

Ophthalmology in Medical Aphorisms of *ben Maimon* Moses Maimonides

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Moses Maimonides was born in Cordova, Spain, on March 30, 1135. His ancestry could be traced back to the royal house of King David of Israel. Maimonides' mother died in childbirth, and consequently his father Dayan (judge) Maimon reared him. Persecution by the Almohades, a fanatical group from North Africa, forced the Maimon family to flee Cordova in the year 1148. Maimonides was thirteen years old. The family wandered through southern Spain and northern Africa for the next ten years and finally settled in Fez, Morocco, in 1158.

Little is known of Maimonides' early life and medical education. It is likely that he studied medicine in Morocco. Maimonides must have been an avid reader since his medical writings show a profound knowledge of Greek and Moslem medical works. Hippocrates, Galen, and Aristotle were his Greek medical inspirations, and Rhazes of Persia, Al Farabi of Turkey, and Avenzoar are Moslem authors frequently quoted by Maimonides.

The Maimon family left Morocco in 1165, traveled to Palestine, and from there to Egypt where they settled in Fostat (old Cairo). In 1174, at age thirty-nine, Maimonides was appointed court physician to Vizier Alfadh al, regent of Egypt during the absence of the sultan, Saladin the Great, who was fighting in the Crusades in Palestine. It was at this time that Richard the Lion-Hearted, also fighting in the Crusades, is reported to have invited Maimonides to become his personal physician, an offer which Maimonides declined. His reputa-

tion as a physician grew in Egypt and neighboring countries, and his fame as theologian and philosopher became worldwide.

Maimonides was also the spiritual leader of the Jewish community of Egypt. At age thirty-three, in the year 1168, shortly after settling in Fostat (old Cairo), he completed his first major work, the *Commentary on the Mishnah*. In 1178, ten years later, his magnum opus, the *Mishneh Torah*, was finished. This monumental work is a 14-book compilation of all Biblical and Talmudic law and remains a classic to this day. In 1190, Maimonides' great philosophical masterpiece, the *Guide for the Perplexed*, was completed.

Maimonides died on December 13, 1204, and was buried in Tiberias. Legend relates that Maimonides' body was placed on a donkey and the animal set loose. The donkey wandered and wandered and finally stopped in Tiberias. That is the site where Maimonides was buried.

Maimonides was a prolific writer. Already mentioned is his famous trilogy, the *Commentary on the Mishnah*, the *Mishneh Torah*, and the *Guide for the Perplexed*. Each of these works alone would have indelibly recorded Maimonides' name for posterity. However, in addition to these, he also wrote a *Book on Logic* (*Ma'amar Hahigayon*), a *Book of Commandments* (*Sefer Hamitzvot*), an *Epistle to Yemen* (*Iggereth Hashmad*), a *Treatise on Resurrection* (*Ma'amar Techiyath Hamethim*), commentaries on several tractates of the Talmud, and over 600 responsa. Several additional works including the so-called *Prayer of Maimonides*¹ are attributed to him but are in fact spurious.

Medical works

Over and above all the books we have just enumerated, Maimonides also wrote ten medical works.² These medical writings are varied, comprising extracts from Greek medicine, a series of monographs on health in general and several diseases in particular, and a recently discovered pharmacopoeia demonstrating Maimonides' extensive knowledge of Arabic medical literature and his familiarity with several languages. Some people feel that Maimonides' medical writings are not as original as his theological and philosophical writings. However, his medical works demonstrate the same lucidity, conciseness, and formidable powers of systematization and organization as are so characteristic of all his writings. The *Book on Poisons*,

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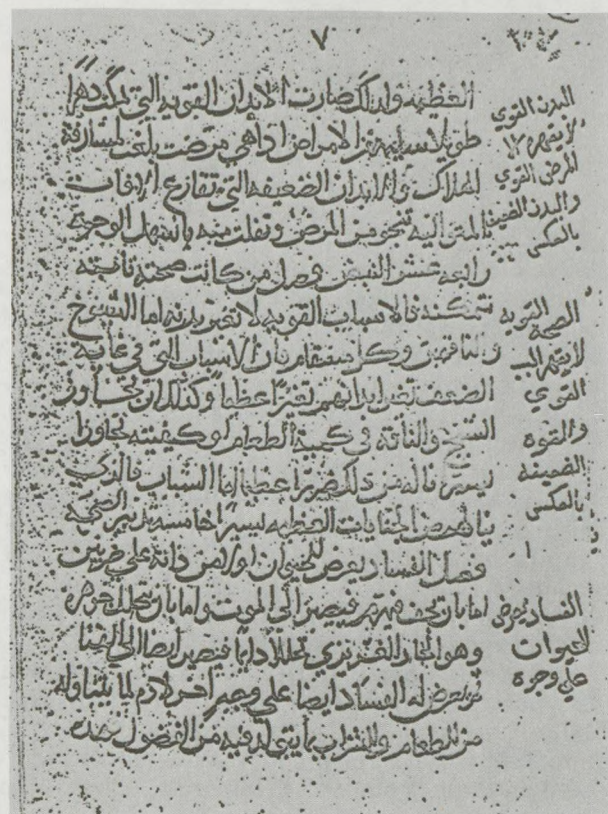


FIGURE 1. Sample page from Arabic manuscript number 1937 in Gotha (East Germany) library. This is only complete Arabic manuscript in existence of Maimonides' *Aphorisms* and dates to middle of thirteenth century.

the *Regimen of Health*, and the *Medical Aphorisms of Maimonides* became classics in their fields in medieval times.

The most voluminous and famous of Maimonides' medical writings is the *Medical Aphorisms of Moses Maimonides* (*Pirke Moshe Birefuah*). This book is comprised of 1,500 aphorisms based mainly on Greek medical writers. There are 25 chapters each dealing with a different area of medicine including anatomy, physiology, pathology, symptomatology and diagnosis, etiology of disease and therapeutics, fevers, blood-letting or phlebotomy, laxatives and emetics, surgery, gynecology, hygiene, exercise, bathing, diet, drugs, and medical curiosities. A complete Arabic original manuscript exists in the Gotha library in East Germany (Fig. 1). A Hebrew translation was made in the thirteenth century and published in Lemberg, Poland, in 1834 and again in Vilna in 1888.³ The definitive Hebrew edition is that of Muntner dated 1959.⁴ Maimonides' aphorisms were also translated into Latin in the thirteenth century and appeared as an incunabulum in Bologna in 1489 and again in Venice in 1497 followed by numerous printed Latin editions (Fig. 2). Only small fragments of this work have ever appeared in a Western language.⁵⁻⁸ A complete English version by

Rosner and Muntner based mainly on Muntner's⁴ Hebrew edition was recently published in two volumes.⁹

Most of the aphorisms cited by Maimonides are culled from the works of Galen, Aristotle, Hippocrates, Rhazes, Al Farabi, and Avenzoar. Some aphorisms are original with him, and these he always prefaces with the phrase "Moses says . . ." The source on which each aphorism is based is given at the conclusion of the aphorism. Maimonides' aphorisms on ophthalmology, based primarily on Greek and Moslem writers, are, therefore, not original with him. His originality in medical writing is clearly evident in his other medical works, however. The following aphorisms dealing specifically with ophthalmology are presented here for historical interest to the modern ophthalmologist.

The reader is asked to take into consideration that the English translation of this twelfth century work was performed by a twentieth century physician. Hence, due to the modern medical outlook of the translator, certain interpretations may not necessarily coincide with Maimonides' understanding and knowledge of ophthalmology. Words in parentheses are additions of the translator and are meant to help clarify the meaning of a particular phrase or aphorism. Maimonides' prolific writings include considerable information on numerous aspects of medicine, and ophthalmology is no exception.

Aphorisms

Chap. 1:48. The inner part of the covering of the eyeball (choroid) has soft and moist hairs (cilia) to gather the fine liquid (aqueous), similar to the soaking of a sponge. It is covered by a moist thin (membrane), the albuginea, which lies flat on the fine liquid. The covering of the eyeball (cornea) is shiny and transparent as a mirror as it covers the fine liquid on the outside, originating from the fluid of the glass (vitreous). *De Usa Partium X*

Chap. 3:52. There are no vessels whatever in the crystalline, albugineous, and vitreous humors (of the eye), as well as in the corneal tunica. Even so, the crystalline humor is nourished from the vitreous humor through osmosis, and the vitreous (receives its nourishment) from the retinal tunica which has abundant arteries and veins. The cornea, too, is nourished by osmosis from the uveal covering because the uvea also contains an abundant vasculature. *De Usa Partium X*

Chap. 3:78. If the covering of the uvea (of the eye) is severely torn, the albugineous humor will escape and egress outside the uveal tunica and meet the corneal tunica. Through this, afflictions will occur: one of these is that the uveal tunica will fall on the crystalline humor, and another is that air will penetrate and escape through this wound. *De Morbis et Symptomis IV*

Chap. 6:13. If a scale forms on the face from conjunctival secretions or sweat which has evaporated and

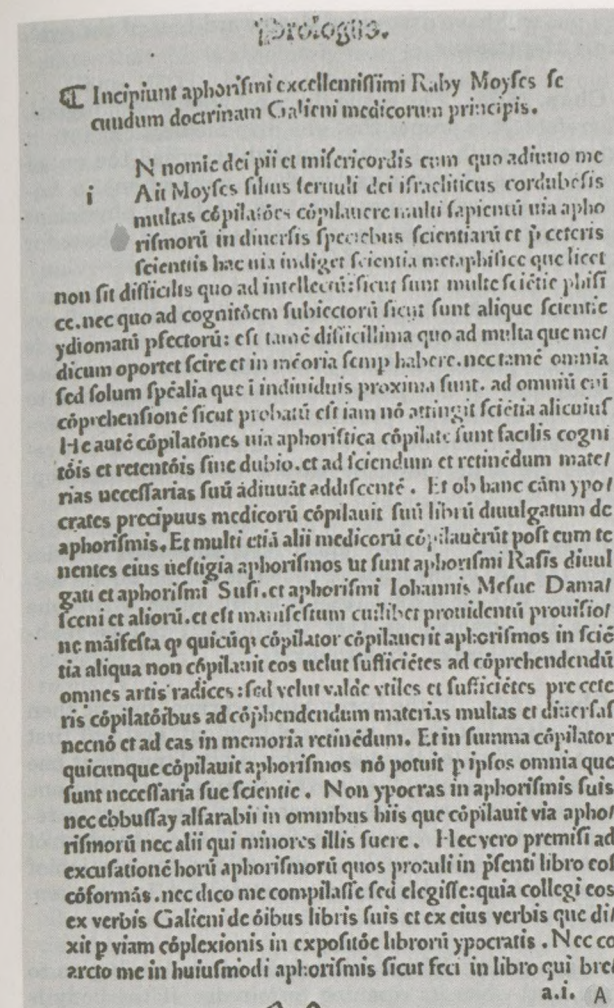


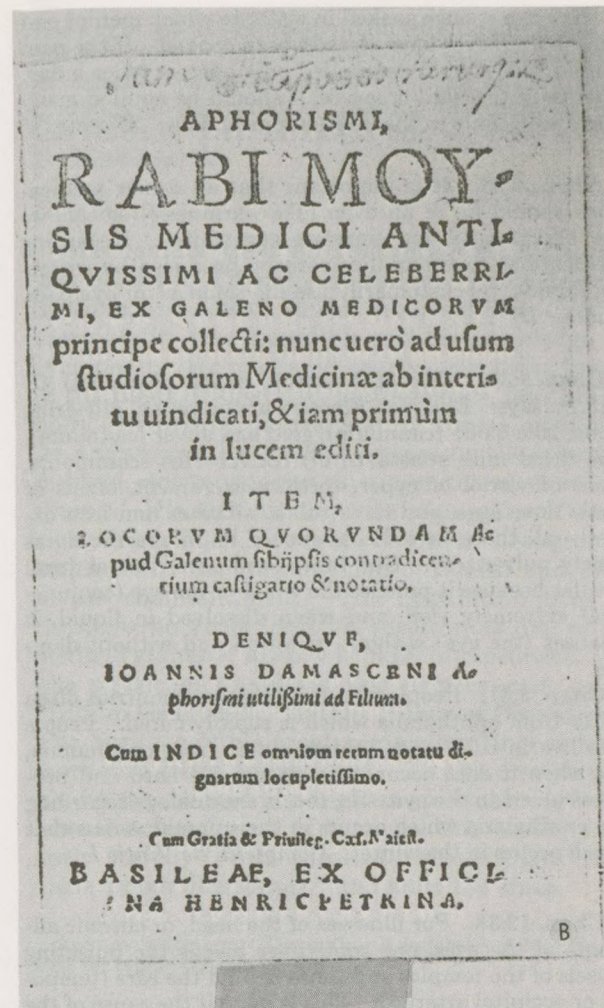
FIGURE 2. Maimonides' *Aphorisms*. (A) First page of a Latin incunabulum dated October 7, 1497, and printed in Venice. (B) Title page from a Latin edition published in Basel, Switzerland, in 1579.

become like dust, this is a bad sign. Similarly, darkening of vision in acute illnesses signifies the death of the power of vision. *Comment. Epidemiarum III*

Chap. 6:18. The eyes reflect a true picture of the measure of body strength, providing that vision and lid opening are normal. *Comment. Epidemiarum VI, 4*

Chap. 6:34. The vision of someone who suffers from vertigo and confusion in the head will become darkened (scotomata) and lost, and he will vomit from the slightest stimuli. He who suffers from vertigo and confusion in the head secondary to a stomach ailment will primarily have palpitations and nausea. *De Locis Affectis III*

Chap. 7:69. If the albugineous humor of the eye is present in greater or lesser than normal amounts, vision becomes damaged. If it becomes thick, then outgoing vision (vision was thought to "go out" from the eye rather than light rays "coming into" the eyes) is diminished, so that objects at a distance can no longer be seen, and even close objects cannot be clearly differentiated. If this humor becomes extremely thick, such as occurs in the loss of the liquid which gives rise to vision (aqueous humor opacifies to form a cataract), and if because of



this thickness a part of the eye near the pupil becomes covered and only a small opening remains, then one only sees every item through that opening, but cannot see many objects simultaneously (? tubular vision). If only a small amount of thick liquid accumulates in the center of the pupil and everything surrounding it remains clear, then one sees everything (opaque) as if one were looking through a focusing screen. If the substances are massive, spread out, and separated in that place (pupil), then the affected individual seems to imagine that he sees a mosquito flying about ("mouches volantes" secondary to vitreous opacities). This occurs to many people upon awakening from sleep and appears as (dancing) figures. This often occurs to young people (deliriums) and in them whose head is filled with wine or another similar type of (intoxicating) beverage. *De Morbis et Symptomis IV*

Chap. 9:8. Sparks and lightning which a man sees before his eyes are due to liquids whose substance and appearance are transformed into albugineous liquids which gather between the crystalline and vitreous humors of the cornea. *Comment. Peri Chymon I*

Chap. 9:22. For eye pain, it is appropriate to apply

to the eye a sponge soaked in water in which melilot and buckhorn clover have already been cooked. If the pain is mild, this should be applied only once or twice a day, whereas if the pain is severe, it should be applied many times, especially in the long (summer) days. *Miamir IV*

Chap. 9:26. It is important that all ocular medications should be of an even luke-warmness; for this we use breast milk and separate egg whites. Regarding medications to tranquilize earache produced by irritating liquids, we customarily use the same as for eye pain. *Miamir III*

Chap. 9:30. (Eleventh century Arabic physician) *Al-Tamini* says: *Elbalach Elsini*, a white, round, glittering stone, zinc oxide (cadmium), gold and silver (cadmium), (the dried milk substance of) convulvulus scammonia, types of vitriol of cyper, tortoise excrement, shells of turtle dove eggs, and terra rubra (silicates and iron oxides)—all these ingredients should be in specific doses (finely pulverized). One takes (and uses) this as (eye) powder because it purifies the white of the eye (conjunctiva) extremely well, and when dissolved in liquid, it cleanses (the eye) without irritation and without damage.

Chap. 9:31. People who live in warm countries often suffer from ophthalmia which is rapidly cured. People who live in cold lands seldom suffer from ophthalmia, but when it does occur, it is strong and hard and produces ulcers in the eye. So, too, is the analogy regarding the ophthalmia which occurs in the summer versus that which occurs in the winter. *Comment. de Vintis I*

Chap. 12:38. For illnesses of the head, or chronic ailments of the eyes, one sometimes bleeds the pulsating vessels of the temples and those behind the ears (temporal or occipital arteries). This is done if the cause of the illness is a warm, soft material, especially if they originate in the membranes (meninges). The patient feels as if he was stabbed, after which the pain spreads out, but the stabbing (sensation) remains in the center of that site. However, bloodletting from pulsating vessels (that is, arteries) entails great danger because sometimes one cannot stop the (flow of) blood, or heat might occur with the blood. For this reason, physicians are very reluctant to phlebotomize a large or even small (artery). A small incision into them is of little benefit. If a vein is severed in its width into two halves, there is no danger since each end will constrict to the side it is in. *De Phlebotomia (VI)*

Chap. 15:24. Cornification of the eye (lids), as long as it is small, (can be treated) with warming medications that liquefy, just as the remedies for *al garab* of the eye. If this (cornification) increases and hardens, then it should be treated with the scalpel (by excision).

Chap. 15:25. Hail in the eye (chalazion) requires excision. The same applies to pus collected in the (anterior chamber of the) eye in the illness hypopion. Most of this should be treated with dissolving medications, not with something that will effect a strong drying action. When the major portion (of the pus) will have been expelled, the remainder will congeal. It will also be eliminated (eventually) by (outward) movement (out of the eye), just as occurs in head illnesses, until the en-

tire pus will have descended downward (out of the eye). *Finis Megatechne*

Chap. 15:28. The eye is the most sensitive of organs. Therefore, it is proper that one drip medications into it extremely gently, after having slightly raised the upper eyelid. One should dissolve these medications in liquids that are usually non-irritating. Ancient physicians found egg albumen to be of great benefit (as a base for eyedrops). *Megatechne XIII*

Chap. 15:29. A moistening medication that flows (drops) has no effect (on the eye), unless a bandage is applied. Therefore, for eye diseases, one should use medications as dry pastes, because a bandage has to cover the entire eye (preventing vision). The eye cannot tolerate being bound with a bandage that is not removed for many days, because a fistula will develop. *Miamir V*

Chap. 15:30. If the liquid (eye medicine) trickles down the face of the patient, then one should hold a vessel (eye cup) for a long time over the place where one wants the washing, so that (the liquid) can be reabsorbed into the eye. *Katagenes I*

Chap. 15:31. If the horny tunic (cornea) bursts, then a thin, clear liquid will pour and flow out, and will first cause softening (of the eye). This is the liquid that one sees in many people, flowing out from a hole where one punctured the eye (ocular paracentesis) in order to remove the (excess) water therefrom (? early therapy of glaucoma). Following this, a generalized contraction of the eye occurs, and it becomes constricted and sunken. *De Usu Partium X*

Chap. 19:16. When ophthalmia of the eye begins to ripen, and when its ripening terminates, if the body is pure, then bathing is one of the best remedies for these (patients). That is, the pain will subside immediately, the deposition of (bad) liquids that heretofore flowed to the eye will cease, and the liquids will distribute themselves and mix equally (throughout the body). *Megatechne XIII*

Chap. 21:9. In barley we find a cooling force for an (inflamed) eye, if it (the barley) is consumed in the form of bread, or gruel, or roasted kernels. Even if one doesn't remove the outer shell, the gruel made therefrom is still useful for its cleansing effect which cannot be attained in any other manner. Indeed, it is because the power of barley gruel counteracts the strength of lentils, so that if one mixes equal quantities (of these) together, then between them a food is produced which is among the most nutritious of all foods. *De Alimento-rum Virtutibus III*

Chap. 22:4. The brain of a bat, prepared with honey, is valuable against ophthalmia. The same is accomplished with the brain of *Etaia* (lamb or sheep).

Chap. 22:5. Bile of the ostrich, the *al adaga*, mixed with honey and applied to the eye, is of value for ophthalmia. If it is cooked in oil of lilies, however, it is beneficial for weakness of vision. *De Theriako ad Pisonem*

Chap. 22:37. Staring at the eyes of a wild donkey permanently (guarantees) healthy vision, and helps

against tearing of the eyes. He (Ibn Zohr), further states that this is absolutely true, and without doubt.

Chap. 22:39. If one paints (the eyes) with a gold lotion, one's vision is strengthened . . .

Chap. 22:69. Kidney and bladder stones should be burned (and pulverized), and if (they are then prepared as a liquid) and painted (on the eyes), liquefy a cataract (literally: white in the eye), whether the latter is old or recent. Similarly, shiny-white porcelain, burned and pulverized and dried (that is, used as a powder) and mixed with some dissolving drugs (liquefies a cataract).

Chap. 23:69. The waters which accumulate in the eye (aqueous humor) (produce) what physicians call (ocular) "tension." These accumulate between the crystalline lens and the corneal membrane. *De Usu Partium X*

Chap. 23:70. If a hemorrhagic inflammation occurs to the membrane known as scleraconjunctiva, which is the white of the eye, this is called conjunctivitis. This inflammation damages one's visual ability, and hinders its normal use. However, if (ophthalmia) due to red bile develops therein, then, because of its burning, it leads to "darkening of the vision" (blindness). This is not just possible, (but is the general rule). *De Morbis et Symptomis IV*

Chap. 23:71. If a site on the cornea becomes corroded, and part of the uveal tunic protrudes, then this is called a staphyloma. The pus that develops beneath the corneal membrane is called "hypopyon." If the eyelids become thickened and hardened on their inner sides, then this is the illness called "grape scab" (? trachoma). Eyelids whose appearance is red, and whose cilia are lacking, (occur in) the illness called "blepharitis" (*sulak* in Arabic), meaning swelling of the lids. A lack of flesh on the large corner of the eye (medial canthus) which is also called the large canthus, is an illness spoken of as "epiphora" (? dacryocystitis). *Miamir IV*

Chap. 23:72. A fistula in the canthus of the eye is called a lacrimal fistula (*gharab* in Arabic). The hard membrane which is on the inner aspect is called *nabialath*. *Miamir V*

Chap. 24:35. I have already observed an exceptional situation, which is not usual, and which is as follows: A young boy received a blow with the end of a knife, near the pupil. Liquids and fluids flowed out from the opening, and the pupil of his eye became smaller, and the corneal membrane contracted completely. After one had engaged in his therapy, he saw well again, because those liquids which had suddenly flowed out all at once, reaccumulated slowly. Such a situation occurs only seldomly. *De Morbis et Symptomis IV*

Chap. 24:20. If one observes a man who has conjunctivitis, and if one is not accustomed to seeing this, then

one's eyes will at first begin to fill with liquid (tears). If one continues to stare, then conjunctivitis will also occur in oneself. Similarly, sometimes a man sees his friend urinating or defecating or yawning or eructating, and this seems to force him to perform the same activity. *De Motu Liquidis*

Conclusion

Maimonides died on December 13, 1204, and was buried in Tiberias, Palestine. The Christian, Moslem, and Jewish worlds mourned him. His literary ability was incredible and his knowledge encyclopedic. He mastered nearly everything known in the fields of theology, mathematics, law, philosophy, astronomy, ethics, and, of course, medicine. As a physician, he treated disease by the scientific method, not by guesswork, superstition, or rule of thumb. His attitude toward the practice of medicine came from his deep religious background, which made the preservation of health and life a divine commandment. His inspiration lives on through the years, and his position as one of the medical giants of history is indelibly recorded. He was physician to sultans and princes, and, as Sir William Osler said, "He was Prince of Physicians." The heritage of his great medical writings is being more and more appreciated. To the Jewish people he symbolized the highest spiritual and intellectual achievement of man on this earth; as so aptly stated, "From Moses to Moses there never arose a man like Moses," and none has since.

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It is a very important thing to know that the people of the world are not all the same. There are many different kinds of people, and they all have different ways of thinking and feeling. This is why it is so important to understand each other and to respect each other's differences.

There are many different kinds of people in the world. Some are tall and some are short. Some are dark-skinned and some are light-skinned. Some are from one country and some are from another. But all of them are human beings, and they all have the same right to live in peace and harmony. We should not judge people by their appearance or by where they are from. We should judge them by their actions and by their hearts. If we can do this, we can build a better world for everyone.

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