sthenic and asthenic; the sthenic diseases are cured by asthenic means, and *vice versa*—that is to say, negative stimuli must be applied for the cure of sthenic diseases, and positive stimuli for the cure of asthenic. This system, based on a few unproved hypotheses, was made to embrace all problems either of health or disease.

Brown was a man of rigid mental temper, making no concessions to any one, whether friends, protectors, or masters; as may be readily surmised, he was in revolt against everybody, and had a fine contempt for the medicine of his day. Thus he says: "The reader will see to what a pitch of simplicity I have brought medicine, which was previously a congeries of hypotheses, incoherences, and errors, a science mysterious and enigmatic; health and disease are the same condition depending on the same cause; the search after causes is the serpent of philosophy." In consequence perhaps of his uncompromising personality, Brown was not a prophet in his own country; neither in Scotland nor in England did his system find much vogue. On the other hand, his doctrines found ready credence in America, owing to the influence of Benjamin Rush (1745-1813), pro-

fessor at Philadelphia, who was much impressed by the favourable results obtained in the application of Brown's system to the treatment of an epidemic of yellow fever. In France the disciples of Brown brought his treatise on the elements of medicine to the notice of the National Convention, who received it favourably. On the Continent generally it may be said that he enjoyed great popularity; thus his therapeutic methods were introduced into the Austrian army, and in Göttingen so much excitement prevailed about this new teaching as to cause fights among the students which involved the calling out of the military. It has been pointed out by Haeser that in Germany Brown's teaching of excitability and asthenia was readily connected with the sentimental school of literature, which had at that time so great an influence over the upper classes, that the whole of society threatened "to dissolve into sensations and feelings."¹

Of the same mental temper, less well known though more scientific than Brown, was the French physician Broussais (1772-1838). As a veritable child of the Revolution all traditional medicine appeared to him worthless, and the various forms of disease described in the schools were for him purely imaginary entities, while the therapeutics seemed actively baneful. "Life is maintained solely by stimuli from the external world, and disease is nothing more than a modification of physiological conditions by abnormal stimuli or deficient stimuli." From Brown, however, he differed

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 760.

in maintaining that nearly all diseases were first local in origin and then gradually spread themselves over the whole body; this he even believed to be true of fevers, and, in fact, considered that a very large number of morbid conditions were due to a gastro-enteritis, very much as we nowadays attribute innumerable symptoms to auto-intoxication. Broussais was as much enamoured of systems as Brown, but his criticism of the latter is severe, saying that when the Scotch physician speaks of excitability, force, and weakness as if they were things perceptible to the senses, with a separate existence of their own, his general propositions have ceased to be reducible to facts. Broussais tried to prove from clinical observation that the same causes may produce sthenic and asthenic diseases. He was certainly less unscientific than Brown, as he maintained that each separate tissue had its own particular morbid manifestation; and in the study of disease he made use of pathological anatomy, endeavouring to envisage the lesions in relation to their morbid symptoms. In his later years he became an enthusiastic believer in phrenology, because he found that it harmonised with his theories of the localisation of disease.

His therapeutics consisted in leeching the affected part, poultices and mucilaginous drinks to counteract the "irritation," and especially the gastro-enteritis. The result of this treatment is shown by the fact that the wards of the Val de Grâce military hospital

at Paris, of which he was the head, possessed the highest mortality. His use of leeching was indeed generous; without counting them, it was his custom simply to turn a jar full of leeches on to the affected part, and in a single year (1819) as many as 100,000 leeches were used in his wards, and the importation of leeches into France in the year 1827 is said to have reached 33,000,000.¹

The latter half of the eighteenth century was characterised by as great a revolution in the world of thought as was the French upheaval in the realm of politics. Heine has somewhere humorously compared such very unlike figures as Kant and Robespierre,² yet each of them stands for a remarkable change in the world of thought and of action. Kant has indeed compared himself to Copernicus, feeling as he did that he was making in philosophy a change analogous to that of Copernicus in natural science. Kant had directed his attention to considering the validity of the very thinking process itself, and had come to the conclusion that our knowledge can only be of phenomena. Our minds being conditioned by the categories of the understanding and the forms of time and space, which are prior to all experience, can only gather knowledge which is

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 884.

² "Both presented in the highest degree the true type of the narrow-minded citizen. Nature had destined them for weighing coffee and sugar, but fate decided that they should weigh other things; and into the scales of one it laid a king, into the scales of the other a god . . . and they both gave correct weight!"—*Heine*.

clothed in these categories and dependent on these forms; they cannot penetrate to the sources of ultimate being; they can never know "things in themselves," the "Ding an Sich" or Noumenon. Hence arose the opposition between Thought and Reality. Knowledge being then united to phenomena, it might not unnaturally be supposed that science in general, and medicine in particular, would be withdrawn from all futile and vain speculations about things in themselves. It is quite possible that this may have been the ultimate effect of the Kantian philosophy upon medicine; but the immediate result was to give an extraordinary stimulus to the pursuit of the "Ding an Sich," as shown in the philosophical systems of Schelling and Fichte. Apart from this, however, the enormous interest given to metaphysics by the publication of the *Critique of the Pure Reason* made it advisable for any system of medicine to put on a philosophic dress. Such an attire was conspicuously absent from the medical system of Brown, so that in Germany, where it became so popular, it had to be clothed in the fashion of the day. This task devolved upon Röschlaub of Bamberg (1768-1835). His work may be regarded as a philosophic introduction to general pathology; but he was possessed by the erroneous notion that scholastic philosophy exercised an almost unlimited dominion over medicine. In order to defend the distinction established by Brown between internal and external diseases, local and general ones, Röschlaub

maintained that the organism is indeed a condition of life, but only an external condition, that the internal one is the vital principle itself. He regarded the "excitability" of Brown as the primal unity and as the general cause of the phenomena of life, thus apparently making it analogous to the "Ding an Sich," and so satisfying the conditions of the critical philosophy. Röschlaub fell into mysticism, theosophy, and the subtleties of Paracelsus, which, however, he renounced in his later years.¹

Kant himself, in addition to his fame as a metaphysician, was well abreast of the scientific thought of his age, and had published several treatises on scientific subjects before the appearance of the *Critique of the Pure Reason*. He was fond of conversing about medical subjects and the new doctrine of vaccination promulgated by Jenner towards the end of the century, and had quite definite views on medical practice; he did not, however, make any contributions to medical speculations, but was much interested in Brown's system. More direct than the influence of Kant upon medicine was that of Schelling. This distinguished thinker (1775-1854) was Professor of Philosophy at Jena, Erlangen, Munich, and Berlin, and originated a metaphysical system in close relationship with natural science and medicine. Schelling did not accept the dualism of Kant, which made a sharp distinction between the realms of Phenomena and Noumena; for him a knowledge of the "Ding an

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 765.

Sich" was not impossible. Thus he says: "In all of us dwells a secret wonderful power, that of retiring out of the changes of time into our own innermost selves, freed from everything that comes from outside, there to behold the Eternal under the form of immutability. Such intuition is the innermost and most real experience on which all depends that we know and believe of a spiritual world."¹ For the subjective idealism of Kant he substituted an objective idealism in which nature is seen to be slumbering or petrified intelligence; the ego is everything, because everything is the Ego. He showed that the whole of nature may be regarded as an embodiment of a process by which spirit tends to rise to consciousness of itself. Because of this affinity which nature has with spirit, Schelling thought that it would be possible to say what nature is, prior to empirical research, and he therefore tried to explain nature by a logical manipulation of such opposites as the Self and Not-Self, attraction and repulsion, together with such principles as polarity, excitability, light, &c. He held that it was only the imagination and reflecting understanding which causes us to separate things, or to conceive of them separately; Reason beholds all things in their totality or oneness; the Absolute is not only the unity of all contradiction, but the unity of unity, and itself unendingness. Schelling's speculations extended over a wide field of science; thus with regard to light, he came near to the Undulatory

¹ Schelling's Works, vol. i. p. 318.

theory of Euler, as opposed to the Emanation theory, which was then in vogue. In electricity he tried to unite Franklin and Symmer. With regard to medicine, he opposed the Iatro-chemical school, and also the idea of a specific vital power; life consists rather in the fact of the chemical process being prevented from coming to a standstill, while diseases owed their origin to the negative condition of life. His interest in medicine led him, in conjunction with Marcus, to edit annuals about medicine as a science.¹ To estimate in a few words the influence of Schelling upon our art would indeed be a difficult task. All attempts, however, to construct nature *a priori* must have a prejudicial effect upon medicine, as tending to draw men's minds away from searching out the truths of nature by way of observation and experiment. On the other hand, Schelling's system was highly intellectual, and quite unfavourable to a careless dilettantism; by his spiritual conceptions of nature he helped to raise all science, and medicine along with it, on to a higher platform. It was this philosophy of Schelling which stirred the two greatest of German poets to busy themselves with science; thus Schiller, the army surgeon, took for his doctor's thesis the most profound medical problem, namely, "The Philosophy of Physiology." Goethe busied himself in his later years very largely with science, and his discoveries in anatomy, botany, and physics are too well known to dwell upon here. The great point

¹ Erdmann, *Geschichte der Philosophie*, vol. ii. pp. 473, 474.

to realise is that medicine was caught up in this general philosophical and poetical idealism, which, synchronising as it did with the mighty effort to reanimate the fallen fortunes of Germany, marks the zenith of that nation's intellectual and moral revival. More particularly we may recognise the influence of Schelling in Kielmeyer (1765-1844), first professor at Karlsruhe and then at Tübingen. He came to the conclusion that the various classes of the animal kingdom are gradual realisations of a common basic idea; he took an important part in the study of comparative anatomy, which became famous through the labours of Cuvier.

Oken (1779-1851) was another distinguished disciple of Schelling. At first he appears quite mystical: "Water is the earthly light," the separated earthly God. Next he followed the doctrine of the all unity of nature and the law of the development of the higher from the lower, specially in the province of zoology. The particular forms of animal life he describes as the limbs of a great ideal whole, and the entire animal kingdom he regarded as man laid out in his separate limbs. In his writings also are to be found the germ of the Cell theory. As early as 1805 he described the elements of organic bodies as vesicles (*Bläschen*). Many of the followers of Schelling, however, fell into the most unbridled fancies, indulging in empty plays on words and ingenious analogies in proportion as they were wanting in positive knowledge. In particular they made great use of the expression "polarity,"

in which they saw every phenomenon and relation of life. Thus they spoke of the polar opposition between the head and lower parts of the body, the brain and the solar plexus, the arteries and veins, the processes of nutrition and secretion, and positive and negative diseases. This doctrine of polarity induced many of these "nature philosophers" to devote themselves to animal magnetism.¹ The immediate effect of endeavouring to construct the world according to the laws of human thought has been thus described by Hamann: "Natural philosophy, in consequence of an excessive impulse towards systematic production, passed from a general knowledge of the possible to a general ignorance of the actual." It must not, however, be forgotten that for medicine it was a great advantage to be regarded in its theoretical aspect as a part of natural science, and in its practical aspect as a science subserving the ideal aims of mankind. The reaction which followed on this transcendental standpoint caused a separation between the philosophers and men of natural science, though the best of the latter have recognised the truth of Schelling's saying, "Where one seeks to know the objects of nature in their isolation, there one sees wide tracts of science going to waste, heaping up grains of sand in order to construct an universe." Before we take leave of Schelling we ought to mention Schönlein (1793-1864), who must be regarded as one of the followers of the philosopher; but he also possessed

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 820.

the merit of introducing into Germany the more exact methods of clinical investigation which obtained in France and England. His great aim was to elevate medicine to the rank of an exact science, after the pattern and method of natural philosophy. "Medicine can only make true progress when the whole of physics, chemistry, and all natural sciences are applied to it, and it is in complete harmony with the brilliant advances made by these sciences." The pupils of Schönlein called his method "the Natural History school." He laid the foundations of a thorough clinical instruction, based upon the most elaborate investigation of the diseased condition, by means of every aid which could be drawn from physical, microscopical, chemical, and pathological diagnosis. He was also among the few physicians who recognised the full importance of the history of medicine, especially with regard to epidemics. The followers of Schönlein still maintained a close connection with the Natural Philosophy school of Schelling. Thus diseases were regarded as independent organic processes and analogous to lower normal organisms. This belief was based on the evils caused by Entozoa, Epizoa, and Epiphytes. Stark, the principal defender of this doctrine, described disease as a parasite developing itself upon the sound organism, which then obeyed special laws of its own. The most extreme form of these doctrines was to be found in the writings of Richard Hoffmann, professor at Würzburg, who regarded diseases as reversions of the

human to lower normal stages of animal life; thus the scrofulous represented the sinking down of the human organism to the level of insects, rachitis meant a descent to the level of molluscs, and epilepsy to that of the *Oscillaria*, &c. Fantastic as many of these ideas emanating from the school of Natural History must seem to us, they did, however, exercise a powerful influence in bringing about a more exact method of clinical investigation. Then again, in contradistinction to the principle of localisation of disease, which, owing to the study of pathological anatomy, was in danger of being over-estimated, the school of Natural History drew attention to the general relationship of the most important diseases, and by its renewal of interest in the history of medicine and of special diseases, gave to medicine a wider and more philosophic outlook.

CHAPTER XII

INFLUENCE OF CONTEMPORARY THOUGHT ON MEDICINE IN THE NINETEENTH CENTURY

THE past century has brought with it the greatest development of scientific research which the world has ever seen, and with it the attempt to regard medicine as an organic whole has been definitely abandoned. The old idea of finding some key which was to unlock the secrets of all imaginable diseases has been given up, and no serious person considers the possibility of forming a system of medicine in the ancient sense of that expression. The last attempt in this direction, which began in the eighteenth century and carries on a chequered existence to the present day, deserves, however, a brief notice.

The founder of Homœopathy was born in an age when men still believed that it was possible for medicine to be taken by storm and an entirely new system evolved, much as the French revolutionists imagined that by an absolute break with the past and a few strokes of the pen the whole organisation of society could be regenerated. We have seen how the love of system at this epoch obtained for the doctrines of Brown a great popularity on the continent of Europe; but the theories of Hahnemann,

though less profound than those of Brown, were destined to become far more famous.

Hahnemann, the son of a painter on china, was born at Meissen in Saxony in 1755. He took his doctor's degree at the University of Erlangen, and then wandered about from town to town in search of a suitable practice, till he finally settled at Leipsic. For many years, he tells us, he refrained from treating the sick, owing to his doubts about the truth of medicine. At last he made his well-known experiment with quinine, in which he observed that that drug, which was usefully employed for the cure of ague itself, produced some of the symptoms of ague when taken by a healthy person. Hence he came upon his doctrine of the treatment of disease known to fame as "Similia similibus curantur." It is, however, a mistake to suppose that this idea was a new one, for it was known to Hippocrates, who recommended mandrake as a cure for mania; and the old legend of the spear of Achilles, which heals the wounds it had itself inflicted, shows how ancient is the belief in the doctrine of similars. Basil Valentine also declared that disease might be likened to a poison which may be either driven out by contraries or drawn out by similars, and the latter is by far the best method and causes least disturbance.¹ But to Hahnemann belongs the credit, if there be any, of erecting this idea into an elaborate principle which should embrace the whole therapeutic side

¹ Withington, *Medical History*, p. 267.

of medicine, all other aspects of the medical art being entirely disregarded. Following the stereotyped course of all reformers in every department of life, Hahnemann began with the wholesale abuse of his predecessors and a general contempt for all existing medical theories and practice. The supreme importance in medicine of searching out the causes of disease was totally unrecognised by him—in fact, he regarded the study of the causes of disease as utterly futile and absurd. For, in his opinion, the health of man is maintained by a purely spiritual vital power; disease depends on a discord in this vital power. Hence the immediate cause of disease is of a dynamic nature and is not to be comprehended by the senses. Naturally, therefore, he neglected pathological anatomy, which at that time was making great strides under the inspiring genius of Bichat. Symptoms, and symptoms only, were all that he considered worthy of attention in the matter of disease. The division of diseases into local and general, feverish and the reverse, he considered absolutely untenable, for he maintained that every disease was general. Hence the local treatment of local ills with poultices and external applications was superfluous or even harmful, since the removal of the local evil renders a judgment of the general underlying condition impossible, and often raises the same to a dangerous height.

There are points in the system of Hahnemann which show him to be the lineal successor of Paracelsus. The latter, as we have seen in a former

chapter, believed in the curative powers of spiritual entities immanent in the human body. Hahnemann thought of these spiritual powers as existing not in the body but in the drugs themselves; for him medicines were not dead substances in the ordinary sense—rather was their true Being dynamically spiritual. “All drugs contain dynamic spiritual powers, which are awakened and brought to life, not by chemistry but by dynamisation, a process unknown before my time, and consisting in rubbing the dry substances in a mortar and shaking the fluids—which is a kind of rubbing. This rubbing sets free the more deeply situated medical powers, which can then act upon our life in an almost spiritual manner, and so cure diseases; for diseases are solely spiritual derangements of the spiritual vital force which animates the human body.” Here, in this fond belief that by certain external material manipulations of drugs, usually in the way of extreme dilution, some super-sensuous power is set free of wondrous therapeutic efficacy, stands revealed that element of mysticism which is at once the strength and weakness of homœopathy. For it appealed powerfully to the popular uneducated mind, ever ready to believe in the fanciful and marvellous, especially in the realm of medicine, and which, clouded and trammelled by the world of the senses, is unable to travel out of the sphere of time and space to the region of Noumenal Being, in which the true mystic lives and moves, but with a certain intellectual coarseness accepts ideas as spiritual which

are really only a refined form of materialism. Such a crude form of mysticism, however, clearly belongs to the world of phenomena, and must therefore, if it is to maintain itself, be based upon observation and experiment.

Health, according to Hahnemann, is the work of the "autocracy of nature," which he describes either as possessed of mind or as undeveloped and without understanding, according to the exigencies of the argument. Though powerless against the original disease, yet it is capable, by increased energy, of removing the disease caused by the medicines, although this latter is more powerful than the original disease.¹ A favourite saying of Hahnemann's was that ancient medicine never cured any disease. As there were obvious exceptions to this paradoxical statement, he asserted that in such cases homœopathy had been employed by accident; but he failed to see how this confession entirely invalidated his other assertion, that medicines only developed the healing properties when they had been "raised to a higher power," *i.e.* by an excessive dilution.

Homœopathy resembled the system of Brown, in that both laid the greatest stress on the symptoms of disease, only Brown studied them in order to arrive at a judgment as to the degree of excitability of the organism, whereas Hahnemann rejected every attempt at comprehending a connection of symptoms with an underlying cause. Brown's system was

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 798.

founded on an undeniable truth, namely, the doctrine of irritability; but it is only absolute caprice which maintains the principle that diseases can only be healed with such remedies as produce similar symptoms in the healthy. The system of Hahnemann, however, became far the more popular. It represented a reaction against the heroic measures of Brown and Rasori, and was certainly infinitely less dangerous; for its treatment was so mild as to amount almost to therapeutic nihilism, and many physicians considered that its apparent success was due to the discontinuance of bleeding, excessive purgatives, and all violent measures, and the recommendation of a simple, non-irritating, and non-medicinal diet. In further explanation of the success of homœopathy it has been said that its zenith coincided with a time when medicine in Germany was in a most unsatisfactory state, so that the complaints of Hahnemann and his followers against it do not seem so wholly unreasonable. Hahnemann, apart from his peculiar theories, was a great advocate of hygiene, and in his book, *The Friend of Health*, appears to have been far in advance of his time as regards preventive medicine. In his treatment of the insane, too, he seems to some extent to have anticipated Pinel.

Medical thought having once been started on this line of pseudo-mysticism, there were not wanting followers to push Hahnemann's theory to the farthest extreme. Among these, perhaps the best known is Rademacher (1772-1850). Born at Hamm in West-

phalia, he studied under Hufeland in Jena and Berlin. His was an entirely natural, pure, and noble character; he regarded the practice of the medical art as a religious duty, and he pursued it with untiring industry and loyalty. His doctrine was an attempt to call into life again the teachings of Paracelsus as to the Arcana. With Paracelsus and Hahnemann he shared the desire for specific remedies, considering that the salvation of medicine was to be based on the foundation of therapeutics as an independent science, diagnosis resting solely on the success of the remedies employed. He had no belief in the *Vis medicatrix natureæ*, and the expectant method of treatment he regarded as almost immoral.¹ He made use of three chief remedies—namely, nitrate of sodium, copper, and iron—which he said corresponded and gave title to the three primary diseases; and though the diseases were unknown to him, they were to be cured by these remedies.

We have now reached the period of scientific medicine for which the nineteenth century will be forever famous, as greater progress has been made in medicine during the past century than in the whole previous history of the world. Three main causes have been responsible for this remarkable result. (I.) The systematic study of pathological anatomy which had been begun by the brilliant investigations of Morgagni, revived during the short and meteoric career of Bichat, and finally established on a firm

¹ Haeser, *Geschichte der Medizin*, p. 804.

basis by Rokitansky and the school of Vienna, which regards the history of the development of morbid processes as the most important task of pathological anatomy. (II.) The foundation of physical diagnosis. So large a part do percussion and auscultation play in the activities of the modern physician, that it is hard to realise that a century ago these important aids to diagnosis scarcely existed. True indeed that percussion had been known to Auenbrugger in the middle of the eighteenth century ; but this remarkable discovery, in spite of the favour bestowed upon it by the great Haller, fell upon stony ground, and only became fruitful early in the nineteenth century through the influence of Corvisart. Laennec's discovery of auscultation (1819) opened up a still wider field for diagnosis, increasing enormously the scientific basis of medicine. Then, too, came the use of the clinical thermometer. Though not unknown to Boerhaave and studied by his pupils Van Swieten and de Haen, it was not till 1850 that it came into general medical practice, owing to the influence of Traube and Bärensprung. In still more recent times the medical *armamentarium* has been enriched by the invention of the ophthalmoscope and laryngoscope, which have so powerfully developed our knowledge of the diseases of the eye and throat. (III.) The immense advances made during the nineteenth century in the sciences of biology and chemistry, the doctrine of evolution, the discoveries of Pasteur and the brilliant application of them by Lister, into the

discussion of which we cannot now enter, have given us almost new conceptions of disease.

The past century has been one of reaction against the idealism of the preceding age, placing the individual rather than the idea in the foreground, and the mutual influence of medicine and philosophy is now less conspicuous than formerly. The process of differentiation which we spoke of in our first chapter has been continuing almost in geometrical ratio during the past century, so that there is hardly a part or function of the human body which is not presided over by specialists with their associations and transactions. Medicine, of course, has not been alone in this ; it but shares in the universal tendency to specialism in all civilised nations in every department of life,¹ from the humblest kind of manufactured commodity to the most exalted products of the human mind. The progress from homogeneity to heterogeneity, which is so marked in the whole physical evolution of man, seems hardly less obvious when we consider man in his aspect of a social animal. That the vast progress of medicine during the past century has been mainly due to the increasing development of this principle it would be difficult to deny. Clearly, the careful mapping out of the field of medicine and the elaborate research carried on in each several department has furnished us with an enormous body of accurate information and detailed knowledge which could hardly have been obtained in any other way.

¹ Haeser, *Geschichte der Medizin*, vol. ii. p. 260.

Such an achievement it would be difficult to overestimate; for in the past the great obstacle to the advance of medicine had been the entire absence of any co-ordinated body of accurately ascertained facts. Resting, as so much of it did, upon unproved hypotheses, it was constantly at the mercy of every fresh speculator of genius, whether a Paracelsus, a Brown, or a Hahnemann. From such outbursts of crude theory in the future it is to be hoped that medicine is now for ever secure, owing to the large amount of sound knowledge which has been gathered up in its various departments.

From the point of view of medicine, therefore, in and for itself, all this tendency of differentiation cannot but have been of the greatest advantage. It is only when we come to think of medicine not as a separate art or science, but in its wider relation to the art of life in general, that doubts and hesitations arise in our mind as to whether there has not been some set-off to the great progress that has been made in the nineteenth century. In spite of the vastly increased knowledge of the causes and treatment of individual diseases, are we much nearer than our forefathers to a knowledge of the laws of health as they affect each individual citizen of the community? That a vast deal more about sanitation and public hygiene is known and actually put into practice nowadays than was the case a century ago, not the most intransigent conservative would deny. But when we come to the effect of medicine on the life of the

individual, do we see a commensurate progress? Given a healthy man, is the modern physician, trained in the methods of modern science, able to give him better advice as to how that health is to be preserved than a physician of a century ago? The old saying that a man is either a fool or a physician at forty indicates no doubt the truth that a man of sense can find out for himself the laws of health as they affect himself without any scientific training, though it will not enable him to treat disease. Owing to the vast accumulation of strange and varied diseases in the hospitals of a large town, physicians are apt to have a false perspective and to suppose that disease is more common than it really is; and yet for how many of those who are to all appearance in health are not the times out of joint? Without entering into a metaphysical discussion as to where health ends and disease begins, we may say at least that wherever there is a maladjustment between the individual and his environment, there to some extent is a deflection from sound health. In the upper classes especially much of this maladjustment is either moral or intellectual or both. A man is weak on the moral side and cries aloud with the Roman poet, "*Vide meliora proboque, deteriora sequor.*" To such an one the medical knowledge of the schools will not be of much avail unless combined with philosophy, which Hippocrates regarded as essential to a physician. Then again, in the intellectual sphere, surely it often happens that a man does not know how to use his talents.

Possessed perhaps of decided abilities, he yet lacks the power of self-direction which should organise and adjust his mental aptitudes ; hence he never comes to the full realisation of himself, but pursuing paths uncertain with an unsettled determination, brings forth no good fruit for his fellows, and much inward dissatisfaction for himself. Here again we may see how a medicine based upon philosophy and embracing the whole range of life, both intellectual and moral no less than physical, would be of enormous service to the community. This, indeed, was the aim of early medicine, which ranged over the whole of life, but it was then premature ; no adequate demarcation had been made between the organic disease which requires definite technical and scientific treatment and those minor deflections from moral and intellectual health which we have indicated above. The ancient Greek, at all events, regarded disease as an entirely exceptional thing ; perfect physical health was the normal and natural state of life, and we can hardly imagine the Greek artisan feeling it necessary to put by money for a time of sickness—as we know from the *Republic*, the Platonic artisan “had not leisure to be ill.” Certainly the Greek physician thought it his duty to envisage the whole of life no less than the whole body. Doubtless the task of us moderns is infinitely more difficult ; so much is now definitely ascertained, that to take the whole of knowledge for one’s province must seem at once chimerical and absurd. And yet something

of the kind must be done if the physician is to attain to the higher aspects of his art. To some extent he would become an authority on education no less than on public health, not mapping out pedantically the exact number of hours which must be allotted to sleep or play to children of different ages, but having a clear idea as to what type of subjects should be taught at the varying epochs of a child's life. Religion and philosophy would not be entirely outside his province. He would learn to realise that in this sphere absolute truth may be less valuable than relative. How often do we come across men who have acquired some knowledge of truths which they have not entirely comprehended; such knowledge is often an incubus to them, impairing the effectiveness of their life. A religion or a philosophy less in accordance with absolute truth, yet more suited to the moral and intellectual apprehension of the given individual, and more capable of educating all that is best from him, may surely be regarded as the religion or philosophy which is the absolute truth for that man. It has been well said that the aim of all religion is to make the inner man predominate over the outer; but all religions do not effect this purpose in the same way, and the "Spectator of all Time and all Existence" would see how it may best be effected in the case of one individual in one way, in another case in another.

It seems a not unreasonable speculation to think that we have now gone as far as it is profitable in the

way of differentiation in medicine, unless the sight of the whole is to be lost in the contemplation of the parts. Ancient medicine had its gaze for ever fixed upon the whole, but then the parts were so few and meagre that there was little temptation to spend much time in thinking about them. But with our present knowledge, so much of which has been garnered during the past century, it seems almost time for a reintegration of medicine to be attempted: just as Wagner endeavoured to bring the sister arts of music, poetry, painting, dancing, which had so long been labouring and perfecting themselves apart, to subserve a unity in his musical dramas, so it would seem to be that the time has come when medicine in all her several departments and with the sister sciences might be brought to such a focus as to subserve the purpose of a sane and rational life. We shall thus find medicine no longer studied only as an isolated science like political economy in the days of Adam Smith and the earlier economists, but forming with it an integral part of sociology, and making its influence felt more and more every day as statesmen and politicians come to realise the gradually increasing importance of public health to the welfare of the community. It is not enough for sound laws to be passed, as in matters of public health it is the administration of them which is all-important; as Montesquieu acutely observed, "All states have good laws—the important question is how they are administered." But Medicine should

not stop here ; rather should she now come with the collected results of her researches to the aid of Philosophy, which is for ever seeking to establish among mankind the basis of a rational existence. Formerly physicians went to Philosophy to get help for their own special problems and to enable them to frame vast systems which should be co-extensive with the universe ; now it will be rather the custom for Philosophy to come to Medicine, and taking from her all the truths which through the ages she has been slowly winning from ignorance and chaos, gather them up into one vast generalised truth which will at length enable men to lead the lives of intellectual and moral beings. Medicine in her turn, even in her special researches and more immediate occupations, will derive benefit from the contact with Philosophy. No longer imagining that a few *a priori* theories will yield up complete knowledge of the functions of the body in health and disease, she will yet feel that even in the smallest and narrowest investigations, or the humdrum round of everyday practice, she is hastening the time when the life of the modern man, though infinitely more difficult and complex, shall be as sane and dignified as that of the ancients.

CHAPTER I

THE DISCOVERY OF AMERICA

THE first discovery of America was made by Christopher Columbus in 1492.

He sailed from Spain in August and reached the island of San Salvador in October.

His voyage was the first of many that led to the European discovery of the New World.

Columbus's discovery of America was a great event in the history of the world.

It opened up a new world of discovery and exploration for the Europeans.

The discovery of America was a great triumph for the Spanish crown.

It was the beginning of a new era in the history of the world.

The discovery of America was a great event in the history of the world.

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