Sir John Herschel and Contact Lenses

Katherine Chalkley has appealed for an exact quotation, from the writings of Sir John F. W. Herschel, of the passage in which he is supposed to have suggested the making of corneal contact lenses (*Science*, 1949, **110**, 693). I am glad to supply the information, and to take this opportunity to point out that Herschel probably did not have *corneal* contact lenses in mind.

The passage occurs on p. 398 of Sir John's great article on "Light," occupying pp. 341–586 of Vol. IV of the *Encyclopaedia Metropolitana*, which was published in London in 1845. The article was, however, signed "Slough, December 12, 1827" and was apparently published separately as soon as it had been written, for a French translation appeared in 1829–1833 and a German one in 1831. Any discussion of priority in the suggestion of contact lenses *per se*, therefore, should probably credit Herschel with such a suggestion as of 1827.

On his p. 398, Herschel is speaking of possible means of correcting for regular corneal astigmatism, which had been recently discovered by G. B. Airy in his own eyes, and not as yet (in 1827) concisely named.[1] Herschel says:

> The strict method, applicable in all such cases, would be to adapt a lens to the eye, of nearly the same refractive power, and having its surface next the eye an exact *intaglio* fac-simile of the irregular cornea, while the external should be exactly spherical of the same general convexity as the cornea itself; for it is clear, that all the distortions of the rays at the posterior surface of such a lens would be exactly counteracted by the equal and opposite distortions at the cornea itself.†

Herschel goes on to describe how Airy solved the problem by means of a spectacle lens in the usual location, but having one spherical and one cylindrical surface—the type of correction used for this common refractive error ever since.

The dagger at the end of the quotation indicates a footnote in which Sir John says:

> † Should any very bad cases of irregular cornea be found, it is worthy of consideration, whether at least a temporary distinct vision could not be procured, by applying in contact with the surface of the eye some transparent animal jelly contained in a spherical capsule of glass; or whether an actual mould of the cornea might not be taken, and impressed on some transparent medium. The operation would, of course, be delicate, but certainly less so than that of cutting open a living eye, and taking out its contents.

Certainly, here is a detailed suggestion of a contact lens, and even of the *molded plastic* type which in recent years has become favored. But I do not believe that Sir John literally contemplated what we now call a *corneal* lens, i.e., one edged to the diameter of the cornea and lacking a scleral skirt. Like his father and his aunt, Sir John was an astronomer. His work is not free of errors concerning the eye, and he certainly knew nothing about it from the operative standpoint (else he would not have used the operation of evisceration as an example of a "delicate" one!). In this instance, his attention was almost entirely upon the cornea, since it is the (only) optical part of the fibrous tunic and hence lay within his department of science. But I would confidently predict backwards and say that if Herschel had tried to make and fit a contact lens, it would have had, from the first or very soon afterward, a scleral portion supporting the "corneal segment" out of contact with the sensitive cornea, in the present manner. The technology of the time could not have provided a corneal lens fitted so perfectly as not to stimulate the cornea's abundant pain-endings—and Sir John would have known this as soon as he touched his own cornea.

About ten years ago, I read a 19th century account of the experimental installation of a corneal contact lens, in a rabbit which wore it for several months without ill effects. Unfortunately, I have lost that reference (which might establish a genuine priority).

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[1] Thomas Young, prior to 1793, discovered his own lenticular astigmatism—amounting to 1.7 diopters—in the course of his experiments on the mechanism of accommodation.

A Note on Chatin and the Hypothesis that Endemic Goiter is Due to a Lack of Iodine

W. T. Salter has written (*Science*, 1949, **109**, 453):

> His [A. Chatin's] fellow scientists tried to apply his method and failed. Finally, the French Academy surveyed these results and concluded that Chatin's work was not tenable. The poor man ended his career in disappointment and frustration; . . .
>
> One wonders, now, how the leading French scientists dared to discredit Chatin's conclusions.

The answer is not hard to find or difficult to understand. In short, others could not confirm Chatin's findings as to the differences in the iodine content of soil, water, air, and food in various localities. (Chatin emphasized the iodine content of the air and almost entirely neglected that of the food.) They also refused to admit that the therapeutic and prophylactic action of iodine, which many conceded, was proof that endemic goiter was due to a lack of iodine. They raised other objections, which I will cite later.

So far as I have been able to determine, neither the Académie Française, the Académie des Sciences, nor the Académie de Médicine ever formally rejected Chatin's views. However, on December 19, 1861, more than eleven years after Chatin's first publication on the subject, E. Rouher, Minister of Agriculture, Commerce, and Public Works, appointed a commission to collect all government data on goiter and cretinism, to coordinate and consider them, and to propose means to abolish these disorders or diminish their incidence. The commission, as originally appointed, consisted of seven physicians and three laymen. The commission requested and secured the addition of Baillarger, as a special representative of the Académie de Medecine, charged by this body with acquainting the commission with the material in the possession of the academy.

The report of the commission was not published until 1873 (Baillarger, J. G. F. *Enquête sur le goitre et le*

cretinisme. Paris, 1873). It consisted of 376 pages, of which eight (283–291) were devoted to a consideration of Chatin's findings and conclusions, which were set forth in his own words.

To these conclusions, the commission objected:

1. Goiter did not exist in the Alps at elevations greater than 1,200 meters above sea level, although Chatin claimed that the air and water contained no iodine.

2. Goiter was prevalent in places separated from others free from goiter by only a short distance. The report cites two villages only a kilometer apart.

3. Goiter was prevalent in the valley of the Oise, where Chatin had found the air and water to be normally iodinated.

4. According to Chatin himself, one-tenth of the women of Trieste, a seaport with iodinated air, had goiter.

There is more in the report that is quite inconsistent with the iodine-lack hypothesis but that is not discussed in this connection. For instance, there was the temporal variation in the exemptions from military service because of goiter in 60 of the departments of France for five successive decennia, 1816–1865. During this period, there were decreases, as in Bas-Rhin, 60, 39, 29, 10, 5 per thousand; increases, as in Haute-Saône, 2, 9, 13, 12, 17 per thousand; and increases and decreases, as in Hautes-Alpes, 62, 142, 123, 87, 101, or Rhone, 24, 38, 50, 28, 24.

However, the commission accepted the prophylactic usefulness of iodine and recommended (p. 347) that iodine preparations of one kind or another be dispensed, free of charge, in school and asylums, to all goitrous children and to all other children whom the physician might consider predisposed to the disease. The report cites several instances of the apparent success of this treatment. Why it did not become general and why France, of all countries, has to this day refused to adopt the compulsory iodinization of salt need not be discussed here. Those interested might do well to read the report by L. Berard and C. Dumet (*Report to first international goiter conference.* Berne, 1927) of the great diminution in the incidence of goiter from 1897 to 1927, without any "systematic preventive treatment with iodine."

Within a year of the publication of the commission's report, A. Chatin was made director of the Ecole Supérieure de Pharmacie and was elected to the Academie des Sciences. A few years later, he was promoted to be Officer of the Legion of Honor. In 1886, he retired from the Ecole Supérieure de Pharmacie and was made honorary director. In 1896, he was the subject of a laudatory biography, under the title "Les Maîtres de Médecine" (unsigned biography in *La Médecine Moderne,* 1896, **7**, suppl. 129). He was later elected president of the Académie des Sciences. He died in 1901 and was the subject of long, eulogistic obituary notices in two important journals. (Guignard, M. L. *J. Pharm. Chim.,* 1901, 6th Series, **13**, 151; and Perrot, E. *Bull. Sci. Pharm.,* 1901, **3**, 23).

It is difficult to find any evidence of disappointment and frustration.

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Scientific Book Register

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