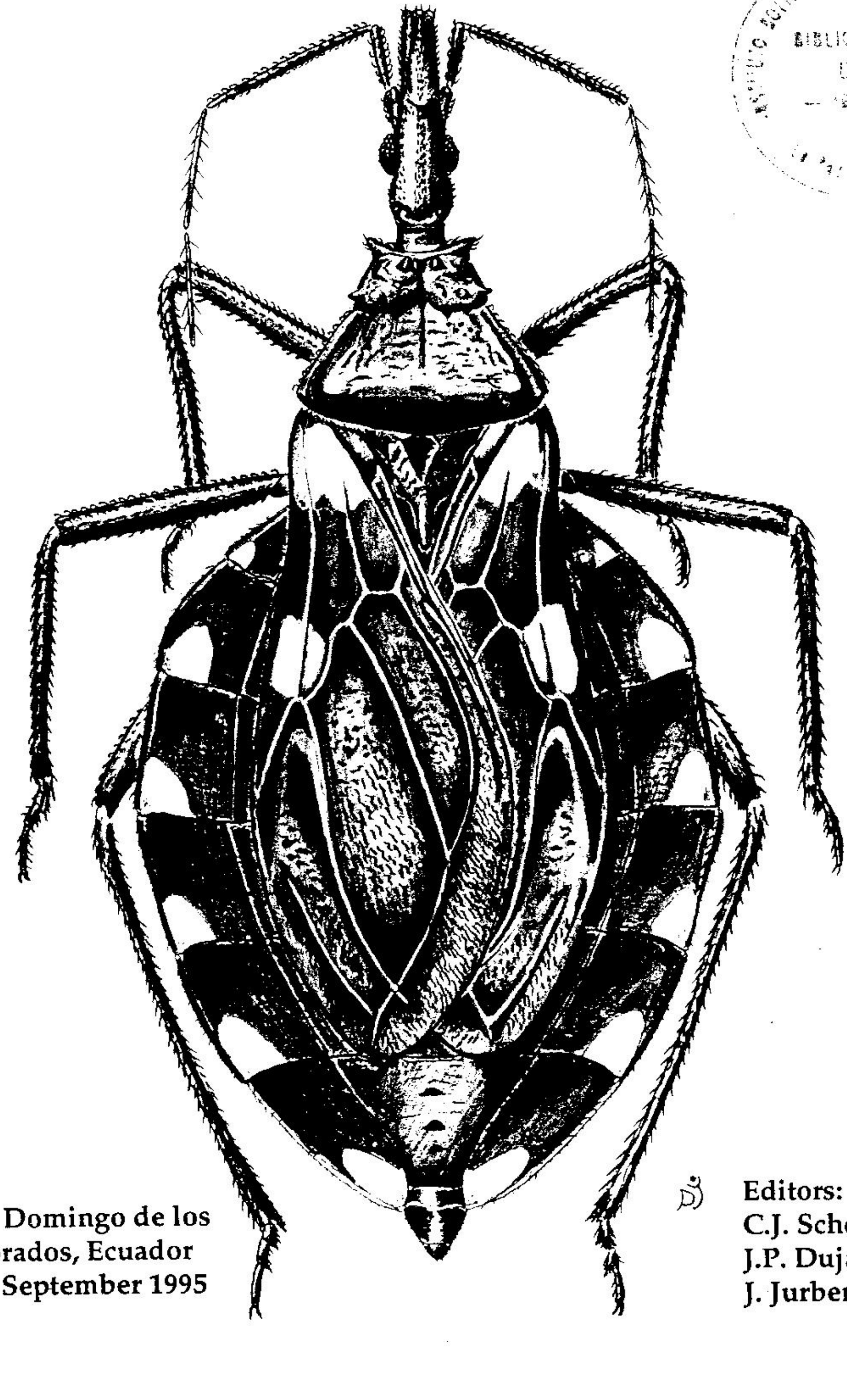
Proceedings
International Workshop on Population Genetics and Control of Triatominae

Taller Internacional sobre Genética Poblacional y Control de Triatomineos



Santo Domingo de los Colorados, Ecuador
24-28 September 1995

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Morphometry

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Genes of isoenzymes and mendelian transmitted heterochromatin blocks have been used to understand the genetic structure of natural populations of *Triatoma infestans* (Dujardin et al., 1996; Panzera et al., 1992) which appear to be structured into small isolated subpopulations. In contrast, morphometry has been explored mainly as a tool to detect geographic differentiation, particularly where isoenzyme variability was too low to reveal interpopulation differences. In most of the comparisons, even neighbouring populations showed significant differences for at least one character (Casini et al., 1995; Dujardin et al., unpublished). This high resolution allowed the use of metric variables to study reinfestation patterns following control trials, and developmental homeostasis in *T.infestans*, as illustrated by the following summaries:

Geographic differentiation

An initial study was carried out in Uruguay using 10 morphometric characters of the head capsule and thorax of male *T.infestans*. This clearly differentiated two geographical populations, one from the northern Department of Rivera, and the other from the southern Department of Soriano. By repeating the same comparisons on the first offspring of individuals from these two departments, reared separately but under identical conditions, we were then able to clarify the genetic and environmental contributions to these differences, which are thought to reflect the two original entry points of *T.infestans* into Uruguay, from Argentina and Brazil (Casini et al., 1995).

Domestic and silvatic *T.infestans*

In Bolivia we compared domestic specimens of *T.infestans* from various localities, and specimens collected from the well-known silvatic foci near Cochabamba plus an additional adult female from a new silvatic focus recently discovered in the Department of Chuquisaca. Numerical analysis showed that silvatic and domestic bugs that did not differ by isoenzymes were nevertheless consistently different by head morphometry. The difference was particularly marked in the length of the post-ocular region (excluding neck), which was consistently larger in silvatic specimens, whether adults or fifth stage nymphs, collected in 1983, 1992, 1995 or 1996. Log-transformation and canonical variate analysis of the residuals computed from the first principal component of a covariance-matrix based principal component analysis (cf. Dos Reis et al., 1990; Yoccoz 1993) was applied to remove the influence of size differences, allowing us to distinguish the influence of environment factors (shown as size differences) from genetic influences (shown as shape differences). Removal of size variation did not affect the significance of the canonical variate analysis, which indicates that the metric differentiation between silvatic and domestic specimens could imply some evolutionary separation that has not been evidenced by isoenzyme studies.

Mechanisms of reinfestation

Jamach'uma, Department of Cochabamba, Bolivia, is a small village surrounded by silvatic foci of *T.infestans*. It was sprayed with deltamethrin in December 1992, but subsequently found to be reinfested by a few nymphs of *T.infestans* in October the following year. The 10 fifth instar nymphs of *T.infestans* newly infesting Jamach'uma after ten months of entomological surveillance were compared in terms of 7 head measurements with 36 fifth instar nymphs collected from houses at Jamach'uma prior to insecticide treatment, and with two groups of nymphs originating from the surrounding silvatic foci. The silvatic nymphs comparised 8 specimens collected in 1992, and 9 specimens collected in 1995. The reinfestant specimens were found to differ significantly from the two silvatic groups, but not from the original domestic specimens (eg. Fig.1) which indicates that the reinfesting bugs represented survivors from the original domestic populations rather than immigrants from the surrounding silvatic foci.

Developmental homeostasis

We have also studied the symmetry of venation structure and size of the membranous part of the hemelytra in *T.infestans* from different geographic areas, and compared the results with two other species of Triatominae and with *Lutzomyia longipalpis* (for review of statistical methods, see Palmer & Strobeck, 1986). *T.infestans* showed significantly higher rates of asymmetry compared to the other species, and in 10% of the specimens we found unilateral deformities in wing venation. Bearing in mind that asymmetry is not under direct genetic control (because both sides of the insect must be under control of the same genes) our data suggest that *T.infestans* has rather reduced developmental homeostasis which may be related to its sedentary nature and relatively low genetic heterozygosity.

References

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Fig. 1. UPGMA tree derived from Mahalanobis size-free distances between samples of *Triatoma infestans* from silvatic and domestic foci (see Table). Differences between samples are not size-related, since the Mahalanobis distances were computed from size-free canonical analysis (see text). Sample D92 represents the domestic populations in houses at Jamach'Uma, collected in 1992 prior to insecticide spraying. Sample R93 is the reinfestant nymphs collected in these houses 10 months later. For comparison, samples S92 and S95 are samples of *T.infestans* collected from nearby silvatic foci in 1992 and again in 1995.

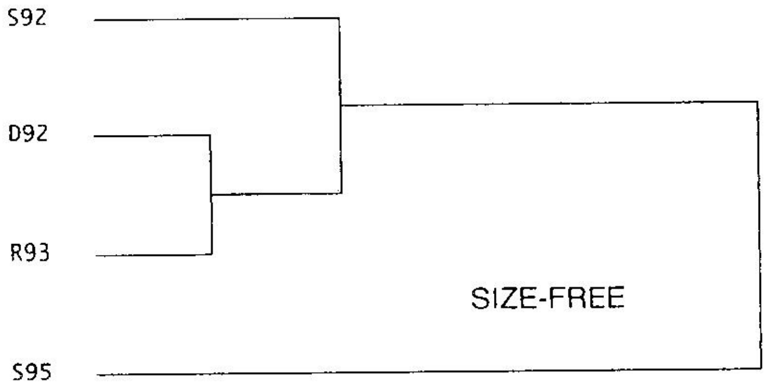

Table. Mahanalobis distances between silvatic and domestic samples of *T.infestans*, after size-free canonical variate analysis

	D92	**S92**	**R93**	**S95**
D92	0	0	0	0
S92	2.805	0	0	0
R93	0.957	3.947	0	0
S95	3.252	2.373	4.453	0

Eggshell architecture