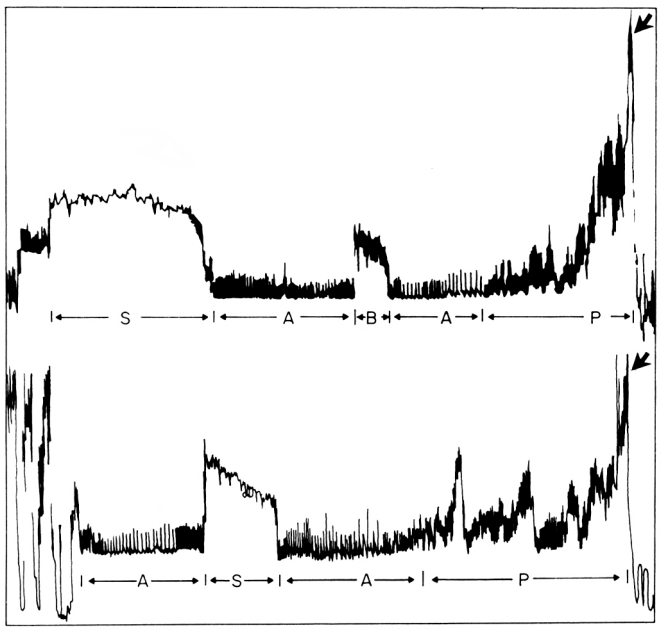
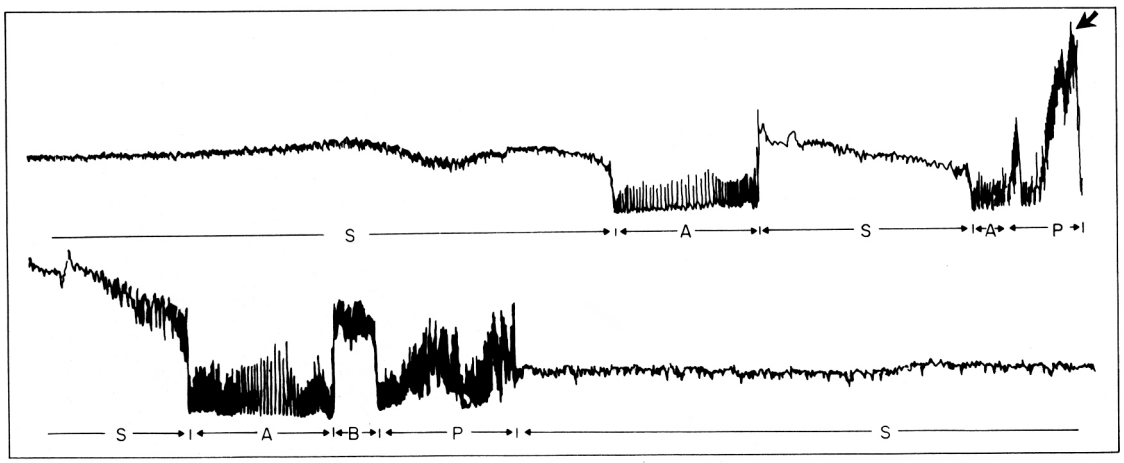
on and into the plant tissues. Subsequent stylet probing along with stylet sheath formation produced an irregular jagged pattern with gradual drop of voltage (P).

Once the BPH went into sustained sucking from sieve elements in the phloem, confirmed by excretion of honeydew rich in sucrose, stable voltage output with micro vibrations in amplitude continued (S). Between the probing (P) and sucking (S) waveforms, two types of brief but characteristic waveforms registered: a regular pulsation pattern (A) and a small plateau formed by a vertical rise of voltage (B) similar to an intermittent sucking waveform. The A and B waveforms are possibly related to sensory responses of the BPH for



1. Examples of waveforms produced by biotype I females on resistant variety IR26, Indonesia, 1987. The upper chart shows that sucking from a sieve element after a P-A-B-A sequence was discontinued shortly. The lower chart shows a very short sucking waveform between the A-waveforms.



2. Examples of waveforms produced by biotype 1 females on susceptible variety Pelita I/1, Indonesia, 1987. The upper chart indicates a process going into a sustained sucking from a sieve element after a sequence of P-A-S-A waveforms. The lower chart shows that a P-B-A sequence occurred during sustained sucking, indicating a change of sucking sites from one sieve element to another without withdrawal of the stylets from the plant. Letters A, B, P. and S indicate A, B, probing, and sucking waveforms, respectively. Arrow indicates a voltage upsurge at time of stylet insertion.

localization of sieve elements within the phloem, such as pulsatory emission of watery saliva for gustatory sensing and trial sucking.

The sequences of waveforms commonly recorded when BPH fed on susceptible rice varieties is P-A-S, P-B-A-S, or P-A-B-A-S. The same waveforms also were produced on resistant varieties.

The sucking waveform appeared only briefly, if at all on resistant varieties (Fig. 1). They lasted for a long time on susceptible varieties (Fig. 2).

This reconfirms that the varietal resistance to BPH is attributed to gustatory blockage of sustained sucking on sieve elements.

Strepsipteran parasites of rice leafhoppers and planthoppers in the Philippines

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Strepsiptera are highly host-specific parasites of auchenorhynchous Homoptera. Host records can be determined by dissecting specimens. In 1985-86, we collected leafhoppers and planthoppers by D-Vac suction machine from dryland ricefields and adjacent grasslands of Caliraya in Laguna and Claveria in Misamis Oriental and from wetland ricefields in Koronadal in South Cotabato, Calauan in Laguna, and Zaragoza in Nueva Ecija.

Two new host records for the Philippines were found, bringing the total to six (see table). The earlier record of *Halictophagus yiperi* Bohart on its sole host *Cofana longa* Merino was not detected. *Elenchus yasumatsui* Kifune et Hirashima parasitizes nymphs and adults of brown planthopper *Nilaparvata lugens* and is newly recorded on *N. bakeri, H. spectrus* Yang attacks only *Cojana spectra* and *H. munroei* Hirashima et Kifune only green leafhoppers *Nephotettix* spp.

H. bipunctatus Yang, recorded in Japan and China, was observed on *N.*

Parasitization of rice leafhoppers and planthoppers in the Philippines.[a] IRRI, 1985-86.

Host	Specimen dissected (no.)	Parasitization (%)				
		Halictophagus			*Elenchus*	
		spectrus	*munroei*	*bipunctatus*[b]	*yasumatsui*	*?japonicus*[b]
Cicadellidae						
Nephotettix virescens (Distant)	1884	–	0.1	0.3	–	–
N. nigropictus (Stal)	3621	–	–	0.1	–	–
Cofana spectra (Distant)	1875	10	–	–	–	–
Delphacidae						
Nilaparvata lugens (Stal)	4666	–	–	–	9	–
N. bakeri (Muir)[b]	430	–	–	–	0.7	–
Sogatella furcifera (Horvath)	5045	–	–	–	2.1	8
S. longifurcifera (Esaki & Ishihara)	238	–	–	–	–	3.4
S. kolophon (Kirkaldy)	175	–	–	–	–	1.1
Sogatodes pusanus (Distant)	5730	–	–	–	3.2	11

[a] *H. piperi* and its host *C. longa were not collected.* [b] New records.

virescens and *N. nigropictus. E.* nr. *japonicus* Esaki et Hashimoto was taken from the whitebacked planthopper complex *Sogatella* and *Sogatodes.*

Parasitization by strepsiptera is low, 0.1-11%, but supplements that of other nymphal-adult parasites, such as *Tomosvaryella* and *Pipunculus,* in regulating populations of rice leafhoppers and planthoppers. Strepsipterans cause castration or stylopization on the host genitalia. Usually they occur as wormlike or pupiform structures with their cephalothorax exserted between the dorsal or ventral abdominal segments of hoppers. An infested host usually has two to three adult strepsiptera embedded in its abdomen.

Nymphula africalis (Lepidoptera: Pyralidae), a pest of azolla in Nigeria

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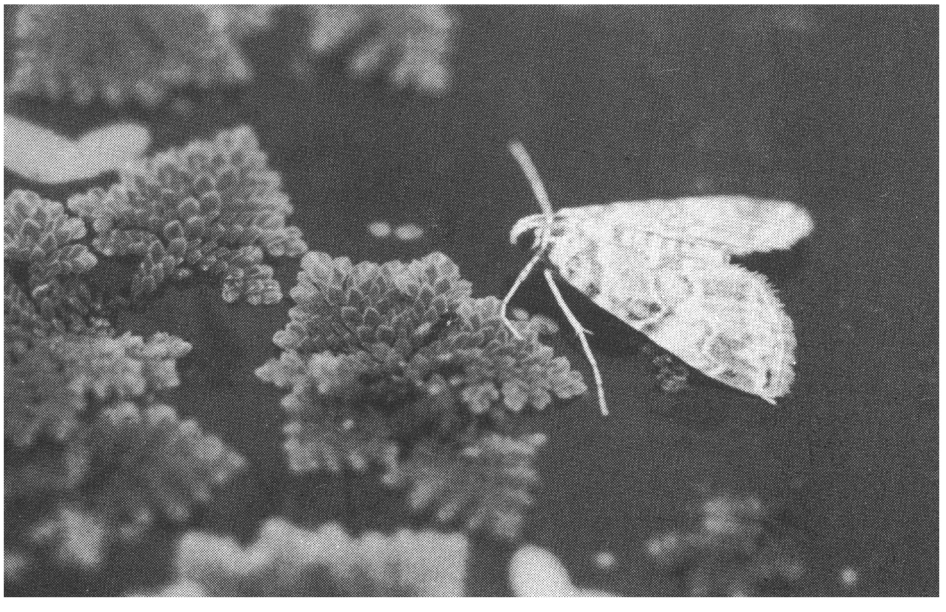
In China, six moths, one beetle, and a snail are considered major pests of azolla. Information on insect pests of azolla in Africa is scarce. In West Africa, two pests (snail *Limnea natalensis* and caseworm *Nymphula* sp.) are reported to have quickly destroyed the inoculum of *Azolla pinnata* var. *africana.*

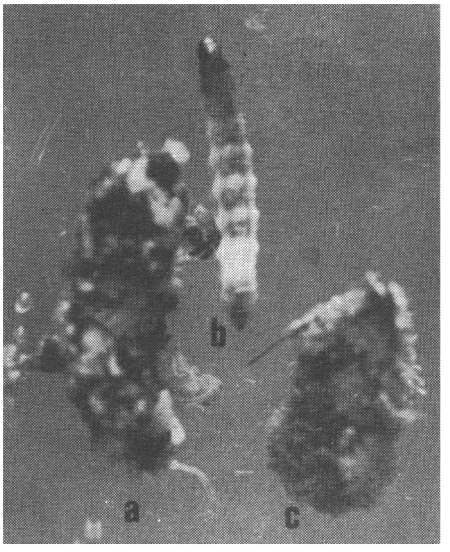
In Sep-Oct 1986, azolla in an irrigated ricefield at Ibadan was infested with caseworm *Nymphula africalis* Hampson. The adult *N. africalis* is a dull-colored moth about 10 mm long with 4 distinct wavy bands on its forewings and a 15- to 18-mm wing span (Fig. 1). Newly hatched larvae feed on azolla leaf buds.

After a few days, they conceal themselves in cases made from azolla fronds, which they carry with them as they move about for food. Larvae stretch their heads and thoraxes from the cases to feed. A full-grown larva is 15-16 mm long and will consume 9-14 azolla leaves a day.

The larval cases are about 20 mm long. Mature larvae spin cocoons inside the cases for pupation. A pupal case is about 14 mm long (Fig. 2). Pupae are brown and about 9 mm long. Adult moths emerge from cocoons within a week.



1. Adult moth of *Nymphula africalis.*



2. a) Larval case, b) full-grown larva, and c) pupal case of *Nymphula africalis.*