

# Clinical and histopathological study of the eye in canine leishmaniasis

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A complete clinical ophtalmologic examination of 41 leishmaniasis naturally infected dogs was made. Twenty three dogs were euthanzied and both eyes were enucleated and processed for histopathological study. Clinically, 80.49% of the dogs displayed various ocular signs of leishmaniasis. Apart from the vitreous humor, one or more of the ocular structures were involved, the conjunctiva and the eyelids being the areas most frequently affected. Histopathologically, the eyes were affected in virtually all cases (96.65%). The typical finding was a lympho-histio-plasmacytic infiltrate, most accentuated in the conjunctiva, corneoscleral limbus and eyelids. This study shows a high clinical ocular involvement in canine leishmaniasis with the important feature that ocular lesions could be the only ones present in the course of the disease.

## Introduction

Canine leishmaniasis is endemic in the Mediterranean basin, and cases have also been diagnosed beyond the region. The zoonosis manifests itself in a variety of ways, including ocular lesions which in our experience might constitute the first clinical sign. The main characteristics of these ocular lesions, previously reported in dogs, include their high incidence (1,2), a predisposition for the anterior segment of the eye (3) and their persistence, often despite specific treatment.

## Material and methods

A total of 41 naturally infected dogs (28 males and 13 females, aged 2 to 8 years) of different breeds were used for this study. Leishmaniasis was diagnosed in all cases by direct observation of *Leishmania spp.* in lymph node aspirates.

Following a full clinical examination of the animals to ascertain their general state of health, eyes were subjected to a detailed ophtalmological examination. 23 dogs were euthanzied and necropsied. Both eyes were enucleated and fixed in 10% formalin; serial sections of the third eyelid, cornea, sclerocorneal limbus, the basal area of the ciliary body and the iris were taken for histopathological analysis. Samples were embedded in paraffin, routinely processed and stained with hematoxylineosin, toluidine blue and P.A.S. In each case, only the most significant lesion was considered.

## Results

Clinical analysis failed to reveal ocular damage in 19.51% of the examined animals. In the rest of animals (80.49%) only one eye was affected in 12.12% of cases, both eyes were affected in other 12.12% of dogs, with lesions of different nature in each eye. In the remaining 75.76%, both eyes exhibited identical lesions.

Where only one segment of the eye was involved, it was most commonly the anterior (70.97%) rather than the posterior segment (6.45%) while in the remaining 22.58% of cases, both segments were affected.

With respect to the different ocular structures, the conjunctiva was the most frequently affected (75.62%), followed by the cornea (35.69%), eyelids (34.25%), ocular fundus (19.52%), anterior uvea (14.64%) and finally the lens (7.32%). Table 1 summarizes, by structures, the nature of the lesions and its incidence. The results of the clinical study show that none of the ocular lesions recorded were leishmaniasis-specific.

Histopathological findings are summarized in Table 2. The sole criterium used in assessing lesions was the intensity of the granulomatous inflammatory reaction in the different areas analysed, as scored on a four-level scale ranging from absence of infiltrate (-) to the highly marked evidence of inflammatory cells (+++). A high percentage (96.65%) of the eyes examined showed a consistent lesion of differing intensity characterised by lympho-histio-plasmocyte infiltrate with or without leishmaniads. In all the cases where ciliary bodies and

iris were affected, the same histopathological changes were evident at the third eyelid and/or sclerocorneal limbus in the same or a higher degree.

Table 1.  
Frequency of ocular lesions in dogs with leishmaniasis

Ocular lesions	%
Blepharitis	24.39
Blepharoconjunctivitis	9.76
Conjunctivitis	34.15
Keratoconjunctivitis sicca	26.83
Mucopurulent keratoconjunctivitis	4.88
Keratitis	4.88
Anterior uveitis	14.64
Cataracts	7.32
Chrorioretinitis	9.76
Retinal detachment	2.44
Retinal atrophy	4.88
Optic nerve atrophy	2.44

Table 2.  
Ocular histopathological findings in dogs with leishmaniasis

No of Dog	A	B	C	D	E
1	—	—	—	NS	NS
2	+++	NS	NS	NS	NS
3	NS	—	++	—	—
4	*	+++	—	++	—
5	*	+++	—	++	—
6		+	—	—	—
7		++	++	++	++
8	*	+++	+++	+++	—
9		+	—	+	—
10		++	NS	++	++
11		++++	++	++	++
12		++	—	+++	++
13	*	+++	+	+++	+++
14		++	+	+	—
15	*	+++	NS	+++	—
16		++	—	++	+
17		+++	+	+	—
18		++	—	+	—
19		+++	+	NS	—
20		+	—	+	—
21		++	—	++	+
22		+	—	+	—
23		+++	++	+	+

(A) Third eyelid; (B) Cornea; (C) Sclerocorneal limbus; (D) Basal area of ciliary body; (E) Iris. (NS) not studied. (\*) Parasitized macrophages; (-) Negative: absence of lympho-histio-plasmocyte infiltrate; (+) Slight: Small amounts of inflammatory lympho-histio-plasmocyte cells; (++) Moderate: Marked evidence of inflammatory lympho-histio-plasmocyte cells, with or without Leishmaniaparasites; (+++) Abundant: Highly marked evidence of inflammatory lympho-histio-plasmocyte cells, with or without leishmaniaparasites.

## Discussion

The high rate of ocular lesions observed in this study has also been reported by other authors (3). The incidence of dogs with some ocular signs (80.49%) is higher than that reported by Slappendel (2) (42.10%). This difference may be due to the fact that the leishmaniasis studies cited were not directly concerned with the ophthalmological manifestations of the disease.

The greater incidence of bilateral rather than unilateral involvement might be due to the systemic character of leishmaniasis. It must be pointed out that although the parasite may initially affect only one eye, the generalised nature of the disease may lead to bilateral involvement in the more advanced stages.

The results obtained show that the anterior segment is more frequently affected than the posterior one. Similar finding has been reported previously (2,4). As Roze (4) has suggested, exclusive involvement of the posterior segment is rare. Nevertheless, examination of deeper structures of the eye is at times hindered by the reduced transparency of more superficial structures. Some dogs may have had a posterior segment involvement that escaped detection in the ophthalmoscopic examination. Although the uvea has been reported to be the most frequently-affected structure (3), in this study the conjunctiva was most commonly affected (75.62% of cases) and involvement of the anterior and posterior uvea was recorded in only 24.4% of cases studied.

With regard to the three forms of blepharitis detected, the mild form described by other authors (5,6) was rarely found. Erosive blepharitis, reported in the literature (6,7), was much more common in this study (Figure 1). Nodular or granulomatous blepharitis has also been described elsewhere, specially in Boxers (5,8). Here, it was detected in an english Setter while three Boxers examined showed no similar lesion.

Conjunctivitis seems to be the most common eye disorder in dogs (2,4). Chemosis reported by Boldy and Clerc (6) and Puchol and Gonzalez (3) was found in one case and

unlike the cases described by Roze (4), it was discrete and unilateral. For this reason, it is felt that in endemic areas like ours, chemosis should not be considered more indicative of leishmaniasis than any other sign. Granulomas, reported by other authors (9), were detected in two cases which may correspond to the granulomatous lympho-histio-plasmocyte infiltrates reported by Roze (9,10) as typical of leishmaniasis, since large granulomas are observable at gross examination (Figure 2). However, in our opinion they do not constitute a pathognomonic sign. They are, in fact, similar in appearance to other conjunctival granulomas and to the limbic pseudotumour described by Walde et al (11), differentiated only by histopathological methods.

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Fig. 3. Keratoconjunctivitis sicca. Severe infiltration of the cornea with granulation tissue (pannus). Superficial ulcerate areas show a distinctive fluorescein staining.



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Fig. 2. Several small depigmented nodules along the margin of the third and lower eyelids (arrows).

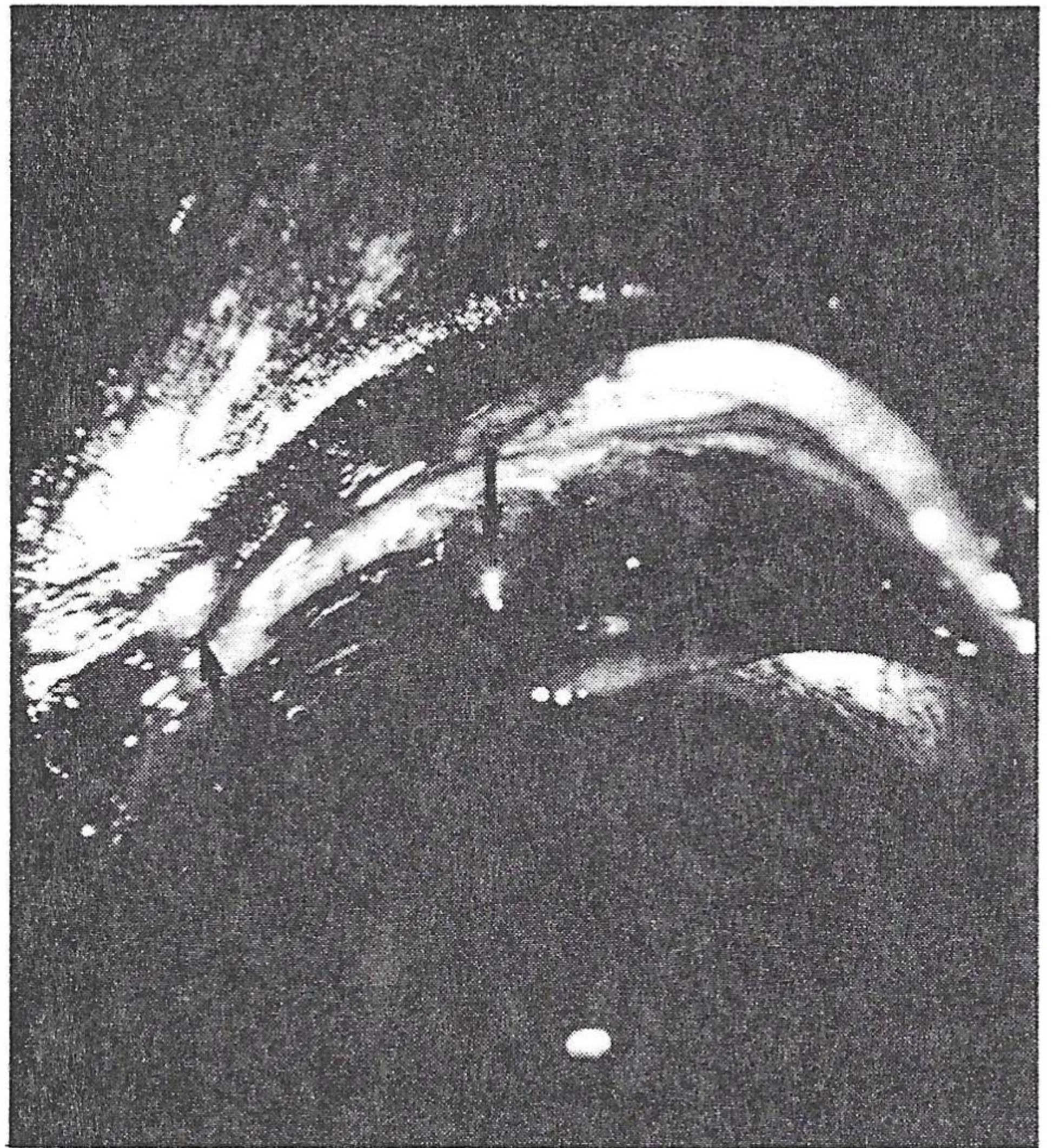
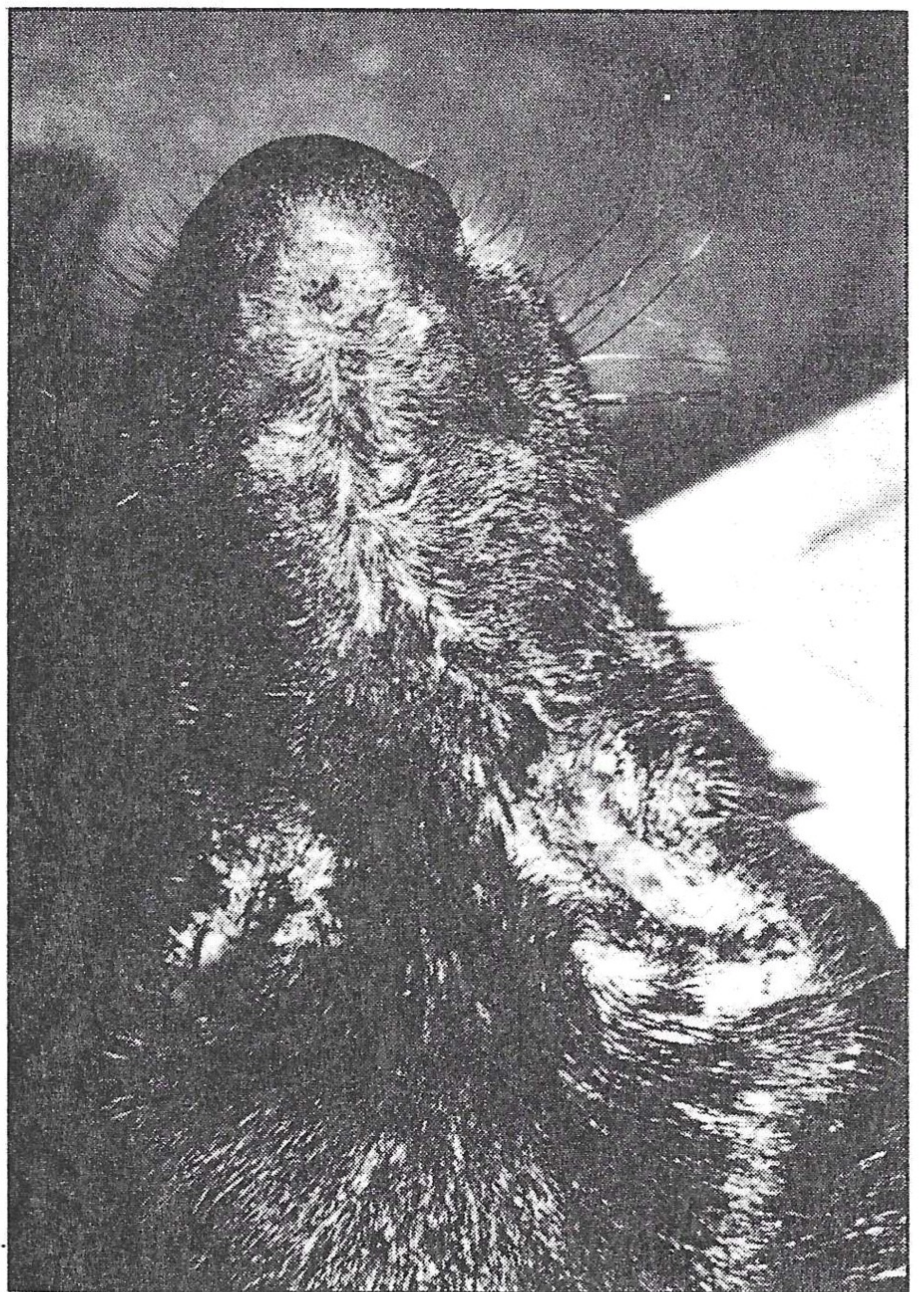


Fig. 1. Severe bilateral erosive blepharitis with secondary bacterial overinfection and mucopurulent discharge.



occurred alone. Corneal ulceration was rare, except in chronic cases of keratoconjunctivitis sicca.

In contrast with Roze (10) and Puchol and Gonzalez (3), we observed neither cases of glaucoma nor modifications in the deepness of the anterior chamber. However, we do agree with Roze (10) in the low incidence of hipopion and hiphema in canine leishmaniasis.

Granulomatous uveitis of the type described by some authors (3,4) was not detected here. All cases of uveitis were non-granulomatous, as others authors have reported (10,12).

Cataracts have been found in animals with leishmaniasis (1,4). Although no direct causal relationship can be established, it is reasonable to assume that the lens may be affected by disorders of the aqueous humour on which its metabolism depends, or as a side-effect of uveitis, which facilitates the deposition of pigment on the lens capsule, giving rise to opacity.

Unlike McConnell et al (1) and Roze (4), we observed no modification of the vitreous. Even so, it is felt that the vitreous is as susceptible to lesion as any other ocular structure. However, since the posterior segment is, in general, less affected, involvement of the vitreous is likely to be less common.

Involvement of the fundus is less frequent but of a highly varied nature. Chorioretinitis (Figure 4) was



Fig. 4. Ocular fundus. Multiple well-demarcated foci of retinochoroiditis in the tapetal area (arrows).



Fig. 5. Retinal haemorrhage dorsal to the optic disc. A less demarcated haemorrhage is present in the peripapillary area.

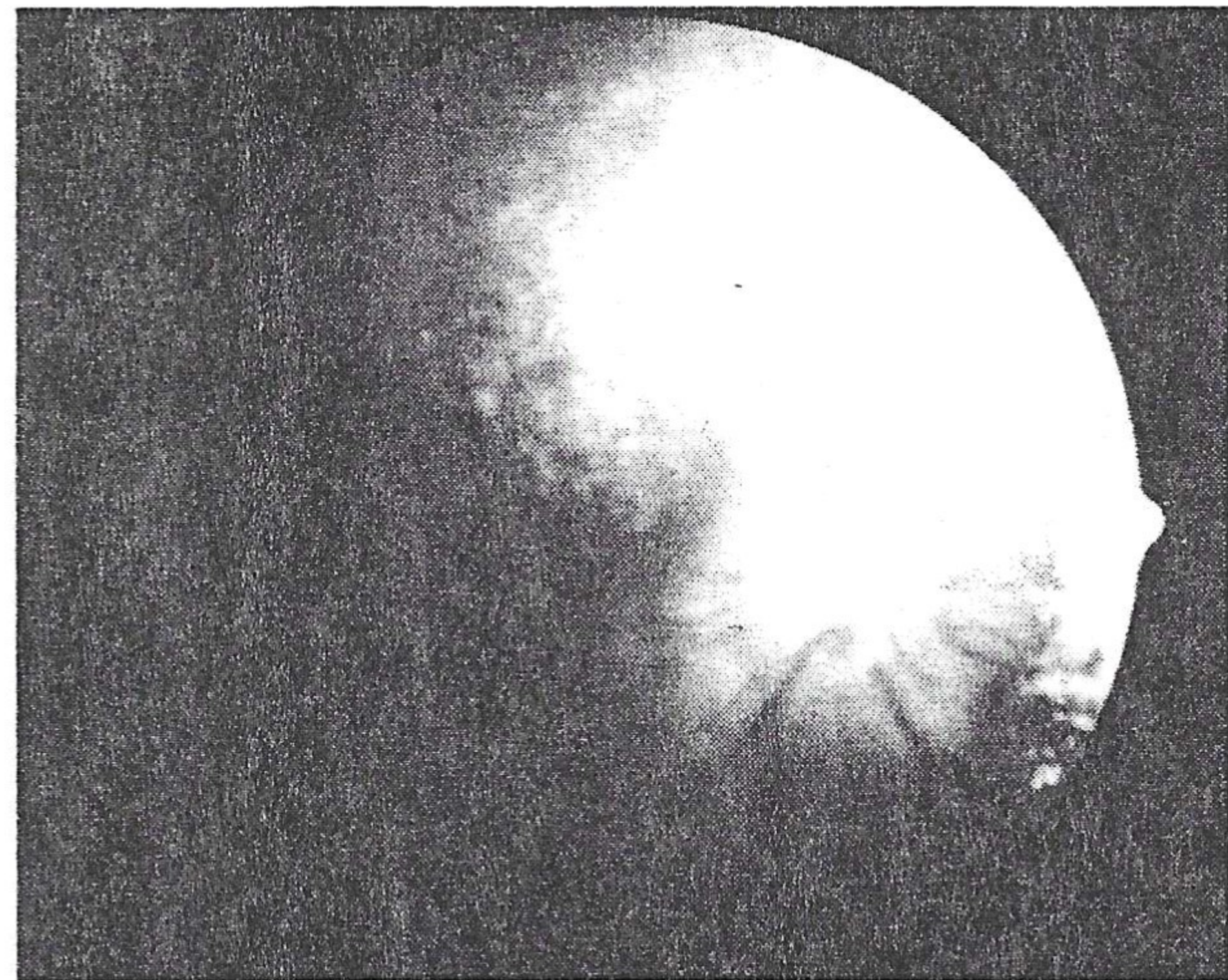
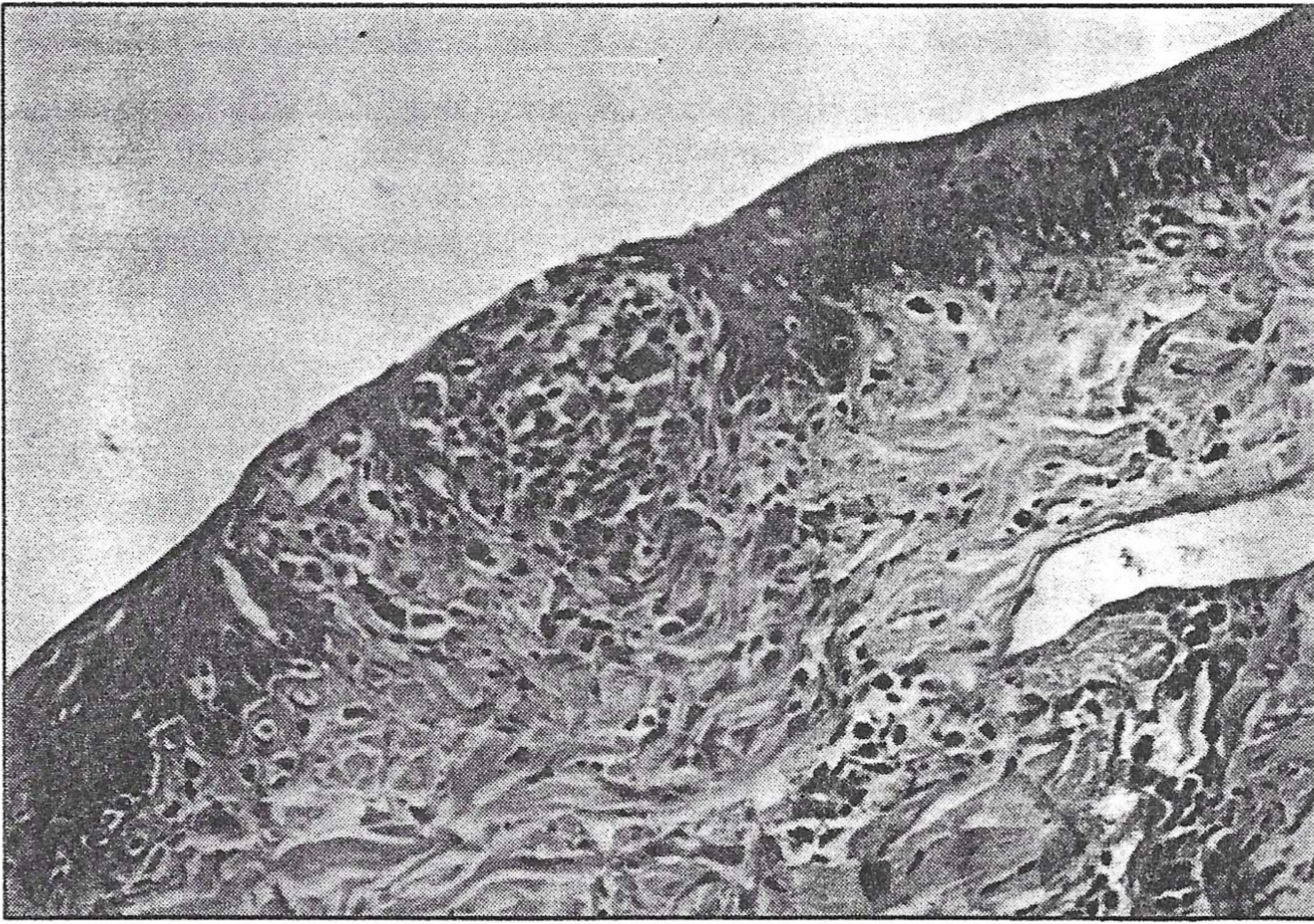


Fig. 6. Advanced retinal atrophy. Note the hyperreflective tapetum and thinning of retinal vasculature.

more frequent in our study than previously reported (4,6). In fact only one case of retinal haemorrhage was recorded in the present study (Figure 5). Roze(4) reports vasodilation mostly affecting the veins of the fundus as a constant finding in leishmaniasis. Similar lesion was not found in our study. Other lesions such as retinal detachment and retinal atrophy (Figure 6), can be found sporadically.

Histopathological analysis revealed that 96.65% of the animals examined were affected. This figure is higher than that obtained by clinical examination (80.49%), which suggests that some lesions, classed as mild (+), may pass unnoticed in clinical examination. It is worth



*Fig. 7. Third eyelid. Small granulomatous infiltrate of macrophages and plasma cells. Adjacent epithelium appears atrophic and with degenerative changes. HE x 400.*

nothing that only the anterior ocular segment was subjected to this type of analysis, whereas clinical examination involved the whole eyeball.

The lesions observed agree broadly with those reported previously (13,14) showing constantly lympho-histioplasmocyte infiltrate. The presence of the parasite is not a constant feature, detected in our study in only five cases.

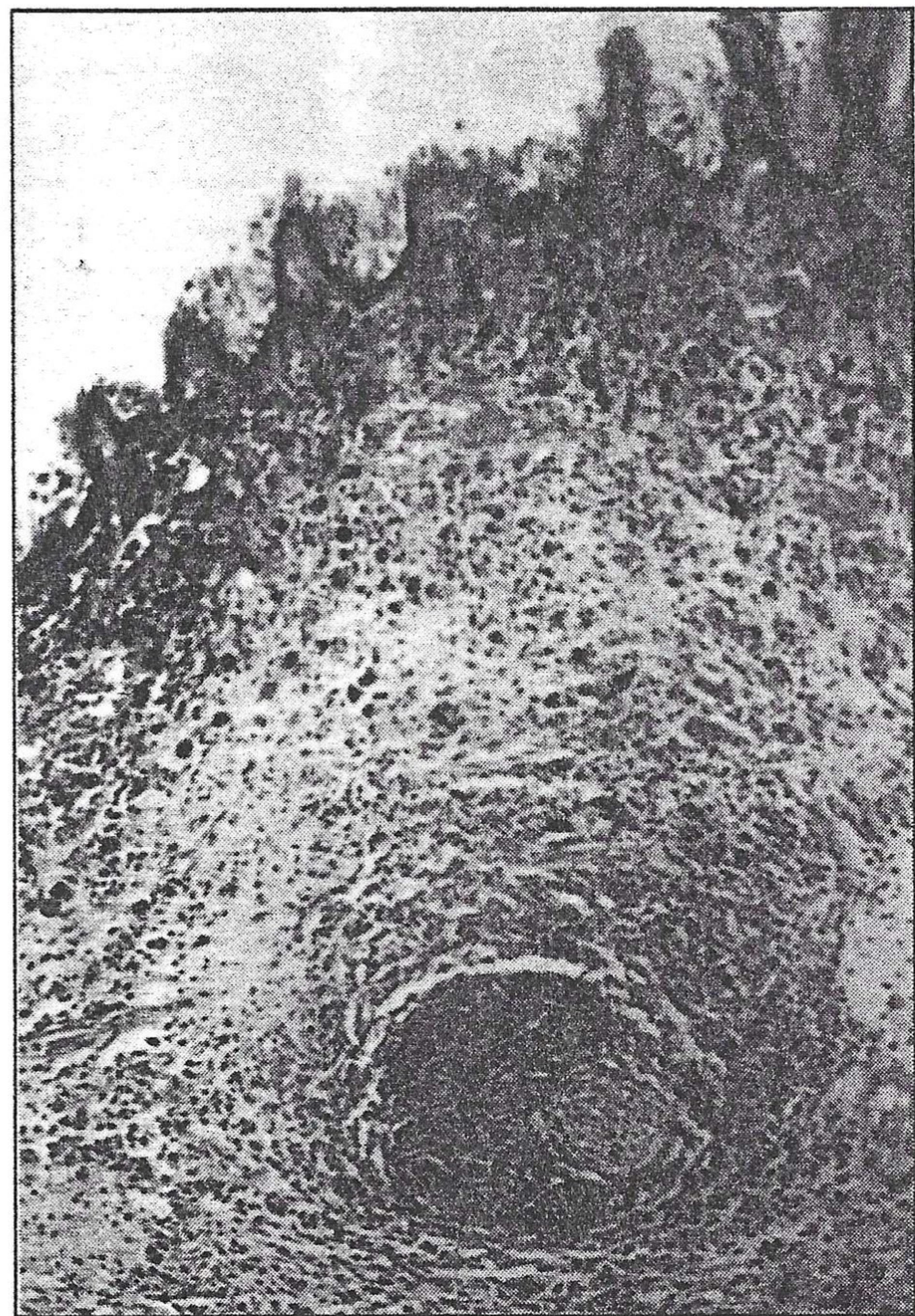
The nature of the infiltrate, and in particular the large number of plasma cells containing Russell bodies, are suggestive of an active participation of the immune response, also manifested by the high plasma and tissue immunoglobulin concentrations observed in leishmaniasis (15).

Among the ocular structures studied, the conjunctiva of the third eyelid was the most affected, thus confirming the results of the clinical examination. In cases where granulomatous conjunctivitis is most marked (Figure 7), these superficial nodules may correspond to what Roze (9) terms 'leishmaniomas'.

The three types of keratitis described by Gallego and others (14) were observed in this study. The superficial form was more common than either the parenchymatous or deep forms. Cases with cell infiltrate in the ciliary body (Figure 8) and the iris were accompanied by lesions to the third eyelid and sclerocorneal limbus, suggesting that these lesions may appear earlier, although this can only be confirmed by a thorough and more systematic histopathological study.

The large proportion of animals affected, coupled with the possible involvement of any ocular structure, suggests

that in endemic areas leishmaniasis should be included in the differential diagnosis of most eye disorders, and particularly those of the anterior ocular segment.



*Fig. 8. Ciliary body. Marked diffuse lympho-histioplasmacytic infiltrate around a lymph node. HE X 200.*

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