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Biological Species and Acoustic Signals in Planthoppers

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Acoustic signals are now widely known to be used in intraspecific communication by planthoppers and leafhoppers. The low intensity signals are transmitted through the plant substrate on which the insects live. In courtship characteristic patterned amplitude modulated signals are usually exchanged between receptive males and females. Females usually call while remaining stationary and receptive males move about the plant actively while exchanging calls. When they eventually make physical contact mating may take place. Sympatric related species of planthoppers usually show clear differences in the temporal patterning of male and often also of female calls [1]. Acoustic signals thus are the major elements of the specific mate recognition systems of planthoppers, as also of cicadas and leafhoppers. Thus different acoustic signals maintain reproductive isolation between sympatric biological species. Indeed there are examples of sibling species that differ primarily in rates of repetition of parts of the male and female calls. The now well known sibling species of *Nilaparvata lugens* associated with rice and Leersia hexandra respectively in Asia and Australia differ in only small call characteristics to the human observer, but they are adequate to maintain reproductive isolation between them.[2]

The related species, *N. bakeri* (Muir), feeds only on the grass *Leersia hexandra* in South and South East Asia.[3] We have recently studied the acoustic signals of populations morphologically attributable to *N. bakeri* from India, Sri Lanka, the Philippines and Indonesia [4]. Particlarly striking differences were found between the male signals of insects from Indonesia (Bali) and the Philippines (Luzon) (Fig.1). These differences were so great that it was assumed at first that the insects might represent different biological species. No morphological differences were found after detailed examination of male genetalia. In the laboratory insects from the two of populations hybridized freely and the calls of hybrid F1 males varied greatly between the two parental types (Fig.1).

Mate choice experiments where females were provided with a choice between males of their own population and those from the other showed no significant preferences. Mating was apparently at random. Thus the major differences in call pattern between the two allopatric populations apparently do not indicate significant levels of reproductive isolation.

Thus the frequent assumption that call differences inevitably indicate biological species limits should be treated with some caution, at least for allopatric populations.

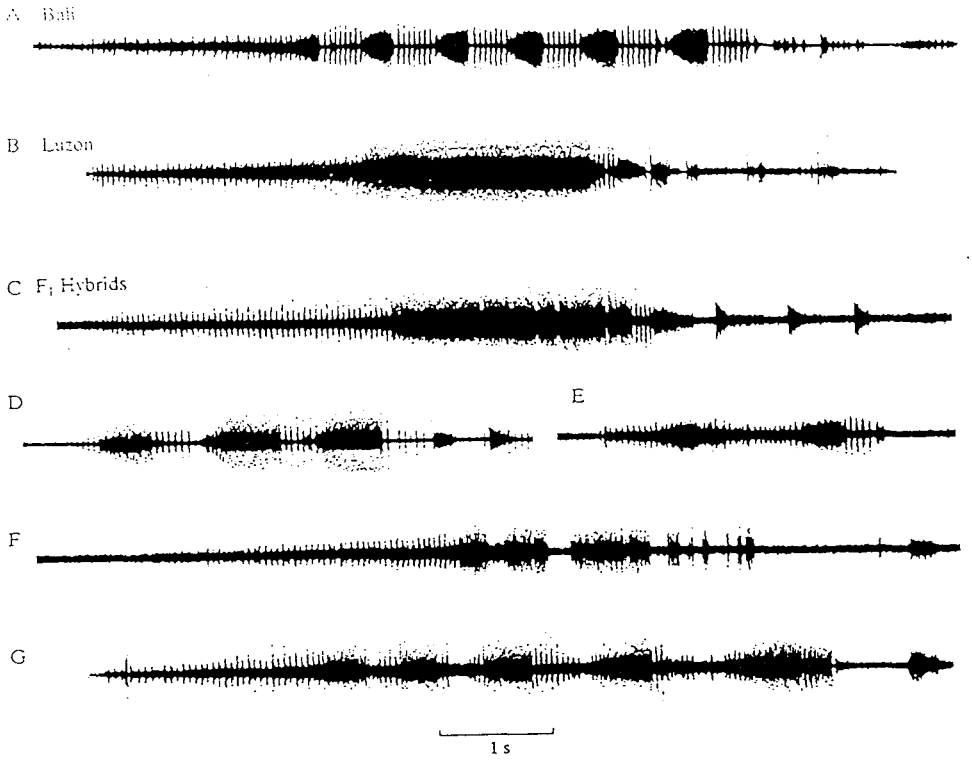

Fig.1 Oscillograms of male calls of N. bakeri from A, Bali, B, Luzon, and C-G, hybrids between them.

References

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