As to the examination of soldiers' teeth, at the Presidio in San Francisco there was a large recruiting camp, and for a time nearly all of the operations performed were on recruits. The regulation required as a minimum 4 teeth that would oppose. Many times examination was made by a physician, and all they did was to look in and see if there were 4 teeth opposing each other. No examination was made as to whether decay was present. These teeth would soon decay after these men went on duty, and indigestion follow; probably these men would be sent home without having done a day's work. Dr. Brown wrote an official letter suggesting that the number of teeth should be raised, that each man should have four opposing molars on either side of his mouth, and greater care exercised in examination of these teeth. This was done, and Dr. Brown thinks that the dental corps did one good thing in raising the standard of the teeth required. Many men invalided home are men with very poor teeth and they have dyspepsia, acute gastritis, acute enteritis, colitis, etc., rendering them useless for service.

Dr. M. I. SCHAMBERG, Philadelphia, said that the time may come when people will be able to get along just as well without teeth. Undoubtedly teeth are deteriorating because of lack of proper mastication. It is also true that the use of the third molar tooth is being gradually lost. The jaws are no longer able to accommodate the teeth, and it is possible that in time to come there will be a peculiar formation of head, in which the upper portion will be very broad to accommodate the immense brain, and tapering to a point at the chin, with an aperture sufficiently large to breathe and to take food without mastication. It should not be allowed to go out that dentists believe teeth are useless organs and can be dispensed with.

Dr. A. E. BALDWIN, Chicago, considered that there is nothing more productive of a healthy mouth than the use of the teeth. If a man or woman has been so unfortunate as to lose a portion of these organs which Nature supplied for masticating food, bridges and plates—although but substitutes—are good substitutes and to be commended. Some work is detrimental, not only to the conditions in the mouth, but to the durability and efficiency of the natural teeth that remain. Dr. Baldwin considered it possible that a tooth with a crown extending below the margin of the gum might, usually, with certain possible exceptions, produce interstitial gingivitis, but from over twenty years' experience, having seen a great many teeth that had been crowned, he would hardly think Dr. Talbot's position tenable. In some cases it is absolutely necessary to place the crown below the margin of the gum to cover the destroyed portion of the tooth. Crowns are still doing good service after twenty years. Teeth, health, and all vital principles will be better sustained by using foods which demand mastication. Dr. Baldwin urged that patients be instructed as to what they ought to do with the teeth they have.

Dr. M. L. RHEIN, New York City, agreed with Dr. Baldwin in regard to a crown that necessarily goes below the gum line. It is all a question of the technic. Dr. Rhein differed decidedly with Dr. Fletcher's contention against the practicability of artificial substitutes. He also opposed the views presented about the future outcome of the race, saying that he could see nothing in the statistical history of the human form that will agree with that view. There is always a diverging point where Nature steps in and saves the day, generally by cross breeding of the races.

Dr. V. A. LATHAM, Chicago, said that teeth are not the only things to be considered. Man demands a number of things by which his existence must be carried on. Teeth are only one adjunct of the whole. So soon as teeth are extracted jaws are changed. There is a change in the cusp, and degeneration and a change in the nervous mechanism. Without natural articulation there is an atrophied condition. Recession of the gum follows atrophy. If the tooth is crowned the mouth should be able to take care of that tooth; foreign bodies are encysted in the heart, why should not the gum encyst and take care of that foreign body without being irritated? Dr. Latham expressed her opposition to artificial food.

IS KERATITIS EVER CAUSED BY RHEUMATISM?*

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Rheumatism is a "symptom complex" rather than a definite disease; an infection, though the germ or germs are not agreed on. It must be separated from the joint diseases due to infected wounds, typhoid fever, acute follicular tonsillitis, gonorrhea, scarlatina, dysentery, pneumonia or septic pyemia in this discussion.

For our purpose, rheumatism may be classed as (1) acute articular and (2) indefinite, the first having well-defined symptoms, the second shading off to phenomena hard to characterize, and yet representing a pathologic entity of defective metabolism in fibrous tissue and insufficient elimination of certain waste products.

Clinical experience shows that eliminative agents influence most favorably both rheumatism and associated keratitis. Typical among these are the salicylates, of which Cushny says, "they increase by 12 per cent. the excretion of sulphur; augment the excretion of uric acid from 30 to 100 per cent., and correspondingly increase the leucocytes in the blood. In acute articular rheumatism they have a specific action comparable to quinin in malarial fever."

In rheumatism the fibrous tissues are chiefly attacked. Whether the cement between the fibers and cells be loosened by infection or an excess of lactic acid in the blood admit substances foreign to them is unknown.

Experiments have shown that ligation of the long ciliary arteries of the *venæ vorticosæ* produces a parenchymatous keratitis, with changes in the posterior epithelium, but observations on the human subject are lacking to indicate their force. There is no *a priori* reason why the cornea should always escape the fate of tendons, endocardium or joints, so the question is pertinent does it escape?

We know that the superficial corneal planes have close relation with the conjunctiva being nourished by an anastomosis of the conjunctival vessels with the superficial ciliary, and enervated by superficial nerves; the middle planes have similar relations with the sclerotic, and the inner with the uveal tract.

As rheumatism may first appear in one valve of the heart and then in the endocardium, so it may appear primarily in the sclera and secondarily in the cornea or primarily in the cornea and secondarily in the sclera; or simultaneously in sclera, cornea, iris, etc.

Whether we regard rheumatism as a germ, a toxin, or other substance foreign to blood or fibrous tissue, it must reach the cornea through the vessels, transversing the sclera, conjunctiva or uveal tract. Unless immune, these are liable to infection before the substance reaches the cornea. Thus is apparent why we see so few cases of primary rheumatic keratitis and so many secondary or simultaneous, and why rheumatic keratitis has so many and varied forms.

The question before us is one of fact: Has the cornea suffered from rheumatism, directly or indirectly?

Most ophthalmologists declare that they have never recognized such keratitis (70 out of 129). Most of the books and medical journals do not even mention the subject. If we knew the specific germ of rheumatism

* Read in the Section on Ophthalmology of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

we might extract it from the diseased cornea and joint of a person suffering from rheumatism and by modern methods prove or disprove their identity. Ignorant of such germ, we must answer our question in terms of clinical diagnosis.

In general the varieties of keratitis from constitutional causes are many, but few if any present so distinct a form as to declare their parentage. The interstitial keratitis of children is generally due to inherited specific disease, but no clinician rests his diagnosis exclusively on the appearance of the cornea; he examines the teeth, the family history, etc. In like manner a case of rheumatic keratitis is established only when syphilis, tuberculosis, struma, local injury or infection be excluded; when it is shown that the patient suffers from rheumatism and possibly that he has had one or more previous attacks associated with keratitis, when the keratitis is non-suppurative, when the pain and photophobia are disproportioned to the corneal lesion, and when the case responds favorably to anti-rheumatic treatment after other treatment has failed.¹ A family history of rheumatism strengthens the diagnosis.

As in other constitutional diseases, there are all degrees of intensity—some so clear that a fool need not err, others so obscure as to puzzle an expert. Hence it is possible that in some cases of keratitis a mild form of rheumatism may be overlooked. This is the more likely because the ophthalmologist rarely sees a case of acute articular rheumatism, and because if a patient with keratitis consults him after convalescence from rheumatism, he pays little attention to the constitutional condition, regarding it outside his sphere. Besides, as the acute forms of disease occasion so much suffering, the patient and the physician easily overlook a slight attack of keratitis—the more so as such attacks are in the deep layers of the cornea.

The following are brief abstracts of personal observations:

CASE 1. Primary keratitis profunda in acute articular rheumatism.

History.—Feb. 20, 1886, Dr. H. W. Longyear asked me to see Mr. G. W. S., for sudden blindness of his right eye. Mr. S. was a real estate dealer, aged 43, tall, slender and of correct habits. Two weeks previously he was attacked with acute articular rheumatism, involving all the larger limb joints. About a week later he noticed his right eye growing dim, until at my visit he could simply distinguish light from darkness. The pain had not been great nor the circumcorneal injection, only profuse lachrymation.

Examination.—Inspection showed the cornea of whitish gray, most dense at the center and shading to clear cornea eyes reaching the limbus; the surface of the cornea was perfectly smooth, and the superficial layers clear, the cloudiness being in the deep layers.

Treatment.—Fearing an iritis, the eye was kept under the influence of atropin and 15 grains of sodium salicylate given every hour till profuse perspiration, and then every two hours. The eye was soaked in hot water for ten minutes before every drop of atropin and the bowels kept free.

Result.—In three weeks the cornea began to clear and in about four months was entirely so. The secondary iridocyclitis left some adhesions. Sixteen years later, with proper correction of refraction, he could see 20/30 and Jaeger No. 1. There has been no return of the disease.

CASE 2.—Primary keratitis interstitialis with necrosis of cornea, in acute articular rheumatism.

History.—July 29, 1896, Dr. R. A. Jamieson asked me to see Mr. J. D., who had become blind during an attack of acute

rheumatism. He was an old soldier, aged 68, of fairly good habits, but illy nourished owing to poverty and successive attacks of acute articular rheumatism. He had suffered great exposure during migrations of his regiment and many attacks of acute rheumatism, each accompanied with more or less blindness, though in the intervals he saw well. At times one eye was attacked, then the other, and occasionally both. His friends and attending physicians had told him that his eye passed from foginess to a whitish tint, and then with convalescence gradually returned to a normal look. Generally the pain and redness had not been great or had been overshadowed by the greater suffering from the rheumatism.

Course.—In this last attack, for some unknown reason, the right cornea had necrosed, its substance being a pulpy mass on my first visit, which dropped off, leaving the bare iris, bound by adhesions to the lens. The left cornea was in nearly the same condition, a small portion remaining firm. In both the lost cornea was replaced by cicatricial tissue. During this attack there had been little pain or circumcorneal injection, and only watery discharge.

On recovery, Mr. D. sought to have his pension raised from \$24 to \$72 per month. In presenting his claim to the Pension Department "rheumatic parenchymatous keratitis" was given as the cause of blindness. The application was refused because the department said no such disease was known. Being pushed, it sent experts from Washington to study the case; it had many eye men in Detroit, Cleveland and elsewhere to study it; it followed up his medical history in all the places where he had suffered blind attacks; he was sent before examining boards other than his own. Finally, after an examination extending over three years the pension was granted, and "rheumatic parenchymatous keratitis" has a place in the Pension Office.

Ere making a diagnosis, I had been careful to eliminate syphilis, gonorrhea, tuberculosis and local injury, and to establish the relationship of the recurring attacks of keratitis to the acute articular rheumatism.

CASE 3.—Band-like vascular growth on the cornea in a case of subacute rheumatism.

History.—July 21, 1904, Dr. Moore of Farmington asked me to see a woman, aged 35, long a sufferer from subacute rheumatism and neurasthenia. Two months previously the left cornea began to cloud in its lower and outer segment.

Examination.—At my visit the cloud was more than one-eighth inch broad and of nearly uniform width from the scleral junction to above the middle of the cornea. The vision was greatly limited, but the pain was considerable, there was slight irritation of the iris and circumcorneal injection. The entire opacity was distinctly raised above the surface of the cornea.

Treatment.—I asked permission to dissect the growth with a knife, but was refused. The treatment was antiseptics, hot water and yellow oxid of mercury applied by massage, and antirheumatics.

Result.—Five months later Dr. Moore reported that the opacity had disappeared, leaving a slight film discernible only on close inspection with oblique illumination.

CASE 4.—Primary keratitis, interstitial, discrete, with subacute rheumatism.

History.—March 20, 1890, Mrs. W. C. S., aged 28, applied for relief from an irregular interstitial keratitis, plus a small abrasion near the sclerocorneal junction on the inner side of the right cornea. There was moderate conjunctival injection adjacent thereto, much pain and photophobia, all of which had appeared during an attack of subacute rheumatism. Since a child she had suffered from similar attacks of keratitis during recurring attacks of subacute rheumatism, for which she had been treated by the late Dr. G. E. Frothingham of Ann Arbor.

Treatment.—Ordinary tonic and local treatment proving unsatisfactory, antirheumatic was pushed and convalescence rapidly established.

Since then I have observed several similar attacks, more

1. F. Mendel (Munchener Med. Woch.), from an experience of over eight thousand intravenous injections of salicylic acid, says that disappearance of pain proves a doubtful case to be rheumatic, so a diagnosis is cleared up by a single injection.

or less severe, all of which readily yielded to antirheumatic management.

CASE 5.—Primary marginal keratitis in subacute rheumatism.

History.—Nov. 20, 1903 Mr. R. McL., a minister, aged 75 applied for relief for a painful eye. For three weeks he had suffered from an attack of subacute rheumatism, and about ten days ago he began to notice an irritation of his left eye, as from a foreign body, a moderate redness of the eyeball, and a whitish spot on the cornea, with abundant discharge of tears. In former rheumatic attacks he had noticed a similar feeling in his eye, which passed away after a time under the use of household remedies; he again resorted to them, but the eye grew worse.

Examination.—There was a shallow crescentic abrasion of the cornea near the upper and inner border, about one-quarter of an inch long and an eighth broad. This was surrounded by a grayish infiltration.

Treatment.—He was treated by hot water, boric acid and dionin, with yellow mercury oxid ointment locally, and large doses of soda salicylate internally. The pain was speedily relieved, and the keratitis rapidly vanished.

Of the first three cases I could find no duplicates in my records; of the last two many duplicates.

In three cases there was a clear history of recurring attacks of keratitis with rheumatism during a period of many years; the keratitis appeared during the rheumatic attack and faded as it declined; all were benefited by anti-rheumatic treatment. All were classed as rheumatic keratitis for the following reasons:

1. They started in the cornea during an attack of rheumatism.
2. Some recurred many times.
3. All other constitutional causes were eliminated.
4. All were non-suppurative.
5. Three were attended with pain and photophobia disproportionate to the corneal lesion.
6. Antirheumatic treatment alone favorably promoted a rapid recovery of either keratitis or rheumatism. In all these five cases the keratitis antedated other involvement of the eye; in two the rheumatism was acute articular; in the others subacute; iritis occurred only in the two profunda cases.

In many people suffering from "indefinite" rheumatism I have observed "Descemetitis associated with iritis," "interstitial keratitis with scleritis or episcleritis or cyclitis," and have thought rheumatism the cause of all eye lesions. All were most benefited by antirheumatic treatment.

To secure a larger number of clinical observations on the point at issue, the aid of colleagues in every portion of the United States was enlisted by the following queries:

1. Have you seen cases of corneal disease caused by rheumatism?
2. If so, how many? What part of the cornea was attacked?
3. Did the corneitis have any distinctive features?
4. Did any case have more than one attack? If so, how many?
5. Complications observed. If any, what were they?
6. Were the cases male, female, black or white? Their ages, and occupation, if any.
7. What treatment did you find most helpful, and what were the ultimate results?

More or less full answers were received from one hundred and twenty-seven. Sixty-seven replied that they had never seen cases of corneal disease which they could ascribe to rheumatism. Several had seen keratitis which they ascribed to gout. Sixty replied that they had seen one or more cases of keratitis which they believed due to rheumatism. The full text of positive answers accompanies this paper.

The cases of keratitis are divided into three classes, according to the starting point of the lesion. As three reported under two classes, a discrepancy of figures will be noted.

Of primary keratitis in acute articular rheumatism, six observers report one or more cases each.

Of primary keratitis in indefinite rheumatism, twenty-nine observers report one or more cases.

Of secondary keratitis in indefinite rheumatism, twenty-eight had seen one or more cases.

It may be questioned whether the secondary cases should be classed as rheumatic keratitis because either the sclerotic or the uveal tract was first attacked, but it is quite as fair as to call scleritis following a keratitis rheumatic. Without rheumatism there would have been no keratitis in either case, so far as known, the same agencies produced the keratitis, so that the relative time when they attack the cornea or sclerotic does not alter their cause, more than in other parts of the body.

PARTS OF THE CORNEA INVOLVED IN RHEUMATISM.

The outer layers of the cornea are reported primarily involved by nine observers, the inner layers by thirteen, the substantia propria by forty-five. It is quite impossible to determine the actual number of cases included in these reports because some used the term "many cases," others "several cases," or a "few cases," or a "number of cases." If we counted three in each of these indefinite reports, the total number of cases of keratitis caused by rheumatism would exceed one hundred and fifty. The actual number stated was sixty-three. Since the reports were made mostly from memory, the actual number found in case books would be far larger.

In cases of keratitis secondary to scleritis or uveitis the middle or inner layers were always involved and occasionally the outer.

Thus we have the positive testimony of sixty expert observers supporting the proposition that "rheumatism has caused keratitis in most of its non-suppurative varieties"—though all agree that it is a rare complication.

These observers report rheumatic keratitis, giving the following names:

OF THE OUTER LAYERS.	
Superficial erosion	1
Dendriiform keratitis	1
Superficial keratitis	5
Marginal keratitis	4
Calcium deposit in cornea	1
Phlyctenular keratitis in aged	1
	13
OF SUBSTANTIA PROPRIA.	
Steamy cornea	2
Interstitial keratitis	8
Diffuse interstitial keratitis	2
Punctate interstitial keratitis	2
Band-like deep seated opacity	1
General haziness of cornea	2
Keratitis profunda (Fuchs)	2
Keratitis profunda (Spicer)	1
Discrete keratitis	1
Pine sandy cornea	1
Kerato-scleritis	15
Parenchymatous keratitis	6
Deep central keratitis	2
Keratitis (indefinite)	1
	46
OF INNER LAYERS.	
Descemetitis	7
	7

TEXT-BOOKS ON RHEUMATIC KERATITIS.

Nearly all text-books and monographs on eye diseases, old and new, fail to mention rheumatic disease of the cornea. In only eight was I able to find the subject mentioned, viz.: Norris and Oliver's "System of Ophthalmology"; Darier's "Ophthalmic Therapeutics";

Posey and Wright's "Diseases of Eye, Ear, Nose and Throat"; Fuchs' "Ophthalmology," de Schweinitz's "Text-Book on Ophthalmology," and the works of Mackenzie and Wharton Jones on the eye.

Neuel and Fenton (Norris and Oliver's "System of Ophthalmology") say (p. 231): "Rheumatism, gout, influenza, impaludism, uterine affections and contusions of the cornea are among the rare causes of parenchymatous keratitis" (p. 235). "Different forms of deep interstitial keratitis occur after a chill or attack of acute articular rheumatism" (p. 236). "Descemetitis is caused by syphilis, rheumatism and gonorrhea." Thus rheumatism (indefinite) is said to cause parenchymatous keratitis or Descemetitis, and acute articular rheumatism causes different forms of deep interstitial keratitis.

Darier (p. 153) describes two cases termed "rheumatic parenchymatous keratitis." On page 164 it is stated that "there are forms of scleritis, of sclerokeratitis, of keratitis and marginal ulcers of the cornea resulting from the rheumatic diathesis."

Mackenzie (1855, p. 516,) speaks of an "arthritis corneitis characterized by roughness of the cornea, with haze from interstitial deposits, a bluish-white ring close to the corneal edge and sometimes a slight iritis."

Wharton Jones (1855, p. 126) says: "Rheumatic parenchymatous keratitis occurs in middle life accompanied by rheumatic characters in rheumatic subjects, pain over the brows and temples, cornea dim and rough on its surface; circumcorneal injection most intense at corneal margin; treatment eliminative and antiseptic."

Posey and Wright (p. 313) say: "Rheumatism and gout are causes of parenchymatous keratitis in perhaps a very few cases."

Fuchs (p. 182) describes keratitis profunda thus: "A gray opacity develops in the center of the cornea, in its middle and deep layers and over which the cornea is gray and punctate but not depressed. After several weeks it gradually abates without ulceration. Vessels are few, if any. In rheumatism the pain is violent and the photophobia great. The iris is mildly hyperemic. Lasts from one to two months. Light cases leave clear cornea; severe ones a permanent, diffuse opacity of the cornea. When this disease occurs with intermittent fever or contusions, it is free from pain and is more protracted."

De Schweinitz (p. 315) describes the rheumatic keratitis of Fuchs, confirming the views stated by personal observations.

Thus the authors in these seven text-books teach the causative relation of rheumatism, to the following forms of keratitis, viz: "Parenchymatous keratitis," "checked interstitial keratitis," "Spicer's keratitis profunda," "interstitial keratitis with roughened external corneal layers," "keratitis punctata," "kerato-iritis," "Descemetitis."

MEDICAL JOURNALS ON RHEUMATIC KERATITIS.

A careful search of the medical journals within reach revealed only seven references to keratitis.

Asmus² regards as "characteristically rheumatic the cases of corneal disease, near the limbus, causing a porcelain-white color, lying first in the parenchyma with a covering of stippled epithelium. Later a deep defect is found. The sclera is but slightly involved. The affection yields readily to salicylate of soda.

R. Kalish³ says that "he has often seen striated, more

or less checkered keratitis disappear, after failure of usual remedies, by use of antirheumatic remedies and restricted diet."

F. W. H. Spicer⁴ says he has found "a new variety of interstitial keratitis. Of fifty-four cases personally studied, free from any trace of syphilis, three-fourths were associated with alcoholic excess, gout, rheumatism and intestinal sepsis. The average duration of the cases was three months. The condition was a vascular ingrowth with a progressive corneal opacity; in the rest, a conical opacity advancing from periphery to center. The opacity was striated, the lines being slightly uneven, sometimes crossing, and becoming obscured by the advance of the disease. The opacity was either uniform or formed by the union of a number of maculae and had soft, smooth edges, gray colored. Surface of the cornea was roughened like orange skin—the essential pathologic change being edema of the cornea. Iritis was observed in fourteen cases—no fundus change. He thinks disturbance in the blood supply is the occasion of the disease."

H. Greef,⁵ says: "We must regard interstitial keratitis as some particular anomaly of general metabolism, which may be induced by many different morbid conditions, as syphilis, tuberculosis or rheumatism." He reports cases of elderly people in whom interstitial keratitis developed in connection with rheumatism. "Leber, Parinaud, Knies, and v. Hippel describe cases in which they placed rheumatism and interstitial keratitis as cause and effect."

C. Ortale⁶ reports the case of a healthy man aged 30 who suffered a kerato-conjunctivitis, with each relapse of an attack of acute rheumatism, which disappeared with the joint symptoms.

Howard F. Hansell⁷ reports the following case, which he terms rheumatic keratitis. "A man aged 36, after several days of suffering with dimness of vision, intense photophobia, and excessive lachrymation, exhibited a cornea dotted behind Bowman's membrane with twenty-four small gray discrete spots, scattered throughout its area. Otherwise the cornea was clear, the iris unaffected but the anterior chamber was deeper than normal and the tension plus 1. Eserin relieved the symptoms, the cornea cleared in a few days, to be followed by an acute inflammation of the sclera."

Jonathan Hutchinson⁸ reports "a slow, painless, unsymmetrical keratitis punctata in a woman aged 49, subject to rheumatism since childhood, with a hereditary history of rheumatism, but no evidence of syphilis; also a case of kerato-iritis in a man aged 40 with rheumatic antecedents, coming on during a rheumatic attack."

Thus contributors to these medical journals give unquestioned evidence of a belief in rheumatism as a cause of various forms of disease in the substantia propria, as "parenchymatous keratitis," "checked interstitial keratitis," "Spicer's keratitis profunda," "interstitial keratitis," "keratitis punctata," "kerato-iritis," and an "uncomplicated Descemetitis."

Finally in favor of a rheumatic keratitis we have (1) cases presented in abstract of five different varieties; (2) one or more cases covering about all varieties of keratitis from each of sixty observers—all expert ophthalmologists; (3) authors in seven different standard

4. Lond. Lancet, August 20, 1904, p. 543.

5. Oph. Review, Vol. XVI, p. 182.

6. Abstract, Jour. A. M. A., Nov. 14, 1903, p. 1240.

7. Oph. Record, Vol. XII, p. 523.

8. Oph. Hosp. Reports, Vol. VII.

2. Klin. Monat. f. Augen., September, 1903.

3. Med. News, April 23, 1904.

text-books on ophthalmology; (4) and seven contributions to medical journals.

While these data seem to establish the existence of a rheumatic keratitis, they also emphasize its rarity. This is as might be expected from the peculiar anatomic structure of the cornea and its relations to adjacent tissues. Besides, any rheumatic affection of the eye is rare. Thos. McCrae⁹ reports two hundred and seventy cases of acute articular rheumatism treated at Johns Hopkins Hospital without finding any specific germ, any corneal disease and but one eye affected with iritis. If it be rare that an iritis or scleritis can be traced to rheumatism, much more should we expect to find keratitis rare.

No especial form of keratitis can be called rheumatic, as under changing conditions, in different persons, with varied intensity of the disease, it may assume any form. In general the substantia propria is most frequently affected, as is shown by clinical reports.

There is ground to hope that a keener study by all ophthalmologists may reveal a rheumatic origin for some cases of keratitis now classed as "unknown," and so supply the key for more successful treatment.

APPENDIX: OBSERVATIONS OF LIVING OPHTHALMOLOGISTS ON THE EXISTENCE OF RHEUMATIC KERATITIS.

PRIMARY KERATITIS IN ACUTE RHEUMATISM.

G. F. SUKER, Chicago: Yes, one case: middle aged man in whom each cornea would become hazy, with apparent loss of luster, whenever he had an attack of so-called inflammatory rheumatism. His vision was very hazy; at the same time the conjunctivæ were injected, photophobia, lachrymation marked. This haziness was limited to the superficial layers of the cornea, and when he was free from rheumatism, vision was normal. He had two such attacks within about three years. The salicin internally and sodium salicyl (gr. x to oz. i) locally with heat seemed to do the most good. The routine local and constitutional treatment was also carried out. The cornea looked not unlike the steamy "glaucoma cornea": the tension was always normal; iris reaction normal; a slight conjunctival discharge accompanied this. This eye condition lasted about two weeks—the climax was reached in about four days.

F. CARROW, Detroit: Yes; a number. The cases gradually involved the entire corneal structure. The features presented were those of rather mild interstitial keratitis, an infiltration of the corneal structure, without ulceration; number of attacks not known. A tendency to iritis of a mild character, the formation of posterior adhesions without a high inflammatory accompaniment. Asiatics (Chinese) and negroes. Age and occupation not remembered; antirheumatic treatment; large doses of sodium salicylate, salicylic acid, etc. Locally atropin. The results varied, in different amounts of corneal opacity or infiltration. I am sure I have been able to distinguish between ordinary interstitial keratitis, the result so frequently seen in inherited syphilis. I have recently had a case, a young woman, in which all the symptoms of an acute rheumatic affection of the joints accompanied the corneal trouble.

A. W. CALHOUN, Atlanta, Ga.: I have seen many cases of mild interstitial keratitis which I have thought were directly due to rheumatism, though behind the rheumatism there may have been some remote cause. In these patients, I observed that each fresh attack of the rheumatism was accompanied by a fresh mild attack of the keratitis, disappearing with the cause. In all of them the keratitis was treated in the usual way, and with antirheumatic remedies, and in all, with good results.

A. E. BULSON, Jackson, Mich.: I have not had a case of purely "keratitis rheumatica," but several with rheumatic diathesis and suffering with the disease at the time of the corneal attack. Two cases at present, in brothers, attacked within a month of each other. These cases were both taken with la grippe, or a severe cold, followed in about ten days with acute articular rheumatism, and also about this time a marked blurring of the vision of one eye, extending rapidly to hyperemia, photophobia, and severe pain. I have also at the present time a case of "keratitis punctata," with rheumatic complications. Just how much these cases are rheumatic or specific I do not know; I am treating these cases with a view of clearing up the rheumatic condition by giving anti-rheumatics. The local treatment consists of application of bandage, colored glasses and atropia to maximum dilatation. Hot fomentations of sat. sol. of acid boræ are applied at intervals during the twenty-four hours. I continue this during the inflammatory stage, and for clearing opacity I am at present using 5 per cent. of dionin. I find this latter drug to act most admirably for this purpose. Every case I have had with rheumatic complications have been interstitial. Some were punctate, and subsequently diffuse. One case the opacity had little points of depression.

N. M. BLACK, Milwaukee, Wis.: Have seen one case; central part of cornea attacked; superficial central erosion, staining slightly with fluorescin, surrounded by an area of interstitial deposit with an intervening area of clear cornea. He had two attacks, complicated with iritis (or this corneal condition complicated the iritis) with almost circular synechia posterior. It occurred in a white soldier. Sodium salicylate was given in 20 grain doses each two hours till physiologic limit; hot compresses; atrop. 1 per

cent.; dionin powder and subconjunctival injections once or twice per week. Four weeks' treatment did not fully clear the interstitial area, the synechia were loosened in upper and outer and lower and inner part of iris; pain relieved immediately after dionin injection and did not return; patient a hard drinker.

F. B. EATON, San Francisco: Yes, the cornea steamy; with usual infiltrations from episcleritis; have seen many cases of iritis with acute articular rheumatism complicating keratitis—possibly one case of gonorrheal rheumatism. Treatment was salicylate of soda in keratitis with acute articular rheumatism. I can not state that I have ever seen an uncomplicated case of rheumatic disease of the cornea—always the episcleral or scleral tissues were involved.

SECONDARY KERATITIS IN INDEFINITE RHEUMATISM.

B. L. MILLIKEN, Cleveland, O.: I do not recall definitely any cases of inflammation of the cornea, pure and simple, which I am sure was due to rheumatism. I have a case now under my care of iritis with punctate keratitis, marked in character, involving the internal lower third of the cornea, which yielded very promptly to large doses of salicylate of sodium. This was a woman, aged 57, a teacher. Ten years ago she had an attack of herpes zoster on that same side with some choroidal trouble. This attack began apparently as an iritis, with inflammation involving the cornea and not being primarily a keratitis.

S. G. DABNEY, Louisville, Ky.: Sclero-keratitis; yes, a good many. Periphery of the cornea extending near center. Characterized by great obstinacy, moderate pain, and tendency to iritis. Some of the cases had several attacks. Both male and female—white—between 20 and 40. Usual antirheumatics with laxatives internally; heat and atropin locally seemed to act well. I do not think any case of corneal disease pure and simple, without involvement of the sclera, caused by rheumatism, has come under my notice.

P. A. CALLAN, New York City: I can not say that I ever had a case of keratitis pure and simple due to rheumatism, but I not infrequently see cases of scleritis which involve the cornea at the limbus.

S. B. ST. JOHN, Hartford, Conn.: I have never seen a case of purely corneal disease caused by rheumatism, but a number of cases in which an episcleritis caused by rheumatism has involved the cornea—sclero-keratitis.

J. H. THOMPSON, Kansas City, Mo.: Have seen a limited area of keratitis neighboring a patch of rheumatic episcleritis, but never a case of keratitis of rheumatic origin.

MILES STANDISH, Boston: I have never attributed any corneal conditions to rheumatism except such secondary disturbances as sometimes happen in cases of episcleritis and scleritis due to rheumatic or gouty origin.

DAVID WEBSTER, New York City: The only form of corneal disease that I can recall due to rheumatism, is that which so often complicates episcleritis, or scleritis, and spoken of as sclero-keratitis. I have seen a good many such cases; impossible for me to tell how many. The disease is prone to recur. It generally occurs in adults. I have generally followed the treatment recommended in the text-books, and have found such cases tedious and resulting in permanently impairing vision.

G. C. HARLAN, Philadelphia: Marginal keratitis, in connection with conjunctivitis and episcleritis—rheumatic—gouty. Marginal, vascular, small points of ulceration. Four or five attacks. Sometimes accompanied by symptoms of influenza. White, female. Sod. salicyl., etc. Atrop., cocaine, and adrenalin locally. Hot stupes. In another case, very frequent attacks recurring for years, sometimes in one eye and at other times in the other. Intense ciliary zone; patches of interstitial corneal opacity and general haziness; once or twice delicate iris synechia; violent attack of scleritis. No syphilis, but some gonorrhea in early life. Father had gout. Salicylates, mercury, iodid, pilocarpin, hot stupes and atropia. Recovery with slight opacity; good vision; possibly gout.

T. Y. SUTPHEN, Newark, N. J.: I only recall the hazy cornea or rheumatic iritis with Descemetitis.

H. F. HANSELL, Philadelphia: I do not remember that I have ever seen a case of keratitis—primary—that I could attribute to rheumatism. A bad case of "sclerosing keratitis" involving both eyes and leading to extensive changes in the curve and transparency of the cornea, occurring in a young woman might have been due to rheumatism. Numerous cases, familiar to us all, of rheumatic iritis with deposits in Descemet's membrane and subsequent keratitis, are of course met with.

J. A. WHITE, Richmond, Va.: I have never seen a case of keratitis that I could positively state was due to rheumatic or gouty causes, but I have had keratitis in rheumatic patients that was very intractable to treatment, especially Descemetitis. I have always thought that a rheumatic diathesis had something to do with this trouble, just as it is supposed to have something to do with iritis, because if we can have pathologic changes in the iris due to rheumatism we can also have it in this part of the cornea, because it is a practical continuation of the uveal layer of the eye.

C. W. HAWLEY, Chicago: I have had several cases, but can not give definite symptoms, etc.

H. FRIEDENWALD, Baltimore: Barring the cases of interstitial keratitis, sclerotizing keratitis, etc., which were in an indefinite manner ascribed to "chronic rheumatic diathesis," I have had no experience which leads me to think that rheumatism (i. e., acute articular rheumatism) has any bearing on corneal disease.

J. H. BUCKNER, Cincinnati: Only when associated with iritis, more than one attack; iritis has been present in every case, I now remember; female; white. Treatment, sodium salicylate and colchicum; locally atropin, four-grain solution, three or four times daily. I only recall one case in which keratitis existed central over the pupil associated with rheumatic iritis. The case was a sister of charity about 40 years of age. I may have had other cases, but have no record of them.

WILLIAM CHEATHAM, Louisville, Ky.: Yes, I am rarely without one or two cases of keratitis with rheumatism on hand. They are parenchymatous, with scleritis or secondary to it. Usually peripheral, it extends as far as the center of cornea. It tends to relapse. It is complicated by involvement of the muscular sheaths or Tenon's capsule, and rheumatism in other parts of the body. Patients were mostly females from 15 to 25 years. Local treatment, atropin and subconjunctival injections and antirheumatics. Treatment at mineral springs has proved helpful.

S. THEOBALD, Baltimore: The cases of keratitis probably de-

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pendent on rheumatic diathesis, that I recall, were of the "profunda type," and usually were not examples of pure keratitis, but rather of "sclero-keratitis," the more intense inflammatory changes being magnified. I have observed recurrent attacks. There was little tendency to ulceration. The attacks were obstinate, and permanent corneal opacities were not infrequently left. Potass. iodid., iodid of iron and sodium salicylate, with atropin locally, were the remedies which I have found most useful. My impression is that the majority of cases were white women.

H. D. BRUNS, New Orleans: Only one case of rheumatic episcleritis, with usual corneal opacities opposite the points of scleral infiltration. These areas seem to undergo sclerosis. Permanent uveulae were left, which greatly impaired vision.

J. L. THOMPSON, Indianapolis: I have had no case which I could call rheumatic disease of the cornea. I have had many cases in women who have scleritis extending subsequently well over the outer margin of the cornea, who have been troubled with rheumatism, and have sometimes benefited them with iodid and the salicylates; have often had to make an iridectomy, and not infrequently had to enucleate the eyeball.

E. A. SHUMWAY, Philadelphia: I have seen no primary lesion of the cornea which I could attribute to rheumatism. I have seen several cases of so-called sclerotizing keratitis, secondary to episcleritis, in which the etiology pointed to rheumatism.

CHARLES E. RIDER, Rochester, N. Y.: For many years I was in position to know my father's practice and opinion, and I think he would agree with me that with the exception of the corneal lesion of advanced scleritis, no cases of corneal disease from rheumatism are observed hereabouts. Under this head might be considered the corneal congestion, which, I think, I have observed, rarely, namely, after a serous iritis which at times I know is of rheumatic origin; the deposit on Descemet's membrane does not seem to be completely absorbed, or, absorbing leaves the tissue somewhat hazy, suggesting structural changes in the cornea itself, after being the resting place of the exudate from the posterior chamber. I have observed this a long time after the attack.

A. E. PRINCE, Springfield, Ill.: I have had frequent cases of rheumatic iritis with corneal involvement, but nothing I regard as specific rheumatic keratitis *per se*.

EUGENE SMITH, Detroit: I have only seen corneal disease of a supposed rheumatic character as secondary to episcleritis or scleritis, and in the form of leucoma of the periphery.

R. J. MCKAY, Wilmington, Del.: Have seen cases of iritis complicated with corneal disease; used the mixed treatment with satisfactory results.

F. BULLER, Montreal, Canada: I look on so-called sclero-keratitis as due to some constitutional condition of rheumatism or strumous diathesis in the same individual in all or nearly all such cases. Further than this, I have not seen and do not know of any form of inflammation involving the cornea which can positively be traced to rheumatism as a constitutional cause.

A. J. ERWIN, Mansfield, O.: Have no recollection of any case of keratitis which I thought due to rheumatism, except as a complication of rheumatic iritis or scleritis.

H. V. WÜRDEMANN, Milwaukee, Wis.: The part of the cornea attacked is the periphery, usually many attacks, only seen as complication of scleritis or episcleritis. Patients, white, males and females, thirty-five to sixty years old; sodium salicylate, oil wintergreen; diet, mineral waters, general and local massage. Locally atropin, diolin, sodium chlorid by subconjunctival injections, were the most helpful treatment.

PRIMARY KERATITIS IN INDEFINITE RHEUMATISM.

C. A. VEASEY, Philadelphia: I have seen a few cases of interstitial keratitis that gave only rheumatic histories, and that recovered under antirheumatic remedies, that I have always believed to have been produced by that poison; but of course I realize that it is impossible to state positively that this is true. Excepting the cases of interstitial keratitis referred to, I can only recall one other corneal affection thought to be due to rheumatism, and that was a case greatly resembling malignant growth, in a middle-aged woman, which, for a time, it was thought would have to be operated on, but which finally cleared under antirheumatic remedies.

C. M. CULVER, Albany, N. Y.: Yes; can not give figures; not very many; different parts; apt to be Descemet's membrane; a tree-like form of inflammation; several attacks—can't give figures, several; usual symptoms of rheumatism; males and females; white, thirty to fifty. I recall an engineer, a townsman and a lawyer. Baths, pilocarpin, atropin and general treatment of rheumatism.

E. W. BARTLETT, Milwaukee, Wis.: I have seen six or more cases of corneal disease occurring with rheumatism. These showed nothing different from other cases in bad health. Male, white. Atropin and a bandage. Treatment for rheumatism was followed chiefly.

H. B. ELLIS, Los Angeles, Cal.: I have had but one case which I can place at the present time, that might come under your query. A boy of 17 came to me two years ago with slight haziness of the cornea, which in a few days developed into a marked case of interstitial keratitis. I have known the father and mother for twenty years, and they are both healthy robust people and give absolutely no specific history, and the boy has no marks of inherited trouble, but he did not have, prior to my seeing him, a mild attack of muscular rheumatism and has been bothered some ever since, so that he has gone to mud baths two or three times in the past year. Both corneae are still very cloudy. Rheumatism was the only thing that I could find as a causative factor in this case.

A. BAIRKAN, San Francisco: Yes, I have seen rheumatism cause keratitis in three cases characterized by a band-like brown, deep-seated opacity along the horizontal meridian. Antirheumatic treatment.

D. E. WELSH, Grand Rapids, Mich.: I have seen a number of cases of keratitis caused by rheumatism; not localized, but general; characterized by a general haziness of the cornea, followed by slight ulcerations of the cornea, several in number; when present, severe pain, photophobia. Several recurring attacks. No complications, except episcleral involvement and association with myalgic pain. Females, white. Large doses of soda salicylate and potass. iodid; lodosi 3 per cent. ungt. I attribute these to rheumatic diathesis, viz., corneal haziness, pain, photophobia and lachrymation; slight ulceration at different points of the cornea away from sclero corneal junction; pannus would develop, later a severe episcleritis in conjunction with a severe myalgia confined more especially to the superior extremities.

ALBERT E. BULSON, Jr., Fort Wayne, Ind.: For some time I have recognized a peculiar form of corneal disturbance which has been benefited by antirheumatic treatment. Most of the cases exhibited a nebulous infiltration of interstitial character. There was no marked vascular disturbance. Rheumatism was suspected from soreness of the extrinsic eye muscles on movement of the eyeball. This class of cases were happily treated by large doses of sodium salicylate. In these cases other local or constitutional causes were eliminated. I have also seen corneal disease associated with iritis, scleritis and episcleritis, but am not sure whether this was due to the rheumatism.

M. D. STEVENSON, Akron, Ohio: I can recall five cases of corneal disease caused by rheumatism. The superficial part of the cornea was involved and associated with scleritis or episcleritis, chronic in course, occurring in persons with rheumatic history. One case had two attacks and one iritis. Treatment was large doses of sodium salicylate, with large doses of water, and dry heat locally.

W. MITTENBERG, New York: Yes, I have seen cases of corneal disease caused by rheumatism; usually the superficial layers were attacked; characteristic features were its being more or less superficial and frequently vascular; several attacks, usually young adults; treatment salicylates internally and usual local medication. N. B.—These cases differ entirely from those known as punctate keratitis, which are attributed to rheumatism.

F. C. HEATH, Indianapolis: Have seen cases, but can only distinctly recall one. The superficial layers were involved, one eye central and the other peripheral. The keratitis, much like phlyctenular ulcers, but rather deeper and covered more surface than the average ulcer of that form. The case had four attacks, and was complicated with blepharitis. Male, white, aged 55, editorial writer on a daily newspaper. Sodium salicylate internally; atropin and yellow oxid mercury locally; results, a slight scar, central, dimming vision of right eye. I have had a recent case of scleritis (at first episcleritis) rather severe and protracted with corneal infiltrations that temporarily clouded the vision a great deal, but ultimately cleared up under salicylates internally, and atropin and bor applications locally.

L. SERRICKER, Cincinnati: I have seen two cases of corneal disease caused by rheumatism. There was superficial denudation. Punctate denudation of the epithelium, and exceedingly profuse; more or less scleral corneal injection, great pain and photophobia. Have observed four attacks in same case. Complicated with cyclitis and irido-cyclitis; white, male and female. Treatment, soda salicylate; recovery perfect.

G. E. DE SCHWEINITZ, Philadelphia: Certainly, I have seen a number of cases of corneal disease attributed to rheumatism. I have a description of them, especially the variety of keratitis profunda, which was first described by Fuchs, in the last edition of my text-book, page 315, and it is my experience that these cases have always appeared either as a central parenchymatous infiltration, or sometimes as a circumscribed interstitial keratitis. I have also seen a few cases of keratitis profunda of the type described by W. T. Holmes Spicer in the January number of the Ophthalmic Review. In a number of his cases rheumatism, or rheumatic pain at least, was present in the patients. Some of my cases were associated with iritis, but otherwise I have not seen any complications. I do not know how many cases I have seen, but quite a number. One of the most marked cases that I have seen was in a prominent physician of this city. Regulation of diet, salicylates and other antirheumatic remedies, atropin, and in recent times diolin, have served me the best purpose. It seems to me that the term rheumatism is a very vague one, and I am not sure that it would be wise to adopt the term rheumatic keratitis, but certainly it is safe to say that very considerable number of cases of keratitis profunda, both general and circumscribed, occur in persons whose chief constitutional disorder appears to be some type of rheumatism.

D. B. CORNELL, Saginaw, Mich.: Yes, I have seen cases of keratitis from rheumatism. They involved the parenchyma of the cornea, and were more circumscribed than when due to syphilis. One case had two attacks. The complications were like those observed in other constitutional diseases. Patients were both sexes, white, and ranged from 12 to 30 years of age. The constitutional treatment was soda salicylate; salicin, potass. iodid and vin colchic.

CHAS. S. BULL, New York: Yes, I have seen keratitis caused by rheumatism, but I do not know how many cases. The parenchyma was involved. Most marked characteristics were the extreme chronicity of the trouble and the tendency to relapse. The case had two or more attacks and were complicated with iritis. Cases were both sexes, white, most over thirty years of age. Local treatment was atropin, hot fomentations, cocaine, dark glasses. Persistent use of alkaline remedies internally, especially sodium salicylate. These cases of mine were observed in the course of rheumatic attacks. They were obstinate in resisting treatment and relapsed more than once. The majority were cured after persistent treatment, leaving a clear cornea, though in a number of them the posterior synchia remained.

E. E. GIBBONS, Baltimore: Yes I have seen eight or ten cases of keratitis caused by rheumatism; attacked the deep layers of the substantia propria. The infiltrate seemed to be punctate and discrete and the subjective symptoms severe for the amount of cornea involved. The opacities usually affect the central portions of the cornea. One had two attacks in each eye. Iritis and scleritis were observed as complications. All but two were white men. The final results were good; all treated by soda salicylate and pilocarpin sweats with usual local treatment.

E. C. ELLETT, Memphis, Tenn.: I have seen one case of corneal disease that I and another ophthalmologist supposed to be due to rheumatism as it occurred in a rheumatic boy, aged 20. He had two attacks in less than a year and has had no more. The attack was acute; the cornea showed a fine sandy appearance, without opacity, and the process ran its course in a week, leaving no permanent results. He was treated with atropin, hot compresses and lithia. I am not sure that this was rheumatic, but I have never seen any other corneal disease that I suspected of being of this character.

L. A. W. ALLEMAN, Brooklyn: If I understand you as asking for cases of corneal disease due to true rheumatism I must say "No." But if you have in mind those ill-defined disturbances of nutrition which are often attended by pain and soreness in the joints and muscles, I have seen many cases. They are, as a rule, marginal keratitis, with much pain and photophobia, subject to frequent relapses, not as a rule attended with serious complications, and best

controlled by general antirheumatic treatment, regulation of diet, etc. Eserin has given the best results locally.

L. H. TAYLOR, Wilkesbarre, Pa.: At the time I received your letter I was called to see a patient at her home, with a severe suppurating ulcer of the cornea. The patient could not come to my office because she was in bed with rheumatism. She had in the left eye an annular ulcer extending entirely around the edge of the cornea beginning at the sclero-corneal margin. I have seen a number of cases of corneal trouble in people who were at the same time suffering with rheumatism, but I could not say that the rheumatism caused the keratitis. Last summer I attended a physician who had a bad case of sloughing cornea. He also had rheumatism, but I did not regard the latter as the cause of the former.

C. A. OLIVER, Philadelphia: Yes, barometric in exacerbation; much adjacent swelling; the periphery of the cornea attacked; young, white, adult, male. Treatment: salicylates and heat.

S. C. AYERS, Cincinnati: Yes, peripheral portion, near margin. Generally sluggish, indolent, more than one. Pain and photophobia. White; females, generally 30 to 40. Treatment: scraping floor of ulcer and using 25 per cent. argyrol, atropin when necessary.

W. H. WILMER, Washington, D. C.: Yes. In a few cases superficial ulcers near margin. Most cases substantia propria. In some cases ring-like involvements of cornea; in most cases a seeming extension of the scleritis into the interstitial portion of the cornea. Several attacks; complications: scleritis, iritis, cyclitis, uveitis. White; black; male; female. Treatment: internally, potass. iodid and salicylate of lithia, pilocarpin injected into the temple, salicyl. of lithia subconjunctivally injected. Hot applications. Good results. In my experience, rheumatic diseases of the cornea are rare, but do exist.

E. E. JACK, Boston: Yes (?), near limbus; lower half; small roundish, shallow ulceration, infiltrated; two to three attacks. Male, 40 years, physician. Treatment, pilocarpin and cocaine only treatment tried. Well each attack in two or three days. The doctor, after two attacks, decided that the attacks came when he had too much uric acid and always got better with an elimination of this. He had other symptoms of this condition. I put a (?) after the first answer, as I do not know whether you wish to class this as rheumatic.

FRANK C. TODD, Minneapolis: Yes, I believe I have seen keratitis caused by rheumatism. I have had cases in which the epithelium has been involved, which, I believe, were of rheumatic origin. Any portion of the cornea may be involved, but I regard as most characteristic that form which occurs in conjunction with and as a portion of uveitis in which the posterior limiting membrane is involved. Such cases are subject to recurrences. Cases involving the substantia propria and endothelium I have considered rheumatic. Both male and female, white. Treatment, large doses of soda salicylate, following Gifford's method.

E. E. HOLT, Portland, Me.: Yes, a number. Corneal substance proper attacked. In some instances not much of any acute inflammation present. Several attacks, leaving opacities; both male and female. Antirheumatic treatment used, salicylate of soda, mercury, iodids, arsenic, hot baths, massage, electricity.

J. M. RAY, Louisville, Ky.: I have for a number of years classed many of the cases of scleritis with frequent relapses that eventually invade the cornea, producing the so-called sclero-keratitis as due to rheumatism. I think I have seen this condition start primarily in the clear cornea close to the periphery and follow the same clinical course as those that had their origin, primarily, in the sclera. I can find in my records one case of this kind, in which, at the interval of three years, each eye was separately involved. The first eye was iridectomized by a colleague. The second eye was improved by subconjunctival injections. The latter treatment, along with antirheumatics, is, I believe, the best treatment of sclero-keratitis. I am sure I have seen several cases of the kind I describe, but can not find their records.

S. D. RISLEY, Philadelphia: I am at a loss how to answer. While I have many cases of scleritis and episcleritis, apparently due to the rheumatic diathesis, I can not recall a single instance of corneal disease which I ascribed to rheumatism. The only exception to this statement may be the case of a man, at least seventy years of age, from whose cornea, at the site usually occupied by the arcus senilis, I scraped a large deposit of a chalk-like material, which chemically gave the calcium reaction.

HIRAM WOODS, Baltimore: I think there is a corneal disease caused by rheumatism. The characteristic features are small central area of deep infiltration. In one case only a small spot was observed down and out. In the others all the cornea eventually clouded. Only one case had more than one attack. The cases were white, two female, one male, aged 22, 18 and 15. No joint involvement in any case. All had a rheumatic history. Salicylate of soda controlled the inflammation. I have seen two or three cases in children of deep keratitis (syphilis and tuberculosis were definitely excluded). Rheumatic and gouty condition were family traits. Soda salicylate was given because of its ability to control the inflammation and the family history. There was benefit from this treatment, but the cases were obstinate; one was complicated by secondary iritis-cyclitis; at least the central lesion antedated the other. The entire cornea was involved.

ROBERT W. MILLER, Los Angeles, Cal.: I have observed cases in which the rheumatic and gouty constitutions of patients suffering from keratitis, occupying a causative relation and in some instances militating strongly against recovery. The forms in which I have noted this relation has been the deep central keratitis and phlyctenular keratitis when the latter occurs in adults or the middle-aged.

91 Lafayette Ave.

DISCUSSION.

DR. W. H. SNYDER, Toledo, Ohio, reported two cases and said that he had never been satisfied of the existence of the condition until he saw these two cases. He thought that these could be safely classified as due to the constitutional effect of rheumatism on the cornea.

CASE 1.—T. D., aged 7 years, height 4 feet 1 inch, weight 46 pounds, was seen in consultation with another ophthalmol-

ogist because of the stubbornness of a corneal inflammation which had resisted all treatment. He has had eye trouble for one year. Eyes very suddenly get very red and inflamed. Pain through the day very much. First one is inflamed and then the other. Three weeks ago the left eye got very red and inflamed. Vision, right, 20/40; left, light perception. The conjunctiva of the right eye is very red and inflamed on the whole nasal side of the globe. The cornea is normal at present and there is no pain. On the left side the whole eye is very red, swollen and painful. On the lower, outer half of the cornea is a large disc of opacity covering the pupil, which seems opaque through all the layers of the cornea. Photophobia is moderate. His physical condition is anemic, poor; eats meat only; subject to diarrhea. Had inflammatory rheumatism two years ago. Pulse sitting is 90; standing, 110; after moderate exercise, 120. Heart sounds show mitral insufficiency. Anti-rheumatic remedies added to his old treatment, with attention to diet brought about a quick and permanent recovery. His physician had been unable to reduce pain or redness at all until the latter treatment was added.

CASE 2.—C. S., aged 17, very small for his age and thin. Three weeks before his left eye had suddenly become red and inflamed, which attacks he had had many times in the last two years. No treatment had been of any service. Vision: Right, 20/20; left, poor light perception. All of the cornea of his left eye was hazy and through all the layers a disc of marked opacity in the center of the cornea. Outside of this the cornea was covered with white dots looking like pin-pricks in gelatin. The whole cornea became steamy first; in twenty-four hours this condition came on. The disc seems like chalk embedded in the cornea. He had been subject to inflammatory rheumatism since a child and heart was affected (mitral murmurs). No treatment had been of avail. From his prescriptions one of atropin was chosen and anti-rheumatic treatment added and in four days the redness had all left the eye. He returned to work at once, being very poor, and has had two or three attacks since, all controlled, however, by the same treatment.

DR. LEARTUS CONNOR said that as far back as the time of Wharton Jones the influence of rheumatism was much more prominent than at the present time and their observations were no doubt as good as those of the present. Dr. Connor said that he had overlooked many of these cases in days gone by and he thought others might have done the same. Dr. Bull of New York, reports a number of cases that he believed due to rheumatism, while Dr. Knapp, of the same city, had never seen any, showing, perhaps, that one man's mind was on the subject and the other's was not. Such brilliant results come from operations and local treatment that the cause of some of these conditions is apt to be overlooked.

BLASTING EYE INJURIES.*

JOHN A. DONOVAN, M.D.

BUTTE, MONT.

"Frenzied Finance," pro and con, of late has so filled the air that to many the question arises: Does mining really exist? With all her disadvantages, Butte still demonstrates mining as a reality. With her annual production of 250,000,000 pounds of copper, not to mention her silver and gold, her many miles of underground tunnels extending nearly half a mile below the surface, and her thousands of miners using tons of powder daily, Butte offers for our study a subject worthy of consideration.

Eissler¹ says:

In no department of human industry has more rapid progress been made of late years than in explosives. The ablest chemists and the best engineers have found in the study of

* Read in the Section on Ophthalmology of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

1. Handbook on Modern Explosives.