

## Chapter 15: Ikhwan al-Safa

Ikhwan al-Safa by Omar A. Farrukh, Ph.D, Member of the Arab Academy, Damascus (Syria)

### Introduction

The name Ikhwan al-Safa was assumed by a group of *libres penseum* who cultivated science and philosophy not for the sake of science and philosophy, but in the hope of forming a kind of an ethico-spiritual community in which the elites of the heterogeneous Muslim Empire could find a refuge from the struggle that was raging among religious congregations, national societies, and Muslim sects themselves.

External evidence concerning the Ikhwan al-Safa is so scanty that no clear historical picture of them is in any way possible. Were it not for Abu Hayyan al-Tauhidi (d. after 400/1009), a famous author and a friend of some members of the group, no facts about them would have come down to us.

The group of the Ikhwan al-Safa originated in Basrah. In about 373/983, the group was already famous and its “Epistles,” which contain its spiritual doctrines and philosophical system, were in wide circulation. [1](#)

The complete name of the group was *Ikhwan al-Safa wa Khullan al-Wafa wa Ahl al-Hamd wa Abna' al-Majd* [2](#) a name which was suggested to them by the chapter of the “Ring-Necked Dove” in *Kalilah wa Dimnah*, a book which they very highly esteemed. [3](#)

The Ikhwan al-Safa succeeded in keeping complete secrecy about their names. But when Abu Hayyan was asked in about 373/983, about them, he named, perhaps at random, five of them: Abu Sulaiman Muhammad b. Ma'shar ad-Busti, known as al-Muqaddisi, Abu al-Hasan 'Ali b. Harun al-Zanjani, Abu Ahmad Muhammad al-Mihrajani, a certain al-'Aufi, and the famous Zaid b. Rifa'ah. [4](#)

The Ikhwan al-Safa produced numerous works the most famous and important of which is the encyclopedic compilation entitled *Rasa'il Ikhwan al-Safa* (Epistles of the Ikhwan al-Safa), which will

henceforth be referred to as *Rasa'il* or "Epistles." These "Epistles" are definitely the result of a collaboration of various writers many of whom may not have been members of the group.

The compilation must have dragged over a long period, but by 373/983 the "Epistles" must have been already complete in the first recension at least. It is, moreover, practically certain that the Ikhwan al-Safa embarked upon the compilation of the "Epistles" with the number fifty in their mind. The current edition, however, has fifty-three epistles.

Closely connected with the "Epistles" is *al-Risalat al-Jami'ah* (the Comprehensive Epistle) which was a summarium and summa of the original "Epistles." It was also intended for private circulation among the more advanced members of the group. The *Jami'ah* discards much of the scientific information originally the backbone of the "Epistles," and expounds more fully and frankly the ideas which the Ikhwan al-Safa intended to inoculate into their followers.<sup>5</sup>

The *Jami'ah* was further summarized in *Risalat al-Jami'at al-Jami'ah au al-Zubdah min Rasa'il Ikhwan al-Safa* (the Condensation of the Comprehensive Epistle or the Cream of the Epistles of Ikhwan al-Safa), called also *al-Risalat al-Jami'ah*.<sup>6</sup> The scientific information as well as chapters of the "Epistles" are eliminated, while the symbolic and esoteric interpretation of the verses of the Qur'an are brought out vigorously.

The Ikhwan al-Safa made arrangements for holding meetings everywhere they had followers. In these meetings, which were held once every twelve days and were restricted to the members and followers of the group, subjects of metaphysical and esoteric nature were discussed.<sup>7</sup> There were also occasional meetings for the initiation of young people.<sup>8</sup>

Apparently, some of the followers were given, during these meetings, to singing, drinking, and other indulgences for which the Ikhwan al-Safa rebuked them indirectly.<sup>9</sup>

The Ikhwan al-Safa were a secret group. They were recruited through personal and confidential contacts. The emissaries were advised to work among the youth, as old people are usually rigid and unfit for any movement.<sup>10</sup>

The group had four grades in which its members were placed generally according to their age. The first and most inferior grade was that of those who had attained their fifteenth year; the second of those between thirty and forty years of age; the third of those between forty and fifty. The fourth, last and highest grade, was that of those who were already fifty years of age.<sup>11</sup>

The Ikhwan al-Safa were Muslims. But they had a special interpretation of religion in general, and of Islam in particular. The Shi'ite colouring, which is very conspicuous in their missionary work, is only dramatic because it helped them to play cleverly upon the emotions of the masses.

In the strict historical sense, the Ikhwan al-Safa did not belong to any sect. In fact, they sought, with the

aid of Islam and Greek philosophy, to work out a spiritual doctrine which would take the place of the historical religions and which would, at the same time, suit everyone and insult nobody.

As far as we can gather from the “Epistles,” the Ikhwan al-Safa had no political programme. It seems, however, that some of their followers had pressed for political action to take the reins of government into their hands. The Ikhwan al-Safa themselves, the magnates among them, were not of this opinion; they reiterated in this connection that their sole aim was to uphold the faith and attain the bliss in the hereafter. In the meantime they tried to acquire knowledge and be versed in theoretical sciences.<sup>12</sup> They declared, further, that they intended to build up a spiritual city, a Utopia, which was not of this world, neither on the continent; nor on the high seas, nor in the air.<sup>13</sup>

The sections, in the “Epistles,” referring to *daulat al-khairi* and *daulat al-sharri* (literally, the State of the people of good and the State of the people of evil) contain only a brief and general discussion on, the terms of governments or dynasties and on their succession.<sup>14</sup> The Ikhwan al-Safa referred once<sup>15</sup> to the coming of *daulat al-khairi*; but they meant simply “the time when the adherents to their group would form the bulk of the nation.”

## System and Theories

### 1. Classification of the Sciences

Sciences may be classified in different ways. The Ikhwan al-Safa mentioned a few classifications and adopted that which divided all branches of knowledge roughly into three major classes:<sup>16</sup> mathematics, physics, and metaphysics, a classification which was current since Aristotle's days. Mathematics included, in the “Epistle,” the theory of numbers, geometry, astronomy, geography, music, theoretical and practical arts, ethics, and logic.<sup>17</sup> Physics included matter, form, motion, time, space, the sky, generation, corruption, minerals, the essence of nature, plants, animals, the human body, the senses, life and death, microcosm, pleasure, pain, and language.<sup>18</sup>

Metaphysics was subdivided, as should be expected, into psycho-rationalism and theology. The first subdivision included psychics, rationalistics, being, macrocosm, mind, great years, love, resurrection, and causality.<sup>19</sup> Theology included the beliefs of the Ikhwan al-Safa, friendship, faith, divine Law, prophethood, call unto God, the incorporeals, polities, the structure of the world, and magic.<sup>20</sup>

### 2. Theory of Knowledge

The Ikhwan al-Safa were very much interested in epistemology or the theory of knowledge. General knowledge, they said; may be acquired in three ways:<sup>21</sup>

(1) The way of the five senses is the natural and the most common way of acquiring knowledge. But through our senses we acquire only the material changes immediately apprehended by us and occurring

in space and time.[22](#)

(2) Man acquires knowledge also by means of primary reason, by pure or mere thinking. But reason, if unaided by sound senses, cannot acquire knowledge. Moreover, concepts having no connection with our senses, like those of God and the First Matter, cannot be acquired thus.[23](#) Akin to the two previous ways is the way of proof,[24](#) the way of the trained dialecticians.

(3) The way of acquiring knowledge which agrees best with the esoteric doctrine of the Ikhwan al-Safa is the way of initiation and authority, i.e., receiving knowledge personally from an authorized elder, a teacher in the broadest and deepest sense. This teacher receives his knowledge from the Imam (religious leader) who, in turn, receives it, through other Imams, from the Prophet whose ultimate source of knowledge is God.[25](#)

Philosophy, wisdom or philosophical wisdom, according to the Ikhwan al-Safa, is to behave Godlike as best as a human being can.[26](#) A more detailed definition would be “love for science added to knowledge of the essence of all beings, gained” as best as one can, together with profession and public behaviour in harmony with that.”[27](#)

In the “Epistles” of the Ikhwan al-Safa metaphysics proper is quite meagre.

### **3. Metaphysics**

If metaphysics did not include theology, it would have interested them very little.

#### **Form and Matter**

The views of the Ikhwan al-Safa regarding form and matter are Aristotelian: every body consists of matter and form which are inseparable, since pure forms are only concepts like the soul and the intellect.[28](#) Matter and form are both simple essences. The form is more important, since bodies are different because of their forms, their matter being in many cases the same; but matter is theoretically older.[29](#) In keeping with their disposition towards compilation, they show some leaning to Plato when they say[30](#) that the images, figures, frames, and characteristics which we see in the world of (sublunary) bodies and in the essences of the heavenly bodies are examples, likenesses, and colourings of those forms which are in the world of spirits.

#### **Space and Time**

As regards space and time, their view was that both are not realities; space is more objective, since it is related to bodies which have dimensions: it is the vessel which holds the contained.[31](#)

Time has no independent existence. It cannot be conceived of except in connection with moving bodies. Note, if space is the outer surface of the world and time is the reckoning of the rotations of the spheres, space and time would be unthinkable prior to the spheres themselves.[32](#) These views led some to think

that they believed in the eternity of the world. They were aware of this accusation and tried to defend themselves against it.<sup>33</sup>

### Motion

There are six general kinds of motion grouped in three pairs: generation and corruption, increase and decrease, change and displacement. The particular kinds are numerous. The continuous and perfect motion is spherical; the straight motion is also continuous but not perfect. The arrow when passing through the air forms, from the bowstring to its falling place, one continuous course.<sup>34</sup> Here they disagree, in the example of the arrow, with Zeno of Elea (d. 430 B.C.) who argued that if a line was made up of points, there must be always space among these points. And so, an arrow in any given moment of its flight must be at rest in some particular point.<sup>35</sup>

### Causality

In the field of causality the Ikhwan al-Safa depended on Aristotle. *`Ilal* (pl. of *`illah*, fem.) or major causes are four:<sup>36</sup> the *hayulaniyyah* (material, the matter or substance of which a thing is made), *suriyyah* (formal, the form which is given to a certain substance to produce that thing), *fa'iliyyah* (active, the agent which gives that substance its form) and *tamamiyyah* (fulfilling, the end which that produced thing serves).

The answer to a question concerning any of the causes, and especially the fourth cause, is always difficult because it is a question about the essence of things. These four causes should act together, otherwise the intended thing would not come into existence, and they should hold on, so that the produced thing might persist. It is needless to say that God is the ultimate cause of all beings.<sup>37</sup>

### Number

Numbers are the vehicle of the doctrine of the Ikhwan al-Safa. The Pythagorean theory of numbers (their properties: proportion, progression, etc.) and their linking mystically to the life and after-life of man captured their imagination.

The Ikhwan al-Safa divided the numbers into two classes: a factor which is the “one” and a “series from two ad infinitum.” The one is an absolute unity, indivisible, undiminishable, and unincreasable. All the numbers originate from the one: the two by the repetition of the “one” twice; the other numbers by adding the “one”; whence its character as a factor to every subsequent number.<sup>38</sup> This dexterous acrobaticism was necessary to arrive at the following, half-theological and half-metaphysical statement: Just as “the one is of a different nature from the numbers which originate from it, so the One (God) is unlike all the beings emanating from Him.”<sup>39</sup>

### Being and Emanation

This leads us to Being and Emanation, the coming of the universe into existence, or its creation.

The universe is not eternal but created by God through emanation. Emanation was a compromise between the strict religious notion of creation and the Aristotelian view of the eternity of the world. Theoretically, creation was accomplished in two steps: first, God willed, in one thought, that the universe should come into existence *ex nihilo*; then, immediately emanation began and proceeded gradually, until the universe took its present shape.

The order and character of emanation were as follows:[40](#)

(i) *Al-Bari* (The Maker, Creator, or God). *Al-Bari* is the First and only Eternal Being, the One, Unique, and One in every respect. He has no partner and no peer. No anthropomorphic attribute or action should be ascribed to Him. Only the will to create pertains to Him.[41](#)

(ii) *Al-'Aql* (Intellect or Gr. Nous). *Al-'aql* was the first being to emanate from *al-Bari*. God created it directly, necessarily, without break, and with no need for movement or effort. From God's eternity it acquires its own eternity; and through His perpetuance it receives its continuity and perfection. It is one in number as God Himself is One. But since God does not condescend to deal with material bodies, He created in the intellect all the forms of subsequent beings and instituted in it the office of re-emanation: from it emanated the world-soul and the first matter. It is clear, then, that the office attributed usually to God belongs, in the opinion of the Ikhwan al-Safa, to the intellect, a counterpart, duplicate, or image of God.[42](#)

(iii) *Al-Nafs al-Kulliyah* (The Absolute Soul, the World-Soul) – The world-soul is the soul of the whole universe, a simple essence which emanated from the intellect. It receives its energy from the intellect. It manifests itself in the sun through which it animates the whole sublunary (material) world. What we call creation, in our world, pertains actually to the world-soul.[43](#)

(iv) *Al-Hayula* (Arabicized from Gr. *hyle*: substance, matter, stuff), First Matter – First matter is a simple and spiritual essence already substance without bulk, and yet without conceivable dimensions. Because the first matter was passive, having no proper energy; it could not emanate by itself. It was caused by the intellect to proceed from the world-soul which had to exert effort and show great care to facilitate for it to gush forth and become subsequently susceptible to accepting different forms.”[44](#)

(v) *Al-Tabi'ah* (Nature) – Nature is one of the powers of the world-soul, the energy diffused throughout the sublunary world and effecting all bodies therein, organic and inorganic. It is the cause of motion, life, and change. It works wisely and uniformly. In this sense, it is the philosophical term for the religious concepts of divine will and Providence.”[45](#)

Here, with nature, ceases the influence of the intellect, since all subsequent emanations will tend to be more and more material, defective, and, consequently, unworthy of its care.[46](#)

(vi) *Al-Jism al-Mutlaq* (The Absolute Body) – When the world-soul began, with the help of the intellect, to move the first matter in three directions, the first matter acquired the three dimensions (length, width,

and depth) and became the absolute body or second matter. The second matter is no more a concept, an essence, or a quality denoting pure existence, as was the first matter, but a quantum, spherical in shape. This absolute body, or second matter, is the substance of which our world, as such, is made<sup>47</sup>

(vii) *The Spheres or the World of the Spheres* – In the seventh stage of emanation appeared the spheres which are not imaginary but spiritual, spherical, hollow, transparent, and concentric bodies. These spheres, which are eleven in number, vary in the thickness of their shells, in proportion to the magnitude of the planets with which they are inset. These spheres are: the spheres of the fixed stars, Saturn, Jupiter, Mars, the Sun, Venus, Mercury, and the Moon. All the heavenly bodies are made up of a fifth element, ether,<sup>48</sup> and are not liable to generation and corruption.<sup>49</sup>

(viii) *The Four Elements* – With the emanation of the four elements: fire, air, water, and earth, we come to the beings immediately under the sphere of the moon (within its orbit), to the sublunary world where the process of generation and corruption begins to take place.

Fire, air, water, and earth – supposed to be elements by the Ikhwan al-Safa like many Greek thinkers – exist, free in nature, in minor spheres about the centre of the earth. Further, they espoused the view of the Ionians, and Thales (d. c. 545 B.C.) in particular, as against the Eleatics, that the four “elements” change into one another, water becomes air and fire; fire becomes air, water, earth, etc.<sup>50</sup>

(ix) *The Three Kingdoms* – In the closing stage of emanation appeared the three kingdoms: mineral, plant, and animal, which originated from the absolute interchange and proportional intermixture of the four elements.<sup>51</sup>

### Macrocosm and Microcosm

The early Greek thinkers conceived of the universe as one living being in which the phenomena and powers are correlated and governed hierarchically by a single general law. Democritus of Abdera (d. c. 370 B.C.) developed from that concept the Theory of Macrocosm and Microcosm which treated of man as a reduced model of the universe, and of the universe as the enlarged copy of man.<sup>52</sup> His theory was accepted by the Ikhwan al-Safa.

### The Individual Soul (al-Nafs al-Juz'iyah) and Its Fall

As soon as the world-soul was called upon to care for individual beings, beginning with the spheres, its innumerable powers became distinct and independent but not detached, since detachability is a property of matter. In this sense individual souls, representing the infinite powers of the world-soul, began to form. During a very long time these souls filled the world of the spheres and constituted the angels who animated the heavenly bodies.

At first, they were aware of the grace which is bestowed by the intellect upon the world-soul, of which they are the powers. They contemplated the intellect and performed the worship due to God. By and by,

some of these individual souls began to forget much about their origin and office.

This sin caused them to get farther and farther (though not in the sense of space and time) from God. The punishment was the fall of the sinful souls to our earth, to be tied to individual bodies in order to atone, by undergoing hardships, pain, and sorrow, for the sin they had committed in their heavenly abode. This was the metaphysical origin of life on earth.[53](#)

The fall was described and explained symbolically by the Ikhwan al-Safa. When God created the universe, He peopled it with spiritual incorporeal beings whose office was to praise and glorify God. These were cognitive beings; they could witness fully the corporeal and the absolute and could conceive of every form and thought anywhere in the universe. The period during which this condition prevailed, since the creation, was called *daur al-kashfi* or the period of exposition, as every being was exposed to every other being in every respect.[54](#)

Towards the end of this period, God willed that *daur al-sitri*, the period of concealment, should succeed and that the Absolute be hidden in a corporeal body which the faculties of the spiritual beings cannot penetrate. So, He created Adam in His own image and breathed in him the world-soul and settled him in His paradise. Then God enjoined that all the spiritual beings, save a few archangels, should prostrate before him, worship him, and be at his command in the management of the world.[55](#)

At the same time God warned Adam against eating from a certain tree. On the other hand, Satan (*Iblis*), one of the lesser leaders of the jinn who had aspired to be in place of Adam, was vexed by the honour bestowed on Adam. He refused to prostrate before Adam and be subordinate to him.[56](#) Then he accosted God with the pretension: ***"I am better than he. Thou didst create me from fire and him from clay."***[57](#) Afterwards he turned to Adam to avenge himself on him.

Knowing Adam's reality and frailty, *Iblis* could convince him that eating from the forbidden tree would disclose to him the names and grades of the archangels who were exempted from prostrating before him, would give him knowledge of the hereafter, and would render him immortal.[58](#)

When Adam realized what he had become, he was filled with boastfulness. At times he overshot himself and disclosed a part of the secret with him to some of those who were around him but were unworthy of this secret before the time assigned for such disclosure. This was Adam's crime – curiosity and lust for power.[59](#)

Now, it was no more possible for Adam to stay with the angels who disavowed him because he showed a knowledge inconsistent with his physical appearance and which was even new and startling to them who, as spiritual beings, were supposed to know more than he. Even the animals and the other inhabitants of paradise were scared by his behaviour and abhorred him. Therefore, he was caused to fall to earth to lead on it the life of flesh, deprived of all the supernatural faculties accorded to him in the heavenly abode. With him also fell his wife and *Iblis*, so that the struggle may continue and be decided openly, and in a fair manner.[60](#)



The fall of Adam represents, in the metaphysical system of the Ikhwan al-Safa, the union of the individual souls with sublunary bodies. When an individual soul is caused to fall, it may be lucky enough to realize its mistake and repent readily. In this case its downward journey is interrupted and it is caused to turn back and regain its former place.[61](#)

The unlucky souls continue their fall towards the centre of the earth to be tied to an inorganic body, plant, beast, or man. We are concerned with the soul assigned to a man which is the least unlucky of all the falling souls.

When a soul falls, it enters the ovum which happens to be impregnated at the time of its fall. This soul in the ovum comes soon under the regimen of the planets. All planets, beginning with the farthest one, Saturn, influence the incubation of the soul turn by turn for a whole lunar month. After the completion of the third month the foetus comes under the influence of the sun, the king, of the planets, and life is breathed into it. The period of pregnancy is accepted by the Ikhwan al-Safa to be (at least) seven complete lunar months, the number of the spheres of the then known planets.[62](#)

The soul is prepared in this world through the medium of the body for the hereafter. Life in this world is only a means to an end: here the soul is enabled to attain perfection in order to be allowed to regain its former celestial life. The body is only the workshop of the soul, a temporary house, a shell, a mount necessary for a journey. Once the body is forsaken by the soul it becomes again a heap of solid matter akin to the constituent elements of the earth. But the body is as necessary for the soul as is the womb for the development of the foetus.[63](#)

Death is welcome to the purified soul, since death means to it nothing more than that it has stopped using the body. With the death of the body the real life of the soul begins. Moreover, the soul cannot benefit by the knowledge acquired during its terrestrial life except after the death of the body.[64](#)

### **Lesser and Greater Resurrections, Paradise and Hell**

With the death of the body occurs the first or lesser resurrection of the soul. All human souls are immortal: those which have attained perfection during their earthly life would be able to enjoy again the absolute being and happiness; those which have remained imperfect would be barred from entering heaven and remain suspended between heaven and earth with the devils dragging them on every side until they are forced back to the hollows of gloomy-bodies and the bounds of physical nature.[65](#)

In leaving the body, the soul leaves simultaneously the lesser hell which is the transient life on earth subject to generation and corruption, change and putrefaction. Greater hell is the eternal condemnation of the wretched soul to roam in the underworld, burdened with the accumulated ignorance and fettered with depression and pain. Paradise, on the other hand, is the vast space of heaven, where the righteous souls float in an infinite spread of light in perpetuance and immortality, in a state of happiness and grace.[66](#)

When all the individual souls have left their bodies and are reunited with the world-soul, the world-soul would lose the reason for its independent existence: so it would return to God. The universe would cease, and there would remain one being: God. This is the greater resurrection: the closing of a manifestation of God.[67](#)

#### 4. Nature and the Sciences

The Ikhwan al-Safa happened to compile in their “Epistles” the scientific materials available to them and, at the same time, support their esoteric doctrine. They tried to arrange these materials, the scientific legacy of Greece since the earliest Ionian thinker, Thales of Miletus, in independent chapters.

The picture which resulted was that of accumulation rather than of exposition, and never that of exhaustiveness and systematization. We do not know, however, what additions they made; but we are sure that they did give us a general account of the scientific life of the Muslims in the Middle Ages, with its bright and dark sides. Further, the “Epistles” supply us with a picture, though imperfect, of the ancient world of science.

(1) In arithmetic, the Ikhwan al-Safa depended in the main, as they say,[68](#) on Pythagoras and Nicomachus. “Pythagoras” must mean the Pythagorean school; Nicomachus was a late neo-Pythagorean of Gerasa (present Jarash in Jordan) who flourished about the middle of the second Christian century.[69](#)

He elaborated the Pythagorean mathematics and wrote a book entitled *Arithmatike eisagoge* or “Introduction to Arithmetic,” in which he maintained that “numbers had a pre-existence in the spirit of the Creator before the formation of the universe. He wrote another book which the Ikhwan al-Safa must have known and used: *Arithmatika theologoumena* or “Theology of Numbers,”[70](#) They also knew a book by Euclid on arithmetic called *al-Usul*.[71](#)

(2) Geometry has for its aim the training of the soul, by which it realizes promotion in knowledge from perception to conception, from the physical to the spiritual and from the concrete to the abstract. Geometry (Ar. *handasah*) is of two kinds: *hissiyyah*, tangible, sensible, or common plane and solid geometry which helps man to acquire skill in crafts; and *`aqliyyah*, intellectual or rational, namely: analytic and descriptive, which enables man to be versed in theoretical sciences.[72](#) The Ikhwan al-Safa knew Euclid and other writers on geometry[73](#) from whom they drew their information on the subject.

To geometry belong the mysterious or magical figures, the smallest of which is composed of nine squares in three rows. In these squares are inserted the numbers 1 to 9 in a manner that any row, horizontal, perpendicular, or diagonal, must give the uniform sum of 15.[74](#)

(3) The aim of the “Epistle” on music is to stimulate the souls, already instructed in mathematics, physics, psychics, and theology, to join the immortals in the vast space of heaven. Music itself is a spiritual art founded by wise men. It has a strong and varied effect on all souls. It is either soothing or

exciting, gratifying or grieving. On this account, music is played to calm the sick and insane, to tranquillize a weeping child or to lull him to sleep. Even animals are subject to the effect of music. Music is also played in temples because of the touch of awe it possesses.[75](#)

Pythagoras was said to have heard the sound of the moving spheres and planets. Since the motions of these spheres have regularity and ratios to one another, their sounds must have tunes which are of highest perfection and harmony. These tunes are intended for the inhabitants of the heaven. Pythagoras discovered the scale and essentials of music as a result of hearing the sounds of the heavenly bodies.[76](#)

(4) The universe, say the Ikhwan al-Safa, is made up of all the bodies in existence. It is finite and spherical in shape. Being is one solid body; it stuffs the whole space: it is the universe. Outside the universe there is neither Being nor Non-Being, neither emptiness (vacuum) nor fullness, since the universe has no outside.[77](#)

On this they agree with the Eleatic Parmenides and his disciple Zeno;[78](#) but they disagree with them fully on the question of motion. Parmenides and Zeno presumed that since the universe is completely replete, the movement of individual bodies is impossible. The view of the Ikhwan al-Safa was: since the mass of the universe is not of the same density, the more dense may move through the less dense, as the fish swim in water and the birds fly in air.[79](#)

The earth stands in the centre of the world; then come seven concentric spheres in which revolve the planets: the moon, Mercury, Venus, the sun, Mars, Jupiter, and Saturn. Finally comes the sphere of the fixed stars. The number of the stars which were determined by astronomical observation, including the seven planets, was one thousand and twenty-nine. All the stars are luminous except the moon which receives its light from the sun.[80](#)

The movement of the planets was explained by the rotation of the outer sphere clockwise: from east to west above the earth, and from west to east under the earth, once every day. The outer sphere carries the other spheres along with it. From this it follows that these spheres with their planets too should complete a revolution around the earth in one day.[81](#)

But the ancients noted that the planets have complicated movements: sometimes they appear to overtake the sun and continue their courses ahead of it; and sometimes the sun appears to overtake them. With the planets nearer the earth – the moon, Mercury, and Venus – this phenomenon was more conspicuous and gave rise to the theory of epicycles. This means that the orbits within the outer sphere are not homocentric with it, concentric or having one common centre, but eccentric, i. e., having independent centres.

Aristotle was in favour of homocentricity; Claudius Ptolemy (d. 168 A.D), the Alexandrian astronomer, upheld the theory of epicycles. Unfortunately, the Ikhwan al-Safa sided with Ptolemy and rejected, at the same time, the view that the heavenly bodies revolve from west to east,[82](#) a view which seems to have had some upholders among the Pythagoreans.[83](#)

Regarding the magnitudes of the stars, they showed some boldness. The earth, they said, is but a point in a large circle. The smallest planet has a size eighteen times that of the earth; the largest is one hundred and seven times.[84](#)

They maintained, further, that the celestial bodies are neither heavy nor light. If any body, they argue, is in its specially assigned place in the spheres, it does not exert weight. It acquires weight, on the contrary, when it comes into the neighbourhood of other strange bodies, not of the same material (water in water or air in air, for example, has no weight). Weight, they say, is nothing but the mutual attraction and mutual repulsion in the face of resistance.[85](#)

We are reminded in this case of the artificial satellites and of the fact that they lose all weight as soon as they leave the zone of the gravity of the earth. In the same spirit, they declared also that the sun and the stars are neither hot nor cold.[86](#)

The Ikhwan al-Safa accepted the solar year to be of 365 1/4 days. On this basis they computed the revolutions of the planets around the earth: Saturn completes a revolution of its orbits in 29 years, 5 months and 6 days; Jupiter in 11 years, 10 months and 26 days; Mars in about 23 months; Venus in 584 days, and Mercury in 124 days only.[87](#)

The Ikhwan al-Safa supplied us with data which enable us to construct formulae for the extension of the universe and for its volume which may be computed roughly at: 1,300,000,000 and 150,000,000,000,000,000,000,000 km., respectively or  $13 \times 10^8$  and  $15 \times 10^{25}$ . This is nothing to be compared with the real measurements, but it serves to give us an idea of the boldness of the Ikhwan al-Safa in their age.

(5) The earth, say the Ikhwan al-Safa is a sphere. Their proof is that any line on the surface of the earth or on the face of a river is an arch, and any portion of the sea is a part of the shell of a spherical body.[88](#) George Sarton, the historian of science, holds that the idea of the sphericity of the earth is as old as Pythagoras; but he wonders how Pythagoras could arrive at a proof. He declares that Pythagoras must have postulated the sphericity of the earth out of wild boldness.[89](#)

They believe also that the earth stands in the centre of the universe, suspended in the midst of the air, because it is in its special place within a space free from the attraction and repulsion of every other heavenly body.[90](#) Although the Ikhwan al-Safa were essentially Pythagorean, they rejected the Pythagorean view that the earth has two motions: a revolution around a central fire and a rotation on its axis.[91](#) They believed, however, that it had a sway (forwards and backwards) on its axis, and that when it was created it was in motion; but afterwards it came to a standstill.[92](#) It seems that they followed, in this view, Democritus who held that the earth had in the beginning a motion, but afterwards it came gradually to a standstill.[93](#)

The earth is not solid or massive, but it is full of cavities. The solid parts of its interior are also of different densities.[94](#)

Further, it has no bottom, in the common meaning of the word; its bottom is its centre. So, wherever a man stands on the earth, his head is always towards the sky (above the earth) and his feet are always towards the bottom or centre of the earth.<sup>95</sup> In spite of all this genial explanation, they believed that we live on one side of the earth only.<sup>96</sup>

(6) In the two chapters on geography and meteorology, based principally on *Meteorologica*<sup>97</sup> and other Greek works, the Ikhwan al-Safa speak of the equator, of the polar zones where the winter is a night of six continuous months and the summer is a day of six continuous months, of the four seasons of longitude and time, of the mountains and their nature as reservoirs of water, and cognate topics.<sup>98</sup> Their explanation of the eclipses is noteworthy,<sup>99</sup> but their interpretation of the ebb and flow of tides is false: they believed that the rays of the moon heat the waters of the sea and cause their rise.<sup>100</sup>

(7) In physics and chemistry the Ikhwan al-Safa held, with Aristotle, the Theory of the Four Elements and rejected the atomic theory.<sup>101</sup> They maintained also with the Ionian physicists that the so-called four elements: fire, air, water, and earth, change into one another.

Furthermore, when those four elements undergo intense heat and strong pressure inside the earth, they change into mercury and sulphur. If aerial moisture mixes with earth, it becomes mercury, a masculine element; if oily moisture mixes with earth, it changes into sulphur, a feminine element. From the further intermixture of sulphur and mercury, in different proportions, are formed all the mineral bodies: clay, glass, iron, copper, ruby, silver, gold, etc.

(8) The natural world is made up of three kingdoms: the mineral, plant, and animal kingdoms. Evolution rests on the view that every kingdom constitute the primary matter and nourishing material for the next higher kingdom. Accordingly, the mineral kingdom must have come into existence long before that of plants. The plants came into existence before the animals; sea animals before the animals on land; the less developed before the more developed; and all animals were in existence ages before man.<sup>102</sup> At the top of the animal kingdom appeared the *qird* (monkey, or ape) which bears so much resemblance to man in shape and behaviour.<sup>103</sup>

There is also a spiritual evolution by which the human soul evolves from the soul of a child to that of an angel. At the age of fifty, the wise and cultivated man may attain the degree which enables him to receive inspiration, to become a messenger between the Intellect and his fellow-men, to found doctrines, and to make laws. At this stage, he is a proxy of God on earth; he attains divinity and so worship is due to him.<sup>104</sup>

## **5. Psychology**

(1) *The Soul* –The soul has three major faculties or powers, every one of which is called equally a soul.

(i) The vegetative or nutritive soul common to all living beings: plants, beast, and man alike. It is subdivided into three powers: that of nutritive proper, that of growth, and that of reproduction.<sup>105</sup>

(ii) The animal, beastly, or sensitive soul belongs to beasts and men only. It is subdivided into two powers: locomotion and sensation. Sensation falls in turn in two categories: perception (sight, touch, etc.) and emotion. Emotion is either primitive (laughter, anger, etc.) or evolved (good food, social and political prestige, etc.). [106](#)

(iii) The human (rational, thinking, or talkative) soul is restricted to man.

These three faculties, together with their powers, work together and are united in man and likened to a tree with three boughs, every bough of which has several branches, and every branch many-leaves and fruit. Comparison may also be made with a person who is a blacksmith, carpenter, and builder or who can read, write, and teach: [107](#) he is one man with three faculties.

(2) *The Brain, and the Heart* – The prevailing belief in ancient times was that the heart constituted the most important organ of the body: the centre of sensation, the seat of intelligence, and the house of life. Aristotle was also of this opinion. The Ikhwan al-Safa decided in favour of the brain and held that it is the brain where the processes of perception, emotion, and conception develop. [108](#)

(3) *The Process of Thinking* – It begins in the five senses and continues in the brain. Fine nerves extend from the sense-organs to different parts of the mass of the brain, where they form a net similar to a spider's web. Whenever the senses come in touch with sensible bodies, their temperament undergoes a change which is communicated soon, together with the abstract forms of those sensible bodies, to the imaginative zone in the front part of the brain. Next, the imaginative faculty passes the traces which the abstract forms have left on it to the reflective faculty, in the middle part of the brain, to ponder upon them and verify their indications; then, the indications are transmitted in turn to the retentive faculty (or memory) in the back part of the brain to be stored there until a recollection of them is needed. At the right time the relevant data are referred to the expressive or talkative faculty by which they are abstracted, generalized, and given the form expressible by the tongue to be received intelligibly by the ear. [109](#)

## **6. Politics**

(1) The Ikhwan al-Safa had no interest in the theory of State or in the forms of government. Nor could they be influenced, in this respect, by Greek writers. The two worlds were totally different: Plato and Aristotle lived in City-States; the Ikhwan al-Safa lived in the great cities of an empire. At any rate, the Ikhwan al-Safa believed that the State rests on two foundations: religion and kingship. A king is indispensable, though he may be a tyrant, if the State is to lead a secure and prosperous life. A group of wise men, however may do without a king. [110](#)

(2) The indifference of the Ikhwan al-Safa about the State was counterbalanced by their keen interest in *al-siyasat al-madaniyyah*, a blend of civics and domestic economy, which bears more on the personal and communal behaviour of man.

As a rule, the Ikhwan al-Safa preferred that their followers should practise celibacy. But since that was impracticable, marriage was enjoined to serve two purposes: first, that the race may continue – a reason which was given by Aristotle too; and second, because there are people who cannot remain celibate. [111](#)

A man of standing should be a kind of a ruler in his community. He should first exercise self-control in the different situations through which he passes, because he who can control himself may be able to control others. [112](#) Regarding his children and brothers, he should give them a fair, uniform but firm treatment from which he should allow no deviation except in circumstances not under his control.

People are governed easier and better if they have been accustomed to a certain way of government. As for other relatives of his servants, and dependants, he should be bounteous in their maintenance and meek in their treatment. But it is of no use to disclose to them any trouble or want of his. This would impair his authority in their eyes without helping him in the least. If he was ever short of means, and consequently obliged to lay a restriction on his favours to them, he should try, to make them believe that he has done so on purpose and not because he has yielded to a certain pressure. [113](#)

A man should choose his friends carefully and treat them with tact: know them well and betray none of his secrets to them. Further, he should appear always, before them, consistent in his opinion and behaviour, because they are expected to share with him his doctrines and way of life (the ultimate aim of the Ikhwan al-Safa in making friends is to propagate their doctrines among these friends). It is very important that the relatives of a leading personality should follow his doctrines and adopt his views, otherwise his friends would lose their enthusiasm for him. He should disclaim publicly any relative who proves to be at variance with him in the matter of doctrine. [114](#)

## **7. Ethics**

Muslims have always been more interested in morals and matters of conduct than in ethical theories, because Islam insists on good or righteous deeds as well as on good intentions. The Ikhwan al-Safa's interest in ethics was confined to its bearing on their doctrine: acquiring theoretical knowledge and doing good in this life so that their souls may enjoy eternity and happiness in the hereafter.

They start from the assertion that characters are either inborn or acquired. Inborn characters begin with the formation of the foetus in the womb, and they develop therein gradually under the influence of the planets. Innate characters, or virtues, are specialized aptitudes assigned to different organs. They enable the soul to act through every organ and produce the sensation, action, or craft particular to that organ without need for deliberation or choice.

At one place the Ikhwan al-Safa assume that inborn characters are uniformly good. [115](#) At another, they maintain that they are bad, and, consequently, all religions were revealed to resist the innate characters of man and to reform them if possible. [116](#)

After birth man begins to acquire virtues. He continues to do so until his death. There is in man an

aptitude to do good, and with the same aptitude he can do evil. Character and behaviour are teachable. [117](#)

Anything which should be done, if done as it should, to the extent to which it should, in the place where it should, at the time when it should, and in view of the end for which it should, is called good. And he who does that thin deliberately and with choice is called a wise man, a philosopher, and a perfect man. Good, for the masses, is that which religion has enjoined, and evil, that which religion has prohibited. [118](#)

Acquired characters are determined and modified by the disposition of the body, climate of the land, and the contact of the children with their parents, tutors, comrades, and with the people in prominence. The different circumstances through which man usually passes are important factors in making people change from one character into another. [119](#)

The Ikhwan al-Safa urge their followers to be idealistic in their behaviour. The good they seek should be final and self-sufficient. One should do good not because one expects from doing it, or for doing it, a benefit, nor because one expects to avoid some loss. [120](#)

## **8. Education**

As soon as a child is born, he comes under the influence of social factors for four complete years, during which he reaches a certain stage of intelligence and comprehension. After the fourth year the child begins to acquire his habits, knowledge, doctrines, crafts, and hobbies by imitation, as a result of his contact with those who happen to be around him. The masses copy the external behaviour of the dominant class. [121](#)

Children are apt to use an analogy characteristic of them. They believe that their parents are perfect and that the conditions prevailing in their own homes are models for all the conditions elsewhere. On the practical side, children are more apt to master the arts, sciences, and crafts of their parents than those of strangers. [122](#)

Knowledge is the abstraction of the knowable in the soul of the knower through the aid of a teacher. The aptitude to learn belongs to the soul alone. The end of teaching is to purify the souls of the taught and give them correct behaviour in order to prepare them for immortality and happiness in the hereafter. A science which does not lead to happiness in the hereafter is useless. [123](#)

Every soul is potentially learned; the parents and tutors polish its aptitude and help it to become learned in action. A teacher is absolutely necessary, especially to common people. [124](#)

The brain is able to store simultaneously all kinds of information, however diverse and contradictory they may be, since it stores their abstractions only. And in spite of the fact that the data stored in the brain fade gradually, and that some of them are sometimes totally forgotten, they do not annul one another. [125](#)



Essentially, knowledge is never spontaneous; it must be taught and learnt. A teacher is simply a guide for the soul to knowledge. Knowledge is handed down traditionally through religious leaders, the Imams, whose ultimate source of knowledge is the Prophet, who acquires his knowledge from God by inspiration. [126](#)

The Ikhwan al-Safa touch at a thorny problem in education. They believe that neither the pupil may benefit from the tutor, nor the tutor may benefit from the pupil, unless there is a kind of intimacy between them. We know for certain that some kind of a reserved friendship is very useful in this respect. But the Ikhwan al-Safa overshoot themselves and speak frankly of “the desire of grown-up men for boys” as an incentive for effecting real education. Furthermore, they mention explicitly that such manners belong only to nations which esteem science, art, literature, and mathematics, like the Persians, the peoples of Mesopotamia and Syria as well as the Greeks. Nomads, who as a rule have no interest in science, art, etc., lack this desire. [127](#)

The idea of Platonic love contaminated the Ikhwan al-Safa as a result of their readings in Greek history in general and in the philosophy of Plato in particular. Plato advocated it especially in his Symposium. Sarton blames Plato and says of him: “Platonic love for him was the sublimation of paederasty; true love is called in the Symposium [128](#) the right method of boy-loving”. [129](#) The Ikhwan al-Safa condemn this desire, however, in all fields other than education. [130](#) Plato too seems to have condemned it in a later work of his, *Nomoi* (The Laws), at least twice. [131](#)

## [9. Religion](#)

On the practical side of belief, the Ikhwan al-Safa speak of religion and laws. The word for religion in Arabic is *din*, i. e., custom or obedience to one acknowledged head. [132](#) Religion is a necessity as a social sanction for the government of the masses, for the purification of the soul, and also because all people are predisposed to religiousness and piety. In this sense, religion is one for all people and for all nations. [133](#)

By Law (Ar. *Shari'ah* or *namus*, from the Greek word: *nomos*, law) the Ikhwan al-Safa meant what we mean today by religion. Laws (religious) are different to suit different communities, groups, and even individuals. These laws are dictated by the wise men of every people for the benefit of their respective nations. [134](#)

On this basis the Ikhwan al-Safa declare that all metaphysical themes in the sacred books such as creation, Adam, Satan, the tree of knowledge, resurrection, the Day of Judgment, hell, and paradise should be taken as symbols and understood allegorically. Only the masses, who cannot think adequately for themselves, understand these themes in their literal and physical sense. Themes of a lesser magnitude, as “**He sendeth down water from the sky,**” [135](#) should also be treated symbolically: water in this context being the Qur'an! [136](#)

The Ikhwan al-Safa were not satisfied with any of the existing religions; they, nevertheless, urged everybody to select one of them. To have a defective religion is better than to be a disbeliever, since there is an element of truth in every religion. Everybody should be left free to embrace the religion he chooses; he may also change his religion, perhaps often too, though he is expected to look for the best religion in his time. He should refrain, however, from contradictory opinions and false doctrines: a wise man does not embrace two contradictory religions at the same time. [137](#)

There should be no compulsion in religion; [138](#) compulsion should be affected only through the laws. This is so because religion is a self-conviction felt in the heart. The laws of religions, on the contrary, are social orders, to abide by which is necessary for the maintenance of security and welfare of the community. [139](#)

The Ikhwan al-Safa formulated a definite attitude towards all existing religions, sects, and schools of theology. [140](#) We shall content ourselves with their attitude towards Islam.

Islam is considered by them to be the religion par excellence: the best and most perfect of all religions. The Qur'an overruled all earlier revealed books. It, being the last, confirmed in them that which resembled its contents and abrogated that which was contrary to its precepts. Muhammad, peace be upon him, is the head of all the prophets and the last of them. He is the governor of all governors; in him has God united the elements of kingship and prophethood, so that his followers may enjoy the worldly as well as the spiritual glories. [141](#)

## Final Note

The numbering of the verses of the Qur'an followed in this chapter is according to *Tafsir al-Jalalain*, Cairo, 1346/1927. There is sometimes in the long Surahs a slight difference in the numbering of verses (resulting from the division of a few long verses). In Rodwell (q.v.) this difference, when it occurs, varies from three to six; in Muhammad 'Ali and Pickthall (q.v.) the difference is only that of one.

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18. [Ibid.](#), ii, pp. 3–388; iii, pp. 3–181.
19. [Ibid.](#), iii, pp. 182–371.
20. [Ibid.](#); iii, pp. 373–432; iv, 3–478.
21. [Ibid.](#), iii, p. 228; cf. ii, p. 351.
22. [Ibid.](#) i, pp. 106, 211; ii, pp. 334, 335–51; iii, pp. 38, 228, 384; cf. pp. 241, 292ff.
23. [Ibid.](#), iii, pp. 41f.
24. [Ibid.](#), i, p. 211; cf. .p. 106.; ii, p. 334; cf. p. 228.
25. [Ibid.](#), iii, pp. 42, 322.
26. [Ibid.](#), iii, pp. 48, 58, 152; Jami'ah, i, pp. 107, 123, 189, 288.
27. [Rasa'il](#), i, p. 23; cf. Jami'ah, i, pp. 99, 107; cf. further pp. 10, 99–107; ii, pp 275f., 277f.. 280.
28. [Rasa'il](#), i, p. 326; ii, pp. 4, 325; iii, p. 186; cf. Jami'ah, i, p. 298; ii, p. 74.
29. [Rasa'il](#), p. 322; ii, pp. 4, 5f.; iii, pp. 186, 360.
30. [Ibid.](#), ii, p. 232.
31. [Ibid.](#), ii, pp. 9, 10, 336; iii, p. 361.
32. [Ibid.](#), ii, pp. 10, 13; iii, pp. 334f., 361.
33. [Ibid.](#), iii, p. 336.
34. [Ibid.](#), ii, pp. 10, 11, 13, 238–47; iii, p. 306; Jami'ah, ii, p. 237.
35. [Ueberweg](#), Vol. I, p. 87; [Sarton](#), [History](#) p. 276.
36. [Rasa'il](#) i, p. 201; ii, pp. 78, 132f.; iii, p. 233; Jami'ah, ii, p. 79; cf. [Aristotle](#), pp. 122ff., 132f., 249ff
37. [Rasa'il](#), i, pp. 201, 354; iii, pp. 185, 233, 325, 327; iv, pp. 8f., 178; Jami'ah, ii, pp. 79, 278.
38. [Sarton](#), [History](#), p. 217.
39. [Rasa'il](#), i, pp. 24f., 28f., 31f.; cf. Jami'ah i, p. 43.
40. [Rasa'il](#), i, pp. 28f.; iii, pp. 184f., 200ff.; Jami'ah, i, pp. 27f.; ii, pp. 284ff.
41. [Rasa'il](#), i, p. 189; ii, pp. 107, 108ff.; Jami'ah, i, p. 593; ii, p. 83.
42. [Rasa'il](#), ii, pp. 4, 9, 83, 244, 293, 392; iii, pp. 187, 189, 197, 228f., 328, 332, 260f.; Jami'ah, ii, pp. 33, 36.
43. [Rasa'il](#), p. 28; ii, pp. 55f., 112ff.; iii, pp. 19, 191, 192, 193, 203, 214f., 235, 361; Jami'ah, i, p. 529.
44. [Rasa'il](#), iii, pp. 5, 187ff., 230; iv, pp. 4ff.; Jami'ah, ii, pp. 4ff., 37.
45. [Rasa'il](#), i, p. 331; ii, pp. 55f., 112f.: iii, pp. 124ff.; Jami'ah, i, pp. 331ff.; ii, p. 36.
46. [Rasa'il](#), ii, p. 36; iii, p. 198.
47. [Ibid.](#), ii, pp. 4, 5; iii, pp. 8, 189, 198, 203, 204; iv, p. 4; Jami'ah., i, p. 276; n, pp. 6, 37
48. Cf. [infra](#) viii.
49. [Rasa'il](#), ii, pp. 2, 3, 22, 25ff., 29ff., 39–42, 123; iii, pp. 190, 219, 221, 361; Jami'ah, i, p. 306.
50. [Rasa'il](#), ii, pp. 5, 22, 45–50, 7, 7, 78, 200, 337, 403; iii, pp. 79, 183, 190; Jami'ah, i, pp. 306, 311; ii; 37, 362; iv, pp. 268ff., 313.
51. [Rasa'il](#), i, pp. 311, 315, 331, 350f.; ii, pp. 45 50ff.; Jami'ah, ii, p. 37.
52. [Rasa'il](#), i, p. 17; ii, pp. 20f., 25f., 243ff., 318, 320f.; iii, pp. 3ff. 9f., 12f., 211–14; iv, p. 277; Jami'ah, i, pp. 240, 563–68, 581–95, 635; ii, pp. 24–38, 123; cf. [Ueberweg](#), Vol. 1, pp. 51, 110; [Sarton](#), [History](#), pp. 177, 216, 421.
53. [Rasa'il](#), i pp. 96, 98; ii, pp. 111 288; iii, pp. 25, 26, 28, 59, 102, 279, 332, 362; iv, pp. 29, 230, 231, 238; Jami'ah, i, pp. 383, 514, 515; ii, 28, 247, 298.
54. [Rasa'il](#), i, pp. 155f. The definitions of the periods of “Exposition and Concealment” as used in the “Epistles” are different from those accepted by the Druzes and the Isma'illis.
55. [Rasa'il](#), ii, p. 227; Jami'ah, i, pp. IIIf., 114, 145ff., 156f.; ii, p. 143.
56. [Rasa'il](#), i, pp. IIIff., 145ff., 157f.
57. [Qur'an](#), vii, 11; xxxviii; 76 cf. Jami'ah, i, p. 126.
58. Jami'ah, i. pp. 113ff., 124–28. 146; ii, p. 144.
59. [Ibid.](#), i; pp. 111, 112, 115f., 155, 158, 163; ii, p. 144.
60. [Rasa'il](#), i, p. 62; ii, p. 17; iii, p. 216; iv, p. 138; Jami'ah, i, pp. 116f., 129, 164, 295, 437, 439ff.; ii, pp. 145, 247, 298.
61. [Rasa'il](#), iv, p. 232; Jami'ah, i, p. 382; ii, p. 298.

- [62.](#) Rasa'il, i, pp. 169, 241; ii, pp. 250ff., 357ff.; iv, p. 413; Jami'ah, i, pp. 513f., 554, 559.
- [63.](#) Rasa'il, i, p. 62; ii, pp. 17, 145, 247, 298, 323ff.; iii, pp. 25ff., 29, 51, 62, 73, 116; iv, p. 138; Jami'ah, i, pp. 116ff., 129, 164, 295, 437, 439ff., 498.
- [64.](#) Rasa'il, i, pp. 169, 226, 255, 277, 337; ii, pp. 43, 277; iii, pp. 51, 56£, 59f.; iv, p. 82; Jami'ah, i, pp. 509, 663, 667; ii, pp. 28, 87.
- [65.](#) Rasa'il, i, p. 260; iii, pp. 26f., 29, 36, 93f., 105f., 279 289.
- [66.](#) Ibid., ii, p. 52; iii, pp. 64, 189, 279, 282, 284, 240, 243, 344, 346; iv, p. 82.
- [67.](#) Ibid., iii, pp. 315f., 320.
- [68.](#) Ibid., i, p. 35.
- [69.](#) Ueberweg, Vol. I, p. 513. Sarton (History, pp. 205, 214, n. 15) sets his flourishing in the second half of the first Christian century.
- [70.](#) Ueberweg, Vol. I, pp. 514, 519; Sarton, Introduction to the History of Science, Vol. III, p. 1511; History, p. 214, n. 32.
- [71.](#) "Principles" or "Essentials" (Rasa'il, i, pp. 44f.). Certainly, this is not the book of Euclid on geometry which was later called the Elements (Ibid., p. 280; cf. also pp. 171, 442).
- [72.](#) Rasa'il, i, pp. 50ff., 63ff., 68–71; Jami'ah, i, pp. 175f.
- [73.](#) Rasa'il, i, p. 68; cf. pp. 103.
- [74.](#) Ibid., i, pp. 71 f.; cf. p. 69.
- [75.](#) Ibid., i, pp. 132ff.. 134, 136, 154, 158. 175, 179f.; Jami'ah, pp. 185–88, 190ff
- [76.](#) Rasa'il, i, pp. 152f., 158M, 168.
- [77.](#) Rasa'il, ii, pp. 10, 24, 25; iii, pp. 374; Jami'ah, ii, p. 24.
- [78.](#) Cf. Ueberweg, Vol. II, pp. 80 ff., 87, 38.
- [79.](#) Rasa'il, ii, p.24.
- [80.](#) Ibid., i, pp. 73ff., 86, 88; ii, pp. 21, 22, 25, 26f., 28, 37; iii, pp. 189f.; iv, p. 321.
- [81.](#) Ibid., i, pp. 100, 244; ii, pp. 21, 74f.; iii, p. 314.
- [82.](#) Ibid., ii, pp. 32ff.
- [83.](#) Ibid., ii, p. 33, cf. pp. 29–37, 86ff.; cf. Sarton, History, p. 289, lines 30ff.
- [84.](#) Rasa'il, i, p. 117; cf. pp. 27f.
- [85.](#) Ibid, ii, pp. 40ff.
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- [87.](#) Ibid., i, pp. 84, 86–88; ii, p. 31; iii, pp. 255–57.
- [88.](#) Ibid., i, p. 111; ii, pp. 22, 49, 57, 219; iii, pp. 210, 219, 310; iv, p. 312; Jami'ah, i, p. 149.
- [89.](#) Sarton, History, p. 212, cf. p. 287.
- [90.](#) Rasa'il, i, pp.– 111, 113; ii, pp. 22, 40, 49, 79, 118, 307, 310; Jami'ah, i, pp. 149f.
- [91.](#) Ueberweg, Vol. I, p. 68 unten.
- [92.](#) Rasa'il. iii, pp. 309f.
- [93.](#) Ueberweg, Vol. I, p. 108.
- [94.](#) Rasa'il, iii, pp. 309, 310.
- [95.](#) Ibid., i, p. 112.
- [96.](#) Ibid., iv, p. 436.
- [97.](#) Ascribed to Aristotle; cf. Sarton, History, p. 517.
- [98.](#) Rasa'il, i, pp. 110–31, cf. pp. 84ff.; pp. 54–75.
- [99.](#) Ibid., i, pp. 79f., 88f.;–ii, p. 21.
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- [101.](#) Ibid., ii, p. 10; iv, p. 7.
- [102.](#) Ibid., ii, pp. 123, 141ff., 152, 154f., 221f., 223, 318; iii, pp. 64, 138.
- [103.](#) Rasa'il, iv, p. 317.
- [104.](#) Ibid., I, pp. 224ff.; ii, p. 287 ; iii, p. 44; iv, pp. 101, 118, 143, 176, 178; Jami'ah, 344, 701.
- [105.](#) Rasa'il, i, pp. 241f.; ii, pp. 325ff.; Jami'ah, ii, p. 164.

- [106.](#) Rasa'il, i, pp. 241f.; ii, pp. 325ff.; Jami'ah, ii, pp. 164f.; cf. pp. 168–86.
- [107.](#) Rasa'il, ii, pp. 325f., 347.
- [108.](#) Ibid., ii, p. 162; iii, p. 23 bottom.
- [109.](#) Ibid., ii, pp. 324, 328, 341, 347; ii., pp. 17f., 29, 376ff., 386, 388, 392; Jami'ah, i, pp. 507, 602f., 60,5.
- [110.](#) Rasa'il, ii, p. 308; iv, pp. 32f., 189.
- [111.](#) Ibid., iii, p. 424.
- [112.](#) Ibid., iv, p. 68.
- [113.](#) Ibid., iv, pp. 297ff.
- [114.](#) Ibid., iv, pp. 299ff.
- [115.](#) Ibid., iv, p. 372.
- [116.](#) Ibid., i, pp. 259, 260; of. iv, p. 144.
- [117.](#) Ibid., iii, pp. 421 f.
- [118.](#) Ibid., i, p. 247, of iv, p. 18, Jami'ah, i, p. 94–96, 98.
- [119.](#) Rasa'il, i, pp. 229–38, 246; ii, p. 372; iii, pp. 268L, 395; iv, pp. 109, 111, 141, 342; Jami'ah, i, p. 237.
- [120.](#) Rasa'il, iv, pp. 118, 141 f., 297 f.
- [121.](#) Ibid., i, pp. 153, 360f.; ii, pp. 129, 379ff.; iii, pp. 147f.
- [122.](#) Ibid., i, pp. 153, 213, 225, 229, 360; iii, pp. 106, 107f.
- [123.](#) Ibid., i, pp. 195, 198, 211, 225, 271, 273, 317; iii; p. 33.
- [124.](#) Ibid., i, pp. 198, 211, 225, 317; ii, p. 352; iii, pp. 90, 426; iv, pp. 18, 127.
- [125.](#) Ibid., iii, pp. 236ff.; iv, p. 114.
- [126.](#) Ibid., i, pp. 211, 225, 317; iv, p. 18; Jami'ah, i, p. 413.
- [127.](#) Rasa'il, iii, pp. 267ff.
- [128.](#) 211B, quoted by Sarton, History, p. 425.
- [129.](#) Ibid., p. 425; cf. pp. 423ff.
- [130.](#) Rasa'il, iv, pp. 170ff.
- [131.](#) 636c, 836c, cited in Sarton, History, p. 425.
- [132.](#) Rasa'il, iii, p. 424; iv, p. 24.
- [133.](#) Ibid., iv, pp. 24, 25f.
- [134.](#) Ibid., i, pp. 135, 247; iii, pp. 48, 49, 241, 374; iv, pp. 24, 25f., 100, 138, 168, 186ff.
- [135.](#) Qur'an, xiii, 19 (cf. Muhammad 'Ali, p.487; Pickthall, p.250; Rodwell, p. 235).
- [136.](#) Rasa'il, iv, p. 137.
- [137.](#) Ibid., iii, pp. 86–90; iv, pp. 22, 37, 54–65; Farrukh, Ikhwan al Safa, pp. 108–13.
- [138.](#) Rasa'il, iv, p. 476, in ref. to Qur'an, ii, 256 (Muhammad 'Ali, p. 111, Pickthall, p. 59, Rodwell, p. 367).
- [139.](#) Rasa'il, iv, p. 476.
- [140.](#) Farrukh, op. cit., pp. 108–13.
- [141.](#) Rasa'il, ii, p. 201; iii, pp. 92, 353; iv, pp. 33, 59, 172, 242; Jami'ah, ii, p. 365.

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