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Berechya b. Nat
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DODI VE-NECHDI

(UNCLE & NEPHEW)

Law Offices
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439 N. Clark St.
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The work of

BERACHYA HANAKDAN,

Now edited from MSS. at Munich and Oxford, with an English
Translation, Introduction etc.

to which is added the first English Translation from the Latin
of ADELARD OF BATH'S *Quaestiones Naturales*.

BY

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To his brother
Professor SIR ISRAEL GOLLANCZ,
Litt.D., F.B.A., etc,
in affection and regard for his high qualities
of heart and mind

This volume is dedicated
by the author
in the hundredth year of the birth
of their father,
the Reverend Samuel Marcus Gollancz.

1920

PREFACE.

In submitting this volume to the attention of those interested in Hebraic studies connected with physics, philosophy and religion, I have much pleasure in acknowledging my indebtedness to Dr. A. S. Yahuda, Professor at the University of Madrid, for kindly help and suggestions in my endeavour to fix the Hebrew text. I desire, further, to record my thanks to my sister, Miss Emma Gollancz, formerly of Newnham College, Cambridge, for her unfailing devotion in the task of revising the proofs of the English portions of my works.

H. G.

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INTRODUCTION.

Introduction.

Among the studies that have engaged my attention since in 1902 I published the "Ethical Treatises of Berachya," one of the most fascinating has been that of his "Dodi Venechdi" (*Uncle and Nephew*), in MS. whole or in part at Munich, Oxford, Leyden and Florence.

In my Introduction to the above-mentioned edition, I promised to give to the world the latter work; but other absorbing interests, and especially the heavy professional demands on my time, rendered the execution of my plans in this respect almost hopeless. However, having already when engaged upon the larger work personally transcribed the Munich MS. (No. 42) for the purpose, and collated it a second time at a later period, I did not give up the hope of once being able to produce this somewhat curious work, the "Dodi," and I now feel a satisfaction in being able to redeem the promise I made many years ago.

What invests this work with an enhanced interest, is the fact that it is not an original thesis, but it reposes more or less upon the work of that prolific writer, *Adelardus Bathoniensis*, Adelard or Athelard of Bath, to which has been given the name "Quaestiones naturales."

I use these words advisedly; for although all writers who refer to this work of Adelard's give it this name, it seems to me, having the only printed edition (15th cent.) before me, that this may not be the original title of the work, but simply descriptive of the subject-matter with which the treatise deals. It is for this reason, if I may anticipate the very tantalising problem, which has cropped up in the course of my investigations, that it is difficult to determine absolutely (although so towering an authority as Steinschneider speaks with dogmatic certainty to the contrary) as to whether, in addition to the Latin version, which is the only

one known, Adelard himself, or someone else, may not have written a French version, a resumé or adaptation of this self-same work. Though I have in vain made search for such a French version, I personally am not at all sure that, by some chance, one may not yet be discovered under a quite different title.

Such a discovery would clear up a very important point, for it would explain the cause of the great discrepancy which exists in the order, the length, and the language of the various Hebrew adaptations of the "Quaestiones" as they appear in the much fuller Munich MS. on the one hand, and in the fragmentary or briefer MSS. at Oxford (evidently identical with that at Florence) and Leyden. In fact, Bloch thinks that while the rendering of the fuller form was made from the Latin, the abridged seems rather to have been made from the French. Steinschneider traverses this opinion, saying that no proof is given for the assumption, the French words which occur here and there not justifying such assumption, as translators from Latin not infrequently substituted a vernacular form, or it may have been the copyists who did so.

In the absence, therefore, of such discovery—and there is only the most slender suspicion of any such French version existing—we are thrown back upon the Latin original of Adelard, not reprinted since the first edition in 1480, and certainly never yet rendered into English.

My prime concern was naturally the editing and translating of Berachya's "Dodi Venechdi" (*Uncle and Nephew*); but, in order to prosecute a comparative study of Berachya's Hebrew version and Adelard's Latin original, I deemed it both useful and necessary to prepare also an English translation of Adelard's Latin, and to incorporate in this volume the first English rendering of these "Quaestiones naturales."

The earlier Hebrew Bibliographers, though referring to Berachya's other works, do not seem to have known his "Dodi," and there could therefore be no question with them as to its origin.

In the article on Berachya in "Les Rabbins Français" (Renan-Neubauer) 1877, there is a reference to Berachya as the translator of the "Quaestiones naturales" (of Adelard), and the writer remarks that "according to M. Bloch, we ought to ascribe to our Berachya questions on physics, under the

form of a dialogue between an uncle and a nephew, found in No. 42 of Munich. The treatise is entitled: "My uncle and my nephew, 'Dodi ve-nekdi.'"

Steinschneider had already in his H.B. (IX p. 92, 1869) remarked, that the celebrated author of the Fox Fables based his dialogue between uncle and nephew upon the "Quaestiones naturales of Adelard of Bath,"—a sort of free translation.

What elements of originality there are in Berachya's work, and to what extent it is a "very free and rhetorical paraphrase" (Steinschneider), if one can call it such, will best be judged, and only be judged from a comparison of the two Hebrew versions (the Munich and the Bodleian, now printed as far as I know for the first time) with the translation of Adelard, contained in this volume.

I can scarcely subscribe to the statement, that "though it is well understood the translation of Berachya is not literal, nevertheless, save for Biblical and Talmudic additions, *it does not depart much from the original.*" To one who has had the advantage of having the full texts of both before him, and has made a thorough study of the subject, it does seem to depart in many respects from the original. The entire treatment on the part of Berachya is different from that of Adelard, one according to his own ideas as a Jew, writing not so much from the physical, scientific, or philosophical side, but what to him was of greater importance, from the spiritual and religious standpoint.

In many, or, at all events, in a large number of the sections or chapters, Berachya has done little more than borrow Adelard's headings or questions, which he uses as a peg, and then formulates the replies to such questions in his own independent method and manner. Towards the end of this Introduction, I shall give a general indication, chapter by chapter, of the relationship between the two versions.

There is some truth (but it has to be qualified) in the remarks (Steinschneider, H.B. p. 85, xiii), "that in regard to Berachya there is no doubt that two works at least, the Fables and the Dialogue, he composed from Christian sources; for the compilation of Jewish material he also made use of Christian ones. In this relation, Berachya enters the circle of those who were the intermediaries for the Jews of Christian culture and literature, and furthermore affords

us the proof that the political and social ostracism existing in Christian lands did not have the effect of preventing those thus excluded from taking their share of the spiritual possessions."

Between the tenth and eleventh chapters of this work according to the order in the Munich MS., there appears the following confession on the part of our author: "I, Berachya, son of Natronai, was worried in thought till I girded my loins, and translated these subjects into Hebrew. I found them in non-Jewish writings, translated (*or* copied) as they were from the Hebrews (*read* 'Arabs'). In them were concealed matters coming from the wise men of our age, whilst the splendid knowledge of the expert was not even looked at by the eye of the untutored. Now when I saw such splendid wisdom placed in front of (*or*, 'restored to') you in an ugly setting, (*or*, 'such splendid wisdom, with nothing objectionable in it, restored to you'), I cleansed it from the hand of the Gentile, and wrote it out in the Holy Language, which is so dignified in tone. Now this is a dialogue between two contemporary scientists, an Uncle and a Nephew, being their contention in a style, refined and purified."

It cannot be determined from whom the numbering of the questions in Adelard and Berachya originated—the latter only as far as the Munich MS. is concerned, since the numbering does not occur in the other MSS. Steinschneider holds that it is often the work of the copyist; and thus might be explained the variations in the divisions and combinations of some of the Questions in the present work; we can scarcely regard such deviations as arbitrary; even a wrongly bound copy of the original might serve to explain why, *e.g.*, Chapters I.—VIII. of Berachya and Adelard XLVII.—LIV. change places.

I am able to confirm this surmise from very recent experience. It is perfectly obvious that in the Bodleian MS. of Joseph Kimchi's *Shekel Hakodesh* ("The Holy Shekel") which I have just edited, some of the leaves were misplaced and wrongly bound together, and proved somewhat perplexing to me, until I was able to find out their proper place in the work.

Adelard discourses in his work, in the form of a dialogue between Uncle and Nephew, on various branches of

Natural Science, treating his subject from the point of view of "Arabian" philosophy. The questions embrace plants, animals, man, and also the physical conditions of the Universe.

As for Berachya's adaptation (for that is the most that we can admit of the inter-relation between the two versions), this is the verdict passed upon him by Steinschneider (H. Ueb. p. 464):—

"The translator (!) availed himself of every possible freedom by omitting, adding and altering. In particular, he has changed the simple introductory phrases of the interlocutors, which give the clue to the connection between the various questions, into rhetorical tirades. He uses rhymed prose and the so-called *musiv*-style (the application of Biblical passages and phrases) with more dexterity and spirit than taste." We can scarcely believe that the learned Professor ever had the complete work before him; and he seems, moreover, to have been dependent upon some careless copyist for the samples of the work which he did have. Otherwise, how shall we explain the following transcription which appears in the *Letterbode* VIII, 35?

האדם נקרא בלשון ערבי (!) בהמות וכל יוני בהמת הקן (!)
homo quidam animal *rationale*?

The passage should have been (cf. M. XX)

האדם נקרא בלשון ערבי בהמות המישור וכל יוני בהמת הקן

And what shall we say of the glaring combination of errors copied by Joseph Jacobs in his otherwise valuable publication, "The Jews of Angevin England," 1893, pp. 196-198? These are his words: "*Man*," he says, *is in the Arabic tongue Behemoth, and in the tongue of Javan [Greece] the beast of the West*," a curious perversion of "animal rationale" (see Steinschneider in *Letterbode* VIII, 35). We now see where the "perversion" lies. This carelessness is particularly to be observed in several of Jacobs's references. It is the risk incurred when a writer does not go to original sources, and the error is thus carried on from author to author.

I regret, first, that Jacobs should have published (p. 196) the passage containing the personal reference on the part of Berachya which appears in "*Les Rabbins Français*," containing the objectionable words "and pearls before swine."

The Munich MS. has no such expression, as can be seen on referring to the corresponding passage (quoted above), and I doubt whether Berachya himself would have used them. A Hebrew scholar can easily account for the insertion of so grotesque an expression by the carelessness of a copyist. And this view seems to be shared by the writer of the article in the *Rabbins*, who had the critical acumen and fine feeling to leave these words untranslated. But I scarcely think that I could adduce a better proof in support of this my contention than the fact that Berachya in his larger work, which I termed the *Compendium* (see my "Ethical Treatises of Berachya, etc.," 1902) uses the following evenly-balanced and moderate terms in speaking of the literature of those not of his Faith. He there (Cf. XLIX., p. 92, Eng.) remarks: "I have culled all this information from the learning of the Greeks, which had been translated into other languages by certain non-Jews; I have redeemed it from the hand of the stranger, and have given it a purer turn of my own, and have incorporated it in this work."

Next, in Question LII. (which should be LIX.) Jacobs interprets "grêle" by *grasshopper*. It would have been impossible for him to make this unpardonable error, had he consulted the original. In the Munich Codex, the word occurs five times (also in the Index), and is explained in the text by קרר which can mean nothing else but "ice" or "cold"; *grasshopper* is, therefore, out of the question, and wrong.

"He leaves out all proper names like those of Socrates, Aristotle, etc." A statement rather unfortunate, as Aristotle is mentioned by name in both the Munich and Bodleian Codices (M. VIII.; Bodl. 34.).

And why refer to the colophon of another work, that by his son Elijah, to confirm the authorship of the work referred to, when the name "Berachya" as the author occurs three times in the "Dodi" itself, once as the "Son of Natronai"?

And so also even the communication from Dr. Perles, alluded to in the article of "Les Rabbins Français," is wrong; for the 52nd question is to be found in the Latin, though not under a separate heading, which misled Perles. I found it as the second portion of Ad. LXI.

As regards Adelard of Bath—Berachya's original, and the circumstances under which he studied and wrote, a list of the works attributed to him, and a specimen of the Latin text, I refer the reader to an interesting notice by Thomas Wright in *Biographia Britannica Literaria*, or Biography of Literary Characters of Great Britain and Ireland, Anglo-Norman Period (1846).

It may be of interest if I here quote some passages from that article. "Athelard is the greatest name in English science before Robert Grosstête and Roger Bacon. His name would lead us to believe that he was of Saxon blood. He was born probably in the latter part of the 11th century, and first quitted England to study in the Schools of Tours and Laon. In the latter place he opened a school, and had among other disciples his nephew, to whom he appears to have been affectionately attached. But Athelard's love of knowledge was unsatisfied with the state of science in France, and he left his school, and crossed the Alps to Salerno, from whence he proceeded to Greece and Asia Minor, and it is very probable that he went to study among the Arabs in the East. Baghdad and Egypt were then the seats of Arabian literature. On his arrival in his native country after an absence of seven years, the throne, he tells us, was occupied by Henry I.; and one of the first books he published after his arrival, being dedicated to William, bishop of Syracuse, must have been written before 1116, the date of that prelate's death. This tract, which bears some resemblance to the Judgment of Hercules by the Grecian Prodicus, and which is entitled *De eodem et diverso*, is an allegory, in which Athelard justifies his passion for the sciences; he introduces Philosophy and Philocosmia (or the love of worldly enjoyment) as appearing to him on the banks of the Loire in the form of two women, when he was a student at Tours, and disputing for the possession of his affections, until he threw himself into the arms of Philosophy, drove away her rival with disgrace, and entered on the path of learning with that ardour which induced him subsequently to seek instruction even amongst the distant Arabs."

(Perhaps I ought in fairness to state here, that the theory has been put forward that the whole reference of a journey to the Arabs is to an imaginary journey, not a real one—an

invention to give more colour to his views on philosophy).

"It appears that after his return from his travels he opened a school, probably in France or Normandy, where he taught the Arabian sciences. These were still new in the West of Europe, and were decried by many, and among others, as it seems, by Athelard's nephew. Athelard wrote one of his most popular works, the *Quaestiones Naturales*, to oppose this prejudice, and to give a specimen of the doctrines on natural history which he had brought home. He reminds his nephew how, seven years before, when he had dismissed him (then a mere youth) with his other disciples, it had been agreed between them, that he would himself go and seek the learning of the Arabs, and that his nephew should in the meantime make himself master of all the science which could be found among the Franks. In reply, the nephew is made to express a distaste for his uncle's Saracenic doctrines, and for the extravagant terms in which he spoke of their superiority over the old studies of the western schools. Athelard then proceeds to defend his opinions on this subject, and provokes his nephew to propose what were considered some of the most natural questions in natural history. The manner in which Athelard speaks of the reception of the Arabian sciences seems to show that they were then quite new among the Christians of the West, and to contradict the opinion founded on a legend preserved by William of Malmesbury, that they had been introduced long before by Gerbert.

"We know nothing more of Athelard's personal history. His celebrity was great in after times, and in the 13th century Vincent of Beauvais gives him the title of *Philosophus Anglorum*. His writings appear to have enjoyed a great popularity. We may divide them into two classes, original works and translations from the Arabic."

Adelard's *De eodem et diverso*, to which reference is made above, appeared for the first time in the Latin original, together with an analysis and a historico-critical study, in 1903. It was published in the fourth volume of the "Beiträge zur Geschichte der Philosophie des Mittelalters," the author being Dr. Hans Willner. It is a well-reasoned and illuminating contribution to the history of the philosophy of the Middle Age; and it is of additional interest in showing that

the main ideas on certain aspects of life, specially of the higher life, running through the "De eodem" are those to be met with in the "Quaestiones."

To summarise this critic's conclusions in his own words as near as possible: First, as to form of composition, there is a mixture of prose and poetry, though the former far prevails. The dialogue itself is to be an incentive to the nephew to strive after the higher spiritual knowledge, to throw himself with fervour into philosophy, the difficulties of which Adelard by no means minimises.

Adelard's works reflect the influence of the condition of the times in which he lived, and of the philosophical theories of his day; and he uses of that material what appears in harmony with his system. Scarcely original and creative himself, he is at pains to reproduce the old teachings of philosophy in a manner according with the knowledge of the hour. The influence of Plato colours his entire system, and his Platonism has its roots both in Augustin and Boethius. He came into contact with the Oriental-Arabic sciences, such as mathematics, physics, and medicine, and they had a remarkably strong influence upon him.

The criteria of truth can only be established by reason, not by sensation. The spiritual power of the soul, which stands higher than the emotional, is able to raise the phenomena to a higher degree of knowledge, namely, truth. Reason is subject to no deception like the Senses; it leads and guides its servants, the external sensations, which it rules and masters. The soul, on the one hand, is the means of teaching us knowledge of the existence of objects, their origin, etc., and on the other hand, by means of reflection, she gets to know herself, to know reason and intelligence.

The power to attain to absolute truth is denied to ultimate reason; but what is denied to the weakness of man is reserved for God alone.

As in all cosmological speculations of the Scholastics, so also with Adelard, the dogma of the Creation of the world is the ground-work of our knowledge concerning the world. The world and its ultimate principles are not, as with Plato, eternal, but created. Matter in itself is lifeless and heavy, a passive substance, capable of no movement, possessing no sensibility. In consequence of the absence of

this power of self-movement, it must receive the impulse from an external cause. Its life is the work of a special spirit which gives it activity, and renders the substance capable of development. Matter obtains its form in accordance with divine ideas; and hence the Universe becomes a creation of the Omnipotence, Wisdom, and Goodness of God.

Mathematical order and unity,—the soul of the Universe or Nature,—are God's creations, subject to Him and dependent upon Him, yet, in regard to the world of matter, exercising their power and dominion over it. They are the principle giving soul to the upper spheres of the Universe; not only, therefore, are the constellations under their guidance, but also matters of earth, including man, are determined by them.

And as for the constellations themselves, they not only exercise purely physical functions, but they also possess secret, spiritual powers, by virtue of which they influence all the events and fortunes of man. They are living substances, of divine nature, after whose pattern all else is created, spiritual existences intermediary between God and man, placed over creatures of the material world. Hence, from the knowledge of the movements and attributes of the stars inferences may be drawn regarding the past, present, and future forms of the sublunary world.

The soul is not divisible; it is not material; it is absolutely one, knowing neither increase or diminution. She alone gives movement to the body; through her arise sensations and perceptions, and also spiritual knowledge. The senses are but the instruments used by the soul to grasp that which can be perceived and retained. In the soul alone—God's creation—is the unity of the human organism established.

Having regard to the perceptive activity of the soul, Adelard distinguishes six faculties—*sensus*, *imaginatio*, *opinio*, *memoria*, *ratio* and *mens*. To man the *ratio* specifically belongs, by which he distinguishes himself from the brute. Relying on Plato, and in agreement with the philosophy of his time, Adelard speaks of a three-fold soul, the rational, animal and vegetative. The rational soul is located in the head, the functions being distributed among its various portions, *imaginatio* in the front, *memoria* in the

back of the head, the middle of the head being reserved for the *ratio*. The seat of the animal soul is in the heart; and that of the vegetable soul in the liver (according to Plato, in the abdomen). Through the blood we get the right proportions in the mixtures of the four chief moistures of the organism, the humours, each of which has its special seat. Yellow gall and black, blood, and mucus have each two of the distinctive qualities, warm, cold, moist and dry, being either warm and dry, cold and dry, warm and moist, cold and moist.

Adelard was the first to make accessible to the West, by means of translations, the knowledge of the writings of Galen, as of the Arabic and Jewish Physicians.

Body and soul are two completely different substances, their junction being purely external and accidental, as they bear the impress of attributes totally opposed, combination and change characterising the body, simplicity and eternity the soul. By virtue of her origin and powers, the soul governs the body which she protects. She existed before and without the body, and in her pre-existent state of pure spirit, free and untrammelled. By her entry into earthly life, she is subjected to conditions of existence totally different; she is incarcerated in the body as her prison-chamber, so that she is limited in her spiritual uplifting, many defects attaching to her, and rendering her clear outlook blurred and weak. The soul's striving to ascend out of the world of matter into the intellectual region, and thus to reach the highest perfection, is an effort to regain her former condition. The soul's mandate when joined to body, is to restore to the body its right and proper measure, and to preserve its equilibrium; but the soul in her earthly course falls from her high estate of spirituality and purity into the low depths of materialism; her original, natural, and good dispositions are thereby converted into the opposite; even the *ratio* loses its hold and rule through the influence of the body."

In order to gauge the general structural differences in the two works, the "Dodi" of Berachya and "Quaestiones" of Adelard, I have supplied in the translation to the former work a cross-reference at the head of each chapter, which will make the comparison easy, and certainly more vivid than any brief and bare summing-up on my part in this

Introduction. I, accordingly, refer the reader to these indications, believing that a close comparison of the two versions will amply repay those interested in this part of the problem.

Without, therefore, dwelling upon the revelations which such comparative study will afford, I pass on to the next point, and ask: How far has Berachya adopted the philosophical theories of Adelard, or rather introduced them into his "Dodi Venechdi"? In which points, specifically, do the views of Adelard and Berachya intersect?

It will probably be readily conceded that the strongest agreement will be found on the psychical and ethical sides, but that Berachya brings out such points into much bolder relief than Adelard.

To cite a few examples. Compare Berachya in Chapter XIX. with the corresponding passage in Adelard. He here dilates on the difference of soul in man and brute, and draws the fine distinction between *Nephesh*, *Ruach*, and *Neshama*, which is naturally quite absent in his original. Again, compare Berachya's Chapter XL. with Adelard's XXXVIII., and a striking difference will immediately be observed. There is coldness in one, whilst there is warmth in the other. Berachya, in the course of answering the question propounded, takes occasion to soar higher and refers to "the three worlds," the lower, including plant life and man; the middle, containing the heavenly hosts; and the third, inhabited by the ministering angels, from whom is derived the soul of man. Man's soul, he says, is high above the lower world; and if she leaves the desires of this world, she will rise; he explains, further, the composition of the soul, its upward glance, and the erect stature of man, ever looking heavenward. This idea is similarly expressed in his "Ethical Treatises": see my edition, Chs. XLVI. (On man's dual nature); XLVII. and XLVIII. (The soul's true essence; and interdependence of soul and body); XLIX. (The "Neshama"); L. (The soul "special and living"); LI. (The soul and body form one agent).

In LXII. (Berachya) and LXIX. (Adelard), as in XI. (Berachya) corresponding to I. (Adelard), there is in different language the clear confession on the part of both, that as the plant is the effect of the Divine Will, so Sun and

Moon are God's creations, implying that, contrary to the view of Plato, all things are created, not eternal.

Quoting Saadya Gaon, Berachya says distinctly in the "Compendium": "The soul is created and renewed, just as other substances are created and renewed; . . . it is a pure essence . . . illuminative in a higher degree than the heavenly spheres and bodies generally." (p. 88.)

As an instance of folk-lore, Berachya introduces into Chapter XIII. the name of *Lilith* as a creature of air, and *Salamander* as the product of fire. Adelard, on the other hand, does not mention such by name.

Berachya refers to the following names of persons and places in the course of his treatise: Alexander, Aristotle (M. VIII.); Ibn Ezra (M. X., XIX., LII.); Parchon (M. IV., LV.); Hagarites, Arabians, Ishmaelites, Wise men of Arabia, Wise Men of Tabor (M. IV.); Cuthim (M. IV.); and to himself (X., XIX.); Jerusalem, the Land of Cush, Egypt, Land of the Hittites (M. VI.); Tyre, Zidon, Philistia (M. XXXV.); Zoan (M. XXXVII.); The Hot Springs of Tiberias (M. XLVII.); and Rameses (M. XLVIII.); Africa and "the Great Sea" (M. VIII.).

If only from a purely philological point of view, it is interesting to call attention to the following (Hebraicised) French words appearing in Berachya's version, and used by him by way of explanation.

They are:—

אונטייה *ente*, graft (Bodl. 3; M. XIV.).

גאיש *gois*, stomach (Bodl. 7).

גזיר *gesier*, gizzard or crop (Bodl. 7. M. XVII.).

גאנה *jaune*, yellow (Bodl. 9, M. XVIII.).

פירלש *pearls*, (M. LVI.).

גרייל *grêle*, ice (M. LVII. גרייל"א)

פולדריין *foudre*, thunderbolt, (M. LIX.).

צרליאון ^{créon} _{serion} (crayon) meteoric stone, aerolite (do.)

שופלייט *soufflet*, bellows (Bodl. 22).

Adopted expressions such as איסטומכא (*stomach*) (Bodl. 7; M. VII) and מילקניא (Bodl. 4), מילקניא (M. XV) *melancholic*, and perhaps אלכסון (M. LXII) should also be noted.

Berachya further introduces the names of the planets and constellations, such as Saturn, Jupiter, Mars, Sun, Venus, Mercury and Moon (Ch. VI.), and in the last chapter he refers to the heavenly "Dragon" and to Cancer, sign of the Zodiac.

And now a word as to the MS. itself. Codex 42 Munich is a beautifully written convolut; this part of the work (No. 2), the "Dodi Venechdi" (ff. 275-300 b) having all the headings in red ink, the introductory headings of the contents being alternately in red, green and black. The writing differs entirely from that in which the פתרון ספר האסמנות וחרצב הבינות is written.

To refer in general terms to the relationship between Berachya's work and that of Adelard, we have to add, that Berachya omits Adelard's introduction with regard to his travels, his return to England, his reminder to his nephew how, seven years before, it was agreed between them that he (Adelard) should devote himself to the study of Arabic learning, whilst the nephew was to attend to the French methods, especially of philosophy, and the relative value of the two systems.

On the other hand, in all Berachya's chapters, in addition to the headings in terse language, the question is restated with an introductory address to "Uncle," generally in a flattering and persuasive style, often with a play upon words of some Biblical text. Thus each chapter in Berachya is fairly independent of the other, while in Adelard there is, generally speaking, a statement or clause at the end of each chapter connecting it with the next, and making an easy transition from one theme to the other.

Adelard I	corresponds to Berachya XI, which is twice as long, a paraphrase and not literal.
II-V	XII-XIII.
VI-VII	XIV-XV, similar in B., a free rendering.
VIII-IX	XVI, " " "
X	XVII, " " "
XI	" Ad. has 'liver,' while B. has 'crop,' stronger than stomach for birds.
XII	XVIII, which is longer.
XIII-XIV	XIX. B. nearly twice as long, agreeing with Adelard's theory in the main as to whether "brutes have minds," but though similar ideas are common to both, B.'s is not a translation, and especially the latter portion, B. drawing his arguments from Scripture, attempting to show from philological distinctions between <i>Ruach</i> , <i>Nephesh</i> , and <i>Neshama</i> , that the term "soul" is applied to but man alone.
Adelard also in this chapter soars above his usual prosy level, and puts into the mouth of the Nephew the following words:—	
"I will gird myself to higher themes . . . True, I am unacquainted with the idle vauntings of the Greeks, and have not seen the cave of Vulcan, yet have I learnt by practice to know the true and disprove the false. I want to discover what you think of human nature. You may magnify as much as you will what you have been saying previously, but if you do not know yourself, I think such things of small account: man's proper subject of discussion is man,"—(thus anticipating the sentiment of Pope: "the proper study for mankind is man.")	
Adelard XV	corresponds to Berachya XX. The two fairly identical in ideas. B. more prolix, speaking of man as called in Arabic "animal of the plain (of equity)," and in Greek "animal of rule or measure"—not in Adelard's original.
XVI	(second part of XX) which, though not much longer, is yet much clearer and fuller than Ad. B. has not the reference to the "old man at Tarsus in Cicilia (sic)," but speaks of the blood-letters in reference to the healing of the body.
XVII	XXI, which is much longer and fuller in detail.
XVIII (cites Aristotle's Physics)	XXII, identical in sense and near in phraseology.
XIX	XXIII, fairly identical.

Adelard XX	corresponds to Berachya XXIV.
(introduces Boethius, not in B.)	
XXI (Boethius on sound)	XXV, more explicit than Ad.
XXII	XXVI, somewhat longer than Ad., adding query re "seeing through a wall."
XXIII (introduces Boethius "De Musica," "De Consolatione," and the "Topica," also Plato's "Timæus.")	XXVII and XXX, a brief and flimsy outline of Ad., and by no means a reproduction.
XXIV (reference to Plato)	XXVIII, both short and fairly identical.
XXV-XXVI	XXIX, briefer and more succinct.
XXVII or XXVIII (refers to himself as a citizen of Bath : mentions Plato)	XXX, practically a query of his own, scarcely traceable in Ad.
XXIX	XXXI, similar.
XXX	XXXII, quite different.
XXXI	XXXIII, query not in Ad.
XXXII	XXXIV, phraseology different.
	XXXV, more vivid and historic in presentation, naming Tyre, Zidon, Philistia, while Ad. simply says "You were coming from the East."
XXXIII	XXXVI, fairly identical.
XXXIV (reference to Aristotelian principles)	XXXVII, an adaptation, with points of resemblance in language and argument.

Adelard XXXV	corresponds to Berachya XXXVIII.
(refers to "Saturnalia of Macrobius" and to Terence's saying "not to slay the slain")	an answer to the query which Ad. omits, and refers to explanation of Macrobius.
XXXVI-XXXVII	XXXIX, same idea expressed in fairly similar language.
XXXVIII	XL, which is longer and different,—the treatment of the question is ethical, and based on Scripture.
XXXIX-XL	XLI, argument almost identical (the last sentence seems the reverse of Ad., end of XL).
XLI-XLII	XLII-XLIII, similarly expressed.
XLIII-XLIV	XLIV, which has a long preamble leading up to the question ; the treatment generally much fuller than in Ad.
XLV	XLV, similar in idea, but different in expression, and twice as long.
XLVI (mentions Boethius "Consolatio")	XLVI, a free paraphrase, with addendum seemingly out of place.
XLVII	L, similar reply, freely rendered, containing a smart application of Eccles. xii, 6, to the subject under consideration.
XLVIII	II amplified, also a reference to the Antipodes, not in Ad.
XLIX (mentions Statius, poet and philosopher)	III, similar, but no reference to Statius' views.
L	IV, expressed in more popular language ; refers to himself by name, and cites Ibn Ezra's and Parchon's comments on Holy Writ. Ad.'s "Antioch" is B's "Land of Cush."
LI	V, a very free rendering.
LII (reference to Arctic and Antarctic regions ; Caribbean Sea)	VI, though an adaptation of main ideas in a loose way, yet simpler ; language and treatment different. References to "Wise men of Arabia," the "Great Sea," "the habitable globe, divided into three parts," "Jerusalem—the navel of the earth," Egypt, Cush, land of the Hittites,—all absent in Ad. Influence of the Constellations.

Adelard LIII (Statius, speaking of Phœbus)	corresponds to Berachya VII, independent treatment.
"	LIV (very brief) " VIII, much more diffuse; interesting reference to Aristotle's advice to Alexander re sand-filter, not in Ad.
"	LV " IX, fairly identical, but more vivid.
"	LVI " X. Question not in Ad.; but a few lines at the end identical with Ad. LVI.
"	LVII, " XLVI (2nd part, which is misplaced) and XLVII. Not a translation; refers to Tiberias.
"	LVIII " XLVIII, story of water-bottle identical, but differently expressed; a reference to Ramesses and Zidon.
"	LIX (Statius mentioned) " XLIX, similar treatment.
"	LX, a more scientific treatment than B. L., (only part of Ad.)
"	LXI, very bare in comparison with B. LI and LII (1st part), quite different treatment and phraseology, adds Ibn Ezra's explanation of Eccles. i, 6, and cites other Scriptural phrases re "the wind."
"	LXII corresponds to Berachya LIII, similar in expression, though free.
"	LXIII " LIV.
"	LXIV " LV (introductory dialogue, citing Parchon's views, not in Ad.
"	LXV (Statius mentioned) " LVI (in parts slavish following of Ad.) and LVII (fuller than latter half of Ad.'s LXIV).
"	LXVI " LVIII, similar language.
"	LXVII " LIX, fuller, citing phrases from Job.
"	LXVIII " LX expressed in more popular language.
"	LXIX (reference " to Socrates) " LXI, more vivid, and truer presentation.
"	" LXII, similar ideas, but different treatment.

The last two sections of the Bodleian fragment (Chs. XXXV and XXXVI according to my numbering) are as far as I can find, traceable neither to the Munich MS, nor to Adelard's original.

The Hebrew text itself is far from perfect; in places it is very corrupt, practically baffling in some few instances all attempts at explanation. I have done my best in offering alternative readings, in order thereby to elucidate many an obscure passage. I do not claim that I have always succeeded even to my own satisfaction; but I may have stimulated speculation upon otherwise hopeless expressions and phrases.

Almost at the last moment I had the opportunity of consulting another copy of the Munich Codex, one belonging to the Halberstamm collection of the Judith Montefiore Theological College, Ramsgate (now deposited at Jews' College, London), but with no further result from the collation than to prove that this late copy was much more unreliable than the older manuscript.

From internal evidence we may hazard the conclusion that the copyist of the older MS. was also an Ashkenazi, perhaps a South German; at times he makes no difference between ו and ם; to indicate the *Kametz*, he frequently inserts the ; and on p. 44 (3 lines from the bottom) we have ועכב, for which I propose ןז, where ןז was evidently written for ןז. It is the copyist, who was not sure of his grammar or orthography, that is to blame; Berachya, who knew his Bible so well, that though quoting (as I showed in my larger work) from memory, he now and again confuses, or rather fuses, two Biblical passages, can certainly not be held responsible for the grammatical and orthographical errors which appear in the text of this work. An interesting example, by the way, of such wrong quotation, is to be found at the end of Ch. X. (p. 10 Heb.), where the words cited do not occur in the Bible: the author may have been thinking of Jeremiah IX., 4.

There is, again, a great difference in the clearness and directness of the Hebrew in the two MSS., the Munich and the Bodleian; the latter, fragmentary, is more terse and simple, and even more correct.

The reader of the "Dodi" cannot help being struck by the remarkably dexterous manner—occasionally carried to the point of daring—in which Berachya weaves into the text of

this work, as part of his natural style, expressions from Holy Writ which he seems to have made his own, quite distinct from direct quotations which he cites for purposes of elucidating his subject. I have in most instances indicated such expressions in the translation by the use of inverted commas.

In this volume I have deviated somewhat from the ordinary course, inasmuch as in place of the usual collection of Notes, I have added textual critical emendations in the body of the Hebrew text, either suggesting an undoubted or probable reading (marked l. or ?), or using the round bracket () to indicate that the word or expression therein contained has to be deleted, and the square bracket [] to imply that it has been added by me to make sense. I have further included in this Introduction such information as might have been conveyed by way of notes.

I will now, in conclusion, add the following few points to the information conveyed in the preceding pages.

In understanding the term דוקין, occurring in the Hebrew of M. XVIII. (Bodl. 8), it is interesting to note what Jewish commentators have to say upon the subject. Commenting on Levit. XXI., 20, *Rashi* explains the word דק thus: שיש בעיני דק שקורין מלא כמו הנוסה כדוק: מיל"א is the French *taie*, a dark spot or speck, a web or cataract in the eye. And the *Mincha Belula* has:—חל"ו אמרו דק הוא: מום העין, ואין לו ריע במקרא וזלתי הנוסה כדוק שמים: In the Talmud the term דוקין שבעין is found in Tr. *Bechoroth*, f. 28, and *Zebachim*, f. 85.

Another expression which proved rather tantalising is השמש אבני literally "stones of the Sun" (M., LII Heb.). At first sight it seemed at though "stones of the sun" meant "metors," reminding one of the poet's words: "Yond light is not daylight It is some Meteor that the Sun exhales." But whereas in some connections אבן השמים might be another form of אבן השמים (aerolite), from the context of the work before us, it has to be taken as meaning "an atom."

And so I venture to read for כאבני השדה in M. LI (Heb.) השמש, regarding the present reading an error on the part of copyist. The author himself describes it as something

so fine that it is indivisible, which leaves little room for doubting that it refers to the "atom" or "specks of the sun."

Towards the end of M. LXII. (Heb.), the last three lines seem to point to an eclipse of the moon, which can only occur when the moon, the sun, and the earth are in one straight line; but the wording in the text is not quite clear. I have, however, translated the passage, as near as possible, as it stands, not wishing to deal too freely with the text before me. But I might add the following statement by way of supplementing the bald rendering of Berachya's words. He wishes to emphasise that while the sun is in the sign of Cancer at the midsummer solstice, we have intense heat; whereas "during the length of time" in the year, meaning, during the greater part of the 365 days, the sun's heat depends upon circumstances, and is greater or less according to his varying positions. But as regards the moon, her light is (apart from the changes in the course of her revolving round the earth within a month) "exposed to occurrences" which are extraordinary, when she is opposite to the sun (at full moon), and reaches one of her nodes, whereupon there occurs an eclipse of the moon. When, however, the new moon gets into her position near the sun at one point of the moon's node, and hides the sun's disc, there will be an eclipse of the sun.

Jewish astronomers of old expressed the idea of the moon's "ascending or descending node" by the words "entering the head or tail of the מלי or חלי (or תנין) heavenly Dragon," i.e., the moon's orbit. (See *Jehuda Ha-Levi's Kusari*, IV., 25, and the illuminating comment on pp. 341-9 by the Editor, Dr. David Cassel).

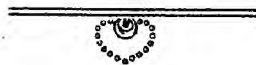
If we wished to criticise Berachya's theory, that "if the moon had a light of her own, we could not stand it, inasmuch as she is renewed month by month," it might be urged that if she had a light of her own like the sun, she would always appear as full moon, and would not be renewed at all. She would in that case simply be a sun of smaller dimension, and not necessarily revolving round the earth.

As regards the physiological terms and the healing art in general, to which reference is made in the Hebrew text, a mine of information is to be found in the work *Biblisch-talmudische Medizin* by Dr. Julius Preuss, Berlin, 1911; and for astronomical data it will be useful to consult Rabbi Levi ben Gerson's *Milchamot Ha-schem* ("Wars of the Lord"), as well as the *Kusari* by R. Yehuda Ha-Levi, to which I have already referred.

At the head of each chapter in the translation of the Munich Codex, I have indicated the corresponding chapter (as I have supplied it) in the Bodleian MS., and also in Adelaar's original. I have further added the cross-reference to the Munich Codex in the Bodleian MS. This will facilitate materially the comparison between the three versions of the curious, albeit fascinating themes propounded in the *Quaestiones Naturales* of Adelaar.

May, 1919.

H.G.



Translation
of
Munich Codex (Hebrew).

This is the Book called "Uncle and Nephew."

I now begin, with the help of God, the Most High, to give heads of chapters of the book called "Uncle and Nephew," being the questions asked by a nephew of his uncle.

Question I.—Why does a man, when he falls into the water, sink like lead, while when dead he floats upon the water? We should expect the opposite.

II.—Why is the earth suspended in mid-air, and how is it maintained?

III.—If the earth were pierced, where would the stone fall which is thrown?

IV.—Why does the earth tremble?

V.—Why is sea-water salt?

VI.—Why do the waters of the sea spread over many places, and yet within a stated hour return to their original place?

VII.—Why does the Great Sea (the Mediterranean) not grow larger in consequence of the mighty waters, for do not all the streams flow into the sea, and yet the sea is not full?

VIII.—Why is there no taste of salt in the streams when they return from the sea?

IX.—Why do streams grow larger instead of smaller?

X.—Why do not the streams that flow into the sea grow less?

XI.—Why does grass spring forth without having been sown?

XII.—Why are products that spring from the soil called herbs, and not those from fire?

XIII.—Why do not plants grow in air, water, or fire, these being of the four elements?

XIV.—Why does a tree grafted on another bring forth fruit

according to the graft, and not according to the root, which grows from the earth?

XV.—Why do some animals chew the cud?

XVI.—Why do those animals that chew the cud, when they lie down, crouch on their rear side and hind legs?

XVII.—Why does not the fowl urinate?

XVIII.—Why do some animals see in the night, and others not?

XIX.—Have animals soul or intelligence?

XX.—We know that the ox has horns as instruments of protection, the wild boar has tusks, and the lion talons. Some animals have means of flight, so that they are nimble to flee from the pursuers, viz., their feet, as, for example, rams, conies, and hares. To man, however, the Creator has given something of greater advantage than these.

XXI.—Why are some clever ones forgetful, while at times the fool remembers?

XXII.—What is perception of form, memory, and judgment?

XXIII.—Why is the nose above the mouth?

XXIV.—Why does the hair fall off from the side of the face?

XXV.—Why is one sound heard by many people?

XXVI.—Why can a sound be heard from the other side of a wall, and yet we cannot see through a wall?

XXVII.—Why, of all the organs of a man's body, is it the eye that sees?

XXVIII.—Is breath real or imaginary?

XXIX.—Why has the eye the power to see the stars at once, and to bring them to view?

XXX.—Why does the soul receive the sensation of sight?

XXXI.—Why does one who looks into glass not see his face?

XXXII.—Why is one who stands in the dark not seen?

XXXIII.—Why are not the eyes at the back of the head?

XXXIV.—Why is the nostril the organ of smell, the palate the organ of taste, and the hand the organ of touch?

XXXV.—Why does a man weep at the time of joy?

XXXVI.—Why do both cold and warmth proceed from one and the same mouth?

XXXVII.—Why do people blow into a man's face to cool his heat?

XXXVIII.—How is it that the throat is able to bear greater heat than the mouth?

XXXIX.—Why are the fingers not of equal length?

XL.—Why does a child not walk at once?

XLI.—Why is a man first reared upon his mother's milk?

XLII.—Why does a man contract disease in the act of coition?

XLIII.—Why are women, cold by nature, more wishful for their husbands than the men are for them?

XLIV.—How is it that man parts from life, and dies?

XLV.—Why does one who has had his fill long for food in a short time?

XLVI.—Why are the living afraid of the dead?

XLVII.—How comes it that warm waters spring forth from the river?

XLVIII.—Why does the water come out of a vessel with a hole in it, if the mouth of the vessel be stopped?

XLIX.—Whence come the winds?

L.—Whence comes the first movement of the wind?

LI.—Can a small object move other things?

LII.—Whence come stillness and rest?

LIII.—Why does the wind blow stronger round the habitable portion of the globe than around the firmament?

LIV.—Whence has the wind force to produce noise?

LV.—Converse between Uncle and Nephew.

LVI.—Whence proceed noise and thunder?

LVII.—Whence comes the frost, called grêle, after thunder?

LVIII.—Whence proceeds the flash of fire, called lightning, at the time of a thunder-storm?

LIX.—Whence proceed the blasts of fire after thunder, and why do they not always fall?

LX.—Whence have thunder and hail the power to pierce a thing?

LXI.—Why is the thunder not heard before the flash of light is seen?

LXII.—Why is the jurisdiction of the moon circumscribed?

Herein he declareth that which is clear, and cleansed from the mean brings forth what is dear. How my heart for his words doth yearn and sigh! Without them all is blast, barren, and dry. Day by day will I slake my thirst at the refreshing words of his mouth.

QUESTION I.

[Bodl. 31; Ad. XLVII.]

And now, Sire, deign to inform me why a man falling into the water sinks like lead, whilst when dead he floats: we should have expected the contrary, as a dead body is heavier than the living.

UNCLE.

'Tis a hard matter that has been labouring to death in your tenement of clay, yet from the body of the lion honey hath flowed. Now, my nephew, to answer your enquiry.

Everything depends on nature; in man's inward parts life is stimulated: and it is necessary for the living being to be impressed with the nature of his origin. If you do not recognise this fact, there is a possibility of your remarking that your constitution is changing.

Do you not know that in man's body there are four basic elements, viz., fire, air, water, and earth, each of these being by nature warm, dry, cold, or moist? Everything derived from fire is warm and dry. Now the warm and dry in man's body are enclosed in the gall, and it is the way of the warm and dry to tend upwards in proportion to their power and origin, for they belong to the lighter arrangement. While the warm and dry are enclosed in their compartment, viz., the gall, which is light, they do not give the members of man's body a chance of floating upon the surface of the water. Once, however, the compartment is broken open (*cf.* Eccles. xii. 6: "Or ever the silver cord be loosed, or the golden bowl be crushed, or the pitcher be broken at the fountain, or the wheel be dashed to pieces at the cistern," meaning "the gall," which is dashed against the liver, the source of the blood), the heat and dryness depart to support all the members of the human body, and the lighter element thus free is spread through every part of the body to the various members, and they are borne upward.

QUESTION II.

[Bodl. —; Ad. XLVIII.]

Uncle! I said within my heart, I would hide my views so as no longer to set my face against thine, lest I weary thee by my questions. But as I applied my heart to desist therefrom, the fire kindled within me, and in the desire to acquire knowledge, my tongue is stirred to ask, Why is the earth suspended in mid-air, and how is it kept there? For the earth bears every weight upon itself, like wood and stone, which hath support but from her (the earth); the air does not support such, since it

is heavier in its constitution than they are. Furthermore, air surrounds on all sides. Now if you were to answer that the earth, not deriving its support from the air, must needs fall, according to ocular observation such a plea is untenable.

UNCLE.

I will answer you according to common sense, not according to ocular observation. Understand well. Why should we say that the earth would fall? If it contained within it a cause for falling, we shall fall with it. No, indeed, "the earth is suspended on nothingness"; and in our hearts is implanted the sense to know that the earth is heavy by reason of its basic elemental properties.

Everything is attracted to its original kind; it has a sort of intelligent fondness for it; for all things have a liking for their own kind, and are drawn on to find their support in the matter to which they cling. For example, earthy things incline downwards, by which is meant towards the pole, called the earth's limit, as there is nothing below it; since as regards that part of the earth which you think beneath the pole, if people could walk upon it, their feet would be opposite the feet of those who walk upon our part of the earth, on the middle of the earth's sphere. Now that point cannot be shifted, and is fixed in one place. All formations of the same kind gravitate towards this middle point; and since it partakes of the nature of its own kind, and is not divided or separated from it, it necessarily follows that as all things hasten by reason of their weight towards it, falling objects will fall thither; their weight and momentum cause them to gravitate towards the lowest point, which is the pole, fixed as it is; and they are not detached from the place where they are found, unless parted by force, as when stones are hewn, or trees felled, or minerals dug out. As regards the pole, you cannot speak of anything as above it; by its nature the pole attracts to it every object that has weight.

You will now see that the cause why things fall is not to be found in that which you thought; on the contrary, the earth supports every existing object of weight; and the reason, or prime cause, is derived from that very support which things receive, and not from their elemental properties. But there is a secondary cause which has to be reckoned with, and that is, the object with which it is connected by nature, the lowest point to which it is attracted, than which there is no lower point, nor one that vacillates. It is fixed in the middle of the earth. As for the stars and luminaries, it is their nature to draw their original generating moisture equally from the four sides (of the universe).

QUESTION III.

[Bodl. —; Ad. XLIX.]

If the earth were pierced, where would the stone that is thrown fall?

Nephew: I understand part of your words; but tell me, according to your contention, suppose the lowest point of the globe, the pole, were pierced to the very bottom, so that one could see from the air on the earth to the air beneath the earth, and one threw a stone through the aperture, where would it fall and rest?

Uncle: That which setteth a bound and term to the earth's movement will cause the stone to rest, and it will not go beyond the aperture.

Nephew: Not so; but the stone will rest in the middle of the earth's crust. This I have found in the book on Physics; but I know not why it is so.

Uncle: Those statements are true. I will now instruct thee why they are so; and then thou wilt understand the secret of the stability of the earth, and the problem as to whither the stone goes, and finds its rest. Thou hast often heard that whatever is fond of its kind flees from that which is not of its kind. For example, fire, whose tendency is to go upward, being of a higher endowment, flees from dust, which is of the very opposite nature. In like manner, all similar things will rise upward when of the same constitution. Thus, that which appears to thee the middle of the earth, when you pierce that spot alone, the earth actively shuns all other natural constituents, for it consists solely of the element of dust; while from the point from which you begin to bore to the spot in which it stops, it is composed and made up of the four fundamental elements; and so as regards the middle, as well as below unto the earth's limit, it is compounded of the air beneath, made up of the four elements. Therefore, if men throw a stone into the hole of the globe, i.e., into the middle, it will rest there in the middle, the spot being solely of the nature of dust; it will not rest above that spot on account of the nature of fire, which flees from it, as it is not of its own kind. And just as the air above the earth will not send forth the stone, because that which is mixed with it has fire as one of its elements, so will the stone which is thrown not go down, or pass beyond the spot which partakes of dust alone; there in the middle it will rest; for one reason, on account of its weight, seeking as it does that thing to which it is attracted; and secondly, on account of its fleeing from that which it resists, something light, viz., the air, which is above it in pedigree. It, therefore, rests and remains in the spot to which it is attracted.

QUESTION IV.

[Bodl. —; Ad. L.]

Why does the earth tremble?

As marrow to my bones, and healing to my flesh, as the cool draught of water to the weary soul, so are thy words understood of all, and afford wisdom more precious than pearls.

Now tell me, Why does the earth tremble? You said for two reasons; it is a heavy substance, seeking rest. But, then, why should the heaviest of all things quake?

Uncle: Though my tongue may indite ever so wisely, if the ear doth not understand, I might as well sow among thorns, and put forth my hand to the scoffer. Such is the case when an enquirer seeks knowledge from a teacher, and the words do not reach his heart.

Nephew: Indeed, my ear and heart are one; and your own words shall prove it. Didst thou not speak in my ear, and say, that when crossing a bridge in the land of Cush, thou was taken off thy legs, and thrown down from thy stand, because the bridge tottered, and the earth trembled, the pillars of which shook violently, and the whole terrain round about, so that the inhabitants of that country said: "It is better to live on a drain-pipe"? Therefore tell me, whence the cause that makes the earth, the heaviest of objects, the support of heavy objects, quake? I should have thought it would find rest.

Uncle: Quite true. I crossed the bridge; the bridge trembled, and crashed with me; but rising, I pulled myself together, to tell the cause of the rumbling earthquake. Remember, it was that one portion of the earth, and not the whole that trembled; moreover, the rumbling did not proceed from its own natural constitution, but from the atmosphere surrounding on all sides, which is constant and never rests. At times, the wind is in the clefts and rocks of the earth, entering there and not leaving, until it finds an outlet to return to its kind, which is the air; and when it is unable to do so, for at times hard matter, such as wood and dry earth, oppose it, it makes a strong effort to release itself, and causes the earth to move and tremble.

I, Berachya, have found in the work by the sage Ibn Ezra, and in the work by Parchon, commenting on the words of Holy Writ, "He looketh on the earth, and it trembleth" (Ps. civ. 32), the idea that the winds are enclosed in the midst of the earth as in stores, and from thence they proceed throughout all the world. When the ground is soft, they go forth with ease, as it is said, "And a mist went forth from the earth" (Gen. ii. 6), producing clouds which turn to water; but when the ground is dry, hard, and strong, the wind goes forth with force, and makes

a thundering noise in the earth; 'tis a sign for mortals to quit that spot, and to change their domicile.

Let him rejoice who investeth the truth with a garb white as snow, even for bondmen and bondwomen, those shaven and shorn (of knowledge), sold as they are for ever as slaves to ignorance, listening to knowledge which is not remembered by them, he saying, For such I shall not fail to make of my heart a storehouse holding the treasures of learning and wisdom; so say I, thy nephew, unto you, uncle, "Give unto me that I may eat thereof!"

QUESTION V.

[Bodl. 32; Ad. LI.]

Now, tell me, Why is sea-water salt?

Uncle: By reason of the salt which is in the Great Sea (*i.e.*, the Mediterranean), it being wide and long, and receiving the power of the sun's heat as it rushes on. Being so extensive, it is always exposed to the full power of the sun, and catches its rays; the heat stirs the water as it flows to a certain density, and through this heat and density the waters acquire the taste of salt. If you do not believe it, you need only ask the people who live near the sea, and they will tell you that, without any effort on man's part, salt is found as the residue of the waters on the dry places of the rock which are exposed to the sun and stars; while if you enquire of those removed from such places exposed to the heat of the sun, they will tell you they have not seen any salt, and they can only produce it by the agency of fire and big piles of wood. You can judge for yourself that the heat of fire will produce salt in water. If you do not believe me, enquire, and you will find that sea-water in summer is salt, as water may be in winter in the kettle. Hence it shows that the salt taste depends upon heat.

QUESTION VI.

[Bodl. —; Ad. LII.]

Why does the sea spread over many places, and yet within a certain time return to its original place?

Thy circuit of knowledge will never be broken;

O that it might ever increase and grow more!

Thou art of wisdom the father and token;

Let me draw from the bucket of thy wondrous thoughts' store.

Now, Uncle, I have seen in a book that came from the land of Cush, and was brought before the Wise Men of Tabor, the question asked, Why do the waters of the sea ebb and flow? Here is a copy of that book.

The Wise Men of Arabia agree that the Great Sea (the Mediterranean), in which the waters flow, surround the whole habitable globe, which is formed like a sphere. Everyone knows that the habitable globe is divided into three parts, while Jerusalem is the navel of the earth; beyond lie Egypt, Cush, the Land of the Hittites, etc. Each portion is called a hemisphere, and one hemisphere contains the two parts of the habitable globe. The Great Sea sends out two flooding arms, one head of which overflows from the east, its course being westward, and going the length of the inhabited portion, and the second rushes eastward. These two arms become divided; the sea is reduced, and runs down considerably, until the two arms again meet. In the place where they meet, the waters are raised, so that they stand up in a heap, and they boil in the depths like a kettle; there is a roaring noise of the waves, for each wants to take the course which it began. Consequently, one pushes the other, and is dragged along in the race; and from the force of the impact and momentum which is acquired in the struggle, one beats against the other with great force and noise, so that owing to the might of the crashing, the waters turn backwards. As they come, so they return, and spread hither and thither, and thus it happens that the waters overflow.

Now tell me, Do you agree with this? I am simply repeating what the scientists held unanimously upon the subject. Had I been present, I would have argued with them; and however right they thought themselves, I should have convicted them on two scores. First, that impact of waters would not cause them to recede, but to mingle together gently and without rushing; and secondly, if I were to agree with them that, by reason of the force of the impact and impinging, the clashing of the waters would always grow greater, so that one set would return by the course it came, and the other similarly, then having to my shame to confess their contention, I would say: The greater the clash when the two arms of the sea meet, the weaker the second impact should be than the first, and the third than the second, until, say, the sixth should become a negligible quantity; for who could believe that by virtue of the four or five clashes the Sea would overflow, so as to return through the length of the habitable surface of the globe? Heaven forbid the thought! No. Scientists understand the nature of the meeting of the two arms of the Sea, and that its ebb and flow do not depend on this.

Now I will give you my opinion. When the two arms of the Great Sea, going from east to west, as I explained, and surrounding, as it were with wings, the habitable portion of the earth, grow in strength, the cause why the Sea ebbs and flows is to be found in the formation of the earth's crust, in its inclines and declines. According to men of science, everything has a tendency to spread according to its potentiality, and to be dragged along, but it cannot cross a place which is too high for it. So it is in the case of the sea and its course, when it bursts forth to go along the breadth of the earth, and it does go until it reaches a high place which forms, so to speak, a bar and barrier to its advance, saying to it, "Thus far and no further!" "Here you can put down your proud billows." Thus they return until the sea becomes low, finding in the course of their return the opportunity to descend into the nearest vales, the waters falling with the depths, and turning to their primeval haunts. This is my view. But I should add the theory of men of science, that the ebb and flow of the sea depends upon the power of the Moon, which presides over moisture as the Sun does over heat. And since there are twenty-four hours in Day and Night, during day-time, when the constellations Saturn, Jupiter, Mars, Sun, Venus, Mercury, and Moon have sway three times each, the Moon has at least three periods during which she has power to rule, and during that period she has sway over the waters to deal with them as she likes, both as regards their rising and their influence, to limit them.

This seems to me not at all improbable, as I observe at each New Moon. Some say that ebb and flow depend on the orbit and conjunction of the stars; and what wise men have told, I will not withhold; and thy views not having failed to explain why the sea doth flow and retire, let us feel our way now, and begin to enquire into this theme.

QUESTION VII.

[Bodl. 33; Ad. LIII.]

Why does not the Great Sea, fed as it is by mighty overflowing waters, grow larger? We have learnt that all streams go to the sea, and the sea is not full; and that there is, indeed, no limit to the number that do flow therein.

Uncle: My nephew is wise in his own eyes, and wisdom is girt in his loins; but if he were to spend all the days of his life in the endeavour, he could never prove to demonstration that all the streams do go to the sea, except to adduce the words of "Ecclesiastes." And just as he cannot prove this, so he cannot prove that some do not go to the sea. Hence we should know that just as some flow to the sea, so some streams are produced,

that no sooner produced, they are absorbed. But I am more anxious about the following more remarkable phenomenon: that when the streams go to the sea, returning in their flow, they are carried beneath the earth, and are absorbed by reason of the heat of the sun and stars, some for all time. How does this happen? For, this being the case, would not the sea grow less and become reduced? However, I consoled myself with this explanation: It is the nature of the sea to restore that which comes within its reach; in this sense, too, we can speak of the sea's vitality.

QUESTION VIII.

[Bodl. 34; Ad. LIV.]

Nephew: I set this question to myself, and look to the man of understanding to draw the conclusion. If we say that the streams return from the sea, why do they not taste of salt, finding it in the sea in which they mingle? On the contrary, they flow into it sweet, and return sweet; consequently we cannot believe that they are swallowed up in the sea, and that no trace of them is left.

Uncle: Even the wise may of a sudden be ensnared through want of understanding, and their learning may leave them through obstinacy, when they do not know and will not understand the laws of Nature, the knowledge of which is extended to those who would be wise; but they prefer to walk in the dark, determined as they are by their own gloomy folly. Thou sayest, the thing cannot be, when thou knowest not by observation that which the wise have declared.

I dispute with thee thy foolish contention, that the waters return sweet to their original source. Nor need you be surprised at the matter; considering that when they return from the sea, and are carried through the earth's clay, the earth through which they pass with their weight of salt, sinking as lead, acts as a purifier; not that the soil retains their salt and dense particles, but by it the waters become purified and refined, and return to their former state. Now you will know why they are sweet.

Had you been with Alexander, when he crossed the Great Sea, you would not have been compelled to investigate this point; for Aristotle, his teacher, ordered sand to be brought from land not salt, and he made a big mound on the vessel in which they crossed, and he dug for himself in that sand a well, and whenever he was short of something to drink, and they could not drink of the sea-water on account of their salt, they took of the sea-water and cast of it into the well, and the waters returned to their sweet taste. This is no secret at the present day to the mariners of Africa.

QUESTION IX.

[Bodl. —; Ad. LV.]

Why do streams grow, and not lessen?

The words of the wise as goads they do nerve; therefore through thee will I write aids my memory to serve. Thy words will I write, and so I'll remember thy voice; now meditating therein, my heart shall rejoice. And if at the end, it's the gift of a friend, what matters the wound, if to knowledge you're attuned?

Having entered upon this subject of enquiry, let us now probe it to a finish, and investigate its bearings: Whence comes the influence which causes every stream to be borne along continually, and from one Sea, which even from the day when the world was created, has not diminished in nature?

Uncle: Had you known the beginning of the thing, you would have come to learn its bearings, since a circular object has neither beginning nor end. This applies to the question you are asking, as to whether their circular motion comes from the streams themselves; and if it appears that in their course they roll along as they cover the rotundity of the earth, it is their regular course to move in a circuit, so that their flow is the cause of their ebbing. Now once a Wise Man went on the way, and he met a villager sitting waiting upon the brink of the river; it was in the rainy season, and it was thundering most violently. The Wise Man addressed him and said, "Why dost thou remain in the open, and why not go to the destination you have in mind? You are a fool to sit there." And the villager answered and said: "I had intended to cross this ford, and I am waiting for the waters to pass." The Wise One rejoined: "You are waiting for a thing to pass that goes round and round. You may sit there till the crack of doom." Now, dear nephew, I liken thee to this villager. So far the words of the Wise.

QUESTION X.

[Bodl. —; Ad. LVI.]

Why do not the streams which flow into the sea grow less?

Lo, I have written for thee what is within the knowledge of the wise. Yet further corroboration may be had from Holy Writ, "All the rivers go to the sea" (Eccles. i. 7), since they descend, water like earth moving downwards, the opposite being the case with fire and wind. In proof of my words that the sea is lower than the earth, I might adduce the words of Scripture, "He calleth to the waters of the sea, and it pours them forth"; i.e., He calleth them to ascend unto the high hill, and afterwards

pours them forth. Again, it is written in Psalm cvii. 23, "They that go down to the sea in ships." And we have not exhausted the causes, for the waters of the river being sweet, they are lighter than sea-water, which are salt and heavy; and when they come into the sea, they ascend like light on account of the force of the light of the sun and its satellites, and the other heavenly hosts; and they return to the clouds, are thereafter poured upon the mountains, where they are gathered, becoming in turn the source of the springs and the streams, restored to the place whence they originally came. You find by experience brooks dried up, because there has been no rain upon the earth.

Do not be surprised that *Ecclesiastes* does not mention (explain) about the streams when they return, for he does not explain how the Sun goes beneath; only those versed in the natural sciences do so. These are the words of Ibn Ezra.

I will now return to the statements put forth by the men of science, unknown to men of the time, O Uncle, distinguished as thou art among them and of thoughts full as a pomegranate, for my mind draws in with my heart's eye, as with the pen of a scribe, that which cometh from thy mouth, regarding the waters flowing in a circle, and how they return from the sea. And now with thee my heart quakes day by day "to determine the distinction between waters and waters" to understand their methods; and when I begin to think of the springs, and the founts, and existing sources, I tremble with fear, not knowing what you, my lord, might have to say about them. My heart further trembles when I contemplate level ground and the valley of the south round about the mountains, and land dry for want of water, whilst the mountain high and lofty has springs gushing forth from it; then say I, How does this come about? Or is it that in reality there is no water at the base of the mount, and that even if there were, it cannot get up there?

The *Uncle* replied: Get my idea into thy heart to understand that the source is from the land of the plain, and that the water comes to the hills from the slopes, so that "it shall be health to thy navel," and speaking to the earth, it will teach thee. For in the bosom of the earth's plain are the sources of water distributed in such wise that by means of various channels they are carried hither and thither as waters flowing lengthwise, yet spread across the earth in breadth, it sometimes happening by chance that they light upon caverns of the earth, surrounded by stones and hard substance covering and resting upon soft earth from above. The waters can consequently not spread along on account of the hard and rocky matter; the result being that they are lifted on high and rise upwards, for the ground above is soft, till one gets to the top of the hill, and on to the course which

is now, as was wont before, worked by man's practical ingenuity and design. You will understand this, knowing that man is able to raise (water) to the top of a hill from a depth of one or half a mile.

This is the reply of the Uncle to his Nephew. The view of Ibn Ezra I have already given above.

I will now begin the dialogue, in the form of question and answer, between Nephew and Uncle.

I, Berachya, son of Natronai, was worried in thought till I girded my loins, and translated these subjects into Hebrew. I found them in non-Jewish writings, translated as they were from the Arabs. In them were concealed matters coming from the wise men of our age, and this splendid knowledge of the expert was not even looked at by the eye of the untutored. Now when I saw such splendid wisdom placed in front of (restored to) you in an ugly setting (*or*, "such a splendid wisdom, with nothing objectionable in it restored to you), I cleansed it from the hand of the Gentile, and wrote it out in the Holy Language, which is so dignified in tone.

Now this work is a dialogue between two contemporary scientists, an uncle and a nephew, a contest to probe and to test matters, in the spirit of the Scriptural clause, in which one man thrusts at the other.

The intelligent will understand the application.

QUESTION XI.

[Bodl. l. 1; Ad. I.]

Why do plants sprout forth when they have not been sown?

O Uncle dear, my light and honour! I well know that thy thoughts scatter far and wide all wisdom and counsel, to instruct me concerning plants and herbs, whilst others see but vain and misleading teachings. For I have enquired of many, Why do herbs spring up when they have not been sown; but whither does their reply lead? They destroy the path of thy ways. But thou, my lord, shalt be listened to in what thou utterest.

Uncle: If thou, my nephew, hast asked a difficult question, thy intentions are nevertheless straight and well-directed towards me; there is sense in them and evidence of attention; therefore keep to thy point, and neglect not to tear off the film of folly from thy heart, so that thou mayest laugh at the fact that for a time thou hast been kept back. By the help of both of us thy

query shall be made clear as truth, and on thy account shall God be blessed and exalted, He who doeth wondrous things, who hath decreed, and such things happen. Thus it was His will that pronounced the *fiat*, and the chaff of herbs sprung forth without the help of man, some for good, some for ill; man could add to the work of Creation, he could not lessen it. Furthermore, it should be observed, that in the nature of plants there are four things innate, called the four elements, as in man's own body, viz., cold and heat, dryness and moisture, corresponding to fire, water, dust, and wind. Some call these the four roots (bases). It is well known to men of science that in plants the four elements are found as phenomena, even though they are not patent to the eye. And so with regard to the earth upon which we live, from which plants spring; it is compounded and constituted from the four elements aforementioned, even though to the eye of man it appears as if it consisted of but one of the elements, viz., dust. This was understood and proved by the early philosophers. And so in the case of fire, water, and air, each is named according to that which appears to exist in it in a more preponderating degree than the others. Thus, to repeat, we call the substance "earth," because the "dust" element is to be found therein to a greater degree than the three remaining elements; and the same applies to "water," "fire," and "air." And if you fathom the subject to its depths, you will find that "dust" has its physical properties alone, and "fire" has its own, and so has "water." And thus I would reply concerning this matter, that in the very bosom of the earth which we inhabit, there is dust of a distinctive nature without the admixture of the other three parts, at the point which is called "the limit's end," being of a different constitution, and indivisible into parts; the same applies to water in the midst of the waters, there is a portion which is simply water; the same applies to the atmosphere, there is some portion of it which is simply pure air, without the admixture of the other elements; and the same may be said of fire; they are distinguished according to their sources.

The end of the whole matter is this; that in the ground which produces grass and herb are the four elements mentioned above; and we should understand, that while the grass is yet tender in the earth, it is brought forth and made to blossom by the four elements; the ground of dust gives it root, its clods and adhesions being, as it were, the earth's bosom; the heat makes it fresh with moisture, which becomes scattered hither and thither in the lap of the earth and in the mould of clay.

Now the nature of fire and air is to rise upwards, and each of these completes the bringing forth of the grass according to its nature, fire endowing it with heat and dryness, and air with

cold and moisture. By help of these two, it grows and appears above the earth; in fact, it could not exist without the help of the natural qualities of dust, which after all is its mainstay and support in the process of growth. Thus and in this way does it happen that grass springs forth without being sown.

But, Uncle, in what way did you help when, open-eyed as you are, you had not the power to bring to light thy words upon a matter of public contention, people maintaining that plants derive their chief nourishment from dust, and more so than from fire?

Yet if this be the case, I would ask, why is this plant warm by nature and that one cold, since, according to your views, by far the larger portion of the plant springs from dust, which is cold and dry, and therefore we should call it, as you told me, cold rather than warm; there being the four elements in the earth, and it is called "earthy" in consequence of the dust, which predominates in it above the elements air, fire, and water.

QUESTION XII.—XIII.

[Bodl. 2, etc.; Ad. II.—V.]

Why are plants called "warm"? Secondly, Why is a growth springing forth from earth more than from fire called "herb"?

UNCLE.

In truth, my words shall fall upon thy ears by way of explanation, for this subject is not obscure, viz., that herbs are derived more from dust than from fire, since their place of growth is in the dust; and, therefore, thou dost ask of me, since they are cold by origin, coming from dust, how is it that thou seest in them natural heat, which implies more fire? Now to reply to this point also. Every object possesses two characteristics, one called greatness (quantity) and the other power (quality): and if a body is treated on the side of its growth, it may also be regarded from the side of the other attribute, power. This you will understand better from the following simile. Look! my tunic is green, and in my ring there is a green stone. The green in my tunic is as the green in my ring, yet the nature of the green in the stone and its power is greater and stronger than the green in the garment, for the green in the stone comes to it by nature, whilst the green in the tunic is in comparison less in strength, inasmuch as it is artificial, forced by human means to be changed from its original condition. Now if you were to stoop and see the tunic in its entirety, i.e., in its whole quantity, it will seem to you that the garment has more green than the

stone, since in size it is larger than the stone; whilst, according to origin and quality, the green in the stone exceeds that in the garment. So with the green herb. Judged by the standard of quantity, i.e., according to its place of growth, you would call it cold; judged by the standard of its original source, warmed as it is by fire, you would say it was warm; for it is not, as you think, that you can discern the fire element in the dust itself; but plants spring primarily from the dust, since the element of fire is but slender.

If this appears trivial to you, it can be strengthened by the consideration of the four elements, and you will, by probing and investigating, and searching the dust to test its quality, come to see why it is called warm.

Nephew: Do you mean that in this way plants may be clearly defined? Then I ask: How comes it that plants, since they spring from one and the same dust, viz., the ground (which the Hagarites, Ishmaelites, or Arabians call "nurse," the Hebrews call "mother of all living," the Cuthæans call "mother of bodies") may be divided off into cold and warm, dry and wet? For it is known to all that everything grows and flourishes by the help of that which is of its own class and kind, while it is destroyed and spoilt by that which is of a different kind and nature; and how then can plants come to be so different one from the other, to be either cold or warm, dry or wet, having sprung from one and the same spot, a spot which you confess to be of a single kind? This is absolutely impossible.

Uncle: I will now try and see whether you have understanding, as I will answer you in brief regarding the methods of plants; they do not gain growth from the body of the fruit.

Nephew: All this is of no use to me, since I see with reference to that which is torn out of the earth, that it is green and fresh in face of the sun, while it is yet in the earth; now it comes forth as a flower, and I cannot call the ground "the mother" of the herb, that strengthens it by its freshness and moisture, since as soon as it comes forth from that which is called its mother (or, "having had its day"), its root becomes old, and its stock dies.

Uncle: I do not agree that the herb comes from the ground consisting of one alone of the elements afore-mentioned, but that it comes from the ground compounded of the four elements, each, as I told you, of varying qualities as regards cold and heat, dryness and moisture. Can you not see why the herbs were not created in air? In air they would die, the sun killing every flower, every root, every herb that would be above the dust; whilst all that is in the lap of the earth may be likened to a newborn child taking hold of its mother's breasts, and, being nur-

tured by them, will not easily wane. I have now told thee sufficient to be of instruction to one who is fond of knowledge, and who, penetrated with this knowledge, will be heartened.

Nephew: Since thou hast introduced me into the subject, thou must instruct me to the end, for the questions are bound up with difficulties, whilst I walk along the crooked paths, straying from the way of understanding, and to thee my complainings are directed.

Uncle: Heaven forbid that I be guilty of wickedness by your obtaining erroneous ideas through my researches; for all created things come through the *fiat* of Him who decrees and commands, and whose actions are in righteousness—a matter which they understood who grasped the meaning of the motion of the constellations, that their change coincided with a change in the boughs and blossoms, for they depend upon the sun and moon for heat and cold. In my reply you had the utterance of all experts; and so you know what you knew not, thus verifying the statement, "Seek, and ye shall find."

Nephew: If thou wilt put thy spirit in me, I shall not hold my peace nor remain passive and idle. Tell me, if thou knowest all, as thou hast said (*or*, "according to the truth"), whether the plants are created from the earth in which are the four elements; and if it be according to thy statement, why do they not spring forth in the air or in water, or in fire, the other of the four elements?

Uncle: Nephew, is not this the thing which I have said, that all things like plants shoot forth and grow in their natural element, and grow more naturally in the dust than in the other bases of life?

Nephew: Ah, but I have seen flowers blooming in water. What then becomes of the theory of the four elements?

Uncle: It has been decreed of old that each thing should turn in its way to the source from whence it came; dust to dust, fire to fire, water to water, and wind to wind.

Nephew: Then answer me this further point. We have observed that dust, that is the ground, bears and brings forth according to its natural kind, viz., herbs. Now enlighten me concerning the other of the four elements, fire, water, and air; do they bear and bring forth?

Uncle: You will find that the waters do bring forth abundantly living creatures, viz., the fish; that the air (which is called a substance) doth generate clouds, and it brings forth a creation called *Lilith*, which inhabits ruins; and fire gives birth to a bird called *Salamander*. Scientists have come to this conclusion, after having investigated the subject.

Nephew: To thee, beloved Uncle, I am indeed indebted for

having gained this information concerning plants, the cause of their heat, why they spring from the earth, how they come to live, and how it comes about that they rise from the earth more than from the other of the four elements, and why they die.

QUESTION XIV.

[Bodl. 3; Ad. VI.]

Why does the tree which is grafted on to another produce fruit like the graft and not like the stock, which has its nourishment from the earth?

Now instruct me concerning the growth of trees, for in this matter the fount of my intelligence is closed. Why, I ask, does the engrafted tree produce fruit like the graft, and not according to the species of the stock which grows from the earth, and spreads lengthwise and breadthwise? How can it be so treacherous to its former species as to give over its strength to the junior, to bear fruit according to the latter kind?

Uncle: O my nephew! Having once ascended the heights of intelligence, who could wish to hide aught from thee? Nay, I will give wisdom to him who would be wise. Understand, you have learnt that the tree which is the graft that is cut off, inasmuch as the saplings are only lopped off from the top, only grows and thrives by virtue of the strength and sap of the graft which is engrafted upon it; and thus it will grow by means of the latter's freshness and moisture; the root which draws the moisture from the ground will hold back what it requires, and leave to the graft the residue; like that which determines the life-stem of all living beings retains what it needs, and permits the remaining members (of the body) to have what it does not require for itself. But the shoot also increases in growth and flourishes, bringing forth blossoms and buds, producing fruit and branch; and since the fruit is nearer to the shoot, and further removed from the stock, it is in closer relation to the nature and kind of that which is nearer, and further from the species of the root which is more distant.

QUESTION XV.

[Bodl. 4; Ad. VII.]

Why do some animals chew the cud?

O Uncle! Having sustained thy reputation for keenness and intelligence, "there is no one so wise and understanding as thou art"; so I said to myself, I would like to know something more about the constitution of animals, but the subject is far from me. Do thou, therefore, instruct me regarding those animals that chew the cud, and those that do not.

Uncle: Dear nephew, let not thy thoughts distress thee. Having your eyes opened on this subject, understand that among men and beasts there are varying constitutions, some being of a colder, others of a warmer nature; some of a dry nature, others of a moist; know, too, that the heat of the inward parts grinds the food until it becomes fine; it cooks it and changes its colour, turning to heat the cold found in colder animals, which, in consequence of their coldness, are unable to grind their food, but which, owing to their lack of heat, cast it from their stomach into their mouth, and it does not return until they have first ground it finer than before. This is the way of oxen, goats, and lambs; and these chewing the cud have, therefore, been called "cold," the *Goyim* calling them "melancholic." You may distinguish these by noticing that their fat is hard and clinging to the flesh, in consequence of the coldness of their stomach, which is not the case with animals that do not chew the cud.

Nephew: I know that horses and asses are warmer than those beasts called "cold"; but what have you to say regarding the ewe-lamb, which is on a plane differing from that of the ass and the horse? Why does it chew the cud more than they do?

Uncle: Because the teeth which they have on both sides help to crush their food and cut it fine, the ewe-lamb being unable, not having an excess of heat, to chew the cud by reason of its teeth alone.

Nephew: I will debate this point with thee, but in all kindness. And if thou art able to answer me, take thy stand and oppose me, but thrust me not off in my search. Thou hast said in my ears that all that are cold and dry chew the cud; why then does not man, who is of this species and nature, chew the cud—man, whom the medical profession calls melancholic among animals?

Uncle: Although man belongs to this category, dost thou not know that he is said to be warmer than those animals that chew the cud? You can test this for yourself, since oftentimes man that is cold, whose stomach is very cold, will not digest his food, but it will come into his mouth, or, having intelligence, it will become loathing to him, and he will vomit what he has swallowed and cast it forth.

QUESTION XVI.

[Bodl. 5; Ad. VIII.—IX.]

Why do those animals that chew the cud, when lying down, crouch on their hinder-parts and on their hind legs?

O my nephew! Though thy question has come upon me like a weapon, I shall not shake my lap (as a coward), but I will parry the stroke. Dost thou not know that all animals that are wrapped in fat on their side and downwards, tend to get fatter; you see it in the case of the ox, whose fat sticks close, and it is, therefore, cold, the liver weighing it down to one side; and in consequence of its weight, the animal lies on the side of the liver, viz.—the hind part.

O Uncle! Is not thy reply at hand, and how canst thou answer thy nephew such a fable? If they lie on this account on their hinder-parts, they ought to rise on their fore-part, which according to thy statement is the lighter; "as they lie, so should they rise."

Uncle: Your question, O nephew, you hurl at the heart of the simple, even as with a hammer that splinters the rock, and man becomes ensnared and swallows crooked words. The question you ask is hard, but I can extricate you from the difficulty; only pay attention to my words. As for all animals which, having fat of the class of those that chew the cud, when standing up, the cold fat and liver weigh them down, and of a surety they are stronger on that side, because they have an excess of fat about the loins; and if on account of fatigue they lie down more on the hind-quarters, heavy on account of fat therein contained, which rests by reason of heavy toil, they become stronger in that very part, since through having rested, they become warmer after the cold which weighed them down. At one time they are overweighted on the right, and another on the left side. But when they become warmer, it is easier for them to rise on one side, for being heated, it is the stronger.

QUESTION XVII.

[Bodl. 6; Ad. X.—XI.]

Why does not the bird urinate?

Uncle! Oh that the words flowing from thy lips might kiss my forehead, they uttering in reply expressions most direct. Every wise-hearted one longs for thy words, and is lifted up by thy speech. So also do I lift up my head, and my soul thirsts to know why the bird has a special mode of its own, inasmuch as all other animals urinate, whereas the winged fowl never does.

Uncle: I will answer you according to nature. Understand, that all animals are reared on milk, and the milk comes from the juice of plants and the sap that is in them. The food produces a duct in such animals for the urine to pass, and with the water which flows to the ground the sap finds a way through the urinal

cavity. Now after the sap has been in the habit of passing through its duct, the latter is no longer stopped up. Birds, on the other hand, are not from the start brought up on something moist, only on small stones or produce; they have therefore no sap coming from their food; and when the stone comes into their crop, it closes up the urinal cavity, and of that which they drink and of the gastric juice nothing gets further than their feathers, which retain the moisture. Pluck one of their feathers, and you will find moisture in it.

Nephew : But enlighten me then, Why have birds no stomach as other animals?

Uncle : Now you are asking a good question. Know that birds are reared on hard food, such as gravel and wheat, etc. A stomach would be unable to grind their food fine enough, for it is only strong enough for soft food; whereas the crop has strength and hardness, which a stomach has not, harder than flint, and like that of a diamond. The crop is intended to crush fine every hard substance, since all its sides are full of sinews from without and from within, and the muscle between the inner and outer sinews is particularly warm. It therefore grinds to perfection all that comes within it.

QUESTION XVIII.

[Bodl. 7; Ad. XII.]

Why do some animals see in the night, and others not?

O Uncle! Mine ears have listened and understood, nor did I regard it as futile what thou hast delivered concerning the stomach. Do thou then teach me something as regards the sight of animals, as some see, and others do not see in the night.

Uncle : Dost thou not know, hast thou not heard, that there are seven films in the eye, and that there are three kinds of moisture in them, from which proceed the principle of sight? First, the innermost of the three is called the white of the eye, being unusually so, and disperses the sight and brings it out. This is all sight. Secondly, there is the middle part, not as white as the former, nor as dark as the third, which concentrates the rays, and prevents them from being scattered more than is proper, and which, so to speak, holds them in check.

The third is the outer portion, which is darker than the second; and the dark part in it is to collect and concentrate the seeing-power of the second, so as not to permit it to scatter itself according to its will and pleasure; it is also placed in charge of the second, and upon it depends primarily the organ of sight. For this is patent and well known to all men of science, that if

the vision were scattered in consequence of the whiteness of the two preceding parts, the eye could not see and make out any small and fine object. And now, since seeing is concentrated by means of this third portion, which in reality is the key to sight, it follows that the bird and the animals that have white in the eye to a greater degree than black, found in the two parts that collect the light, will be able to see in the night, since the white in the eye prevails in the darkness and the gloom more than by day. You may see this in the case of the cat that sees best by night, and cannot stand the clearness of daylight, as it is too strong and rare for it. Your eyes, for example, cannot stand the sight of the sun, but in the night when the sun's light is no hindrance to it, you can see better. I have tested this with many people whose white of eye is more than the dark; when they come across snow, they cannot see at all, or but very little. And you can prove this yourself; when you wish to have a good look at a thing, you strain your sight and press your eyes together, that the rays of sight shall not be dispersed; for when this latter thing happens, you do not look at one object, but you look here and there.

He who would understand will listen; while he who refrains will stand aloof. It is wisdom that gives the character of greatness to the wise.

QUESTION XIX.

[Bodl. —; Ad. XIII.—XIV.]

Have animals a soul or intelligence?

I called thee to mind upon my couch, for from thee have I derived much kindness, and there slumber in my heart some of the things which have been planted by thy wisdom; let therefore now thy reflections be scattered abroad, so as to refresh the memory of them. Make known unto me whether animals have a soul, and whether they possess the power of reasoning or not, for this no man knows exactly.

Uncle : Thou hast justified my answering thee, for the matter which is not on thy tongue thou sayest thou canst not be enlightened upon, as no man understands the subject. Hast thou not heard that what is doubted by the simple-minded is not concealed from the wise?

In very truth, animals have a soul; for it is manifest that animals have knowledge, and in that knowledge there is either judgment to discriminate that one thing is different from another, or the power does not exist. It is the same with a man who is looking at one coming towards him; he sees him, but he does not

pay sufficient attention to know clearly whether he is fair or dark, or whether he be of a pale or ruddy countenance. I mean this. A thing may be looked at and known by the eye, but not known to the mind, so that if the man were asked, "Who is it that is coming towards thee?" he would not know, since he has but a confused notion of him.

And the *Nephew* said: Thou hast spoken right, for knowledge need not imply judgment to discriminate between one thing and another, nor need there necessarily be reasoning or intelligence in the matter of touch, beyond the knowledge that something is at the moment being handled.

Whereupon the *Uncle* rejoined: You are caught in my net; saying, that if they have the judgment to reason, they have not the knowledge to seek flight on account of some object, just as you may look at a thing, and not have the power to sufficiently distinguish what it is, and so you would not try to escape from it, as might occur to you and to others besides you.

Now if animals had not this knowledge and judgment to distinguish and know what they see, how will you account for the following fact: You see a hound running furiously in a thunderstorm, and carried along the ground in excitement, and in the height of his running, he will come back. What is there to account for this? I, therefore, say that it does possess judgment to seek flight, and this faculty cannot come from the body alone; it surely comes from the soul. Again, you may learn it from the voice that is heard. He who listens applies reason in the act; for if he did not reason when hearing the sound, he would do nothing in consequence. You see it in the case of dumb animals; when you speak to them, they attend with intelligence. For if it were not so, they would do nothing on your behalf (when you order them). This is the truth, otherwise you would find no animal come at your bidding.

Now you will see clearly that the hound, when afraid, and hearing his master's voice, will begin to do that which he had not done, or will finish that which he had begun, since he has knowledge arising from his bodily endowment, having its basis in the material, while he possesses the judgment to discriminate, which is resident in the soul. And the animal has undoubtedly the power to distinguish. Dost thou not see that the hound tracks the footprints of the hart and runs after it, so that its master shall be pleased with it and rejoice at its feat? Seeing this, must we not attribute it to the power of judgment and discrimination—a faculty resident in the soul? O my nephew, God forbid that thou shouldst not believe this, and only think, as the world believes, that animals have that knowledge without judgment to discriminate!

Nephew: O my very dear uncle! Art thou not ashamed and confounded that thy words contradict one another? You have just stated that animals have knowledge, and in saying this, you confess that they have a soul. Now, is it not a fact that when you smell a thing, you have something apart from that which you smelt before? And this occurs with everything that has the "breath of life in its nostrils"; but it is not so in the case of an object that is immovable, as, for example, a stone. It is only so in the case of things that have movement, as an animal; and since such "breath" cannot be thought of without a "soul," you say that the animal has a soul. Furthermore, moveable beings have faculties which are divisible, some belonging to the body, others to the soul; bodily faculties tending upwards, being of the nature of fire, some gravitating downwards, of the nature of dust; other faculties, having their seat right and left of the body, front and back, being of the nature of air and water, and the organ of speech being located hindermost (or, traced to others), derived from the soul. And these faculties are found in dumb animals that move about, and therefore I must say, that animals have souls. The end of the matter is, that we can by no means establish to a verity that they have reasoning power determined by Creation as residing in the body and not in the soul.

As a fact, the higher faculties are in the soul of man, so that it might rise up to Heaven, unto Him that gave it; but it is different in the case of the soul of the brute, which is but wind that ascends into air for but a short time, from which it disperses hither and thither, and vanishes as smoke in a moment, descending downwards.

Now I, Berachya, can arrive at this conclusion by way of Scripture, for the word "soul" is never applied but to man alone, the most convincing proof being found in the verse: "He giveth soul unto the people upon it, and spirit to those who walk therein" (Isaiah xlii. 5). We could not base this plea on the phrase alone which runs: "All that hath the breath of life in its nostrils" (Gen. vii. 22), although it occurs immediately after the reference to man. Furthermore, it is said, speaking of Creation: "He breathed in his nostrils the breath (of the spirit) of life" (ibid. ii. 7), which is the soul, located in the marrow of the forehead, as mentioned in this work.

Now in the creation of animals it is said: "Let the earth bring forth the living soul (*nephesh*) after its kind" (ibid. i. 24), the *nephesh* being in the liver; the word itself of the root as occurs in the expression, *uphishtem*, "And ye shall go forth and multiply" (Malachi iii. 30), being of the meaning "to increase and spring forth," for this reason, that the blood is the soul

(*nephesh*). Now do not be surprised to find the *neshama* (breath) called both *ruach*, "spirit," and *nephesh*, "soul," and even the body called *nephesh*, as in the phrase, "He will redeem my *nephesh* from the grasp of the grave" (Ps. xvii. 16).

This is also the explanation given by Ibn Ezra, namely, that the *nephesh* is the "growing power" resident in the liver, in which all living things share. This *nephesh* is of the body, the faculty that longs for food and cohabitation; whereas the *neshama* is of the higher kind, its seat being in the forehead, ever seeking to teach man the ways and works of God Almighty—the *nephesh*, seated in the liver, being always in search of bodily pleasures. Need I dilate any further upon this subject, seeing that I have explained it at the end?

QUESTION XX.

[Bodl. 10; Ad. XV.]

Why have animals instruments of defence, which man has not?

To me the matter appeared remarkably strange, and it surprised me, when I found, that the animal had an advantage over man, inasmuch as animals have attached to their bodies instruments of defence, while men have not.

Now, Uncle, I cannot boast of a brain capable of unravelling this point by any innate knowledge of mine; but according to what the eye and ear of men perceive, everything has been created in accordance with the rule of equity and right. We know, indeed, that the ox has horns, the boar tusks, and the lion talons; some animals have special means for fleeing, so as to enable them, being light, to run from their pursuers; we see them in the feet of rams, conies, and hares. But man has been endowed at Creation with an advantage yet greater than this in the gain he possesses, by reason of his inventive genius, to forge instruments and weapons.

O Nephew, listen and hear, and I will teach you wisdom. Man is called in Arabic the animal of the level, and in Greek the animal of the rule. And they are right; for sense is implanted in their hearts according to "the measure," "rule," and "level" by which men measure in the world, so that he might be tranquil, and restful, and quiet, when he experiences times of peace; but that when, in the whirligig of time, war supervenes, and his heart becomes violent, and he boils with rage, he might go about and seek to prepare instruments of war, to carry spear, stones, and terror, shield and javelin, and thus equipped to enter

into battle. But when the world is quiet, he will understand how to release himself from all this incubus; he will rest after the storm, and be restored to his equilibrium.

Now if such instruments had been fixed to his frame, he would get sick of life, and despair at the sight, having no use for them, all being peaceful round about him. Again, suppose a man were angry with him, or he with another, they would have the common sense to take council together, and by means of argument to come to a compromise and understanding with each other. But as for the brute, who has no power of speech or argument, it is necessary that it have such weapons for defence, so that one might be provided against the other. So far as regards instruments of warfare. Now, if man had facilities in the way of special adjuncts for purposes of flight, so that his feet might be nimble as those of a hind, he might be turned aside from his ordinary course of life, and come to long after and pant for the wind, becoming a man of the wilds, his legs, hands, and limbs being subservient to his eager haste; so that if the despoiler came suddenly upon him, he would have no time to rise and stand up against him, and to rouse himself against his oppressors, and to carry the accoutrement of war on account of his frail nature.

It is for this reason that the Creator formed man of an equable disposition, so that in peace he might be quiet, and in time of war resolute and vigorous.

[Bodl. —; Ad. XVI.]

[Why have men and beasts sinews?

O Uncle, I have probed the fountain of thy thoughts, and I am yet not satisfied. Therefore, tell me now, why men and beasts have sinews, and how it came about that they were created before the flesh.

Uncle: Understand, Nephew, that the sinews in man give strength and firmness to all the limbs, being formed in network fashion. Our wisacres of old knew what they were about when they bound the bodies of man and beast with cords, and placed them in the overflowing stream and in the place over which the torrent of boiling waters passed; and when, after a certain fixed period, they found the flesh gone, and the bones of the body which had been bound fallen to pieces, whilst the sinews remained in their frame of net-work. In this manner they came to know and solved the question about the finer cords, how they were distributed here and there throughout the body

from the brain; and they taught the blood-letters concerning the healing of the body—to bring down as much blood as was necessary; and further, how the sinews bound the limbs together, and strengthened them by means of small ligaments, “a coating of skin for the clothing of man.”]

QUESTION XXI.

[Bodl. II; Ad. XVII.]

Why does the clever one at times forget, and the fool remember?

If hidden things have caught me in a trap, the sick at heart and bereft will rejoice; for, Uncle, my heart beats within me when I call thee to mind, adding to my thirst which is intolerable. Hidden from me is the explanation why many a wise one is forgetful, while he who is not clever has a memory for things.

Uncle: Since thou hast mounted the steps of knowledge, thou hast trampled under foot many an error. We know that the power of the soul permeates the whole body, and that there are parts in man's body that receive the nerves radiating from the brain that are more responsive to sensations than others, as, for example, the eyes and ears, for the bones and the liver are not sensitive. The heart thus receives more of the influence of the soul than the members of the human frame, and it is on this account that all these members are subject to it; and whatever the working of the soul in the body, it depends upon the support which the body lends to the soul. The first help is from the brain, the second from the heart, and the third from the other organs. From the brain proceed shrewdness, judgment, discrimination, and recollection.

At first, man learns to understand; after this, he comes to form a judgment, so as to distinguish what he has learnt; and then he is able to recollect for years that upon which he has formed his judgment. In the cavities of the brain, on the forehead, there are collected the five senses, and from thence they are distributed, so as to make manifest their impressions. I will explain this with all clearness. The knowledge gained from shrewdness, judgment, and recollection does not proceed from one single cause, but from varied causes. Shrewdness comes from moisture, and memory from dryness; for nothing receives a deeper impress, form, and likeness than dry matter; and the dry matter only receives this impress and likeness easily from the time that it has once received such impress, form, and like-

ness, when the bond between them is not quickly broken and removed. Therefore, he who has a brain will have a good memory, but not necessarily knowledge.

Nephew: O Uncle! Don't be angry if I worry you to explain this subject to me in the clearest way possible, so that I come to the very depth of it. I have heard people say that the government of an image or impression in man is threefold in character: judgment, discrimination, and memory, as thou hast said, and that these faculties all reside in the brain. Now if men of science knew this, alas, the deluded ones! For I have heard amongst the wise men of Arabia and amongst those of Kedar their explanation, as follows: That the form of a thing is really seen in the middle (of the eye), *i.e.*, the image of a man or woman is seen; the eye sees the form; and the judgment to distinguish it resides in the middle of the brain; meaning, that in seeing the form, the brain determines it clearly by the organ of sight, distinguishing what it is, so as to recognise it from the back. Memory, too, is located in the hindermost part of the head, in the ultimate cavity of the brain, the place in which all the other impressions are collected; hence man remembers that which he has seen and determined.

QUESTION XXII.

[Bodl. II; Ad. XVIII.]

What is recognition of form? What is memory? What is judgment?

My request to you now is, How does all this become known to man, born of woman, for how can the working of the soul be known?

Uncle: O Nephew, by the man devoid of understanding this is considered impossible, since knowledge is spurned by the fool; but I beg of you to realise that it is no secret to him who first revealed the secret, and you may understand how he came to gain the knowledge. He applied himself to understand why the brain has cavities. He observed a man, otherwise at ease and serene, who had been wounded by a stone on the forehead just in the spot wherein the fount of impressions centres, and from that day onward that man failed to recognise the image. But there remained in him yet the other two faculties. He next met with a man who had been injured in the middle of the brain, and he again was unable to distinguish one object from another. A third person was affected on the side of memory. The fact is, there is but a fine line between these several parts of the brain.

We, therefore, know that the soul is not matter, but that the phenomena of the soul are manifest in material substances.

QUESTION XXIII.

[Bodl. 12; Ad. XIX.]

Why is the nose placed over the mouth?

The tongue of the wise brings healing; and therefore, O lord, tell me why the nose is placed over the mouth, for it is nauseous that the mucus of man should come down into his mouth.

Uncle: I am not wise enough to answer such questions; but understand that nose and mouth are not such important organs as the brain, heart, and liver; they serve, first, to draw down the mucus from the head; and secondly, they have the power to induce the mucus of the head from the right and left side. And since the mouth is one of the organs of the body, and as from the stomach upwards there could be no aperture in all the body other than the mouth, the mouth was placed near to the stomach, so that it might empty the moisture coming from the stomach, and spew it out.

QUESTION XXIV.

[Bodl. 13; Ad. XX.]

Why does the head lose its hair from the sides of the face?

This is the question, Uncle, which I ask of you: it is a big question, and I seek an explanation.

Should not the Creator who made man, and adorned him like the cherub with spreading wings, and left nothing wanting to render him a thing of beauty, have perfected his beauty so as to include his face? And now just because everything is so perfect in him, he is often derided and laughed at on account of his baldness. And if it was natural that he should become bald, then why not have the baldness at the back of the head?

Uncle: If you are clever, you would infer one thing from another; from what I told you before, you can know this very thing. It is through the mouth alone that everything enters the body. In the stomach the food is ground and cooked, as a pot boils upon a fire; and in the passage through which the food passes, its smoke rises upwards; and this passage is nearer the side of a man's face, and somewhat further away from the back of the head. It is because of the steam rising from the stomach that the pores widen and spread, for the head faces the steam, such is its course; and it is on account of the heat of the stomach boiling like a kettle, that the pores of the head, spreading and widening, send forth the moisture, and the limitation of the pores cannot withstand the strain thereof. It is through this

that it happens that young people, being hot-blooded, are specially prone to become bald, for the hair can find no support by virtue of the pores.

QUESTION XXV.

[Bodl. 14; Ad. XXI.]

Why is a sound heard by several people?

How long shall seductive paths, increasing their snares, afflict my soul? For if, as they sayest, the subjects about which I enquire are not hidden from me, at all events doubt is engendered in my heart, which over-rules all my thoughts. Therefore, O my sire, extricate me from this net. True scientists tell that every sound that issues forth, that exists, and that is heard, is a matter of atmosphere; and it is known that the air is a material body, and that one body cannot be in different places at one and the same time; and this being so, how can one sound affect the ears of various persons?

Uncle: O Nephew, thou hast drawn this from the source, but alas for the day when, expecting to find your response, you did not sink your bucket; nevertheless, may you find the fruit of your labours at my hands!

Know that the air which exists in the mouth of man, and is expelled outwards by the tongue and by the throat, thrusts from before it that air which was expelled in front of it; and that which is present at any given moment pushes the second, and the second the third, and so on in progression, until the air-waves are recognised by the ears of many folk; these whiffs of air are similar one to the other, but they are not renewed ones. You can compare it, if you would understand the point intelligibly, to a stone when cast into the water; it makes a circle, when you throw it, and from that circle a second, third, and fourth circle is produced.

QUESTION XXVI.

[Bodl. 15; Ad. XXII.]

Why can you hear sounds through a wall, and yet not see through a wall?

Nephew: According to your explanation, why then does not a wall of iron, or copper, or stone interrupt a sound; why does it allow it to pass through on the other side of the wall, and be heard? How is it that the air has that force to pass, seeing there is no opening? Furthermore, why in the same manner

can you not see through a wall, for the power of the eye is greater than that of the ear?

Uncle: Hast thou not heard, and dost thou not know, that all bodies are porous? If thou canst not test it by observation, it can be known by this, that sweat passes through stone or metal, and you can be sure of it by the sweat generally, and by the hair, which exudes warm moisture. As regards sound, which is really air, it passes through the pores which are invisible, and is heard by the hearer. With reference to your query as to why the eye has not the power to see through such pores as the ear has the power to hear, dost thou not know that the eye is full of darkness and veiled in gloom, so that it has the power to see only as far as the wall, in so far as the light shines upon it either in reality or by reflection, and does not penetrate (lit. cover) the wall, the light knowing its limitation, "Thus far shalt thou come, and no further"; it has no power within the wall.

QUESTION XXVII.

[Bodl. 16; Ad. XXIII.]

Why does the eye see at all?

Nephew: Since thou knowest all this, having gained it by diligent toil, and thou hast none nearer to thee than myself to profit, do thou invest me with but one portion of thy knowledge, and instruct me on the point: What is the nature of eye-sight, and why does the eye see?

Uncle: Ask of me, and I will give thee thine inheritance, and will answer thy question whilst breath be yet within me. Understand that light is, as it were, a rapid and rare form of atmosphere of the nature of fire, and is known to have been created from that kind that goes to make up the two nerves that run from the brain to the eye-cavities, called delicate organisms, and their endings are not found in all the forehead and round about, which is all hard, with the exception of these two very delicate cavities; and it is from them that sight proceeds. Even sight is material, since the air proceeding from the brain is said to be matter, compounded indeed of the four elements, but the element of fire preponderates to a very great extent.

QUESTION XXVIII.

[Bodl. —; Ad. XXIV.]

Is breath real or imaginary?

Let me know concerning the breath of man which comes from his mouth, is it real or imaginary?

Uncle: It is easily understood that it is a reality, since it is made up of the four elements that govern the bodily form.

QUESTION XXIX.

[Bodl. —; Ad. XXV.—XXVI.]

Why has the eye the power to see, etc.?

O *Uncle*, while deep sleep settles upon other men, my thoughts trouble me, wishing to know why the eye has the power to see the stars so quickly, and to draw its view from thence without interruption to a greater degree than the mind (has the power to grasp); for with his eyes, man sees them altogether, whilst the mind cannot grasp their number. The eye is thus quicker than the mind.

Uncle: Know that the brain, seat of the soul, according to the majority of scientists, is of an exceedingly cold nature. Some say it is of a warm and wet nature, and knowledge comes from the brain, either very cold, or warm and wet; it therefore follows, that if the eye looks at an object of the same nature as itself, such as the stars are, namely, that of fire, each object being attracted to the gaze of its affinity, the eye has the quicker perception, and this is derived from the soul.

Nephew: And when the eye is closed, why does not sight depart altogether?

Uncle: All things sustain their strength and power by resting, so that the air from which sight proceeds gains in natural strength by resting; its aspect is improved on all sides when the eye is again opened.

QUESTION XXX.

[Bodl. —; Ad. ? XXVII.—XXVIII.]

Why does the soul receive the sensation of sight?

This anxiety shall be to thy gain, and thou shalt laugh at the latter day. For know, *Nephew*, that the seat of the soul is, as I told you, in the brain, and from it are derived all the sensations and impulses of the will. You know that five senses serve the soul, and they are as follows: Sight, Hearing, Taste, Smell, and Touch. What the eye sees abroad it tells to the soul by means of the nerves that receive the sight, and so with the remaining sensations; for all the nerves of the hand, and all the cords in the various members, pass from the brain. Eyes and ears are the most sensitive of all, with the exception of the heart, all of which partake of the same composition.

QUESTION XXXI.

[Bodl. 17; Ad. XXIX.]

Why cannot a man see his face in glass?

You gain wisdom from the utterance of the wise, though it be concealed from the simple. Now, Uncle, tell me why cannot a man see his face in glass, while he can see it in a mirror made by himself?

Well asked! Hear and understand that the eye is the foe of darkness and gloom; therefore the clear view is on the side of the eye, and the darkness is on the other side. The range of the eye extends as far as the dark part, and not beyond; and what is seen is reflected to the eye, and it reports it. But ordinary glass, which is transparent, sight penetrates, and the thing is not reported to the eye.

QUESTION XXXII.

[Bodl. 18; Ad. XXX.]

Why is he who stands in the dark not seen?

Do instruct me on this point, why he who stands in the dark is not seen by him who stands in the light, while he who stands in the light is seen by him who stands in the dark.

Uncle: First, you should understand and know that light and darkness are the negation of each other; and the eyes, as they look into darkness, find no support or fixity, wandering from the path, and gazing in vain into the air, for by nature they move about, and long for that which is on high. But when they gaze towards the light, from which they originate, since sight is from the soul, which is in the brain, which itself is the light of life, they feast on their kind, looking at the light which by nature was created from the same matter, the onlooker being over against it.

QUESTION XXXIII.

[Bodl. 19; Ad. —.]

Why are not the eyes at the back of the head?

O honoured and beloved Uncle, teach me further, why the eyes of man are not at the back.

Dost thou not know, Nephew, that there are three chambers in the brain—the first for seeing, the second for understanding, and the third for recollecting? The first, which is in the middle of the brain, sees an external object, and reports it unto the second, until it grasps it; and the second—the brain proper—reports it

unto the third, for the purpose of recording it, the seat of which is at the back of the head; and if the cavities of the eye had been near the third portion, they would have been the seat of memory (not sight).

QUESTION XXXIV.

[Bodl. 20; Ad. XXXI.]

Why does the nose smell, the palate taste, and why is the hand the organ of touch?

O Master, when I considered thy words I found what was right; but when thoughts went astray within me, I sucked the venom of asps, and my struggles became like those of Esau against his brother. Why, I ask, does the nose smell, the palate taste, and the hand become the organ of touch? How does all this come to them, so that one does not do the work of the other? I ask, why? Certainly not in any spirit of ill-will; but "if I am not for myself, who will be for me?"

Uncle: My dear Nephew! If doubts rise within thee, leave them alone—a sweeping rain, leaving no food; but I will receive your enquiries, believing you to be perfectly straight; and I place myself at your disposal as a target. Concerning these three sensations, smell by the nostril, taste by the palate, and touch by the hand, understand that each one organ has been designed to do its special work through the medium of objects external to them. Of themselves they could do nothing; the nostril could not, unless there were outside something present to smell, either something sweet like apple and spice, or something unpleasantly unclean, and the air generating fumes from the object present, and that air reaching the nostrils, and thus producing the sensation of smell. It is not, as you thought, that the aperture of the nostril near the mouth is the cause of smelling; for if the hard membrane which is to be found inside the nose were cut, it would yet be able to smell. But as regards the hard part of the nose between the two eyes extending to the palate, called in Arabic, "breasts of smell," if that were stopped, it could not smell at all. It is formed on the plan for smelling, and its passage is to the brain; it is firmer than ordinary flesh, yet softer than bone. All this is so designed, that it can smell quickly and hurriedly; for there is no power in the muscle of the body equal to that in the brain.

Such is the organ of smell; and similar conditions govern the other four organs which come from the brain, and reach the palate and tongue, called the organs of taste. There are the well-known nerves which course from the brain to the hand, and become the instruments of touch; for the hand distinguishes

between warm and cold, and this by reason of the brain nerves which come from the soul. One does not do the work of the other; the hand does not smell, for it is not formed on the pattern adapted for smelling; the nose does not touch or taste. May all this knowledge be welcome to you!

QUESTION XXXV.

[Bodl. 21; Ad. XXXII.]

Why does a man weep in the hour of joy?

Silently do I regard my position, and continually is thy law upon my tongue. Therefore, do thou now enlighten me upon this point, since thou knowest I have loved thee above all creatures, and hence also have I loved thy heart's reflections. Now, when you were in Tyre and Zidon, touring all the districts of Philistia for a long while, so long that we gave up hopes of you, and I never thought to see you again, and when the good news reached me that you had got to your destination safe and sound, and I went to welcome you, and to give expression to the joy of my heart, oh! how I embraced and kissed you! But why, then, in the very moment of my extreme happiness, did my eyes flow with tears? Whence and why did weeping come, when there was every occasion for joy?

Uncle: O Nephew, you are trying to trample upon the honeycomb; while surely thou knowest that good tidings makes one grow fat; thou knowest too, that joy broadens man's heart, and engenders warmth in the human frame increasingly in a short time—a varied form of heat, the fumes of which rise to the brain at the time, and the moisture which is present therein becomes reduced, and there is movement in the fresh moisture which begins to travel, so that water flows from the brain to the first apertures at hand; thus it is that water flows from the eyes.

QUESTION XXXVI.

[Bodl. 22; Ad. XXXIII.]

Why do cold and heat proceed from one mouth?

O Uncle! Let us examine on this head what the wise men have opined, why from one and the same source do there issue forth both hot and cold.

O Nephew! Both the wise man and the fool are silent on this subject. Understand, however, that all the wise ones of India agree and are clear on this head, that all the winds of the body come from the lungs; they come one way and afterwards disperse; their passage does not vary. You should, therefore,

know that heat chiefly coming from the lung hurriedly and without interruption, as quickly rises to the mouth; and when it finds the mouth open, it comes out hot, as it comes straight from the lung; but when it is neutralised on the way, coming in contact in the mouth when closed, and obstructed, through coming into collision with the wind entering through the nostrils, it turns cold; for nothing among the four elemental bases of life turns more quickly from hot to cold than air.

QUESTION XXXVII.

[Bodl. —; Ad. XXXIV.]

Why do men blow into the face of another to cool his heat?

Understand that when I was in Zoan in a fixed dwelling (*lit.*, "in a tent that did not wander"), I heard a Wise Man questioning his fellow, and saying, "I have a great question to ask." And he began: It is known that everything in a moveable state becomes warm by its own motion, for this is the way of all bodies; why then do men race and rush to blow air into a man's face to cool him from his heat? And this is what he replied: 'Tis true that all things in motion become heated; it is a natural law; but the breath in man's body is so very warm that it ultimately comes out in perspiration through the air travelling outwards, while the air and breath coming from without, although it is warm enough to be brought to a man's face to cool the greater heat that comes from the interior of his body, yet when the outer air reaches the inner breath, man becomes minus both of them, neither hot nor cold. On my return I pondered these things, realising that the questioner was right, and also he who replied.

And though I heard this, I did not quite understand, since from my youth I had learnt that all things of one and the same nature become increased when added together, while those of unlike kind that do not resemble one another become reduced, and ultimately neutralise each other. How then can we believe that the warm wind can cool and chill the breath which is warmer than itself?

Uncle: The man who answered thus came very near the truth, and I agree with him with regard to his admission. And when you say, how can the warm breath be cooled by the warm wind, you may compare it to warm water which becomes cool by means of luke-warm.

Nephew: If you bring me proof from water, I will adduce fire in proof of my contention. See, you wish to cool a big pile of wood upon which the wind is blowing and setting alight, and

near it there is a small fire, which you cast into the fire caused by that which has kindled the big pile. Will it not make the fire of the pile bigger, and appear to human eye greater and higher than before, and the greater the strength the greater the heat, because the greater the quantity of wood the larger the conflagration? So I say the warm wind from without adds to the inner heat (of the human body) still greater heat.

Uncle: Your ideas are entirely wrong, when you compare fire to water. Say! what connection is there between straw and corn? Dost thou not know that water is cold by nature, and if you heat it, you expel its original nature, and change it to that of fire? But if you mix luke-warm water with hot, it is a little thing for them to quickly turn to their original character; because fire, being by nature of greater heat than anything else, if you cast into it a little more fire, it is easy to add to its original character, and make it burn all the more fiercely.

Nephew: This but strengthens your contention that luke-warm water cools the warmer, because it is not alike warm in character, while there is some compelling force in the body which causes the cooling; but in the case in which two things allied as regards heat, one hot from within and one hot from without, and there is no compelling power to cool but to increase the heat, for the nature of both is warmth, one ought to increase the heat of the other, which would be natural; for it is almost an axiom: Add something of the same nature to a thing, and you increase it.

Uncle: According to your stubborn opinion, the comparison between water and wind does not seem agreeable to you. Nevertheless, the air from without being warm, and the breath within man being warmer still, when the former comes to be driven and blown, and the outer air supervenes and is added to the warmer breath of the body, the latter *nolens volens* is traced along the path it came, and it re-enters the body. The outer air bides its time, but this circumstance does not beg the question of the two breaths mingling; it is simply that the inner one is driven further in, and the outer one is received. It is for this reason that people blow, to chase the warm wind into the body, to bring in the outer air in its place, depending upon the zest of the on-coming blast, and the power of the other to remain in its place. Such is man's constitution. Do not think that this co-mingling of outer and inner breaths is similar to that of water with water, or fire with fire, in which case one comes in, while the other comes out; for this breath comes into a man's face, and having a cooling effect causes the warmer air to be driven in, and it takes its place, not having attained to its degree of heat.

QUESTION XXXVIII.

[Bodl. 23; Ad. XXXV.]

How is it that the throat is able to bear greater heat than the mouth?

My house-friend did turn his thoughts to me as to the seat of learning, asking now concerning the members of the human frame, and with his questionings bewildering me and mine, so that I alone escaped to give the reply. He asked me: How am I able to bear hotter food in my throat than I am able to bear in my mouth?

Hearken, Nephew, and I will speak and indite words for thee! When thy friend relied upon thee, thou wast unto him as a broken reed; for in such matters thou hadst to infer one thing from another. Hast thou not heard that the organs nearest the heart and the lungs are warmer than those further removed? Thus the throat is nearer to them than the mouth, and it is therefore the warmer in degree; and the warmer organs can more easily bear the heat which is allied to them. And even though the organ of the mouth is warm, the heat of the throat is greater, and the mouth cannot endure its heat, for it is cold in comparison with the outer heat that enters into it. When, however, food enters into the throat, there it is a matter of equal temperature, or near to it.

QUESTION XXXIX.

[Bodl. —; Ad. XXXVI.—XXXVII.]

Why are the fingers of unequal length?

O Uncle! Let us enter now upon a path not to be esteemed lightly, for open criticism is a good thing, and it happens that my faculties have not been sufficiently instructed to meet their needs, else my lips had uttered knowledge with clearness.

Now, therefore, teach me why the fingers do not reach each other, seeing that they are not of equal length.

Uncle: Even in this matter I will open my mouth to you. Dost thou not know why the hand is of hollow shape? Why did you not feel yourself constrained to ask your question in this form? For know, that Creation has supplied man with every requisite, and there is no organ in the human frame so like a vessel as the hand; that when man wants to drink water, he may fill his hand with it, serving as it does the purpose of a vessel; on that account it is hollow in shape.

Nephew: You are teaching me concerning the hollow shape of the hand, but not concerning the fingers.

Uncle: The reason why there is inequality in the length of the fingers is just because the hand is hollow; so that if you bend them in circular form, your hand will be arranged as a perfect whole. It is necessary for the hand to be shaped hollow so as to be able to grasp and hold things. If the fingers were all, say, of the size of the thumb, the hand could not take hold of an object, without its dropping from its grasp.

QUESTION XL.

[Bodl. 24; Ad. XXXVIII.]

Why does not the child walk at once?

O Uncle, since we are engaged with the conditions of man's formation, let us examine our ways and search to know why the new-born child does not walk, relying upon its feet, like the domestic and wild animal.

Uncle: Pay attention, and you will see that his members are more tender than that of the brute, and he has been created upon the plan that he walk with stature erect and upright, so that he might look upwards towards heaven, which is a very great and different thing from the arrangement in the case of the creature walking on all fours.

Nephew: These two points also are difficult for me to understand, and I cannot grasp them.

Uncle: According to observation and hearsay we know, and it has not been concealed from us, that the Almighty, blessed and exalted be He, created three Worlds, the lower one, formed of various degrees of plant life and such like formations, while man alone who lives thereon belongs to the highest degree; the second world consists of the heavenly hosts, the stars and the constellations, and called the middle world; and the third world, high above this, is that of angels ministering to the Creator, the soul of man being created from their effulgence, and receiving the higher power according to the grade of the angels' ministry.

We, therefore, know that man's soul is high above the lower world, and is designed to recognise therein the works of its Creator. Those who walk on all fours, however, were not created for this purpose, namely, to acknowledge the works of the Creator; only in the case of man do we find the Scriptural text applied: "Thou didst crown him with glory and honour" (Ps. viii. 6), and this but on account of the soul with which He endowed him, being itself the light of the Angels derived from the light issuing from the Sun.

If this soul leaves the desires of the lower world, it is able to rise by rapid degrees, and to receive great strength from the

higher power which it has received by means of the Angelic Light. This is a subject that requires much explanation; yet the wise will understand what I have said from the hints which I have given, that the frame of man is weak, and that in stature he is by nature erect, and that this natural condition is called "*Neshama*" (soul). Attend to these two considerations, and this will elucidate the cause of man's condition of walking.

It is the higher soul placed in man that endows him with the will to be cautious in his actions, and to strengthen his limbs as an expert would in his business, without his possessing big bones, or the other limbs of the brute creation; but to work with his hands such things as should be done in accordance with the soul's character and its requirements, such as to stitch and to tear, to reap and to sow, to receive and to distribute. For these purposes the worker requires more delicate members for use and labour as he desires, and not such as are on the plan of the animal which has been created for man's sake, such animal requiring big limbs and bones like a bar of iron, strong as beds of copper, expressed in the phrase: "There is much increase in the strength of the ox" (Prov. xiv. 4); it has been created for many purposes, such as to draw things by the yoke adapted for carrying burdens.

I have now made known to you why man has tender limbs; and from this you may infer the connection between the high position and state (of the soul) and the matter of man's erect and tender frame—ever looking heavenward, turning unto Him that created the soul, and to the Source whence she, man's support, was hewn, lest she be defiled and soiled by the dust of the animal walking on fours. She has chosen her place in the head and the brain, saying, "Here will I sit for security"; this is the spot whence she can survey the entire body beneath her, it being her wish to preserve the body in the state in which it had been handed into her charge. From this you may learn that not for nothing did God create man's limbs tender, and his frame erect; and just as man's limbs are well fitted for his doings and his actions, so has the animal of bony dimensions been formed for its work, its "*Neshama*" (soul) tending downwards, towards earth.

QUESTION XLI.

[Bodl. 25; Ad. XXXIX.—XL.]

Why is man reared at the start on his mother's milk?

O Uncle, you might seek and not find a man to quarrel with you regarding man's formation, and the purpose, according

to your view, for which his limbs were adapted at Creation, for the heart of the wise will bear testimony to all this. Now I have prepared in my mind this strong stumbling-block for you, to tell me why man is brought up on milk, since it seems cruel, and a degradation for the mother, nor is the habit proper.

Uncle: May the ears of the deaf perceive! Have I not written for you times out of number, that all things are reared and strengthened by means of that which is of its own kind? Now understand, that the child is entirely from the blood of the woman, and after it comes forth to the light of the world, the blood in the woman turns and becomes milk, and it is on this account that the new-born babe is brought up on milk, which is of its own kind. Now since mankind adopted this habit from the first, we have to say that it must have observed the habit of the wild animals and the sea-monsters, which drew forth their breasts to suckle their young, and men did the same to their offspring.

Nephew: Let thy adversary approach, if he would marvel at thy words, that milk is a child's natural food, and that it is soon driven off and weaned from it; and if it be as you say, why is milk not good for youth and old age, seeing that it was their earliest nourishment?

Uncle: For several reasons milk is man's first nourishment; for the sake of haste, owing to the tenderness of the limbs; as one thing is necessary for bringing up tender children, and another for the more hardened youth of years; a third is adapted for young females, another for more developed ones; some things for limbs more perfected, and others for those not so well matured. But I am not the man who wish to assert that woman's milk would be hard for youth and old age, if the milk of those who walk on fours is hard for them, but it appears cruel. This is the view of those who feed on it or sip it.

[There is something wanting here.]

QUESTION XLII.

[Bodl. 26; Ad. XLII.]

Why does a man become infected in the act of coition? Deep set in the lap of wisdom are thy reflections, and thy thoughts come like burning firebrands, therefore do I long for thy words. Now, therefore, Uncle, tell me why when a healthy man lies with

a woman, and gives her of his infection, she does not contract the disease?

Uncle: If you wish to know the cause and reason of this thing, pay attention and understand the nature of man and of woman. Man is by origin of a warm nature, and woman cold; and the warmth in man is traceable to his dry endowment, whilst the coldness of woman to that of her moist endowment. Hence when the woman receives infected seed coming from that which is of a character both hot and dry, her cold and wet nature resists the infection, and admits of no chance of being spoilt, (for no cold and wet thing will draw to itself the warm and dry). It therefore happens as regards the seed sown in her, that it does not lose its character or strength, for at the time when a healthy man introduces into a woman such and similar dry and warm properties as they exist in him, in the process of the discharge the warm goes to warm and the dry to dry; since just as that which is cold and wet repels that which is warm and dry, being of contrary nature, in the same manner does that which is warm and dry attract that which is of a kindred nature.

QUESTION XLIII.

[Bodl. 27; Ad. XLII.]

Why do women who are cold, have a greater desire for their husbands than the latter have for them?

The replies of my Master have rent my questions, and swallowed up my words; and I walk about all my years drenching my thoughts with thine; and so this question has come to me, and is like a stone in my heart, until thou bring forth my soul from this distress.

Why, I ask, does a woman long for the man more than he for her, especially as you say that women are cold by nature? According to nature, man should have the stronger desire, since his nature is warm.

Uncle: The cold in woman has nothing to do with this desire in her; it is the moist in her which is greater than in man. Understand, it is for this reason. On account of woman's coldness, her blood cannot become oxidised in her to the same degree as in man, who is warm. Now the blood longs to get free, and it is necessary that it be set free by means of man's coition and by the escape of semen; the semen in woman is but blood of whitish hue, and it is in consequence of woman's coldness that she desires the warmth of man; this is the way of cold objects. You know that serpents on account of their cold nature enter

into a man's mouth while he be asleep, just on account of man's warmth.

Nephew : How is it that the blood in woman is cold, and the moisture greater?

Uncle : The blood boils through the membranes attached to her person, her nature rousing her to expel the blood from her inward parts in such a manner as to require the male; and although the man might by the act run the risk of infection, she, on the other hand, does not contract the disease, unless it be through the following three things: bearing children from the man, drawing to herself some poisoned breath of his, or if her natural condition gives her an extraordinarily strong degree of warmth, and her heat is greater than that of women generally, who are cold.

QUESTION XLIV.

[Bodl. 28; Ad. XLIII.]

Why does man part from life, and die?

My master is trampled upon in the House of the Wise; they plan hidden devices to capture him, and to obtain answers from him. Then make light to answer this questioning of the untutored, and say at once, it is a hardship to part that which has once been joined—this is known of all objects. And yet we are convinced that all is measured out by the rule of righteousness, and the line of equity. Nevertheless, it is the duty of those who would be wise to know and investigate the conditions of this lower world; and to learn by experience wisdom and device, to understand one matter by help of another, and the reason why. And since I have wearied you with subjects regarding Life, do not be angry if I dwell upon the subject of Death, and ask you to give some little heed to him who enquires: Why does man part from his life, and die?

I am not now asking concerning those killed, who die untimely deaths, the cause of whose end is known, but I ask about those who die not the violent death by being killed or being drowned. Man is created upon the plan of life, and there is no combination more lovely than that of body and soul, since the soul has set her dwelling according to her desires, and from her fixed abode she looks down upon her whole body to direct it according to her will, as we have already explained. The one is attached to the other, and she sends forth her cords and sinews to hold the body, and they are held fast together. Why then this parting, after the soul has acted as the Watchman over the tower of strength? Teach me, therefore, Does this divorce between body and soul take place by mutual consent?

Shouldst thou reply to me and say, This soul is bound to come forth from the body by God's will at the time when He draws nigh to destroy the "*Nephesh*," to turn it back again like the clay of the seal, and the very parting bears witness that the soul departs from the body unwillingly, as we see the body in pain, rolling and groaning, lamenting and writhing before it departs, like the parting of two friends, the knowledge of all mortals that they have to die making them afraid of death; if you retort thus, I would say to you: Since the dissolution takes place by Heaven's will, and against man's wish, why does the soul go forth from the body with pain and difficulty, seeing that at birth it joins with the body silently and easily, artfully and without sensation? Why should the dissolution occur amid weeping and groaning, when the mating was so sweet and desirable? Further, why does He allow them to part? It would be such an easy and pleasant thing to keep them together in matrimonial alliance; it would be nothing to make them one. Moreover, it seems such a right arrangement for them to be together. And now, since the parting is against their will, for they have a joint life and pleasurable residence, how comes it that they do not remain together for ever? And if this be by the will of Heaven, then stand and consider the marvels of Him perfect in knowledge and instruction. How hard will this parting be at the time of the end (*or*, awakening), so hard that they will be too weary to sustain it, unable to bear it!

I have thus made the question more difficult; yea, I have found pleasure in fathoming its depths; and you too will be as gratified as I am, possibly as pleased as you would be "with wheat of Minnith and confectionery," in turning the matter over and searching it through and through, and you will reach the goal, purifying your heart from all doubts.

The first part of the investigation will be, to know in what way the body relies and supports itself upon the strength of the soul, how to find its support for the duration of life, for there are bodies that do not depend for their support and sustenance upon the strength of the soul; there are bodies that at times wander away, and at other times remain. We must therefore know that when the strength of the body fades, the soul loves that body, and in its love for it, it supports it, and keeps it alive. It sometimes happens that the junction of the body and soul is not a mutual suit, nor is their dwelling together, since something repellant is found in them, and the soul has therefore no concern in disappearing from its body, the two loving each other merely as friends, the Creator having made them like such from birth, when they are found to be of one and the same nature. Of such are the bodies in this lower world, created upon the right principle,

being compounded of the four elements plainly stated above—fire, water, air, and dust.

And whatever the soul finds in the body, it is something of equal or nearly equal kind, and she on that account draws near to it and dwells in it, for she is derived from the higher souls, and therefore loves the thing which is of equal character and according to the rule of equity, namely, man's body. This body requires great caution with regard to the four roots of things, so that, for example, fire should not have a preponderating weight over the three others, and gain the mastery through its nature, or that the weight of the element of dust be not too much; for everyone has a limit and fixed time to live according to the quantity of natural heat and moisture, not the strange fire and foreign moisture, which is the very contrary to his own. Now, whenever the soul finds these four bases of life of equal measure, not one gaining the mastery over the other, or finds it approximating its origin, it is delighted to dwell therein.

There are, on the other hand, certain bodies in the lower world that are not of equable temperament, but are unnatural, like stones and timber that cannot easily catch fire. There are objects, too, in the middle world, namely the heavens, called stars and constellations and luminaries, which are of equable nature, they are *Neshamoth* (souls) that have neither beginning nor end; they cease not in their motion, but move along, some in a straight line, some straight but backwards, yet right in their courses; some descend, others ascend; some hasten, some tarry; and therefore the bodies of men are sometimes equable, and at other times journey from the straight way; they sometimes move, and sometimes rest. The soul is found by them according to what they draw from the four elements, and remains in them in proportion to their resting and reposing in them; but when these elements depart from the body, the component element of fire becomes likened to fire, air to air, water to water, and the bones which are cold and dry return to the dust, their own principle. These are the foundations of the body, just as beams form the foundation of the house.

[Bodl. —; Ad. XLIV.]

How does the healthy one spoil his elemental conditions, and how are they wrenched from their healthful state?

Thy word is better to me than the best morsel, at the time when thoughts break through my frame, and release my mouth from the bridle.

And now, Uncle, I will not rest on my lees, until I gather the gleanings of thy vineyard, for "my beloved hath a vineyard

in his corner," which his light has planted (or, in which he planted his light), and it has become a fruitful vine to those who have wavered in judgment. Deign, therefore, to instruct me as to how a man first becomes detached from his original health, after, as you say, he was created upon a right model, and strengthened by the four root elements, sustained by proper association, and the body grafted upon the soul; whence the cause that his original well-being takes leave of him?

Uncle: I will make this my secret pleasant to my Nephew, for it is laid up with me, and sealed in my heart, replying briefly, yet not stinting in disclosing my thoughts. Apply thyself to know that everything that destroys something else will in turn become destroyed by that which it destroys—e.g., ploughshares, axes, hammers, and hatchets. Dost thou not see as regards the hatchet used in felling trees, in splitting one portion into several pieces, and thus destroying and dividing an object into parts, that its beauty (newness) is changed and becomes spoilt, for by use the iron becomes blunt, and its form is gone; and so with the ploughshare in ploughing, and so with the knife and blade used for bread and meat; as long as they themselves are not spoilt in their employment, they work mischief. This is the way with everything that acts upon another, that self-same object will in time act upon it.

Man's body works by means of its food, its victuals, which it grinds, and cooks in the stomach, and the food acts upon him, changing his nature and his elemental condition, expressed in the words, "And the grinders cause him to cease" (Eccles. xii. 3), [*Berachya's own reading into or application of these two words of the Preacher*]. It comes to this, that while the character of food is changed by means of the bodily organs, the nature of the body becomes changed by the food it takes, hinted at in the words, "When thou shalt have ceased to spoil, thou shalt be spoilt" (Isaiah xxxiii. 1). If you examine the matter closely, you will find that such is the case with all things. It thus happens in the same way, that if the soul wishes to rear the body, and to sustain it by means of eating and drinking, it will pull it down by means of the food itself.]

QUESTION XLV.

[Bodl. 29; Ad. XLV.]

Why does one who has eaten to satisfaction long for food in a short time?

O Uncle, thou hast made thy Nephew say, "Thou art honoured and esteemed in the eyes of all men." And now, after all this, there proceeds from thy mouth the statement that the

passive becomes turned into the active agent, and the despoiled into the spoiler; and that it is in this manner that we have to account for the structure of the human frame becoming demolished. Tell me, Why does one who is full desire in a short time more food, being hungry?

Uncle: O Nephew, even this I can tell you. Although ordered and ordained by nature it is an extraordinary feature for every living thing has other characteristics well-defined and known which enflame and keep him alive. These come from air, according to the law that parts of the great and mighty body co-exist with parts resident in the body that are compounded of the four root-elements that come from outside of the body, namely, fire, water, air, and dust. These four elements act in this way; they destroy what they find in a body as external. First as regards flesh, man is brought up on it, expands on it, grows up strong and tall, and when it enters the body the blood is abstracted by means of these four bases, and it converts them from their proper proportion. Thus come about both the waste and the support of the body; for, owing to the waste and analysis in the body, it happens that it loses something that should go to its maintenance and natural support. For instance, when he crushes fine the food in the body, and it is destroyed, it is necessary that it come to an end; and he therefore eats a little, so that what he eats now shall be over and above that which he had lost in the process of digestion. Therefore it is a saying: "He who does not give out what he likes, will not take in what he wishes," meaning the body, which gives up a little in order to add to its nourishment, when, after analysis and separation, the body loses what it receives, and it becomes necessary to add to it on the side of what it has lost, and to bring into it something to restore the balance. If this were not done, the body might overdo matters and become surfeited, or even partake of that which is abhorrent to it; and by deviating from the right line, the divorce of the partnership ensues. Now pay heed to this answer, and you will no longer have cause for anxiety.

[Bodl. 30; Ad. XLVI.]

QUESTION XLVI.

Why are the living afraid of the dead?

All the members of my body are in harmony with thy counsels, and obey thy words, for they are pleasant; but among them there is a secret regarding the origin of the experience, as to why a living one should be afraid of a dead person, one to whom he had been attached in life-time. It would seem that in death

both hatred ceases, and love is lost; then what harm can the dead do to one?

Uncle: He who bringeth the dead to life, and causeth the living to die, has planted the instinct in the heart of all living to love and attach to itself the thing that is sustained in its original state, and to shrink from that which is destroyed in its proportions, and there is nothing that maintains vitality like love, or destroys it like hate.

Nephew: This is not unknown to me, and what does this reply of yours teach?

Uncle: You are to understand from my utterance that which you yourself have confessed, that all life is fond of life and its continuance for ever; how much more so man, who has the knowledge of higher things and their maintenance in this world? Life is really the association of body and soul; and it is therefore necessary that all living should love this association; and having once liked the association, why should he not hate the dissolution? From hating the dissolution, he comes to hate the factor, which is the body, seeing it, as he does, bereft of the soul. This hate does not arise from the sense of fear in the body—the biggest fool would not think so, but from the thoughts which the parting calls to mind. The wise ones have therefore named this feeling hate, not fear.

Nephew: I just remember what you said concerning the course of the waters revolving in a circle; if this be true, there is no source nor fount in the world which is ever parted (*i.e.*, what the Arabs call "En"); I mean that, once going round and round, it will never return to its original channel.

Uncle: You have put a difficult question; bring forward your ideas in proper arrangement, and the wise of heart will search and sift them, as they present themselves in the chambers of your thoughts; for many a one seeks, and does not find out why the waters revolving (about the earth) cannot be called "fount" or "spring." And now for your instruction, to make you understand the subject better, I will make this comparison.

The moisture in man's body which issues in the form of sweat is called "a rebuke" (indecent); and so we can speak also of the earth's moisture, which oozes out in many places where there is slackness, and from which drops issue; they are so many sources in the earth's foundations in which moisture exists, and from which mists arise in consequence of the sun's heat, and the earth, compounded of the four elements, is bedewed and sweats; for we know that the earth does not cease to ooze forth sweat, and the drops join together, thus forming "the spring." And what is the usual experience in regard to the earth? In summer-time if the slightest moisture issues from it owing to the upper

heat, called "*sharab*," it becomes dry and parched. They who betimes drink of it have come upon water-holes without finding any water; whereas in winter, owing to the richness of the soil and its moisture, the waters return to their former state.

QUESTION XLVII.

[Bodl. —; ? Ad. LVII.]

How does hot water come from the spring?

Slumbering upon my couch, I spake unto myself, and in the multitude of my thoughts, I was pained to think of the ways of the brooks and their taunts, turning backwards and flowing into the river (*or*, to the mountain) and the valley; but with regard to the hot water (from the stream), I know not the why and the wherefore. For when I was in Tiberias, I bathed in the hot water of the great river, and I could not understand the cause and reason of its temperature. I, therefore, did put my hand to my mouth, but now speak of this matter till thou givest me to understand the cause of this procedure.

Uncle: Even in this matter I would reply to you, I will not leave you nor forsake you; but as a father giving unto the wise cometh wiser still, so though you will profit, I should not be the loser.

As I told you, you should know that the whole earth is a network of mines, which bring forth after their kind, teeming round about with sources of silver and gold, others of copper, iron, tin, and lead: then again, there is the source of the stone quarries or the mines of brimstone, which is a kind of earth inflammable, having smell, is volatile, yellow, with a blue flame, and it is on this account that the water is hot; for as the water flows from the sides of the mine, the springs become hot by contact, just like lime when you throw water upon it, and these have healing properties. If you do not believe what I now say, you should go to such a spot where this water boils, and you will see it boil sulphuric; then you'll confess to the truth, and find such to be the effect.

QUESTION XLVIII.

[Bodl. —; Ad. LVIII.]

Why does water flow from a vessel with a hole in it, when the stopper is on it?

Let not my lord be angry, if I speak yet again with reference to the nature of water, for I still have some doubt on the subject. For when we left Rameses to go each one on his way, I did not rest until I came to Zidon, and was detained (*or*, "entertained")

in the house of a high personage; and when it was meal-time, one of her servants came and poured water over our hands out of an extraordinary vessel, which had holes in the bottom, and from the holes flowed the water which was poured over our hands; but it happened that when he put his thumb upon the aperture on the top of the vessel, the water remained, and did not come out, but when he removed it from the vessel's mouth, it flowed. When I saw this, I thought that the mistress of the house was a witch, for so did her servant say. The thing went forth from my mouth, and all who listened to me laughed at me. Then said I to them, teach me and I will be silent; but not one of them enlightened me on this subject. Now, therefore, O Master, tell me if I have made a mistake in calling her a witch; or does this thing proceed from natural causes? I have laboured much to understand this, but have failed.

Uncle: He deserved to be put in chains for attributing the virtue of the vessel to witchcraft, since this did not come about either by the skill of the mistress of the house, or by the skill of the servant, who poured the water over thy hand from a vessel, which from the first was brought out by its maker in this fashion.

Hast thou not heard that the root-elements of the world, namely, fire, water, air and dust, have a way of associating, and you do not find any action of one unassociated with that of the other; and when they work in unison in any case, they hold fast together to the finish, and there is no empty spot (vacuum) in which one of these would not be. Now, not one of these elements is nearer in character to water, to take its place, than air, and for this reason: Water, like air by nature, is flowing and wet, which is not the case with fire; for even though it moves, it is dry, whilst dust does not move. It is, therefore, proper that air should take the place of water which moves, and is wet like itself; and when water runs along from its place, and turns into its way, it is necessary that the other, namely air, similar to itself, should fill its place immediately. Now if water be stopped and its second comes, seemingly to take the place of its associate to which it is attached and which is unable to come there, that element which wishes to come forth cannot be released, for it cannot find an outlet. Now, when the servant in pouring out makes a way for the air to enter the vessel, the water would come out, and air would come in; but when the entry of air is stopped, so that it cannot get into the mouth of the bottle to be in the place of water, then as the two natures are so bound together as to change places with each other, how can the water come out of the vessel? For as the air comes in, the water comes out, provided that the holes be not too wide to bear the weight of the water.

The wise of heart will rend the enclosure of his heart, so that wisdom laid up within him might enter in its place; and he who has crushed thy chief points shall fill his mouth with gravel, since they are all straight, and easily understood.

Now, dear Uncle, we have discussed concerning fire, and water, and dust. I would now indite my remarks concerning the wind. I will speak so that it may profit me; the subject of the winds worries me, to understand whence they come. Do thou, therefore, now speak prophet-like concerning the wind.

QUESTION XLIX.

[Bodl. —; Ad. LIX.]

Whence come the winds?

Uncle: "I am not a prophet"; yet, after much toil, I have learnt something of the nature of the wind; and to thee and thy likes I will tell, for neither price nor reward, that which has not been hidden from me.

Winds come partly from the earth, and partly from the water, as is patent to the eye. They do not come from the deep sea. When the sun passes beneath the earth during the night, the earth becomes heated, and from the slack places there proceed moisture and heat; a mist rises from the ground and from the waters thus warmed in the night by the power of the sun and stars. Even with the rising of the billows of the sea, its waters are shaken up, and the air is increased, so that it rises, and is carried up on high like smoke. This air is dense, and accordingly, in rising, moves hither and thither. I call this air "dense" for this reason, because there is atmosphere which is "light," namely, that which is nearer the firmament, in which there is no wind, moving as it does by virtue of the wind nearer the earth; for where there is stillness, there is no wind.

QUESTION L.

[Bodl. —; Ad. LX.]

Whence comes the first movement of the wind?

Nephew: If it be as you say, that the wind has its movements from some outside source, it necessarily follows that air moves even when the wind is still. Now see, if you find the air still, and the other is moving or still, if it be very still, it will not rob the other of its quietude to set it in motion. This being so, that which moves does so by force of another which is itself set in motion, and that other moved by a second, and that second by a third cause, *ad infinitum*. Then the movement of the air is without beginning.

Uncle: Do you not know that by nature fire is cold, and it need not be roused by some extraneous power: so it is with wind, which is air; its movement is inherent in itself, without any other moving agent; and by nature it is quiet; it consequently comes to this, that air moving by force of something else is moved by something that is still and does not move, for naturally the atmosphere causing movement of the air must be a moving agent, though itself is neither stirred nor moved, inasmuch as it is still and quiet.

QUESTION LI.

[Bodl. —; Ad. LXI.]

Can a small object (an atom) set other things in motion, since a thing that drives is not fine?

Nephew: You tell me that original creation is not moved, how then can it move other things, itself being still? On this matter I am in the dark; for the thing that moves and chases another thing must move by virtue of its motive power in acting upon the subject moved from its position, and becoming settled down and resting in some other position when at rest, in the place from which it has chased some object in consequence of its usurping the spot. If this be so, then a fine object which, on account of its tiny size, is indivisible, like the atom (*I read Abne-Ha-shamesh*), tell me if, when it be moved, all similar things are moved; for there is no particle which has not its own place, and according to what you say, it will go on moving other objects *ad infinitum*. If this be true, it follows that the wind, once having begun to set things in motion, has no end and limit to its moving and driving power.

QUESTION LII.

[Bodl. —; Ad. LXI.]

Whence come stillness and rest?

Uncle: My nephew should in his impatience during the twilight of his learning, suffer his light to measure his path, speaking as he does to gain knowledge, and to increase his strength.

In truth, the wind does find a limit to its power of setting in motion; and I still hold fast to my statement that everything which itself moves and wanders about will move and chase other objects, although this movement will not be lengthwise, from end to end, but orbicular, revolving in a circle to the place from which it goes forth to move. And this motion of the wind being

circular is similar to the motion of the waters which go round in a circle; and concerning your statement, that once setting in motion, there is no limit to its activity, understand, that it will be limited by the blowing of another wind, when the latter comes to meet it, and pushes it along, so that it is unable to pass. Hence the cause of the Sun's specks (atoms) and of the wind carrying out their movements and settling down in circles.

Now this wind which is overcome by impact will be again chased by another to which it has to give way, and this is the characteristic *ad infinitum*; for each wind-blast pushes another; and it accordingly happens that the movements interrupted in places in the waters are necessarily resumed, until they push on together, and by their overwhelming power find their rest and calm, when once meeting again they are quiet after their motion. This is the utmost limit of the winds, when they find rest. Now from the impinging of these "specks of the Sun" that go round in a circle, you may learn this thing, that they are thrust along by the force of something else which thrusts it along, since a small single object could not impart its motion to all of them, and the motion once begun will find its limit, as I have explained to you.

This was the interpretation given by the *Uncle* to his *Nephew*, an explanation which will be understood.

In the same way does Ibn Ezra explain the words of Ecclesiastes (i. 6): "It surroundeth and goeth," for the wind surrounds and then at length goes on, and to its circuits doth the wind return; there is no sense in explaining it that the whole verse refers to the Sun, and that the word *Ruach* "wind" means "corner," for then it should have said simply *Ha-ruach*, meaning "direction" or "corner," not "*shab Ha-ruach*."

Now the winds depend on the Sun; for when it is South, the south wind is on the increase, and when in the Northern corner, the north wind.

Experts in navigation, acquainted with the origin of winds as coming from the Sun, have found convincing proofs that the Sun goes round and round, as is borne out by Ecclesiastes (i. 5): "The Sun shines forth . . . and hasteth to its place"; thereafter "The wind turneth about continually in its course" (*ibid.*, 6), which means the wind by itself; then comes a reference to the waters: "All the streams flow to the sea . . . thither they go again" (*ibid.*, 7). In these clauses you have three out of the four fundamentals of the earth's composition, namely, fire, water, and wind, the fourth having been referred to before in the words, "the earth abideth for ever" (*ibid.*, 4).

Now these four fundamental elements are mentioned in their respective places, but people pay no attention to the fact.

Already in the Book of Genesis (i. 1-2) "fire" is implied in the expression "heavens" (*Shamayim*, compounded of *Esh* and *Mayim*); "air" is identical with *Ruach* "spirit," used in the creation of heaven and earth, when it says, "The spirit of God was hovering," etc.; then comes "upon the face of the waters." In Job, too, (Ch. xxviii. v. 25, 24): "When he maketh a weight for the wind, and meteth out the waters by measure"; "for He looketh to the end of the earth." "Who hath directed the Spirit of the Lord" (Is. xl. 13)? Then in Proverbs we read: "Who hath ascended up into heaven and descended? Who hath gathered the wind in his fists" (xxx. 4)? "Who hath bound the waters in his garment? Who hath established all the ends of the earth?" And so in Ecclesiastes, as I mentioned: "The Sun riseth," etc. (i. 5).

I have recited these passages to add additional support to the arguments adduced in this work, in which the scientists have applied themselves to speak on the subject of the origin and sources of matter. It is no light theme, since from them are derived all created things and their forms.

QUESTION LIII.

[Bodl. —; Ad. LXII.]

Why does the wind blow round about the habitable parts of the globe more than about the firmament?

Nephew: He who doth not regard thy words has indeed lighted upon evil conditions, inasmuch as deepest lore is revealed unto thee; and it is on this account, in consequence of thy vast knowledge, that my heart is firmly set. Teach me, then, why the wind blows round the habitable parts of the globe more than round the sky; for thou hast spoken in my ears, saying, that the wind moves by reason of its nature and of that similar to it; and if this be the case, it does not move higher than that which its own nature demands. And, therefore, when you say to me that the wind encircles the habitable earth, I ask: Is it fond of separating itself from its place, or does it love it, namely, the earth and water, from which it springs, according to your statement? If it be attached to its original place, why does it separate and rise from the earth at all? And if it is not, why does it not ascend to the skies?

Uncle: If my *Nephew* has come to investigate the nature of the wind to know its course, having applied himself to understand, and to bring relief to himself (for your question shows lack of knowledge concerning the origin of this phenomenon), then all I can say is, that in writing on the subject of winds,

I stated air comes partly from earth, and partly from water; and there is further superadded something of the nature of fire, to produce sound; so that when the characteristic of sound attaches to it, it approaches the fiery element, which is proportionately light, in consequence of all the moisture that abounds in it; whereas the colder elements do not leave it to rise upwards, namely, water and dust. Thus there is (in wind) some characteristics that weigh it down by reason of its "cold" and "dense" moisture, and some lighter element in consequence of its "warmth"; hence, when it has to move about, it is unable to rise through weight of moisture, and it is unable to descend through the lightness of the warmth in it; and thus prevented, it hovers over the face of the waters, and round about the habitable portion of the globe.

QUESTION LIV.

[Bodl. —; ?Ad. LXIII.]

Whence comes the force of the wind to produce sound?

Thy words are longed for by me more than any desirable object; and I place the edge of a sharp sword to guard them, while you inform me concerning the source from whence winds rise, their movements, their shock, and their ceasing. I marvel whence the force of the wind to be able to splinter and break rocks in pieces, and with such great thundering noises.

Uncle: I pity you, indeed, if your stony fence is beaten down by reason of the destructive tempest, and you know not whence the force and power of the wind to overthrow such fences. Understand, therefore, that the force of the wind is derived from its weight and speed, when it has once been bottled up for some long time in the earth and has not found vent for itself, settling there in stillness till there comes the opportunity for its breaking forth. Everything subject to separation ultimately comes forth only by force, when being detained for a length of time, and then, in being released, it makes a thundering noise; whereas if it lodged there for but a short time, it comes forth quietly.

QUESTION LV.

[Introductory to next.]

This is the dialogue between Uncle and Nephew.

The author *Parchon* came near to the right explanation when he dilated on the subject, and gave a popular interpretation in the following form: Vapour, when rising from the earth, does

not come from the rock or hard mountain, nor from dry and arid soil, where there is much traffic, but only from slack spots like ponds and meadows, and from the sides of the earth; for when the sun goes beneath the ground in the night it warms the earth, which is itself like mire. It is on this account that thick vapour rises from it, and the wind brings it to all the corners of the world, becoming like a strong garment, and moves it as a ship is tossed; and from that motion arise sounds and thunder.

I have further heard that, owing to the rains which are in the firmament above the sky formed from the world's atmosphere, when great heat is generated, the lower sky is warmed by the heat, and the rains flow upon it from the sky above it, and make the sound "Tuk, Tuk," as when iron becomes white hot by fire, and water be dropped upon it.

You can know that this is true, since such noises do not come in winter-time, only in summer, and always after intense heat, and near the rain season. Should they occur in winter, it is through the heat owing to the cooling of detached air; but on this point he has expressed no view, only concerning noise and thunder; he has not spoken with regard to the fury of the winds.

I will now return to the dialogue between Scientists, the explanation on the subject given by the Uncle to his Nephew.

QUESTION LVI.

[Bodl. —; Ad. LXIV.]

Whence proceed noise and thunder?

Great as have been the searchings of heart on the part of my Uncle, for his is not fatty and clogged, yet there is a subject which men have not touched upon, and which has also not entered the chambers of their hearts, namely: Whence comes the noise of the thunder? Dost thou know how it comes about that when they have sway over the earth, the people are affrighted at the sound, their hair standing on end; and not human beings alone, but even domestic animals, when they hear it, return to their homes; and as for the wild animals, they stick close to the oak trees; and as for the birds, they avoid the air, and they hide in the forests, and in the thick foliage. There are also objects that find their shelter in some other substance, in the very heart of that substance, so as to do their work. Such are pearls, when they hear the noises before their work is finished; they leave off, and fleeing, hide themselves in the deep sea, and do not return until the noises have ceased. Now canst thou unravel from thine own understanding this problem, and enlighten me on it, being the one person in the world to know it?

Or, dost thou share the views of the rest of the world who know nothing of this thing, the conspiracy (of silence) being so strong and hard, thou being associated with them?

Uncle: Why thus pursue after me? What is the matter that you assemble against me? This has broken the staff of the wise; it is therefore hard to explain to you, unless your heart induces you to believe; but if you will direct your heart to me, you will understand it before you lie down; and as for him who is prepared to meet my views, he will dwell securely, free from worry.

The matter is true beyond doubt, and there need be no palpitation of the heart, that the air which comes from the earth is, by virtue of its natural sweat, raised on high above the earth. This you can verify by observation. There is the fine mist, the thicker vapour mid-way, and still thicker, and then the most dense, in proportion to the quantity of sweat issuing from the ground which produces moisture. To repeat, there is the mist thick as mud; there is the finer; and the thickest of all, which when rising above on to the highest places, is killed by the cold which issues from the atmosphere, the sweat once again becoming cloud.

But if it should happen that the cold air meet the mist, which in reality is sweat, then with the cold wind the air which comes from the sweat would be turned to hard frost; and this frost, coming from the cold, would expand far and wide in the air, and be maintained by the lower atmosphere that keeps it up so that it will not break. Should it, however, happen, either that it meet a strong wind, or in summer-time heat without wind, then the frost would be melted by the strength of the heat or broken by the strong wind; and when the wind reduces it, so that it find no hold, it will then melt, and fall. You can both feel this, and observe it by the eye; for in winter when the noise comes, your ears will tingle when it breaks and splits; and similarly in summer when it melts, your ears will hear it. Then if from such causes thunder and noise arise, be not surprised at the occurrence; for you can observe the clouds with the eye, and by feeling you can distinguish the frost at the time when the wind blows, and it melts when cracking. These things will, therefore, not appear to you so very strange, since you can hear them with your ears. Why then be confused and gnash the teeth, and blink through fear of this, reeling like a drunken man with gaping mouth, when you taste what is unpalatable?

But know, that what has influenced thee is thy ignorance of the origin of things, which has closed thine eye from seeing, and thy heart is too poor to understand—the cause of so many

people stumbling. For the heart enveloped in gross darkness, and not arriving at true perception, is continually groping about like a blind man in the dark, for he does not put faith in the words of the wise, who see things with their mental vision and with their physical eye.

Therefore, look well to the problems concerning the origin of things, so as to understand how they follow their own courses; be no sluggard, unwilling to gain knowledge, deeming it such a heavy burden. I have found many such, who when I spoke to them, paid no heed to my words, nor did they incline the ear, and so my word went forth abroad, mocked at in the world, they talking nonsense in explaining the way of the thunder. And if you wander after them, you will become as one of them.

QUESTION LVII.

[Bodl. —; Ad. LXIV.]

Whence come frost (or hail), called grêle, after thunder?

Nephew: He who listens to thy words will rejoice, but he who mocks at them, trouble will overwhelm him. Correct me then in thy love, but consider me not a nuisance, when I take courage, and apply myself to the acquisition of learning and knowledge, justifying to myself the words which I spake (or, thou didst speak) with regard to *Kohleth* and the origin of air. But as regards the frost coming from the air (as you told me), I cannot understand it, nor come to a decision, as to how the air can carry it; and if it be broken up, as you say, why no big pieces are visible.

Uncle: You have the right on your side, as I was too brief in my explanation. But now I ask you to ponder the way of frost, its original causes and effects. Have you ever seen, after the noise of thunder, the frost called grêle?

Nephew: I have often told you that I have seen it.

Uncle: I have frequently seen frost like crumbs, and man and beast killed in consequence of their dropping from the air. And now do you know the cause of this, and whence come these morsels of frost, called grêle? They come from the numberless clashings of the clouds, when the air coming from the sweat of the earth is broken, and it turns to cloud (becomes cloud), and is turned to ice. And when the portions are crushed and beaten very fine, and they come down upon the earth, which is their destination, if the air near the earth is cool, then the wind cools it, and "scatters the hoar-frost like dust," as ice called grêle; but if the air be warm, the morsels of ice dissolve, and they turn once again to water, but creatures do not grasp that it is mere water.

Hence it happens that rain or bits of frost, called grêle, come after the noise of the breaking of the ice. Now keep this in mind, and do not be troubled about it; for it is not that small pieces are produced in the sky when you see them falling, and that they return, but that ice was extended overhead, and by the impact of air it is broken into the shapes found on the ground, remaining in that state in proportion to the temperature of the earth.

QUESTION LVIII.

[Bodl. —; Ad. LXV.]

Whence the lightning-flash at the time of thunder?

The lips of the wise scatter knowledge; so I trouble you at intervals, time after time, you whose pleasant words are as honey from the comb; I long that my soul may be revived by them, enjoying this honey of honies. For this reason I beg you to instruct me: Whence comes at the time of thunder the flash of fire, lightning, that lights up the world, and all that are beneath the heavens see sparks of fire escaping? True, I have heard many dilating upon the matter, but their reasons do not hold. And, therefore, I cannot justify their statements.

Uncle: This is a question which has a right to come into the very courts of the wise, and to reach them in the innermost temple of knowledge, namely, confirmation of the origin and nature of the thing that giveth light to the eye of man. At every impact of two objects that rush towards each other, by the very fact of their rushing there issues first as a result of their impact that which is light in their composition, and the light elements inherent in the nature of cloud takes the form of fire, inasmuch as cloud is a combination of the four elemental properties, the lightest of which in every body is the element of fire; it therefore follows, that fire comes forth through the force of the impact of the bodies, and it sheds its light to the corners of the earth. In the tent of the middle atmosphere, the impact of the bodies, i.e., the clouds, strikes the structure of the firmament, and owing to their impact, lightning and a flash of fire are emitted.

QUESTION LIX.

[Bodl. —; Ad. LXVI.]

Whence come fires after thunder, and why do they not fall always?

Nephew: Wherefore does there not come after all thunderstorms the noise that splits with flames reaching to the sky, and

burning and hewing down things, known by the name of *polderon*? Surely several sounds are heard in addition to it. And lest thou shouldst think me a fool, I shall not be silent, so that thou shouldst not gloat over me and say, I have put him off with a reed.

Uncle: You seem to me to be an ambush-man, stabbing as with spears; yet I will not be afraid of thy voice, I will rather reply to you gently, so as to extricate you from the band of fools, causing you to apply your heart to the learning of the wise. There is no noise like that of the thunder called *polderon*.

Noises are divided into three classes, and there is but one of the nature of fire. One divides and cuts everything it meets; the second burns like burning iron; a third breaks like stone. From these three different natures, you will understand how it happens that when bodies meet and come to clash, sometimes it is stone that comes down, sometimes fire, and sometimes air. If bodies meet in which there is nothing but wind, only air issues from them, in which case there is fatal danger, when it descends upon the habited parts. And when it happens that bodies meet fire in those clouds in which there is ice, as we remarked, and the clashing in contact is great, there issues fire from them, which is light in nature; while if the clash is slight and weak through the contact, there issues something of the nature of stone, which Greek scholars term "serlion" (?) (*Adel. Kerauninus*), shaped like the stag and ram, and it breaks the ice.

So explain the wise men. But I, the copyist, say: We find it expressed in Scripture thus: "Out of whose womb came the ice? And the hoary frost of heaven, who hath given it birth?" (*Job. xxxviii. 29*). This is what God spake to Job; and without this utterance, he would not have known it. But in the words of Elihu, it is said: "Out of the chamber cometh the storm" (which means the winds); . . . "By the breath of God ice is given" (*Job xxxvii. 9, 10*).

It is not proper for men of humble and obscure rank to multiply words on this point, much or little, from their own ideas; for even in this which I have written, I have gone beyond my knowledge in the attempt to understand the nature of the atmosphere, when it becomes spoilt and repellant. Such is my explanation.

QUESTION LX.

[Bodl. —; Ad. LXVII.]

How do thunder and hail obtain the force to pierce an object? Since you made a beginning with the origin of sounds,

I would gather the following additional information and ask: Whence does there proceed the mighty force which sends forth from the contact of clouds a substance, whether of the nature of fire or air or stone, mingling with the dust a thick atmosphere as it sweeps a long distance, and descends round about the earth, sometimes destroying cedars, throwing down towers, burning houses, and penetrating into the crust of the earth, and there is no one to oppose it?

Uncle: Give me a little respite, and I will tell you, and you may profit by the utterance of my lips. Understand and see that any object which, in meeting another, has the hold upon it, and is able to pierce and break it, does so by virtue of the momentum which it gains in its course more than by any inherent force within it. You see it in fighting, how riders pierce a thick shield with a small lance, one even not tipped with iron. Again, it often happens that the speed of horse and rider is of greater avail in the conflict than any particular strength in them; it is the speed, you see, which counts in favour of the rival, and in proportion to the strength of the thrower. Here you have the reason for your question, why, in consequence of the force of the impact of two bodies, the speed and the flight have the power to pierce, whether it be fire, air, or stone.

QUESTION LXI.

[Bodl. —; Ad. LXVIII.]

Why is not the sound of thunder heard before the light is seen?

Having once applied myself to these matters, I am desirous of knowing them from end to end. When you say that it is due to the impact of two objects that the sound comes first, and that the sound takes the form of fire, and this distribution of fire it is which consumes things before our eyes, you imply that the fire comes after the thunder, since it is only after the crash resulting from the impact that the fire issues forth; then I would say: Why is the fire seen before the crash is heard? How will you account for the theory of cause and effect, when from the contact of objects fire is produced, realising that the sound is only heard after the air has been disturbed?

Uncle: Your heart has spewed out some little folly; your hardship is great through your undigested matter; nevertheless, if you determine the subject for yourself in its right light, you will cause all this vain meditation, resulting from your thoughts, to be overcome; for it is not right to look for the explanation of the cause and reason of things in nature simply in their chance

meeting or force of impact, but as brought about by the force and pressure of the natural laws of sight and hearing. Now, to extricate you from the chance of stumbling, I will make the following comparison; for every one, however hard, should be willing to grasp a subject when presented by comparison. You are standing upon a high and lofty mountain, and see at the foot of the mount a man hewing wood or breaking stone; you see in the twinkling of an eye his hand inclining to cut, whereas the blow only comes a moment later. So is this matter. Thick clouds run between us and the place where the clouds meet, which robs us of the power of hearing it at once, but these are unable to shut out the flash of fire that flashes to our eyes; this, however, is quite a natural thing; for the perception of the eye is keener than that of the ear, although the moment when the flash is seen is the same moment when the thunder takes place. The eye, however, sees things at a distance, whilst the atmosphere conveys the sound to the ear, and its passage is slow, not reaching the ear till after the lapse of a moment.

QUESTION LXII.

[Bodl. —; Ad. LXIX.]

Why has the Moon the lesser dominion?

If I be in thy sight as a boor, and my errors enough to make one shudder, it is because there is not one among men with an open ear, whose protection you can secure; so if I do ask some little foolish question, close your eye, and shatter it like a potter's vessel. See, we have talked about the earth below, and its characteristics; next, it was our duty to ascend in the scale, and speak concerning the air which intervenes between us and the sky, and its natural condition; and now I'll turn and attempt a complete ascent to the heavens, since the subject which is difficult my heart shall open, as I run after thee to listen to thy statements.

Now this question stands forth first: "Why is the moon circumscribed in her rule and in her beauteous light more than the plexus of stars and sun?" Why, in fact, should she not be equal in dominion? On this point I set my thoughts towards thee, and shall be corrected by thee. For I say, the world is made either from something within itself, or out of something that is existing. And if the moon, which is one of the largest creations, began its existence through some matter, why was her complete circle narrowed, considering, too, that she is nearer to us than the sun and stars, which have not grown less in size than what they originally were?

Uncle : Now you have crossed forts and watch-towers, and broken the doors and bolts of intelligence by reason of strength and power; therefore dost thou go forth with a high hand; nevertheless, there are still left horns (of difficulties), these thou canst not break. They are the two questions which you ask: Whether the moon was created out of itself, or out of some other matter. You may select whichever of the two you please; but do pay attention, and see why the moon was created, and do not consider what it was prior to its formation.

I have heard people lamenting and saying, Why is the moon during all the days of her rule (not) complete? meaning, Why is it not a perfect round? We should have thought that it might always be round, and necessarily giving light from its own self, and not from some other object. But it is not so; for its light is entirely derived from the sun above it; and when she gets near the gaze of the sun, and appears to us obliquely, in proportion to its nearness, its light is reduced to a third, fourth, or half. Hence the cause of its reduction in size. You also know that drought and great heat prevail in the world when the sun is in the constellation Cancer, and that the sun rules for 365 days and more; therefore its heat is variable in the longer interval, as you only experience its chief power in Cancer. Had the power of the moon come from herself, we should not have been able to stand it in the world, inasmuch as her rule is renewed month by month.

It is for this reason that the Creator, blessed and exalted be He, who fashioned the moon, did not endow her with force evolved out of herself, but fixed a period for her to renew herself, namely, every month, to be larger or smaller according to her aspect towards the sun, from which she derives her power. As for the sun, his form remaineth, and does not depart. Not so the moon; being in the lower degree, she changes her light according to her distance from the sun. The light of the moon is subject to extraordinary occurrences when it enters upon the earth between the moon and the sun, in the head or tail of the heavenly "Dragon" (*i.e.*, the moon's orbit). You will not see the sun in the day-time; and in the night, when she gets in position over against the sun, the light of the moon will be wanting.

Finis, Finis, Finis, Amen, Selah!

Translation
of
Bodleian MS. (Hebrew).

TRANSLATION OF BODLEIAN HEBREW MS. (2135 Neub.)

Now these are the questions put by a scientist to his uncle, who was a great man of science.

I.

(M. xi.)

O, Uncle, my light and honour! I know that counsel and wisdom are in thee to afford me instruction; now, Why do grasses spring up that have not been sown?

O, Nephew, because God Almighty does wonders: He it is who decreed, and things came about, since He doeth all that He wills. He saith and decrees: "Let the earth bring forth grass, herb yielding seed (Gen. i. 11)," and in accordance with this decree, herbs spring forth unsown and without the help of man, some for good, some for ill, nothing to be added to God's decree.

Then why should not other products and objects, by means of which human beings subsist, grow without man's aid?

O, Nephew, understand that it is because of the decree which He pronounced and the curse concerning the first man's sin, when God Almighty exclaimed, "By the sweat of thy brow shalt thou eat bread. . . . Thorns and thistles shall it (the earth) bring forth to thee (Gen. iii. 1, 18)."

It is for this reason that products do not spring up without the help and toil of man.

2.

(M. xiii.)

O, Uncle, why do herbs spring forth from the ground in consequence of four bases, seeing that they are cold and moist, warm and dry, corresponding to the conditions in man, derived as he is from fire and water, dust and wind, scientists and philosophers saying, that earth and dust are cold and dry, fire warm and dry, water cold and wet, and air warm and wet?

Now herbs, composed of four bases, how can they spring from the ground which is cold and dry?

O, my Nephew! It is well known to scientists that grasses do come from the four bases, and so does earth come from the four bases, and so fire, and so water, and so wind, all come from

these four bases; but with this understanding, that as regards the dust of the earth, the cold and dry elements preponderate more than in the other of the three bases, since the ground was created cold and dry. It is in proportion to the nature of the earth from which it springs whether it be warmer or colder, or more moist or dry, that determines the kind of herb that springs forth from the ground.

And so the command, "Let the waters bring forth abundantly, etc. (Gen. i. 20)," refers to the rearing of fish; and since they are brought forth from the waters, and since each one is created from the four elements, each of the four creative elements could not by itself bring forth anything and cause it to rise, i.e., either fire or water, dust or wind. Things, therefore, sprout forth and grow from the four bases wherever they exist in larger quantity, each one according to its species.

O, Uncle, you have told me with reference to the production of herb from the ground; but what about the other three elemental sources, fire, water and air, what do they produce and send forth?

O, Nephew! I answered you with regard to waters that they bring forth a living creature, namely, fish, produced in the water; as regards the wind, which is air and cloud, it rears the creature called *Lilith*, which dwells in ruins of houses or cities; and as for fire, it produces the bird called "Salamander"; medical men agree on this point.

3.

(M. xiv.)

Uncle! Why does a tree engrafted with another tree called *ente*, when producing fruit, bring forth fruit of the kind of the tree and not of the graft, the growth of which is from the earth, its roots spreading broad and long? How can the fruit deal so treacherously with its origin as to take its strength from the smaller tree, and not bring forth from the larger root?

O, Nephew: Thou knowest that the branch (?) of a tree, i.e., the root, when cut, will not rise and grow, and the root which produces the sap will only retain as much as is necessary, leaving the rest to the graft, just as the *nephesh* (vital part) of each living being retains what is requisite for it, emitting to the other members what it does not require for itself. The graft, however, with which the tree is engrafted causes it to grow and rise, to bring forth buds and blossoms, producing the growth of fruit; and because the fruit is nearer the graft and further removed from the root, it partakes of the nature and species of that nearest to it, and is removed from the character of that which is distant from it.

The following has reference to beasts and birds:—

4.

(M. xv.)

O, Uncle! Give me to understand why some animals chew the cud?

Nephew, know that there is a difference in the constitution of man and beast on the side of coldness and warmth. Through the heat of the stomach the food is ground until it becomes small; this is the case with oxen and sheep, goat, hart and ram. Therefore medical men call such animals that chew the cud cold by nature, the *Goyim* calling them *melancholic*.

O, Uncle! If the animal chews the cud through cold, why do not such as the horse and ass, which the doctors call cold *melancholic*, chew the cud?

Nephew, it is as you say, that they are cold, only they are warmer in degree than the animals afore-mentioned, viz.: oxen, sheep, goat, hart and ram.

There are, moreover, further evidences of animals not chewing the cud, namely, when they have teeth upper and lower, so that they can grind their food well.

O, Uncle! You said that every cold and dry creature chews the cud; why, then, does not man, of a cold and dry nature, chew the cud, seeing that the doctors call him *melancholic*?

Nephew, there are human beings cold and dry by nature, and yet in spite of this, they are warmer than the animals mentioned above. But you sometimes see people who, through an excess of cold in their stomach, do not masticate their food, so that it comes back into their mouths, and they spew it out. It is because man has the knowledge to recoil from the food which he has once swallowed, that he spews it forth.

5.

(M. xvi.)

O, Uncle, inform me why animals that chew the cud, when lying down, crouch on their hinder parts and hind legs?

It is, Nephew, because all animals have the most part of their fat on the side of the heart and downwards, like the ox, and such as are cold and dry; and the liver it is which weighs it to one side, and through its weight it lies on the side of the liver, which is rearwards.

But, Uncle, if such animals as mentioned lie down on their rear on account of the weight of the fat, why do they not rise on their fore-part, which is the easier for kneeling, for in the case of animals, "as they lie down, so should they rise up."

O, Nephew, know that all animals that have fat chew the cud, and the cold fat weighs them down; and because they have fat particularly thick, and loins strong, and because of this being

fixed, they lie on the side which is behind the liver, and their stomach becomes warmed from the cold which had weighted it down; thereupon, in consequence of its extra warmth, it is more easily strengthened.

6.

(M. xvii.)

Uncle! Why are the habits of some animals different from other domestic and wild animals? I mean, all of the latter drink and urinate, while every winged-bird drinks and yet does not urinate.

Know, my nephew, that all domestic and wild animals are reared on milk, and the milk is derived from the juice of plants and the moisture in foods; the milk forms material for urine, water poured out upon the ground, and produces sap in the passage of the bladder. Having once formed this material, the aperture is no longer stopped up.

Now, the bird does not have milk to begin its nurture, nor does its growth come from such things as have moisture, but from small stones or grain; and when the stone or produce comes at first into its interior, it closes up the place (or cavity) of the water, and the moisture within it does not reach the closed place. By reason of the sap, the feather grows, and the sap enters into the growth of the feather. You will know and understand this by squeezing one of their feathers, for you will find moisture in the hole of the feather in which the feather grows, and the sap will issue forth as the feather grows.

7.

(M. xvii.—contd.)

O, Uncle! Why have some birds stomachs, called *gois*, and others gizzards, called *gésier*?

Understand, Nephew, that no birds reared from the earth have a stomach, for it would be of no use to them, but they have a gizzard, which is stronger and harder than a stomach; for the gizzard is made to grind small every hard thing, being as it is full of sinews from without and within, and muscle between the inner and outer sinews. It is exceedingly strong, and therefore crushes everything that enters it. But the stomach has no such strength; it is only able to grind fine food.

8.

(M. xviii.)

Uncle, why do some animals and birds see in the night, while others do not?

Thou knowest, Nephew, that the eye has four skins (films),

in which are found three substances: moisture from which proceeds sight, called "specks" (*nubecula*); the first is white, by means of which sight is distributed, and it is all sight; the second, upon which sight is concentrated, so that it shall not be dispersed, which is not as white as the first.

[Something wanting in my copy—added by the copyist.]

9.

(M. xviii.—cont.)

Uncle! How comes it that the white of the eye changes to yellow? We should not be surprised if it changed to red, since when there is too much blood, it goes to the eye.

Know, Nephew, that the liver is the fount and source of the blood; and the red gall attached to it draws the moisture and the waste from the blood of the liver. Now if the gall be too full, or it be poured into the liver, and some of the fluid becomes mixed, and spreads and disperses through the whole body and in the eye, then the white of the eye appears yellow, because the organs are weakened through the change in the blood. Hence King Solomon's words: "Thou art beautiful; thou hast doves' eyes." (Song of Songs iv. 1), for you can judge from the eyes as to the health of the body.

10.

(M. xx.)

O, Uncle! To me it seems a great wonder, as to why the beast has an advantage over man; for beasts have instruments of defence fixed to their frame, while man has not, or they have means of flight. See! the ox has horns, which is its instrument of warfare; bears have tusks, which are theirs; the lion has claws wherewith to fight; in like manner many other animals have various means of protecting themselves; rams, conies and hares, e.g., and many others have nimble feet, which enable them to escape from their pursuers. Man, however, has none of them.

Understand, Nephew, that the Creator has given man an advantage, inasmuch as He has planted in his heart the instinct of device and prudence, and faculties of counsel, to catch all such animals by his designs, to seek out instruments of defence in warfare, or to search for peace with his foes, to allow good understanding to supervene, and to take sweet counsel together. But animals being devoid of the powers of speech have need of weapons for flight and defence.

Now, if man had such weapons attached to his body, he would despair on seeing that in peace-time there was no opportunity for using them. Again, if men were fleet as the stag, man would set his mind and be bent upon becoming a wild person,

and he would pay no attention to become a man of intelligence, capable of appraising knowledge and understanding his Creator, while his thighs and legs and the members of his frame generally would take the place of weapons through their racing; and if the despoiler or war itself should come upon him suddenly, he would not be able to rise and stand up and bear arms in the fight, when it is needed. Therefore God has created man upon this plan, so that he be quiet and at ease when peace reigns, and yet able to equip himself when the time of war demands it.

11.

(M. xxi.)

O, Uncle, it is hidden from me why a man of ability forgets, and a fool remembers things.

Understand, Nephew, that the heart, more than any of the other organs of the body, receives the whole power of thought and of the soul, and therefore all the members of the human frame are subservient to it. There are parts in the body which contain cords emanating from the brain to the eyes and ears, and all of which serve the brain and heart; in this way, that one comes from the brain, a second from the heart, and the third from the remaining members. In the brain there are four compartments; the first about the forehead, which is the store-house for faces; then the store-house of feeling; then that of memory; and lastly that of touch. The brain is, as it were, a spring to water the whole body, by means of the spinal cord which comes forth from it, similar to a stream which comes forth from a spring. All the chambers have marrow in them like to its original source; in the forehead there are two cavities in which are concentrated the faculty of perception, and from whence starts the thinking power.

I would now explain to you that understanding proceeds from "the form." When a man sees a person or a horse or an animal or any other object, it is by means of the store-chamber of faces that he comes to understand whether it be a man or beast or some other thing, and what its name is; whereas if this chamber be damaged by a knock or wound or any such accident, he may observe, but he will not recognise, the object.

All this knowledge comes from the moisture in the marrow of the respective compartments; and of all that he observes and recognises he forms a clear judgment by means of sight, and he distinguishes what he observes, and subjects the store-chamber of sense to judgment and feeling for the benefit of his body.

Now if the chamber of sense be hurt, the patient could not feel or perceive anything, and would be like the beast.

Whatever a man has judgment upon, the store-chamber of feeling gives it practical effect by virtue of the chamber of recol-

lection, in which memory resides, and sets a seal upon all that the man's eyes see and his ears hear, observing in order to recognise, and to form a judgment, by means of the other store-chambers. Now this particular marrow is drier than that of the others, so that whoever possesses dry marrow will have a retentive memory, while he will not have cleverness, for the latter proceeds from the moist marrow of the brain.

12.

(M. xxiii.)

Uncle! Why is the nose above the mouth; it is, indeed, objectionable that the mucus of man should run down upon his mouth?

Because, Nephew, there is heat in the marrow of the head, and mucus flows down from the marrow, the nose is placed near it to bring down the mucus from the right and left by means of two apertures in it, lest the nauseous part which comes down from the marrow in the head descend into the mouth. And since the mouth is on one side of the body, and there is no opening from the body (upwards) to the mouth, the mouth is placed near the stomach of the body, to bring down and spew out the mucus of the stomach.

13.

(M. xxiv.)

Uncle! Why does the hair of a man fall off in front and not from the back?

Nothing, Nephew, enters the stomach of man's body but through the mouth. The food in the stomach is ground and cooked as in a kettle upon the fire; the smoke then ascends upwards into the head through the openings, this way being the shortest cut to a man's face, and furthest from the back of his head. Know, too, that in the stomach, which boils like a kettle, the pores spread and widen, and through it steam passes with the moisture, so that the hair is unable to stand the smoke that rises through the widening of these pores or apertures. It is for this reason that it happens that young men who are over-heated become bald, the hair being unable to obtain a hold in them in consequence of the smoke and heat that rise to the head through the width of the pores.

14.

(M. xxv.)

Uncle! What is the nature of sound that comes from man?

Know, Nephew, that the voice or sound that comes forth just as the soul (*Neshamah*), is simply air, as you observe in the case

of any instrument. Furthermore, the air existing in man's mouth, and expelled outwards by the tongue and throat, is simply air coming out.

15.

(M. xxvi.)

Uncle! Why can you not look through an iron, copper, or stone wall, seeing that the power of the eye is greater than that of the ear, and man is able to see at a distance that which he cannot hear?

Understand, Nephew, that sound, which is air, passes through pores which are not visible.

Then, Uncle, why has not the eye the power to see through such apertures, as the ear has the power to hear through them?

Because, Nephew, gloom and darkness are enemies to the eye, and the eye has power to see the wall, as the light of the sun shines upon it; but it cannot see through the wall: this the eye is unable to accomplish.

16.

(M. xxvii.)

Uncle! Teach me concerning eye-sight; why does the eye see?

Know, Nephew, that in the brain there is a very rare air created from the species of fire, which comes down through the two nerves that proceed from the brain to the apertures of the eyes, and these are called organisms; no ending of them appears in the whole forehead and its surroundings, all being hard, with the exception of these two openings, which are exceedingly delicate. From these come sight, which is also called an organ. Furthermore, the eye is composed of the four basic elements, though the fiery exist in it to a greater degree than the other three. Now as to why when the eye be closed, sight does not altogether disappear, you must know that whenever any object rests, it gains strength through resting; and so the air from which sight proceeds, when it stops looking hither and thither, is by that very cessation strengthened in character when once again the eye opens.

17.

(Cf. M. xxxi.)

Uncle! Why does man see his face in glass?

Know, Nephew, that gloom and darkness are enemies to the eye; hence pure sight is on the side of the eye, and darkness on the other side. The eyesight extends as far as the darkness, no further, and it then returns to the eye, reporting what it has seen. But the glass which is clear on both sides arrests the object seen, and does not bring it back to the eye.

18.

(M. xxxii.)

Uncle! How is it that a man, standing in the light, is not seen well by one standing in the dark, while they standing in the dark see well those standing in the light?

Dost thou not know, Nephew, that light and darkness are foes, and that when the eye gazes at the darkness it finds no support, and wanders from its path. But when the eyes look at the light, from which they are derived, since sight is from the *Neshamah* (soul) in the brain, which is the light of life, they rejoice in their fellow-creation, and the same when they gaze at the stars, which are equally of the same nature, since they are of one and the same creation.

19.

(M. xxxiii.)

Uncle! Why are the eyes in front, and not at the back of the head?

Thou knowest, Nephew, that the brain consists of three parts, and that whatever the eye sees it reports to the *Neshamah* which is in the brain, by means of nerves. The first chamber is that of observation, storing that what the eye sees; the second subjects it to the judgment of sense; and the third commits all to memory, and puts the seal on it. If, however, the eyes were at the back of the head, remembrance would depart.

20.

(M. xxxiv.)

Uncle! Why is the nostril the organ of smell, the palate that of taste, and the hand the organ of touch, so that one is not able to do the work of the other.

Because, Nephew, it has been so ordained that each should but do its own work. The nostril will not smell, unless it finds some external object to smell, whether it be bitter or sweet, a perfume or apple, or something nasty, since smell comes from the atmosphere existing without, which atmosphere reaches to the nostrils, and they therefore perceive the smell. Now the nose is planned by creation for smelling, for the nose has length, and it runs to the brain, in which lies the *Neshamah*.

The same applies to the things which come from the brain to the palate and tongue, and to the hand called "the instrument of touch"; the hand is able to distinguish between cold and wet, and warmth and dryness; the palate and tongue taste through the nerves of the brain, wherein the *Neshamah* resides.

21.

(M. xxxv.)

Uncle! When the heart of man would be glad, why do tears

flow from his eyes when he has some joy, and whence comes weeping?

Know, Nephew, that gladness broadens man's heart, and it brings forth, begets, and generates in a brief period of time warmth, and that warmth is of varied character; and for the time being its steam and moisture ascend to the brain, and being moist they drop from the brain to the porous openings in the head, and along that way water descends into his eyes, and his eyes drop tears.

22.

(M. xxxvi.)

Why, O Uncle, does both warm and cold air come out of man's mouth?

Understand, Nephew, that wind from the air goes in and out of the body round about the heart; and from the heart it goes to the veins which pulsate like the billows of the sea, and the soul thrusts off the heat, and draws the cool air from it. Hence when you press the pulse, it is found that the wind which has already entered the body, and leaves the body immediately through the mouth, is very warm; and that wind which man draws from the air into the mouth, and breathes out before it enters the body, is cold, as you see in the article named a bellows (*soufflet*), with which they blow the fire.

23.

(M. xxxviii.)

Uncle, how is it that the body can stand hot food more than the mouth?

O, Nephew, thou knowest that all the members nearest the heart are warmer than those further away. Now the throat is nearer to the heart than the mouth; hence in degree it is warmer, while the mouth and tongue are colder, they being further away from the heart. When, therefore, the mouth and tongue taste food which is hotter than is right, they cannot bear it; but as soon as it enters the passage of the throat, which is warm, it is able to bear it. You can see it yourself in the fact that if your hand is warm, you cannot touch even cold things, and if your hand be cold, and it touch something too hot, it cannot bear it.

24.

(M. xl.)

Uncle, why does not the new-born child walk at once, like domestic and wild animals which, immediately at birth, walk on their feet?

See, Nephew, man's frame is much more delicate than that of the animal, it having been planned so by Creation that man should walk with upright posture, looking heavenward, inasmuch as he was created out of the Spirit of the Creator, and the Soul is desirous of understanding her Creator.

The life of the animal, on the other hand, descends downward towards earth, and therefore the Creator created it with big limbs, each one according to its burden, designed to serve and minister unto man; hence his large and hardy frame.

25.

(M. xli.)

Uncle! Why is a child first reared on his mother's milk; it seems an unclean method?

Thou knowest, Nephew, that the birth of man is from the blood of the woman, and that after he comes forth to the open, the blood of the woman turns to milk. He, therefore, thrives upon his mother's milk, which is of his own being. So also do animals suckle their young. Now, why is this milk not good for youths and men of age, seeing that milk is the earliest diet of man's upbringing in consequence of its being quickly digested? For this reason, that one article is necessary for tender children, another for youths, the members of whose frame are developed, and another for older ones of stronger constitution, who require nutritious food, so that they shall be able to do hard work.

26.

(M. xlii.)

Uncle! Why does a healthy man become infected when he lies with a woman with whom a diseased person had been lying, whilst the woman herself with whom this diseased one had been lying, is immune from infection?

Understand, Nephew, that man's nature is warm and dry, the woman's cold and wet. Therefore when the woman, in her nature, receives the seed of the infected one, warm and dry, the cold and wet nature of the woman expels his disease, and does not give that seed a chance of destroying her natural endowments, for no cold and wet thing can attract to it the warm and dry, while the semen once sown does not lose its character and force. Now, when a healthy man comes upon her, it happens that he draws unto himself the infection through the dry and warm in himself and that of the infected one which was warm and dry, similar then to his own endowments; for the warm and dry attract the warm and dry, being of one and the same nature, while the cold and wet repel their opposites, not being of the same nature.

27.

(M. xliii.)

Uncle! Why does the female, though cold by nature, long for the male, seeing that men have their desires owing to their excessive heat?

In consequence, Nephew, of her cold nature the female longs for warmth, while male longs for the opposite, *i.e.*, to cool his exuberant warmth; the moisture in woman and the menstrum, cannot, owing to her coldness, be oxidised within her in the same way as it is in men who are warm. The blood, therefore, longs to come forth, and of a necessity it does come forth as the natural effect of coition, although it happens that when a man, tainted by contact with a woman with whom one diseased had lain, copulates with that woman, she does not draw to herself the infection, unless under three conditions, *viz.* : that she gives birth to children from the infected one, or she draws to herself the breath that comes from the mouth of the diseased one, or that the woman becomes extraordinarily heated through copulation.

28.

(M. xlv.)

Uncle! Why does man part from life and die?

My question does not refer to those killed or drowned, for this naturally follows.

Nephew! The soul in the body is created by the Almighty; it, therefore, longs for the rule of proportion found in the human body created from the four bases—fire, water, dust, and wind. Now, as long as the soul is in the body, and these four elemental properties exist in the right corresponding proportion, warmth against cold, and moisture against dryness, one not preponderating over the other, or as long as these four creative agencies are fairly nearly balanced, the soul is rejoiced and finds pleasure in her (the body), so that body and soul become like two staunch friends. But when one of these elementals preponderate over the other three or over two, and they come into conflict with one another, so that one of them gets reduced, the soul then is unable to remain in the body for even an hour. If one of the four becomes so low as to be wanting, the soul quits the body without delay, just as a man flees from before his enemy.

29.

(M. xlv.)

Uncle, why does a man, once satiated, become hungry in a short time?

Man, dear Nephew, is created out of four basic elements, and the cold is compounded with the heat, and the moist with the dry. When these are well mixed, one corresponding to the other,

man is in good health, his food is easily digested according to the right way, and his whole frame and its members are nourished.

But when heat, which is fire, prevails in the body over the other three, the food is instantaneously masticated and digested, and after a short time, owing to the heat of the fire in him, he becomes hungry, because the food which was masticated did not nourish the members properly, and in the same manner as at first; hence he becomes a victim of sickness.

30.

(M. xlvi.)

Uncle! Why does the living one fear the dead, whom he loved as his own self, and as soon as he dies, his love for him vanishes forthwith?

Understand, Nephew, that the living love everything that maintains its character, and hate that which loses its original pattern and usefulness in the world. So it is with the living condition called the association of body and soul. It necessarily follows that the living one loves this association; and once having loved it, it hates the dissolution. Now, after the soul has divorced her, why should she live in the body, which she hates and fears?

But it is only the veriest fool who will think anything of such hate as this.

31.

(M. i.)

Why, Uncle, when a man falls into the water, does he go down into the depths of the water, while when dead he floats on the surface of the water, and you know that a man dead is heavier than one alive?

Understand, Nephew, that man is created out of four elements—fire, water, dust, and wind. The fiery creative agency, warm and dry, is enclosed in the red gall, and its nature is to rise upward; now when the gall is opened, man dies, for the creative agency of air and fire depart from him, and the dust and water portions descend downwards; consequently, the dead are heavier than the living. According to my idea, it is because the body being hollow, it floats upon the face of the waters.

32.

(M. v.)

Uncle! Why are the waters of the sea more salt than other water?

Because, Nephew, the sea is great and wide, and receives the force of the sun's light, and that of the satellites and all the heavenly hosts. On account of its width, it receives all the heat from the sun that shines upon it; and through the sun's heat, the

waters are turned and become thick, receiving the taste of salt. Now, if you enquire of the peoples inhabiting near the sea, they will tell you that, without human effort, they have found the waters left upon the rocks turned salt, owing to the spot being opposite the glare of the sun; while, on enquiring of those removed from that spot, and not opposite the heat of the heavenly hosts, you will learn that they do not have salt ready for them in this manner, by the force of fire or great conflagration. You will see, too, that salt may be derived from sweet water by means of heat and fire.

33.

(M. vii.)

Uncle! Why do all streams go to the sea, and yet the sea is not full, for one cannot estimate the sum total of the rivers?

You should know, Nephew, that just as some rivers go to the sea, in like manner it may be said that some of them derive birth from the sea; as it swallows up, so it gives forth; the waters are carried along under the earth, and are swallowed up by it, and it is in the nature of the sea to restore what is in it; this is the sea's vitality.

34.

(M. viii.)

You say, Uncle, that the streams return from the sea, and no trace of salt is discernible in them; it is found in them when they are mixed together; going to the sea sweet, they return sweet.

Do not be surprised, Nephew, for the waters are carried along in the earth's clay, in the lap of the earth, which is not salt; and what they receive of the waters drops from them in the course of their difficult passage; the salt and the clods sink; and being kept back are refined, so as to return to their original sweetness; but if they pass through earth which is salt or turbid, they remain so. You should know that when Alexander crossed the Great Sea, Aristotle, his teacher, bade him carry with him sand from a land not salt, and he placed a big mound on a vessel, and made a sort of well in the sand; and it came to pass that when they were short of drink, and could not drink of the sea-water, for it was salt, they took of the sea-water and cast it into that well of sand, and it came out sweet.

35.

(M. —.)

Uncle! Why are headaches or other bodily ailments more apparent in the urine than in the excrements, knowing that meat and drink enter the body by way of the gullet?

You know, Nephew, that the excrements are the waste of the food that enters the intestines, the remainder being converted into blood; and that blood nourishes all the members, each according to its importance—the heart, the brain, the liver, the red gall, the millet, the kidneys, the sinews, and the fats—by means of small nerves; all the water separated from the other blood, from which the organs derive their nourishment, going down to the bladder, and entering it; it retains that water; and this it is which is turned into urine.

36.

(M.—.)

Why, Uncle, does the vein of the pulse beat more than the other veins, which do not pulsate; and why do we learn from the pulse whether a person is hot or cold, wet or dry?

Know, Nephew, that when the Almighty created man, and breathed within him the breath of the spirit of life, that spirit being warm and moist, surrounding the heart, sustaining and strengthening it, coursing through the veins that beat, and as it enters the veins, so going forth to the heart, and thence coming out again by way of the mouth—this is breath. Now, since this is very warm, it must necessarily come out, so as to introduce another breath, colder than itself, coming and going like the waves of the sea. In these veins that pulsate, there is no blood as in the other veins, but there is a vein full of the spirit of life surrounding the heart; and physicians can tell, when they feel the pulse, the force and strength of the heart, and whether it has warmth or cold, moisture or dryness.

Finis.



Translation
of
Adelard^{us} of Bath's
"Quaestiones naturales" (Latin).

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QUESTIONS."

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ADELARD OF BATH'S PREFACE TO HIS

VERY DIFFICULT NATURAL QUESTIONS.

On my return the other day to England, in the reign of Henry, son of William,—it was he who had long maintained me abroad for the purpose of study—the renewal of intercourse with my friends gave me both pleasure and benefit.

After the first natural enquiries about my own health and that of my friends, my particular desire was to learn all I could about the manners and customs of my own country. Making this then the object of my enquiry, I learnt that its chief men were violent, its magistrates wine-lovers, its judges mercenary; that patrons were fickle, private men sycophants, those who made promises deceitful, friends full of jealousy, and almost all men self-seekers: this realised, the only resource, I said to myself, is to withdraw my thoughts from all misery.

Thereupon my friends said to me, "What do you think of doing, since you neither wish to adopt this moral depravity yourself, nor can you prevent it?" My reply was to "to give myself up to oblivion, since oblivion is the only cure for evils that cannot be remedied; for he who gives heed to that which he hates in some sort endures that which he does not love." Thus we argued that matter together, and then as we still had time left for talking, a certain nephew of mine, who had come along with the others, rather adding to the tangle than unravelling it, urged me to publish something fresh in the way of Arabian learning. As the rest agreed with him, I took in hand the treatise which follows: of its profitableness to its readers I am assured, but am doubtful whether it will give them pleasure. The present generation has this ingrained weakness, that it thinks that nothing discovered by the moderns is worthy to be received—the result of this is that if I wanted to publish anything of my own invention I should attribute it to someone else, and say, "Someone else said this, not I." Therefore (that I may not wholly be robbed of a hearing) it was a certain great man that discovered all my ideas, not I. But of this enough.

Since I have yielded to the request of my friends so far as to write something, it remains for you to give your judgment as to its correctness. About this point I would that I felt less anxiety, for there is no essay in the liberal arts, no matter how well handled, to which you could not give a wider range. Grant me, therefore, your sympathy. I shall now proceed to give short answers to questions put by my nephew.

Here begins Adelard's treatise to his Nephew.

You will remember, Nephew, how seven years ago when you were almost a child in the learning of the French, and I sent you along with the rest of my hearers to study with a man of high reputation, it was agreed between us that I should devote myself to the best of my ability to the study of Arabic, while you on your part were to acquire the inconsistencies of French ideas.

NEPHEW: I remember, and all the more because, when departing, you bound me under a solemn promise to be a diligent student of philosophy.

The result was that I applied myself with great diligence to this study. Whether what I have said is correct, the present occasion will give you an opportunity of discovering; since when you have often set them forth, I, as hearer only, have marked the opinions of the Saracens, and many of them seem to me quite absurd; I shall, therefore, for a time cease to exercise this patience, and when you utter these views, shall attack them where it seems good to me to do so.

To me it seems that you go too far in your praise of the Arabs, and show prejudice in your disparagement of the learning of our philosophers. Our reward will be that you will have gained some fruit of your toil; if you give good answers, and I make a good showing as your opponent, you will see that my promise has been well kept.

ADELARD: You perhaps take a little more on you than you ought; but as this arrangement will be profitable not only to you but to many others, I will pardon your forwardness, making however this one stipulation, that when I adduce something unfamiliar, people are to think not that I am putting forward an idea of my own, but am giving the views of the Arabs. If anything I say displeases the less educated, I do not want them to be displeased with me also: I know too well what is the fate which attends upon the teachers of the truth with the common herd, and consequently shall plead the case of the Arabs, not my own.

NEPHEW: Let it be as you will, provided nothing causes you to hold your peace.

ADELARD: I think then that we should begin with lighter matters, and if here I fail to give you a reasonable account, you will know what to expect in more important subjects. Let us begin then at the bottom, and so proceed upwards.

CHAPTER I.

WHY DO PLANTS GROW WITHOUT ANY PREVIOUS SOWING OF SEED?

NEPHEW: Since you distrust yourself, I see that you want to sharpen your wits by dealing with smaller matters. I will therefore make the start of our disquisition with plants which have their roots in the earth. I ask, then, how do plants spring from the earth? What reason exists or can be given, seeing that the surface of the earth is at first level and motionless, what is it, I say, that stirs there, springs up, grows, and puts forth branches? For though, if you like, you can collect quite dry soil, and after carefully riddling it put it in a pot of earth or brass, yet as time goes on you will see a shoot springing up, and to what are you to ascribe this save to the wondrous effect of the wondrous Divine Will?

ADELARD: Will on the part of the Creator there certainly is in the springing of plants from the earth, but it is not divorced from reason. That this may be quite clear, I grant that plants spring from the earth, but not from pure soil: it is assuredly a mixture of such a sort as to contain in each of its particles, which indeed are subject to sense, all four elements with their qualities. Most certainly these four samples compose the one substance of the universe in such a way that the component parts exist in each compound, but yet never in such a way as to be apparent to the senses. The fact is, that we mistakenly call the compound by the name of its simple, for no one has ever touched earth or water, just as no one has ever seen air or fire. The things which we apprehend by our senses are compounds,—not themselves, but made out of themselves. Hence as the philosopher says, we ought to use not the terms earth, water, air, fire, but instead earthy, watery, airy, fiery. Therefore since in your earthy matter, no matter how subtly pulverised, the four causes necessarily exist, there arises hence a sort of compound, mostly earthy, to a less extent watery, less still airy, and least of all fiery: it owes to earth its power of cohesion, to water that of spreading, to air and fire the tendency to rise, for unless fire were contained in it, it would have no power of upward movement, and unless water or air, no power of lateral expansion: while finally, were it not for earth, it would have no coherence.

Hence it is that the things combined with wondrous subtlety in your dust, come forth into the light. However, that you may understand the matter with entire clearness, I place the cause of this process in the exterior elements arousing and drawing forth their like, and by their qualities driving it out: hence the inferiors,

by a perpetual process of dissolution, pass over to their likes. Your first question is now answered : please proceed to your next point.

CHAPTER II.

WHY ARE SOME PLANTS CALLED WARM, WHEN ALL ARE MORE EARTHY THAN FIERY?

NEPHEW : No doubt the man with a mere smattering of philosophy but no thorough training in it, will regard your answer as satisfactory, but not so I; nor will you thus escape my net. I grant that plants spring up because some cause drives them forth, and put to you next the following question. Since all roots of this sort are rather earthy than fiery—that is, share in earth rather than in fire, for it is on that account that they have both birth and position in proximity to earth—why are some of them found to be warm by nature, and others cold? For inasmuch as the greater part of them is earth, it follows that the property of earth abounds the more in them. Consequently they should all be called cold rather than hot. If, therefore, as you explained just now, they have derived both their name and property from that which abounds most in these compounds, then all things which are nourished from the earth and in proximity to it, should rather be called earthy and cold.

ADELARD : I cannot deny that their nature is earthy, rather than fiery, for they have a greater share in earth than in fire. But when we come to your inference that being more earthy they are, therefore, less fiery, I part company with you. For the words "more" and "less" are in regard to the qualities of things used in two distinct senses—one, according to *quantity*, two, according to *efficient power*. For instance, this cloak of mine is entirely green; so also is the emerald green. But the greenness of the cloak is greater in respect of quantity, that of the emerald greater in respect of efficient power: hence if you consider quantity, you can say that the former is greener than the latter, but if efficiency, then it is the other way about. Hence in the matter of qualities "more" or "less" according to quantity depends on nature, but this is by no means so in regard to efficient power. In this way, therefore, all plants (since they have a greater share of earth quantitatively) are cold, yet some of them are warm in respect of great efficient power.

CHAPTER III.

WHY DO PLANTS OF OPPOSITE NATURES GROW IN THE SAME SOIL?

NEPHEW : The distinction you draw is not quite correct. Granting that roots are of opposite natures (for some are hot,

others cold), I proceed to ask you, how is it that they live in the same soil. For as everything of the sort obtains its nutriment from the soil, which the Greeks and Romans call "the mother of bodies" (and it is admitted that each several thing is nourished by its like, and destroyed by its contrary), tell me, if you can, how plants of opposite nature can live in the same place, or else grant that they are all of the same nature—but that is impossible.

ADELARD : To test the edge of your intellect, I will protect myself with a shift, and say that plants derive no nourishment from the soil.

NEPHEW : It is easy enough for me to prove the contrary, for when they are plucked from it, they lose not only strength and power of growth, but life itself. Hence it is clear that they have received something from their mother, and when they are deprived of it, die immediately. Again, if they got nothing from it, in vain would be all the diligence of the farmer in working the land. There then is your shift exposed for you, and now you must bring forth a stronger argument if you have one.

ADELARD : Very good : I grant then that they are nourished from the earth, but from a compound not a simple earth—not, that is, from the earth but from the earthy, as I explained before. There being in this the four elements, each plant has food to suck in for itself, the hot plant taking that which is hot; the cold that which is cold; the dry what is dry; and the moist what is moist. You can see this clearly from the fact, that when the outer air robs them by means of the parching summer-heat of whatever they had drawn from the earth, that part of the plant which is above the earth's surface, perishes entirely, while that part which is within the bosom of the earth, its mother, remains protected like a nursing child, and so is kept alive. But wordiness is the mother of weariness : therefore let us go to the next point.

CHAPTER IV.

WHY DO NOT PLANTS SPRING FROM WATER, AIR, OR FIRE, AS THEY DO FROM THE EARTH?

NEPHEW : But you will not go on quite so easily as you think. You have yourself been weaving the halter for your own destruction. If, as you say, the four elements are present in the various corporeal compounds that they may afford nourishment to other compounds also, it follows that the air which we see would be able to give plants the same nourishment, and therefore, when uprooted from the earth, they would draw food from the air. But since, in spite of all their longing for it, the air cannot give

them this, your whole argument goes to pieces, and the accomplishment of everything must be ascribed to God.

ADELARD: I will detract nothing from God; for whatever is, is from Him, and by Him; yet not even this is said vaguely and without due care, as we must listen to the very limits of human knowledge: only where this utterly breaks down, should we refer things to God. Let us, therefore, as not yet being bankrupt in knowledge, return to reason. Air, like earth, certainly contains in itself the four formative elements; yet it neither can nor ought to give food to an uprooted plant. Why I will explain to you. Every object of perception—I mean by the phrase the universe—even though it is the conjoint result of those causal principles, does not contain the various components equally in the compound, e.g., in this body earth abounds, in that one water preponderates: this one has a greater share of air, that one is aflame with fire. Accordingly, therefore, as each one has the greater share of this or that cause, so it follows also the properties of that particular cause, showing this by its special qualities. Notice especially that plants have a greater share in earthy nature, and are therefore also more particularly fed by earth. If they are uprooted, they find indeed nutriment in air, but not the right sort; for of that which is more essential they get a smaller proportion, of that which is less essential too much. Hence their dissolution is inevitable, and for the following reason: their earthy part, not finding sufficient sustenance in the air, insists on being freed from the conjunction in order that it may return to its like—I mean, earth. When this, therefore, is removed, the other components being freed from their weight return to their own kinships. This dissolution the mass of people, who never have true terms at their command, call “death,” whereas it should really be called not death, but “change.” Speaking of the universe, a philosopher says, “Nothing of it is lost, nor can anything be added to the sum total of its contents, bound together as they are; but by the corruption of its parts as they grow old, it suffers a sort of loss.” To my mind, indeed, nothing at all in this world of perception dies; and this is just as true at the present time as on the day of creation. For if any part is freed from any one conjunction, it does not perish, but passes on to union with something else. Let us now, however, return to the main point. My explanation of the question is as follows: by just as much as water differs from earth, by so much does it afford less nourishment to roots, I mean than earth does; of course, it gives more nourishment than air. In like manner, air gives less nourishment than water, but more than fire. But we have taken too long over this matter, which must be obvious to a purblind man or a barber; so let us pass on to something higher.

CHAPTER V.

DO CREATURES OF AIRY NATURE LIVE IN AIR, AND OF FIERY NATURE
IN FIRE, JUST AS CREATURES OF EARTHY NATURE
DO IN EARTH?

NEPHEW: In very truth, it is obvious to the purblind or the sightless. How grievously did the Saracens befool you with their subtle trifling. But not to-day shall you trick me out of laying bare your deceitful and obscure arguments, covered up though they be with subtle falsity: I can see clearly what you are aiming at.

ADELARD: You are putting a question which is unintelligible to both of us, to the end that I may out of disgust grant you what is false.

NEPHEW: You do not know to whom you are talking, but this will teach you. By your own proposition you are forced to admit, that in water certain objects exist which are of a nature more watery than earthy or airy or fiery, and in air certain others which are more airy than earthy or watery or fiery, and others in fire more fiery than earthy or watery or airy; for this is the natural consequence of what you said before. But it will not do, and so you ought to go no further.

ADELARD: Of a truth your *reductio ad absurdum* breaks down altogether: what you have stated is exactly true: in water there are things of watery nature, i.e., fishes, which are mere compacted water; and in air, airy powers. In fire also, that is in the upper ether, there live fiery animals which we can see. Therefore my argument will do, and we are agreed.

NEPHEW: Well, for my part let the argument rest a while. So as not to excite your anger, I will say no more on this.

ADELARD: It is then established how roots grow, and why they are called warm and live, and why they last longer in earth than elsewhere, and why they die.

CHAPTER VI.

WHY THE FRUIT FOLLOWS NOT (!) THE NATURE OF THE GRAFT.

NEPHEW: Let us now pass on to the natures of trees. I ask you then why it is that when a cutting is engrafted on a stock, the fruit follows entirely the nature of the thing grafted. It is agreed that the graft and the stock are of different nature, and, as I have said, these things when growing get their nourishment from the ground: consequently, they will draw from it either the same nourishment or else unlike and opposite nourishments. But



to live on the same food is impossible for them, since they are of different and opposed natures; so that the graft requires food from the stock. Now this it draws either through the stock or otherwise: but the latter course is impossible. Consequently then it draws it through the stock. Again, the stock either draws the same food or does not. If it does not do so, then there is a break in the drawing, and the graft cannot receive the food it wants; while if the stock draws the same food as the graft, then it is drawing what is its opposite. If this is so, it is drawing and seeking for the means of its own destruction—a thing which is neither possible, nor in keeping with the arguments already adduced.

ADELARD: You are handling the matter like a sophist, and I must put an end to your quibbling. I grant you that the graft draws its food from the earth and through the stock. You go on "just as the stock also does." Granted. You then go down a step and say, "consequently, it is drawing in its own opposite." This too I willingly accept. Lastly, you make the inference that therefore it is of its own accord drawing in its own destruction. This, indeed, is not a descending, but tumbling down a whole flight; and I will clear up the matter in a word or two. The stock is drawing for itself and for a second thing: that which it draws for itself it keeps, that which it draws for the benefit of the graft, it passes on to it. In like manner, the stomach draws and seeks after whatever is necessary to the parts of the body, keeps what it wants for itself, and gives to those others what belongs to them. Similarly, both the stock and the graft abide by their own nature; and if after three days or a longer time you were to cut off the graft, you would find the stock of the same nature as it had been before.

NEPHEW: What you have said on this point is childish—mere probable conjectures rather than necessary truths. Let us then proceed to the nature of living beasts, for there I cannot help thinking I shall put a spoke in your wheel.

ADELARD: It is a little difficult for you and me to argue about animals. I, with reason for my guide, have learned one thing from my Arab teachers, you, something different; dazzled by the outward show of authority you wear a head-stall. For what else should we call authority but a head-stall? Just as brute animals are led by the head-stall where one pleases, without seeing why or where they are being led, and only follow the halter by which they are held, so many of you, bound and fettered as you are by a low credulity, are led into danger by the authority of writers. Hence, certain people arrogating to themselves the title of authorities have employed an unbounded licence in writing, and this to such an extent that they have not hesitated to insinuate

into men of low intellect the false instead of the true. Why should you not fill sheets of paper, aye, fill them on both sides, when to-day you can get readers who require no proof of sound judgment from you, and are satisfied merely with the name of a time-worn title? They do not understand that reason has been given to individuals that, with it as chief judge, distinction may be drawn between the true and the false. Unless reason were appointed to be the chief judge, to no purpose would she have been given to us individually: it would have been enough for the writing of laws to have been entrusted to one, or at most to a few, and the rest would have been satisfied with their ordinances and authority. Further, the very people who are called authorities first gained the confidence of their inferiors only because they followed reason; and those who are ignorant of reason, or neglect it, justly desire to be called blind. However, I will not pursue this subject any further, though I regard authority as matter for contempt. This one thing, however, I will say. We must first search after reason, and when it has been found, and not until then, authority if added to it, may be received. Authority by itself can inspire no confidence in the philosopher, nor ought it to be used for such a purpose. Hence logicians have agreed in treating the argument from authority not as necessary, but probable only. If, therefore; you want to hear anything from me, you must both give and take reason. I am not the man whom the semblance of an object can possibly satisfy; and the fact is, that the mere word is a loose wanton abandoning herself now to this man, now to that.

CHAPTER VII.

WHY DO SOME ANIMALS CHEW THE CUD, AND OTHERS NOT?

NEPHEW: By all means let it be as you ask. It will be easy for me to oppose you on the ground of reason; but do not take shelter under the authority of your Arab friends. Let reason then be the only judge twixt you and me. Now, since we are to discuss the brute beasts, I will ask you why some chew the cud, and others not.

ADELARD: The natures of animals, like those of human beings, differ. Some of them are naturally hot, others cold, some moist, and others dry. Those which are hot more readily digest the food they have taken in, and more easily change it into blood, while cold animals have more difficulty with this. Everything subject to change is altered more easily by heat than by cold, for fire has, as it were, the property of sundering what is conjoined. Consequently, those animals which have a hot stomach easily

digest their food. Others, however, which are of a cold nature, being unable to digest their food, bring it back, and use their teeth again upon it, in order that by a second process it may the more readily be softened: this is done by oxen, goats, and similar animals, whom the Greek physicists call "melancholic." How all these animals are of cold nature is clear enough to the physicists, and you may get an idea of it as follows: it is for this reason, that they have both their fat harder, and what is commonly called the paunch (sepum) more solid; while others, as being warmer, have the fat softer, it being better digested, or to use the common phrase, more greasy.

NEPHEW: If, therefore, these animals ruminate on account of their cold nature, why are not the horse and the ass ruminants? They, as I have learnt from the physicists, are also melancholic.

ADELARD: But not to the same extent; for their stomach is considerably warmer, and their teeth better adapted for grinding.

NEPHEW: Oh, no, you will not wriggle out of it in this way; for if, as you say, this happens to them by reason of their coldness, why do not sheep, since they are of warm complexion, make the same demand?

ADELARD: Though they are by nature warm, yet their poverty in the matter of instruments has the result of forcing upon them the same toil, for there is no strength in their teeth, and for this reason they are called bidents. Furthermore, they are only of moderate heat, having also the paunch like that of the melancholics.

NEPHEW: Very good; if because they are melancholic they are, therefore, ruminants, then it would be the lot of some human beings also, who are melancholic and of cold nature, to be ruminants.

ADELARD: It may be that by comparison with others of their kind some men are cold, yet in comparison with the other non-speaking animals, we judge them hot. But what I am going to tell you will upset your contention altogether: I have seen some men whose stomachs were of such cold quality, that not being able to digest the food they had taken, they could not manage to retain it, with the result that not long after a meal, they brought up any heavy and indigestible food they had eaten.

CHAPTER VIII.

WHY DO ALL RUMINANTS LIE DOWN HINDER-PART FIRST AND FRONT-PART AFTERWARDS?

NEPHEW: On this topic let what you have said be enough: I now propose to ask the following question, Why do all animals

which ruminate, and are provided with a paunch, lie down hinder-part first and front-part afterwards?

ADELARD: You have put several questions into one, for these three things—to ruminate, to have a paunch, and to rise back-part first are co-accidentals coming from the same cause, viz.: coldness. But this coldness is not present in all the limbs equally; for it is greater in the hinder ones and those further removed from the heart, in which consequently there is bound to be greater weight.

Rightly, therefore, do they lie down heavier part first.

CHAPTER IX.

WHY DO SOME ANIMALS GET UP FRONT-PART LAST?

NEPHEW: Then now my point is established. For if they lie down hind-part first because they are cold in the hind-part and warmer in the front-part, then they would be bound to rise front-part first, and as this consequent does not happen, then the antecedent also is absurd.

ADELARD: Whatever rests does it in order to regain the strength which toil has lessened. Therefore the animals we are discussing, after their strength has been refreshed by rest, and while that strength is fresh and vigorous, begin by raising that part of their bulk which is the heavier. Just so you, I imagine, when engaged in work deal with the heavy weights while you are fresh and full of strength, and afterwards when tired with the lighter ones.

CHAPTER X.

WHY SOME ANIMALS WHICH DRINK DO NOT URINATE?

NEPHEW: That this should be the case is neither necessarily true, nor yet impossible. But now I wish you to resolve this question, why do some animals which drink not make water? Considering that the superfluity of what they drink descends to the kidneys and gathers there, and should thence flow out through the member, it is strange that some birds, e.g., the dove, drink much, and yet, though there is every reason for their doing so, do not make water.

ADELARD: Some animals when first born are reared on a soft and semi-fluid substance; I mean milk, the greater part of which is watery, and only a small fraction earthy. Others are reared on a hard substance, e.g., pebbles, sand, and the like, for instance, birds. Those then which live on a watery diet have a

bladder and make water. Howbeit as the dryness of their food makes itself increasingly felt in them, it becomes necessary for them to drink a little, that by this small amount of water the way may be made easier for solid food also and pain spared to the organ through which the hard substances descend. We must not suppose according to the opinion imputed to Aristotle that the paths by which food and drink enter the stomach are separate and distinct. For in the same way food descends into the stomach, and then, if they have one, into the liver. As therefore the moisture is not nourishment for the body, but is only present in small quantities to make easy the passage of solid food, it requires no separate exit for itself.

NEPHEW: As you have mentioned the stomach parenthetically, I ask you now why some animals have a stomach, and others not?

CHAPTER XI.

ADELARD: As you are conducting your enquiry along the line of reason, I will give you the reason of this. Those animals which live on pebbles and sand have no stomach, but still require something of a hard character, viz.: the liver, which is stronger than the stomach in respect of propulsive power, and can withstand the roughness of the sand and the chipped edges of pebbles, being provided with very strong muscles on both inside and outside, while between them lies flesh of the most solid character. By means of the interior substance it is able to retain its contents; by means of the fleshy part it digests the same; while by means of the exterior substance it is able, should anything, breaking the inner barrier, try to make its way out, to prevent it from penetrating to the vitals.

CHAPTER XII.

WHY DO SOME ANIMALS SEE MORE CLEARLY BY NIGHT THAN BY DAY?

NEPHEW: In spite of your explanation, I have still some difficulty about the brute creation. Why is it that some of them see more clearly by night and others by day? We know that light is an aid to sight, and darkness the reverse.

ADELARD: The eye, which is the instrument of sight, necessarily contains various humours. One, which is white, is an aid to sight, and through it the spirit of sight both issues forth and spreads. Another is black, and prevents the spreading from being too great: through it, as being dark, both heat is spread, and a constraining influence exercised. Those animals, therefore,

which see less clearly by day than by night have the white humour in abundance, and the black to a smaller extent; hence, in the daytime, the spirit goes too far forth, and by the excess of its diffusion loses the power of distinguishing the objects of sight. By night, however, by reason of the exterior darkness, it becomes more concentrated, issuing forth with greater clearness, and seeing more clearly. This point can be established also as follows:—you have noticed that some people have eyes whiter than they should be, and hence but poor sight, and if you took them out on to a wide expanse white with snow, they would be able to see little or nothing. Again, you yourself, if you want to see anything particularly clearly, have to contract your eyebrows. Hence we see that sight, when concentrated, does not wander, but gets a clearer impression of what has to be seen. This point will be manifest to you later if you have the wit to grasp it.

CHAPTER XIII.

HAVE THE BRUTE CREATION MINDS?

NEPHEW: Would you now discuss the question as to whether brutes have minds?

ADELARD: On this point there is to-day a difference of opinion: the common people unhesitatingly say no, while philosophers are equally confident about the opposite. My reasons for saying that brutes have minds are as follows:—Brutes have senses; and every perception must either follow the movements of the judgment, or not. Therefore, the perception of brutes follows either something or nothing. For instance, when I turn my eyes in any direction, I form a judgment about the things I see, understanding that what seems to be white is white, or the like. Sometimes, too, I see an object without forming any judgment on it; this is when my mind is occupied with other matters. The senses, indeed, have no judgment or understanding of the objects on which they are exercised. Consequently, if they have no judgment about the objects of sense, animals would have no set purpose of seeking them out or fleeing from them. For instance: whatever you see without having any understanding of, that, as a result of that perception, you neither seek after nor flee from—an experience common enough every day both to you and everybody else. Assuming then that brutes have no set purpose about exterior things, tell me, if you can, how it happens that a dog, hurrying at the top of his speed towards some object, turns off from it if he sees something in the road which, I won't say hurts him, but merely might hurt him. What was it that so quickly changed his first aim to its opposite? Animals clearly have in their minds both purposes, that of seeking out and that

of fleeing from, and must consequently have something which tells them whether to seek out a thing or flee from it, and this something, not being corporeal, must exist only in the mind. Hence it follows, that animals must have minds. Further, every sound heard coming from someone else either produces some understanding in the hearer, or does not. If it produces no understanding in the hearer, then he is not on account of that sound (l. "*momentum*" for "*nomen tui*") impelled to do anything, for it suggests nothing to him. This is what we mean in regard to brutes when we talk of anything as being suggested to them: for either it begets understanding in them, or it does not. If it does not, then it excites or produces no motion in them towards action. If, therefore, this were the case with animals, they would neither initiate any plan on account of a sound heard, nor avoid one. Tell me then this, if you can: how should a dog in that case on hearing the voice either immediately abandon the course he has begun, or start an opposite one? Further, perception and the distinction of the perceptions are not the same: moreover, the power of distinguishing any things whatsoever, and more particularly those which are the objects of perception, can reside only in the mind. And animals do display the power of distinguishing between the objects of perception; for not only does a dog in pursuit of an animal perceive its scent, but if another of the same species cross his path, he being cognizant of the scent of both of them, distinguishes between them: mindful of his trainer, he despises the one, and prefers to follow after the other, for he has, as it were, an impression in his mind—this is the one I ought to follow; the other is not the same; and in making this notable difference, there is a subtlety which betokens no little judgment of the distinguishing sort. Hence it follows that brutes also must have a fundamental power of distinguishing.

NEPHEW: Never shall you compel me to admit more than I have learnt from the common cry, that brutes have perception but not understanding.

ADELARD: Fie on you! you forget our agreement that reason should preside over our discussion. Now, perception is an ambiguous sort of word, so let us consider its meaning, and then we can make up our minds. To my idea, the definition of sense is a *considerable change of mind and body*, due to *external contact*. If this definition is to be accepted, we must first provide grounds for its acceptance. First, the word "change" is rightly used; for in every movement affecting the senses, the quality of the body undergoes change, either by approaching something else, as in sight and touch, or by the approach of something else to itself, as in smell, taste, and hearing. The quality of all functioning organs is changed by contact with external bodies. Change, therefore,

is common to all senses; but because there are some changes frequently occurring in regard to the body which, on account of their great subtlety, affect little change on the qualities of the organs—the mind never aroused by them to an act of judgment—e.g., contact with an atom or an almost imperceptible smell—I have added to my *differentia* the word "considerable." Also, since in regard to inanimate bodies from contact with others and with themselves, considerable changes in their qualities are frequently produced, so that they are changed to effects contrary to those produced by their separation, I have said animate body.

Lastly, because a considerable change is often wrought in an animate body from internal causes and the mere motions of the mind (e.g., redness from anger and pallor from sadness), in order to separate these, I have added "by external contact." We have, then, now a complete definition with equality of convertible terms; it cannot be called either too wide or too narrow, and there is no doubt that it is correct. This granted, it follows that my argument is correct, and that just as there cannot be sense except in relation to an animate body, so they cannot exist without a mind. Further, to go outside what I have said about the senses, let me taken an argument from motions. There are several sorts of movement, some especially referable to the body, others more particularly to the mind. For as a result of the fire in them, bodies can move upwards, as a result of the earth, downwards: as a result of the air and water, to the right and to the left, backwards and forwards; while orbicular motion is referable, in the first place, to the mind only. Since then this movement occurs in animals (note that they move of their own accord), it follows also that they have minds.

CHAPTER XIV.

HAS OPINION ITS FOUNDATION IN THE ANIMATE BODY?

NEPHEW: Methinks I am altogether opposed to your arguments. That animals have not understanding nor power of distinction, but only opinion, I will grant; and this I assert to have its foundation not in the mind, but in the body. Reason proves that rational judgment has its foundation in the mind; while with regard to opinion as it exists in brutes, I am quite clear that its seat is in the body, not the mind.

ADELARD: I look at the question whether even opinion itself may not have its foundation in the animate from the following point of view: we ourselves being rational, have both a power of distinction existing in the judgment and an opinion about objects of sense, but neither the one nor the other can exist in our bodies minus the mind. Now, if in the human body, which

is composed through a conjunction of elements of earthy materials, there exists that which arises from the senses—call it what we will, it cannot abide in it unless mind is present also. Much less then can you look for it in the brutes, unless you are quite out of your senses. If, on the other hand, you are not ashamed to say that it can abide in it without a mind from the mere conjunction of elements, then you lay yourself open to the charge of degrading human bodies to a lower position than the others,—a thing obviously false.

NEPHEW: Very good; let us then agree to say that brutes are animate, but say at the same time that their minds, when separated from the body, perish, awaiting, as they do, neither reward nor punishment for their deeds.

ADELARD: How wrong-headed is your change of position! You say that the body which is of vile and changeable essence, liable to generation and corruption, composed of a diversity of elements, not certainly existing but continually and always passing from one thing to another, and neither this nor that—this, you say, does not perish, while the mind, its guide, divine and incorporeal, the directress of nature in its totality not in particularity, does perish! You must be mad. It is rather you yourself who perish, when you so wrongly lose confidence in so noble an essence.

NEPHEW: What you say merits attention rather than belief. However, I will gird myself to higher themes, and do my best with such poor knowledge as I have to bring light out of the smoke. True that I am unacquainted with the idle vauntings of the Greeks, and have not seen the cave of Vulcan, yet have I learnt by practice to know the true, and disprove the false. To work then! I want to discover what you think about human nature. You may magnify as much as you will what you have said previously, but if you do not know yourself, I think such things of small account: man's proper subject for discussion is man. For just as a stupid work based on enquiry into subtleties (or, as a futile handling by means of a subtle enquiry) lowers the mind, so a lofty subject-matter sharpens the mind's eye for investigation.

ADELARD: As I have now managed to supply an answer to your question, it shall be your business to propose whatever you want treated, and mine to discuss it.

CHAPTER XV.

WHY HUMAN BEINGS DO NOT HAVE HORNS.

NEPHEW: I want to talk about the composition of man; so, please, first explain this difficulty: Why do human beings not have horns?

ADELARD: Be it as you will; but first I must get from you a reason, either true or likely, why you think they ought to have them: otherwise such a discussion deserves no place between philosophers. For my part, I do not think it is worth while to find causes for all existing things, but for those which reason suggests to us ought to be different from what they are.

NEPHEW: Your request is indeed fair. Reason tells us that all things which the Creator drew from the formlessness of nothing into the form of being were, as being made by the Best, made in the best way, and that He gave the faculty of existence to all things made by Himself, for they both joy in living, and are provided with definite weapons in order that they may preserve their lives. Now certain animals—and it is of these I speak—have definite means of protection which are part of themselves, e.g., the boar, his tusks; the lion, his claws; the bull, his horns; and with these, if danger threatens, they defend themselves; others again, not big enough to defend themselves by size of body, save themselves by their speed, e.g., goats, deer, hares, etc. Seeing then that this is so, that creatures of lower rank are naturally protected,—I ask you how it is that man, who is of higher rank than the lower animals, has neither natural arms of defence, such as horns or death-dealing tusks, nor speed of flight by which to escape the foe's menace. The result is, that having no weapons provided by the Creator, he has laboriously to provide them for himself from external sources, while in time of stress he has to put his confidence in the feet of another creature rather than in his own. We thus have the creature, who is dearest to supreme goodness, deprived of supreme help.

ADELARD: I will first give you an obvious answer. I believe that as man is the creature dearest to the Creator, it is not fitting that he should be naturally provided with weapons, or have the power of fleeing over great distances. He has what is far better and nobler than either of these things, I mean reason, in which he so pre-eminently excels the brutes that by means of it he can subdue them, put bits in their mouths, and then train them in various exercises. You see then by how much the gift of reason transcends all natural weapons.

NEPHEW: The fool would accept your answer, but not so I, for you have not answered my question. Naturally, I have no hesitation in admitting that reason excels all physical means of offence. My point is this: even those men who excel their fellows in reason are at times in need of protection against threatening danger, and this to such an extent that they are compelled to get both weapons and means of transport from external sources. *(Here the text seems corrupt, and one line is untranslatable.—Ed.)*