extreme heat or cold very marked, especially the *heat of the "glaring fire"* and the coldness of damp places.

Cinnab. Old, tedious cases, that have taken mercury, in excess. "Parboiled" looking patients.

Hepar. Spasmodic closure of the lids in a *marked degree.* This also is an excellent antidote to the mercurial cachexia, and differs in its action from the latter drug, especially in its extreme *sensitiveness* to *cold air.* Desire to keep the eye *warmly* covered. The greatest *sensitiveness to touch* frequently exists. Patient withdraws as an attempt is made to examine the organ, as if *afraid of being touched.*

Sulphur. In the beginning, as an intermediate remedy or in *terminating* (does not the doctor mean *completing?*—Ed.), the cure has now high repute; and without it some old indolent, scrofulous cases would go uncured. Eyelids *glued together in the morning*, and it is with the *greatest difficulty* that they are separated. Water is not a favorite application, and when it is used aggravation is almost sure to follow.

Calc. caust. In scrofulous *chalky* appearing patients inclined to *obesity*, with their lids firmly adhering to each other in the morning and scurfs in the cilia during the day. Children during dentition; plethoric females with *too early* and *profuse* menstruation. *Profuse perspiration about the neck*, and *cold clammy condition of the feet.*

Sepia. Cures granulations especially in tea-drinking females. Aggravation from bathing. Desire for cool air. Inclination to drooping of the lids as if it were impossible to keep them open.

Pulsat. Want of thirst. The granulations generally very fine, sometimes dry, and at others accompanied by excessive secretion of *bland* mucus, and not much photophobia. *Anæmic, amenorrhœic* females who *delight in open air exercise.* The *heat* of the sun is not agreeable, and the wind frequently increases the lachrymation. Cold applications agreeable and refreshing. (A. K. Hills, N. Y. J. H., April, 1873, p. 67.)

Trachoma. Report of a case in which improvement progressed rapidly under *Aur. met.*, 6th, 30th and 200th successively. (W. H. Woodyatt, U. S. M. and S. J., v. 8, p. 205.)

Two cases of *Pterygium, Laches.*[30]. (S. R. Rittenhouse, Proc. H. M. S., Penna., 1873.)

CORNEA.

Ulcers of the Cornea. *Acon.* Ulcers from traumatic causes. *Arg. nitr.* Old ulceration with sub-acute keratitis; superficial ulceration with granulation of the lids; coldness in the eye, and burning pain in the scalp, as if drawn tight; ulceration of cornea in new born infants, with profuse discharge from the eyes.

Arnic. Traumatic ulceration with much hemorrhage in the anterior chamber.

Arsen. Central ulcer with intermittent pains. Central vascular ulcer with hot burning lachrymation; scalding pain in the eye, especially in the morning, ameliorated by warm water. Superficial ulcer with slight redness, but much photophobia and lachrymation; child lies with head buried in the pillows. Dryness of the eye with considerable itching. Burning pain in the eye at 2 A. M., and the ball feels sore to touch. Dull pain in the eye, worse at night, especially after midnight, preventing sleep; slight photophobia and lachrymation, and after bathing in cold water, the eye feels swollen, painful, and burning. Burning pain across the brow, with acrid lachrymation, worse at night.

Asa fœt. Extensive superficial ulceration with iritic pains from within outward, relieved by rest and pressure.

Aurum. Ulceration occuring in the course of pannus with enlarged cervical glands. Pains from without inward, and aggravated by pressure.

Calc. carb. Ulcer, worse for a few days after menstruation, vascular with much photophobia. In fat unhealthy children. There are no prominent eye symptoms under this drug, but we are guided chiefly by concomitant symptoms.

Iodide of calc. Ulceration with enlarged tonsils and cervical glands.

Chin. mur. Severe periodic pains.

Cim. vulg. (properly *Actæa*). Sharp pain through the eye into the head.

Cinnab. Pain above the eye, extending from the internal to the external canthus; or pain running around the eye.

Conium. Intense photophobia and very little redness of conjunctiva.

Crot. tig. Upper part of cornea, in nursing women. Severe pain in supraciliary region, worse at night. Conjunctiva greatly inflamed. Pimples on the face.

Euphras. Ulcer and pannus extending from above, downward to centre of cornea; slight dimness of cornea with profuse smarting lachrymation; profuse thick, acrid discharge. Lids thick and red; photophobia and pain worse in the daylight. Blurring of the eyes, ameliorated by wiping.

Graphit. With moist fissured eczematous eruptions. External canthi cracked. Ulcerous cornea with a few small vessels running into it, great photophobia, soreness with fissure of the external canthus.

Vascular ulcer, cannot get eyes open till 9 or 10 A. M.

Hepar s. c. Red vascular elevated ulcer, like a piece of red flesh, at the margin of the cornea. Much pain in one before going to bed, and much photophobia; shooting pain, worse in evening and morning. Hypopyon, with central circular ulcer. Abscess of cornea. Round, smooth, perforating ulcer. Ulceration with much photophobia, child will not, and cannot open eyes. Vascular ulcer from injury, with throbbing pains about eyes, and top of head. Ulceration of upper part of cornea from large granulations which bleed easily, much photophobia; eye better when warm. Lids swollen and bleed when opened. Serpiginous ulcer, relieved by warm water. Ulcer with white base, great rednes of cornea and conjunctiva, and much pain, relieved by warmth. Pains aggravated by cold or uncovering eye. Lids spasmodically closed, and sensitive to touch. Throbbing pains.

Kali bichr. Ulcer with slight photophobia in morning and agglutination; smarting worse after rubbing, stringy discharge from the eye. Ulcers and pustules of cornea with *no* photophobia, no redness.

Merc. prot. Ulceration commences at margin of cornea and extends, involving only the superficial layers, either over the whole cornea or a portion of it. Ulcers occurring in the course of pannus and conjunctivitis granulosa. Large excavating ulcer on upper part of cornea with several small ulcers on lower portion; generally excessive photophobia. Thick yellow coating at base of tongue.

Merc. sol. Ulcers, extending across upper part of cornea, vascular, with pains worse at night, and relieved by holding lids open; with erysipelatous swelling at lids and nose, flow of burning hot tears, always worse before midnight, and relieved by bathing with cold water; with intense photophobia, sore nose and eczematous eruptions on face; central (ulcer) cannot bear to have eye

covered; mouth bleeds easily; pressing pain on looking at a light. Ulcer surrounded by grayish opacity; tearing, burning pains in and about eyes, extending into frontal bones. Severe tearing in forehead and vertex. Pains always aggravated at night. Photophobia very marked and worse from any artificial light. Lachrymation profuse, burning and excoriating. Lips thick, red and swollen.

Natr. mur. Ulcerations, after cauterizing with nitrate of silver; with dread of light, so that child lies with head buried in pillows, lids swollen, bleed on opening, much lachrymation and eruption on face and lids. Sharp piercing pain above right eye on looking down, with throbbing headache worse in the evening. Feeling of sand in the eye, worse in the morning, itching and burning in the eye, canthi cracked, and lachrymation acrid.

Nux vom. Excessive photophobia and aggravation (general) in the morning. Large central ulcer, sharp darting pains, chronic ulcerations; lids thick, red, swollen, and agglutinated in morning. Conjunctiva injected.

Pulsat. Thick white or yellow bland discharge. General amelioration in open air.

Rhus tox. Vascular ulcer of upper part of cornea, worse latter part of night, and from sunlight. Superficial keratitis with much photophobia and lachrymation, so that tears gush out on opening, spasmodically closed lids. Lies constantly on face. Lids œdematously swollen, particularly the upper; chemosis of conjunctiva. Worse after midnight and in damp weather.

Silic. Sloughing ulcers. Hypopyon.

Sulphur. Sharp sticking pains, as if a needle or splinter were sticking in the eye. Superficial ulceration with much photophobia and lachrymation and sharp pains as from sand in eye, worse in the house. Ulcers with eczema capitis, with stitches temporarily relieved by ice water, with sticking pains in morning, with pain in eyeballs, intense photophobia, profuse discharge of mucus and tears, and red lids, with hypopyon, commencing with sudden sharp pain, causing lid to drop, now sharp stitches; after vaccination, pain in eyes and heat ameliorated by cold water, wakes at 4 A. M., with sharp pain in eye, recurrent, with pain, much photophobia and lachrymation and restlessness at night; and border of cornea, resulting from pustules. Great photophobia generally and profuse lachrymation. Aggravation from bathing.

Thuya. Linear peripheral ulceration, with hypopyon after venereal trouble. Suffusion of eyes. Pain, as if a nail were being

driven in over the left eye. (Geo. S. Norton, N. Y. J. H., Feb., 1874, pp. 543–553.)

IRIS.

Diseases of the Iris. In traumatic iritis, *Arnic.* has never given satisfaction. *Bellad.* and *Acon.* are much better. In *syphilitic iritis mercurial preparations*, especially *Merc. p. r.*, 2d trituration in acute, and *Merc. subl.*, 2d dilution in chronic cases. *Kali hydr.* in relapses after abuse of mercury, or *protojoduret of mercury*, when no abuse of mercury did precede. *Nitr. ac.* in relapses and old cases spoiled by mercury. In collection of pus in eye-chambers (hypopyon) *Mercur.*, *Hepar* and *Sulphur*, have proved beneficial. Where there is great intraocular pressure caused by it, *paracentecis of the cornea.* (Payr, J. Pr., 1873, p. 320, etc.)

Iritis. Mr. W., æt. 19, complained of pain in the left eye, over the brow and down the temple, which was aggravated at night. There was intolerance of light, with lachrymation and injected conjunctiva. The muscles of the eyeball were stiff on movement, and the ball itself was somewhat sensitive to the touch. Cured by *Spigel.*[6], every three hours. (Eye and Ear Clinic Hahn. Med. Col., W. H. Woodyatt, U. S. M. and S. J., v. 8, p. 201.)

Rhus tox. in Irido-choroiditis. *Lids red, swollen and œdematous, especially the upper, and spasmodically closed, with profuse gushes of hot tears on opening them;* sac-like swelling of the conjunctiva; yellow, purulent mucous discharge; swelling around the eyes. Burning pain in eye, with much photophobia; stitches in eyes and temples, with vertigo; lids cannot be opened; worse in the evening. Pain in right eye, so tense he could not bear the slightest touch, with pressive, burning pain in the eye. Child lies constantly on its face with its hands to the head; head hot, and face red. Rhus pains relieved by motion, aggravated by damp weather and on getting wet; sensitiveness to change of temperature; restlessness at night, especially after midnight; disturbed by bad dreams. (Geo. S. Norton, N. Y. J. H., March, 1873, p. 30.)

Nitr. ac.[2c]. Syphilitic iritis. On lying down, or even inclining head from the upright position, feeling as if warm water was flowing over, and from both eyes, first right, then left, relieved by cold water. (E. W. Berridge, N. A. J. H., v. 22, p. 192.)

Syphilitic Iritis is generally more rapid and disastrous, and has a greater tendency to produce irido-cyclitis and irido-choroiditis

than any other form of iritis. Generally assumes the parenchymatous form, involving the whole iris tissue, the fibrillæ of which become swollen from exudation into its parenchyma. It is more smooth than normal, with a dull glistening appearance. Pupil irregularly contracted, acts sluggishly and sometimes immovable. Large tortuous veins on the surface of the iris, injection of the anterior ciliary vessels forming a rosy or brownish ring about the cornea. Exudation of lymph along the edge of the pupil binding the iris to the capsule of the lens. Pus in the aqueous humor rendering it turbid and settling in the anterior chamber, causing hypopyon. *Condylomata, of yellowish red or brown color upon the iris;* protruding into the anterior chamber; highly vascular, sometimes degenerate, but are more often absorbed.

Severe, cancer-like syphilitic pains, *in*, *above*, and *around the eye*, and even over the whole side of the face. Fever, coated tongue, anorexia, lassitude, and symptoms of constitutional syphilis. The most common sequelæ are synechia, capsular cataract, atrophy of the bulb, or staphyloma of the cornea or sclerotic. Bandage *both* eyes, keep patient in bed on low diet, keep the pupil dilated with a solution of atropine. (*Atrop. sulph.*, iv. grs. to ℥j.) *Merc. corr.*, *sheet-anchor.*

Merc. corr. Severe burning, cramping pains.

Merc. sol. Worse at night after going to bed. Very sensitive to heat and cold. Gaslight more painful than sunlight.

Merc. prot. Eye symptoms like *Merc. sol.;* tongue, red tip and edges, and thick yellow base.

Cinnab. A very important remedy. Pain from the inner canthus across the brow; pain seems to run around the eye.

Thuya. Large wart-like excrescences on the iris, with severe, sharp, sticking pains in the eye, aggravated at night, and ameliorated by warmth.

Asaf. Pains, burning, sticking or pressing, extending from within outwards, relieved by rest and pressure.

Aurum. Bone pains. Pressive pains in the orbit and above, from above downward, and from without inward.

Petrol. Dull pulsating pain in the occiput.

Hepar s. c. In latter stages, eye very sensitive to touch. Pains relieved by warmth.

Sulphur. Intercurrent, removes *recent* adhesions. Little, sharp, sticking pains in the anterior part of the eye, feeling as though there were a glass splinter under the lid.

Chin. mur. Symptoms intermit with chills and some fever.

Rhus tox. Œdematous swelling of the spasmodically closed lids, and upon opening them a profuse gush of tears. Also consult *Arsen.*, *Clemat.*, *Arg. nitr.*, *Laches.*, *Lycop.*, *Natr. sulph.*, *Nitr. ac.*, *Phytol.*, and the *Kali's*. (Geo. S. Norton, N. Y. J. H., June, p. 172, and July, p. 216, 1873.)

LENS.

Visual Accommodation. Since the article on the mechanism of accommodation was published, I have continued my investigations from time to time. More particularly I examined the changes observable in the image reflected from the anterior surface of the crystalline in the eyes of some myopes when they attempted to adjust their sight from distant to near objects. In some, if not in all of these, I observed that the reflected image of the candle appeared brighter and smaller than in normal eyes, and that in these attempts at accommodation this image moved in an uncertain and unsteady manner. From these phenomena I inferred that myopia does not always or solely depend on increased length of the visual axis, but that it may sometimes be owing to abnormal convexity of the anterior surface of the crystalline and to deficiency in the power of regulating the movements of the crystalline. Myopia may be produced: first, by undue elongation of the visual axis; second, by increased convexity of the cornea; third, by increased convexity of the crystalline lens; and fourth, by abnormal refractive power of the crystalline. Careful observations will, I believe, enable us to determine which of these conditions exists in each individual case of myopia.

In order to study the various catoptrical and dioptrical phenomena that take place in the eye, I constructed a model of the eye on a scale of ten times the dimensions of the natural eye. The sclerotic is represented by a glass globe having a diameter of twenty-four centimetres, painted black on the inside to represent the choroid, and colored white outside in imitation of the color of the sclerotic. A section is cut out of the globe in front to receive the cornea, which is represented by a section of a globe of eight centimetres radius of curvature cemented on to the sclerotic over the anterior opening. Behind this hangs the iris made of vulcanized India rubber, with a circular opening to represent the pupil moderately dilated. Immediately behind this, and at three centimetres

from the cornea, lies the crystalline lens made of sections of two glass globes, the anterior surface of ten centimetres radius of curvature, the posterior surface of six centimetres radius of curvature. These two sections are united by means of a brass ring, to which they are cemented, and the space between—five centimetres from centre to centre—filled with a mixture of two parts of glycerine to one part distilled water, which gives a lens of a refractive power equal to that of the natural crystalline lens. The whole of the space behind and in front of this artificial crystalline is filled with water, which nearly represents the refractive power of the aqueous and vitreous humors. At the back of the globe exactly opposite the cornea a circular space of the artificial globus is left clear to observe the picture formed on what corresponds to the retina. When the model eye is directed towards a bright image, say a lighted candle at the distance of twenty feet, the image of the candle is accurately focussed inverted on the clear space corresponding to the retina in the visual axis. On bringing the candle nearer to the eye the inverted portion on the retina becomes blurred and hazy, in consequence of the focus being thrown beyond the retina, and this haziness increases as the candle is brought nearer to the eye. A slight movement of rotation of the crystalline on its vertical axis suffices to restore the perfect image of the candle on the retina by shortening its focus. The nearer the candle is approached to the eye, the greater is the inclination required to be given to the crystalline lens in order to focus the image correctly on the retina.

When we now look into the eye from one side, the candle being placed on the opposite side at an angle of a few degrees from the line of vision, the catoptrical phenomena of the eye can be easily observed. When the lens is placed as for distant vision the three images reflected respectively from cornea, anterior surface of crystalline and posterior surface of crystalline are seen; the two former large and upright, the last small and inverted. The image from the cornea is nearest the candle, then comes that from the anterior surface of the crystalline, and nearest to the observer is the small inverted image reflected from the posterior surface of the crystalline. We shall suppose we are observing the eye from the nasal side while the candle is on the temporal side. If we now perform the slight rotation of the crystalline on its vertical axis from temporal to nasal side I suppose to take place in accommodation for near vision, we shall see that the image reflected from the anterior

surface of the crystalline moves away from the observer and towards the corneal image. If now we restore the lens to its unaccommodated position and transpose candle and observing eye, the former to the nasal the latter to the temporal side, we see the three images as before. Then if we slightly rotate the lens as in the previous experiment, we see image reflected from the anterior surface of the crystalline move towards the observer and away from the corneal image, just as it is seen in the natural eye, as I described and depicted in my former paper.

This model has no pretensions to be an accurate reproduction of the eye ten times the size of nature, for the surfaces of the actual cornea and crystalline are ellipsoidal, and those of the artificial eye are spherical. The index of refraction of the real crystalline varies in its different layers, the outer layers having a smaller refractive power than the central portions. The glycerine lens being of the same refractive power throughout represents the average index of refraction of the natural crystalline; just as the radii of curvature of the spherical cornea and crystalline represent the average radii of curvature of the same parts in the real eye. Notwithstanding these dissimilarities, the model gives a very fair reproduction of the optical effects of the real eye, and all the phenomena of vision are sufficiently well represented on a larger scale in the artificial eye, and, as I have said, they completely corroborate and demonstrate the—truth, I was going to say, but I shall say the—possibility of the changes, I have conceived as occurring in accommodation, being those that actually take place in the natural eye. (Dudgeon, B. J. H., 1873, p. 63.)

Unsuspected Loss of the Crystalline Lens. Patient, æt. 60. Vision of r. eye nearly normal (11–12); l. eye 1–200; l. eye distinguished light from darkness and outline of a figure; eyes alike externally; eighteen years before left eyeball was struck by a nail; no visible wound at the time of pupil or external eye; under the ophthalmoscope media clear, retina, cheroid and optic nerve healthy. Oblique illumination found slight tremulousness of the iris. The iris is never tremulous when it has its natural support, and its natural support the crystalline lens must be dislocated or absent. The ophthalmoscope had discovered it not dislocated. Placing a thick cataract glass before the eye, the patient could read through it. (H. C. Angell, N. E. M. G., Feb., 1873, p. 76.)

Glaucoma. Essential, common to all kinds of glaucoma is the increase of intraocular pressure, which is conditioned by the pressure of the blood, and by the quantity of secreted intraocular fluids, and the contra-pressure of the internal integuments of the eye, influenced by the contraction of the eye-muscles. As th secretion of the intraocular fluids is regulated by muscular nerves, the intraocular pressure can be increased or decreased by the influence of the nerves; thus, for example, does a swollen lens or an incarcerated portion of the iris by its irritation cause an increased secretion of fluid. The intraocular pressure can be detected by touch, and the visual power decreases, and finally is extinguished in consequence of the want of a sufficient supply of arterial blood to the retina. The causes of the typical, pure glaucoma are obscure. The visible sign of the intraocular pressure is the pulsation of the central artery of the retina, which under normal conditions does not exist. Important likewise for the diagnosis is the decrease of visual power, especially laterally; the pupil dilates, is immovable, and shows a dark green reflex, wherefore the name glaucoma; later, the iris atrophies, the cornea becomes anæsthetic in consequence of pressure upon the ciliary nerves; weak points in the bulbus yield and bulge, and the terminal portion of the nervus opticus is by the intraocular pressure excavated. In some cases the increase of this pressure goes hand in hand with inflammatory processes, in others not. Donders divides, therefore, glaucoma into two classes: glaucoma cum ophthalmia and glaucoma simplex. The acute glaucoma proceeds in this manner: suddenly, violent pain around the eye; visual power diminished, even extinguished; eye reddened, sensitive to light, pupil dilated; water in eye-chamber, and vitreous body turbid, eyeball hard. The visual power increases somewhat when the inflammation subsides, but is entirely extinguished by subsequent attacks. Precursory symptoms are: dimness of sight periodically; appearance of rainbow colors around candle or gaslight, slight injection of the sub-conjunctival vessels, rapid increase of presbyopia, etc. If left alone, blindness invariably follows. The only means to save the eye is iridectomy. (Berl. Kl. Wsch.; J. Pr., 1873, p. 75.)

RETINA AND OPTIC NERVE.

Weakness of Sight. Patient, a young lady at school; while studying, the eyesight becomes suddenly dim, and the letters indistinct. While reading fast the same symptoms aggravated;