

of the lids assumes a glistening, white, and puckered aspect. This new tissue is very apt to contract and produce entropium; and the rough surface which it constantly opposes to the cornea generally gives rise to opacity; so that supposing the cornea has escaped uninjured through the second stage of the disease, the patient will now be in imminent danger of losing his sight from these secondary changes.

Causes. *Causes of Diphtheritic Conjunctivitis.*—The causes which give rise to this form of conjunctivitis are doubtless those local influences, whatever they may be, which engender or rather favour the growth of the contagium which causes diphtheria. It is met with in districts where diphtheria is endemic; and the disease has been known to spread from the conjunctiva to the nares, mouth, and throat. On the other hand, it is equally certain that the secretion from a mucous membrane attacked by diphtheria, is capable of propagating a similar form of disease in an otherwise healthy eye; it is, in fact, a highly contagious affection, and hence arises the necessity for taking every precaution to prevent the discharge spreading from a diseased to a healthy eye.

Contagion. Diphtheritic conjunctivitis is most apt to occur among children under eight years of age, and in the majority of instances both eyes are affected.

Treatment. *Treatment of Diphtheritic Conjunctivitis.*—Diphtheritic conjunctivitis being a local manifestation of a very intractable form of disease, it is almost impossible effectually to ward off the injurious consequences which too often follow its invasion.

Continental practices. Some German practitioners advocate an antiphlogistic plan of treatment proportioned to the sthenic character of the affection—namely, the energetic application of cold to the part, extensive local bleedings, and the severest antiphlogistic regimen. Others would add the administration of mercury in large and repeated doses, so as to bring the patient under the influence of this drug as speedily as possible; calomel and mercurial inunction are, in fact, recommended *ad libitum*, and appear to be the means upon which they chiefly rely to stay the progress of the disease. They have been closely followed by other continental practitioners: thus, in the first stage of diphtheritic conjunctivitis, M. Wecker employs cold water compresses to

the lids, and he also recommends the application of leeches to the temples; but above all things he insists on the administration of calomel every two hours. As soon as the patient is salivated, he affirms that the conjunctiva loses its buff-grey appearance, the second stage of the disease being speedily established. He speaks favourably, also, of the effects of tartar emetic in relieving the feverish symptoms.*

Certainly, as our continental brethren have had the most experience in diphtheritic conjunctivitis, these methods of treatment demand our careful consideration, but my own experience would dispose me to adopt a very different method, and one which has been very generally sanctioned both in England and America in the treatment of diphtheria.† I rely more upon large doses of the sesquichloride of iron, combined with chlorate of potash, than on any other drugs, in the first stage of the disease: thirty drops of the tincture of the former, together with twenty grains of the chlorate of potash, may be administered every three hours, and this in spite of the fever which generally attends the outset of the affection. The state of the bowels must be attended to; hot baths at bedtime often induce perspiration and quiet the patient. As a general rule, a lowering plan of treatment is to be avoided; on the other hand, soup and a generous, though non-stimulating dietary are demanded. Mor-

Efficacy doubtful.

Tr. ferri mur.
Pot. chlor.

Nutrients.

* Dr. Pagenstecher reports on fourteen cases treated "by scarifications and the energetic application of cold in the diphtheritic, caustics and atropine in the secreting, stages. Six did badly, the rest were more or less benefited."—*Ophthalmic Review*, vol. i. p. 190.

Professor Stellwag, while fully adopting the antiphlogistic method in the active stages of the disease, rejects mercury and other reputed *antiplastics* as "absolutely and certainly inefficacious."

See also *Ophthalmic Hospital Reports*, vol. v. p. 363, where the disease is reported to have advanced rapidly, in spite of calomel.

† The American editors of Professor Stellwag's work observe: "The accepted general treatment in the United States for diphtheria in any form is the administration of iron and nutrients, e.g., beef-tea, until the patient has rallied from the depression caused by the disease. We suppose this is as applicable in diphtheritic conjunctivitis as in any other form of this blood disease."—p. 325.

Opium. phia or chloral should be given in sufficient doses at bedtime to procure the patient sleep during the night.

Local treatment. With regard to the *local treatment*, caustic should not be used in the first stage of the disease, for the circulation in the conjunctival vessels is already impeded by the fibrinous formation surrounding them, and caustic would simply intensify this condition; in fact, we shall in these cases, as in all other forms of conjunctivitis, do well to remember the formula already laid down on this subject. Caustic is not, as a rule, to be employed *unless a purulent discharge exists*.

Caustic in purulent stage only. When once the purulent discharge has commenced, and the conjunctiva become red and vascular, the local treatment must be altered, and conducted upon precisely the same principles as I have described for the treatment of purulent conjunctivitis. A solution of five grains of nitrate of silver to an ounce of water should be dropped into the eye frequently, in cases where there is no ulceration of the cornea, but when ulceration has commenced, the dilute caustic pencil must be applied carefully to the tarsal conjunctiva, together with cold compresses over the lids, the eye being kept scrupulously clean. We should remember always that the discharge is not only contagious, but appears to possess irritating properties, and consequently to keep up the diseased action, if allowed to remain in contact with the eye. The general treatment will still consist in giving tincture of iron and chlorate of potash, morphia, and hot baths.

Cleanliness. In the third stage of the disease very little can be done, beyond ordering the patient a mild astringent lotion to be used twice a day, and bathing the eyes frequently in tepid water. We cannot prevent the formation and contraction of the cicatrices, which are unfortunately the natural consequence of the loss of tissue, following the previous destructive action of the disease.

Astringent lotions.

GRANULAR CONJUNCTIVITIS, OFTEN CALLED MILITARY OPHTHALMIA.*—This is a common form of disease, par-

* See "Maladies des Yeux," par M. Wecker, vol. i. p. 98; "Lehrbuch der Augenheilkunde," von Stellwag v. Carion, p. 385; "L'Ophthalmie militaire à l'Académie Royale de Médecine de Belgique," par le Dr. Warlomont, *Ann. d'Oculistique* tom. xlii. 127.

ticularly among the lower classes, who are exposed to malarious and other debilitating influences. It depends upon the presence of numerous small granular bodies scattered in the connective tissue of the conjunctiva, principally in the tarso-orbital fold, and sometimes in the cornea. These growths spring from the cells of the connective tissue of the part; they contain no blood-vessels or nerves, and are, therefore, utterly unlike the villi in every respect; they are, in fact, new formations, and not a mere hypertrophy of pre-existing ones, as Dr. Schmid and various other authorities hold.

On everting the lid of a person suffering from granular conjunctivitis, it is true that we shall, in the majority of instances, find the papillæ of the conjunctiva more or less congested and enlarged, their hue varying according to the stage of the disease. In chronic cases, the epithelium covering them becomes thickened, and they are prominent and of a dusky brownish-red hue, and of course confined to the tarsal conjunctiva. On the other hand, the neoplastic growths which are characteristic of granular conjunctivitis, are most abundant on the superior tarso-orbital fold, and sometimes extend to the orbital conjunctiva where there are no villi. Frequently, however, they are so small, that we must employ a lens in order that we may clearly discern them. But whether situated in the tarsal or orbital mucous membrane, they present the same appearance of small granular masses, aptly compared to millet seeds, situated immediately beneath the conjunctiva. As the disease advances, these granular bodies may increase considerably in size, and may then be distinctly noticed scattered among the enlarged villi of the palpebral and orbital portions of the conjunctiva, and sometimes they extend to the cornea. In the more chronic forms of the malady, owing to an excessive development of intercellular material, which assumes a gelatinous character, these "granulations" sometimes attain the size and translucency of boiled tapioca grains—constituting the "frog-spawn" granulations of some pathologists.

If we examine these granular structures with the microscope in their early stages, we find that they consist of a stroma of connective tissue, containing a number of nucleated cells with a little fluid; they

Granules not enlarged villi, but new formations.

Resemble millet-seeds,

or "frog-spawn."

Consist of germinal matter.

subsequently undergo fatty degeneration, this is also the case in those chronic forms, where the cell elements are replaced by the gelatinous intercellular material already described. It is often difficult to draw a line of demarcation between the embryo elements of the connective tissue and the growths of granular conjunctivitis; but however similar in appearance, their properties are dissimilar, for the granular bodies, in place of becoming developed into connective tissue, degenerate into a fatty or other perishable substance, which is gradually absorbed, and the space which it has occupied contracting, small cicatrices are left to mark its former position. It is to the existence of a conglomeration of these cicatrices, and the consequent contraction of the conjunctival tissue thus induced, that the unfavourable results of this form of disease are mainly due: the cicatrices presenting a rough and uneven surface, which, by constantly rubbing against the cornea, induces irritation and subsequently vascular opacity of that important structure.

Very prone to degeneration.

Leaving cicatrices.

How far analogous to tubercle.

Mistaken for glands.

At the commencement of this chapter, I said that these granular bodies bore some analogy to tubercle. This is so as regards their common origin in a proliferation of the connective-tissue corpuscles, and in the unstable character of the product to which it gives rise, leading to the destruction of the normal tissue in the immediate vicinity. The analogy, however, does not extend further, and the history of granular conjunctivitis does not point to any constitutional vice allied to that of tubercle or scrofula.

It is quite possible to mistake the enlarged glands of the conjunctiva for the neoplastic growths of granular conjunctivitis. In all cases of irritation of the mucous membrane, the glands become swollen, and may frequently be seen beneath the conjunctiva, looking very much like the new formations which are characteristic of that affection; nor can I lay down any special rules by which to distinguish them. The enlarged glands, indeed, are still held by many pathologists to constitute the essential elements of the granular bodies noticed in the conjunctiva in this form of disease.*

* Ophthalmic Surgery, by Dr. P. Frank: *Army Medical Department Report for 1860*. According to Prof. Stellwag, it is

Symptoms.—Granular conjunctivitis may be described under two heads, the acute and chronic; the former may be conveniently divided into three stages.

Symptoms of the acute form.

1. The first stage of acute granular conjunctivitis usually lasts from eight to ten days; the patient complains of intolerance of light, and supra-orbital pains; he has a sensation as if sand or grit were in the eye, and profuse lachrymation. The margins of the lid are slightly swollen, and, on everting them, we find the palpebral conjunctiva to be congested, and a number of small, white, prominent bodies, looking like millet seeds, may be noticed embedded in the mucous membrane.* This condition of the conjunctiva is most marked in the upper lid, and especially along the tarso-orbital fold. But the palpebral conjunctiva is not alone affected; the same condition extends to the mucous membrane over the globe of the eye; minute white specks of a similar nature may sometimes be seen in the cornea, with numerous small but easily defined vessels coursing over it, inducing a well-marked vascular opacity of this structure.

1st stage: Photophobia,

pain,

congestion. Granular bodies.

2. This condition having lasted about ten days, the second or inflammatory stage of the disease commences. The conjunctiva becomes deeply congested, and in the course of a few days a purulent discharge takes place from its surface. In fact, suppurative conjunctivitis is established, so that it is almost impossible to distinguish between the second stages of purulent, diphtheritic, or acute granular conjunctivitis; for the enlarged villi, and the congested state of the mucous membrane in the latter affection, entirely conceal the neoplastic formations.

2nd stage: inflammatory.

During the suppurative stage of the disease, the eyelids are often slightly swollen, and chemosis may exist; but as in purulent, so in granular conjunctivitis, our chief anxiety will be as to the condition of the cornea. Fortunately this structure is less apt to slough, or become rapidly destroyed by ulceration, in granular conjunctivitis, than it is in the purulent form of the disease. The neoplastic growths which form on

Suppuration.

Cornea may suffer.

the "spawn-like" granulations which have been more particularly confounded with hypertrophied glands.

* Dr. H. Snellen on Diseases of the Conjunctiva: *Ophth. Hosp. Reports*, vol. iv. p. 61.

the cornea might reasonably be supposed to give rise to deep-seated ulceration, but in practice this is not found to be the case: when numerous, however, they are almost certain to be followed by vascular opacity.

Sometimes prolonged,

with sub-acute symptoms,

A less tractable form.

3rd stage: Relapse or recovery.

Treatment.

Inflammation curative.

Must not be checked.

In many cases the second stage of the disease is much prolonged, and is attended with less acute symptoms than those above described: this is especially the case among old or ill-nourished people. Under these circumstances the purulent stage of granular conjunctivitis is a protracted one: the patient may complain of only slight photophobia, and of little, if any, supra-orbital pain: he can open his eyes with comparative comfort, and unless the cornea is involved, can manage to see his way about. The palpebral conjunctiva, however, is intensely congested, the villi being prominent, and resembles a granulating wound, with a small quantity of pus oozing from its surface.* This state of things may last for a month or more; and although the symptoms are not very acute, they are most intractable, superficial ulceration of the cornea frequently complicating the case, and too often rendering that structure opaque; or it may be that staphyloma occurs.

In the more acute cases, the purulent stage of the disease runs its course in about fifteen days; the chemosis then subsides, the purulent discharge ceases, and the disease passes into its third stage.

3. We should then anxiously watch for the reappearance of the granular bodies: if they again become visible, the probability is that we shall have a case of chronic granular conjunctivitis to deal with. On the other hand, if the inflammatory action has been sufficiently severe to destroy the neoplastic formations, the third stage of the disease will be a comparatively simple matter.

Treatment.—The treatment to be employed in acute granular conjunctivitis will necessarily vary according to the progress which the disease has made. We must bear in mind the fact, that the inflammatory action, under these circumstances, is a curative one; we may therefore with safety allow the first stage to run its course unchecked, and are likely to do more harm than

* Dr. Marston on Ophthalmia: *Beale's Archives*, vol. iii. p. 194.

good by applying astringents, and such like remedies, to the conjunctiva. If the irritation going on in the eye is excessive, the patient should be confined to a dark room, and the eyes bathed with tepid water four or five times a day. At bedtime the extract of belladonna should be smeared over the skin of the eyelids and brow, ten grains of Dover's powder being administered if the patient is restless and unable to sleep.

As I have already explained, defective sanitary arrangements appear to be a direct cause of granular conjunctivitis, and consequently, in treating this disease, we must pay great attention to the hygienic conditions under which our patient is placed. Pure air, good diet, cleanliness, and a due amount of exercise, must be carefully enjoined, otherwise the conjunctivitis is almost certain to run on into a chronic form of disease, terminating, as it too often does, in vascular opacity of the cornea.

Hygienic measures.

In the second stage of this affection, our treatment must be guided by the character of the inflammatory action going on in the conjunctiva, and more particularly by the condition of the cornea. So long as the cornea is free from ulceration, and there are no indications of destructive changes going on in it, we may with safety allow the conjunctivitis to run its course without any local application. The eyes must be kept clean, and poppy-head fomentations are often grateful to the patient, and are a means of keeping his mind employed. Tonics are generally required: soda and quinine, together with Dover's powder, may be given with advantage three or four times a day, and subsequently the chlorate of potash with the tincture of muriate of iron. I would even advise these remedies, together with a generous dietary, in cases where the second stage of the disease is pursuing an active course, and much more so when the inflammatory action is languid and weak. In the latter instance it will be well to stimulate the conjunctiva, by applying sulphate of copper to its surface once a day, until such an amount of increased action is excited as will be sufficient to destroy the neoplastic growths, which are the origin and cause of all the mischief.

Promote second stage by fomentations, tonics,

generous diet,

and cup. sulph.

If, however, we consider that the inflammation is more than adequate to accomplish this purpose, and that it is endangering the vitality of the cornea, we

Or control
it by
arg. nit.
and cold.

must at once control its action by means of nitrate of silver and cold compresses. In the first instance, a five-grain solution of nitrate of silver should be dropped into the eye every second hour, and cold compresses constantly applied over the lids in the interval: it may be well at the same time to administer a purgative, and if the patient is in pain, a full dose of the hydrate of chloral at bedtime and atropine drops applied night and morning to the eye. Should the disease, in spite of this treatment, gain ground, we must smear over the chemosed conjunctiva with the dilute caustic pencil. Let it be distinctly understood, however, that this treatment will only be necessary when the cornea is in danger. Of late I have frequently employed tannin in cases of this kind with very great advantage; tannic acid being dusted into the patient's eye once or twice a day. I find a local application of tannin in this way most useful, even in the earlier stages of the disease, the cornea being hazy and vascular, with a purulent or muco-purulent discharge from the conjunctiva.

Caustic.

Tannin.

In third
stage:
do little.

Causes.

Over-
crowding.
Bad food.
Dirt.

Specific
infection
doubtful.

If the second stage of the disease has done its work effectually, there will be no necessity for further interference on our part: the inflammatory action gradually subsides, and the parts return to their normal condition. A mild astringent lotion, applied to the conjunctiva twice a day, will hasten the cure, and as the lids are apt to become glued together during sleep, the dilute citrine ointment may with advantage be smeared along their edges at bedtime.

The Causes of granular conjunctivitis may, as a general rule, be traced to influences which engender an impaired state of the nutritive functions. Among these, the overcrowding of human beings, together with filth, impure air, want of proper food, and in fact deficient sanitary arrangements in general, are doubtless the most prolific sources of this disease, and are capable not only of causing conjunctivitis in men, but also in the lower animals.

It appears that the neoplastic formations, which are the primary cause of the disease, may exist as it were in a latent state for a very considerable time, but that any slight cause of irritation throws them into activity; and hence, probably, the reason why purulent matter from other sources is capable of inducing granular conjunctivitis; the truth being that the disease has

been in existence prior to the inoculation of the purulent secretion, which has simply added fuel to the fire, and thrown the germinal matter of the part into a state of renewed excitation. Nevertheless, so high an authority as M. Wecker is of opinion that granular conjunctivitis is essentially a contagious disease; and there can be no doubt that in the suppurative stage, the pus from the surface of the conjunctiva may induce a purulent conjunctivitis in the eye of an otherwise healthy individual.

There are, probably, few people among whom granular conjunctivitis is more common than the lower orders of Irish, in Great Britain and elsewhere. The poorer classes of India, and in fact of every part of the world, are also more subject to it than their richer brethren; but local influences seem most fertile in generating the disease, and may even give it an endemic character. An instance of this kind is to be found in certain schools in Calcutta. The children in one of these schools are of different nationalities—natives, half-castes, and Europeans—but the buildings are situated in a most filthy part of the city, surrounded by open drains, and every conceivable abomination, and granular conjunctivitis is never absent from among the boys; whereas in other schools of a similar nature, but situated in a healthy locality, not a single instance of the disease is to be met with.

It is a remarkable fact, that a prolonged application of atropine to the surface of the conjunctiva appears to give rise to granular conjunctivitis; at any rate, one sees this form of disease arising after the long-continued instillation of atropine. Unless, however, it were positively ascertained that the neoplastic growths peculiar to this affection had no existence prior to the instillation of the alkaloid, I should not be disposed to admit the connexion of cause and effect. Many of these patients have been placed under conditions exceedingly favourable for the development of granular conjunctivitis, having probably taken no inconsiderable amount of mercury for the cure of iritis, and having at the same time been reduced by antiphlogistic measures, adopted to control the inflammation. Before, therefore, ascribing to atropine any peculiar property of developing granular conjunctivitis, I should like to watch its effects on a perfectly healthy eye; it may

Prevails
among the
poor.

and in un-
healthy
districts.

Atropine
said to
cause it.

only act as an irritant, developing a pre-existing form of disease.

CHRONIC
GRANULAR
CONJUNC-
TIVITIS.

Sometimes
the sequel
of acute.

More often
primary.

May be
latent,
with active
periods.

Disabling
character of
the disease.

CHRONIC GRANULAR CONJUNCTIVITIS.—If a case of acute granular conjunctivitis has been over-treated in the first or second stages of the disease, the inflammation having been prevented from running its course, and Nature having been thus thwarted in her cure, as soon as the inflammatory action has subsided, the granular bodies reappear, and we shall then have to deal with this most obstinate affection.

Chronic granular conjunctivitis, however, does not always commence in this way; on the contrary, it far more frequently begins by the appearance of the neoplastic growths beneath the conjunctiva, without any antecedent irritation or inflammation. The granular bodies may be so small that we require the aid of a magnifying glass to see them. In this condition they do not necessarily give rise to any inconvenience; the patient may be unconscious of their existence, but usually complains of "sore eyes." Any slight cause, such as a disordered stomach, or over-exposure to the glare of the sun—in fact, any irritation, immediately sets up an attack of conjunctivitis; the neoplasms increase in size during these periods of disturbance, and are, indeed, the immediate cause of the hyperaction going on in the conjunctiva.*

Individuals affected with this chronic form of disease are consequently liable to suffer from attacks of conjunctivitis, rendering them utterly unfit to carry on the ordinary duties of life. It is not uncommon to meet with soldiers suffering from granular conjunctivitis, particularly if serving in the tropics, the climate predisposing them to this affection; and their symptoms may be such as to lead one to suppose that they are malingering; their eyes look tolerably healthy, but as soon as they are put to any work, necessitating exposure to sun and dust, they get an attack of conjunctivitis. Cases of this description may at first sight appear suspicious; unfortunately, their termination, in the majority of instances, proves that they are of a most serious character, ending as they too often do in destructive changes in the cornea.†

* Dr. Marston on Ophthalmia: *Beale's Archives*, vol. iii. p. 201.

† Ophthalmic Surgery, by Dr. P. Frank: *Army Medical Reports for 1860*.

This chronic form of the disease may exist for years without inducing any great amount of hypertrophy of the villi; but sooner or later these become prominent and hard, and between them patches of white cicatricial tissue are to be seen, produced by the degenerative changes in the mucous membrane, beneath which the granular bodies existed. The uneven surface of the mucous membrane thus produced, by constantly rubbing against the cornea, often leads to vascular opacity of that structure, and it may be, to complete loss of sight.

May cause
hyper-
trophy of
villi,

and opacity
of cornea.

The *Symptoms* of chronic granular conjunctivitis have been pretty clearly indicated in the above remarks; but I may, perhaps, recapitulate them with advantage. In the early stages of the disease, the only reliable feature upon which we can depend for its identification is, the presence of the minute granular bodies beneath the conjunctiva. They give rise from time to time to attacks of conjunctivitis, the mucous membrane becoming congested, its villi more or less turgid, while the patient complains of slight pain in the eye, intolerance of light and lachrymation. After each attack of this kind, the neoplastic growths increase in size, often attaining to that of a grain of sago.

Resumé of
symptoms.

This state of things may last for a very considerable period, but sooner or later the material of the granular bodies undergoes absorption, and loss of substance thus occurring in the connective tissue of the part, the cavity closes by the formation of a cicatrix. As these minute cicatrices coalesce, patches of a dense fibrous structure appear on the surface of, or rather replace, the conjunctiva. It is seldom that the whole of the tarsal mucous membrane is thus destroyed; portions of it remain, the villi having become hypertrophied, so that the everted lid presents an uneven appearance, rough velvet-like patches rising out of a white cicatricial tissue.

The uneven surface of the conjunctiva thus produced, by constantly rubbing against the cornea, causes so much irritation in the anterior layers of the latter, that it passes into a state of vascular opacity: or it may be that entropium is produced from an incurving of the tarsal cartilage, induced by the cicatrization of the spaces occupied by the neoplastic bodies of granular

conjunctivitis (*see* p. 106). As changes in the cornea advance, the sight is more or less impaired, and ultimately the patient becomes almost blind. The disease, depending as it generally does upon constitutional causes, most commonly affects both eyes.

Treatment.

Sanitary measures.

Treatment.—The remarks which I have already made, on the importance of attending to the external circumstances and hygienic conditions of patients suffering from acute granular conjunctivitis, are equally applicable to the chronic form of the disease; and unless these are carefully regulated, all other treatment will be utterly useless.

Promote suppuration by cup. sulph.

In the selection of remedies, our object must be to excite sufficient inflammation in the mucous membrane to destroy the diseased action going on in the part; and with this in view, we may smear a crystal of sulphate of copper over the conjunctiva of the upper and lower lids, every other morning, or until we have induced a considerable amount of irritation in the part, ending in suppurative conjunctivitis of a mild character.* In this way we may hope not only to cause absorption of the existing granular bodies, but also, by having at the same time improved the patient's general health, to prevent their reproduction.

Various reputed specifics.

Acetate of lead has been employed for the cure of chronic granular conjunctivitis. It is recommended that the powdered acetate of lead should be sprinkled over the surface of the diseased mucous membrane, once or twice a week. *Liquor potassæ* has been applied to the conjunctiva, and its efficacy is highly spoken of. I have tried many of these so-called specifics, but have never yet cured a case of granular conjunctivitis unless upon the principles above laid down, though I by no means assert that sulphate of copper is the only remedy which we can use under these circumstances. Any other substance which will excite sufficient inflammation in the conjunctiva to cause absorption of the granular bodies, will answer the purpose equally well. On the other hand, if the patient is placed in improved sanitary conditions, the disease may disappear of itself,

* M. Warlomont having tested a number of medicinal agents with a view to find a substitute for inoculation, is in favour of sulphate of copper.—*Ophthalmic Review*, vol. i. p. 186.

unless the neoplastic growths have given rise to cicatricial tissue replacing the healthy conjunctiva. In combination with general treatment of this description, in chronic cases of granular conjunctivitis, complicated as they always are with more or less haziness of the cornea, tannic acid dusted into the affected eye once or twice a day affords the patient a better hope of relief than any treatment I know of. I must refer the reader to the section on diseases and opacity of the cornea for further information as to the treatment of these complications.

I need hardly say that soldiers, suffering from this form of conjunctivitis in the tropics, should be sent to Europe. As a general rule, they are an actual encumbrance to the service, being quite useless as effective members of their regiments; while, at any time, active changes may be set up, and a purulent discharge established, capable of propagating suppurative conjunctivitis by contagion, and they may thus become a source of widespread mischief to their comrades.

Prevent contagious diffusion.

The following conclusions regarding military ophthalmia (granular conjunctivitis) have been arrived at by M. Warlomont, from an analysis of the lengthy discussion on this subject by the Royal Medical Academy of Belgium:—

Researches of Belgian Academy on military ophthalmia.

I. Military Ophthalmia, also called contagious ophthalmia, granulous ophthalmia, &c., is an affection essentially transmissible, and subject to easy and frequent relapses. Those who have been affected by it are never sure of a perfect cure.

II. If it be true, as some state, that it can arise spontaneously in civil populations, it is as surely established, on the other hand, that in all the countries of Europe, where its presence has been assured, it has always commenced in the army, and spread itself from them among other classes of the population.

Propagation of military ophthalmia.

III. In Belgium, especially, it has been proved that before 1834 it affected the army almost exclusively. It was only after this period, and dating from the disbanding of those affected by granulations, and their return to their homes—a measure ordered by the Minister of War, on the proposition of the Sanitary Inspector-General of the Army, and sanctioned by the

Commission of Inquiry and by Professor Jünken of Berlin—that its extension began among the civil population.

IV. The isolation of individuals affected with military ophthalmia in all its stages is imperatively demanded by the contagious character of the affection. Beyond this prophylactic measure, it is not possible to retard or extirpate the disease. To send back affected patients to their homes is, therefore, a dangerous and irrational proceeding.

V. Individuals who have had this ophthalmia during their service, may be attacked afresh with it in their homes, without having been again exposed to the producing cause, and though they may have borne no traces of the disease at the time of their discharge. These relapses may take place at periods more or less distant, and science, possessing no criterion by means of which the limits of the connexion may be fixed, the disorders which are the consequence of it may be brought forward by those who have suffered from them, and urged as a claim to the assistance of the State, whatever may be the interval which has intervened between the first and following attacks.*

PUSTULAR
CONJUNC-
TIVITIS.

Two forms:

Conjunc-
tival and
corneal.

PUSTULAR CONJUNCTIVITIS.†—Under this head I shall include the “conjunctivitis phlyctenulosa” and “pustulosa,” the “scrofulous corneitis” or “herpes of the conjunctiva and cornea” of some authors.

It is advisable, however, to describe pustular conjunctivitis under two heads, according to the position of the pustules or herpetic spots; in many instances they are confined to the orbital mucous membrane, and the conjunctivitis is then a very simple matter, but if the pustules extend to the cornea, it becomes one of the most distressing affections from which a patient can suffer. In some cases the pustules invade both the cornea and conjunctiva at once, or they may surround the cornea like a row of beads; at other times they are situated partly on the cornea and partly on the conjunctiva.

* *L'Ophthalmie militaire à l'Académie Royale de Médecine de Belgique*, par M. le Dr. Warlomont, extrait des *Annales d'Oculistique*, tom. xlii. p. 126.

† “*Maladies des Yeux*,” par M. Wecker, vol. i. p. 139.

1. With regard to that form of the disease in which the pustules are confined to the conjunctiva. In these cases they rarely exceed two or three in number, but are apt to occur in succession one after the other, and consequently worry the patient a good deal. Each so-called pustule consists at first, either of a simple elevation of the epithelium by a collection of serum beneath it, forming a minute vesicle not larger than a pin's head, or of an equally minute, whitish, nodular mass or pimple, on the summit of which a similar vesicle is quickly developed. These little bodies are situated on a patch of congested conjunctiva, while the remainder of the mucous membrane may present a perfectly healthy appearance. (Fig. 1, Plate III.) If several pustules co-exist on the conjunctiva of the same eye, a large portion, or even the whole membrane, may look red and inflamed; the pustules, however, being raised above the surface of the conjunctiva, and of a whitish-yellow colour, are always sufficiently apparent against the red ground. Under these circumstances, as I have before remarked, they are usually situated near the margin of the cornea, and sometimes extend over it, being partly on the conjunctiva and partly on the cornea.

These little pustules contain at first a clear serous fluid; this quickly undergoes a change, becoming yellowish and opaque, and they then present the appearance of so-called lymph vesicles. The contents may become absorbed in the course of eight or ten days; or the epithelium giving way, the fluid beneath it escapes, and a superficial ulcer remains, which in the majority of instances is speedily healed by fresh layers of epithelial cells; the congestion of the conjunctiva then disappears, and the parts return to their normal condition.*

Symptoms.—The subjective symptoms to which this form of pustular conjunctivitis gives rise are usually unimportant, the patient complaining of a sensation of grit or sand in the eye, and of slight pain when the eyeball is turned in the opposite direction to the band of congested conjunctival vessels. After using the eye for a time, it begins to ache and water slightly. Unless

First form.

“Pustules”
few and
isolated.

Vesicular
summits.

Congested
base.

May dry up
or burst.

Sensation
of sand.

Eye aches
and waters.

* “*Pathology of the Human Eye.*” Dalrymple, Plate XIII. description.

the pustules are situated on the cornea, the patient seldom suffers from intolerance of light, but comes to us with his eyes wide open, complaining of the above symptoms; he will probably add that his eyelids stick together during sleep. On examining the eye, one or more pustules may be seen on or near the margin of the cornea, the conjunctiva surrounding them being somewhat congested; but with this exception, the eye appears perfectly healthy.

Treatment.
Dusting
with
calomel.

Treatment.—I know of no treatment so efficacious in this form of pustular conjunctivitis, as dusting over the vesicles and congested portion of the conjunctiva with calomel, once a day. The calomel may be most conveniently applied with a camel's-hair pencil, and the eyelids immediately closed and kept shut for a few minutes. This application causes the patient a little pain and momentary irritation, but it certainly cures the conjunctivitis with remarkable rapidity. In addition to the calomel, the edges of the lids should be smeared with the dilute oxide of mercury ointment (one part to three of cacao butter) every night before going to bed. Some surgeons recommend a weak solution of acetate of lead or zinc to be dropped into the eye two or three times a day. But independently of treatment, the tendency of the disease is to get well of itself in the course of a few days, unless the patient be in a low and weak state of health, when the pustules are apt to appear in succession, and cause him considerable inconvenience; nor will they disappear until the general health has been improved by suitable means.*

Ung. hyd.
ox.

Improve
general
health.

2. Corneal
form.

"Scrofulous keratitis,"

2. In the second class of cases of pustular conjunctivitis, or, as it has been styled, herpes of the cornea, in contradistinction to that of the conjunctiva, both eyes are usually affected; the disease is most commonly met with among children from six to twelve years of age. This affection is sometimes described as scrofulous keratitis.†

On examining the cornea, which may be a matter of difficulty, on account of the spasmodic closure of the lids and intolerance of light which attend the affection

* Lectures on Diseases of the Eye, by Mr. Critchett: *Lancet*, vol. i., 1854, p. 509.

† Dixon "On Diseases of the Eye," p. 95, 3rd edition.

—we shall notice several small white specks on its surface, consisting of vesicles or pustules precisely similar to those already described as occurring on the conjunctiva; they also run the same course, either their contents become absorbed, or the epithelium covering them bursts and gives exit to a little serous fluid. The pustules are confined, in great measure, to the superficial layers of the cornea, but the abraded surface sometimes takes a considerable time to heal, and is apt to degenerate into an unhealthy ulcer, which may involve the deeper layers.* There is a marked disposition for a succession of these pustules to form, sometimes for months together, rendering the complaint both a distressing one to the patient, and difficult to cure.

Pustules
on cornea.

May leave
ulcers.

In well-marked cases the cornea is hazy, spots of opacity, corresponding to the pustules, being scattered over its surface; vessels may also be seen meandering over it from the conjunctival border towards the pustules. Permanent vascularity of the cornea, however, is not a common consequence of this disease. The vessels of the conjunctiva, as a general rule, become uniformly, though not deeply congested; the subconjunctival tissue is also involved, and its characteristic pinkish zone, surrounding the circumference of the cornea, is often to be seen.

Cornea
hazy.

Conjunctival and
scleral con-
gestion.

The skin about the inner angles of the eyes is very apt to become excoriated, from the patient constantly pressing his hands against his eyelids to exclude the light, and from the perpetual flow of tears over the part. This excoriated state of the inner angle of the eye and lower lid often adds much to the patient's troubles; moreover, in many cases, the disease is associated with eczematous or herpetic sores about the nostrils, lips, or cheeks, and it may be with an enlargement of the glands of the neck.

Excoria-
tion and
sores of
face.

But perhaps the most characteristic feature of this form of the disease are the nervous phenomena which attend it—the intense intolerance of light, and spasm of the lids. There may be also considerable ciliary pain, but this is by no means a constant symptom. The photophobia and blepharospasm are intimately

Photo-
phobia and
blepharo-
spasm.

* "Maladies des Yeux," par M. Wecker, vol. i. p. 141.

Nature of
the nervous
pheno-
mena.

associated with each other, the former being referrible to hyperæsthesia of the retina or optic nerve, by which a painful sense of dazzling is produced by even a feeble light; and the latter to a morbid reflex action, excited by irritation of the ciliary nerves distributed to the cornea, of the optic nerve, or both, and reflected through the portio dura, which is the motor nerve of the orbicularis. There can be no doubt that the impression of light on the retina plays a most important part in exciting this spasm, for it is greatly lessened if the patient be removed into a dark room, and he may even succeed in opening his eyes; the relaxation, however, is by no means complete, and it therefore seems reasonable to infer that both the optic and fifth nerves co-operate in its production, just as in the familiar instance of sneezing, which though generally excited through the fifth nerve, may also in this affection of the cornea be determined by a dazzling light.

Physi-
ognomy
diagnostic.

It is generally possible to diagnose a case of this form of conjunctivitis, from the appearance and gesture of the patient, without even examining his eyes; he comes to us with his eyelids firmly closed, his head bent down, and a handkerchief or both hands pressed against his eyes, so as to exclude every particle of light from reaching the retina. If we attempt to force open the eyelids, a gush of tears escapes from them, and the eyeballs are involuntarily turned upwards, the patient making a desperate effort to close the lids, and sometimes sneezing violently.

The prominent features, therefore, of this form of conjunctivitis, are the hazy state of the cornea and the great intolerance of light from which the patient suffers; he may complain of slight pain in the eye, but this is by no means a constant symptom of the disease.

Evening
remissions.

This affection has generally a tendency to remissions towards evening. A patient who has probably remained during the greater part of the day hid away in the darkest corner of the house, and often with his face buried in a soft pillow, so as to exclude every ray of light from his eyes, suddenly brightens up towards evening, and is ready to play about with his companions.

Treatment.

Treatment.—Herpes of the cornea is usually a very

persistent and troublesome affection to cure. Our treatment must be mainly directed to the improvement of the patient's general health. Cod-liver oil and iodide of iron, together with nourishing food, cleanliness, and fresh air, are without doubt the class of remedial agents upon which most reliance can be placed. In place of giving iron, we may commence our treatment by administering a few grains of quinine combined with carbonate of soda twice a day; these drugs may be continued with advantage, together with iodide of iron. Arsenic is especially useful in cases where the disease is accompanied with eczema or other affections of the skin covering the patient's face; in instances of this description, to cure the disease of the skin is to cure the affection of the eyes. Arsenic is administered, I think, most advantageously in the form of the liquor arsenicalis, to be taken freely diluted in water, after food. The dose must, of course, vary with the age of the patient; but for an adult I generally order six minims, to be increased to ten, three times a day, until the affection of the skin and eyes begins to improve, or until the characteristic effects of the drug have manifested themselves in the patient.

Pure air,
good food,
cod-liver
oil.

Iron.
Quinia.

Arsenic.

Counter-irritation, by means of tincture of iodine painted over the skin of the lids every evening, or a succession of small blisters, or an issue opened in the skin of the temple, are useful adjuncts to the foregoing treatment.

Counter-
irritation.

I order a strong solution of atropine to be dropped into the eye twice a day; it relieves the intense photophobia, and has generally a very beneficial effect.

Atropine.

It sometimes happens that atropine irritates the eye, in which case the extract of belladonna, containing a grain of atropine to the half ounce, may be rubbed over the eyebrows twice a day. But the pupils must be widely dilated before we cease the application of this drug in or over the eye, and it is frequently necessary to keep up its action for ten or fifteen days. It generally happens that the patient experiences great relief after his pupils have become fully dilated by means of atropine or belladonna, used as above directed. As soon as the irritation has subsided, calomel should be dusted over the surface of the

Belladonna.

Calomel.