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Section 10

2000-2001

Glaucoma

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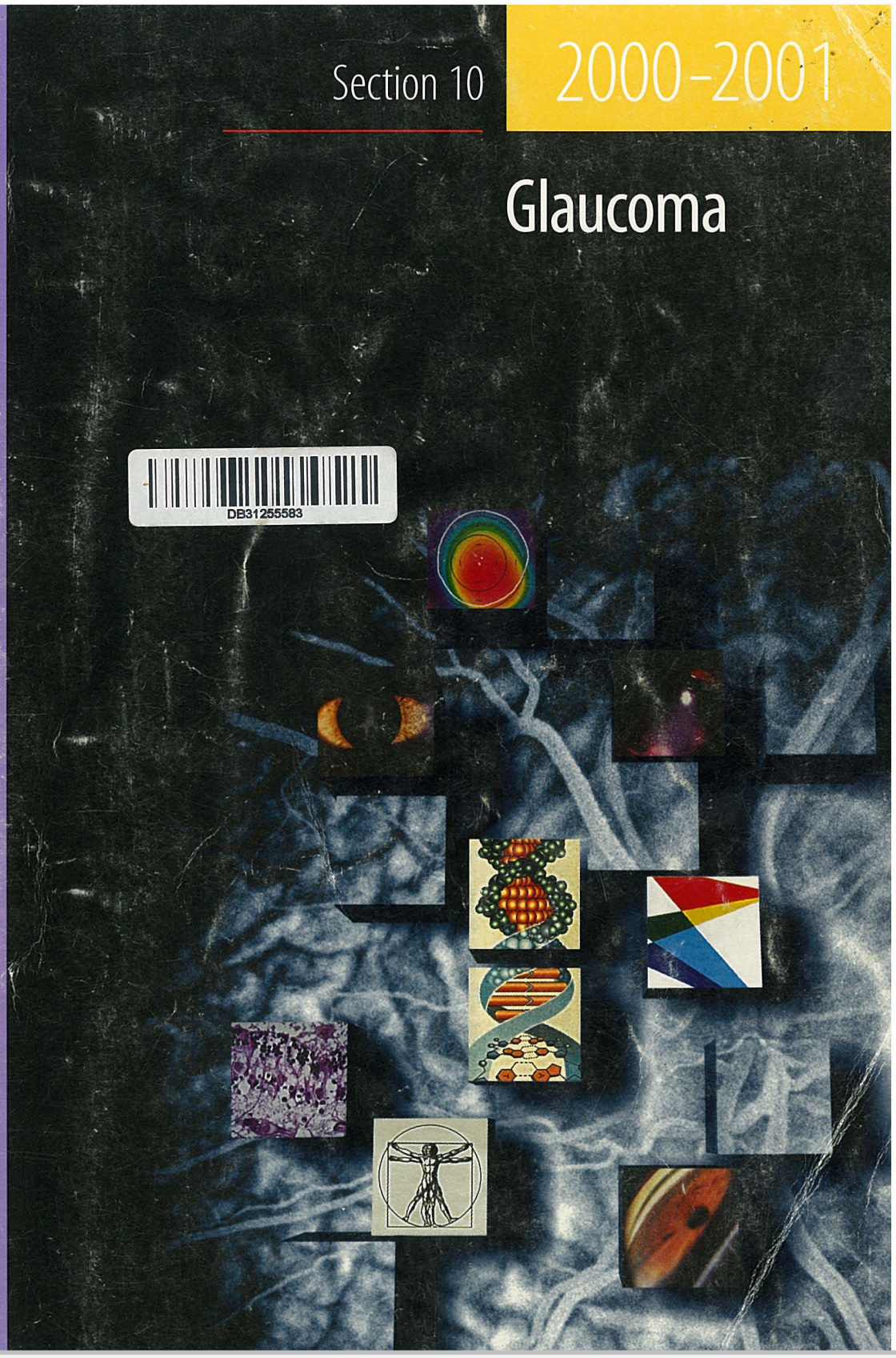

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Development of Our Concept of Glaucoma and Its Treatment

The word *glaucoma* derives from the Greek word *glauk6s,* meaning a watery or diluted blue. Hippocrates mentioned the condition of glaukosis among the infirmities suffered by old people. Hippocrates meant by the term a bluish discoloration of the pupil. The condition was later called *ypochyma* and corresponded to a cataract.

In antiquity glaukosis and hypochyma were considered identical. Later, during the Alexandrian time, glaucoma was thought to be a disease of the crystalline body (or fluid), which changed its normal color to light blue; hypochyma, in contrast, was regarded as the exudation of a fluid that later congealed and lay between the iris and the lens. All glaucomas were considered incurable, while it was believed that some hypochymata could be improved.

The authors of antiquity and Arab physicians interpreted glaucoma as an incurable cataract with desiccation of the lens. During the Middle Ages, the School of Salerno introduced the concept of "gutta serena," which was supposed to be one type of incurable cataract in which the pupil was dilated and clear; the condition was considered to be possibly congenital. According to this school, another type of incurable cataract existed in which the pupil would dilate suddenly and appear green.

Pierre Brisseau, with his little book on cataract and glaucoma published in 1709, was the first to consider glaucoma as a vitreous opacification. He correctly interpreted cataract as an opaque crystalline lens. The first reasonably satisfactory description of glaucoma was written by Charles *St:* Yves (1722): "Glaucoma is one of the spurious cataracts. First the patients see smoke and fog; then they lose vision while the pupil becomes dilated; finally, only a remnant of vision remains temporally. The disease may begin with severe pain. The prognosis is poor. There is danger that the other eye will also be affected." Quite likely he was describing angle-closure glaucoma.

Johann Zacharias Platner (1745) was the first to state that the glaucomatous eye was hard, resisting the pressure exerted by the fingers. The pressure theory was then emphasized and clarified by William Mackenzie (1830). Jakob Wenzel (1808) thought that glaucoma was primarily a disease of the retina, while S. Canstatt (1831), Julius Sichel (1841), and followers declared glaucoma a form of choroiditis. All of them considered glaucoma incurable. Georg Josef Beer (1817) thought that glaucoma was an opacification of the vitreous and the sequel of an arthritic ophthalmia that would only develop in patients with gout who had had no preceding ocular inflammation.

A few futile attempts were made to treat glaucoma in the early nineteenth century. Mackenzie suggested a sclerotomy or lensectomy. Georg Stromeyer recommended tenotomy of the superior oblique and myotomy of the inferior oblique.

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St. Yves wanted to enucleate the affected eye to prevent involvement of the second eye. The first real breakthrough in treatment was the discovery in 1856 by Albrecht von Graefe that iridectomy could be a curative procedure for certain types of glaucoma. He had first tried without success the instillation of atropine and repeated paracenteses to lower intraocular pressure (IOP).

Only with the invention of the ophthalmoscope by Hermann von Helmholtz in 1851 was it possible to observe the changes in the optic nerve head associated with glaucoma. The term *pressure excavation* had been coined by von Graefe. This ophthalmoscopic concept was corroborated by careful pathologic examinations initiated by Heinrich Muller. Edward Jaeger and Isidor Schnabel defended the hypothesis that glaucoma was characterized by specific optic nerve disease.

It soon became obvious that an iridectomy could not cure all types of glaucoma. Albrecht von Graefe had already noted that a "cystoid scar," meaning a filtering bleb in today's jargon, would offer certain advantages for normalizing IOP. Sclerotomy was first proposed by Louis de Wecker in 1869. Surgeons then tried to keep the wound open on purpose, either by infolding of the conjunctiva (H. Herbert, 1903) or by incarceration of the iris (George Critchett of London in 1858 and Soren Holth of Oslo in 1904). Finally, the iridosclerectomy was devised by Pierre Lagrange in Paris (1905), and the trephining operation was introduced by Robert H. Elliot of Madras, India. Thermosclerotomy was first described by Luigi Preziosi of Malta in 1924, and it was later modified and popularized by Harold Scheie of Philadelphia in 1958. Trabeculectomy was subsequently described by Watson and Cairns in the 1950s in England.

The medical treatment of glaucoma was initiated with eserine, which is derived from the Calabar bean of West Africa. This drug was first recognized as a miotic and used for treating iris prolapse. In 1876 Ludwig Laqueur of Strasbourg and Adolf Weber of Darmstadt were the first to use eserine to treat glaucoma. The alkaloid pilocarpine was isolated in 1875, and it was first topically applied to the eye by John Tweedy of London (1875) and by Weber (1876) in an effort to lower IOP.

Frederick C. Blodi, MD

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