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(Accepted 31 October 1980)

My Student Elective

Chasing bugs in Brazil

SIMON WESTON SMITH

Our little house in Brazil saw the first signs of life at the unfortunate hour of five in the morning. Three bodies stumbled out to eat a breakfast of coffee and cakes before the crashing of gears and clouds of dust announced the arrival of Domingos in a vehicle which had once passed as a jeep. Armed with torches, forceps, and little wooden boxes with clip-on lids, these three

bodies then clambered into this mechanical miracle and with more roaring, crashing, and dust we would hurtle down the road out of the village of Mambai into the surrounding countryside. Five or six hours later Mambai would once again tremble as Domingos hurled the blue jeep up the hill and around the corner into "High Street," stopping to disgorge the three bodies which had embarked earlier that morning, now covered from head to toe in dust and bruises, but still carrying torches, forceps, and little wooden boxes with clip-on lids.

This troubled village of Mambai lies not far from the centre of Brazil, about 400 km north-west of the city of Brasilia, and these three bodies, which plagued this village for two-and-a-half months during the summer of 1979, belonged to two fellow students

and myself. We were driving around Mambai not with the intention of terrifying the local inhabitants, but rather with the aim of studying the epidemiology of Chagas's disease, otherwise known less colourfully as South American trypanosomiasis.

No rain but plenty of water

Mambai is the central village of a municipality of about 1000 houses and 5000 people spread over about 2000 km². The area is largely uncultivated yet bears no similarity to the landscape most people associate with wild Brazil. There are no Amazonian rain forests and no daily tropical rain storms; instead, Mambai is an area of sparsely spread trees and shrubs without rainfall for most of the year. Surprisingly, however, the land is crossed by ever-flowing palm-lined streams which receive their water from vast underground lakes.

These plentiful supplies of water throughout the year make irrigation feasible; however, it is used to only a limited extent, and the landowners of Mambai are generally content with their non-intensive farming. Indeed, there is no market for the goods they might be able to grow, as transport to any centres of industrialisation is exceedingly difficult. But things are changing and the German owner of a ranch covering some 400 km² of Mambai looked forward to rearing large numbers of cattle on a well-irrigated stretch of land and driving the produce for sale in Brasilia.

The people of Mambai are enormously varied in origin. The majority are of Portuguese extraction, but there are negroes who have moved west from the sugar plantations on which their fathers worked as slaves. The picture is further complicated by Northern European missionaries, whose enthusiastic proselytism seems to have produced some fair blue-eyed children among the dark-skinned Portuguese families. All the families, however, live a similar way of life in their mud-brick or wood-and-palm houses. A few cattle are raised; rice, maize, coffee, and cotton are grown; and sugar cane is crushed, fermented, and distilled to make a potent brand of rum known as *pinga*. In Britain house-to-house surveys might be met by offers of cups of tea, but in Mambai we were given liberal quantities of this lethal spirit.

Research into Chagas's disease

You may still be wondering what our research work entailed, and what we were doing with torches, forceps, and little wooden boxes with clip-on lids in the heart of Brazil. Our aim was to assess the proportion of houses in Mambai infested with the "barber bug"—*Triatoma infestans*. This member of the reduviid family of insects has among other unpleasant characteristics a predilection for human blood and an ability to carry in its gastrointestinal tract the causative organism of Chagas's disease—*Trypanosoma cruzi*. Its life style thus forms the basis for an understanding of the epidemiology of Chagas's disease, and we hoped to find out some of the factors affecting the populations of this bug. We therefore visited a large number of houses attempting to catch any bugs present, while at the same time noting down the characteristics of the house construction and getting details of the number of inhabitants. This work formed part of a continuing research project being carried out under the control of Professor Philip Marsden of the University of Brasilia aimed at lowering the incidence of Chagas's disease by controlling the population of vector insects.

Such grandiose ideas, however, were far from our minds when each day we set out in the jeep driven by our guide Domingos in search of the blood-sucking bugs. We systematically visited the houses in each area of Mambai with questions for the householder and with an intensive one-man-hour search of the house for the insects themselves and for any evidence of their presence. In our search we sprayed the house with a solution of pyrethrin—an insect irritant—to which the bugs reacted by leaving their cracks, only to be seized and popped into little wooden boxes with clip-on lids. Frequently, however, no bugs were seen yet much evidence of their presence was at hand: this included casts of the insect shed during its development, the small white eggs laid in the hundreds by the female, and the brown stains of dried faeces left on the walls of infested houses by insects climbing to their resting places after their meals of human blood. At the end of the day on our return to the village the faeces of the collected bugs were examined under a microscope to determine whether the insect was carrying *T. cruzi*. If present the protozoan was seen swimming through the debris of the gut contents.

We were able to compare the results of this survey with those of a previous survey done in 1975, and we found an increase in the percentage of houses infested. Of all the houses, 21% (17% in 1975) had bugs carrying *T. cruzi*, 40% (32% in 1975) had bugs, and 82% (55% in 1975) had some evidence of infestation. We were able to show also that the degree of infestation was considerably influenced by some of the factors we had measured for each house. In particular, a house was most likely to have bugs if it was made of mud bricks, if the walls were unplastered,

FIG 1—A smart, recently built house (photo courtesy of Andrew Mason).

FIG 2—A wood-and-palm house with team members entering (photo courtesy of Andrew Mason).

and if the amount of light in the rooms—particularly the bedrooms—was low. Interestingly, the houses with the lowest rates of infestation were the traditional wood-and-palm dwellings. The number of inhabitants in a house was also found to be important, with a greater likelihood of infestation in the houses of the biggest families. On splitting up the municipality into areas we found that the probability of high-quality well-plastered houses bearing marks of infestation was least if the neighbouring houses were of a similar quality and greatest if the local houses were of a poor quality.

These results confirmed and extended previous findings and indicated the importance housing conditions and general social and economic factors have in influencing the incidence of disease.

Social conditions influence disease

Making an arrogant leap from fieldwork in central Brazil to the future of Chagas's disease, I think it is possible to draw a comparison between those areas of Brazil where Chagas's disease is endemic and Britain in the late nineteenth century when it was afflicted with tuberculosis. The major factor behind the drop in the incidence of tuberculosis was the improvement in social conditions rather than the introduction of specific chemotherapy or the use of prophylactic immunisation. In similar fashion, I suggest that the incidence of Chagas's disease will start to decline soon not because of specific treatments for the disease or because of prophylactic immunisation but rather because of economic development and improvements in housing. I do not wish to paint too rosy a picture for the future while the incidence of the disease is on the increase, but in areas such as Mambai progress is being made, and the houses now being built are of a much higher standard than their predecessors.

One of the thoughts, then, with which I returned from Brazil was of the importance of social conditions in influencing disease, and the degree to which the health of a nation is determined not by its organised health care system, but by the nation's economic wellbeing. Without a successful progressive economic base the people of Mambai have no means for improving their standard of living and limited means of combating disease. The question that then arises is to what extent doctors should concern themselves with economic and social matters as a means of promoting health.

We thank the following organisations for their help: the British Medical Students Trust; Gonville and Caius Colleges, Cambridge; Aero Peru; the Jowett Fund; the Thomas Keeping Fund; the Medical Research Council; the Overseas Development Administration; the 27 Foundation; the Westcroft Trust; the Gilchrist Educational Trust; and St Thomas's Hospital Medical School.