

Paper No. 7.

SPECIFIC OPHTHALMIA OF CATTLE.

By J. D. W. A. COLES, B.V.Sc. (S.A.) Veterinary Research Officer, Department of Agriculture, Union of South Africa.

IN this short paper it is intended to present only a very brief resumé of our knowledge. Perhaps it would be wiser to think also of ophthalmia in sheep and goats, for it appears probable that the disease in cattle is essentially the same as in these other animals. For the sake of convenience, the condition will be discussed under various headings.

History.—A few references will suffice to illustrate its world-wide distribution. Fleming (1871) in his "Animal Plaques" mentions that in 1781 the disease was rampant in cattle in Flanders, and in 1782-5 it was a source of great trouble at Bray in the Seine-Interieure, France.

Billings reported a very extensive outbreak in cattle in Nebraska in 1889, and Jones and Little, and others, have repeatedly drawn attention to the disease in North America since then.

In 1927 Murray-Jones described "pink-eye" in sheep in Western Australia, and Theiler in 1928 drew attention to the importance of ophthalmia to the stockbreeders throughout the continent.

According to Clater, sheep in England suffered severely in 1868 when cattle were also frequently affected. In England the shepherds said the sheep were "lark-spurred" i.e. had been struck in the eyes by larks rudely disturbed by the wandering animals.

Numerous investigators all over Europe have written on the prevalence of ophthalmia there in spring and summer. It is as yet unknown to what extent the disease occurs in Africa. From Northern Rhodesia to the Cape it is a thorn in the side of sheep and cattle breeders, and its presence in Kenya is no longer doubted. It is most likely that closer inspection will reveal its existence in the other African territories.

It has been reported in Palestine.

Epizootology.—The consensus of opinion favours the view that the disease is endemic, but at certain times it assumes the nature of an epizootic. Epizootics occur mainly in spring and summer, and as yet, no factors have been determined whereby we can prophesy the particular locality and severity of the disease.

It is our experience that age, sex, colour and breed are of no great importance, although, generally speaking, in the case of cattle calves are the worst sufferers.

It has been noted by Mitchell in the case of cattle in Natal, and by us in the case of sheep at Onderstepoort, that animals are prone to develop the disease when moved on to a new farm, although the other animals on the farm escape. It has been observed also that on one farm the calves may suffer most one year and the adult cattle the next.

Pathological-Anatomy.—This has been described by numerous workers, but apparently no one has as yet succeeded in obtaining material for a careful histological examination of the conjunctiva

and cornea in the very earliest stage of the disease. There is an acute catarrhal conjunctivitis associated with an acute keratitis. The conjunctiva and cornea are oedematous, superficial epithelium of the latter becomes desquamated in patches thereby admitting bacteria, and shallow ulcers form. Vascularization of the cornea sets in early and then granulations form in the ulcers. The granulations may be excessive and in such cases superficial necrosis of this tissue results. Finally the granulation tissue contracts, the blood vessels disappear and white corneal specks remain. These corneal opacities usually disappear in six months in cattle, and in a much shorter time in sheep.

Occasionally the corneal ulcer may be so deep that penetration occurs, followed by panophthalmia and phthisis bulbi. It appears that panophthalmia is more frequently met with on certain farms than on others.

Symptoms.—Whether there is anything akin to an incubation period will be discussed later. The disease is generally unilateral. When bilateral it may commence in both eyes simultaneously. Lachrymation, photophobia and oedema of the eyelids are first noticed. Subsequently all the other changes mentioned under pathological-anatomy may be observed, and frequently there is fever with its associated symptoms. The internal structures of the eyeball usually manifest changes due to extension of the inflammation.

It cannot be said that the disease is recurrent in cattle, sheep and goats, although an affected eye may later again develop lesions of an acute inflammation.

Immunity.—Probably no genuine immunity ever results from an attack of the disease.

Transmission.—It is generally agreed that there is no direct transmission from animal to animal, and in nature it is probable that indirect transmission also does not occur.

Prognosis.—As a rule it is very good. Unless the animal is subjected to irrational treatment or the secondary bacterial infection is of a particularly virulent nature, the disease runs a typical course, the acute stage lasting from one to three weeks. The corneal opacities, as already mentioned, persist for a few months, the time depending on the severity of the attack. Whether the powers of vision are always permanently impaired has never been definitely ascertained.

Treatment.—Drugs are of little avail unless treatment is undertaken in the earliest stages. The ordinary well known formulae for treating acute conjunctivitis and keratitis are employed. The farmers and natives of South Africa have a belief that medicinal agents promoting a local active hyperaemia are of value, and in veterinary practice this idea has found expression in the injection of Lugol's iodine into the supraorbital fat. It is now no longer doubted that this treatment not only does not assist the recovery of the animal, but causes great additional pain.

Barbarous customs which may be mentioned consist of firing a ring round the affected eye, or treating it with mixtures of salt and fine grit, salt and pulverized cuttlefish and strong formalin, etc.

Unless treatment can be undertaken properly, it is preferable to leave the animal alone for the power of nature is amazingly great.

Etiology and Pathogenesis.—The various theories will be discussed separately.

1. *Theory of rheumatic origin.*—It is practically impossible to say much about this. The etiology of all rheumatic conditions is still most imperfectly understood. No good argument in favour of this theory has ever been advanced, and we might ask ourselves if it is at all likely that rheumatism would manifest itself in such singular way. The theory must, however, stand until the etiology of ophthalmia is elucidated or until our knowledge of rheumatism is sufficiently far advanced to be able to rule it out.

2. *Deficiency theory.*—It is well known that keratomalacia in the human subject is a deficiency disease. However, ophthalmia occurs in animals under such diverse hygienic conditions and in the form of such widespread epizootics that all reasoning must be against this theory.

3. *Theory of bacterial origin.*—In this connection it may be mentioned that Marsalskij in Kasan claims that a member of the paracoliform group is the causal agent. Little and Jones in America make the same claim for a diplobacillus. Others again have accused other bacteria.

Sheppard and I have both occasionally found swabs to be sterile (by cultural methods and by the examination of smears prepared from them) which had been rubbed gently over the corneae and into the conjunctival sacs of affected eyes. We have on numerous occasions failed to find bacteria in the aqueous or vitreous humor or in the deeper tissues of diseased eyes. Bacteria of various types are, however, usually seen in sections in the superficial corneal erosions. The conclusion we have come to is that bacteria are merely secondary invaders of damaged tissue. The same remark holds good for any other visible micro-organisms.

4. *Ultraviolet virus theory.*—The injection of bacteria free filtrates of the macerated tissues of diseased eyes into the blood, subcutaneous tissue, eyelid, conjunctiva, cornea or anterior chamber of a normal animal is always followed by negative results. Unless the properties of the virus resemble those of the virus of influenza in the human being for example, we must disregard this theory.

5. *Sunlight theory.*—Sunlight cannot be the direct cause for the disease may occur as an epizootic at any time of the year. Animals constantly stabled may also become affected.

6. *Dust theory.*—This is also untenable. In South Africa the disease is worst when the amount of dust in the air is least. In Europe it is generally the other way about.

7. *Theory re foreign bodies e.g. husks of seeds.*—This theory cannot account for epizootics appearing only in certain years, and even the best hygienic measures will not prevent their occurrence.

8. *Theory re stinging, etc., of eyes by insects.*—This theory has never been studied in a proper scientific manner. The fact, however, that extensive outbreaks may occur when insect life is most dormant does not add to the attractiveness of the theory. It is, moreover, extremely seldom that a dead insect is found in the conjunctival sac and this militates against such an idea, especially when we consider also the amazing mobility of the eyelids.

9. *Thelazia and hodesii theory*.—*Thelazia* and *hodesii* is the only eye worm found in South Africa, and it occurs exclusively in the ox and buffalo. It plays no role, contrary to popular belief, for thousands of animals that do not harbour the parasite contract the disease and vice versa. Thus far it will be seen we have fairly conclusively eliminated all the theories except two—the rheumatic and the virus of the influenza type. These two cannot be studied at this juncture for very obvious reasons. We cannot now come to the last and most promising theory:

10. *The theory of protein sensitization*.—Keratitis anaphylactica is a well known condition in the human subject, and we have observed it in donkeys more than once during the process of hyperimmunization against *B. anthracis*. The study of allergy is one of the romances of modern medicine and since the demonstration of Walzer of whole food proteins in the normal blood stream is likely to assume tremendous importance. It is already well known that food allergy alone accounts for many cases of migraine, eczema, bronchial asthma, intestinal obstruction, idiopathic epilepsy, angioneurotic oedema of the urogenital tract, hypotension, irregular and painful menstruation, sinus congestion, asthenia, diarrhoea, constipation and nausea, etc.—a truly formidable list.

As yet, however, nothing has been done to study systematically the allergic reactions in the domestic animals, but it is fervently hoped that such work will be undertaken here in the immediate future.

It is conceivable that in ophthalmia we have first a sensitization of the cornea and perhaps also of the conjunctiva. The subsequent absorption of the sensitizing protein would presumably, by analogy, lead to an oedematous condition of these structures. As a result of this oedema the superficial epithelial cells of the cornea would become desquamated, thereby paving the way for secondary bacterial infection. The picture would now be one of an acute case of ophthalmia.

Such a theory would preclude the possibility of a so-called incubation period. Instead of this there would be an indefinite sensitizing period.

Paper No. 8.

A HYPOTHESIS CONCERNING THE ETIOLOGY OF
“STIFF-SICKNESS.”

By Dr. C. SHEPPARD CRUZ, Veterinary Officer, Department of
Agriculture, Mozambique.

THE author of this essay has had the opportunity, in the course of the last year, to come in contact with two forms of “stiff-sickness” in an acute stage, and to observe their known symptomatology, under favourable conditions. The report of these cases was made in such a manner as to place us from the outset on the right track. Subsequent observations on these animals—in kraals on the left margin of the Incomati River (Pacuane), and in other kraals on the left margin of the Limpopo River (Moambe)—confirmed the diagnosis.

If there are, as we believe, two diseases, both bearing the name of “stiff-sickness,” the cases which we observed must be attributed to