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REPORT

OF AN

EXAMINATION OF THE EYES OF ONE HUNDRED AND SIXTY-SEVEN INMATES OF THE PENNSYLVANIA INSTITUTION FOR THE INSTRUCTION OF THE BLIND.

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The records of blind asylums, if correctly kept, should furnish us with the opportunity of determining, more nearly than any other means within our reach, the comparative frequency of the different causes of blindness.

In looking over the register of the Pennsylvania Institution for the Blind, with this end in view, it was evident, that the histories, obtained entirely from the accounts of the parents or friends of the applicants, were, of necessity, in most cases inaccurate and in many erroneous, and consequently of very little use for scientific purposes.

I therefore availed myself of the opportunity kindly afforded me by the principal, Mr. Chapin, to make a careful examination of the 167 inmates of the institution, with a view of determining, in each case, the present condition of the eyes, and so, as far as possible, the cause that led to it.

As a greater number of the cases afforded very little interest individually, I have classified them in general summaries, making a more detailed report of those whose interest seemed to warrant it.

As the rules for admission do not require applicants to be entirely blind, but only enough so to prevent them from gaining an education in ordinary schools, comparatively few are "stone blind," without even the perception of light.

In reference to the amount of vision, I have made four classes. 1st, those who can distinguish large type, as the heading of a newspaper or the title page of a book; 2d, those who have what is called quantitative vision, which enables them to distinguish the shadows of large objects; 3d, those who have mere perception of light; and 4th, the "stone blind."

There are 31 of the first class, 46 of the second, 28 of the third, and 62 of the fourth.

It is difficult for people who enjoy the blessing of perfect sight to understand how highly the mere ability to distinguish day from night is prized by those who are limited to this melancholy pittance of vision.

Several who have been the subjects of disease of the optic nerve, or of the brain at its origin, have before them a constant "glare of daylight," never varying in the brightest noonday or the darkest midnight; and so far from being annoyed by it, they call it a comfort, and would be very loath to exchange it for the gloom of perpetual darkness.

A general classification of the diseases that led to blindness shows:—

Purulent ophthalmia in	55 cases
General " "	22 "
Traumatic " "	30 "
Trachoma "	6 "
Keratitis "	6 "
Amaurosis "	11 "
Cataract (acquired) "	1 "
Separation of retina "	1 "
Congenital diseases and deformities	35 "

Purulent ophthalmia being generally thought to furnish the greater proportion of candidates for institutions for the blind, the number, large as it is, is scarcely so large as I expected to find it. More than half of the cases are of the form occurring in infants (ophthalmia neonatorum). As prompt and skilful treatment is almost invariably successful in this disease, it is fair to infer that nearly all of these cases would have been saved if they had enjoyed this advantage. The treatment is simple and easily applied, and should be thoroughly understood by every practitioner. Fortunately this is much more the case now than a few years since, and it is safe to predict that blind asylums will in future be, to a great extent, cut off from this hitherto fruitful source of supply.

Most of the cases of absolute blindness are furnished by the shrunken eyeballs of purulent ophthalmia.

Of the cases of general ophthalmia, five were caused by scarlet fever, three by spotted fever, and one by smallpox. In the rest the cause could not be definitely ascertained, though most of them give evidence of having originated in iritis. In one the affection of the second eye can be distinctly traced to sympathetic ophthalmia excited by long continued irritation in the eye originally diseased.

In seven of the traumatic cases both eyes were destroyed by blasting or gunshot accident; in the rest one eye only was originally injured and the affection of the other eye followed in

From two days to two months in	7 cases
" two months to six months in	3 "
" six months to one year in	6 "
" one year to two years in	3 "
" two years to four years in	2 "
In nine years in	1 "
" twenty years in	1 "

In none of them can any other cause for the blindness of the second eye be discovered than the influence of the injured one. The last two cases may be considered doubtful. In the one in which blindness of the uninjured eye supervened at the end of nine years, the eye secondarily affected has a dilated and immovable pupil with a greenish colour, and cataractous lens, suggesting glaucoma or, perhaps, choroiditis. The one in which twenty years supervened has white atrophy of the optic disk. The patient states that both eyes remained irritable for eight years after the injury, which was inflicted by a snowball. It is quite possible that a slow form of disease may have continued in the nerve after the ball became quiet, and extended eventually to the other eye. Nearly all of the rest are plain enough cases of sympathetic iridocyclitis.

As, in the whole range of surgery, scarcely any point is more definitely established than the injurious effect frequently excited by an injured eye upon its fellow, and no treatment is more clearly indicated than the prompt removal of the offending organ in such cases, most of these persons may be fairly set down as victims to the misplaced affection for sightless and unsightly eyeballs, in which even medical men still too often sympathize. In only three instances has operative interference been attempted. In one an anterior section was performed without effect; in two the injured eye was removed, but not until the other was "almost blind;" in none was extirpation resorted to at the precious moment when "weakness" of the uninjured eye and failure of its accommodation sounded the first note of alarm. There is no indication in any of the injured eyes of the presence of a foreign body.

The cases of trachoma and keratitis afford little interest. None of them are completely blind, and nearly all are strumous subjects. Some doctor has left his mark on one of them, in an extensive lead deposit on the centre of each cornea. So much has been said and written upon this subject, and the fatal effects of lead, when applied to an ulcerated cornea, have now been so long and so certainly established, that it would be extremely awkward to be called to the witness stand, as an expert, in the trial of a brother practitioner for malpractice in such a case.

Of the eleven cases classified as "amaurosis," eight present well marked white atrophy of the optic disk, and three blue atrophy. No very satisfactory history could be obtained from any of them. Two of the former are attributed to "brain disease," occurring in one instance at three years

of age, and in another at six. In one, blindness came on suddenly at four years of age; in another at thirteen, after "pain and inflammation." In one at four years during typhoid fever. One had intense pain in the brow for four years, commencing at thirty-six, the vision gradually diminishing and disappearing entirely at the same time with the pain. In one the sight commenced to fail immediately after a sunstroke, and was gone in less than a week. One is attributed to "brain fever," caused by a blow upon the head at two years of age, probably incorrectly, as the illness did not commence until two months afterwards. Nystagmus exists in five cases, external strabismus in one, and internal strabismus in two.

One of the cases of blue atrophy has no other history than that of a gradual diminution of sight; one at eighteen years of age had violent pain in the occiput and brow, lasting for more than three months, during which the sight progressively diminished, and was quite gone at the end of that time; the other awoke blind one morning at two and a half years of age, without previous warning; general paralysis came on a week afterwards and lasted about a week. There is external strabismus in the second case.

None of these cases of atrophy show any sign of other paralysis. Slight deafness exists in one case only.

The second case of blue atrophy, at nearly ten years after the commencement of the disease, and the last case of white atrophy, at nearly twenty years after the commencement of the disease, though both without the slightest perception of light, have before them, day and night, a constant subjective "glare of daylight." This, of course, must depend upon some continued irritation of the nerve or brain, and it is odd that it should last so long in a condition of perfect health. The most probable cause is the pressure of some morbid growth or bony enlargement.

There is only one well-established case of acquired cataract. It is that of an old man employed about the house, who had the misfortune to be a patient in the times when the operation of couching was still in vogue. He had sight for a while, but it was eventually extinguished by a disorganized vitreous.

The case of separation of the retina attributes his blindness, probably incorrectly, to a sunstroke. He has funnel-shaped detachments.

The thirty-five congenital cases consist of—

Cataract	10
Retinitis pigmentosa	9
Deformities	9
Atrophy of nerve (probable)	3
Atrophy of choroid	3
Unknown	1

The cataract cases present nothing of special interest. Some have been operated on with partial success. In very few does it seem likely that the

cataract is the only defect, the high degree of blindness suggesting an opaque vitreous, or an insensitive retina.

The subject of retinitis pigmentosa is of sufficient interest to warrant a brief reference to the history of these cases.

J. M., æt. 20, male, was always "night-blind," but could read fine print in a bright light until within the last four years. Vision has gradually diminished until he can now just see to go about alone, and recognize persons in bright daylight. His pupils are contracted, but respond to light slightly. Blindness is absolute except in the region of the macula lutea. There is no nystagmus. He has had four brothers and four sisters. One sister and one brother are blind, making three out of a family of nine. A brother and a sister died young, about whom he is uncertain. His father's vision is good, but his mother and his maternal grandfather had night-blindness.

S. M., sister of J. M., æt. 16, never had good sight, but could recognize persons six years ago. Has now merely quantitative vision. The pupils of normal size and respond freely to light. She has external strabismus and nystagmus.

S. J., female, æt. 22, had night-blindness in early childhood. Her vision gradually diminished until two years ago, since when there has been no change. Can read No. L. Snellen in a bright light, but cannot go about alone in the evening, or on a dull day. Vision confined to region of macula. Pupils normal, slightly responsive. Four brothers and eight sisters all have good vision. Parents are cousins, "but not full cousins."

L. W., female, æt. 19; hemeralopia and central limitation of field of vision well marked. Can read No. XXX., held close, in very bright light. Says her vision has never been better or worse. Pupils dilated and slightly responsive. Has four sisters, one of whom is now nearly blind, though she could see to read until sixteen years of age. No hereditary predisposition to blindness, or consanguinity of parents.

B. C., female, æt. 17, vision $=\frac{20}{C}$ in contracted field and by bright light; hemeralopia. Pupils slightly contracted and responsive. Parents not related. No other cases of blindness in the family.

W. G., male, æt. 21, born blind. Has slight perception of light only. Pupils contracted and immovable; nystagmus; pigment spots well marked, but peripheral, and not abundant. Has had two brothers and three sisters, all born blind but two, the oldest and the youngest child. One of the blind children is dead; one is an idiot, and the others are rather deficient in intellect. No hereditary predisposition. Parents not related.

J. C., male, æt. 19, has never seen better than now. Vision quantitative. Pupils dilated and fixed; hemeralopia; nystagmus; pigment marks decided, but peripheral, and not abundant. Has had five sisters and five brothers. One sister has the same affection. She can see to go about in daytime, but not after sundown. Her vision was never better. No consanguinity or inheritance.

C. K., female, æt. 38, could distinguish large letters until eighteen years of age. Sight gradually diminished until blindness is now absolute. Pupils dilated and fixed. Ext. strabismus Of twelve children, seven were born partially blind, the blindness increasing as they grew older. She and one other are stone blind, the rest have perception. Parents not related.

No cases of blindness in previous generation. Parents lived to old age, and children are healthy.

M. K., æt. 28, sister of C. K., could distinguish large letters until twenty years of age; can now just distinguish day from night. Pupils dilated and immovable. Ext. strabismus. The ophthalmoscopic appearances in these two cases are very beautifully marked.

Only two of these cases of retinitis pigmentosa show any signs of dulness of intellect. But two are the only members of their families affected. Consanguinity of parents can be determined in one instance. Hereditary predisposition in two. The usual history of progressive increase of blindness is wanting in four cases, in two of which blindness was almost complete at birth. In these two the retinal pigment is scanty and peripheral.

Though much has been written upon this subject, its literature is still very unsatisfactory. It cannot be said to be definitely decided whether the disease is a slow form of inflammation or a degeneration, or even whether its primary seat is the retina or the choroid. One point is unfortunately sufficiently well established, that we are powerless to oppose its progress.

The following are the cases of malformations, exclusive of congenital cataract, concerning which latter it is often difficult to determine whether it is the result of arrested or perverted development, or of intra-uterine disease.

M. S., female, has microphthalmus. The transverse diameter of the right cornea is about three lines, and that of the left two and a half lines; the normal diameter being about five lines. There is quantitative vision in the right eye. The pupils are irregular and immovable, with calcareous looking opacities at their upper edges, probably shreds of capsule. The corneæ are dotted over with numerous white specks, in their deeper layers, having much the appearance of the punctated opacities of capsular iritis. She has had four brothers and three sisters. The youngest three of the family, two girls and one boy, had perfect sight. Five out of eight children were born blind. Her mother's vision is good, but her father was born blind, and has eyes "just like her own."

E. M., female, has microphthalmus. The left eye is about the size of a cranberry. The cornea is about two lines and a half in diameter, and is opaque and bluish white, differing very little in appearance from the sclerotic. It has slight perception of light. The left is the same, except a ciliary staphyloma above, probably from an inflammation in early childhood. She has three brothers and one sister. One brother was born blind. She is the oldest child, the blind brother next. No other case of blindness in the family. Parents are first cousins.

H. G., male, lenses cataractous and balls decidedly small. Excessive nystagmus prevents any measurement of cornea. The eyes turn strongly downwards under the lower lid. Vision quantitative. He is the oldest of six boys, the rest of whom have good vision. His mother's eyes are perfect, but his father was born nearly blind.

W. P., male, has rudimentary balls about the size of a pea. The corneæ are not defined. The eyes appear like mere nodules of connective tissue on the ends of the optic nerves, covered by conjunctiva. They are in a

constant state of motion. The lids are sunken, and the commissures contracted; no other deformity. Both parents and eight brothers and sisters have perfect eyes. Parents are not related.

It seems odd that these minute rudiments of eyes should be supplied with active external muscles, but this is the rule in such cases. Wilde, in his classical work on "The Malformations and Congenital Diseases of the Organs of Sight" says:—

"I cannot find an instance of the complete absence of all the muscles which move the globe in an eye otherwise healthy and natural, for even in cases of the total deficiency of the visual organs, rudimentary muscles have been observed. . . . We have many instances on record of the muscles being present in children born with brains, although the globes into which they would have been attached were totally absent."

W. M., male, has small eyes and cataractous lenses. The corneæ are partially opaque, flat in the right eye and staphylomatous in the left. The irides are mere narrow rims. He has three brothers and three sisters, all with sound eyes, but one brother who has "eyes like his own." No other case of blindness in the family. Parents not related.

G. M., male, balls small and shrunken looking. Diameter of each cornea about four lines. Right lens cataractous; left pupil clear, except a small white speck on the surface of capsule. There is hypermetropia, $\frac{1}{3}$. The catoptrictest shows the presence of a lens. $V=\frac{20}{c}$ with a $+\frac{1}{3}$ glass. Nystagmus and small pupil prevent ophthalmoscopic examination.

T. M., brother of G., has eyes very much like his in general appearance. In the right eye there is a coloboma of the iris downwards. Hypermetropia$=\frac{1}{6}$ and $V=\frac{10}{70}$. Can read No. $4\frac{1}{2}$ S held close to the eye. In the left eye there is internal strabismus and an occluded pupil. There are two other brothers and five sisters. One sister has eyes like theirs, making three out of a family of nine children. Father's eyes are perfect. Mother has "one slightly deformed eye."

A. B., female. The left eye, never perfect, has been destroyed by inflammation. In the right, the lens is cataractous and shrunken, and there is a coloboma of the iris downwards and outwards. She has vision$=\frac{5}{c}$ with a $+\frac{1}{3.5}$ glass, through the coloboma and below the edge of the lens.

E. B., male, has rather prominent eyes, and marked nystagmus. In the right eye there is an immovable pinhole pupil in the normal position, and quantitative vision. In the left the central pupil is rather larger than in the right, but nearly occluded, apparently by opaque capsule. There is a second pupil, about half a line in diameter, at the upper and inner part of the periphery of the iris. He can read medium-sized print, held close to the eye, through this pupil. When it is covered by the upper lid there is merely quantitative vision.

Polycoria, or plurality of pupils, is a rare deformity, and this form of it is, I think, particularly so. The five cases given by Wilde seem to have been, strictly speaking, "double pupils," formed by bands stretched across an irregular pupil, or a partial coloboma. In this, the only vision is through the second pupil, which is separated from the normal position

by the whole width of the iris. I have advised the formation of an artificial pupil in the right eye.

As an illustration of the scientific value of records not made by some one interested in ophthalmic surgery, I may mention that this boy was sent to the institution by a physician of high standing and extensive practice as a case of partial blindness, resulting from an attack of small-pox in infancy.

It will be noticed that in five of these nine cases of congenital deformity, there were other blind children in the family, and that in four of these five there was blindness in one parent, and in the remaining case the parents were first cousins. Two of the cases being brothers, reduces the number of families to four.

The following three are probably cases of atrophy of the optic nerve, a rare but recognized form of congenital disease. The ophthalmoscopic examination, however, was not satisfactory or conclusive in any of them.

A. S., male, æt 22. Pupils dilated and immovable; can read No. IV. S. in a bright light for a few minutes at a time; can see better now than when a child; vision improved up to fifteen years, and has been stationary since; has one sister with good sight; no inheritance or consanguinity.

W. M., male, æt 13. Pupils slightly responsive; vision quantitative, and has never been better or worse; four brothers and two sisters; one sister blind; no inheritance or consanguinity.

L. M., sister of W. Pupils slightly responsive; slight perception of light.

In all these cases, constant and excessive nystagmus made an accurate ophthalmoscopic examination impossible. There are none of the characteristic marks of retinitis pigmentosa in any of them; the retinal vessels are contracted in at least two. The colour of the discs could not be satisfactorily made out. The refractive media are clear.

Of three cases of congenital atrophy of the choroid, the blindness has been progressive in one, who could read, with difficulty, until seventeen years of age, but now, at thirty-eight, can just count fingers; in the others, there has been no change of vision. In one of the latter, there are numerous pigment spots scattered over the retina, but I have not placed it among the cases of retinitis pigmentosa, because blindness is principally due to a large spot of choroidal atrophy at each macula. I have not been able to detect any cause for the disease.

P. M.—The original disease cannot be made out on account of destruction of the balls by inflammation within a few years.

The statistics of the institution show a larger proportion of congenital blindness than I expected to find. In the annual report for 1866, the causes of blindness in five hundred and ninety-two pupils admitted up to that time are given, and sixty-one are set down as "born blind." There are, however, thirty-eight cases of cataract, and, as most of the pupils admitted are from ten to eighteen years of age, it is fair to suppose that at

least thirty of these were congenital. Congenital blindness is also very apt to be ascribed to some "fever" in infancy, and there are a certain number of cases in which the defect is not noticed in early childhood. There were probably then fifteen or twenty per cent. of congenital cases in these five hundred and ninety-two.

Of the one hundred and sixty-seven cases reported above, nearly twenty-one per cent. are congenital.

A very important and interesting consideration in this connection is the effect of inheritance and of consanguinity of parents.

In the report just quoted, the parents are said to have been "relations, so far as known," in thirty-seven instances, and one parent blind in five instances.

Of the thirty-five congenital cases now in the institution, six are the children of blind or partially blind parents and relationship between the parents can be traced in only two instances.

In reference to the latter cause, Mr. Chapin, whose experience in this direction, as Principal of this, and formerly of a similar institution in Ohio, is perhaps more extensive than that of any one else in the country, says he always suspects it when there are two or more blind in a family. In a letter to Prof. Dunglison (*Human Physiology*, p. 690), written in 1856, he gives the cases of twelve families, in which blindness was attributed to intermarriage of near relations. In six of these families there were two blind children, in one there were three, in two there were four, and in one there were seven. He also reports two children, then under his care whose mother was blind. "The parents have a large family of children, and all (save now and then a rare exception) go blind between the ages of sixteen and twenty." The disease can be traced back, in this family, through seven generations. As these pupils came from a distant State, there is no opportunity to examine any member of the family, but there is scarcely a doubt that the cause of their blindness is retinitis pigmentosa.

Mr. Chapin, in 1846, at that time Superintendent of the Ohio Institution for the Blind, inspected and reported upon a number of similar institutions in Europe; among them, the "Hospital Royale des Quinze-vingts," of Paris, founded, in 1260, by St. Louis. The blind inmates were encouraged to marry, and the greater number were married, in some instances, to seeing persons, and in some, to other inmates of the hospital.

There were one hundred and thirteen children of these parents then in the institution, and "of all the children born in this hospital for the last twenty years (during which the then superintendent had been connected with it), of parents, one or both of whom were blind, not one has been born blind or become so since." Whether this kind of encouragement, the propriety of which is more than doubtful, has been continued, and added twenty more years of experience on this subject, I have not been able to ascertain.

Mr. Chapin further states, in his letter to Prof. Dunglison, that but one decided case of hereditary blindness had, at that time, come within his knowledge; and that he had "been acquainted with the domestic history of several hundred blind persons, and had known about twenty-five or thirty marriages in which one of the parties was blind, but never a blind offspring."

These statements seem, at first sight, to be very conclusive; but they have really very little significance in the absence of any information as to whether the blindness of the parents was congenital or acquired.

We have knowledge of but four marriages that have resulted from acquaintances formed in the Philadelphia institution—not in consequence of the encouragement of the officers, but in spite of their best efforts at discouragement. There have been one or more children in each instance. All had good sight but one, who was born quite blind, and this was the only case in which the blindness of either parent was congenital.

The six cases of hereditary blindness now in the establishment are all furnished by subjects of retinitis pigmentosa or congenital deformities.

In conclusion, I would suggest that examinations of this kind offer a field well worth cultivating, as they afford the only opportunity of recording, in large numbers, the final results of disease, and the history and nature of many cases of congenital defects that must, otherwise, escape observation entirely. The examination of the inmates of a single institution can, of course, be little more than suggestive; but if every applicant admitted to all similar institutions were carefully examined and recorded by an ophthalmic surgeon, a mass of facts, that might be positively useful, would soon be accumulated.