

A Rickettsia-like Organism and an Unknown Intracellular Organism of the Conjunctival Epithelium of Goats.

By J. D. W. A. COLES, B.V.Sc., Veterinary Research Officer,
Onderstepoort.

IN a paper by the author (1931) appeared a description of a Rickettsia-like organism found in the epithelial cells of the conjunctiva of sheep suffering from infectious conjunctivitis, commonly known as ophthalmia. The name *Rickettsia conjunctivae* was suggested for it. In another paper (1931) was described an unknown intracellular organism of the conjunctival epithelium of sheep. This second organism was thought to be unassociated with disease.

In a letter to "The Veterinary Record" (1933) the writer mentioned that a Rickettsia-like organism had been found by him in the conjunctival epithelial cells of calves suffering from specific ophthalmia. The presence in some cattle of an apparently harmless organism resembling in all respects the unknown intracellular organism of the conjunctival epithelium of sheep was also noted.

The purpose of this article is to describe a Rickettsia-like organism associated with specific ophthalmia of goats; and an unknown intracellular organism, similar in every way to those found previously in sheep and cattle, associated with nothing worse than an extremely mild conjunctival catarrh of the goat.

While investigating specific ophthalmia of cattle at Immerpan in the Northern Transvaal in January, 1934, the author came in contact with a flock of about five hundred Swiss goats. They were running on lime-stone veld of a semi-bushy nature. About ten per cent. of the goats had lesions suggesting they were just recovering from acute conjunctivitis and keratitis. In one fairly recent case the Rickettsia-like organism was found, in another case there was a mixed infection of this and the unknown intracellular organism, and in about ten other cases the unknown organism alone was present.

In April, 1934, there was an outbreak of specific ophthalmia of Swiss and nondescript goats at Onderstepoort. In all new cases of the disease a Rickettsia-like organism was found invading the conjunctival epithelium.

DESCRIPTION OF THE RICKETTSIA-LIKE ORGANISM.

Situation.—So far only intracellular forms have been seen. They lie in the conjunctival epithelial cytoplasm. Free-lying forms may be seen occurring singly, or in small groups of up to ten, but these are due to the breaking down of infected cells during the preparation of the smear.

Morphology.—Pleomorphism is marked. The following types occur:—

- (1) Solid forms approximately $\cdot 5\mu$ in diameter.
- (2) Ring forms with a fairly clear centre and sometimes showing a distinct halo (chromophobic cytoplasm?). The ring is $\cdot 8\mu$ to $1\cdot 4\mu$ in diameter and the halo is $\cdot 5\mu$ wide.
- (3) Imperfect rings. The chromatoid material extends about three-quarters of the way round the circle. The centre is clear and a halo can usually be seen. These rings are $\cdot 8\mu$ to $1\cdot 6\mu$ in diameter.
- (4) Triangles. The chromatoid material usually extends along two sides, and at all three points it is common to see a little bulging of this material. The centre is clear, and there is usually a halo. These triangular forms are about $\cdot 8\mu$ to 1μ along each side.
- (5) Bipolars. These are 1μ to 2μ in length, the smaller being the more numerous. The breadth is $\cdot 4\mu$ to $\cdot 6\mu$. The chromatoid material is prominent at the ends, and very thin along the sides. The centre is clear. Halos are often seen.

The forms with clear centres are more common than the smaller solid forms, and their outlines are sharper.

Arrangement.—It is common to find the whole conjunctival epithelial cell packed with the parasites. In some cases the organisms are present in small clumps, one to three or four in number. These clumps do not hug the nucleus. At times the parasites are rather diffusely scattered throughout the cytoplasm. It is remarkable in how many cells all the portions of chromatoid material are just about 1μ from each other. The clear intervening spaces forming a network are occupied by the halos.

Up to 80 per cent. of the conjunctival epithelial cells may be affected.

Staining.—Most of the observations have been made on smears air-dried and then fixed by immersion in absolute alcohol for one minute. The smears were stained with Grüber's Giemsa (1 drop per 1 c.c. aq. dist. for 1 hour). Giemsa is perhaps the best stain. The smaller solid forms tend to stain reddish, and the larger forms tend towards a bluish colour. The chromatoid material in the bigger forms is a reddish-blue.

The organisms are Gram negative and not acid-fast. Fuchsin, eosin, Loeffler's methylene-blue and carbol-thionine blue all stain the parasites, but not as intensely as ordinary bacteria.

Detection.—In properly-prepared smears stained with Grüber's Giemsa this is easy. The smears are best made from early cases of specific ophthalmia. An increased number of neutrophiles will almost invariably be found in the smears. Occasionally the organisms are present in clinically normal eyes, but here too the neutrophiles tend to be more frequent.

Effect on Tissues.—It is possible for the cells to be damaged during the preparation of the smear. Notwithstanding this, however, it seems definite that degeneration of the invaded cell does occur, with subsequent rupture. The infected cells are not appreciably swollen.

Multiplication.—The bulging dense specks of chromatoid material observed especially in the triangular forms suggest a budding process. No definite opinions, however, may be given.

Transmission in Nature.—The vector is unknown.

Association with Disease.—It cannot be stated definitely yet that this Rickettsia-like organism is the cause of disease, but it certainly is associated very closely with specific ophthalmia of the goat.

Description of the Unknown Intracellular Organism of the Conjunctival Epithelium of the Goat.—In respect of morphology, tinctorial characteristics, locality and arrangement this organism is indistinguishable from the one already described in sheep.

Association with Disease.—There is clinical evidence to suggest it may be associated with an extremely mild form of conjunctival catarrh.

SUMMARY.

(1) A Rickettsia-like organism of the conjunctival epithelium of the goat has been described. It is associated with specific or infectious ophthalmia of goats in South Africa.

(2) An unknown intracellular organism of the conjunctival epithelium of the goat in South Africa has been described. It may be associated with a very mild form of conjunctival catarrh.

Until more is known of the vectors of the Rickettsia-like organisms associated with the specific ophthalmias of the sheep, ox, and goat, and of the unknown intracellular organisms found in the conjunctival epithelium of these three species, it appears to be unwise to assign names in addition to *Rickettsia conjunctivae*, the name already given to the Rickettsia-like organism of the conjunctival epithelium of sheep.

REFERENCES.

- COLES, J. D. W. A. (1931). A Rickettsia-like Organism in the Conjunctiva of Sheep. *17th Report of the Director of Veterinary Services and Animal Industry, Union of South Africa*, pp. 175-186.

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- COLES, J. D. W. A. (1931). An Unknown Intracellular Organism of the Conjunctival Epithelium of Sheep. Preliminary Report. *17th Report of the Director of Veterinary Services and Animal Industry, Union of South Africa*, pp. 187-189.
- COLES, J. D. W. A. (1933). Contagious Irido-Cyclitis in Sheep. *The Veterinary Record*, Vol. 45, No. 2329, pp. 165-166 and plates.

DESCRIPTION OF PHOTOMICROGRAPHS.

1. 1400× Rickettsia-like organisms in a conjunctival epithelial cell of a goat suffering from specific ophthalmia. Note the distinct halos.
2. 1400× Rickettsia-like organisms in a conjunctival epithelial cell of a goat suffering from specific ophthalmia. Note the distinct halos.
3. 1400× Rickettsia-like organisms in a conjunctival epithelial cell of a goat suffering from specific ophthalmia. Note the distinct halos.
4. 1400× Rickettsia-like organisms in a conjunctival epithelial cell of a goat suffering from specific ophthalmia. Note the distinct halos.
5. 1400× Unknown intracellular organisms in the conjunctival epithelium of a goat. A few diplococci are much darker than the unknown organisms.
6. 1400× A conjunctival epithelial cell of a goat invaded by unknown intracellular organisms.

The author is indebted to Mr. T. Meyer for the photomicrographs.



Fig. 1.

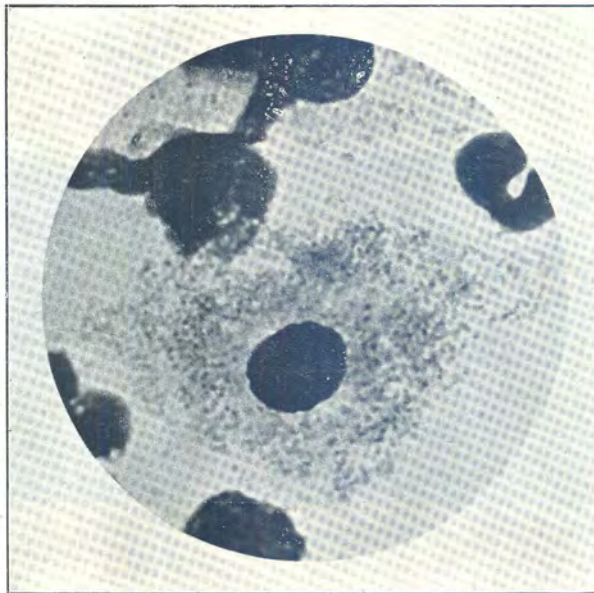


Fig. 2.

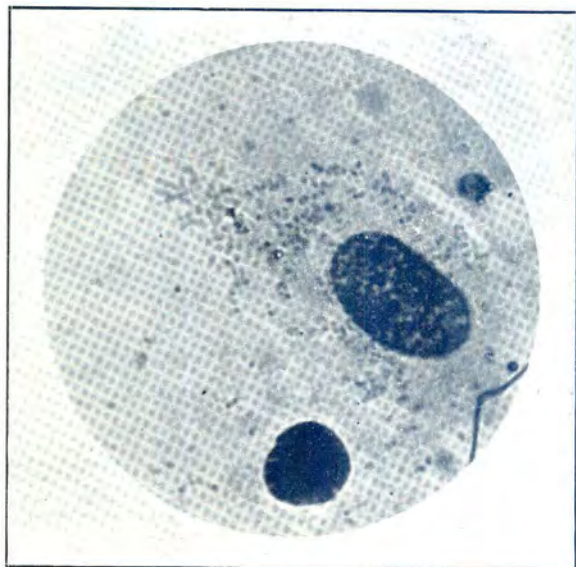


Fig. 3.

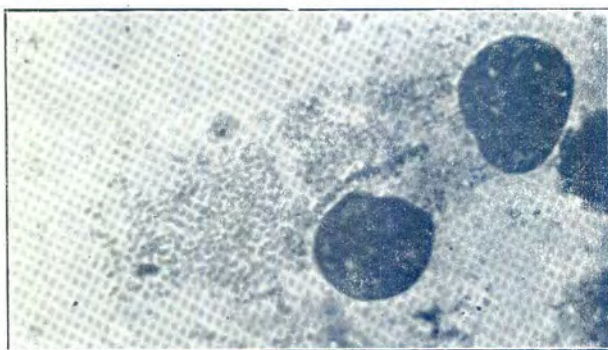


Fig. 4.

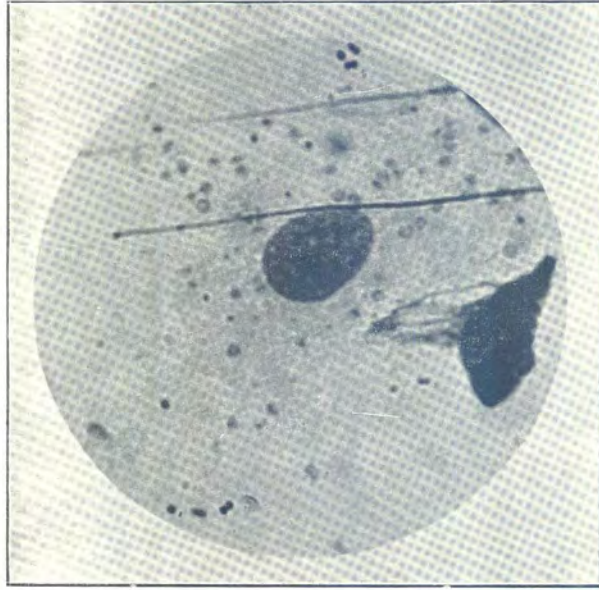


Fig. 5.

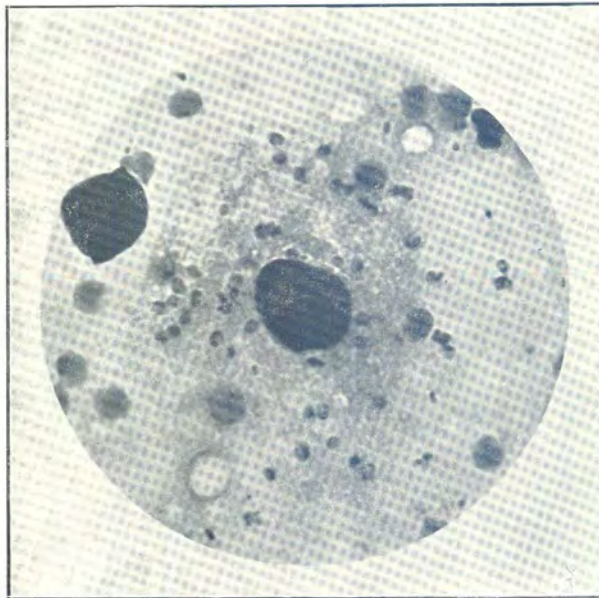


Fig. 6.