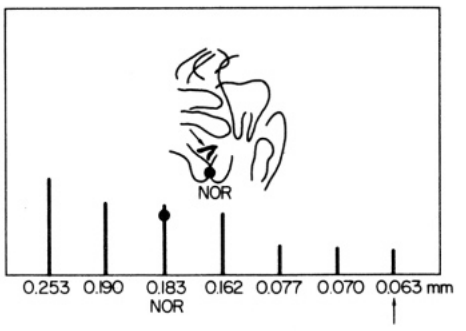
chromatin length (142 mm) ranged from 10 mm to 36 mm (Fig. 2). The X-body was 9 mm long while the nucleolar organizing region (NOR) was 26 mm long. The relative mean length of the 7 linkage groups was 0.063 mm; NOR measured 0.183 mm.

These chromosomes condensed maximally during premetaphase, with these diameters: 4.1 μ, 3.5 μ, 3.5 μ, 2.9 μ, 2.6 μ, 2.4 μ, and 2.3 μ. One autosome was distinctly large (4.12 μ long and 3.5 μ wide) and was termed macro-autosome. Later, during metaphase 1 (Fig. 1b), the X-body fused with the autosomes at the equatorial plate. The corresponding chromosome volumes were 0.029 μ^3 (NOR), 0.018 μ^3 (NOR), 0.018 μ^3, 0.01 μ^3, 0.005 μ^3, and 0.0007 μ^3 (X).



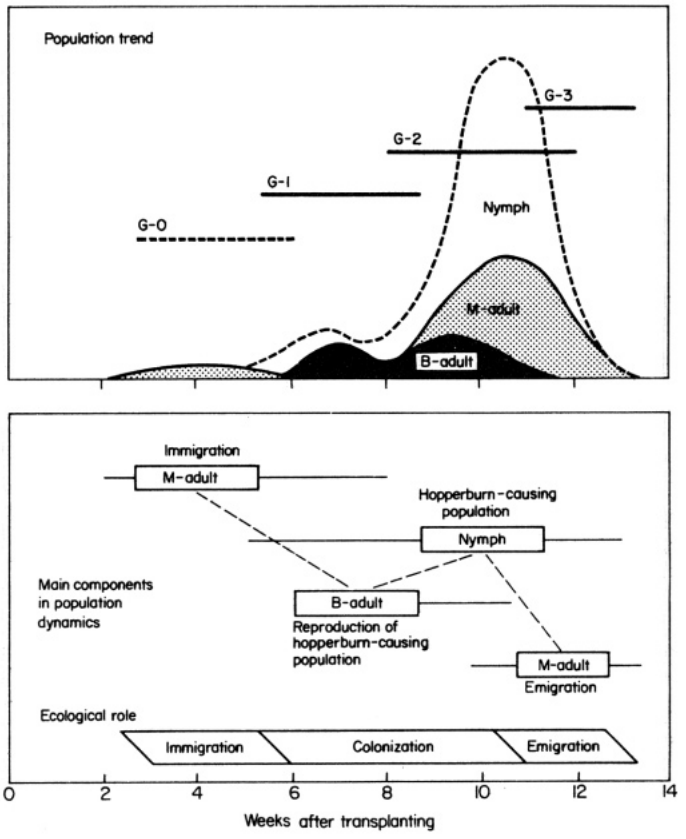
2. Camera lucida drawing of pachytene chromosomes of *N. malaynus* and their idiogram. IRRI, 1985-86. Sex chromosome is indicated by an arrow. Magnification 1250X (oil immersion).

N. malayanus has a mean meiotic index of 0.56, mean number of meiocytes 203, and mean number of nonmeiocytes 157.

During diakinesis, spontaneous chromosomal aberrations were shown by cells. In 100 cells, 10% had reduced chromosome numbers and 5% had increased chromosome numbers (Fig. 1c).

Population dynamics of the brown planthopper (BPH) in irrigated lowland areas of West Java, Indonesia

K. Sogawa, A. Kusmayadi, Y. Raksadinata, Soekirno, F. Natanegara, and T.R. Djatmono, Indonesia-Japan Joint Programme on Food Crop Protection, Directorate of Food Crop Protection, P.O. Box 36, Pasarminggu, Jakarta, Indonesia



Basic trend of BPH population development in irrigated lowland ricefields in Jatisari West Java, and important components and stages of a population cycle. G-0 to G-3 = generation, B = brachypterous, M = macropterous.

Population dynamics of the BPH were studied in six consecutive crop seasons (1983 dry season to 1985-86 wet season).

BPH- susceptible, high-yielding Pelita I/1 was planted in 10- × 10-m paddy plots. BPH population density and composition were visually counted weekly in 20- to 210-hill samples, depending on growth stage. Percentage of brachyptery was monitored weekly by sampling 5th-instar nymphs.

Although BPH populations varied considerably across the crop seasons, insect generations within a season more or less overlapped, a basic pattern of BPH population dynamics. Three ecological stages were associated with wing dimorphism (see figure):

Immigration: BPH population was initiated in newly transplanted rice fields with the immigration of a small number of macropterous adults. Immigration usually started at 3 wk after transplanting (WT) and was discontinuous throughout vegetative growth.

Colonization: Nymphs from the immigrant founders appeared at 5-6 WT. The population increased strikingly when second-generation nymphs emerged, reaching its peak at heading to flowering 9-11 WT. Before the surge in nymph population, brachypterous females emerged at 6–8 WT, indicating the shift of generation.

Wing form monitoring showed that almost all the adults that emerged before 8 WT were brachypterous, indicating that first-generation nymphs from macropterous immigrants emerged mostly as brachyptera to contribute directly to colony growth.

Emigration: Adults emerging 10 WT from the peak nymph population were predominantly macropterous and emigrated. The population usually

collapsed after that emigration.

Population density was highest at 9-11 WT, regardless of population pattern. Hopperburn depended on the nymph density at its climax. Most hopperburn-causing nymphs were considered to have come from the brachypterous females emerging 6–8 WT. Those brachypterous females emerged from the progeny of macropterous immigrants arriving at 315 WT. The densities of macropterous females at 3-5 WT and of brachypterous females at 6–8 WT, seem to be important parameters for predicting hopperburn on paddy crops at ripening.

Host range and biology of three rice caseworms

N. Chantaraprapha, Entomology and Zoology Division, Department of Agriculture, Bangkok, Thailand; and J.A. Litsinger, Entomology Department, IRRI

Three pyralid caseworms are commonly collected in light traps at IRRI. *Nymphula depunctalis* (Guenée) is a known pest of rice. The pest status of *Paraponyx* (= *Nymphula*) *fluctuosalis* (Zeller) and *Paraponyx* (= *Nymphula*) *diminutalis* (Snellen) was determined using rice and 61 ricefield weeds as hosts. Vegetative stage plants were used as caseworm attacks occur only during the first month after transplanting.

The plants were collected at IRRI and offered as food to newly hatched first-instar larvae. During the first round of screening, free-choice tests reduced the number of potential hosts to 28 (Table 1). Caseworm development was further evaluated in no-choice tests from the first larval stage through adulthood.

On all development parameters, rice was the most nutritious host; 85% larvae pupated and 67% emerged as adults. The polyphagous rice caseworm developed on 23 plant species representing 18 genera and 2 families. Survivorship to adulthood was low (2-36%) on the 22 nonrice hosts.

The larval growth index includes two developmental parameters: survival and days to pupation. A high growth index occurs with high survival and short developmental period. More than 20% of adults reared on *Leptochloa chinensis, Polytrias amaura, Chrysopogon aciculatus, Leersia hexandra,* and *Ischaemum muticum* emerged.

Neither *P. fluctuosalis* nor *P. diminutalis* survived on rice. They are true aquatic caseworms (they remain underwater during their entire larval period). *N. depunctalis* larvae are semiaquatic, ascending rice plants at night to feed.

The most suitable host of *P. fluctuosalis* and *P. diminutalis* was the

Table 1. Host plant range of 3 species of caseworms found in ricefields.[a] IRRI, 1983.

Plant[b]	Larval growth index[c]		
	N. depunctalis	*P. fluctuosalis*	*P. diminutalis*
Poaceae: Gramineae			
Oryza sativa	6.35 a	0	0
Leptochloa chinensis	1.92 b	1.5 c	0
Polytrias amaura	1.51 c	0	0
Echinochloa colona	1.50 c	0.6 f	0
Chrysopogon aciculatus	1.43 cd	0	0
Leersia hexandra	1.31 d	0	0
Ischaemum muticum	1.11 e	0	0
Phragmite vulgaris	1.04 ef	0	0
Digitaria ciliaris	1.01 ef	0	0
Paspalurn paspalodes	0.94 fg	0.3 gh	0
Echinochloa glabrescens	0.83 gh	0	0
Echinochloa crus-galli spp. *hispidula*	0.75 hi	0	0
Paspalidium flavidum	0.74 ij	0	0
Dactyloctenium aegyptium	0.58 ijk	0	0
Cynodon dactylon	0.55 jk	0	0
Chloris barbata	0.43 klm	0	0
Eleusine indica	0.28 mn	0	0
Panicum repens	0.25 n	0	0
Paspalum conjugatum	0.20 n	0.6 f	0.1 e
Cyperaceae			
Cyperus brevifolius	0.74 ij	2.4 b	0.2 e
C. rotundus	0.46 kl	0.7 f	0.9 d
C. difformis	0.36 lmn	0.2 h	0.8 d
Fimbristylis miliaceae	0.30 lmn	0.4 g	0.3 e
Hydrocharitaceae			
Hydrilla verticillata	0	3.3 a	5.2 a
Blyxa echinosperma	0	0.9 e	0.8 d
Ottelia alismoides	0	0.1 f	2.0 c
Characeae			
Chara vulgaris	0	1.4 cd	2.6 b
Commelinaceae			
Commelina diffusa	0	1.3 d	0.7 d

[a] Av of 4 replications, 25 larvae/replication. [b] These plants were not hosts to any caseworm species: *Alternanthera sessilis, Amaranthus spinosus* (Amaranthaceae); *Pistia stratiotes* (Araceae); *Ageratum conyzoides, Eclipta prostrata, Tridax procumbens* (Asteraceae); *Azolla caroliniana Azolla microphylla, Azolla pinnata* (Azollaceae); *Cleome rutidosperma* (Capparidaceae); *Pithophora* sp. (Cladophoraceae); *Commelina benghalensis* (Commelinaceae); *Ipomoea aquatica, Ipomoea triloba,* (Convolvulaceae); *Cyperus iria* (Cyperaceae); *Euphorbia hirta, Phyllonthus niruri* (Euphorbiaceae), *Marsilia minuta* (Marsileaceae); *Mimosa pudica* (Mimosaceae); *Ludwigia octovalvis* (Onagraceae); *Aeschynomene indica, Calopogonium mucunoides, Macroptilium lathyroides* (Papilionaceae); *Ceratopteris thalictroides* (Parkeriaceae); *Peperomia pellucida* (Piperaceae); *Imperata cylindrica, Polytrias amaura, Rottboellia exaltata* (Poaceae); *Eichhornia crassipes, Monochoria vaginalis* (Pontederiaceae); *Portulaca oleraceae* (Portulaceae); *Borreria ocymoides, Hedyotis biflora* (Rubiaceae); *Lindernia anagallis* (Scrophulariaceae); *Sphenoclea zeylanica* (Sphenocleaceae). [c] Growth index = pupation (%) divided by larval development (d).