infection below which mass treatment will become unfavourable in terms of cost-effectiveness. However, it also implies that above this value variations in the prevalence of infection have little effect on the cost per infected person treated. The precise prevalence value at which this non-linearity is evident is dependent on the cost per person treated: the higher this cost, the lower the prevalence value. This relationship has important practical implications for the cost-effectiveness of mass treatment implemented in areas with a prevalence of infection above a given level.

Based on WHO's recommendation of mass treatment at a prevalence of 50%, the estimated cost per infected child treated for school-based delivery is US$0·46 for albendazole and US$1·58 for praziquantel. The cost-effectiveness ratio is higher for praziquantel owing to the higher drug and delivery costs (which incorporate a screening component to identify the schools for mass treatment and require the dose for each child to be calculated). In the intervention areas of the PCD (Tanzania) the prevalence of infection with *Ascaris, Trichuris* or hookworm was 73% (PCD, 1998b). Based on the cost of school-based albendazole treatment of US$0·23, this translates into a cost per infected child treated of US$0·32. Successive interventions will be expected to reduce the prevalence of intestinal worms in these communities, and as a result one may need to readdress the cut-off prevalence level that justifies mass treatment. Indeed, the analysis here suggests that since mass treatment with albendazole delivered through schools can be achieved at such a low cost, mass treatment in areas with more than 25% infected children would still result in a cost per infected child treated less than US$1·00. This would be equivalent to using mass treatment in areas with greater than 50% infected children if a mobile team were used (see Figure).

In conclusion, delivery of anthelmintics through the school system as opposed to using a mobile team can reduce delivery costs by an order of magnitude. In addition, due to these low costs, mass treatment for intestinal nematodes may be 'good value' even when only 25% of the community are infected.

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Short Report

Trapping sylvatic Triatominae (Reduviidae) in hollow trees

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Control of Chagas disease by the elimination of domestic vector species of Triatominae has been highly successful over vast areas of the Southern Cone countries where *Triatoma infestans* is the main domestic vector. This type of control is now being developed in the northern part of South America and in Central America where *Rhodnius prolixus* and *T. dimidiata* are the most significant vectors. In controlled areas there are increasing numbers of reports of sylvatic species of Triatominae beginning to invade human dwellings. Consequently, research activities should focus on original sylvatic species adapting to peridomestic and domestic habitats. The entomological observations generated will assist in the adaptation of vector control strategies.

In the Chaco region of Bolivia the main sylvatic candidate vectors are *T. sordida* and *T. guasayana* (NOIREAU *et al.*, 1998). Recent observations have drawn attention to the existence of a sylvatic *T. infestans* 'dark morphs' population. The adults present chromatic (overall darker coloration with small yellow markings on the connexivum) and morphometric differences but isoenzymatic similarity with domestic *T. infestans*. This suggests that they form a separate population of the same species (NOIREAU *et al.*, 1997). Nymphal instars of *T. infestans* 'dark morphs' have been collected from hollow trees where they are probably living in association with wild rodents.

The collection of triatomines in their natural environment is laborious and time-consuming. The light-trap has the disadvantage of capturing only starved adults of species attracted by light. Other methods include the inspection of a great variety of potential ecotopes such as hollow trees. Various bait-traps have been designed to sample triatomines but they yield poor results (RABINOVICH *et al.*, 1976; TONN *et al.*, 1976; CARCAVALLO, 1985). This work reports the trial of a very simple trapping system to collect all instars of triatomines in hollow trees, a favourable ecotope for many triatomine species including *T. sordida, T. guasayana*, and *T. infestans* 'dark morphs'.

The surveyed area was La Choza (18° 34′ 516″ S; 62° 40′ 108″ W), an isolated site typical of the phytogeographical region of the Chaco, located on the route to Izozog (Cordillera Province, Department of Santa Cruz, Boli-

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via). The area is covered by dense and thick vegetation (elevation 4–6 m) consisting of hardwood trees with some reaching a height of 12 m. The undergrowth consists predominantly of thorn shrubs, bromeliads, and cacti. One hundred and forty-two traps comprising small plastic bottles (9 × 6 cm) covered with double-coated adhesive tape and containing a mouse as bait were suspended by string in hollows of 82 trees located within a radius of 7 km. They were placed for 8 h in the daytime or 15 h by night. Collected triatomines were identified by morphology (LENT & WYGODZINSKY, 1979) and genetics (isoenzyme analysis) to discriminate between both *T. sordida* cryptic species occurring in the Chaco (named groups 1 and 2) and *T. guasayana* (NOIREAU *et al.*, 1998).

From a total of 142 traps, 38 contained live triatomines which adhered to the tape (26·8%), while 2 traps presented only wings and/or legs of bugs. Captures were similar whether performed in the daytime or at night. *T. infestans* dark morphs was the predominant species (60·6% of the 71 triatomines captured), followed by *T. sordida* group 1 (25·3%), *T. sordida* group 2 (9·9%) and *T. guasayana* (4·2%). The average number of triatomines captured by positive traps was 1·8 ± 1·3. Most traps (76·3%) contained only 1 species while 21·1% contained 2 species and 1 trap (2·6%) contained 3 species.

Twenty-nine (35·4%) of 82 trees investigated were positive for triatomines, some trees being positive for several species. Eleven trees contained only *T. infestans* dark morphs (37·9%) while 8 (27·6%) contained *T. infestans* and other species. Ten (34·5%) contained *T. sordida* group 1 and/or *T. sordida* group 2 and/or *T. guasayana*. The majority of positive trees harboured nymphal instars (81·7% of the 71 captured triatomines were nymphs) and might be considered as breeding sites. The distribution by species was as follows: *T. infestans*, in 19 of the 29 positive trees (33 nymphs and 10 adults); *T. sordida* group 1, in 15 trees (17 nymphs and 1 adult); *T. sordida* group 2, in 5 trees (5 nymphs and 2 adults); and *T. guasayana*, in 3 trees (3 nymphs and no adults).

The bait-traps developed by TONN *et al.* (1976) consisted of wood-boxes divided into 2 parts, in one of which a chicken, rabbit, or mouse was placed. The same authors also modified the trap by wrapping it with adhesive tape. But many days of trapping were needed to capture a single specimen. In contrast, our results demonstrate that bait-traps can sample arboreal triatomines efficiently. The contrasting results may be due to the different behaviour of the triatomine species captured, and the small size of our traps which allowed them to be introduced into the hollow trees and not placed in the periphery of potential habitats as done by TONN *et al.* (1976).

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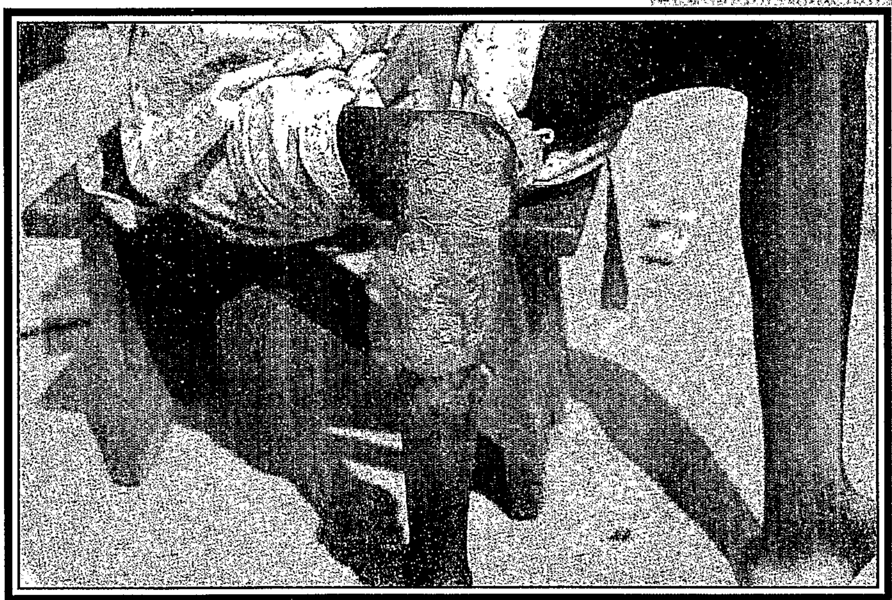

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