study (excluding 323 children below 10 years of age and 60 non-participants were classified into eight groups based on their blood group type and on their infection status (Table I). The infected group comprised persons diagnosed as having *Wuchereria bancrofti* infections. The diagnosis was based on both clinical and laboratory determinations.

Table I—The association between blood groups and infection with *Wuchereria bancrofti*. Commercial (DeCruz Corporation) anti-A and anti-B sera were used for ABO typing

	A	B	AB	O	Total
Infected	13	33	7	20	73
Uninfected	18	49	12	43	122

A statistically non-significant result was obtained ($\chi^2_3 = 1{\cdot}42$; $p > 0{\cdot}10$) demonstrating that in this series there was no association between blood groups and infection with *W. bancrofti*.

The confidence with which associations between blood groups and various diseases have been assessed remains equivocal. Most of these studies have been of the case/control type. VOGEL (1970), WIENER (1970) and WOOLF (1955) highlight a number of the inherent sampling and statistical problems which pervade this literature, including the interpretation of statistical significance, lack of *a priori* probabilities, pooling of heterogeneous data, sampling bias, errors in blood typing and so on. These issues are the concern of any population based study.

AYRES *et al.* (1976) put forth the hypothesis that polysaccharides of filarial worms may inhibit the α and β agglutinins in human sera. They were able to test the hypothesis in Belém in the state of Pará in Brazil. A series of 596 microfilaria-positive cases, all more than 40 years old were matched to a referent uninfected series (n = 596) of similar age, sex and occupation. They found a statistical excess of group B among the infected persons. However, in comparing this study with others in India and Japan AYRES *et al.* (1976) found no consistent relationship. Immediate difficulties pertain to the sample selection criteria and the numbers of cases and controls. In Belém only persons over 40 years old were sampled. In Okinawa the ratio of cases to controls was small and in Ernakulam in India the control series had insufficient numbers. RIFAAT *et al.* (1978) observed that blood group AB was related to filariasis as measured by three different techniques: (i) intradermal test, (ii) thick blood film, and (iii) counting chamber; however no mention was made of how the sample was selected from the population.

The present study chose an unselected population segment consisting of the first 195 participants entered randomly into a larger study. Sampling bias was negligible because only 60 of the total eligible population of 943 villagers refused to participate and these were equally distributed throughout the age groups. Blood typing was performed by a single highly trained individual. Lastly, grouping of individuals into the infected or uninfected category was made using both clinical and laboratory determinations.

Serious attention to the issues of sampling and statistical analysis may provide the key to the real and perhaps consistent relationship between filariasis and blood groups.

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Parasites in archaeological material from Brazil: a reply to M. M. Kliks

M. M. KLIKS (1982) from the University of Hawaii, in a letter to this journal criticized our paper "The finding of eggs and larvae of parasitic helminths in archaeological material from Unaí, Minas Gerais, Brazil (FERREIRA *et al.*, 1980).

We would like to make the following comments on his letter:

(i) Kliks starts his letter "Helminth ova and adults recovered ...". He misread our paper since adult worms are not mentioned in any part of it.

(ii) "... The shape of scat illustrated generally resembles those produced by bears or dogs ...". There are no bears in that part of the continent and dogs were not known by the Indians until the colonization by Europeans. Furthermore, in the same coprolites Trichuris eggs of the same size as those of *T. trichiura* and smaller than *Trichuris* from dogs were also found. Experimental models with artificial desiccation of faeces in our laboratory have shown that this process does not alter the size of the egg, which thus remains a valid character for identification.

(iii) "Furthermore, in my experience none of these criteria by themselves is sufficient to establish the human origin of a group of palaeofaeces in the absence of an archaeological context firmly indicative of

human presence". Careful reading of the "Material and Methods" section of our paper will clearly show that when we assessed the origin of the coprolites, no single criterion was considered. We were based on a well documented series of archaeological data indicative of human occupation (artefacts, rock paintings and even burials).

(iv) "... and could just as well be those of oesophagostomid or trichostrongylid genera". We have had the opportunity to observe eggs of trichostrongylids in recent human faeces as well as in coprolites and the size difference between those and the ancylostomids are evident.

(v) "... hatching process occurs in the soil over a period of a week or more ...". Ancylostomid eggs can hatch inside the faecal mass easily under tropical conditions as we have observed several times in faeces kept for some time at the laboratory.

(vi) Perhaps all our comments above were not necessary since the same eggs and larvae were found in the intestinal content of a mumified Indian body from the same archaeological site (FERREIRA *et al.*, 1983).

(vii) Kliks ends his letter saying: "All of us who work with ancient dung must remember "all that glisters is not gold". The archaeological site is at Minas Gerais, the Brazilian State where most of our gold mines are found, and there, very often, "what glisters is really gold".

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Bulinus browni Jelnes, 1979 (Gastropoda: Planorbidae), a member of the forskalii group, as intermediate host for *Schistosoma bovis* in western Kenya

Bulinus forskalii (Ehrenberg, 1831), as identified from morphological characters, has been recorded as intermediate host for *Schistosoma bovis* in the Sudan (MALEK, 1969; MAJID *et al.*, 1980) and in western Kenya (MCCLELLAND, 1955; TEESDALE & NELSON, 1958; SOUTHGATE & KNOWLES, 1975). Recently *B. browni* was separated from *B. forskalii* on enzyme characters and some evidence suggested that *B. browni* rather than *B. forskalii* was one of the intermediate hosts of *S. bovis* in western Kenya (JELNES, 1980).

In the Kisumu area, western Kenya, numerous *B. forskalii* sensu stricto were collected in water bodies used for watering cattle during the dry season. These snails were found to shed paramphistome cercariae frequently, whereas no snails were found to shed schistosome cercariae. In a sample of *B. browni*, as identified from enzyme patterns, from Tiengre Stream, west of Kisumu, one of eight specimens shed mammalian-type schistosome cercariae. In this area no human schistosomes are known to utilize forskalii group snails as intermediate hosts, and therefore it seems safe to claim these cercariae to be *S. bovis*. From the same locality, infected specimens of the africanus group were collected simultaneously. Analysis of egg morphology carried out after passage of the cercariae in mice revealed the presence of both *S. bovis* and *S. haematobium* in the snails of the africanus group.

Further studies are needed to clarify the role of *B. forskalii* and *B. browni* in transmission of *S. bovis* in eastern Africa.

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