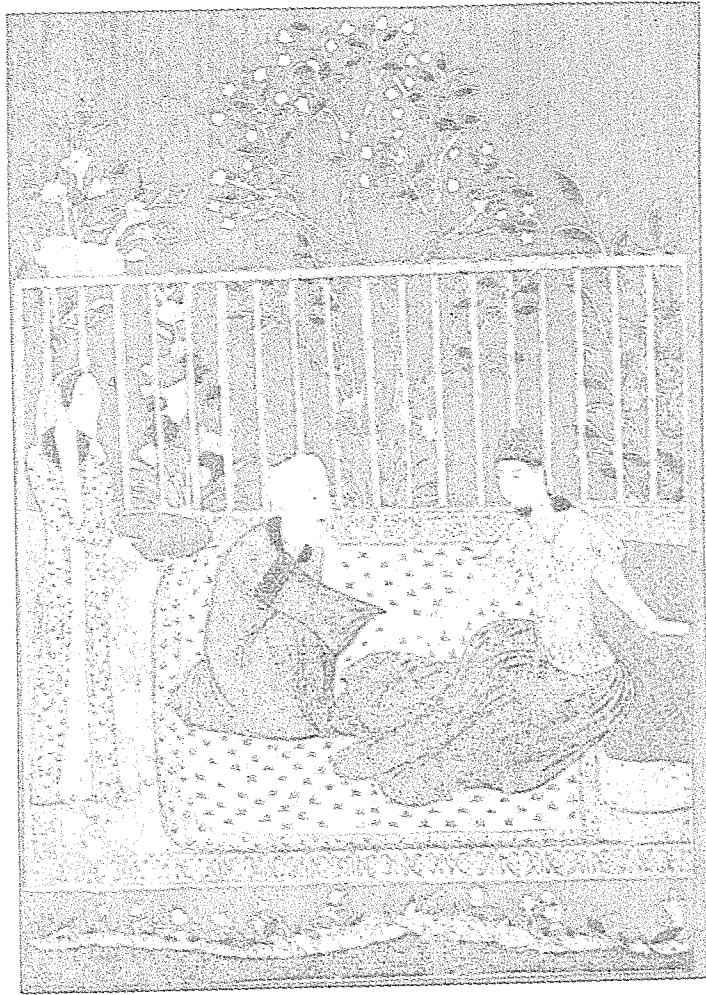


THE CANON OF MEDICINE
OF AVICENNA

AMS PRESS
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A physician and his patient.
From an early Persian MS. (Add. 27,261, f. 371b)

"A great sage—a reader of ancient books, Greek, Persian, Latin, Arabian, and Syriac; and skilled in medicine and astronomy, both with respect to their scientific principles and the rules of their practical applications; he was experienced in all that healeth and hurteth the body; conversant with the virtues of every plant, dried and fresh, the baneful and the useful. He was versed in the wisdom of the philosophers, and had compassed the whole range of medical science and other branches of the knowledge-tree."

(4th Night—Burton; Lane.)

A TREATISE ON
THE CANON OF MEDICINE
OF
AVICENNA

INCORPORATING A TRANSLATION
OF THE FIRST BOOK

BY

O. Cameron Gruner, M.D. (Lond.)



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PREFACE

THE purpose of the present treatise is two-fold :

(1) To furnish a translation of the First Book of the Canon of Medicine of Avicenna. The section on Anatomy has been omitted in favour of the first half of the *De viribus cordis*. This assists in the second object of this treatise. Distinctively large type is used for the translation.

(2) To present a study of its mystical philosophy (*tasawwuf*), especially showing where this and modern biological knowledge are reciprocally illuminative.

The words of the late Prof. E. G. Browne may be quoted here : " Even if we rate the originality of Arabian medicine at the lowest, I venture to think that it will deserve more careful and systematic study."

Furthermore, the Thomistic philosophy of human nature is specially discussed, and its applicability to the Medicine of the future is definitely enunciated.

A grateful acknowledgment is made to the School of Oriental Studies, London Institution (University of London) for signal help in the acquisition of the Arabic, Persian, and Chinese essential to the purposes of the treatise.

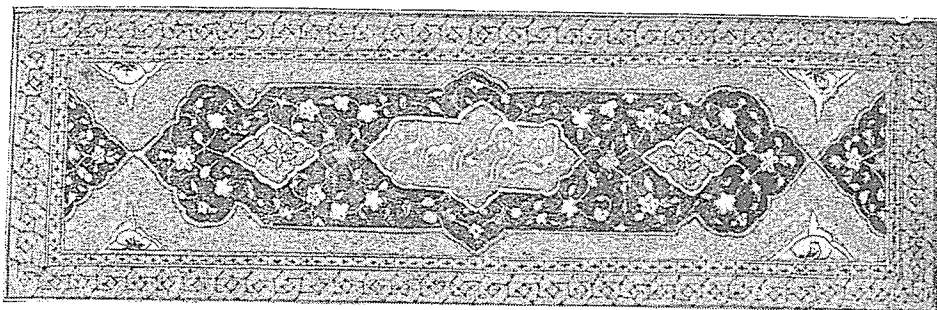
O. CAMERON GRUNER.

London, December, 1929.

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PRELIMINARY THESIS

THE RELATION BETWEEN THE CANON OF MEDICINE OF AVICENNA AND MODERN THOUGHT



CONSIDERATIONS are not wanting which entitle the Canon of Medicine of Avicenna to an esteemed position in modern thought. In the first place, there is the outstanding intellectual culture of the Saracen Empire during the period of history to which Avicenna belongs. Secondly, in the case of much of his teaching, it may be said that the difference from ours is largely only that his speech is alien, and is apt to be misunderstood. In these days, the great complexity of the language with which we express our scientific thought corresponds with the intricacy of the instruments wherewith facts are elicited. Thirdly, many of the advances of modern times offer the solutions to the very theorems and propositions of former times. Finally, ideas are to be found in his work which provide suggestions for useful research in the future.

§ 1. The importance of idea over material achievement is not to be forgotten. The achievements of any age are subject to decay with the lapse of centuries, but the ideas which gave rise to them remain living through all cycles. Therefore to propose a real place for Avicenna in modern thought is not to propose a return, as it were, to old architecture, or the costumes of long ago. It is rather to render accessible to-day the picture which he painted, and so enable it to renew its still vital message. It is to play over again the music which he expressed, and enable perhaps one or two to rejoice in it. And this without obscuring the issue by discussing nationality, or schools of thought, or evolution of ideas, or technical methods.

If it appear to some a fault that the master appears to have used passages from other works, and this without full acknowledgment, it should be remembered that after all a painter may use pigments which someone else has manufactured, and is allowed even to employ other persons (usually pupils) to execute certain portions of his picture. Indeed, even after his decease, it is not improper that some may have been entrusted with the delicate task of touching up faded portions of the canvas which he bequeathed.

The place for Avicenna in modern thought is gained when it is agreed that he shall be viewed as one who entered this world entrusted with a mission independently to express for that age, by means of those various tools which he then found in it, the wisdom which is unchanging and impersonal. So also there is the need to-day that this same wisdom should be re-expressed for this age by means of the new data which lie to our hands.

I

THE INTELLECTUAL CULTURE CONTEMPORARY
WITH AVICENNA

§ 2. (a) *Intellectual Culture in the Central Saracen Empire.* Carra de Vaux, in his monograph "Avicenne,"¹³ furnishes particularly striking comments, as follows (p. 156):—

"The more we investigate the enormous literary output of the Arabian empire, and come into intimate appreciation of the master minds of the middle epoch and of antiquity, the more we become aware of their sincerity.

"We should, we think, offer our salutations to these great personalities of that day, whose works and lives were equally encyclopædic. . . .

"Our own times do not show more worthy figures; we complacently assume that there are no more worthy than ourselves because science, so greatly developed to-day, cannot be held all within one single head. That may be. But it is only right to admit that science has less unity and harmony to-day than formerly it had; that it is less pure than it was under the grand peripatetic discipline. Our attitude towards that is neither humble nor sincere.

"In these days we are concerned too much to have our name blazoned forth than to grasp a great extent of science. We are more anxious to uphold the profession than to have a passion for study; we seek titles and reputation rather than real knowledge; and in order to appear more specialistic than our ancestors we expose ourselves to the judgment of posterity as having smaller minds, and fettered souls."

§ 3. (b) As to the state of civilization in *the western Saracen empire*, we have the very illuminating description of Ameer Ali in his "The Spirit of Islam"² (p. 392):—

"The Arabs covered the countries where they settled with networks of canals. To Spain they gave the system of irrigation by flood-gates, wheels and pumps. Whole tracts of land which now lie waste and barren were covered with olive groves, and the environs of Seville alone, under Moslem rule, contained several thousand oil-factories. They introduced the staple products, rice, sugar, cotton, and nearly all the fine garden and orchard fruits, together with many less important plants, like ginger, saffron, myrrh, etc. They opened up the mines of copper, sulphur, mercury, and iron. They established the culture of silk, the manufacture of paper and other

textile fabrics ; of porcelain, earthenware, iron, steel, leather. The tapestries of Cordova, the woollen stuffs of Myrcia, the silks of Granada, Almeria, and Seville, the steel and gold work of Toledo, the paper of Salibah, were sought all over the world. The ports of Malaga, Carthage, Barcelona and Cadiz were vast commercial emporia for export and import. In the days of their prosperity, the Spanish Arabs maintained a merchant navy of more than a thousand ships. They had factories and representatives on the Danube. With Constantinople they maintained a great trade which ramified from the Black Sea, and the eastern shores of the Mediterranean, into the interior of Asia, and reached the ports of India and China, and extended along the African coast as far as Madagascar.

“ In the midst of the tenth century, when Europe was about in the same condition that Caffraria is now, enlightened Moors, like Abul Cassem, were writing treatises on the principles of trade and commerce. In order to supply an incentive to commercial enterprise, and to further the impulse to travel, geographical registers, gazetteers, and itineraries were published under the authority of Government, containing minute descriptions of the places to which they related, with particulars of the routes and other necessary matters. Travellers like Ibn Batuta visited foreign lands in quest of information, and wrote voluminous works on the people of those countries, on their fauna and flora, their mineral products, their climate and physical features, with astonishing perspicacity and keenness of observation.

“ The love of learning and arts was by no means confined to one sex. The culture and education of the women proceeded on parallel lines with that of the men, and women were as keen in the pursuit of literature and as devoted to science as men. They had their own colleges (for instance, at Cairo, established in 684 A.M. by the daughter of the Mameluke Sultan Malik Taher); they studied medicine and jurisprudence, lectured on rhetoric, ethics, and *belles-lettres* and participated with the stronger sex in the glories of a splendid civilization. The wives and daughters of magnates and sovereigns spent their substance in founding colleges and endowing universities, in establishing hospitals for the sick, refuges for the homeless, the orphan and the widow.”

§ 4. (c) Cordova, the most celebrated western university of the Empire at the time of Avicenna.—This is well known as an instance of the high degree of culture of the day. Ameer Ali,² speaks of “ that wonderful kingdom of Cordova, which was the marvel of the middle ages, and which when all Europe was plunged in barbaric ignorance and strife alone held the torch of learning and civilization bright and shining before the western world.” The greatness of the city is indicated by its population, which is given by Haeser²⁶ (i. 662) as 300,000, and by Campbell¹² (p. 57) as one million ; and by the library of “ about 200,000 ” volumes. To see the city to-day, traversed as it can be from wall to wall, within half an hour on foot, and to read of an extent of “ 24 miles one way, and six in the other ” (Ameer Ali¹, p. 517) shows that the word “ kingdom ” conveys a truer idea of its greatness. To read of “ innumer-

able libraries, 3,800 mosques, 60,000 palaces and mansions, 200,000 houses inhabited by the common people, 700 baths, 80,000 shops, besides hostels and serais " is to wonder how so much can have come to be now represented by so little.* Nevertheless, the " grand mosque " alone, which is still at any rate externally intact (and interiorly is still surely one of the wonders of the world despite its mutilation) stands sponsor for the rest ; and no doubt many of the existing imposing buildings—now devoted to very different uses—stand for the palaces and mansions. As to the literary treasures, these have been traced at least in part from Spain to Fez, as shown by Horne³³ (p. 32, 61), with the *Roud El Qartas* as his authority ; and he then points to years of pilfering from the library of the great mosque of El Karouiyān at Fez, as having scattered these works for ever out of ken.

§ 5. A study of the street names, and even the place names and current dialect in " Moorish Spain " to-day also confirms the story of past greatness. But the mystical knowledge displayed in the dispositions of the decorative designs and their poetic inscriptions on the walls of the Alhambra halls, state-rooms, and private apartments can leave no doubt of unsurpassed artistic power, where every sense-impression was deliberately drawn on. Lights and shadows, and colours changing with the hours of the day ; musical effects of simultaneous diversity of disposition of flowing water ; perfumes ; courting of the prevailing breezes ; interior architectural form ; and furnishings, animate and manufactured—all these were combined for the achievement of a perfect representation of (divine, over and above human) Beauty.

§ 6. (d) *Among the Chinese.* The bearing of Chinese philosophical thought on the subject of Avicenna lies in the fact that we here meet with a notable example of intimacy of relation between world-conception and Medicine. The writings which are so carefully studied to-day by so many sinologists were extant at the time of Avicenna, and are still held in the highest esteem by Chinese thinkers. The modern Chinese philosopher is supposed to say to the Westerner (Somerset Maugham⁵⁴): " What is the reason for which you deem yourselves our betters ? Have you excelled us in arts or letters ? Have our thinkers been less profound than yours ? Has our civilization been less elaborate, less complicated, less refined than yours ? Why, when you lived in caves and clothed yourselves with skins, we were a cultured people. . . ." The attitude towards western learning so displayed may be blamed by many, but is certainly praised by those who have studied the philosophy most deeply. As long ago as 1876 we read conclusive evidence (by Sir Henry Howarth³⁵) that much of our vaunted civilization actually came from that ancient race. If some students discuss their philosophy with a certain cynicism (Forke²³), others (Bruce¹¹, Wilhelm¹⁰¹) see into the justice of their conceptions. As Carus¹⁵ remarks : " We need not be blind to the many errors and absurdities

* " Every dwelling-place, even if it has been blessed ever so long, will one day become a prey."—(Old saying quoted by Ameer Ali,¹ p. 125.)

of the ancient occultism to understand and grant the truth that underlies its system." These words are exactly applicable to the Canon of Medicine of Avicenna.

It should be added that errors and absurdities are apt to be ascribed to ancient authors which really arose from misunderstandings and ignorance on the part even of contemporary pupils. The subsequent generations perpetuated the errors, and even in these days the attempt to represent the real meaning of ancient texts by translations exposes one to unexpected extraordinary pitfalls. Our idiom is so diverse from the technical Chinese.

II

THE NATURE OF THE KNOWLEDGE PRESENTED
BY THE CANON

§ 7. (a) *The Canon is a précis*, and not a sum-total of Avicenna's knowledge. Numerous passages occur in the Canon which show that this is the case, that it is a series of notes or skeleton outlines of thought not too lengthy to be memorized by his students (5)—much as they would memorize the Quran. Thus: (2) "to the full extent necessary, and yet with apt brevity," (16) "do not place in medicine what does not belong to it," (34) "having discussed the equable temperaments *sufficiently*," (80) "I purposely omit reference to certain other problems relative to the fluids of the body": "just as much as is necessary to enable you to practise medicine intelligently." Many passages also refer to others of his own works for further details, to avoid confusing the purely medical issue of the Canon. These (philosophical) works are gradually becoming more widely known.

"Generally speaking, the saying of the saints and sages are terse, presenting only the germs of truth; these are developed by later teachers and then expanded and added to. We must see to it, however, that we get at the original meaning of the saints and sages." (Chu Hsi¹⁰, p. 168.)

"Books are only words, and the valuable part of words is the thought therein contained. That thought has a certain bias, which cannot be conveyed in words, yet the world values words as being the essence of books. But though the world values them, they are not of value; as that sense in which the world values them is not the sense in which they are valuable." (Chuang Tzu, Giles trans. p. 170).

§ 8. To say that a work is the product of the age in which an author lives is certainly often an error, for it is to confuse the person's insight with the tools (the language at his command) available to express himself with. Similarly to work out the relation between a literary work and the religious belief of the author, as for instance to show the relation between Islamic science and the Koran carries the same fallacy with it. The Prophet says "every soul when born is a faithful follower; it is afterwards that he becomes unfaithful"—which is to say that the form of religious belief is a secondary implantation, whereas the spirit of a sincere life can be traced to the original being.

Avicenna's medicine, like Indian medicine, has been traced to the Greek system. But it has been proved that the great works of Charaka and Susruta were available in Arabic, under the title of *Kitab-Shawshura-al-Hindi*, from the seventh century ("Ayurveda," 1924, i. 1; and *see also* Weber, *Hist. of Indian Lit.*).—Similarly, the view that the Chinese borrowed their philosophy of the five elements from the Turks has been sufficiently disposed of by Forke. (p 242, 243).—It is beside the purpose of this treatise to take up such questions.

§ 9. The common notion that progress or stagnation in secular knowledge has a causal relationship with (a certain) religion is typically voiced in his address on "Medicine and the Church," by Sir Farquhar Buzzard¹⁰³ (1927). The comment to make is: "*post hoc sed non propter hoc.*" The advances in the science of medicine, as in all other sciences, are surely a part of the (divine) plan for mankind; whereas the collateral abandonment of religious fundamentals remains a human responsibility.

§ 10. (b) *The word "Canon" (Qanun).*—Equivalent words: code of laws; series of principles. Tao 道 (cf. Forke²⁴). Principle is defined as "something antecedent, which exercises a real positive influence upon the consequent" = Causes (four kinds, 13) = Reasons.

In view of this it is clear that the Canon is not properly to be regarded as an "encyclopædia" of the knowledge of the time, or to be contrasted, for instance, with the now classical "Osler."

§ 11. (c) *The word "knowledge."* Knowledge is not simply an assemblage of "facts"; nor is it to be made synonymous with "truth"—certainly not Absolute Truth, of which all human knowledge falls short (see diagram in Appendix), although one single word is capable of containing or implying all knowledge, as in mathematics a single term may be equated with an infinite number of terms summed together. But even the mathematical sciences can only afford approximate truth (Hume, quoted by Maher⁵⁰: p. 238). We may recall the words, "if he attain to all knowledge, he is far off still" (à Kempis⁹⁵, ii. 11).

§ 12. Facts, as S. Thomas⁸¹, (i. 53) explains, are what our intellect regards external objects as, and as we judge of them only in terms of our sense-organs, these objects may be different. God knows them as they are. Our intellect depends on our imagination, and that depends on our senses, and our senses only convey discrete fragments which we gather into one continuous impression regardless of intervening points." We live as it were in a network only the nodes of which are evident to the senses.

§ 13. (d) *Mystical Insight.*—There is a distinction between knowledge gained in the ordinary manner and that gained by "mystical insight" (*Kashf*). The writer of *Gulshan-i-Raz*²⁵ (couplet 299, p. 30) advises his readers to follow this, saying:

"Straightway lift yourself above time and space,
Quit the world and be yourself a world for yourself."

And:

"The moment we are enlightened within,
We go beyond the voidness of a world confronting us."
—Seng-ts'an, quoted by Susuki,²¹ p. 185.

As this "opens up all of a sudden a world hitherto undreamed of, it is an abrupt and discrete leaping from one plane of thought to another" (ib. p. 200).

"Real science is seeing the fire directly,
Not mere talk, inferring the fire from the smoke.
Your scientific proofs are more offensive to the wise
Than the urine and breath whence a physician infers."⁵⁷
—(p. 306.)

"Man looks at the surface of the ocean. Yet he is so small that he cannot even be compared to one of its drops, limited as he is in intellect and in his knowledge. It is only to those who, having just touched creation, bow to God, forgetting their limited self, that God has remained. These through whom God has spoken are the only beings who have been able to give any truth to the world."⁹²—(*Rose-garden*, 1st ed., 120.)

§ 14. "The mind is not like a horizontal door which has to be made larger by force. You must clear away the obstructions arising from creaturely desire, and then it will be pure and clear with no limit to its knowledge. Heng Ch'u said: "When the Mind is enlarged it can enter into everything throughout the universe" Chu Hsi¹⁰ (i. 182). "He who praises God knows about Him."

This attitude towards Nature is to be claimed for Avicenna, on the plain evidence of his other writings, including the "Al Najat" which appropriately appears in the Arabic version of the Canon printed at Rome in 1593, and of the *Libellus* on the powers of the heart⁴ (real authorship disputed) which Arnold of Villanova translated into Latin (ca. 1235-1312)—and is included in the Latin edition of the Canon, 1595.

The acquisition of knowledge by this process demands nothing more than a keen observation of the life around us, and was as much within his reach as ours. Such knowledge is not too restricted to one period of history, one language, or to one or two universities. And if it should seem that because our civilization is so different his opportunities were much less, we may pause to reflect that the difference between our age and his is chiefly one of mechanical appurtenances and phraseology; and that even to this day we need not travel far (e.g., the old streets of Cordova and Granada, or more definitely, to northern Africa) to see much the same sort of scenery as he was accustomed to, much the same sort of life as is drawn in the "1001 Nights." In any case, what is human life, at bottom, but a matter of buying and selling, receiving and giving, seizing and relinquishing, constructing and demolishing, acquiring learning and losing it, seeking power and breaking it, bidding and forbidding, covenanting and comminating, giving in marriage and seeking to obtain in marriage, birth and death.

§ 15. The significant phrase "seeing into one's own Nature" (Hui-neng: Susuki,⁹¹ p. 203, in which most admirable work occur many passages by way of explanation) gives a graphic description of that which gives Avicenna his superiority. The Canon is simply the *medical garb* in which the one Truth is expounded. It is for us also to perceive it in whatever idiom it might be described—Western, Eastern—Islamic, Confucian or Buddhist, e.g.

It would then seem as if the mind were now able to float as it were round all the concepts man has ever given to the world, or round all the most familiar events of one's daily life, and perceive clearly that which can never be set forth in words. We should then also quote the words (given in *ib.*, p. 223, in reference to *satori*—enlightenment) "I perceive of it that it is something, but what it is I cannot perceive. Only meseems that, could I conceive it, I should comprehend all truth."

§ 16. Further than this, to find that some of the statements in the Canon are certainly erroneous, and that modern investigations have placed us at an infinitely greater advantage, does not invalidate the work as a whole. Its possibilities for suggesting thoughts of real value to-day are more realized the more one reads "between the lines," and the present treatise does not claim to exhaust them.

" Let not the authority of the writer offend thee, whether he be of title or great learning, but let the love or pure truth entice thee to read " (à Kempis⁹⁵, i. 5).

§ 17. Insight into eternal truths.—A person may (a) glimpse them, (b) understand them moderately, (c) understand them fairly thoroughly. But in describing them to another, he may explain them (i) imperfectly (no one can explain them properly!), (ii) inadequately or incompletely, (iii) wrongly, because of (a) imperfect education, (b) educational bias, (c) religious or anti-religious bias, (d) inherently erroneous methods of thought, (e) restriction to logic. Such truths, again, may be denied by persons being told of them, for because in their turn they misunderstand, or understand only in part, either through careless attention, and (a) to (e).

§ 18. Insight *versus* Intuitional Knowledge.—A note should here be made that the term "insight" as used here bears a rather different meaning to that pertaining to the term "intuitive knowledge," which S. Thomas⁹³ ascribes solely to the angelic mind, and defines as "the attainment of the truth of a thing at a single glance without the aid of reasoning" (liv; lv. 2; lviii.3, 4;⁹⁴ vol. 3, p. 51-87; Pegues,⁹⁵ p. 18). On the other hand this mode of perceiving truths need not be disallowed a rudimentary commencement among the powers of the human soul, just as the "brute" mind must be allowed to contain rudiments of those high mental capacities which characterize the human being. Throughout all orders of creation, the lower are endowed with the scaffolding for the manifestation of successively more exalted capacities of the higher.

III

THE BASIC DIFFERENCE BETWEEN "THE CANON"
AND MODERN MEDICINE

The Canon treats of	Modern Medicine consists of
<p>I. Speculative "Medicine." Certain fundamental principles (Cosmology, psychology, metaphysics)</p> <p>II. Practical Medicine.</p> <p>A. Application of I to the study of (i) health, (ii) disease (tendency, predisposition, threshold stage, declared disease, (iii) cessation of life.</p> <p>B. Actual treatment of "disease" by (i) regimen, (ii) drugs, (iii) operative interference.</p>	<p>A. Principles of Medicine Theory: The application of the facts of chemistry, physics, anatomy, biology to the systematic description of innumerable "diseases" classified as far as possible on the basis of the microbic theory. Symptomatology. Etiology. Diagnosis.</p> <p>B. Practice of Medicine.</p> <p>(a) Laboratory work. (b) Therapeutics, pharmacology and dietetics. (c) Surgery. (d) Gynaecology and Obstetrics. (e) State Medicine: Hygiene in all its branches. (f) Psychological Medicine: Treatment of insanity. (g) Legal medicine, etc.</p>

Modern medicine is based on the conception of the universe as a conglomeration of dead matter out of which, by some unexplainable process, life may become evolved in forms. To Avicenna the whole of the universe is the manifestation of a universal principle of life, acting through the instrumentality of forms. Or, again, in modern medicine, the forms are the source of life; to Avicenna they are the product of life. Space itself is an aspect of the one life (Hartmann, on Paracelsus, ^{28a}, p. 217).

§ 19. In this way the difference between Avicenna's conception of "principles," and that of modern medicine is easily shown. To the school-boy "science" would consist of (a) "bookwork," (b) laboratory work, which his teachers would insist is the basis of (a). Similarly, the medical curriculum begins with lectures, though these are more and more inclined to become laboratory demonstrations; and goes on to laboratory and hospital work.

§ 20. In short, Avicenna's medicine, and all ancient medicine, is intimately bound up with philosophy, to wit, *that of human nature*—a philosophy which proves to be virtually identical with "modern scholastic philosophy," no doubt partly because the Quranic account of the origin of Man tallies with the Christian.

§ 21. Modern Medicine, on the other hand, assuming the title and rank of a positive science, emphatically discards and excludes it. Hence we read: "the physiologist" (said Burdon Sanderson) "can pursue philosophy if he has a turn for it, but must understand that the moment he enters the field of philosophy he leaves his tools behind him"; or "it is unfortunate that the limitations of scientific thought were often ignored by men of science in their writings . . . the result diverts those who know, but befogs the unsuspecting reader who will probably put the blame on his intelligence" (Ed. Hughes³⁶).

"According to Positivism, science cannot be as Aristotle conceived it, the knowledge of things through their ultimate causes, since material and formal causes are unknowable, final causes (are) illusions, and efficient causes (are) simply invariable antecedents, while metaphysics under any form is illegitimate" (Sauvage,¹⁷ xii. 313). Or, expressed more boldly, "philosophy" is considered to be the exact antithesis of the truth which modern medicine gives us, and is therefore inherently inadmissible to medicine.

The ignorance which accounts for this attitude is only met by insisting on proper definitions of terms. The following apply here: Philosophy is "the science which is concerned with first causes and principles; it is the profound knowledge of the universal order, and the duties which that order imposes on man (Mercier, *Logique*, 1904; de Wulf¹⁷: xii. 26). Again, philosophy is the true perception and understanding of cause and effect.—Metaphysics is "that portion of philosophy which treats of the most general and fundamental principles underlying all reality and all knowledge" (Maher⁵⁶, p. 520).—Psychology is "the science which treats of the soul and its operations"—and, therefore, clearly, must be the real foundation of Medicine.

§ 22. It is in modern scholastic philosophy that the student finds ample exposure of the fallacy in positivism and its cognates, enabling him to detect the difference between false and true, expressed with enough force of logic to satisfy the most meticulous. This queen of all the sciences amply proves positivist science (including Medicine) to be incomplete knowledge when taken alone. The knowledge of movement or change must be supplemented by mathematical and metaphysical view-points. (Cf. Mercier,⁵⁶ pp. 35, 36; and especially Wundt¹⁷: xii. et 35). Such men as Albertus Magnus and Roger Bacon were convinced of the necessity of linking the sciences with philosophy¹⁷ (xii. 38).

When medicine has in this way become ennobled it reaches its highest degree of perfection, in that it penetrates to the very depths of reality⁵⁶ (p. 9), admitting this knowledge to need, even then, a further complement to make it complete—namely, knowledge in relation to God (“Christian wisdom”).

“Sapientia est scientia quæ considerat causas primas et universales causas. Sapientia causas primas omnium causarum considerat” (In. Met. I., lect. 2). “Ille qui cognoscit causam altissimam simpliciter, quæ est Deus dicitur sapiens simpliciter, in quantum per regulas divinas omnia potest judicare et ordinare” (Sum. Theol. II-II. q. 45, art. i.c). “Non acquiritur studio humano, sed est deorsum scendens (*ibid.*, ad 2). “Cum homo per res creatas Deum cognoscit, magis videtur hoc pertinere ad scientiam, ad quam pertinet formaliter, quam ad sapientiam ad quam pertinet materialiter: et e converso cum secundum res divinas judicamus de rebus creatis, magis hoc ad sapientiam quam ad scientiam pertinet (*ib.* q. 9, a. 2, ad 3).

As St. Thomas⁸¹ said in his day, “they think that nothing exists besides visible creatures” (C.G., ii. 3, l.p. 5) [N.B.—“Creatures” are (a) animate, (b) inanimate]; “they think that things proceed not by the divine will but by natural necessity” (*ib.*). So even in those days time and fortune were expended on researches which sound philosophy would have shown to be inherently futile.

We may reflect for instance on the reiterated search for a location of the soul, which the pioneer anatomists prosecuted, and also on the commonly repeated announcement to successive students of anatomy that the pineal gland is now no longer regarded as the site of the soul. There is the sub-conscious suggestion to the student that scientific research has effectively disposed of the mediæval belief in the soul, whereas history only proves that the revolt against the precise teachings of the Council of Trent¹⁶ (1545-1563) necessarily came to naught. The very definition of “soul” which this council laid down makes a search for its location ludicrous.

IV

SPECIAL DIFFERENCES BETWEEN THE CANON AND MODERN MEDICINE

A. Conceptions known to Avicenna; not now recognized.

§ 23. There are four main conceptions belonging to the Canon, but not recognized by modern Medicine. To use S. Thomas' words^{83 84} (i. 32; art. 1; p. 270) they can be shown to be “not impossible”; that is, the discoveries of modern science do *not* abrogate them.

These conceptions are relative to (*a*) the nature of the human being as a whole, (*b*) the constitution, (*c*) the "breath," (*d*) the "elements." Each of these is dealt with in some detail under the corresponding sections of the Canon, but some of the salient points are suitably referred to at this stage.

§ 24. (*a*) *The conception of the nature of the human being as a whole.*—The varieties of views on this point which people in every country and race exhibit both in conversation and in literature, numerous though they are, are capable of classification under one of three headings :

(i) The *first*—the *Platonic* view—regards the human being as "soul within a body," while admitting "soul" to be indefinable, and beyond the power of location. This view, widely supposed to be "Christian," is well known as "pagan" to students of folklore.

(ii) The *second*—the *scientific* or rationalistic and modern view—takes the physical body as the fundamental, seeing in it the outcome of known or at least knowable forces. The facts of anatomy, physiology, etc., convey their own inevitable conclusions. This view makes its immediate appeal. From the first lesson the pupil is able to feel a grasp of some tangible knowledge, whereas the alternative third view entails a long study before the intricacies of abstract philosophy can be mastered. The difference between experience and "poring over books" is only too obvious. The possibility of interweaving the two methods is not on the horizon.

In its answer to "religion," this scientific view has no objection to raise to its votaries retaining a private belief in the Platonic view, if their temperament demands it. But this "pious belief" must not be allowed to vitiate procedure when scientific research is undertaken.

This modern conception regards the body as an aggregate of "spare parts" which are "assembled" well, or ill; can be repaired, or remedied. According as the assembling is good or bad, and according to the "fuel," so is there health, or susceptibility to infection by organisms. The kind of assembling is a matter partly heredity and partly of environment.

The following remarks in a review on a recent article in *Science*—by Lillie—may be quoted from the *Times*, Oct. 24th, 1927, p. 19. They present the idea in technical language :—

"Physiology finds the organism to be a nexus of physicochemical determination; differing only from non-living systems in its complexity. . . . Speaking of freewill, one argument against 'indeterminism' is that 'the energy balance sheet of a man shows us there is no creation of energy within the body.' To assume will-power 'we conflict with Newton's first law.' . . . The ultramicroscope alone suggests indeterminism, and even this may be only because we do not know enough about Brownian movement, etc. Protoplasm is a 'heterogeneous system.' In heredity submicroscopical units determine the details of inheritance—but an event originating in an ultramicroscopic particle can spread to the whole cell or organism. On this view, a human action appearing entirely spontaneous and voluntary to the actor and spectator would exhibit itself as a succession of mechanically determined events capable of study and prediction in all its microscopic details. But traced inwards it would ultimately resolve itself into certain ultramicroscopic events in the interior of the nerve-cell." But "even the freedom of the ultramicroscopic particle may be no more than a subtler kind of determinism beyond the reach of present analysis." §64 contradicts these remarks.

It may be noted, in passing, that the doctrine of vitalism is really only another form of rationalism, as will appear when the scholastic doctrine is duly investigated.

§ 25. The *third* view—*scholastic, Thomistic*—presented by modern scholastic philosophy, has the Aristotelian basis. Its soundness is best appreciated by careful study prolonged until the prevalent inadequate and illogical conceptions of the universe are clearly exposed. Briefly, the view is expressed in the words: "the human being is a material body vivified by a life-principle, the two together constituting the rational human soul." As S. Thomas⁸⁴ says: "It is not my soul that thinks, or my body that eats, but 'I' that do both" (p. 25). In other words, again: *The body and "soul" form one complete whole—one "single being"*³⁸ (p. 53); ⁵⁶ (p. 302, 306).

It is this view which underlies the whole Canon, and is expounded in connection with the corresponding parts of the text. It is this view that makes the ancient work fall in line with the most "modern." Its consequences are far-reaching. The external configuration of the body, including the physiognomy, is a reflection of the functional capacity of the internal organs and general make-up of the individual. The character, talents, physical form, shape of individual features, general development, and indeed every detail of the physique, length of limbs, of fingers, cutaneous markings, contour of the eyes and ears, etc., are all part and parcel with the functional conformations of the viscera, and the mental characters; a study of the visible will inform of the nature of the internal conformation. (Cf. 107)

§ 26. The idea that from a study of external features and general habit one should deduce conclusions as to functional capacities* is generally opposed by academic medicine; as is voiced by F. v. Müller (1921, quoted by Kolle, Mitt. Ggeb. Med., 1926, 40, 371) when he says "we must steadfastly avoid drawing any far-reaching conclusions about the functional behaviour of the organism from a study of the external characters of the body."

While it may be urged that the external features are usually misread, it may also be admitted that even the customary "physical examination" of a patient does not yield uniform results when practised, as it necessarily is, by persons of varying talent. Surely, the remedy is to exert greater care. We may, for instance, observe how a skilled weaver will detect the site of a flaw in the "set-up" of a loom by a mere glance, whereas a novice discovers it only after laborious search. See § 163.

On the other hand, the biochemical tests for functional capacity of organs—so much the vogue, and so much exploited, and so duly impressive on patients and their friends—are clearly inadequate in the light of the scholastic doctrine. It is true that the attempt to force the intangible to yield to mathematical formulæ, rules, and weights and measures (as, for instance, in blood-cholesterol analyses) is sincere enough, to judge by the time, energy and money expended so freely. But what is to be the verdict once it is realized that the anatomical organs are not functionally discrete or amenable to distinctive "specific" tests? A just appreciation of the intimacy of relation inherent in the conception of the human being insisted on here suffices to show the futility of those labours and studies whether made upon man or upon the various orders of animals taken instead.

More than this, there is the conception that the internal organs belong to one another beyond the anatomical limits. The heart, to anatomy, is a circumscribed organ; to Avicenna it is part of a force occupying the whole body. "Man's heart is both corporeal and incorporeal" (Chu Hsi¹⁰, i. p. 162). So, again, the liver is simply a visible portion of a "liver" whose operation pervades the whole

* The relation between character and physique was scientifically studied by the Chinese 450 B.C. (Cf. Wieger.)

body.* Or, to combine modern with ancient knowledge, the physical heart, the arterial vessels, and the sympathetic nervous system, including the connections between this and the sensorium and that which corresponds to the "sensitive soul" in its emotional aspect, for instance—all this is one great composite; and its state is also reflected in many subtle indications which offer themselves to the keen observer of the patient.

The modern research on diseases of the brain and insanity is based on the assumption that the material brain is the source of all nervous activities, which are correlated with definite biochemical, physicochemical and even structural changes in brain substance. Mental disease is the outcome of similar changes. The Platonists would consider mental disease as apart from the "soul." The Thomistic view leads to much more subtle conclusions, capable of lasting influence.

(b) *The doctrine of "the constitution."*

§ 27. The term "constitution" conveys different ideas to different minds. The laity regard the term as synonymous with "temperament" or "make-up," at least in part, and consider a description of a patient as having a nervous temperament, a delicate constitution, etc., quite adequate. With this goes the conviction among the lay that the medical curriculum leaves the graduate fully able to "understand his constitution" whereas in actual fact the subject is never discussed. The study of physique is quite superficial, and is admittedly made solely to establish a diagnosis of specific "diseases." Hence the term, in conversation, is actually nothing more than platitudes.

To modern medicine, regarding the body as corporeal, constitution is a matter of physique, resistance to disease, mode of reaction to various stimuli (including psychic stimuli). Classifications of varieties of constitution on this basis are afforded by various writers in all countries—e.g., a classification into athletic, leptosomic and dysplastic; into arthritic, endocrine, lymphatic, asthenic, infantilistic, chlorotic, etc. (Current medical journals).

In the Canon, Avicenna establishes "constitution" in terms of humours, temperaments (hot, cold, dry, moist) and "elements" (whose proportions are set for every individual.—47). If we go further, and apply to this term the method which Rumi³⁷ (p. 169), the great Persian sage demanded of students of the Quran, we shall not regard a patient's constitution as understood until we have studied the matter much more intimately.

" Know the words of the Koran are simple,
But within the outward sense is an inner secret one.
Beneath that secret meaning is a third,
Whereat the highest wit is dumbfounded.
The fourth meaning has been seen by none
Save God, the Incomparable and All-sufficient.
Thus they go on, even to seven meanings, one by one,
According to the saying of the Prophet, without doubt."

* Cf. Paracelsus, *de viribus membrorum* (Hartmann, p. 219).—Moreover, each individual "is a member of the great organism of the world" . . . "not a separate being isolated from Nature." (Ib. p. 51). Individual: human world: one leucocyte: one human being.

"I know," said Tawaddud, the lady most learned, "the sublime Koran by heart and have read it according to the seven, the ten, and the fourteen modes" (438th Arabian night).

Therefore, to draw a lesson for our study out of these indications, we shall see that the aim in view is to formulate a person's constitution out of a number of components, none of which must be omitted from the series. To express the whole picture many modern aspects must be studied—histological, biochemical, psychological, without neglecting factors (metaphysical, etc.) accepted by the ancients but almost forgotten to-day. For instance, the past events in the ancestral history of the patient must be included, and all the factors coming into play even from the time of quickening may not be overlooked.

The insight afforded by the true conception of the nature of the human being in this way leads us on to an understanding of individual constitutions which should be amply satisfactory.

(c) *The doctrine of "the breath."*

§ 28. This subject is discussed in the course of the text (§ 136). The term "breath" found in Eastern writings is taken as the *exact* equivalent of Avicenna's conception, and is understood properly only when the "elements" are understood (see § 73).

Equivalent terms: life-principle; *ḥayat*; حيوّة; the breath of life; *virtus vitalis*; *spiritus*; vitality; *Hu* (in Persian mysticism*); *Ch'i* 氣; *nafas* (also used for "soul," "individuality").

It may be conceded that many of these words are used synonymously with much confusion in consequence. Thus the old doctrine of vitalism, supported by vitalists, is not the antithesis of, but strictly speaking, another form of rationalism. In Paracelsus we read "the first matter of the elements is nothing else than life. . . . The soul of the elements is the life of all created things. . . . There is again a difference between the soul and the life. Fire if it lives, burns. But if it be in its soul, that is, in its element, it lacks all power of burning" (Opera ii. 264). Errors of this kind are avoided by a careful study of the scholastic philosophy.

(d) *The doctrine of "the elements."*

§ 29. This is fully entered into at the end of the corresponding chapter in the translation (§ 55—108).

The conception of the universe in terms of four, or five, elements has been found among all peoples. To argue in favour of the doctrine almost compels an attempt at harmonization of its different forms (Aristotelian, Indian, Persian, Chinese, for instance). Suppose a number of people each set out to paint one certain landscape; that each is of different nationality; that each is restricted to a certain limited number of pigments; that each is a true artist. The final picture presented by each will be striking and inspiring. But it would be out of place to begin and compare stick with stick and stone with stone. If we understand, we shall learn—from each. The modern futurist may excite ridicule in his attempts to depict a landscape in terms of psychic forces, which he claims to discern, but to the mind of a student

* *Hu*, in Chinese, 呼, is not the exact equivalent, through being used more for the act of expiration—unless there is a mystical sense attached to the term.

his work would have a different effect. These varying forms of one conception are amenable to intelligent understanding. (Cf. note to 20.)

§ 30. Carus¹⁵ (p. 34) writes: "An explanation of the universe which derives all distinctions between things, conditions, relations, etc., from differences of mixture must have appeared very plausible to the ancient sages . . . even to-day Western scientists of reputation attempt to explain the universe as a congeries of force-centres, acting either by attraction or repulsion in analogy to positive and negative electricity. On the ground of this fact the educated Chinese insist with more than a mere semblance of truth that the underlying idea of the Chinese world-conception is fully borne out and justified by the results of Western science." Elsewhere the intimacy, in fact unity, between this philosophy and everyday life (Forke,²² pp. 239, 269) is referred to as the justification for so often quoting Chinese thought in expounding Avicenna.

B. Conceptions known to modern medicine; but not to Avicenna.

§ 31. Among the most important of these are:

(a) the anatomy of the circulation of the blood. (b) the rate of that circulation. (c) The details found in Quain's anatomy; the microscopic anatomy; such complexities as form the theme of Bayliss' Physiology. These details might be expressed as those of "the mechanics of the body." (d) Interactions in the tissues: chemical and cellular metabolism. (e) In *pathology*—the microbic theory; the endless and always increasing number of "diseases"; the laboratory diagnosis of dysfunction of organs; (albuminuria was, of course, unknown); symptoms as evidences of disordered reflexes. (f) In *treatment*: the use of antisera and specific anti-substances of organisms; hypodermic medication; complex drug treatment has passed out of vogue. Surgery.

§ 32. Considerations which suggest that these instances of ignorance are not as grave as is supposed, and do not invalidate the standing of ancient medicine in regard to actual practice:—

Ad (a). Circulation of a kind was propounded in the case of the "breath," the elements, and the body-fluids, though not along anatomical channels. The Chinese recognized a process of "revolution," a succession of cyclical changes, an ebb and flow. Indeed, it is suggested in Duhalde²⁰ (p. 184) that the Chinese knew of the circulation of the blood itself some hundred years B.C.

Wieger (p.309, on Su-Wên), discussing whether the Chinese knew of the circulation of the blood twenty centuries before Harvey or not, decides truly that "their knowledge of the circulation of the blood in the human microcosm was intuitive, not experimental, conjectured in imitation of the circulation of the vital principle in the universal microcosm, in which they believed. They guessed the fact, and they never verified it. . . . During more than twenty centuries, the *how* of the guessed circulation never worried their mind. The yin-yang circulates in a ring, the five agents do the same, the blood the same. That is all . . ."

Ad (b). The rapidity of the changes was certainly not realized. The Chinese apparently believed that the circulation was completed only fifty times in one day (there is however room for fallacious translation).

Lest there should be over-satisfaction with ourselves, it may be suggested that the rapidity of the movement of the *lymph* was not realized before about 1908,

* But if a doctrine which is common to Taoism and esotericism (that of microcosm and macrocosm) is allowed to be valid, the words "intuitive knowledge" cannot be made synonymous with "conjecture," "guess."

and is perhaps not fully realized by many practitioners to-day; the rapidity of passage of food-materials down the small intestine was not known till the advent of the "bismuth" meal. The circulation of bacteria (cf. Arch. Exp. Med., 1923, 33) is not realised; the existence of a circulation of nerve-impulses is not yet admitted.

Ad (c). The *capillaries* of the liver are referred to in **83**; in the *body* in general in **85**. True, what Avicenna calls capillaries are larger than those we see with the microscope. But he knew that the blood passes from large trunks into the liver, traverses "capillaries" in the liver, and re-emerges by large trunks.

Ad (d). Interactions in the tissues were conceived of as taking place with an ebb and a flow (which is correct); lymph exudes into the tissue-spaces. Interactions take a considerable time (true). Digestion goes on within the blood-vessels in various parts of the body.

Ad (e). "Fermentation" was the counterpart of bacterial growth as we know it. The term is used sufficiently specifically in the text (e.g. **78, 79**). Diseases were regarded chiefly as parts of a *process*; and there were but few processes (which is quite true: nine processes: see § 172). Urinalysis was carried out in order to assess the functional state of the liver (**605**).

§ 33. *Ad (f).* Modern medicine claims its title to superiority by its successes, and judges the medicine of the past by its failures.* But what would the judgment be if this method were reversed? Suppose we accepted the verdict of those among the laity—not so few—who are dissatisfied with their experiences of orthodox medicine and have turned to the "unqualified" of one kind or another? or those of other countries who prefer their native doctors still? or even those Europeans who have experienced triumphant success from native doctors, after modern methods had failed? After all, the ancient medicine is still practised from Cairo to Calcutta, and a medicine not very different holds sway through the Far East. The late Sir Charles Pardy Lukis (Ind. Med. Services) is quoted as saying "Many of the empirical methods of treatment adopted by hakims are of the greatest value, and there is no doubt whatever that their ancestors, ages ago, knew many things which are nowadays being brought forward as new discoveries (Ayurveda, 1924, 2, i. 1).

Drug-treatment.—The complexity of prescriptions of former times has given place to simple and short ones, and the tendency is to discard them altogether. But the reasons for the ancient method are given in the Canon, and Avicenna's choice of remedies depended on a careful consideration of the constitution of the remedies, as well as of the patient and his idiosyncrasies. Thus, certain ingredients would be allowed or disallowed in a given standard confection according to the nature of the particular patient. "The presence or absence, and the amount, of nardus, ginger, fennel-seed, anise,

* In his address, "Medicine and the Church," already referred to, Sir Farquhar Buzzard¹⁰³ says, "During more than 5,000 years the claim of those who practised medicine was to cure their patients of disease . . . we have gradually realized that no claim of that kind can be maintained . . . we make no claim to cure, either during the heat of battle or after victory has been won, should that be the result." This "modest standpoint" can surely hardly be said to be really general?

piper, cyperus rotundus, must be according to the season, and the age of the patient " 89 (p. 91).

§ 34. Hartmann²⁸ (*Chinesische Heilmethoden*, Münch, Med. Woch., 1927, June 3rd, 935) describes the accuracy of native diagnosis (from the pulse, § 204) as "disconcerting,"* and describes certain forms of treatment (auto-chemotherapy, Bier treatment) as being practised in a manner only different in outward appearance from the technique which we pride ourselves as being absolutely the "latest." "No wonder," he says, "that the Chinese are proud of their art, considering how long they have known that which we have only recently discovered."†

§ 35. The cynical mind cannot be upheld which passes off the reputed successes during the Middle Ages as coincidences, and overlooks the modern crowded out-patient departments as evidences of the limitations of our current therapy and theory; nor can the sceptic be much noticed who denies miraculous cures rather than admit scientific theories to be in any sense inadequate.

§ 36. Nevertheless, it is obvious that the principles of the Canon could not be taught over a hospital bed or in the out-patient department. It is true that they cannot cater for the wholesale requirements of the hospital or clinic. It should be clear to the candid that our modern technique does not avail for 100 per cent. of cases; for those who do not benefit at least an experiment with other systems of treatment should not be denied. If the fault is laid at the feet of over-strenuous routine work, the more leisured may yet find an advantage in a system which puts the details of a person's constitution in all its aspects into the forefront, where there is no question of teaching it either to classes or even to possibly indifferent individuals. The words of Paracelsus may be recalled, where he says: "the doctor who loves his art does not undertake twenty cases but five, knowing that no one person can conscientiously treat more than a certain number. No one person could ever make the whole world sound."

C. Knowledge common to Avicenna and Modern Medicine.

§ 37. A perusal of the text of the Canon will show many passages which apply quite well, without explanation, in these days. Thus, the following may be specified: the close relation between emotions and physiological states (shown to be even closer than modern research has realized).—The classification of people into sanguine, phlegmatic, bilious, saturnine, frigid, "hot."—The physiology of sleep, and how posture may remedy insomnia.—

* The same wonder at their practice is recorded in A.D. 1253, when the friar William of Rubuck visited their country.

† These words can be fully endorsed, if only from a study of the Chinese classic on the pulse" (80 volumes), discussed under the heading of "The Pulse" in the present treatise (§ 208). Among other ancient Chinese medical works (first seen by the present writer in the very extensive collection in the Library of M'Gill University, Montreal) reference may be made to the astonishing accuracy of representations of medicinal and other plants, and the almost dramatic representations of various diseased states in the *I tsung chin ch'un* by Hung Chou—extant in Avicenna's time. This work was reprinted between 1904 and 1924, and an older edition is in the Library of the School of Oriental Studies (London Institution).

Choice of location for dwellings.—The choice of a good drinking-water.—Health resorts. Climatic influences on health and illness—Plethoric maladies.—Dietetics.—Hydrotherapy.—Regiminal treatment.—The uses of counter-irritation.—Bier treatment.—The introduction of remedies into the urethra.—The use of vaginal tampons.—The use of anæsthetics by the mouth (medicated wines: scopolamine!).—Testing the strength of a drug by animal experiment (Vol. 5).—The treatment of insanity by malaria (228).—The following paragraphs are interesting among many others: 106, 115, 255.

No doubt the great difference between the ancient and modern is one of outlook, which accounts for the difference of *topic*. That which appeared interesting and even important in those days is passed over by modern physiology and pathology. Each century has its own interests. The mistake made is to suppose that the older interests were "wrong," "incorrect," "useless"; and to label them as "out of date." True, fashions of all kinds come to be out of date, but the epithets "right," "wrong" do not apply. The more carefully we observe modern science the more evident does it become that just its terminology and subject of conversation is different. Things are seen from new angles, and things only surmised at then are amenable to tangible description now.

In fact, there occur moments, even at this day, when suggestive thoughts might be drawn from the Canon, to help in studying the individual, tedious, or baffling case, especially where the practice is far distant from the laboratories and appliances of modern medicine.

V

OF INTEREST TO THE SCHOLAR.

§ 38. The present translation is based on the Latin versions published at Venice in 1608 and 1595, supported by a study of the Arabic edition printed at Rome in 1593 and the Bulaq edition.

It is true that as E. G. Browne⁶ (p. 34) pointed out, "the Latin Qanun swarms with barbarous words which are not merely transcriptions, but in many cases almost unrecognisable mistranscriptions of Arabic originals," and that Hirschberg and Lippert³⁰ regard the Latin as almost unintelligible, though they admit the "slavish adherence" of the Latin to the Arabic. Campbell¹² (p. 139) states that there was a "society of translators" at Toledo, about 1130 A.D., "whose method of translating from Arabic to Latin was to put the Latin equivalent over the Arabic words, disregarding the sense of the original." It is true that in many passages the obscurity is similar to the effect which would result if one were at this day to render idiomatic French word for word into English.

It is important to point out that the Latin of Volume I is very different from that of Vols. III-V; so different that the translation must have been the work of different persons. While the criticisms are justified with regard to these three volumes, they do not apply to

the first, whose Latin is very close to the Arabic, and hardly to be improved. The difficulty really is that the Arabic itself is so condensed that the meaning can only be clearly represented in English by the use of many more words, whether to help out the meaning itself, or to make a presentable reading.

It may well be said, as did E. G. Browne⁶ (p. 26, 27): "he who judges Arabian Medicine only by the Latin translation will inevitably under-value it and do it a great injustice. Indeed it is difficult to resist the conclusion that many passages in the Latin version of the Qanun of Avicenna were misunderstood or not understood at all by the translator, and consequently can never have conveyed a clear idea to the reader."

§ 39. The following aids to clearness have been utilized. (a) The study of Avicenna's other works, and of contemporary philosophical writings, in the existing translations. (b) The study of various Latin terms as understood by modern scholastic philosophy in its exposition of the mediæval nomenclature. (c) The use of modern terms when there is no reasonable doubt of their referring to the same idea, though the literal term in the Latin is obsolete. The careful study of the original Arabic has here been of special importance, for words in the Latin version, which are evidently technical there, become merely colloquial when translated into English, whereas in the Arabic version, such words at once take on their proper character in the Arabic-English and Persian-English dictionaries. (d) The use of tabulation of the matter. There are instances where this proves possible without omitting even a single Arabic word. (e) The use of paraphrase for certain passages. These are marked (p). A certain freedom of rendering has been inevitable in view of the importance of bringing the *full* meaning of the text to the reader's notice without subjecting him to the need of reflecting deeply on passage after passage—as is requisite with the original Arabic.*

VI

§ 40. The main purpose of this treatise will now be seen to centre in the idea that in the ancient philosophy there is material capable of useful application to-day. The selection of the work of Avicenna is not intended to provide an apologium for that one author, but is specially appropriate for these reasons: (i) his acknowledged excellence; (ii) his greater accessibility among mediæval medical writings; (iii) a certain indefinable charm of expression peculiar to himself. But above all, (iv) the fact that his central theme is a conception of the nature of the human being really identical with that of Thomistic philosophy, and in these days specially stressed and developed by "modern scholastic philosophy." As these are related, so might Avicenna be related to a modern

* To have dealt with the work from the point of literature would have entailed giving the preference to safeguarding against likely criticisms at the hands of pure scholarship.

scholastic medicine, which would aim at reasons for health and ill-health far deeper than those given by the microbic and cognate theories.

With Mercier⁵⁶ "we do not regard the Thomistic philosophy . . . as a boundary which sets limits to personal activity of thought . . . but make use of his" (in this case, Avicenna's) "teaching as a starting-point from which we may go further afield" (footnote, p. 31).

With Maher⁵⁰ we ". . . resuscitate and" (apply to Medicine) ". . . a psychology that has already survived four and twenty centuries, and has had more influence on human thought and human language than all other psychologies together. My desire, however, has been not merely to expound, but to expand this old system . . . to make clear to the student of modern thought that this ancient psychology" (and Medicine) "is not so absurd, nor these old thinkers as foolish, as current caricatures of their teaching would lead one to imagine. . . . To trespass (on the soul) . . . is assumed by (many writers) to be the gravest of professional delinquencies."

§ 41. Therefore Avicenna is allowed once more to present his theme. To the questions we are constrained to ask of him, we find our answers (1) in his other writings; (2) in contemporary literature; (3) in the writings of modern Eastern thinkers; (4) in the works of S. Thomas; (5) in modern scholastic philosophy. If some truths are crudely expressed or perhaps faultily explained, it is our privilege to re-express and re-explain with those aids.

§ 42. Those who may have failed to identify one single Truth under different garbs are not obliged to accord these garbs an unfriendly reception upon the stage of our modern world. To recall a favourite Indian metaphor, the danseuse has so robed herself, and displays such diversities of art that under the ever-changing coloured beams of light it is difficult to believe there can be only one and the same artiste before us. Should it prove impossible to verify this, at least the very exhibition of the art should serve so to refresh that we can resume our work and ambitions with an added zest—now confident that the future realization of our desires is not so intangible as at first appeared.

"I deemed life was tranquillity and rest,
I find it but a never-ending quest;
And I, who sat in quietude and peace,
Toil on a journey that shall never cease." (Shamshad.²⁹)

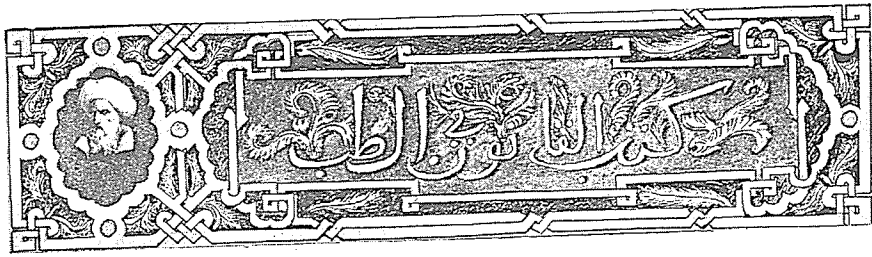
"Why should the Cosmos turn its wheel of worlds
If not to search for Thee eternally?
Why should the tireless Sun arise each morn
If not to look for Thee?" (Zauq.²⁹)

"How can I win that Hidden One Who sits within the secret place,
For even in my very dreams She wears the veil upon Her face." (Jurat.²⁹)

"For long, throughout the world, I sought for Thee,
Through weary years and ages of unrest;
At last I found Thee hidden in my arms
Within my breast!" (Zauq.²⁹)

§ 43. That which is spread before us, beneath the unceasing surge and change of the crowded life of the thoroughfares of great cities, as well as beneath the panorama of Nature herself, was surely understood by those who insisted "there is no second Cause," and by Chu Hsi¹¹ in saying "the innumerable laws (of Nature) all proceed from one source" (p. 137). In this the thought is not pietistically of a Creator, but of a living Reality met (passively or receptively) or encountered (actively or contestingly) by us all at all times. That Reality must be understood before we handle the problem of our patient with real efficacy.

§ 44. In the intention of this work, then, there comes into consideration that greater Art of Medicine—not an ethical Hippocratic ideal, but something of the divine—an Art as real to Avicenna, philosopher, poet, musician, the worker among the great and the small, aware of the dramatic in Life, as it should be to us. So we step out of the world of the modern critic, the scholar, and the medical historian, indeed of modern medicine itself, into one in which we stand, as it were, hand in hand, with the great Master of the East—almost with his very eyes gazing upon and scrutinising this ever open book of Life of ours—divested of the false notions of "progress" and "time." His language is thus no longer alien—and, incidentally, he lives again!



Introductory Words

IN the first place we render thanks to Allah, for the very excellence of the order of His creation, and the abundance of His benefits. His mercies are upon all the prophets.

2. In the next place, I may say that it is at the request of one of my very special friends,* one whom I feel most bound to consider, that I prepare this book on Medicine, setting forth its general and particular laws to the full extent necessary, and yet with apt brevity.

3. My plan is to deal with the general aspects of each of the two divisions of medicine—the speculative and the practical. Then I shall treat of the general principles applicable to the diagnosis of the properties of the simples, following this with a detailed account of them. Then I shall take up the disorders which befall each individual member, beginning with an account of its anatomy, and that of its auxiliary. The anatomy of the several members and their auxiliaries is dealt with in the first book. Having completed the account of the anatomy, I shall show how the health of the member is to be maintained.

4. This subject being completed, I proceed to a general discourse about general diseases—their causes, the signs by which they are recognized, and the modes of treatment. After this, I pass on to the special diseases and will point out in as many cases as possible—(i) the general diagnosis of their characters, causes and signs, (ii) the special diagnostic features,

* Was it Al-Jūzjāni? (cf. E. G. Browne,⁷ p. 157).

The portrait in the heading reproduces a painting in oils hanging in an ante-hall of the Seville University.

The designs in this and many other headings through this work are adapted from or copied from, Arabic and Persian sources. For others, taken from manuscripts, etc., the author is indebted to the kindness of Messrs. Luzac & Co. Initial letters are taken from the 1608 edition in Latin, the 1523 edition of Haly Abbas, and various mediæval illuminated books.

(iii) the general rules of treatment, (iv) the special methods of treatment by (a) simples, (b) compounded medicines.

I include specially designed tables under the subject of simples to enable you to survey the facts rapidly as to the adjuvants for treating disease by simples.

Compounded medicines, and their adjuvants, and how to mix them I have deemed it best to consider separately in a "Formulary." This it is my intention to compose after the special subjects are dealt with. Disorders not confined to one member are described in this book ; the cosmetics are spoken of ; and the knowledge set forth in previous books is assumed. Allah helping me to complete this volume, the formulary will be added to it.

5. Every follower of my teachings who wishes to use them profitably should memorize most of this work, even though he do not quite understand it all.

It is my intention to prepare further volumes if Allah should prolong my life still further, and if circumstances prove propitious.

SCHEME OF CONTENTS

- Book I. General matters relative to the science of medicine.
1. The definition and scope of medicine. Health.
 2. The classification of diseases ; their general causes and symptoms.
 3. The preservation of health and regiminal treatment.
 4. The classification of the modes of treatment in general.
- Book II. Materia medica.
- Book III. Special " pathology " (Medical and Surgical).
- Book IV. Special diseases involving more than one member.
The cosmetic art.
- Book V. Formulary.

CONTENTS OF BOOK I*

PART I comprises six theses :—

1. The definition of medicine. The topics of medicine.
2. The imponderable elements.
3. The temperaments and constitutions.
4. The fluids of the body, and how they arise.
5. The members (bones, muscles, nerves, arteries, veins) (= tissues and organs).
6. The faculties of the body : vegetative, sensitive, vital. The power of locomotion. The functions and operations of the body.

PART 2 comprises three theses :—

1. Ill-health :
 - (a) Causes, symptoms.
 - (b) States of the body ; types of disease.
 - (c) Disorders of configuration.

* The Latin text is abridged here.

THE CANON OF MEDICINE

- (d) Loss of continuity.
 - (e) Diseases of the composition.
 - (f) Disfigurements.
 - (g) The phases or cycles of disease.
2. The causes of disease :
- (a) Atmospheric, seasonal, winds, localities ; the sun.
 - (b) Vegetative functions.
 - (c) Food and drink.
 - (d) Other factors.
 - (e) Enumeration of the causes of each of the corporeal conditions.
3. The evidences of ill-health in (a) the pulse, (b) the urine, (c) the fæces.
- PART 3 comprises five theses :—
1. Nutrition. Regimen from birth to childhood.
 2. Regimen from childhood to old age ; Exercise, gymnastics, bathing, dietetics, fatigue.
 3. Regimen for the aged.
 4. Regimen appropriate to the various constitutions and habits of body.
 5. Seasons.
- An epitome giving the regimen in special circumstances of life.
- PART 4. The treatment of disease.
(There are 263 chapters in all.)



“ In the name of Allah, the Merciful, the Clement.”

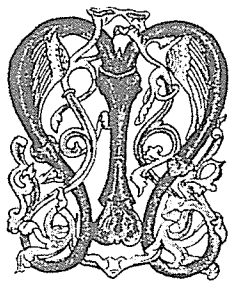
BOOK I

“ Whoever has mastered the first book of the Qanun, to him nothing will be hidden of the general and fundamental principles of medicine.”—*Chahar Maqala.*’

Part I

THESIS I

I. THE DEFINITION OF “ MEDICINE ”



EDICINE (6) is the science by which we learn, (a) the various states of the human body, (i) in health, (ii) when not in health, (b) the means by which, (i) health is likely to be lost, and (ii) when lost, is likely to be restored to health. In other words, it is the art whereby health [the beauty of the body—long hair, clear complexion, fragrance and form (Chahar Maqala)] is conserved and the art whereby it is restored, after being lost.

7. Although some divide “ medicine ” into a speculative (theoretical) and a practical (applied) part, you have assumed that it is wholly speculative “ because ” you say “ it is pure science.” But truly every science has both a speculative and a practical aspect. Philosophy has a speculative and a practical side. So has medicine. The difference between the two need be explained only in the case of medicine. Thus—

When, in regard to medicine, we say that practice proceeds from theory, we do not mean that there is one division of medicine by which we know, and another, distinct therefrom, by which we act. We mean that these two aspects belong together—one deals with the basic principles of knowledge; the other with the mode of operation of these principles (within the body). The former is theory; the latter is applied knowledge.

8. "Theory" of medicine is that which, when mastered, gives us a certain kind of knowledge, apart from any question of treatment. Thus we say that "there are three forms of fever and nine constitutions."

9. "Practice" of medicine is not the work which the physician carries out, but is that branch of medical knowledge which, when acquired, enables one to form an opinion upon which to base the proper plan of treatment. Thus it is said: "for inflammatory foci, the first agents to employ are infrigidants, inspissants, and repellants; then we temper these with mollificants; and, finally, when the process is subsiding, resolvent mollificants will accomplish the rest. But if the diseased focus contains matter which depends for its expulsion on the integrity of the principal members, such treatment is not applicable. Here the theory guides to an opinion, and the opinion is the basis of treatment.

Once the purpose of each aspect of medicine is understood, you can become skilled in both, even though there should never come a call for you to exercise your knowledge.

10. Another thing—there is no need to assert that "there are three states of the human body—sickness, health, and a state which is neither health nor disease." The first two cover everything. Careful consideration of the subject will make it clear to the physician either that the threefold grouping is unnecessary or that the group which we reject is unnecessary.

The first two states really cover everything. Careful consideration will convince the physician that the third state is dual—on the one hand an infirmity, and on the other a habit of body [some ugliness of form, for instance] or a condition which cannot be called strict health although the actions and functions of the body are normal. One must not risk defining "health" in an arbitrary fashion, and include in it a condition which does not belong to it (*p*).

However we do not propose to argue this matter out, because a disputation of that kind does not really further medicine.

§ 45. Joannitius¹¹, Hunayn ibn Ishāqal-'Ibādi (E. G. Browne⁷, p. 147)—defines Medicine as “the science which informs us about the states of the human body in health, or when it deviates from health; how to retain health; how to regain it.”

It is concerned with the following:—

1. That which is integral in the *nature* of the human being. The seven “notes” of the healthy human being—four being material, essential, and three formal. The four “accidental” notes.
2. That which is apart from the *nature* of the human being.
3. The præternatural or abnormal, to which belong the diseases, their causes and signs.



§ 46. THE SCOPE AND DEFINITION OF MEDICINE AS A PROFESSION; the motives underlying.

I. MEDICINE AS AN EXTERIOR LIFE OR CAREER.

(a) *The pursuit of a science.* Medicine may be taken up as a science in itself, for the sake of science—namely, “that science which treats of the prevention or cure of disease.” . . . This work entails the study of cognate sciences. Love of knowledge may be the chief motive; that is, it is an intellectual pursuit; though other motives may be associated.

Many branches of medical science are separated off as distinct pursuits—external, internal, state, psychological, pathological, legal, medicine, etc. As a Career, it may be orthodox, that is obedient to the laws about practice, etc.; in which case it is also obedient solely to the microbic theory of disease—or unorthodox in various degrees, through following different “systems,” many of which are unauthorized, and lead to some form of illegal practice.

If Medicine be regarded as concerned with the nature and constitution of man (as a matter of the first importance in learning how to maintain health and alleviate the distresses of ill-health), it is defined virtually in the same way as Avicenna, and conforms also to modern scholastic philosophy. In this case the practitioner would centre his attention on the individual, the patient himself, rather than on some disease or infection, or over and above the disease or infection; the constitution being primary in causation.

(b) *The pursuit of a practical art.* The scientific aspect is here made subsidiary to practical utility and success.

(i) In its primary motive, this form of pursuit is of course the pursuit of a livelihood, and medicine is a form of commercial life. Its success would then be measured by the bank balance. Admittedly this is seldom of the degree called wealth. After a long life of hard work, such a one might grieve at his lack of success did he not simultaneously have motive (ii). For these words then apply: “The only compensation which medicine offers to wealth is the spiritual pleasure of sacrifice, that solemn sweetness which floods our being when we see the fruit of our pain. The dependence of the soul on the Creator, brings our obligation to Him in dealing with those under our care. This is what makes the weary dispensary clinic blossom with a fullness of solace surpassing all expectations” (Flagg.²³)

(ii) Pursuit primarily for humanitarian motives—the alleviation of suffering, especially of physical pain; and of various disabilities. (The actual cure of disease is often supposed to be within human scope, though an impartial judgment must surely modify such an idea.) Preventive medicine is based on the same motives.

§ 47. 2. MEDICINE AS AN INTERIOR LIFE. Motives in the strict sense.

(a) “*Worldly motives*”—pursuit as a means of satisfying a certain egoism or ambition on the part of the doctor himself or of his relations; pursuit as a trade or business.

(b) *As a form of devotion to Fellow-man.* Philanthropy. (i) The relief of pain, disability, suffering, etc. (ii) Socio-political motives—the efforts of legislation and research: sanitary medicine; state medicine. Industrial medicine. Organization of “team” work both for research and the “panel.” The devotion is more to

Man in the abstract, the individual not receiving personal contact, as he does under (i).

(c) *As a form of devotion to God.*

(i) The study of medicine may be made the means of studying God both in Nature and in Man, and indeed in all Life, to perceive the purpose of God therein.

(ii) The pursuit of practice (a) as a penance or means of mortification "in the cell of your heart." So, Avicenna the Sufi seeing through the Quran how daily life is a disciplinary (Massignon, ⁵³ ii. 515). (b) A means of reaching personal perfection. "Every soul is on the way to sanctification, after all, and God leads each according to the means He selects as best" (Tanquery, ⁵⁴ p. 976). This is the practitioner's "unitive way." To achieve one single act in the whole life would be to achieve the desire. (c) A means of realization of the love of God. "The fear of the Lord is the beginning of wisdom" (Medicine as a "religious life" being capable of inclusion under this title)—culminating, not through personal will, but through divine will, in a consciousness of the presence of God throughout every organ and tissue, so that the *state* ("Hal") of recollection may finally become actual. (d) A means of expiation. It is possible that expiation may be accomplished through the instrumentality of the physician, and without his being aware of the fact. He may be the instrument whereby the patient is released from illnesses arising from causes indicated in § 199. On the other hand, he may fulfil a deeper intention, especially when both skill and devotion are great, for in him the devotion of God to man may become capable of expression,—he may become the vehicle of God's intention. As the master virtuoso is just one voice of God heard from among the sea of musicians, and is only able actually to utter one or two of the voices of thousands of composers in his recital, so also is the utterance of that expiation rare and restricted. One wave alone comes into prominence and then breaks, but it is with thorough purpose, not at random. Even so, God, in that wave, may wish to express Himself in that manner if only once and through one individual in one generation.

§ 48. This, the highest aim of the pursuit of medicine as an art receives a dual reward: the subtle intangible but far-reaching influence upon the patients, benefiting them unknowingly; the influence upon the physician by the spirit of divine love whereby is imparted the gift of *insight* into the realms of absolute realities—into that which underlies deeply the appearances of this kaleidoscopic world; the gift of *ability to counsel* the patients along the road of their own life, whereby those for whom this counsel is intended shall proceed towards the common goal of Man. Neither physician nor patient may be conscious of this gift. Yet the former may recognize in the illnesses or persistent ill-health some *decree*, some divine purpose related to that particular soul, which it may be for the physician to intervene or not, whether he perceives the holy ground on which that patient momentarily stands or not. No treatment will cure till the expiation is accomplished.

To the despondent and over-tired and weary practitioner, these motives reveal the same life and vision of Paradise as belonged to the author of the Canon; once viewed, its warmth and happiness may still accompany him as he resumes his daily round, and thereafter his enforced departure upon the tasks of the day need evoke no sigh of regret.

As Ibnu 'l-Farid (A.D. 1182-1235) reveals in his *Ta'iyya*⁵² (p. 180), there is the power of lifting oneself into the sphere of the infinite and eternal, whereby the daily task becomes transformed "all breathing human passion far above."

§ 49. In these days, mass-production of all kinds, and in great cities. In those days, individual craftsmanship and artistry in secluded places. In these days, the organization of modern medicine for wholesale achievement in all its departments; team-workers and the rush of the highways, with a certain scorn for the isolated. In those days, a placid and leisurely solitude, in which could be attained a quiet seership of Life.

In thought, we of this day may step aside from the rush of the highways and lanes, and in our wayfaring find ourselves back in those times, meeting with a solitary and forgotten seer, stay quietly awhile with him, and through him gain a glimpse of Something which nothing else can reveal, Whose very truth is abiding and irresistible.



2. THE SUBJECT-MATTER OF MEDICINE

11. To medicine pertains the (study of the) human body—how its health is maintained; how it loses health. To know fully about each of these we must ascertain the causes of both health and sickness.

12. Now as health and sickness and their causes are sometimes evident to the senses and sometimes only perceived by means of the evidence afforded by the various symptoms, we must in medicine gain a knowledge of the symptoms of health and sickness.

It is a dictum of the exact sciences that knowledge of a thing is attained only through a knowledge of the causes and the origins of the causes—assuming there to be causes and origins. Consequently our knowledge (of health and sickness) cannot be complete without an understanding both of symptoms and of the principles of being.

Symptoms: the word includes our modern “signs” and “symptoms.” *Principles of being*: this is the topic of scholastic metaphysics. *Only through a knowledge of causes*:—compare the following:—

“It is impossible to know a thing perfectly unless we know its operation; since from the mode and species of its operation we gauge the measure and quality of its power, while the power of a thing shows forth its nature: because a thing has naturally an aptitude for work according as it actually has such and such a nature.

“Now the operation of a thing is twofold, as the Philosopher teaches (9 Metaph., D.8, viii. 9); one that abides in the very worker and is a perfection of the worker himself, such as to sense, to understand, and to will; and another that passes into an outward thing, and is a perfection of the thing made, that results from it, such as to heat, to cut and to build.” (*Contra Gent.*⁸¹, ii. 1).

13. There are four kinds of “cause” (of health and sickness):—

1. The *material cause*—namely, the human subject in a state of health or disease. The immediate subject is: the members and the breath. The more remote is: the humours. The most remote is: the (imponderable) “elements.” The humours and the elements are composites, and they are liable

to vary. But though they are subject to a variation of composition and change they show a certain constant unity, to which they converge—namely, a unity of “constitution,” or of “form.” The constitution is in relation to the “change”; whereas the “form” is related to the “composition.”

2. The *efficient causes* are such as change or maintain the states of the human body. Namely :—

Extrinsic : the air and affiliated agents :
localities, countries, habitable regions and the like :
comestibles, potables, and the like.

Intrinsic : movement and its opposite—repose of body and mind ;
including sleep and its opposite—the waking state ;
evacuation of secretions and excretions ; and its opposite
—retention thereof :
the changes at the different periods of life .
occupations ; habits and customs :
descent (race, nationality).

Agents affecting the human body by contact, whether contrary to nature or not.

3. The *formal causes* : the constitutions ; the compositions ; the faculties proceeding from the constitutions.

§ 50. Costaeus, the Annotator of the Canon (1608 ed.) passes on to speak of health as a “harmony of the composite, the formal cause of the human body.” Galen also defined temperament as the formal cause of the human body. It is exactly here that we find the issue between theology and rationalism, for the former defines the formal cause of the human being to be what is called “the rational soul.”

The refutation of the statements is adequately made by S. Thomas⁸⁴ (lxiii), thus :—

“Harmony cannot move a body or govern it, as neither can a temperament. A harmony and a temperament also admits of degrees. The notion of harmony rather befits qualities of the body than the soul ; thus health is a harmony of the humours ; strength is a harmony of muscles and bones ; beauty is a harmony of limb and colour. . . . Harmony may mean either the composition itself or the principle of composition. Now the soul is not a composition, because then every part of the soul would have to be the composition of the parts of the body. . . .” (I, p. 166).

Just as the mediæval physicians fell into the rationalistic error so ably and thoroughly exposed throughout the “*Contra Gentiles*,” when they “freed” themselves from stereotyped teaching, so with modern teaching.

The physical and chemical facts which were discovered in the nineteenth century appeared finally to controvert both the statements of the Canon and those of the scholastic metaphysicians ; but it is

gradually becoming clear to more and more thinkers that this is not the case.

4. The *final causes*: the actions or functions. A knowledge of these presupposes a knowledge of the faculties and the breaths (which are the subjects of the faculties) as we shall show.

14. These, then, are the subjects which pertain to medicine. Familiarity with them gives one *insight* into how the body is maintained in a state of health, and how it becomes ill. A full understanding of how health is conserved, or ill-health removed, depends on understanding the underlying causes of each of these states and of their "instruments." For example—the regimen in regard to food, drink, choice of climate, regulations regarding labour and repose, the use of medicines, operative interference.

Physicians treat of all these points under three headings, as will be referred to later—health, sickness, and a state intermediate between the two. But we say that the state which they call "intermediate" is not really a mean between the other two.

15. Now that we have enumerated these groups of causes (of health and sickness) we may proceed to discuss whatever Medicine has to say concerning (*a*) the elements; (*b*) the constitutions; (*c*) the fluids of the body; (*d*) the tissues and organs—simple and composite; (*e*) the breaths and their natural, sensitive and vital faculties; (*f*) the functions; (*g*) the states of the body—health, sickness, intermediate conditions; and (*h*) their causes—food, drink, air, water, localities of residence, exercise, repose, age, sex, occupation, customs, race, evacuation, retention. The external accidents to which the body is exposed from without; (*i*) the regimen in regard to food, drink, medicines; exercises directed to preserving health; (*j*) the treatment for each disorder.

16. With regard to some of these things there is nothing a physician can do, yet he should recognize what they are, and what is their essential nature—whether they are really existent or not. For a knowledge of some things, he depends on the doctor of physical science; in the case of other things, knowledge is derived by inference [reasoning]. One must presuppose a knowledge of the accepted principles of the respective sciences of origins, in order to know whatever they are worthy of credence or not [criteriology]; and one makes inferences from the other sciences which are logically antecedent to these. In this manner one passes up step by step until one reaches the very beginnings

of all knowledge—namely, pure philosophy; to wit, metaphysics.

Hence, if a doctor undertakes the proofs of the existence of the “elements” and the “constitutions” and their derivatives from medicine itself he errs, for medicine cannot make these things clear, belonging as they do to the domain of natural science.

§ 51. In regard to this last sentence note: “It is not the concern of physical science (incl. medicine: Tr.) to study this first origin of all things; that study belongs to the metaphysician, who deals with being in general and realities apart from motion” (Contra Gent. ii, c. xxxvii).

In reference to the same, note also the following passage by J. Rickaby, S.J., ⁷⁹ (p. 103): “motions, molar and molecular, vibrations and transferences chemical, biological, mechanical or cosmic—are the subject-matter of the professor of physical science; but the Creator and the creative act are above motion . . . the range of physical science is narrower and lower than that of literature. . . . When a physicist pronounces on a religious question either for or against religion, he is *sutor supra crepidam*: he has overshot his subject. *Of course he ought to overshoot his subject.* . . . Wherever physical science becomes the staple of education, to the setting aside of Latin and Greek, it will be found necessary . . . in the interests of religion to insist upon a parallel course of metaphysics, psychology and ethics . . . trained on physical science without literature and philosophy, the mind suffers atrophy of the religious faculties, a disease which some seem anxious to induce upon mankind—a painful disease nevertheless, productive of much restlessness and irritability.”

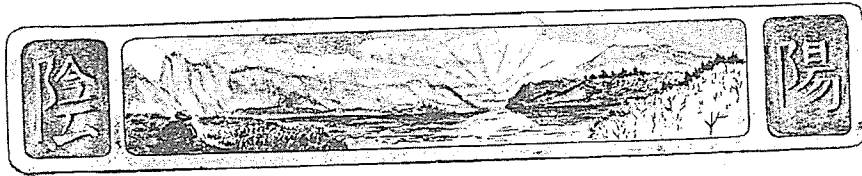
17. List of what the physician aims at having a clear notion of; what each is, and whether the non-manifest actually exist or not.

1. The elements. Do they exist? How many are there? In what modes are they? What are they? How do they arise?
2. The temperaments and constitutions. What are they? How many are there?
3. The fluids of the body. Do they exist? How many are there?
4. The members and the sense-organs. [The science of anatomy.]
5. The faculties. Do they exist? How many are there?
6. The functions. [The science of physiology.]
7. The breaths. Do they exist? How many are there? Where are they? What changes in state do they undergo? What are the causes of retardation (lagging) of the breath?

(Or : the changes in the affective faculties ; and the cause of their persistence.)

8. The causes. How many are there ?

18. The physician must also know how to arrive at conclusions concerning (1) the causes of illnesses and the individual signs thereof ; (2) the method (most likely to) remove the disorder and so restore health. Wherever they are obscure, he must be able to assign to them their duration, and recognize their phases.



THESIS II. THE ELEMENTS



LEMENTS. 19. The elements are simple bodies. They are the primary components of the human being throughout all its parts, as well as of all other bodies in their varied and diverse forms. The various orders of beings depend for their existence on the intermixture of the elements.

Elements : Equiv. : cosmic elements ; imponderable elements ; primordial essences ; first-principles ; elementary principles ; grades of radiance.

It is important to note that these elements are *not* "matter," but have only a virtual existence, as explained more fully below (§ 73 ; 309).

"Formae elementorum sunt in mixto virtute, non actum motu."⁸³
(76. 4. 4. m.)

"I am in water, and earth, and fire, and air.

These four around me, yet of these four I am not."

(Shamsi Tabriz,⁶⁸ T. 235, 5, p. 220.)

A difference must therefore be observed between them and the literal earth, water, air and fire.

Each of the latter, it must be noted, contains all four elements, imponderable elements, the correspondingly named element being merely preponderant (cf. § 143).

Simple bodies.—That is, simple in the scholastic sense ; indivisible. "Simplicity is that quality in virtue of which a substance has neither constitutive nor quantitative parts" (Mercier,⁵⁶ ii. 523).

20. Natural philosophy speaks of four elements and no more. The physician must accept this. Two are light, and two are heavy. The lighter elements are Fire and Air ; the heavier are Earth and Water.

Four elements and no more.—In Chinese, Buddhist, and Ayurveda philosophy there are five. In theosophy also, a fifth, named "ether," is given. The alchemists gave three. Aristotle discussed a fifth saying "the heaven is not of the nature of the four elements, but is itself a fifth body, existing over and above these"—quoted by S. Thomas⁸⁴ (68. i. p. 218). These various statements are not actually mutually contradictory (cf. § 29).

Light: equivalents: weak, male (because conferring or inceptive), positive, active. Heaven.

Heavy: equivalents: strong, female (because recipient), negative, passive. Earth.

“Heaven is man, and earth woman in character;
 Whatever heaven sends it, earth cherishes.
 When earth lacks heat, heaven sends heat;
 When it lacks moisture and dew, heaven sends them.”

(Mesnavi,⁵⁷ p. 161.)

21. THE EARTH. The Earth is an “element” normally situated at the centre of all existence (see scheme in § 54). In its nature it is at rest, and all others naturally tend towards it, at however great a distance away they might be. This is because of its intrinsic weight. It is cold and dry in nature, and it appears so to our senses as long as it is not interfered with by extraneous agencies, and obeys its own peculiar nature. It is by means of the earthy element that the parts of our body are fixed and held together into a compacted form; by its means the outward form is maintained.

“The Earth is the warp and weft of thy body.”—(Mesnavi,⁵⁷ p. 41.)

“Earth” is understood in respect of its principal property of dryness⁸⁴ (69, i. p. 234).

22. THE WATER. The Water is a simple substance whose position in nature is exterior to the (sphere of the) Earth, and interior to (that of) the Air. This position is owing to its relative density. In nature it is cold and moist. It appears so to our senses as long as there are no influences to counteract it. Its purpose in (the world of) creation lies in the fact that it lends itself readily to dispersion, and consequently assumes any shape without permanency. In the construction of things, then, it provides the possibility of their being moulded and spread out and attempered. Being moist, shapes can be readily fashioned (with it) and as easily lost (and resolved). Dryness, on the other hand, permits forms to be assumed only with difficulty, and they are resolved with similar difficulty. When dryness and moisture alternate, the former is overruled by the latter, and thus the object is easily susceptible of being moulded into a form; whereas if the moisture were overruled by dryness, the form and features of the body would become firm and constant. Moisture serves to protect dryness from friability; dryness prevents moisture from dispersing.

“ Verily the likeness of this present life is no other than as *water* which we send down from heaven, and wherewith the produce of the earth is mixed, of which men eat, and cattle also, until the earth hath received its vesture and is adorned. The inhabitants thereof imagine that they had power over the same, but our command cometh unto it by night or by day, and we render it mown (as reaped seed-produce: Woking trans.), as though yesterday it had not abounded with fruits.” Quran, x. 24. (p. 51, Gulshan²⁵.)

Again, more specific still, Quran 18. 45. shows that Water enters into the plants, and *only as long as it is there do they live*. “ The parable of the life of this world: like *water* which We send down from the cloud so the herbage of the earth becomes luxuriant on account of it ”: (Woking trans.) “ *min assama fa khatalatabihi . . .* ” mingled with—or, as one may paraphrase (cf. the sevenfold interpretation of the Quran): “ water is the channel of life ”; and note that the water came from the cloud, to which it was itself drawn by the solar heat !

“ Water has especially a life-giving power, since many animals originated in water, and the seed of all animals is liquid. Also the life of the soul is given by the water of baptism ”⁸⁴ (ib. 74, iii, p. 273). “ Augustine holds ‘ water ’ to mean ‘ formless matter. ’ ”

Water may be understood here in the sense of “ radical moisture ” (Paracelsus), which is absolutely essential to life, “ H₂O ” being thus as it were an instrument or substrate. The plant cannot shoot out leaves, flowers and fruit without it; so man cannot thrive without this radical moisture, or innate moisture. Moreover, on this view, the moisture is conserved by a medium which has “ material ” humidity—a concept which brings us to the domain of chemistry.

The watery nature may be called “ fluid nature ”; pliability; living character.³⁹

So, in the Chinese conception, Forke²³ (p. 271) explains, that the “ fluid ” of water is yang, and its substance yin; the fluid of earth is yang, and its “ substance ” yin; whereas the “ fluid ” of fire is Yin, and its “ substance ” Yang. Yin is here understood in a procreative sense, Yang in a destructive sense.

23. THE AIR. Air is a simple substance, whose position in nature is above the sphere of Water, and beneath that of Fire. This is due to its relative lightness. In nature it is hot and moist, according to the rule which we have given. Its effect, and value, in (the world of) creation is to rarefy, and render things finer, lighter, more delicate, softer, and consequently better able to move to the higher spheres.

See also under “ atmospheric air ” (264).

The air-“ element,” entering into the “ breath,” is that which enables us to stretch and contract, and also makes possible the involuntary movements throughout the body.³⁸

24. THE (SPHERE OF THE) FIRE.

"Ignis est causa omnium ignitorum."—(St. T.,⁸¹ iii. 46.)

Fire is a simple substance, which occupies a position in nature higher than that of the other three elements—namely the hollow of the sublunary world, for it reaches to the (world of the) heavens. All things return to it. This is because of its absolute lightness. In nature it is hot and dry. The part which it plays in the construction of things is that it matures, rarefies, refines, and intermingles with all things. Its penetrative power enables it to traverse the substance of the air; by this power it also subdues the sheer coldness of the two heavy cold elements; by this power it brings the elementary properties into harmony.

The difference between the "element" fire, and fire as usually understood is shown in describing flame, for instance, as "material" fire, and vesicants like cantharides, urtica, as "essential" fire. Or, as stated under "air," there is a "fluid" of fire and a "substance" of fire. Just as "water" is "radical" or "substantial," "material."

25. The two heavy elements enter more into the construction of the members (and fluids of the body, Costaeus), and contribute to repose. The two light elements enter more into the formation of the breaths and contribute to their movement as well as to the movement of the members—always remembering that it is the form that is the motor (and not the breath. The form initiates the breaths and through them moves the organs of the body and the limbs.) So much for the elements.

"Elementa subtiliora predominantur in mixto, secundum virtute; sed grossiora secundum quantitatem."—(Sum. Theol.,⁸² 71, 1, 2m; 91, 1, c. 3m.)

Fire, Air, Aether; the nourishing flame which imparts heat, life, sense and intelligence¹⁷ (xiv. 153).

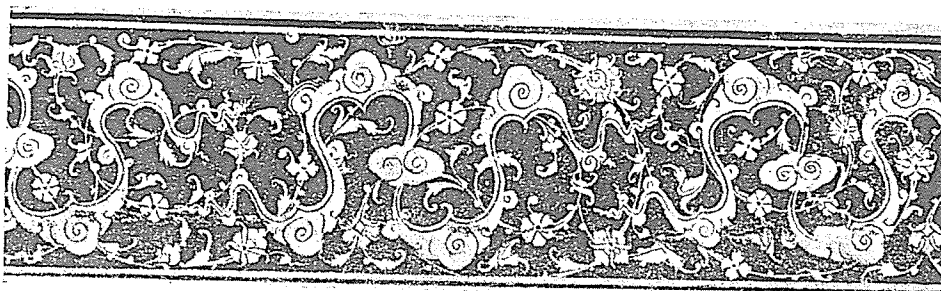
§ 52. "It is the form that is the motor and not the breath."—In this sentence is contained the crux of the whole subject. "Form," used in the scholastic sense, has a subtly specific meaning when applied to the human being. This meaning is gone into in the accompanying exposition. Briefly, the form when associated with the solid, fluid, and gaseous components (earth, water, air) of the "body" is called a "living human being," and it accounts for the continual movement of the "breaths" (life-principle) which manifests to the onlooker that that human being really is living.

§ 53. Position in nature.—If the names of the elements are taken as synonymous with the corresponding words describing mundane nature, it is evident that earth (land) is higher than "water"; and that "air" is above both. The fire (solar heat) is above all. But mystically speaking there is such a relation apart from the geographical one.

§ 54. In the following scheme the classification of "worlds" is set out according to the various schools of thought (Koranic, Persian, Ptolemaic, etc.) prevailing in the middle ages. The literal discrepancies are simply due to the standpoint having been taken differently—sometimes theological, sometimes philosophical, sometimes scientific—by the several schools of thought.

SCHEME OF THE POSITION OF THE SEVERAL "WORLDS" AS
CONCEIVED BY THE ANCIENTS.

- The Vacuum. Al-Khala; la Khala wa la Mala. "Neither vacuum nor plenum" (E. G. Browne,⁶ 118).
- Eleventh Heaven. The Empyrean. The seventh heaven of S. Thomas,⁸⁴ "wholly luminous" (68, p. 228).
- Tenth Heaven. The Primum mobile (because it originates the motions of the lower "spheres." The Plain. The starless Heaven. Al Falaku'l-Atlas. Ptolemy's Empyrean.
(* Ch. Maq,⁷ p. 4, makes this the ninth heaven.)
- Ninth Heaven. The Crystalline. The sixth heaven of S. Thomas, or "Aqueous"; "wholly transparent." The Celestial sphere. The Highest Heaven. 'Arsh⁸⁵ (p. 22). The movements in this accounts for the irregularities of movement in the fixed stars.
- Eighth Heaven. The Zodiacal Sphere. The Throne, al-'Arsh (Quran). The fixed stars. The zodiacal heaven is the confine of the material universe. The fifth Heaven of S. Thomas: the starry heaven with eight spheres, the first being that of the fixed stars.
- Seventh Heaven to First Heaven: "The sphere of the Planets."
"Into seven heavens did He fashion it"⁸⁵ (W., p. 22).
"He made them complete seven heavens" (Q., 2, 29). "Every sama (Heaven) is a heaven in relation to what is beneath it, and earth in relation to what is above it." Raghīb, quoted in Woking trans. of Quran.
- "There are seven corporeal heavens in all, in the opinion of Rabanus"⁸⁴ (68, 4, p. 228). Here comes the Angelic Kingdom (good and bad angels).
- Seventh. Saturn: Black. The first to be created.
- Sixth. Jupiter: Blue. Presided over by Michael. Formed from the light of himma (meditation).
- Fifth. Mars: Blood-red. Presided over by Azrael. Formed from the light of Wahm (judgment).
- Fourth. The Sun. Presided over by Israfil. Formed from the light of Qalb (heart).
- Third. Venus. Yellow. The world of similitudes. Formed from Khayal (phantasy).
- Second. Mercury. Grey. Formed from Fikr (reflection).
- First. Moon. White, then silver. Made from Aether.
"The heaven of the moon." Jili⁸² (p. 122)
- (Here comes "the horizon between matter and spirit."⁸¹)
- Sublunary world.⁸¹ The "world of growth and decay."⁷⁷
- Fourth Interspace (Furja⁷). The Human Kingdom.
- Fourth Elemental Sphere. Igneous sphere. *Fire*.
Divided by Rabanus into an upper region, the fiery heaven, and a lower, the Olympian heaven.
- Third Interspace. The Animal Kingdom.
- Third Elemental Sphere. Aerial sphere. *Air*.
Divided by Rabanus into an upper region, the ethereal heaven, and a lower, the aerial heaven.
- Second Interspace. The Vegetable Kingdom.
- Second Elemental Sphere. Aqueous sphere. *Water*.
- First Interspace. The Inorganic World (chiefly E. and W.; aided by A. and F.).
- First Elemental Sphere. Terrestrial sphere. *Earth*.
Jili refers to seven limbos of the earth⁸² (p. 124).



EXPLANATORY EXTENSION OF THESIS II

1. Preliminary remarks.
2. The doctrine of matter and form : (a) Considered statically ; (b) Considered dynamically.
3. The doctrine of imponderable elements : (a) Considered statically ; (b) Considered dynamically.
4. Application of the doctrine to biochemistry, histology, etiology, etc.

I. PRELIMINARY REMARKS

§ 55. Thesis II is the foundation of the whole Canon, but so entirely has the doctrine and world-conception of Avicenna been superseded by modern scientific teaching that the whole of his work may be said to fall with it.

The fact that for millions of intelligent people this world-conception (scheme of things, theory of life, Weltanschauung) is an intense reality in their daily lives (Forke,³⁴ p. 239) does not usually signify, and yet even a training in Western universities does not dispose them to abandon it.

So too, the daily-recited Breviary still contains the *Benedicite opera omnia*, in which the four "elements" sing their praise, just as for S. Francis, in his *Song of the Sun* they were an instruction for us to do likewise.

Their immediate dependence for existence upon the continuously exercised will of the Creator is spoken for both by S. Thomas Aquinas, in the West, and by the Persian Sage in the East. "Even air, water, earth, and fire draw their sustenance from Him, both winter and summer" (Mesnavi). As the mighty servants of God ("to us they seem lifeless, but to God living," Mesnavi,⁵⁷ p. 15) they offer Him praise (Quran) and service (Mesnavi).

The modern world-conception sets out that the universe is composed of chemical elements grouped into compounds, aggregated into masses varying from the size of vast nebulae to the smaller but still vast "suns," down to the fragments of dust beneath our feet ; whereas the modern scholastic philosophy sees in our space-time world only a fringe (Cf. Job xxvi. 14), and allows that the ancient idea of "heaven beyond the blue" evidenced understanding and not superstition. In short, the doctrine underlying Avicenna is capable of justification.

2. THE DOCTRINE OF "MATTER" AND "FORM"

A. Considered Statically

§ 56. Inanimate matter, in a state of rest, is the outcome of two principles, neither of which exists apart from the other. These are: the principle of inertia, or passivity; the principle of activity. The former receives the scholastic term "primary matter"; conveniently abridged to *m*. It is the "material cause" of a thing. The second principle is termed "form," "formal cause"; conveniently abridged to *f*. It is non-material.

"Man is the result of the combined operation of heaven and earth, of the union of two principles" (Li Ki "vii. 3. 1).

Every object has its *f*, but every *f* is not corporeal, for while some *f*'s are intrinsically dependent on matter, others can exist apart from matter.

§ 57. *m* remains indifferent and undetermined; it will take an infinite number of active principles *f*. But as soon as a given *m* has taken a given *f*, it ceases to be indifferent, for it has become *mf*. The union of *m* and *f* results in a concrete object—"matter," as ordinarily understood. In other words, it is said that when *m* receives *f*, a physical or corporeal substance (object) appears. *f* is said to "in-form" *m*; when that has happened, we have *mf*, "substantial form," the physical substance, "in-formed matter." So *f* is called the "formal cause" of a thing. *f* is also called a "determining principle." It "perfects" or completes *m*. So, we say, "when *m* is completed by *f*, a physical substance appears." *f* is also called "essential form." Correspondingly, it is said to give rise to *mf*, the "essence."

f imparts distinctive nature to *m* and fixes the character and properties and activities resulting from the union. *f* provides the "deep intrinsic reason" for *mf*.

mf, *mf'*, *mf''*, *mf'''* . . . *mfⁿ* would represent as many different objects, whether living or non-living.

§ 58. *mf*, then, stands for the following concepts: (1) physical substance, corporeal substance. "Corporeal" because evident to our senses. "Substance" because viewed in its "static" state—inactive, stationary. Every chemical substance is a different *mf*. (2) "nature." Here it is viewed in reference to its powers of activity. (3) "essence": here we describe what it is, and say what distinguishes one *mf* from another, from all other *mf*'s. In other words, it has "transcendental properties"—being, essence, unity, distinction from other beings, truth, and good. Every object is a being. Every object is a "creature." Every object perceptible by our senses is a material being. (4) "Constitution." Here we study *mf* from the point of view of how it came into being.

§ 59. Every object has three causes for its existence: material, formal, and efficient. That which brings about the union of *m* (material cause) and *f* (formal cause) is called the "efficient cause." There is another cause called the "final cause"—namely the *reason* for its existence, the reason for its creation.

§ 60. As soon as *mf* exists, certain qualities become manifest to our senses, by which we are enabled to form a mental image of the object—over and above the “transcendental properties” just referred to. These qualities are called “accidents.” In the formula, we represent them by the italic *a*. A concrete object is therefore represented more accurately by the symbol *mf.a*, the dot showing that *mf* forms one essence. To be more exact, then, the different objects around us would be represented by the formulæ *mf.a*, *mf.'a'*, *mf."a"*, *mf.'"a"'* . . . *mf."a"*.

§ 61. A further scholastic term is introduced if we say that “when *mf* (‘potentiality’) becomes ‘actuality,’ it is *mfa*.”—This is another way of saying that until a substance actually exists, it has no “accidents,” or “qualities.”

§ 62. The same symbol—*mf.a*—stands equally for a chemical atom, a chemical compound—inorganic or organic—however complex; for a whole mineral; for a histological “cell” (microbe, protozoan, cell-colony, simple or complex), for a whole plant or animal, or for a human being as a whole. Any object in the universe—water, stone, tree, mountain, herb, sun—can be represented by this same symbol. Every object is a “creature” in the Thomistic sense. Every object is “in-formed” matter. The differences between them all depend on the *f*.

§ 63. “Human nature” is “informed matter,” bearing certain properties or marks, and endowed with “existence.” Each organ in the body is “informed matter.” Every tissue is “in-formed matter.” The blood, the lymph, the urine, etc., are each of them “in-formed matter.” Every microscopic cell of which the tissues are composed is merely “in-formed matter.” So also is every chemical entity which composes the cells, and the whole person also is just “informed matter.”

§ 64. In the case of a living human being there is this complication that each particle of matter of which he is composed is represented by *mf.a*, and the body itself, as a whole, is representable by *mf.a*. To picture the whole person more satisfactorily we should employ a capital letter—say *M*—to stand for the actual matter of the body; and the human “form” would be representable by another capital letter *F*, for the human “form” differs from all other forms. Hence the human being is symbolized by *MF*, rather than by *mf.f'* or *mf+f'*—both of which would be inaccurate. $M = n.mf.a$. When death occurs, *MF* becomes *M* and *F*; *M* becomes $n.mfa$ again—simply a collection of chemical inanimate substances. *MF* stands for “a human soul.” *F* is not “soul.” *F* does not exist without *M* in the first instance, but after death it does exist without *M*. However, the great and important fact is that at the time of death *F* is no more like *F* at birth; being different, it is correct to symbolize it as *F'*.

The object of life is not to alter one's character, but to *control* it so that the passions never come to light. It is not for us to try and “add a cubit to our stature” (Mt. 6, 27) but to direct our unchangeable “character” into the very highest altruistic direction. The object of life is to prevent the character from determining the form of one's actions. See §164 iv.

Many of the laws operating in the non-living substance *mf.a* also occur in *MF*, though every separate *MF* follows its own laws. The laws peculiar to the chemical substances of which the body is composed necessarily apply in *MF*, as well as those pertaining to his being a particular *MF*. The mere fact of *MF* being altogether more elaborate than its component *n.mf.a*'s (which together make *M*) does not abrogate the applications belonging to those component *mf*'s—a fact which is often overlooked. Rationalism, for instance, assumes that because the lower are still present, the higher must simply be a variety of them.

"In the living conscious being, this qualitative determining factor (the germinal principle) takes a still higher form, its range of activity is wider, its power of applying, directing, and disposing of the energy stored in the organism is more varied and more flexible, but it cannot alter the quantity of the capital funded in the self-moving machine. If, then, it be the quality of the forces distributed in the nervous system which the directive power of the soul immediately determines, the liberation and control of a man's physical activity by his thoughts and volitions need not necessarily conflict with even the most rigid fulfilment of the law of the constancy of the quantity of energy." (From P. Couailhac, *La Liberte et la conservation de l'Energie*, Paris, 1897, Livre iv. ; quoted by Maher⁹, p. 523).

"If an angel or a demon set a barrel rolling down a hill by even a slight push, the action of such a spirit would involve the invasion of the system of the material universe by a foreign energy. But this is not the way the soul acts, according to the philosophy of S. Thomas and Aristotle. Here the soul is part of the living being, a component principle capable of liberating and guiding the transformation of energies (it selects and stores up) in the constitution of the material organism, which along with its compounds goes to form a single complete individual being." (Maher⁹, p. 428).

Again, not in virtue of its rationality is the *forma animale*, but through the vegetative and sentient faculties. (Aristotle, quoted in ¹⁷, ix. 239).

§ 65. There is an important passage on "matter" in the *Summa Theol.*⁸⁴ (Q. 85, Art. 1, p. 185-6) which brings out the distinction between the ponderable and the imponderable: the interested reader should really study the whole section of the *Summa*, on the "Understanding."—"Matter is twofold, common and *signate* or individual; common, such as flesh and bone; and individual as this flesh and these bones. The intellect therefore abstracts the species of a natural thing from the individual sensible matter, but not from the common sensible matter. . . . Mathematical species, however, can be abstracted by the intellect from sensible matter, not only from individual, but also from common matter; not from common intelligible matter, but only from individual matter. For sensible matter is corporeal matter as subject to sensible qualities, such as being cold or hot, hard or soft, and the like; while intelligible matter is substance as subject to quantity. Now it is manifest that quantity is in substance before other sensible qualities are. Hence quantities, such as number, dimension and figures, which are the terminations of quantity, can be considered apart from sensible qualities; and this is to abstract them from sensible matter. . . . But some things can be abstracted even from common intelligible matter, such as *being, unity, power, act*, and the like; all these can exist without matter, as is plain regarding immaterial things."

B. Considered Dynamically. Change

"The kettle is silent, though it is boiling all the while." (Mesnavi⁵⁷, p. 261.)

§ 66. It is natural to consider the objects of the material world as being in the first place stationary; that is, in a state of static being. But actually they all undergo change, from the highest to the lowest. There is movement either in the object itself, or at the instance of some other object. Hence we now consider the dynamic changes in *mf.a.*, *MF*.

§ 67. Changes are of two kinds—“substantial change,” “accidental change.” The example of the former is the chemical change occurring in the course of chemical reactions. *mf.a* becomes *mf.a'*. The example of accidental change is, for instance, when water becomes steam; when a person or plant grows; when a person becomes emaciated, or an object shrinks in size.

§ 68. The nature of substantial change is most important in regard to physiology and pathology. The first step is associated with a disappearance of the old *f*, the process called “corruption” by the scholastics; in modern words, “disintegration.” There is then a new *f'*—the new “form,” whose appearance is called “generation.”*

§ 69. From the point of view of the *causes* at work, there are three steps—an external agent or material cause, a receptive function, whereby the old *m* receives a new *f'*, and the efficient cause which brings *f'* into union with *m*.

§ 70. In the view of modern science, of course, the properties of “water” for instance, appear at the moment when the H_2 and O meet and unite; the appearance of $NaCl$ and H_2O , again, is adequately explained simply from the union of $NaOH$ and HCl in appropriate proportions. But Thomistic science perceives the need of something further. The water-molecule, or complex of molecules, is something more than the two H atoms linked to oxygen, and this something is the inert principle of matter *m*, which releases the old *f* and accepts the new *f'*. As Rahilly explains, a molecule or a complex of molecules such as an organism, presents not only “colligative or summational properties, but also indiscrptible specific qualities of the whole which cannot be distinctively predicated of or portioned out among the parts.” “We must therefore conceive—not imagine!—a spatially complex and disparate aggregate as being in some fundamental sense, one “being.”†

§ 71. The causes of substantial change (the efficient causes) in inanimate “beings” are the well-known familiar extrinsic “forces of nature”; but in the case of living beings, the efficient causes are the intrinsic “faculties” which they possess. Some of the latter account for changes of substance, while others have to do with a change of position—locomotion; and others again excite a movement in the mind.

§ 72. In the human being, the immediate efficient cause of an outwardly visible act consists of the muscles and nerves; behind that is the more remote efficient cause—the sensuous appetite or desire; and behind that is the sensuous cognition, which is an integral property of *MF*—a passive act, itself a “faculty.” Behind that, peculiar to the human being, is the all-important final cause. This is philosophically described as “the means by which perfection of life is reached”—whether that “perfection” be relative or absolute, whether the interests of the physical body are served, or the intellectual life, or whether the highest perfection (i.e. of soul) is the goal in view—where *MF* uses *M* as the “innocent creature of God,” in order to attain true perfection.

*“God is an Abaser and an Exalter. Without these two processes nothing comes into being.” Mesnavi⁵⁷, p. 300.

†Rahilly, appendix to “Modern Scholastic Philosophy”⁵⁸

In animalibus quae movent seipsa est magis quaedam colligatio partium quam perfecta continuatio (St Thomas, *In VIII. Physic.* i. 7).

3. THE DOCTRINE OF IMPONDERABLE ELEMENTS

A. Considered statically

§ 73. (1) *Relation of the imponderable elements to "matter" and "form."*—Do the elements belong to "primary matter" or to "form"?

This problem was discussed in so masterly a fashion by St. Thomas that his words are still applicable and unsurpassable. His perfect understanding of the nature of matter is combined with a precision of explanation which should satisfy every student. The following quotations may be made: "By the words earth and water (in Gen. i.) primary matter itself is signified" and not literal water or earth (Augustine⁸⁴, p. 194, S. T. 66; 1). "The ancient material philosophers maintained that primary matter was some corporeal thing in act, as fire, air, water, or some intermediate substance" (ib. p. 192) "Corporeal matter was impressed with the substantial form of water, and with the substantial form of earth" (p. 231) "The power possessed by water or earth of producing all animals resides not in the earth and water themselves, but in the power originally given to the elements of producing them from elemental matter" (ib. 71, i, p. 251).

In the note to 19 it is seen that the four elements cannot be assigned to literal matter. But they cannot be assigned to "form" either, as they have no being until literal matter has itself come into being. Hence, while the chemical elements are *mf*, the imponderable elements are neither *m* nor *f*, for they are inseparable from *mf*, and the primary qualities of a thing do not appear until it exists—that is, till *m* and *f* have become *mf*.—"The two exist because of the one, but hold not even to this one" (Seng-ts'an, in Susuki⁹¹, p. 184)—words used in another connection, but equally applicable.

§ 74. "Humidity" says Paracelsus⁸³ (ii. 264) is not "an element of water, or burning an element of fire. An element is not to be defined according to body, substance, or quality. What is visible to the eyes is only the subject or receptacle." . . . "Fire which burns is not the element of fire as we see it . . . the element of fire can be present in green wood no less than in fire. . . . Whatever grows is of the element of fire, but in another shape. Whatever is fixed is of the element of earth. Whatever nourishes is from the element of air, and whatever consumes is from the element of water. Growth belongs to the element of fire" (Cf. "innate heat" § 140) "Where that element fails, there is no increment. Except the element of earth supplied it there would be no end to growth. This fixes it; that is to say, it supplies a terminus for the element of fire. So, also, unless the element of air were to act, no nutrition could be brought about" (Cf. oxygen) "By the air alone all things are nourished. Again, nothing can be dissolved or consumed unless the element of water be the cause. By it all things are mortified, and reduced to nothing" (ib. 266). "The invisible elements need to be sustained, nourished and increased by some visible thing, and at length they perish with them." In other words, the "elements"

only exist as long as there is *mf.* "Both are interdependent and related, though their activity goes on without waste or loss." . . . "Each invisible attracts to itself its own. Stones come forth from the strong spirit of the earth" (ib. ii. 279).

Such passages, often supposed to be meaningless, become intelligible in the light of Thomistic philosophy, though according to biographers, Paracelsus would not have wished to appear to subscribe to that.

§ 75. The imponderable elements must not, however, be confused with "accidents" (*a*). "Prima quatuor qualitates non sunt habitus elementorum" (S. T.⁸³, 49, 4, 1). These primary qualities form the link between the object and our own consciousness, for our knowledge of the universe is really simply a knowledge of those qualities (heat, cold, moist, dry) with that of secondary qualities (subtility, thickness, lightness, heaviness, rarity, density, translucence, opacity, brilliance, dullness, etc.). "Sensible matter is corporeal matter as subject to sensible qualities, such as being cold or hot, hard or soft, and the like" (ib. ⁸⁴, 85, i, p. 186).

§ 76. So all the concrete objects of this world—from the granite mountain to the microscopic protozoon—are related to one another in virtue of the imponderables. And in virtue of the same, they are related to extra-mundane objects (sun, moon, stars). "The matter of the heavenly bodies and of the elements agree in the character of potentiality" (ib. ⁸⁴, 66, 2, p. 199). Since matter cannot exist without them, the human body itself must also manifest them.

§ 77. (2) *The analogy between the four elements and vibration-rate.* The earth element may be compared with a slow vibration-rate, the water element with a more rapid rate, and the remaining elements with still quicker vibration rates. The slower rates are "coarser," and the more rapid ones are "finer." Hence, as Avicenna says, the earth and water are "heavy" and the others are "light." The meaning of the imponderable elements is made more intelligible through the idiom of modern science. But in making such an analogy we must avoid the common error of equating things capable of being analogized with the same thing. To compare the "elements" with vibration-rate, is to compare them with light. "Soul," "radiance," "spirit," "breath" have all been compared with light ("lux"). But to pass on to identify them in any sense with "lux perpetua," and then with "Universal Intellect" is indefensible, yet even modern thought is not immune from the fallacy. Paracelsus⁷² explains "element" as "spirit" (meaning "form," no doubt), which "lives and flourishes" in the visible objects of Nature "as the soul in the body" . . . "not indeed," he explains, "that it is of precisely the same essence as a soul, but it corresponds with a certain degree of resemblance. There is a difference between the elemental and the eternal soul. . . . For the first matter of the elements is nothing else than life, which all created creatures possess. The soul of the elements is the life of all created things" (ii. 264). Averrhoes said "of all things the soul is most like light."

The perfect reasoning in dealing with these errors, which is given

by S. Thomas in "Contra Gentiles" should be studied by all who are inclined to award the last word to scientific theories.

§ 78. (3) *Applications of the doctrine.*—The application of the doctrine to the subject-matter of Medicine is simple when the elements are represented by their corresponding "tendencies." A few of the relations are shown in tabular form, by way of illustration. Thus :—

Name of Element.	Tendency.	Corresponding system.	Excretion.	Special Sense.	Operation in body.	Type of mind.	Corresponding mental state.
Earth	Spreading	Skeletal	Faeces	Touch	Gives shape	Mental torpor	Obstinacy.
Water	Drooping	Muscular	Urine	Taste	Nutrition	Lymphatic	Fear.
Fire	Downward Rising	Liver. Blood.	Sweat	Smell	Digestion	Optimistic	Submissive Affectionate.
Air	To and fro	Vascular Cutaneous	Saliva	Hearing	Physical movements	Cheerful	Anger ; irate Vexation (and weeping)
Aether	Stillness	Nervous. The hair	Semen	Vision	Respiration Reasoning	Reflective	Humour Sadness

§ 79. The correspondence between body and mind, in virtue of the pervasion of the whole being by the "elements," is specially elaborated, in a particularly interesting manner, by Chu Hsi¹¹ (p. 214), where the five elements are taken as the "physical" counterparts of "five ethical principles" (love, righteousness, reverence, wisdom, sincerity), which are present in all beings, just as are the elements.

§ 80. The Buddhist exposition of the human being as composed of five elements—"matter," "sensation," "thought," "action," and "consciousness" (e.g. in Honen¹², p. 314)—though raising another question—shows how generally the establishing of an intimacy of relation between body and mind is sought after, in all periods of history.

§ 81. Through the doctrine of the elements, the existence of a subtle indispensable link between tissues, organs, fluids, and mental attributes becomes intelligible. The methods of reasoning peculiar to different peoples and individuals, their changes of mood, their personal behaviours are all to be worked out on this basis, as, in his succeeding chapters, Avicenna works out the nature of temperament, humours, and constitution.

"The 'ether' in the constitution of the creature differs in the degree of its clearness and translucence. When the ether with which the individual is endowed is clear and translucent . . . but neither pure nor complete, some entanglement with creaturely desire is unavoidable ; but it can be overcome and got rid of, and then we have the wise man. When the ether with which the individual is endowed is blurred and turbid, there is the beclouding with creaturely desire

to such an extent that it cannot be shaken off, and we have the foolish and degenerate" (Chu Hsi¹⁰, i. 117).

§ 82. (4) *Associated factors*. Since the primary qualities belong to the elements, the laws of action and "passion" apply. Various aspects of this law are described by the terms: strength—weakness; *jelal-jemal* (Persian); *qaḍā-qadr* (Arabic). These determine the phenomena of human life, and therefore call for consideration under the dynamic aspects of the doctrine. Statically they are significant to the physician because they reveal themselves in variations of functional capacity of organs. With the dominance of the several elements we may expect corresponding vigour of the several systems of the body—e.g. the nutritive faculty, and the liver-function; renal functions, etc. The emotional make-up, character, and even talents for art, crafts, literature, politics, etc., attitude towards life in general—all these are "coloured" by the dominant "element." The study of the patient's features, gestures, voice, posture, hands acquires an added meaning, as informing about the strength or weakness of the several systems and faculties—to a degree which is not so very inferior to the information afforded by the expensive instruments of modern clinical research.

See also under "destiny." (§§ 111-115)

"Strength is the manifestation of the positive ether, and weakness of the negative. Each of these again is either positive, and then 'good,' or negative, and then 'evil.' Strength when good is righteous, straightforward, resolute, majestic, firm; when evil, harsh, proud, soft, irresolute, and false. The Mean (the ideal) is the maintenance of these principles in equilibrium." Bruce¹⁰, p. 111.

B. Considered Dynamically.

"The five elements move unceasingly, succeeding one another in predominance, in turn, though all always exist simultaneously" (Li Ki⁴⁷, vii, 2, 3).

"The earthy sign (of the Zodiac) succours the terrestrial earth,
The water sign (Aquarius) sends moisture to it.
The windy sign sends the clouds to it,
To draw off unwholesome exhalations.
The fiery sign (Leo) sends forth the heat of the sun,
Like a dish heated red-hot in front and behind.
The heaven is busily toiling through the ages,
Just as men labour to provide food for women.
And the earth does the woman's work, and toils
In bearing offspring and suckling them."

Mesnavi⁵⁷

§ 83. The movement of the elements is mutually opposite (Sum. Theol.⁸⁴ 66; p. 197). Change is continually taking place within the human being. This change is either cyclical or progressive. The former characterizes the ordinary phenomena of physiology, and the latter manifest as "growth." The cyclical changes of physiology (in its biochemical aspect) may be described in terms both of the chemical elements and of the imponderable elements. To do so by the pictorial title of "the *dance of the*

elements” is at once to bring up the atmosphere of the East, and the very scenery of Avicenna’s mind.

“ All the four elements are seething in this caldron (the world),
None is at rest, neither earth nor fire nor water nor air.
Now earth takes the form of grass, on account of desire,
Now water becomes air, for the sake of this affinity.
By way of unity, water becomes fire ;
Fire also becomes air in this expanse, by reason of love.
The elements wander from place to place like a pawn,
For the sake of the king’s love, not, like you, for pastime.”

Shamsi Tabriz⁶⁸ (p. 338).

The changes are the important things;—not the things in themselves, for matter, after all, only exists in virtue of the ceaselessly acting creative power of God. Did He withhold the power, at that instant the matter would cease ; it has no reality apart from His intention. It would not be a case of the world being “ destroyed,” but one of “ ceasing to be.” We are apt to be deceived by “ matter,” and devote our thoughts to this instead of to the changes ; and perhaps the “ moment of nascence ” (§ 91) is even more important than the changes themselves. The greatness of the ancient “ Book of Changes ” (Yi King) is due to the recognition of this principle.

§ 84. The advantage of this simile is that it brings out not only movement of a certain orderly kind, but also rhythm and *motif* ; the thought being of such primitive native dances in which the action requires only two dancers (male and female, of course) who are in the presence of many spectators. Each dancer performs entirely different movements, and the *two never come into actual contact*. The movements are harmonized by the music, which is itself as characteristic and essential as either of the performers.

Further, it will be clear that the feelings of the dancers themselves do not concern the watchers ; behind their emotions there is the real meaning of the dance, and whether the dancers discern that or not, the observer should strive to discern it. There may be special affinities or attractions between the dancers of the minuet ; but neither their pleasure, their displeasure, their steps, nor the music, are the basic reality.

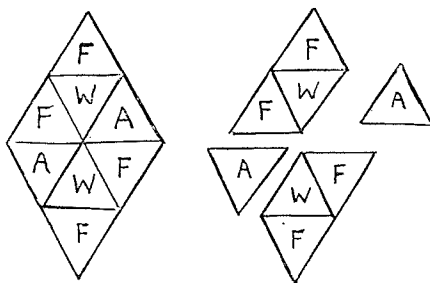
Moreover, the skill of the dancers is not always of the same degree. Artistic genius may produce greater pleasure in the watchers, but there is something greater even than skill.

§ 85. The phenomena of physiology and pathology may be viewed as a series of changes of analogous character, the cycle of changes in chemical elements, tissue-cells, and other rhythmic phenomena being studied without neglecting the conception of the imponderable elements.

§ 86. From the doctrine of matter and form it is clear that with the changes from one chemical compound to another in the course of the cyclical phenomena, there is a dropping of the “ form.” Also, the imponderable elements rearrange, and blend into new modes at the same time. As the author of *Gulshan-i-Raz*³⁶ (lines 250-255 and footnote) says :

“ The elements, water, air, fire and earth,
 Have taken their station below the heavens ;
 Each serving diligently in its own appointed place,
 Before or behind which it never sets its foot.
 Though all four are contrary in their nature and position,
 Still one may see them ever united together.
 Inimical are they to each other in essence and form,
 Yet united into single bodies by fiat of necessity.
 From them is born the three-fold kingdom of Nature.”

§ 87. To present a simple example, for illustration—Glucose, for instance, would be described as WA^2F^4 , each letter representing the corresponding imponderable element. When this substance is broken up into alcohol and CO_2 , by the dispersal of the “ cohesive force between the three elements (e.g., by the influence of an “ opposite ” : the yeast-ferment), two portions of WF^2 result, the “ air ” having escaped, and the “ fire-water ” of the aborigines being left behind. This may be represented pictorially thus :



The germination of seeds may be described in similar terms. Thus, it would be said that the ethereal undulations from the sun penetrate the loosened earth round the seeds, and by their successive shocks affect the particles of matter composing the germinal centre of the seed. The readjustments of atoms and compounds with oxygen result in the generation of vital energy. The “ earth ” (mineral substances, and remnants of animal and vegetable matter) mingled with “ water ” (moisture) forms the factor of “ heavy elements ” (20). The “ air ” (its oxygen content), “ fire ” (solar heat), and “ aether ” (sunlight) make up the factor of “ light elements.” The two series together affect the starch in the seed, bring about its change into glucose, whereby the seed swells until the plumule emerges, and the rootlets begin to penetrate the soil in search of “ water ” and “ earth,” while the leaves expand to take in the “ air,” and “ aether ” by the aid of “ fire.”

§ 88. Expressed in another way, there has been a change of vibration-rate. Or we might regard the imponderable elements as compulsorily riding upon the chemical elements during their metabolic interchanges, although the fire, water, earth or air cannot be thought of as retaining a sort of identity throughout. It would be better to use another idiom : the noumenal is coterminous with the phenomenal. Or, comparing it with wave-motion, it is as if there were two superimposed curves. When the two curves tally, every dip of one meets a dip in the other. The imponderable dips

down, as it were, into the world of matter, illuminating the "ocean of physical matter" according to the mode (intensity of vibration) in which it touches the lower curve. At each rise of the wave, the former returns into the metaphysical "ocean," and in doing so, the physical matter returns to (momentary) inactivity.

The breaking down and building up of substance, in the course of metabolism, is the same as the scholastic "corruption" (disintegration), and "generation" (reconstruction); and is concurrent with the changes in the imponderable elements. In Avicenna the process is thought of in their terms, whereas to the physiologist the process is worked out in terms of the material chemical elements.

So, in Chinese philosophy, we are introduced to the alternating opening and closing operations of Nature, which are controlled by the "Law," as the pivot controls the opening and closing of a door" (p. 134). (Cf. with urooj-nasool in Sufic philosophy.)

§ 89. Hence we find that Thesis III is working out the dynamic consideration of the imponderables, under the title of "temperament." It is the action and "passion" between the opposites which results in "temperament." This conception carried through all aspects of man provides the explanation of the diversity which characterizes the unity—one human being.

Akhlak-i-Jalali²⁵ says: "In truth there is one and the same principle, which, if prevailing in the attempered elementary particles is equipoise of temperament, if produced in musical tones is excellent and delightful intervals, if apparent in the gestures is grace, if found in language is eloquence, if produced in the human limbs is beauty ('Though their beauty charm thee,' Quran, Sura 33, v. 52), if in the qualities of the soul equity. Of this principle the Soul is enamoured and in search, whatever form it may take, whatever dress assume" (Verses 625-630 of Gulshan-i-Raz; many other passages in this poem are equally applicable).

This therefore forms the introduction to Thesis III.

4. APPLICATIONS OF THE DOCTRINE

(a) To biochemistry.

§ 90. Starting with the conception of matter so far detailed, both statically and dynamically, and applying the dynamic aspects of the imponderable elements designated as a "dance," we may proceed to trace the chemical elements and compounds through the body, entering as they do in the form of solid and fluid articles of diet, or by means of respiration. The chemical elements are seen to be in a form which is sometimes "fixed" or "bound" (combined), sometimes "free." They pass into the tissues, and linger there for a longer or shorter time before passing out again. During practically the whole of this time they are combined, but at the actual moments of chemical interchange they become free or "nascent"—the moments when f becomes f' .

§ 91. It may be said that that moment of *nascence* is the focus, or the whole purpose, of the cycle of changes which occur in the

body—anabolic and katabolic. That one moment is the opportunity for vital actions to actualize. That moment finds its location in this or that histological unit or tissue-element, which itself is, in a certain real sense, itself the actualization of that moment!. This moment achieved, they become bound once more and steadily descend the ladder of metabolism until they are found once more outside the body. To quote from a deep thinker of the early Victorian age: "Nitrogen, like a half-reclaimed gipsy from the wilds, is ever seeking to be free again, and, not content with its own freedom, is ever tempting others not of gipsy blood to escape from their thralldom" (Religio Chemicæ,⁷⁸ p. 149).

§ 92. At this same vital moment of the cycle, there is a change of the *pivot of function* in the substances concerned. All the substances with which the subject of metabolism deals belong to the carbon compounds, whose structure is well known to be described with the terms straight chain, double-chain, ring-compounds, etc. With these forms of "skeleton" are associated the various "side-chains" which are to the others as the limbs to the body. All the familiar groups of biochemistry (paraffins, primary and secondary alcohols, aldehydes, acids, amides, ketones, ethers, sulphonic acids, albumoses, leucins, purins, diaminoacids, sugars, etc.) may be thought of as presenting a sort of individuality which depends more on the side-chains than on the skeletons, and yet the radicles of which these side-chains are composed owe their character more to stereochemical position or other relations than to the elements which belong to them. With change of formula there is no doubt a change of physical state (colloid, crystalloid), of electrical reaction and so forth. But the fact of change (Cf. § 83) is still more important, even than the change of personality or individuality (so to speak). The pivot of function changes from one element—carbon, e.g.—to another (nitrogen, sulphur, phosphorus, e.g.). The important thing is that from being carbon-centric, the physiological processes are nitrogen-centric, sulpho-centric, phospho-centric. Or, unicentricity gives place to duo-centricity (e.g. sulpho-ferro-centric), or perhaps multi-centricity (e.g. in albumen), because the function cannot pass on to a new pivot unless two or more other elements have come into special association.

For instance, in oxy-centricity, a compound constructed on the straight-chain skeleton (-C-C-C-C-) may become oxycentric, because the new basis is -C-O-C- (formation of anhydrides, esters, etc.). Here the important thing is that the centre of function is -O- and no longer -C-. In nitro-centricity, the change is associated with the appearance of -C-N-C-, the centre of function being now -N-, which is important. In sulpho-centricity, a compound with a group -C-S-O₂H (thio-ethers, allyls, etc.) may arise; this is quasi-pathological for the human body, and however insignificant the -S- may be to the chemist maybe it is evident to the senses in virtue of a distinctive odour. Such compounds as sulphocyanides, taurocholates, indoxylsulphates, melanin, various mucins, lardaceous substances, hair, and the horny skin have an importance of their own,

and some of them form the links between nitro-centric and sulpho-centric compounds. In phospho-centricity, the dominance of the phosphorus atom is the culmination of the purpose of the metabolic change. So the author of *Religio Chemicæ* (p. 149) said "phosphorus is in the active condition at the centres of vital action and in the passive (allotropic) state at the outlying points." In the case of lecithin, there are variations of centricity. Its nitrogen, phosphorus, or hydroxyl may be dominant according to the metabolic circumstances, and the subsequent linkages and fate of each successive derivative is according to those circumstances.

Other elements may come to form important pivots of function, under more or less exceptional conditions (e.g., arsenic, silicon, etc.).

§ 93. It is clear then, that we can watch the metabolic processes from the chemical side as a sort of pageant or procession. But if we view it as the chemist does, according to syntheses and analyses, oxidations and reductions, and according to the intermediate products which he discovers when he arrests that pageant, as one might stop a dance in order to be sure that a certain individual was present or not, we may easily come to conclusions quite at variance with the living truth. Stop the dance, and the illusion is destroyed. The life has gone!

The living cell does not necessarily follow the programme of the laboratory. Indeed it might be doubted whether any substances as such ever appear except at the end. The actual process might well be like a shuffling of cards, whereby the order of the cards is altered and the order or relative position is the important thing. On the anabolic side there is always the face; on the katabolic side there is always the back. Between the two there are always the same atomic personalities which remain as it were in the same room but change about to receive different ranks with respect to one another.

Each element may be traced through its various phases, through compound after compound, its behaviour being modified by the side-chains, and its importance altered, so that now it has a regal position, with the others as its slaves, and now is reduced to slavery, subservient to another element which has now assumed the royal position. Each in turn receives homage from its fellows; each enjoys a brief reign upon the throne.

§ 94. Such is the chemistry of life, viewed mystically. It is an incessant movement. Interchanges proceed continually, and not only in one substance at a time, but in a thousand at a time; not one element only (C, H, N, O, S, P) but all of them simultaneously—not necessarily one ruler, but sometimes co-rulers, in the various substrates of action; not all at the same rate, but at different rates and with different rhythms.

§ 95. (b) *In histology*.—These pictures of biochemical processes must be linked up with what we actually see with the naked eye and with the microscope. Morphological changes are all manifestations of the unseen or invisible biochemical cycles. Not "structure first, then function." Not "function first, then structure." The two are inseparable both in time and place. Hence,

however exact his histological knowledge, the physician must hold clearly before him the activities which only the mind can hold and piece together and watch. The histological appearance shows us the processes arrested at a particular moment when some group is dominant and another "recessive." Its very appearance is artificial, the produce of reagents acting upon a dead "fixed" protoplasm; a reaction between complex dyes and the chemical substances produced by the fixatives. That which appears to be the permanent substrate for functions, a definite scaffolding, is quite otherwise. In the picture given of the dance of the elements in the body, the "skeleton" seems a base from which side-chains arise and give purchase for the "dancing" element; but as a matter of fact the skeleton, the side-chain, and the element are mutually necessary. The whole structure is altering the whole time. So with the tissue. The change of chemical substances entails a change from solid to colloid, colloid to fluid, fluid to gas or back to colloid; and while so doing they become perceptible under the microscope as cell-substance, cell-fluid, cell-juice, tissue-juice; fluids aggregate and condense into "cells" (colloid phase); cells constantly dissolve or "splay out" into fluid, or undergo partition from larger and larger particles into submicroscopic and finally into visible microscopic particles, or else undergo partition into "supernatant fluids" of simpler chemical composition. In the course of these changes solids and the like separate out; and these last are usually but faultily regarded as products of metabolism comparable to the goods manufactured in a factory. The appearance of granules rather than fluid, or precipitate rather than solution in the tissue, depends on the kind of elements concerned (mineral atoms, ordinary atom-groups), and the direction of interchange. See § 125.

Some examples of the steps of the cycle towards visibility :

<i>Fluid phase.</i>	<i>Colloid phase.</i>	<i>Submicroscopic character.</i>	<i>Microscopic appearance.</i>	<i>Fate.</i>
Homogeneous "humour"	Cell-substance	Spongioplasm	Tissue cell as a whole	Excretable substance and protein derivatives.
Abnormal "humour."	Atrabillious humour	Less colloidal	Coarse particles (insoluble)	Inexcretable without medicamentous aid.
Tissue-fluid	Serum-protein	Aminoacids	Bioplasm; occasional crystalline deposit	Urea, etc.
Sulphur	Colloid Sulphur potentially excretable phase.	Larger particles of Sulphur	Cell-granules, cell-wall	Sulphur derivatives; sulphonic acids, etc.

§ 96. It is not possible to prepare a fully exact correlation between the carbon, nitrogen, phosphorus, and sulphur series and structure seen under the microscope. Broadly speaking, the carbon series is related to the cell-substance; the nitrogen and phosphorus series are associated with the nuclear structure. Certain kinds of cells are associated more with some elements than with others. Moreover one must always bear in mind that the movement is all through the cell, all through the whole histological unit. The fulfilment of the functions of such a unit implies the simultaneous movement of all the elements concerned, and each cycle proceeds at a different rate.

§ 97. It is less easy still to present a picture of the movement in a whole tissue in these terms. Only here and there does some product emerge which is identifiable by the physiologist and biochemist. Endless intermediate steps and changes find their concrete expression in the one product which we perceive as some detail of cell-structure under the microscope. We may trace various isolated substances in certain parts of certain cells of the body, and yet are not able to dogmatize about them, because in the process of life in the tissue there is a constant flow of matter, the visible becoming invisible, and then again visible. That is, the visible food material taken in, the invisible changes and interchanges of elements and atom groups (the "metabolism") and their changing pivots of function; and the finally visible product of excretion. If there be a range of variation from a "normal" in the steps of this "dance" there is at least no doubt that ill-health comes of a change of rhythm when the "foot-falls" are out of time, or some of the "steps" omitted.

§ 98. It is clear that if the changes in the imponderable elements should chance to fail to run concurrently with the breaking down and building-up of substance (the scholastic corruption or disintegration and generation or reconstruction), this would also mean a break in the rhythm; the wave-motion would not be symmetrical, to use the previous simile; and the body would be "ill." But it may be added, in passing, that the varying dispositions exhibited by people are the manifestations of lack of perfect symmetry and synchronism; perfect symmetry would show among other things as "a cheerful disposition."

§ 99. The histology of an organ is the visible sum total of chemical units, with the atom groups of ponderable elements successively formed in the cells and tissues. These constitute the stage and scenery of the metaphysical "dance"—that of the imponderable elements which interweave and complete the picture of the living processes. But to understand the picture itself, and see its meaning, brings us to questions which must be deferred at this point.

§ 100. The wonderful insight into the processes taking place in the human body which is afforded by the conception of "macrocosm" and "microcosm" used by the alchemists of old, and still rightly used by many thinkers, is sufficient justification.

In nature we see, for instance, a crowd of human beings, composed of hundreds of units which have aggregated for a relatively few moments. We may call it simply "a crowd," or we may specify and say what kind of a crowd. As one watches

it, people come up to it; others leave; others walk by without deviating their steps. Perhaps in five minutes it has all dispersed.

What of it? What was its purpose? What was its effect?—here or perhaps elsewhere? Perhaps it is subversive of order, anarchical, pathological; perhaps it is simply mechanical, obstructive, congestive.

Such may be observed under the microscope, but we call the components cells or perhaps excretory products or foreign bodies. To some, such analogising is fanciful and useless. But that Avicenna found this method of enquiry vastly productive and helpful there is no doubt. As a faithful Moslem, too, he would realize the voice of the Quran, saying, "these things are to you for a sign." Words belonging not only to the moral law, but also to the law of Nature in all its ramifications—for the Artificer and the Lawgiver are one.

§ 101. By the time we have grasped these several aspects and associated them with the chemical aspect of life, we have formed a nearer approximation to the true picture of life *at that moment of time*. But it has already passed on to something different! However, there is no way of keeping pace with that except by understanding the cycle of changes in each and every case. Cycles of incipience, of growth, of maturation, of decay. The *reason*, or *cause* of the change, is to be understood before one can keep pace.

§ 102. *The causes at work in the dance of the imponderable elements*.—The mutual attraction and repulsion which underlies all change is to be found inherent in the imponderable elements, as it were by definition. The active and passive qualities of the separate elements come into play when they are compounded, and (because they necessarily occur in the same "geographical" spot, and are only separable by mental analysis) they have to do even with physical state (solid, fluid, colloid, gaseous) and form (granular, amorphous, crystalline) and physical property (solubility and insolubility; positive or negative electrical charge). Hence they may be said to affect the *direction* of movement, whether to less colloid state, or more colloid, to differentiation or de-differentiation, clearness or sharpness of reaction, or to confused state.

§ 103. This doctrine may be brought beside the Chinese principle of Yang and Yin.

To the Yang principle belong the ideas: anterior, south, rising, fecundating, expanding, growth, advancing, strength, order, heat, motion, cheerfulness, life.

To the Yin principle belong: posterior, north, falling, breeding, contracting, decay, retarding, weakness, confusion, cold, rest, anger, death.

In relation to the body: Yang belongs to the breath, the head, the speech, the eyesight, exhaling; the shape of the body. Yin belongs to the blood, the feet, the vital force, silence, inhaling; the "body" itself.

Yang is active, flowing, fullness, straightness, music. Yin is passive, tending to inertia, emptiness, crookedness of form, ceremonial.

There are relations between yang and yin, and hardness or softness, and the organs of the body. (Forke²³, 216).

"When the ether has the proportions of the yin, and the yang correct and harmonious, there is perfection of the ether, and it is equally permeable by all five elements, as in the case of man. When the proportions are unequal, there is imperfection of the ether, the manifestation of the elements is unequal, as in the case of animals."—BRUCE,¹⁰ footnote: i. 115.

§ 104. The idea of Yang and Yin swinging as a pendulum may add to our conception of life. The rocking of the cradle has the subtle purpose of throwing the yang and yin into rhythm, and the

movement of the infant's breath into rhythm, which, once started, will continue for at least an hour or two. (See 698.)

§ 105. *Urooj: Nasool.*³⁸ Rise and Fall. The anabolic process belongs to the former; the katabolic (formation of "effete" substances, their removal from tissues and organs—whether by deposition in tissues, as atheroma, or by discharge from the body) belong to the latter. These terms in Persian mysticism emphasize the fact of changes and movements running in cycles. Each individual has his own characteristic cycle of changes; the movement of the "breath" goes by cycles. The life as a whole shows its cycle, being sometimes 75 years, sometimes more, more often much less. In addition there are the smaller cycles—waxing and waning of vital force in a certain rhythm peculiar to the person, and carrying with it susceptibility or resistance to infection, and the like.

§ 106. *Other principles:* these would be expressed as laws, which can be classified into various groups—those belonging to nature in general; those belonging to human nature; those belonging to our conceptions of life, health, and disease. Law of *qaḍā* and *qadr*; construction and destruction; of distribution; of interdependence; of intention; of compulsory visibility (discontinuous functions, etc); of desires. Note § 82.

§ 107. *Cause of synchronism:* namely between the two dancers in the simile; these dancers being the material element and the imponderables respectively. This lies in the conception of "breath" or "life-principle," with its cycles.

§ 108. (d) *Extramundane and extracorporeal influences on the human body in virtue of the common content of the "four elements."*

That there are definite extracorporeal influences on the metabolic workings of the human body should now be intelligible. The effect of heat, cold, wet climate, dry climate is well enough known but is widely ignored, as evidenced by elaborate researches into chronic articular "rheumatism" being apparently made in every direction but this.

To go further, and agree with the ancients that epidemics and the like had relation to planetary influences, is not necessary; nor is it necessary to dismiss their possibility off-hand. It is not safe to argue that there is no relation between the planets and stars and life on this earth simply because some relation once thought to be true is now discredited. If the whole universe is one organic whole, there cannot but be some relation.

The relation between seasonal irregularities and the interactions of the "elements" is referred to by Forke²³ (p. 298, footnote), in showing how the Chinese associated each season with the dominance of a given element.

According to the influences prevailing at the time of birth, so is the endowment of the person born "with such an ether." If "toward, the disposition is bright and good . . . if untoward, not." Chu Hsi¹⁰, 85. In time, and with constant self-culture, "the inequality of ethereal endowment will of itself disappear." *ib.*, 86.