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ČAŠM-PEZEŠKĪ

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In ancient Persia and the first two centuries of Islam. Although no direct information about eye therapy in pre-Islamic Persia has come down, in the *Dēnkard* ophthalmologists (*dīdbān*) are mentioned as professional specialists (*Dēnkard* 8.38.12 from the *Sagādum*, ed. Madan, II, p. 756 line 9; ed. Dresden, p. 84 fol. 124 line 5, tr. W. E. West, in *Pahlavi Texts* IV, SBE 37, p. 123; Christensen, *Iran Sass.*, p. 419; see also Elgood, 1970, p. 56).

There are grounds for belief that ophthalmology was studied in the hospital of the college at Jondayšāpūr (Gundēšāpūr), which had, reputedly, been founded by Ḵosrow I Anōšīrvān and remained in being after the Arab conquest. Ebn Abī Oṣaybeʿa (II, pp. 117-18) states that Māsawayh (or Māsūya) b. Yūḥannā moved from Jondayšāpūr to Baghdad, where he treated the eyes of the vizier Faẓl b. Rabīʿ and the latter's *ḡolām* (bodyguard). Ḥonayn b. Esḥāq (known in medieval Europe as Joannitius), the author of *al-ʿAšar maqālāt fī'l-ʿayn* (The ten treatises on the eye) and several other works in this field, had not actually studied at Jondayšāpūr, but as he is reported to have learned medicine from Māsawayh's son Yūḥannā he must have been influenced by the traditions of the Jondayšāpūr hospital (Meyerhof, pp. 19-20). This Yūḥannā b. Māsawayh is not only described as a physician from Jondayšāpūr (Ebn Abī Oṣaybeʿa, II, p. 139); it has also been noted that Persian terms appear in his *Dağal al-ʿayn* (Eye disorder), which is one of the oldest ophthalmological treatises of the Islamic period (Meyerhof, pp. 11-12). The hospitals in Persia and the eastern part of the Islamic world, which were in fact modeled on the Jondayšāpūr hospital,

were organized in departments; among these there was always an ophthalmology department (Najmābādī, 1353, p. 787; Nafīsī, p. 20) under an independent director who had authority over every eye-doctor (*kaḥḥāl*) in the hospital (Ḡanī, 1333). At the same time the ophthalmologists were not classed as surgeons, although they treated many eye complaints surgically (Elgood, 1970, p. 56). Before being allowed to practice, the ophthalmologists underwent an examination; they were required to know the anatomy of the eye (Elgood, 1951, p. 346) and to be fully conversant with Ḥonayn b. Esḥāq's work (Elgood, 1970, p. 63). Only those who worked in hospitals were recognized as qualified ophthalmologists. This was significant in view of the presence of large numbers of untrained itinerant eye-doctors. For the same reason the ophthalmologists pledged themselves on oath not to let their instruments fall into the hands of any unauthorized person (Elgood, 1951, p. 347).

The 3rd-4th/9th-10th centuries. After the above-mentioned early authors several ophthalmologists and ophthalmological treatises of the 3rd/9th and 4th/10th centuries are known to us. ʿAlī b. Rabban Ṭabarī, a pupil of Ḥonayn b. Esḥāq and a teacher of Moḥammad b. Zakarīyāʾ Rāzī, devotes a section on eye diseases in his compendium *Ferdaws al-ḥekma* (ibid., p. 140). Rāzī, although not known as an ophthalmologist, devotes the second part of his encyclopaedia *al-Ḥāwī* to eye diseases. He is also reported to have written three monographs, *Hayʾat al-ʿayn* on eye anatomy (Ebn al-Nadīm, ed. Tajaddod, p. 308). *ʿElāj al-ʿayn beʾl-ḥadīd* on eye surgery (Ebn Abī Oṣaybeʿa, II, p. 361), and *Fī adwīat al-ʿayn wa ʿelājehā* on eye medication (ibid., p. 360). This suggests that he devoted part of his clinical practice in the hospital at Ray to treatment of eye disorders. Rāzī deserves special credit for developing procedures and instruments for treating fistulas of the tear duct and for his preventive medicine against smallpox and its effect on vision (Najmābādī, 1353, pp. 429-31). In the *Ketāb al-abnīa ʿan ḥaqāʾeq al-adwīa* of Mowaffaq-al-Dīn Abū Manṣūr ʿAlī Heravī, the oldest known text on medicine and pharmacology in Persian, numerous drugs for the eyes are mentioned. Abū Bakr Rabīʿ b. Aḥmad Aḵawaynī Boḵārī similarly devotes parts of his textbook, also in Persian, entitled *Hedāyat al-motaʿallemīn* to the eyes and their diseases and remedies (ed. J. Matīnī, pp. 75, 270-77). Abū Māher Mūsā b. Yūsof Sayyār Šīrāzī, an ophthalmologist who cured the Buyid prince ʿAżod-al-Dawla Deylamī before his accession, was the author of a book on *Amrāżal-ʿayn* (Eye diseases) and the teacher of two distinguished practitioners, Ebn Mandūya Eṣfahānī and Abu'l-Ḥasan Aḥmad b. Moḥammad Ṭabarī (*Nāma-ye dānešvarān* II, pp. 50, 52). Ebn Mandūya, who at first worked in the hospital at Isfahan and later moved at

ʿAżod-al-Dawla's request to the ʿAżodī hospital at Baghdad, has left two treatises, *Fī tarkīb ṭabaqāt al-ʿayn* (Eye structure) and *Fī ʿelāj entešār al-ʿayn* (Treatment of pupil dilatation). Abu'l-Ḥasan Aḥmad b. Moḥammad Ṭabarī wrote a book, which became famous, on *al-Moʿālaja al-boqrāṭīya* (Hippocratic therapy; the first chapter is on ophthalmology, and he refers in it to a monograph, now lost, that he had written on the subject (Meyerhof, p. 17). Abū ʿAlī Sīnā (Avicenna) discusses the anatomy and diseases of the eye in the third *fann* (article) of the first part of the third volume of his *Qānūn* (lithog. Tehran, 1295/1877). Also worthy of mention is a descendant of the Boḵtīšūʿ family from Jondayšāpūr, by name Jebrāʾīl b. ʿAbd-Allāh b. Boḵtīšūʿ, who served ʿAżod-al-Dawla as his personal physician and wrote a monograph on the *ʿAṣab al-ʿayn* (Optic nerve) which was much admired at the time (Ebn Abī Oṣaybeʿa, II pp. 73-74).

The Saljuq period. An ophthalmologist who enjoyed great fame in the early Saljuq period was Abū Rūḥ Moḥammad b. Manṣūr Jorjānī known as Zarrīndast. In 480/1088, at the request of Sultan Malekšāh, he wrote a book entitled *Nūr al-ʿayn* or *Nūr al-ʿoyūn* (Light of the eye[s]), which is apparently the oldest monograph in Persian on the subject; it consists of ten discourses in twenty-one chapters (Monzawī, I, p. 608). Together with much that is new and original, it contains material drawn from Ḥonayn b. Esḥāq, and this may explain why Zarrīndast was described as a commentator of Ḥonayn's work (Meyerhof, p. 9). The most eminent Persian physician of the 6th/12th century was Sayyed Esmāʿīl Jorjānī (d. 531/1136), author of the Persian medical encyclopaedia *Ḏaḵīra-ye ḵʷārazmšāhī* (photographic repr. ʿA.-A. Saʿīdī Sīrjānī, Tehran, 2535 = 1355 Š./1976) and of another book entitled *al-Aġrāż al-ṭebbīya* (Purposes of medicine; Tehran, 1345 Š./1966); in both works he devotes sections and chapters to ophthalmological matters and physiology of the eyes.

The Mongol and Timurid periods. In the time of the Il- khans, Qoṭb-al-Dīn Maḥmūd Šīrāzī gained prominence as both a physician and a philosopher. In the preface to his encyclopaedia *Dorrat al-tāj* (ed. S. M. Meškāt, Tehran, 1317 Š./1938, pp. 38-39) he tells us that after studying medicine with his father and his uncle he had spent his youth practicing it in the Moẓaffarī hospital at Shiraz and had personally treated eye patients there (loc. cit.). Moreover he reportedly also wrote a monograph on a related subject. It may therefore be inferred that the hospital at Shiraz had an ophthalmology department. Similarly in the hospital in the Rabʿ-e Rašīdī at Tabrīz an ophthalmologist and five assistants were employed as well as various other specialists (Rašīd-al-Dīn

Faẓl-Allāh, p. 319). Noteworthy ophthalmological works from this period are Neẓām-al-Dīn Qazvīnī's *Ketāb al-ʿayn* written at the end of the 7th/13th century and Moḥammad b. Moḥammad ʿArab's *ʿElm ḥekmat al-ʿayn* dedicated to the Il-khan Abū Saʿīd (Elgood, 1951, p. 143). Early in the 10th/16th century Šams-al-Dīn ʿAlī Ḥosayn Jorjānī came into prominence with the Persian translation of ʿAlī b. ʿĪsāʾs *Taḏkeratal-kaḥḥālīn* (Biography of the ophthalmologists), to which he added a critical appendix. He made the translation at the request of the sultan of Golconda, Moḥammad-ʿAlī Qoṭbšāh. The book was widely used in the teaching of eye surgery in the Safavid period (Elgood, 1970, p. 57).

The Safavid period and the 12th/18th century. More is known about eye therapy in the Safavid period. The most eminent physician of the time, Bahāʾ-al-Dawla Moḥammad Ḥosaynī Nūrbaḵš Ṭaraštī, allotted to ophthalmology a large part of his *Ḵolāṣat al-tajāreb* (Compendium of clinical tests), and Moḥammad-Bāqer b. ʿEmād al-Dīn, an eye specialist, wrote a treatise on drugs for the eyes (Monzawī, *Nosḵahā* I, p. 584). An important development in this period was the start of the use of spectacles. It seems that spectacles were first imported into Persia by Venetian merchants in the time of the Āq Qoyunlū (Eqbāl, pt. 2, p. 3). The poet ʿAbd-al-Raḥmān Jāmī (817-98/1414-92) mentions spectacles, which he calls "European glasses" (*šīša-ye farangī*), in one of his *qaṣīdas* (*Kollīyāt*, ed. Š. Barēlvī, Karachi, 1982, p. 45). A portrait of Reżā ʿAbbāsī, the renowned miniaturist of Shah ʿAbbās I's reign, shows him bespectacled. John Fryer, the physician in the English East India Company's service who was in Persia from 1676 to 1678, noted that spectacles were coming into use (Elgood, 1970, p. 67). We have no information, however, about the properties of the spectacles or the reasons for their prescription and use.

There are no mentions of ophthalmologists in the reign of Nāder Shah, but two Persian treatises from the Zand period attest to the continuing interest of Persian physicians in the subject. These are the *Āyīna-ye eskandarī* written for Eskandar Khan, who may have been a brother of Karīm Khan Zand (Rahāvard, p. I), and the *Resāla-ye atābekīya* on anatomy and diseases of the eyes and remedial drugs (Monzawī, *Nosḵahā* I, p. 464).

The Qajar period. While the traditional methods of eye therapy remained in use (Polak, II, p. 346), it was in this period that Persians began to gain knowledge of the modern medical sciences that were being developed in Europe. Dr. J. W. Polak, who arrived in Persia about 1850, was impressed by the fact that large numbers of Persian ophthalmologists were practicing their profession in the Ottoman empire, Egypt, Arabia, and even India and China,

and that eye drugs made in Persia were used as far away as Smyrna (Polak, II, p. 204). He found that these ophthalmologists were acquainted with various surgical procedures and very skillful in performing some of them (II, p. 205). Spectacles were more widely used. The satirical poet Yagmā Jandaqī (II, p. 212) described them as "little eyes" (or "winks") "with horns" (*čašmak-e šāḵdār*). Although not much is known about Mīrzā Bāba, the first Persian physician who had studied in Europe, it seems probable that he learned something about modern methods of eye therapy. Formal teaching of modern medicine in Persia began when the Dār-al-Fonūn college in Tehran was opened in 1268/1851. Among the European doctors engaged by the minister Amīr-e Kabīr to teach at the Dār al-Fonūn were several who had special knowledge of ophthalmology, and some of them wrote textbooks that were translated into Persian. J. E. Polak, an expert on the subject, was the author of *Kaḥḥālī* (Eye treatment; tr. H. Afšār, lithogr. Tehran, 1273/1856) and *Jalāʾ al-ʿoyūn* (Brightness of the eyes; lithogr. Tehran, 1273/1856). J. L. Schlimmer, a Dutch instructor at the Dār al-Fonūn, was the author of a work with the same Persian title, *Jalāʾ al-ʿoyūn* (lithogr. Tehran, n.d.). Mīrzā ʿAlī Raʾīs-al-Aṭebbāʾ, who after studying under Dr. Tholozan became a greatly respected teacher at the Dār al-Fonūn (Najmābādī, p. 223), wrote a textbook entitled *Żīāʾ al-ʿoyūn* (Light of the eyes; Tehran, 1300/1883). Mīrzā Abu'l-Ḥasan Khan Doktor, head of the Government Hospital and a teacher at the Dār al-Fonūn, translated from French into Persian P. C. Sappey's (1810-96) *Traité d'anatomie descriptive*, 3 vols., Paris, 1853-64, 4 vols., Paris, 1888-89, part of which deals with the structure of the eye (*Maṭāleb-e aṣlīya-ye tašrīḥ*, Tehran, 1308/1891); according to the preface of this work (p. 1) Mīrzā Abu'l-Ḥasan Khan Doktor had written a book of his own on eye therapy (*kaḥḥālī*). Dr. Moḥammad Khan Kermānšāhī known as Kofrī translated a book by Dr. Galzowski into Persian under the title *Żīāʾ al-nāẓerīn* (Light of the sighted; Tehran, 1301/1884).

Modern times. It was not until 1334/1916, however, that a formal course in ophthalmology was instituted at the Dār al-Fonūn. The teaching staff was headed by Dr. Yaḥyā Lesān-al-Ḥokamāʾ, who after studying in Persia under Dr. Ratulde and later in Paris had returned to Persia in 1904 as the country's first fully qualified modern ophthalmologist (Maḥbūbī Ardakānī, pp. 26, 292). He was given the chair in ophthalmology at the medical school in Dey 1318 Š./December 1939-January 1940 (Maḥbūbī Ardakānī, p. 266). From that time on he also engaged in surgery and clinical instruction (Prof. Šams, interview in Ordībehešt 1368 Š./April-May 1989) at the Wazīrī Hospital on Fridays and was at the same time an attending ophthalmologist at the Sīnā Hospital (Maḥbūbī

Ardakānī, p. 337).

The credit for initiating the scientific study of eye diseases in Persia and introducing modern techniques of treatment belongs to Professor Fatḥ-ʿAlī Šams, the son of Lesān-al-Ḥokamāʾ. From early childhood he had lived in Paris, where he completed his elementary education and later his higher education in ophthalmology. In 1928 he became the first Persian to receive the rank of Professor *agrégé*. In 1309 Š./1930 he returned to Persia and began teaching ophthalmology at the medical school and at Dār al-Fonūn during the day and at the military hospital in the evenings. After the establishment of the Fārābī Hospital (see below) in 1312 Š./1933 he concentrated most of his energy there, becoming the director of its ophthalmology department. He also was the head of the medical school of the University of Tehran for some time.

Up to 1950 Professor Šams was in charge of preparing reports on trachoma throughout the world for the international congress of ophthalmologists (Prof. Šams, interview). In Ḵordād 1333 Š./May-June 1954 he presented the electrocoagulation technique he had developed for the treatment of trachoma, which was hailed as one of the best contemporary pieces of research on trachoma (Ardakānī, p. 164). With the implementation of this technique the number of reported cases of trachoma decreased spectacularly (Prof. Šams, interview).

In 1326 Š./1947 he founded the Ophthalmological Association of Persia (Majmaʿ-e Čašm-pezeškī-e Īrān). The first medical college in Persia was opened at Tehran in 1337/1919, and Dr. Lesān-al-Ḥokamāʾ was put in charge of the ophthalmology teaching (Maḥbūbī Ardakānī, p. 255). The Faculty of Medicine was established at Tehran University in 1313 Š./1934, an ophthalmology department was organized, and in 1318 Š./1939 Lesān-al-Ḥokamāʾ became its full professor; advanced courses for eye specialists were started in 1334 Š./1955 (ibid., pp. 266, 292). In later times eye departments began work in most of the university hospitals throughout the country and also in some newly established private hospitals.

Spectacles were in short supply until 1309 Š./1930. From the start of that year, the modern system of optometry and prescription of appropriate corrective lenses was introduced (Prof. Šams, interview).

Centers of study and treatment. Although a small number of the hospitals functioning before 1312 Š./1933 had ophthalmic wards, it was not until that

year that the first special eye infirmary, later Fārābī Hospital, was opened at Tehran. In 1300 Š./1921 a garden belonging to Ḥājī Moʿaddel Šīrāzī had been purchased for the city hall to serve as the municipal sanatorium, orphanage, and shelter for the poor. Later, when typhus broke out in the shelter, it was converted into a temporary hospital called Hospital Number 2, and in 1319 Š./1940 it became a part of the medical school and was named the Fārābī Hospital. At that time, fundamental changes were made in the building and it began operations with 120 beds and 6 treatment centers. Soon after plans were made to expand the hospital, and in 1321 Š./1942 the foundations were laid for a new building next to the old one. It was opened in 1324 Š./1945 and the capacity of the hospital, now entirely devoted to ophthalmology, had been increased to 240 beds and 10 treatment centers. Professor Šams remained its director until 1359 Š./1980 (Maḥbūbī Ardakānī, p. 339). In Āḏar 1335 Š./November-December 1956 another new building was constructed, and its operating room was dedicated to Dr. Lesān-al-Ḥokamāʾ Šams in appreciation of his service (ibid.). In time the hospital won international recognition as a center for ophthalmology, and physicians from other countries came to study or teach in it, participate in conferences, or give lectures. Members of the Persian Ophthalmological Association (Anjoman-e Čašm-pezeškān-e Īrān) convened in Fārābī Hospital on the first Sunday of every month to report progress on their latest research (ibid., p. 340). In 1362 Š./1983, construction began to expand further the hospital on a lot of about 72,000 m^2 behind this hospital, which according to the new plan, will include an adjacent residential compound to house its doctors. It is already one of the largest ophthalmological centers in the Middle East, and its collection of eye color photographs are unique in the world (Prof. Šams, interview; *Kayhān*, 5 Šahrīvar 1362 Š./27 August 1983).

Until recent years Fārābī was the only public hospital specializing in ophthalmology. In Ordībehešt 1367 Š./April-May 1988 the second Persian public ophthalmological center started operations in Zāhedān (*Kayhān*, 29 Ordībehešt 1367 Š./19 May 1988), and the building of another large ophthalmological hospital in Shiraz, where two such centers (Pūsṭčī and Ḵalīlī hospitals) already exist, began in 1366 Š./1987 (*Kayhān*, 20 and 21 Ḵordād 1366 Š./10 and 11 June 1987). Pūsṭčī hospital, a reputed clinic for the treatment of eye diseases, was founded in Shiraz in 1330 Š./1951 with funds provided by the endowments of ʿEnāyat-Allāh Pūsṭčī. In 1346 Š./1967 it was incorporated into the system of the School of Medicine of Pahlavi University (now the University of Shiraz) and is now known as Darmāngāh-e Časm-e Dānešgah-e ʿOlūm-e

Pezeškī-e Šīrāz. It has no facilities for post-surgical hospitalization of its patients, who instead are generally transferred to Ḵalīlī Hospital, another ophthalmological center.

There are ophthalmological departments alongside other medical divisions in many of the hospitals of Tehran and other cities. The ophthalmology department of the Mīṭāqīya Hospital (the present Moṣṭafā Ḵomeynī Hospital) in Tehran is among the reputed centers and is mostly active in cornea transplants (*Kayhān*, 24 Ordībehešt 1366 Š./14 May 1987). Also, the ophthalmology department of the Labbāfī-nežād Hospital in Tehran is among the most modern ophthalmological training centers in Persia, in which advanced surgery, such as lenticula-optic transplants, are performed (*Kayhān*, 4 Tīr 1366 Š./25 June 1987; 20 Tīr 1367 Š./11 July 1988). Today, all the provincial capitals such as Isfahan, Shiraz, Tabrīz, and Mašhad, have eye clinics and ophthalmology departments.

From 1314 Š./1935, when the health centers of the schools (*ṣeḥḥīya-ye madāres*) affiliated with the Ministry of Education were established, until 1357 Š./1978, when they were transferred to the Ministry of Health as the School Health Department (Edāra-ye Koll-e Behdašt-e Madāres; Karīmī, p. 9), one of the main activities of this department has been to study, identify, prevent, and treat student eye diseases (Nāẓer et al., p. 4; *Kayhān*, 24 Farvardīn 1364 Š./13 April 1985). Among those who have served in this department were the late Dr. Noṣrat-Allāh Bāstān (Bāstān, p. 842) and Professor Fatḥ-ʿAlī Šams (Prof. Šams, interview). Although the duties of the student health bureau were limited to simple prophylactic medicine and control of infectious diseases, they gradually increased, and in the area of ophthalmology it engaged in activities such as studying student vision, identifying patients with eye disease, providing eye glasses for students, and providing the resources for making use of ophthalmological services (Yūnosī, pp. 5, 8). In 1350 Š./1971, the center for the training of school health care supervisor (*morāqebīn-e behdāšt-e madāres*) was established, and until 1357 Š./1978 about 7,000 graduates of this organization began working in the schools (Karīmī, p. 10). One of their duties was to conduct a fundamental evaluation of the students' vision (*Gozāreš*, p. 11). In 1354 Š./1975 health identification cards for students began to be issued, and at the same time physicians of the School Health Department engaged in statistical studies of eye diseases. According to the statistics collected, in that year about 25 percent of the students in the Tehran public schools suffered from eye diseases (Nāẓer et al., p. 22). Although this level decreased in later

years, today, as well, 11 percent of students suffer from refraction disorders and require glasses (*Gozāreš*, p. 5; *Kayhān*, 24 Farvardīn 1364 Š./14 May 1985).

Of other ophthalmologists one may mention Dr. Mohaḏḏeb-al-Salṭana ʿAlī-Reżā Bahrāmī and Dr. Bāstān. Dr. Bahrāmī studied medicine with his father, Dr. Abu'l-Ḥasan Khan Bahrāmī and then, along with Lesān-al-Ḥokamāʾ Šams, studied in Tehran with Dr. Ratulde (Maḥbūbī Ardakānī, p. 26). In 1297/1918 he became the director of the Women's (later Jahānšāh Ṣāleḥ) Hospital, a position he held until 1305 Š./1926. He also ran the ophthalmology department of the hospital (Maḥbūbī Ardakānī, pp. 330-31). Dr. Noṣrat-Allāh Bāstān (1282-1361 Š./1904-82) was a graduate of the medical school of the University of Tehran, where he first met Lesān-al-Ḥokamāʾ Šams and gradually became interested in ophthalmology. After completing his education in Tehran he went to France, where he studied ophthalmology before returning to Tehran. From 1315 Š./1936 he started practicing in that city and teaching at the medical school of the University of Tehran (Bāstān, pp. 939-42). For some time he was the director of the ophthalmology department of the Sīnā Hospital and in 1319 Š./1940 he was appointed head of the ophthalmology department of Wazīrī Hospital (Maḥbūbī Ardakānī, pp. 338, 342).

Common diseases of the eye and their traditional treatments.

Āb-e čašm (lit. water of the eye), which includes *āb-e morvārīd*, or *āb-e sapīd* (cataract), *āb-e sīāh* (diplopia or amaurosis), and *āb-e sabz* (glaucoma), was treated or arrested in various ways. In its early stages it was treated with collyrium (*sorma*) or powders, and ointments (*šīāf, żemād*) such as the one prescribed by Boḵārī, which is the basis of the ointments called *bāslīqūn-ekabīr* (basilicon ointment) and *sorma-ye rūšīānā* (made of sal ammoniac, aloes, long pepper, and saffron prescribed by Ḥakīm Moʾmen (pp. 1123-24, cf. Jorjānī, *Ḏaḵīra*, p. 352). Rāzī (II, p. 306) also used an ointment comprised of fat, cooked colocynth (*ḥanẓal-e poḵta*), balsam oil, meerschaum (*farībūn*), sal ammoniac, and fennel water, and Jorjānī (*Aḡrāż*, p. 327) used a poultice composed of white hellebore (*ḵarbaq-e sapīd*), white pepper, gum arabic (*ošaq*), with turnip juice. Advanced cataracts, however, were treated with surgery alone, which was common at least from the time of Ḥonayn b. Esḥāq. In the opinion of ophthalmologists, diplopia or amaurosis or glaucoma could not even be treated with surgery. Warm and spicy ointments were put on eyes for the fluid to be tempered (*poḵta*). They were then removed with drugs or surgery (Boḵārī, pp. 282, 283), because it was thought that the fluid had solidified and could not be removed with a syringe. The fluids were, therefore, softened with

ointments and warm drugs. In the opinion of Rāzī (II, p. 302), if *āb-e čašm* is very thick and viscous or very thin, it cannot be treated surgically. Surgery for *āb-ečašm* was performed with a syringe called *meqdaḥ* (needle), *mahat* (scraping), or *mesbār* (probe) (Moḥaqqeq, p. 76). Jorjānī (*Ḏaḵīra*, pp. 362-63) writes an interesting description of surgery with *mahat* and describes in detail the medical treatment after surgery. Rāzī (II, p. 303) also used the same device, or *meqdaḥ*. This instrument was commonly used in Persia for centuries. The description of Raphaël du Mans of a syringe that was used in Isfahan to remove cataracts is the same as that described in the centuries before and after (Elgood, p. 66, quoting Raphael de Mans without reference to the source; compare with Fāʾeq Ḵaṭṭāb, pp. 70ff.). According to this report, the syringe was in the shape of a triangular pipe with both ends open. One end was connected to a piston and the other end to a hollow needle. There was a hole in the middle of the pipe, from which the fluid was drained from the eye.

Ramad, or trachoma. Jorjānī (*Ḏaḵīra*, pp. 348-49), who mentions its various types, used various methods to treat it. Among them were an ointment composed of scabiosa (*māmīṯā*), sarcocola (*anzarūt*), saffron, gum tragacanth (*katīrā*), and opium mixed with rain water and egg white. Boḵārī (pp. 270, 271) also prescribes a compound of camphor ointment, lead powder (*sapīda-ye arzīz*), sarcocola, starch, gum tragacanth, and opium.

Barad, the fluid that collects behind the eyelid and causes it to be sticky. This disease was at times treated with sumac ointments (Ḥakīm Moʾmen, p. 1131) and sometimes with surgery, with an instrument called *mebżaʿ* (Fāʾeq Ḵaṭṭāb, p. 70). The lid was cut widthwise, and the thick and sticky fluid was removed with the instrument (Jorjānī, *Aḡrāż*, pp. 311-12).

Ẓofra or *nāḵona* (*nāḵonak*; pterygium) is a growth similar to a nail that appears in the corner of the eye. It was treated in two ways: 1. with drugs, such as *bāslīqūn-e kabīr* (royal ointment), by pouring the juice of cooked crab or sweetroot (*šīrīn-bayān*) extract into the eye (Heravī, pp. 186, 194), or with a mixture of crab powder and salt (Bīrūnī, I, p. 371); and 2. through bloodletting on the head, by opening the two veins in the corner of the eye, and finally by surgically removing the pterygium (Boḵārī, p. 277; Jorjānī, *Ḏaḵīra*, pp. 351-52).

Sapīda or *bayāż*: a white spot that appears on the eye, often after a severe headache, the treatment for which, according to Jorjānī (*Aḡrāż*, p. 325) was a compound of *šaqāyeq* (corn poppy or anemone) extract, extract of centaury (*qanṭūrīyūn*), and honey, which was poured into the eye.

Damʿa, or watering of the eye (different from cataracts, diplopia, or amaurosis), caused by a malfunction of the muscle in the corner of the eye. This disease was treated with a collyrium composed of green vitriol (*tūtīā-ye sabz*), yellow myrobalan (*halīla-ye zard*), long pepper, aloes (*ṣabr-e zard*), and turmeric (Jorjānī, *Aḡrāż*, pp. 751-52), or an orange ointment (*šīāf-e nāranj*) made up of vitriol nurtured in sour orange juice, starch, ceruse (*safīdāb*), gum tragacanth, yellow myrobalan, *ḥożoż* (Berberidis lycii), and opium (Ḥakīm Moʾmen, p. 1127), or by applying coral (*bossad*) and copper (*noḥās*) powder to the eye (Heravī, pp. 63, 335). It is also noteworthy that some eye ailments were treated by applying leeches to temples or branding the temple with a hot rod. Polak saw such treatments in Persia and mentions their extraordinary curative effects (Polak, II, pp. 239-40).

Eye medicine (*akḥāl*), both simple and compound, included various kinds of dry collyrium, wet collyrium (also called *šīāf, żemād*), and drops. Dry collyrium consists of two kinds. The first kind is a mineral and is found in various forms. According to Bīrūnī (II, p. 584) one kind is in crystal form and is mined in Ray. Another kind was found in Isfahan, and was apparently a lead mineral compound. The second kind was a compound called *ṭaraḥmātīqūn*, which was made of a combination of herbal and mineral drugs. Among the first two kinds of collyrium were antimony vitriol, and manganese (Heravī, pp. 82, 120-21). The latter kind also was made in numerous compounds such as powdered burnt date pits, Indian nard, and burnt lapis lazuli stone (Jorjānī, *Aḡrāż*, p. 325). Some of these compounds were given particular names such as *baslīqūn-e kabīr*.

Šīāf, a compound of various drugs with rain water or clean water, which were dried in the shade, and when needed, water was added to them and used, or they were made into ointments and used (Ṭabarī, p. 176; Ḥakīm Moʾmen, pp. 1129-33). Some *šīāf*s were also gradually given particular names, such as *šīāf-e nāranj* and *šīāf-e somāq* mentioned above.

Qaṭra (drops) were obtained from combining extracts of several drugs or one plant, such as the drops that Rāzī (II, pp. 146, 148) obtained from rose petals, or combined with other drugs.

The powders or *sormas* that women use today to strengthen eyes and that are also used to treat some diseases and often as cosmetics are obtained in various ways: 1. *Sorma-ye terma*: wicks of cashmere are placed in a container (not copper) along with butter and set on fire. Then a plate is placed over the

container to collect the soot for use. 2. *Sorma-ye donba*: cotton is made into wicks and burnt in sheep fat, as in the previous instance. 3. *Sorma-ye qalam-e gāv* (cow bone marrow): cotton is made into wicks and burnt in cow bone marrow, and the soot is collected. 4. *Sorma-ye bādām* (almond): same as (3) but with almond oil, which is considered to be especially useful in strengthening the eyes (Katīrāʾī, pp. 330-31).

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