

THE BRITISH JOURNAL  
OF  
OPHTHALMOLOGY

APRIL, 1923

COMMUNICATIONS

---

SO-CALLED GLASS-WORKERS' CATARACT  
OCCURRING IN OTHER OCCUPATIONS, WITH A  
REPORT OF TWO CASES\*

BY

ALAN W. SICHEL, M.D.(Edin.), D.O.(Oxon.), D.O.M.S.(Lond.)

CAPE TOWN

Introductory

THE condition known as glass-workers' cataract first began to receive attention in Great Britain some 18 or 19 years ago when Robinson, of Sunderland, published an account<sup>(1)</sup> of cases occurring in that locality. A further description<sup>(2)</sup> was published in 1907 and in July, 1915, the results of Robinson's observations were embodied in a paper entitled "Glass-workers' Cataract,"<sup>(3)</sup> read before the Oxford Ophthalmological Congress. Stated briefly, the chief facts brought out in this paper are, that persons exposed to incandescent molten glass or to continual furnace glare in the flattening of glass, suffer more than ten times as frequently as other people from cataract; that the characteristic feature of this type of cataract is opacity of the posterior cortical layers of the lens of varying size, within the pupillary area, in contradistinction to the more usual type in senile subjects where peripheral striae appear round the margin of the lens, the central area remaining clear; that the changes in the lens substance are brought about by the action of the infra-red or heat rays.

---

\* Being a paper, with demonstration of cases, read at a meeting of the British Medical Association, Cape of Good Hope (Western) Branch, Cape Town, on July 28, 1922.

Attracted by Robinson's first publication, Dr. T. M. Legge,<sup>(4)</sup> H.M. Medical Inspector of Factories, determined to investigate the subject for himself and brought the matter before the Departmental Committee appointed by the Home Office to enquire into the question of industrial diseases. As a result of this committee's work, a recommendation was included in its second report (1908) to the effect that "cataract in glass-workers" should be added to the Schedule of Industrial Diseases for which compensation may be claimed. The Home Office referred the aetiology of cataract in glass-workers to the Royal Society, a committee of which was appointed in 1908 to investigate the condition. As a result of the activities of this committee several researches were undertaken, the work in particular of Sir William Crookes,<sup>(6)</sup> Parsons,<sup>(7)</sup> Martin,<sup>(8)</sup> and Hartridge and Hill<sup>(9)</sup> being of much value in the elucidation of the problem. In its report,<sup>(10)</sup> published in 1921, the results of the investigations of the committee are summarized as follows:—

1. That the luminous rays are not the cause of the disease.
2. That ultra-violet radiation is not the cause, in so far as any direct action upon the lens is concerned.
3. That the evidence is strongly in favour of the view that heat is the active agent.
4. That it is uncertain whether the heat radiation acts directly on the substance of the lens, or indirectly by disturbing the nutrition of the lens.
5. That possibly ultra-violet radiation may play some part in the causation by indirect action on the nutrition of the lens.

It should perhaps be pointed out here that the liability to cataract of glass-workers was denied by Snell<sup>(5)</sup> in a communication published early in 1907 giving the results of his own investigations. His experience, however, was limited to flint-bottle and pressed-glass workers, in which processes the heat is not so great as that experienced in the making of ordinary (heavy) bottles. That the former class of glass-worker is less liable to cataract is admitted by Robinson, whose original observations were more than substantiated as the result of the enquiries directed by Legge.

Within the last few years it has become abundantly clear that the occurrence of cataract among industrial workers who are exposed in the course of their employment to continuous heat and glare, is not confined to glass-workers. To Cridland of Wolverhampton belongs the credit of having demonstrated the occurrence of so-called glass-workers' cataract in a "puddler," i.e., iron smelter, the first case of this kind being shown at a meeting of the Ophthalmological Section of the Royal Society of Medicine in 1915<sup>(11)</sup>. In the following year he described a similar case, also

in a "puddler"<sup>(12)</sup>, and since that time has observed others of the same nature at the Wolverhampton Eye Infirmary<sup>(13)</sup>. As the result of his experience Cridland has little doubt that the type of cataract known as glass-workers' can occur in occupations other than that of glass-blowing, one being that of "puddling."

St. Clair Roberts, of Dudley, was the next to describe cases of cataract<sup>(14)</sup> occurring in an industry other than that of glass-blowing. His cases, about 25 in number, were collected among men and women engaged in chainmaking, and showed cataract resembling in clinical features the type of so-called glass-workers' cataract.

More recently, Healy, of Llanelly, has drawn attention to the prevalence of lenticular opacities in the eyes of tinplate millmen<sup>(15)</sup>. From the statistics available it would appear that the incidence of cataract in this class of workman is abnormally high. An interesting point mentioned by Healy is that in his experience lenticular changes attributable to the action of radiation do not develop until the workman has been engaged at his particular occupation for a period of 15 years. This at least applies to tinplate workmen. In each of the cases to be described, it will be observed that the patient had been engaged at his or her work for a similar period before the onset of lens changes was first noted.

South Africa being a producing rather than a manufacturing country, there exist in it few industries in which conditions likely to cause damage to the eyes through radiation by heat or glare are present. However, Brinton, of Johannesburg, recently reported<sup>(16)</sup> that he had met with cases of cataract of the same type as that found in glass-workers, in gold-smelters and assayers. But to anyone acquainted with industrial conditions in South Africa it must be obvious that, excluding the mining industry, there are few occupations in which the workman is exposed over long periods to the deleterious effects of intense heat or light such as is the case in the large industrial areas of Great Britain. For the reasons stated, the cases to be described are of more than passing interest.

### Cases

CASE 1. Mr. O. D., *aet.* 38, a machineman employed at the South African Railway Works, Salt River, was recommended by Dr. H. W. Stephens, Railway Medical Officer for that area, to see a specialist owing to failing sight. In the absence of Dr. J. S. du Toit, to whom he had been referred, he was examined by the writer on May 30, 1922. His complaint was that although he could see "well enough" in the distance, he was able no longer to find his number on the check board at the works. This inability was of one week's duration. He was not aware of any

failure of sight previous to this. On examination his condition was found to be as follows :—

R.V. 4/60, L.V. 6/36 partly; nothing abnormal to note on external examination except slight latent divergence revealed by the screen test; by oblique illumination the lens of each eye appeared somewhat hazy; no view of the fundi was obtainable; with the mirror at a distance it was evident that lenticular opacities were present.

After instillation of a mydriatic, the lens condition could be seen clearly. This in each eye consisted of a posterior cortical opacity, centrally situated with respect to the pupil and limited in extent. The opacity was somewhat irregular in shape, of cobweb-like structure peripherally, but with a denser central portion suggesting a Maltese cross in outline. Radiating from the centre of the lens and situated in the posterior cortical layers were a number of sectors, five to eight, surrounding the opacity as the spokes of a wheel the hub, and increasing in width towards the periphery. These additional changes could be seen only with a plane mirror, the concave mirror showing merely diffuse lens haze. The condition of the right eye was, if anything, a little more advanced than that of the left. The fundi, now visible though not too clearly, were normal. The nature of these changes suggesting cataract of the glass-workers' type, enquiry was directed to the nature of the patient's work, a description of which at once confirmed the diagnosis which had occurred to the writer. The man had been employed for the past 15 years in the tyre shop in which steel tyres are removed from or fitted to the wheels of rolling-stock by means of a furnace heated by "blow lights." In order to obtain an exact idea of the nature of this work the writer paid a visit to the tyre shop in question. The furnace consists of a circular metal casing about 9 inches in depth in which the tyre to be fitted is placed. Arranged at regular intervals round this casing and directed into its interior are 6 jets fed by crude oil and compressed air, each jet emitting a roaring tongue of flame which plays upon the contained tyre. The latter is heated in this way for 7 to 30 minutes, when it is removed and another one placed in position, this process continuing during the whole of the working day. The heat thrown out by the apparatus even at a distance is very great, but the glare is not pronounced, the tyre not being raised above black heat. Every now and again the machineman has to approach to within a distance of 1 to 2 feet from the casing in order to re-light one or other of the jets which tend to go out. In doing this he was observed instinctively to shield his eyes with the palm of his hand. Further interrogation of the patient elicited the facts that his working hours had been from 7.15 a.m. until 5 p.m., that previously he had worked for 2 to 3 days at a stretch

at the furnace with intervals of from 2 to 5 days away, but that for the last 18 months he had attended the furnace continuously from day to day. The patient's wife stated that frequently on returning from work in the evening his eyes had appeared irritated and the skin surrounding them reddened. For permission to present this case the writer is indebted to Dr. J. S. du Toit.

CASE 2. Mrs. L. T., *aet.* 64, presented herself for examination at the Salt River Free Dispensary on July 19, 1922. She complained that her sight had been failing gradually during the last 3 or 4 years, and had become so bad that she was no longer able to work. Vision in each eye was reduced to counting fingers only. By daylight and on oblique illumination well-marked lens haze seemed to be present, such as is found in the senile lens. By ophthalmoscopic examination no view of the interior of either eye was possible. On dilating the pupils the condition was revealed. In each eye there was a posterior cortical lens opacity situated centrally, dense and circular in shape, suggesting in appearance an inkblot to which this particular type of opacity has been likened by Legge. The opacity in the right eye was a little the larger of the two. The remainder of the lens was clear, but the effect of internal reflection from the opaque spot was puzzling at first; as the mirror was moved from point to point, ripples as it were of apparent opacities encircled the peripheral margin of the lens. There were no sectors or striae to be seen. The type of lens change present immediately suggested that associated with the glass-worker. Questioned as regards the nature of her work, the patient explained that she had been engaged in laundry work for the past 15 years. This entailed ironing clothes by hand with the ordinary flat iron which she had been in the habit of doing from 7 a.m. until 5 p.m. on three days in the week for a period of 15 years. She herself had thought that the work was affecting her sight, and she remarked on the heat which made her mouth dry and was felt on the cheek. She usually inclined her head slightly to the right at work, so that the right eye was a little nearer to the source of heat than the left.

#### Remarks

With regard to the two cases here described, there can be no doubt but that the first, *i.e.*, in the machineman, exhibits a condition agreeing in every respect with that typically seen in glass-workers as first pointed out by Robinson. The clinical picture of the lens opacity, the bilateral involvement, the age of the patient, the nature of his work and the period of time he had been engaged at it, all prove conclusively that the cataract can be ascribed to no other cause but that of heat radiation.

In the second case, *i.e.*, that of the laundress, the diagnosis is

not so obvious and the question of the condition having been brought about solely by heat is at least debatable. That cataract of the senile type may commence in the posterior cortical layers of the lens as a central opacity is admitted, but most observers agree that this is unusual if not rare. In the present case the lenticular opacities correspond with the description given by Legge of those frequently observed by him in glass-workers, namely, resemblance to a blot of ink. The patient's age proves nothing but merely lends force to the argument in favour of the opacities being of an uncommon senile type. The fact that she had been exposed to constant heat, though to be sure of no very great degree, for a period of 15 years, together with the clinical picture of the lens changes present and the involvement of both eyes to an almost equal extent, entitles one, in the writer's opinion, to include the case in the category of glass-workers' cataract.

Up to the present, cases of so-called glass-workers' cataract have been described as occurring in iron-smelters, gold-smelters, chainmakers and tinsplate millmen, in addition to glass-workers. To this list are added now cases in a machineman and a laundress. It would appear, therefore, that the condition may occur in many different occupations, no doubt more frequently in some than in others, the all-important factor being the question of exposure to radiant heat over a sufficiently long period of time.

In order to avoid confusion in nomenclature, brought about by affixing labels to particular groups of industrial cataract, it would be more scientific to adopt a name common to all by means of which this special type of lens opacity could be classified according to its mode of production, namely, the effect of radiation. No more appropriate term suggests itself than that of "ray cataract" first proposed by Cridland<sup>(1)</sup> for the reasons mentioned by him. Further investigation into the incidence of ray cataract is called for, especially in regard to its frequency in the various industries or occupations in which workers are subjected to prolonged and continuous exposure to radiant heat and light.

#### REFERENCES

1. **Robinson, Wm.**—"Bottle-finishers' Cataract." *Brit. Med. Jl.*, Jan. 24, 1903.
2. **Robinson, Wm.**—"Bottle-makers' Cataract." *Brit. Med. Jl.*, Aug. 17, 1907.
3. **Robinson, Wm.**—"Glass-workers' Cataract." *Ophthalmoscope*, Vol. XIII, p. 538, 1915.
4. **Legge, T. M.**—"Home Office Report on Cataract in Glass-workers," 1907.
5. **Snell, Simeon.**—*Brit. Med. Jl.*, Jan. 5, p. 8, 1907.
6. **Crookes, Sir Wm.**—"The Preparation of Eye-preserving Glass for Spectacles." *Proc. Roy. Soc.*, 1913.
7. **Parsons, J. H.**—*Science Progress*, 1909. "Some Effects of Bright Light upon the Eyes." *Jl. Amer. Med. Assoc.*, 1910.
8. **Martin.**—*Proc. Roy. Soc., B.*, Vol. LXXXV, 1912.
9. **Hartridge and Hill.**—*Proc. Roy. Soc.*, Vol. LXXXIX, 1915.
10. "Report of Glass-workers' Cataract Committee of the Royal Society." *Brit. Jl. Ophthalm.*, p. 464, Oct., 1921.

11. Cridland, B.—"A Case of Glassblowers' Cataract in a Puddler (Ironworker)." *Ophthalmoscope*, Vol. XIII, p. 125, 1915.
12. Cridland, B.—"A Second Case of Glass-workers' Cataract in a Puddler (Iron-smelter)." *Ophthalmoscope*, Vol. XIV, p. 25, 1916.
13. Cridland, B.—"The Occurrence of Glass-workers' Cataract in Puddlers (Iron-smelters)." *Brit. Jl. Ophthalm.*, p. 193, May, 1921.
14. Roberts, B. H. St. Clair.—"A Series of Cases of Glass-blowers' Cataract occurring in Chainmakers." *Brit. Jl. Ophthalm.*, p. 210, May, 1921.
15. Healy, James J. "The Prevalence of Lenticular Opacities in the Eyes of Tinplate Millmen." *Brit. Jl. Ophthalm.*, p. 194, May, 1921.
16. Brinton, A. G.—"Discussion on Industrial Cataract." *Ophthalm. Soc. of the United Kingdom. Brit. Jl. Ophthalm.*, p. 269, June, 1922.

The following may also be consulted:—

- Chicago Ophth. Soc. "Discussion on Exposure of Eye to Light Rays." *Amer. Jl. Ophthalm.*, p. 49, Jan., 1922.
- Birch-Hirschfeld.—*Arch. f. Ophthalm.*, Vol. LXXI, No. 3, 1909.
- Abstract Bulletin of Nela Research Laboratory Works of G.E.C., Cleveland, Ohio. "Glasses for Protecting the Eyes in Industrial Processes." *Brit. Jl. Ophthalm.*, p. 244, May, 1920.
- van der Hoeve, J.—Chicago Ophthal. Soc., Oct. 24, 1921. "Affections of the Eye induced by Undue Exposure to Light Rays," *Amer. Jl. Ophthalm.*, p. 49, Jan., 1922.
- Stein, Dr. L.—"Untersuchungen uber Glasblaserstar." *Arch. f. Augenheilk.*, Vol. LXXIV, p. 53, 1913. *Ophthalm. Rev.*, Vol. XXXIII, p. 12, Jan., 1914.
- Parsons, J. H.—Roy. Soc. Med., Dec. 3, 1913. "Demonstration of Specimens of Crookes' Glass." *Ophthalm. Rev.*, Vol. XXXIII, p. 28, Jan., 1914.
- "Cataract in Ironworkers." *Brit. Jl. Ophthalm.*, p. 224, May, 1921.
- Cramer, Dr. E.—"On the Origin and Clinical Peculiarities of Glass-blowers' Cataract." *Klin. Monatsbl. f. Augenheilk.*, Jan., 1907.
- Chick and Martin.—*Jl. Physiology*, Vol. XL., p. 404, 1910.
- Correspondence on subject of "Cataract in Glass-workers." *Ophthalmoscope*, Vol. XIV, p. 109, 1916.

---

## ON MACULAR PERCEPTION IN ADVANCED CATARACT

BY

GEORGE YOUNG

COLCHESTER

In the June, 1917, number of this Journal I published a brief note on a test for macular perception in advanced cataract, which had proved useful to me. To-day I wish to describe more fully the way in which I perform it now, and, as a prelude, will introduce such a concrete case as would call particularly for a test of this nature in practice: one in which the question becomes of vital importance, and the conditions make it most essential to be able to form a sound opinion on the macular function before advising an operation, there being no second eye to call upon in case of a disappointing result, and the possibility of bilateral macular disease being present.

A patient presented himself to me with a senile cataract in his right eye, so advanced that the whole nucleus of the lens was opaque, and the red reflex was limited to the periphery. No trace