

of the embryo is sheathed in the coleorhiza. Where the coleoptile tip is situated, the epiblast and the ventral scales meet to form an inverted Y-shaped gap not unlike a germination pore.

Prior to the emergence of the radicle or coleoptile, the ventral scales, the epi-

blast, and the coleorhiza swell, rupturing the seed coat, the pericarp, and the lemma. At about 36 hours of germination, the ventral scales, the epiblast, and the coleorhiza begin to give rise to a large number of epidermal hairs. At about 48 hours of germination, the

coleoptile begins to protrude through the inverted Y-shaped gap between the ventral scales and the epiblast.

At about 60 hours, the radicle begins to push through the coleorhiza (Fig. 2). At this stage, the seeds are ready for sowing. ■

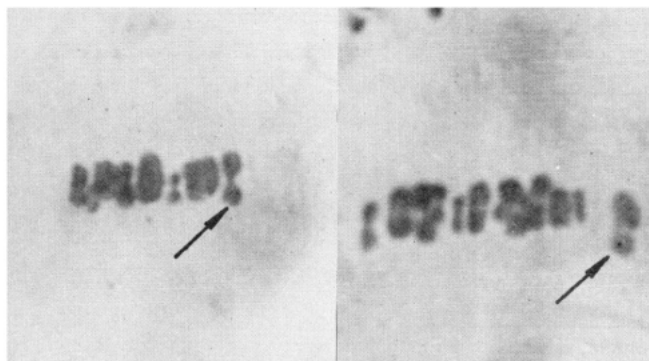
Cytogenetic variation in brown planthopper biotypes 1 and 2

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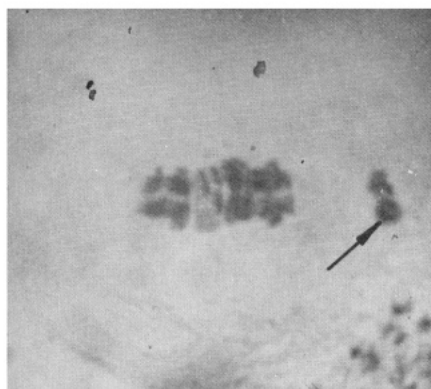
Chromosome number, morphology, and behavior often are used as complementary taxonomic indicators in species complexes. Sex chromosomes are especially useful in cytotaxonomy because they can show marked and subtle differences within a genus or a species. Cytogenetic investigations of the meiotic chromosomes of brown planthopper (BPH) biotype 1 and 2 populations maintained as stock cultures at IRRI show that the first division of meiosis is reductional and the second equational for all components of the species' genome.

The male diploid number, determined to be $2n = 30$, consisted of 14 bivalent autosomal pairs and XY sex chromosomes. *Nilaparvata lugens* (Stal) has an XY sex determining mechanism, with the males heterogametic (1411 + XU) or producing two types of secondary spermatocytes and the females homogametic (1411 + XX) or producing only one type of secondary oocytes.

Chromosomal behavior during metaphase I featured the clustering of highly condensed and shortened autosomes at the equatorial portion of the reproductive cell and separation of the highly heterochromatic, unequally synapsed sex chromosomes from the autosomal grouping. The clustering of autosomes is due mainly to intrachiasmatic and inter-chiasmatic matrices between the homologous bivalent chromosomes and among the tetrads or homologues.



1. Metaphase I chromosomes in testicular cells of brown planthopper biotype 1 males. (Sex chromosomes are indicated by arrows.) IRRI, 1981.



2. Metaphase I chromosomes in a testicular cell of brown planthopper biotype 2 male. (Sex chromosome is indicated by arrow.) IRRI, 1981.

Metaphase I stages in testicular cells from 60 newly emerged males each of BPH biotypes 1 and 2 were examined. In 218 biotype 1 cells, 147 (68%) showed complete aggregation of sex chromosomes with autosomes. The rest of the cells revealed slight separation of sex chromosomes from the autosomes. Almost 100% of 200 metaphase I chromosomes observed for biotype 2 manifested complete isolation of the sex chromosomes from the autosomal groupings.

The sex chromosome is more isolated from autosomes in biotype 2 than in biotype 1. The extent of chromosome clumping also was higher in biotype 2

than in biotype 1 (Fig. 1, 2). The occurrence of such chromosomal aberrations as loose pairings of paired homologous bivalents as well as fragmentations or chromosomal deletions were more frequent among biotype 1 than biotype 2 chromosomes. Further cytogenetic studies are in progress. ■

GENETIC EVALUATION AND UTILIZATION

Grain quality

Cooking and milling quality of Spanish rice varieties and breeding lines

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Seven rice varieties grown on more than 90% of the rice area in Spain and 2 good grain quality rice hybrids were evaluated for milling and cooking quality. The varieties and breeding lines were grown using current Spanish culture methods in 3×3 -m plots in a 3×3 balanced lattice design.

The varieties and breeding lines were classified by the Recommended Model