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STUDIES OF THE DOMESTIC ECOLOGY OF TRIATOMA INFESTANS BY MEANS OF HOUSE DEMOLITION

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SUMMARY

In Mambaí, Goiás, three residences and two chicken houses and in Uberaba, Minas Gerais, one chicken house all infested with **Triatoma infestans** were carefully dismantled and all the bugs collected. Data on population structure, bug infection rates with **T. cruzi**, and feeding patterns is discussed. Some evidence of bug migration within the house and the influence of house construction materials on bug distribution is presented. Bugs tend to live near blood meal sources but there is no evidence of blood meal preference in **T. infestans**. Some observations on Reduviid predators of Triatominae were made and **Telenomus** parasitisation of eggs of **T. infestans** and **T. sordida** in Mambaí recorded. Further studies in other Chagas transmission areas with different bug species and socio-economic conditions using this technique will provide new information on the ecology of bug vectors and the dynamics of transmission of **T. cruzi** in afflicted households.

INTRODUCTION

Control of the transmission of **Trypanosoma cruzi** to man depends on the application of residual insecticides to bug infested houses since there is no effective chemotherapy. Although a variety of triatomine species occur in houses in Brazil two species have become highly domesticated: **Triatoma infestans** and **Panstrongylus megistus.** The domestic ecology of the latter species has been recently studied at São Felipe, Bahia, by the Chagas Study Group of the London School of Hygiene and Tropical Medicine [13] based at the Fundação Gonçalo Moniz and the results are in preparation for publication. In order to study the domestic behaviour of **Triatoma infestans** we utilized the same technique of house demolition developed at São Felipe.

This method attempts to capture all bug instars detected in an infested dwelling. The information available from six houses, five in Mambaí, Goiás, and one near Uberaba, Minas Gerais, forms the basis of this report.

MATERIAL AND METHODS

The most important aspect of the work is patience coupled with careful dismantling of the house structure. A hammer was very rarely used; hands and a machete being sufficient. The number of man hours of work was noted each day and with 4-6 people working the time of demolition varied from 22 to 106 man hours per house. Initially the house was photographed from various angles taking note of any unusual features. Next a plan of the house was prepared and all measurements noted. Such measurements included not just the length and height of internal and external walls but also roof area and wall thickness. Different building materials were used in different parts of the houses and these were noted. On the house plan sites of possible blood meal sources such as beds, chicken nests, rat burrows etc, were marked. Attempts were made to capture all animals (lizards, rodents) found during demolition. Domestic animals consisted only of dogs present in three houses.

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Before touching the walls or roof decisions were made on the sequence of demolition based on the information obtained above. Usually the roof was removed first to provide light for work on the interior of the house. Walls near blood meal sources were frequently left until last for detailed attention. White sheets were spread on the ground and secured by stones. All personnel were equipped with forceps and labelled containers and two teams usually worked together. The first secured a piece of wall or roof material and removed any visible bugs. This was then passed by hand to the white sheets there the second team dislodged hidden bugs onto the sheet with sharp taps with a stick and if necessary dissected the material before stacking it on one side. When the wall and roofing material was completely removed, the wooden frame of the house was examined and any bark stripped to reveal bugs.

Walls were usually of dried mud moulded onto a wooden frame (Fig. 1). A variety of roofing materials were used (Fig. 2). Curved ceramic roof tiles were usually of the portuguese type made locally. Sometimes grass was used as thatch or tree bark (imbirusu tree) cut in the form of crude tiles. UnB 2 was an unusual house being constructed almost entirely of palm with a large roof area of several layers of palm leaves of various species. The outermost roof layer and crown were made up of the large fan shaped leaves of the buriti palm (Fig. 3). It took 106 man hours of work to dissect this house since each palm frond had to be examined for bugs.

For large concentration of small instars a modified car vacuum cleaner[4] (Fig. 4) was used to collect these bugs.

Samples of eggs were collected in three houses. Apart from **T. infestans** in three houses small numbers of **Triatoma sordida** were also found and noted. The first house demolished revealed a large number of a bug which is predator of Triatominae and thereafter such species were also collected.

Details were obtained from the owner regarding the age of the house and the time bugs had been present. Reliable information on this last point was only obtained from two houses and was 18 months and six years. The number and age of inmates of the house was noted and where possible a clinical, serological and parasitological (xenodiagnosis with 20-40 third instar **T. infestans**) examination was done on family members. Enquires were made regarding animals living in or near the house.

All bugs captured were put in containers labelled with reference numbers reffering to the site of capture and transported to the laboratory at the University of Brasília. Here they were identified, counted, aged by instar and sexed in the case of adults. Mortalities were small (5-7%). Frequently a recently dead bug was fresh enough to be examined for infection. All large instars and the majority of small instars were examined individually by rectal dissection for evidence of **T. cruzi.** Also individual blood squashes of stomach contents were collected on Whatman no. 1 filter paper, dried and held in a dessicator until dispatch to Imperial College London for identification of blood meals [3,16]. Elutes from this blood were examined by precipitin tests and the type of blood meal recorded. Positive mammalian feeds were tested for man, dog, cat, pig, bovid, opposum rodent and horse. Negative mammalian feeds were tested for avian and reptile. Mammalian feeds too weak to identify specifically or which failed to react to the range of mammals mentioned above were recorded simply as mammal.

RESULTS

The houses studied fall into two groups, residences and chicken houses (Table I). Houses will be referred to by the code noted in this table. Often when a house becomes uncomfortable it is turned a chicken house and a new house built nearby. This was the case in two of the chicken houses while G. de A.[2] was converted from a kitchen outhouse.

RESIDENCES

In the first three houses listed in Table I the owners had recently vacated the property. These houses were residences and Table II lists the **T. infestans** bugs by instar captured in these houses. The number of bugs is variable and bears some relation to the number of people living in the house since this governs availability of blood meals to develop a bug population. Population structures also vary since UnB 2 has many of the first three instars

Fig. 1 — Residence FLG I^A. Note to the right of standing man the open wall of wooden stakes not favourable for bug colonization and the mud cowdung wall to the left of him suitable for bug colonization

Fig. 2 — Residence LN 3. Note roof composed of two different tiles. To the left the bark of the imbirusu tree and to the right portuguese ceramic tiles

Fig. 3 — Residence UnB 2 constructed entirely of palm. Note the fan shaped buriti palm fronds forming the roof crown

Fig. 4 — The modified car vacuum cleaner in use for collecting small instars by suction

TABLE I

Details of houses studied

Code	Locality	Age of house in years	Number of inhabitants	Time of vacation of property related to demolition	Time of demolition month/year
Residences					
UnB 2	Bora	3	7	24 hours	July 74
FLG I^A	Fazenda Laja Grande I^A	2	3	2 hours	Sep. 74
LN 3	Lagoa Nova 3	6	1	15 days	July 75
Chicken houses					
PB	Patrimonio Baixo	30	0	3 years	Feb. 75
G. de A.²	Gruta de Água 2	12	0	—	Sep. 74
UnB 4	Mambaí Town	8	0	4 years	Mar. 75

and FLG IA a predominance of the last three instars. It should be noted however that 200 large instars were removed from UnB 2 two weeks before demolition so this population structure is not truly representative. Inevitably small numbers of bugs were lost among the rubble in the search and these are recorded in Table II.

LN 3 was the only house where a timed catch was done before demolition (see foot note Table II). To get some idea of intensity of bug infestations in houses in our survey work we use a sample collected in one man hour. In this instance this represented approximately one seventeenth of the total population.

Table III shows the distribution of infected bugs in the three residences related to age. UnB 2 is an example of high bug infestation without **T. cruzi** infection — a situation not uncommon in Mambaí. FLG IA shows a light infection rat with a steady increase with age in the bugs. The source of this infection was the mother of the family of three who although asymptomatic had positive xenodiagnosis and serology for **T. cruzi** infection. In the house LN 3 infection rates were relatively high in young bugs. A variety of infected blood meal sources were available to this bug population (see Table V) which may account for high infection rates in all stages.

TABLE II

Number of different instars caught in residences

Code for house	Instar I	Instar II	Instar III	Instar IV	Instar V	Adult male	Adult female	Lost in rubble	Total
UnB 2 (*)	538	191	186	83	45	26	23	13	1105
FLG I^A	43	86	147	167	315	107	93	31	989
LN 3 (**)	64	66	22	14	60	46	17	11	300

(*) 200 large stages of unknown composition removed 2 weeks earlier
(**) Capture before demolition 18 bugs/man hour

TABLE III

Distribution of infected bugs in the 3 residences according to age

Code		Instar I	Instar II	Instar III	Instar IV	Instar V	Adult male	Adult female	Total
UnB 2	Number	0/96	0/113	0/146	0/69	0/41	0/18	0/15	0/498
FLG IA	Number	0/2	0/49	5/118	8/144	21/286	13/75	15/75	62/747
	Percentage	0	0	4.2	5.5	7.3	17.3	20.5	8.3
LN 3	Number	5/16	16/55	9/22	11/13	22/59	25/44	10/16	98/225
	Percentage	31.3	29.1	40.9	84.6	37.2	56.8	62.5	43.5

NB Number = number of bugs positive/number of bugs examined; Percentage = percentage of above fraction or percentage infected

TABLE IV

Results of bug blood meal examinations in residences

Code	Man	Avian	Dog	Mammal	Rodent	Reptile	Bovid	Negative	Total examined
UnB 2	360	2	0	1	0	0	0	34	397
FLG IA (*)	419	288	1	2	0	19	1	28	747
LN 3	94	10	22	6	24	3	0	35	194

(*) 11 mixed avian/man feeds were noted

Table IV shows blood meal sources recognised in the stomach contents of the bugs. In many bugs no source could be identified because little evidence of the previous meal remained in the gut of the starved bug. As a result of this these totals differ from the totals examined expressed in Table III.

In UnB 2 man was almost the sole food source. The family being very poor they had no animals and the house was remote from neighbours. Avian sources (chicken) are usually important as illustrated in the data from FLG IA. The 19 reptile feeds were from lizards (Geckoniidae) five of which were caught during demolition. The solitary bovid feed is probably from a wandering cow resting near the wall. In both these houses the percentage of negative feeds, a reflection of the incidence of bug starvation, was low being 8.6% and 3.7% respectively. This is in contrast to LN 3 were it rose to 18%. LN 3 showed a rich variety of secondary sources to man. The sole resident, a 59 year old widow, moved out 15 days before demolition. She had one chicken she took with her that nested near her bed. She had no dog which must have slept there after her departure. Fresh cow droppings were found in the living room but there no bovid feeds are recorded. Table V presents further data on LN 3. Fifty percent of avian meals and one hundred percent of reptile feeds came infected bugs. Neither birds or reptiles harbor **T. cruzi.** This is explained by the fact that infection occurred with a previous blood meal. This is supported by analysis of first instar feeds. Infected first instars were only detected with dog, rodent, and mammal feeds. In the laboratory first instars feed only once and this is probably the case with the great majority in the field. Thus indirectly we know these infected animal sources were available for bug alimentation. Table VI show yet another unusual feature of LN 3. Blood meal sources were related to locality of capture on the house plan. Only data from the south side of the roof is shown in this table. A wide variety of feeds are represented in the roof even among first instars. Why a first instar should climb into the roof after feeding on a dog is unclear but this house was characterised by wide bug dispersal throughout the fabric possibly in search of food after the old lady left. This woman had no evidence of **T. cruzi** infection clinically, serologically, or after a xenodiagnosis utilizing 80 **T. infestans.** However she gave a history that one month before she had left the house she had been visited by a cousin and this wife for several weeks. Examining these two family members by xenodiagnosis showed only the wife to have a low parasitaemia infecting 10 percent of the bugs used in xenodiagnosis. In this house therefore at least three sources of **T. cruzi** infected blood were available to the bugs at various times.

Much calculation was devoted to relating this data to the house plans as regards wall or roof site, composition and area. The most important conclusion is that bugs congregate near a blood source as illustrate in Fig. 5 which shows the house plan of FLG IA. The highest concentration of bugs and infected bugs is in the wall nearest the bed, and nearest the infected source, the mother. She slept next to the wall, her two-year-old daughter next to her and her husband on the outside. The walls of the bed room nearest the bed also had high infection rates. Few bugs are usually found near the stove. Apart from the bedroom most of the house walls in FLG IA were of separated wooden poles for coolness and unsuitable for bugs (see Fig. 1). An isolated mud wall (no. 4) revealed a significant infection rate. This is probably explained by the fact that after the evening meal the family rested and talked leaning with their backs against this wall.

PERCENTAGE DISTRIBUTION OF TOTAL BUG POPULATION ▭ AND INFECTED BUG POPULATION ○ IN RELATION TO THE WALLS IN HOUSE FLGIA

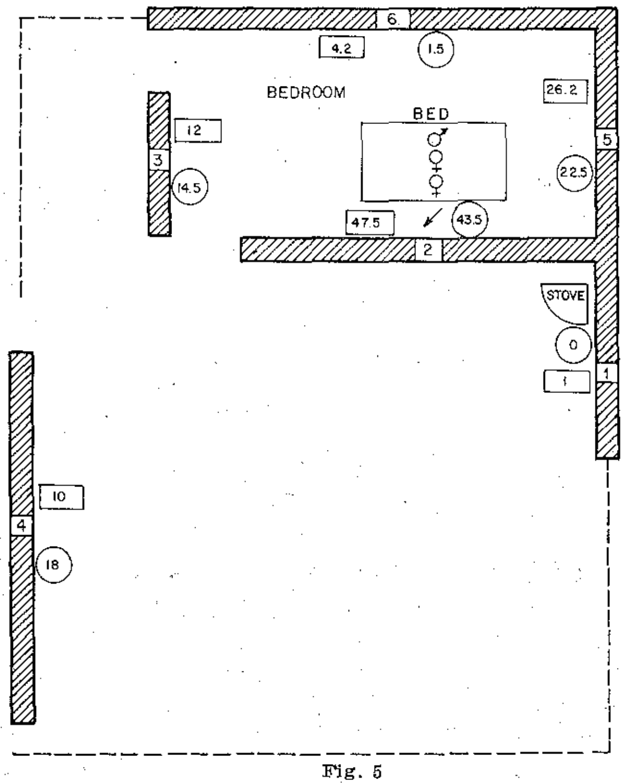

Fig. 5

TABLE V

Analysis of blood meals related to infection rate in residence LN 3

	Man	Avian	Dog	Mammal	Rodent	Reptile	Negative
Number of identifiable feeds (all stages)	94	10	22	6	24	3	35
Number of bugs infected (all stages)	35	5	7	5	18	3	10
% infected	37.2	50	31.8	83.3	75	100	28.6
Number of identifiable feeds in first instars	1	0	7	1	2	0	1
Number of infected first instars with identifiable feeds	0	0	2	1	2	0	1

TABLE VI

Pattern of blood feeds in bugs found on the south side of roof of LN 3 residence

	Man	Avian	Dog	Mammal	Rodent	Negative
Total blood feeds	12	2	13	3	19	17
First instar feeds	0	0	5	1	2	0

TABLE VII

Distribution of **T. infestans** in residences in relation to roof and walls

	UnB 2	FLG IA	LN 3
Number of bugs in walls	206	944	150
No. of bugs in roof	886	14	139
Percentage of bugs in roof	81	1.5	48.1
No. of bugs in roof (per square metre)	31.6	1.1	4.7
No. of bugs in walls (per square metre)	11.3	60.9	6.9
Proportion roof to wall	3:1	1:55	1:1.5

Table VII indicates another difference between the residences. In LN 3 the bug distribution was relatively uniform throughout the house but in UnB 2 the roof held 81% of the population as compared with 1.5% in FLG IA. Applying a correction for area this still reveals a highly significant difference which is probably explained by a difference in construction materials. The roof of UnB 2 was of several layers of palm, dark, slightly humid and cool. In contrast the walls of a single layer of upright palm fronds provided little cover for the bugs (Fig. 3). FLG IA on the other hand had excellent classical cracked mud walls, ideal for bug colonization, and honeycombed with tiny passages in the rotting wood lath frame. The roof of grass provided poor cover and would heat up quickly in the sun (Fig. 1).

CHICKEN HOUSES

In these, chickens were the main source of food, and two bug species were present **T. infestans** and **T. sordida.** In two houses **T. sordida** was only present in small numbers. **T. infestans** multiplies well in chicken houses. Table VIII shows the distribution of bugs in the three chickens houses by instar with totals. Table IX shows number of bugs positive for **T. cruzi** which were restricted to the species **T. infestans** and really only significant in house PB. Table X shows a variety of blood meal sources were utilised in PB some of which must have been infected with **T. cruzi.** Unfortunately no infections were detected in first instars to identify blood meal source; 29 of the 30 infected bugs were either adults or fifth instar suggesting a rarity of infected feeds. As a percentage of total feeds infected bugs represented 23.5% of rodent feeds, 16.6% reptile, 13% weak mammal and 8.2% avian. Rodents are a probable source of these **T. cruzi** infections. Xenodiagnosis of the single dog was negative. Although the new house was only 30 metres away no bug infestation had occurred during the 6 years after the move suggesting the population in the old house was static and stable on the food sources available.

UnB 4 held a small population of chicken feeding bugs but apparently a man had rested there as shown in Table X.

TABLE VIII

Number of different instars of the two bug species caught in chicken houses

Code	Species	Instar I	Instar II	Instar III	Instar IV	Instar V	Adult male	Adult female	Total
PB	**T. infestans**	37	51	77	43	121	97	62	488
	T. sordida	0	4	5	0	7	3	4	23
G. de A.[2]	**T. infestans**	95	155	220	122	105	78	112	887
	T. sordida	0	0	0	1	21	21	16	59
UnB 4	**T. infestans**	1	2	4	1	8	5	3	24
	T. sordida	11	8	11	1	16	14	12	73

TABLE IX

Showing overall numbers of bugs observed and infection rates in bugs in chicken houses

Code	No. of bugs visualised	No. lost in fabric	**T. infestans**				**T. sordida**		
			No. captured	No. examined	No. positive	% positive	No. captured	No. examined	No. positive
PB	554	43	488	481	30	6.2	23	21	0
G. de A.[2]	962	16	887	504	2	.4	59	48	0
UnB 4	106	9	24	24	0	0	73	67	0

TABLE X

Results of bug blood meal examinations in chicken houses

Code		Man	Avian	Dog	Mammal	Rodent	Reptile	Negative	Total examined
PB	**T. infestans**	0	179	5	24	18	6	128	360
	T. sordida	0	7	0	0	2	0	7	16
G. de A.[2]	**T. infestans (*)**	24	309	0	1	0	0	117	451
	T. sordida	2	34	0	0	0	0	15	51
UnB 4	**T. infestans**	1	20	0	0	0	0	1	22
	T. sordida								

(*) There were 5 mixed avian/man feeds

The situation in G. de A.2 however was very different. The single wall supporting the roof of a leanto formerly used as a kitchen held one of the highest bug densities (50 bugs/cubic metre). The stove was now a chicken perch and yielded 530 bugs. 69 Bugs were captured on the adjacent house wall. The owner said that they penetrated the wall to his bedroom but he would not permit us to demolish this house wall. However after the demolition of the chicken house this wall has been kept under observation. Twenty months after demolition 7 bugs were caught in one man hour all uninfected. Blood meal analysis identified 5 pig feeds, one chicken and one mixed man and chicken feed. Returning to the wall a month later a further 10 bugs again all **T. infestans** were captured in one man hour. For the first time a bug was caught in the house — an adult male heavily infected with **T. cruzi**. This was the only bug containing human blood the other nine having fed on chickens. Evidently invasion of the home is continuing and the owner has resorted to the use of Parathion.

PREDATORS

Special mention must be made of predatory bugs since we encountered an unusual situation in UnB 2 the first house we demolished.

As Table XI demonstrates we caught 473 adults of a hemipteran of the family Reduviidae identified by the British Museum as an unknown species of the genus **Cosmoclopius** a bug predatory on other insects. Subsequently we recovered various examples from the vegetation around the house by sweeping it with nets. It is attractive to suggest that the small number of adult **T. infestans** caught in the house is the result of the presence of **Cosmoclopius**. Unfortunately we cannot be sure. We omitted to collect dead **T. infestans** in the house. Also as mentioned previously this house was used as a source of field bugs for a laboratory experiment and 200 large stages were removed before our study. However the presence of **Cosmoclopius** is worthy of note in this remote house on the forest margin. This predatory bug was absent in the other houses reported here although in the LN 3 house we found two other species (unidentified) and in the PB house two examples of yet another species.

In the **Cosmoclopius** collection from UnB 2 30% of the bugs dissected were found to contain a flagellate, which is still under study but appears to be a new **Crithidia** species.

Table XII demonstrates evidence of another predator in Mambaí, the wasp Telenomus. In house G. de A. 2 small numbers of eggs of both **T. infestans** and **T. sordida** were found parasitised with this species.

TABLE XI

Data on **Triatoma infestans** and **Cosmoclopius sp** (Hemiptera reduviidae) in residence UnB 2

	No. of young stages	No. of adults	Total	% with flagellates
T. infestans	1 043	49	1 092	0
Cosmoclopius sp	0	473	473	30 (*)

(*) **Crithidia sp**

TABLE XII

Showing details of egg collections made in 3 houses

Species of bug	Site of collection	Hatched	Immature	Embryonated	Dead	Parasitised (*)	Total
T. infestans	UnB 2	482	69	51	21	0	625
T. infestans	FLG I A	88	52	10	1	0	151
T. infestans	G. de A.2	204	66	77	4	10	361
T. sordida	G. de A.2	136	6	13	1	2	158

(*) Parasitised with a telenomus species

DISCUSSION

Many houses in rural areas of Brazil like Mambaí are only used as residences for short periods of time due to deterioration of the fabric and in some instances the nuisance of bug invasion. A new house is built nearby and the old house often used to breed chickens. This study demonstrates the changes that occur in the behavior of a resident bug population when this occurs. The data presented here has a limited value because it is cross sectional and relates only to the bug population present at one particular time. There is some evidence that such domestic bug populations fluctuate over a period of years and during seasons of the year [6,7].

The age structure of the six bug populations studied (Tables II and VIII) shows no consistent pattern. In some houses a high incidence of bugs of a certain age is noted. For example instars III to V in FLG IA. In five of the six houses there are more males than females in the adult population. The effect of predators or failure to secure a blood meal must take its toll of such a bug population. How these factors operate in field situations like these is unknown.

More studies of timed catches before demolition are indicated. Since to date no better trapping technique has been developed the timed manual catch is the sampling method we use in our routine survey work. This has many disadvantages in terms of the labour involved and a variation in efficiency of the catcher. An experienced catcher is likely to concentrate on wall sites near food sources. It is likely that variation between a timed one hour catch by a collector and the total bug population will be great. Bugs are not distributed uniformly through the house fabric. However if we know the approximate significance of such a sample, bug densities could be calculated for all the houses in Mambaí since data of such timed catches is available.

Table III shows house UnB 2 as an example of Reduviidism without Chagas disease a situation similar to Anophelism without Malaria. This phenomenon is commoner in Mambaí, Goiás, than in the other area where we have done survey work namely São Felipe, Bahia. House FLG IA shows a pattern characteristic of the majority of infected bug populations we have studied to data namely a steady rise in infection rate with the age of the bug. Evidently the older the bug the more chance it has of encountering an infected feed and since bugs incubate **T. cruzi** remarkably well this infection will persist. House LN 3 in Table III demonstrates a pattern not commonly seen namely a high infection rate in all stages. Tables IV and V contain data which provide an explanation for this namely in LN 3 a variety of infected blood meal sources were available. This house illustrates the importance of animal reservoirs both wild and domestic in infecting bugs [2,12]. However it must be remembered that old lady left the house 15 days before demolition and many of the bugs had fresh blood in them. Whether the same variation in blood meal sources would have been observed if she had been in residence when the house was demolished is another matter. Since she had no dog a dog must have slept in the house after she left. The presence of a large human bolod meal source and timidity of rodents and wild mammals would almost certainly have reduced the number of such meals. Many studies have shown that **Didelphis** species is a likely mammalian source since it enters houses at night for food and has a high parasitaemia for **T. cruzi** [2,17] but we found no evidence of such feeds.

Table IV also shows the predominance of human feeds in the first two houses listed. As MINTER [11] has pointed out and the data on house demolition from São Felipe and Mambaí indicate **T. infestans** and **P. megistus** feeds are determined more by the proximity and availability or the blood rather than the type of blood. Both species feed well on man or chickens in the field. Man with his larger mass and his constant sleeping locality attracts and maintains local bug populations. However as we show here if man leaves the house bugs seek other sources as in house LN 3. Further if man puts chickens in the house the bugs will turn to chickens and maintain high populations.

Large domesticated animals such as cows, horses and pigs seem to have little role in the maintenance of bug populations in houses. Probably opportunities for contact are limited. However as the more recent blood feeds from house G. de A.[2] indicate bugs will feed on pigs if the opportunity arises. Such farm animals can be experimentally infected with **T. cruzi**[5,9]. Further work is needed to establish whether such animals have importance in domestic transmission cycles.

The finding that in house LN 3 one of the relatives of the old lady had a capacity to infect bugs has a wider significance. MILES[10] has shown how frequently these bug infested households in São Felipe receive visitors with the consequent danger of disseminating infection. One observation on bug movement in the house is recorded in Table VI. 18 Bugs who fed on a dog at ground level subsequently climbed into the south side of the roof of LN 3 for reasons that are not clear including 5 first instars. The blood meal here acted as a marker but evidently using other markers (paint, isotopes) more information can be obtained on bug movements in houses. GOMEZ-NUÑEZ[8] using isotopic labelling of bugs in houses in Venezuela has shown they congregate near the beds and a similar finding is illustrated in Fig. 5 in house FLG IA.

The well known field observation that types of house construction favours bug colonisation is illustrated in Tables VII and VIII. However this is not always the rule and a well constructed house with brick walls and a corrugated iron roof can harbour bugs. The studies on the chicken houses show how a **T. infestans** population readly adapts to this host. **T. sordida** is common in chicken houses in the area and has also been found in houses. **T. sordida** is a bug a preference for avian blood[11]. Although it can be infected with **T. cruzi** in the laboratory infection rates in field catches are low and this is borne out by this study. **T. infestans** infections in chicken houses were mainly from sylvatic sources probably rodents and sylvatic mammals. In house PB an equilibrium had been reached between the bug population and the blood meal sources available and no migration had occurred to the adjacent residence. In G. de A.[2] however such migration was occurring.

The situation as regards predators in house UnB 2 is unique in the literature. We have not been able to rear this species of **Cosmoclopius** in the laboratory to date although it feeds on **Rhodnius** nymphs and has reached the second stage. The fact that all examples of this species were adult and they were observed in flight suggests they had flown to the house. The manner in which **Cosmoclopius** acquires the crithidial flagellate in its intestine is not known. Both the exact species of bug and flagellate await further identification as do the other three species of predatory bug found. Parasitisation of eggs with the wasp **Telenomus** is common in São Felipe[14] so it was no suprise to find it in Mambaí. BARRET[1] has recently reviewed the little that is known about the predators of the vector bugs of Chagas disease. More work is obviously needed.

We have been able to trace few studies such as those described here in the literature. Over a period of 4 years 8,548 **T. infestans** were collected from a single house in Bambuí, Minas Gerais[7]. The largest single catch before demolition was 4,645 bugs. This study also includes a house plan and information on the status of the residents regarding **T. cruzi** infection. To evaluate the effect of insecticide spraying on **T. infestans** in Belo Horizonte, Minas Gerais, houses were demolished at weekly intervals after B.H.C. application and bug populations estimated[15]. We conclude that house demolition is a useful technique to investigate the epidemiology of domestic transmission of **T. cruzi** and may have value in assessing the effect of control measures.

RESUMO

Estudos da ecologia doméstica do Triatoma infestans através de demolição de casas

Em Mambaí, Goiás, três residências e dois galinheiros, e em Uberaba, Minas Gerais, um galinheiro, todos infestados com **Triatoma infestans** foram cuidadosamente desmontados e todos os barbeiros coletados. Discutiram-se os dados sobre a estrutura populacional, os graus de infecção de barbeiros com **T. cruzi** e os padrões de alimentação. Foram apresentadas algumas evidências da migração dos barbeiros dentro de casa e a influência dos materiais de construção das habitações. Os barbeiros tendem a viver próximos às fontes de repasto sangüíneo, mas não se encontraram evidências, especialmente por fonte alimentar no **T. infestans**. Realizadas algumas observações nos

predadores reduvídeos de Triatominae, foi relatado o parasitismo de **Telenomus** de ovos de **T. infestans** e **T. sordida.** Estudos complementares em outras áreas de transmissão de Chagas com diferentes espécies de barbeiros e condições sócio-econômicas, utilizando esta técnica, irão fornecer informações na ecologia dos vectores e a dinâmica da transmissão de **T. cruzi** em famílias afectadas.

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