

**ZOONOTIC PARASITE INFECTIONS  
OF THE ARABIAN SACRED BABOON  
*PAPIO HAMADRYAS ARABICUS* THOMAS  
IN ASIR PROVINCE, SAUDI ARABIA**

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**SUMMARY.** Evidence of zoonotic parasite infection was recorded in the faeces of the Arabian Sacred Baboon in human populated residential and non-residential areas in Asir, Southwestern Saudi Arabia. Cysts of *Giardia intestinalis* and *Entamoeba histolytica*, and ova of *Hymenolepis nana*, *Enterobius vermicularis*, *Ascaris* sp., *Trichuris* sp., and a hookworm were encountered in 45 (about 39 %) of 115 faecal samples examined. A higher rate of infection was observed in the residential areas. Most of the parasites recovered in the baboons were also found to infect humans in these areas.

Since this primate has previously been reported to be of zoonotic potential, it is suggested that serious measures should be brought into effect to prevent human-baboon contact in the areas investigated.

*Key-words:* Saudi Arabia. Baboon. Intestinal parasites.

**Parasitoses intestinales de *Papio hamadryas arabicus* Thomas dans la province d'Asir (Arabie Saoudite).**

**RÉSUMÉ.** L'examen de 115 échantillons de selles du babouin *Papio hamadryas arabicus* récoltés dans les zones résidentielles et non résidentielles de la Province d'Asir, située au Sud-Ouest de l'Arabie Saoudite a révélé l'infestation de ces singes par divers parasites intestinaux. Des kystes de *Giardia intestinalis* et d'*Entamoeba histolytica* ainsi que des œufs d'*Hymenolepis nana*, *Enterobius vermicularis*, *Ascaris* sp., *Trichuris* sp. et d'un Ankylostome ont été trouvés dans 45 échantillons sur 115 (soit 39 %). C'est dans les zones résidentielles que les taux d'infestation tant chez les singes que chez l'homme sont les plus élevés. Le babouin doit être considéré comme une source de contamination pour l'homme et il serait nécessaire de réduire les contacts entre les populations de singe et la population humaine.

*Mots-clés :* Parasitoses intestinales. Babouin. Arabie Saoudite.

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## Introduction

Studies on zoonosis have attracted relatively little attention in the Kingdom of Saudi Arabia. Most investigations have been concerned with diseases and infections communicable between food-producing animals and man (Al-Issa *et al.*, 1985 and Farah, 1985). *Echinococcus granulosus* (Batsch) was reported from stray dogs in Eastern Saudi Arabia (Kawasmeh and Cheema, 1985). Hydatidosis was reported in 42 patients in Central Saudi Arabia (Noah *et al.*, 1986).

The Arabian Sacred Baboon, the only nonhuman primate in Saudi Arabia, is of zoonotic potential. It was first suspected to be a reservoir host for human schistosomiasis (Kummer *et al.*, 1980) and was later reported to be so for *Schistosoma mansoni* Sambon (Ghandour *et al.*, 1986).

The present study was prompted by the increasing populations of this baboon around residential areas in the City of Abha and nearby villages, where it has been fed by the people as part of their recreational activities.

## Material and methods

The study was carried out in seven locations in and around Abha (*Fig. 1*). Four of these locations (sites 1-4) were in the Asir highlands, 2,000-2,500 m above sea level. The other 3 locations (sites 5-7) were in the lowlands, 400-600 m above sea level.

A total of 115 fresh baboon faecal samples collected from the seven study sites were examined for intestinal parasites. To ascertain that the samples belonged to different baboons, each site was visited five times by the author and his four field assistants. The animals were observed closely during the first four visits, and each member of the field team spotted specific animals that had marks or injuries on certain parts of their bodies in order to identify them. Faecal samples of the identified animals were collected in the fifth visit. A portion of each sample was transferred into a 5 ml tube and was immediately transported to the laboratory for examination. The samples came from 27 adult males, 45 adult females, 18 young males, and 25 young females.

Cysts and ova were concentrated using the formalin-ether technique (Garcia and Ash, 1979). Ten slide preparations were made from each sample, and each preparation microscopically examined. When parasite ova or cysts were encountered, they were recorded, and, with the exception of ova of *Enterovius vermicularis* (L.) and an unidentified hookworm (see results), 20 cysts/ova were measured. Human volunteers from the residential areas made 61 stool samples available for examination.

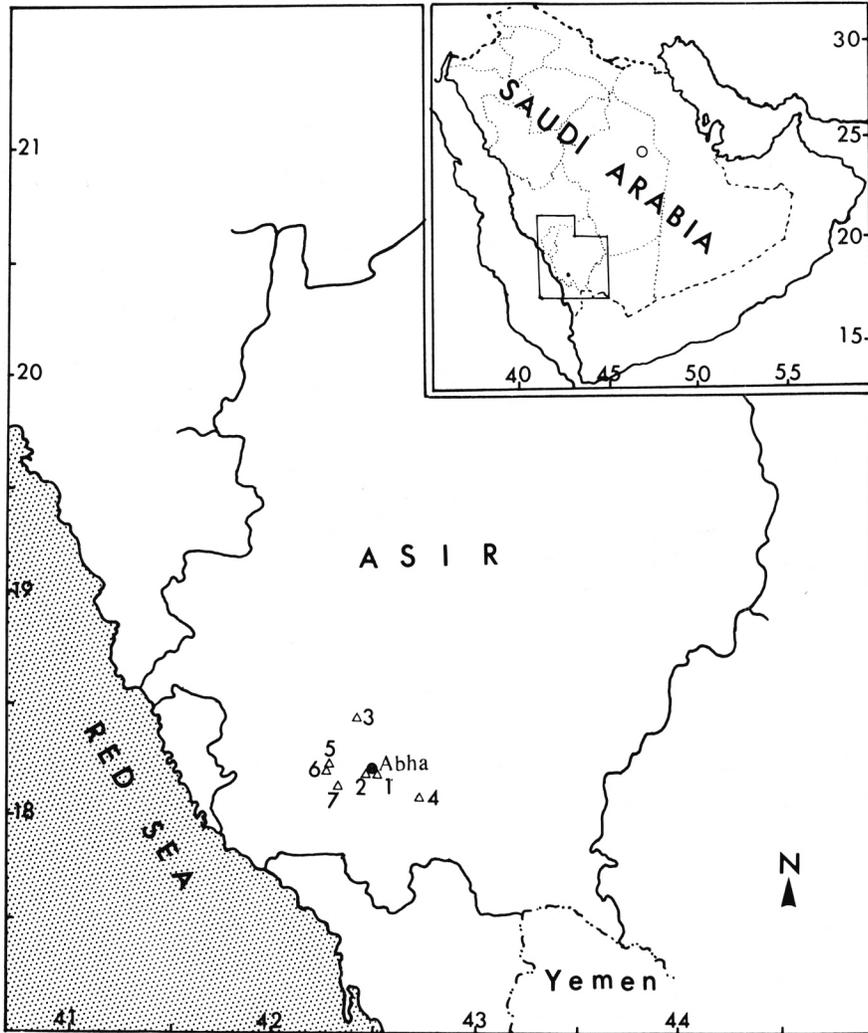


FIG. 1. — Study sites  $\Delta$  around Abha  $\bullet$ .

1: Hai Al-Dhabab, 2: Jabal Nahran Road, 3: 3 km, W. Shaar, 4: 2 km N. Al-Masgi, 5- Al-Shabain, 6: Al-Bateela, 7: Hiswa.

## Results

The overall prevalence of the parasites recovered is summarized in *Table I*. Positive infections with these parasites were observed in all baboon age and sex groups, but there were slight variations in susceptibility to infection. A total of 23 (51.1 %) adult females, ten (40 %) young females, nine (33.3 %) adult males, and seven (38.9 %) young males exhibited evidence of infection.

TABLE I. — Prevalence of intestinal parasites in the Arabian sacred baboon from seven localities in Abha City and vicinity.

Parasites	Locality (n)							Total (115)
	Hai Al-Dhabab (22)*	Jabal Nahran (13)**	West Shaar (13)**	North Al-Masgi (16)**	Al-Shabain (15)*	Al-Bateela (18)*	Hiswa (18)*	
<i>Giardia intestinalis</i>	3 (13.6)	0 (—)	0 (—)	0 (—)	3 (20.0)	2 (11.1)	2 (11.1)	10 (8.7)
<i>Entamoeba histolytica</i>	6 (27.3)	3 (13.3)	1 (7.7)	0 (—)	2 (13.3)	2 (11.1)	1 (5.6)	15 (13)
<i>Hymenolepis nana</i>	3 (13.6)	0 (—)	0 (—)	2 (12.5)	2 (13.3)	4 (22.2)	0 (—)	11 (9.6)
<i>Ascaris</i> sp.	2 (9.1)	0 (—)	0 (—)	0 (—)	1 (6.7)	3 (16.7)	1 (5.6)	7 (6.1)
<i>Enterobius vermicularis</i>	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	1 (5.7)	0 (—)	1 (0.9)
<i>Trichuris</i> sp.	5 (22.7)	2 (15.4)	0 (—)	2 (12.5)	3 (20.0)	6 (33.7)	4 (22.2)	22 (19.1)
Hookworm ova	2 (9.1)	0 (—)	0 (—)	0 (—)	0 (—)	2 (11.1)	0 (—)	4 (3.5)

Note: Numbers in parentheses indicate percentage of positive infections.

\* Residential site.

\*\* Non-residential, recreational site.

Whenever available, twenty cysts/ova of the parasites were measured. However, only five and nine ova of each of *Enterobius vermicularis* and the hookworm, respectively, were encountered and measured. Means (in  $\mu\text{m}$ ) of measurements of cysts/ova of these parasites (in parentheses) were: *Giardia intestinalis* (Lambl) ( $11.05 \times 9.75$ ), *Entamoeba histolytica* Schaudin (14.3), *Hymenolepis nana* (von Siebold) (36.95), *E. vermicularis* ( $51.4 \times 22.2$ ), *Ascaris* sp. ( $65.65 \times 43.9$ ), *Trichuris* sp. ( $50.45 \times 20.8$ ), and the hookworm ( $47.1 \times 30.6$ ).

Concurrent infections with more than one parasite species, comprising ten different combinations, were observed on 25 occasions. These were (frequencies in parentheses): *G. intestinalis* and *E. histolytica* (3), *G. intestinalis* and *H. nana* (2), *G. intestinalis* and *Trichuris* sp. (3), *G. intestinalis*, *E. histolytica* and *Trichuris* sp. (2), *E. histolytica* and *H. nana* (1), *E. histolytica* and *Trichuris* sp. (3), *H. nana* and *Ascaris* sp. (1), *H. nana* and *Trichuris* sp. (6), *Ascaris* sp. and *Trichuris* sp. (2), and *Ascaris* sp. and the hookworm (2).

In 61 human stool samples examined, the following parasites (prevalence in parentheses) were recovered: *G. intestinalis* (21.3 %), *E. histolytica* (11.5 %), *H. nana* (14.8 %), *Ascaris lumbricoides* L. (11.5 %) and *Trichuris trichiura* (L.) Stiles (18 %). Moreover, ova of *S. mansoni* which were not recorded in the baboons during this study, were observed in 2 human stool samples in Hiswa village (Fig. 1).

## Discussion

Attempts to catch or trap the Arabian Sacred Baboon during this study proved almost impossible. This was due to the aggressive and cautious behavior of this primate. Shooting the animals needed special official permissions which would have delayed the study considerably. Therefore, the afore-mentioned procedure in collecting faecal samples was the most practical.

It was shown that (Table I) the prevalence of human parasites in the Arabian Sacred Baboon was higher in the residential areas than in the non-residential ones. This may indicate that infection of the baboon is largely associated with permanent existence of human beings. The non-residential, recreational sites, however, are visited by humans for only limited periods of time.

The low prevalence of *E. vermicularis* could be attributed to the fact that ova of this nematode are not voided in the faeces normally, but are deposited around the anus by female worms. Therefore, finding ova of this parasite in only one sample may not reflect the actual picture of infection.

Variations in the susceptibility of infection in relation to age and sex could be related to the feeding behaviour of the animal. Adult males usually have access to food first, and young animals may join them. Adult females normally wait until the feast is over, and may then eat the left-overs which have been contaminated with the faeces of male and young animals.

The parasites listed herein have previously been recorded by other investi-

gators from humans in Saudi Arabia. Siddiqui (1981) reported *G. intestinalis*, *H. nana*, *A. lumbricoides* and hookworms in Al -Baha, Midwestern Saudi Arabia. All of the parasite species recovered in this study were found in humans in Riyadh district (Abdel-hafez *et al.*, 1986) and in the Eastern part of the country (Khan *et al.*, 1987). Nasher (1978) reported *G. intestinalis* and *E. histolytica* in humans in Abha and vicinity.

The present study shows a case of zoonanthroponosis, where the Arabian Sacred Baboon (incidental host) has acquired certain parasite species from man (maintenance host). The relatively high prevalence of infection in the baboon, however, indicates that these parasites have been well established in this incidental host, and may be considered a reservoir host.

Several feral and domestic animals are known to be of considerable importance in the chain of parasitic infections in man. Examples of these, which include non-human primates, game animals, carnivores, dogs, swine, cattle, etc., were reported by the joint WHO/FAO expert committee on parasitic zoonoses (1979), as well as by many other workers. The occurrence of human parasites in baboons, *Papio* spp. has been reported by Nelson (1960), Kuntz and Myers (1966), Myers and Kuntz (1968), and Fenwick (1969). In view of the above findings, and since the Arabian Sacred Baboon coexists with humans in vast areas in the southwestern part of Saudi Arabia, it could be a source of health hazard. Therefore, it is strongly recommended that certain measures be brought into effect in order to prevent human-baboon contact in these areas.

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