## SCREENING KEY FOR CAPS TARGET PYRALOIDEA IN THE EASTERN AND MIDWESTERN UNITED STATES (MALES)

1. Chaetosemata absent, if present then moth straw colored; preacinctorium present butmay be hard to find; a slide mounted cleared abdomen shows open tympanal cavitiesmedially (Crambidae)3
1'. Chaetosemata present, moths always brown and gray; preacinctorium absent; a slide mounted cleared abdomen shows closed tympanal cavities medially (Phycitinae) 2
2. Forewings narrow and mostly brown; scale and setal tufts present near base ofsacculus; apical portion of gnathos hooked; mesotibia without an oblique blackdash (honeydew moth)Cryptoblabes gnidiella
2'. Forewings with pale costal area and black distal dot; apical portion of gnathos bilobed;mesotibia with oblique black dash (cactus moth) Cactoblastis cactorum
3. Gnathos and uncus joined like a pincer; middle of hindwing with a row of scales at base of Cu vein ..... 4
$3^{\prime}$. Gnathos and uncus not joined like a pincer; middle of hindwing lacking row of scales at base of Cu vein ..... 6
4. Ocelli absent; costal process of valve large and flattened apically Diatraea considerata
4'. Ocelli present; costal process of valve, if present, blunt and triangular ..... 5
5. Frons with upper and lower ridge; triangular costal process of valve absent (Asiatic rice stem borer) ..... Chilo supressalis
$5^{\prime}$. Frons with single upper ridge; triangular costal process of valve present (spotted stalk borer) Chilo partellus
6. Forewing with scale tuft near base of costa; gnathos toothed dorsally Crocidolomia pavonana (binotalis)
6'. Forewing lacks scale tuft near base of costa; gnathos not toothed dorsally ..... 7
7. Wings white with a thick straight contrasting brown band at the margins ..... 8
7'. Wings lack a thick contrasting brown band at the margins ..... 9
8. Brown band at forewing costal margin encloses one to two pale spots (box tree pyralid) Diaphania perspectalis
$8^{\prime}$. Brown band at costal margin solid, without a pale spots ..... 9
9. White lateral margins of frontal area not reaching antennal base; dark band of forewingwidens at anal angle; hindtibia not flattened; dorsum of A5-6 dark, the rest white; analtuft no wider than two times the abdomen (pumpkin caterpillar; established in S . Fla,exotic in rest of US)Diaphania indica

9'. White lateral margins of frontal area reaching antennal base; dark band of forewing not widened at the anal angle; hindtibia flattened; dorsum of A1-5 white, A6-7 either dark or white; anal tuft 2-3 times wider than the abdomen (non-target, melonworm)

Diaphania hyalinata
10. Wings and abdomen orange with black dots; uncus elongate, the tip rounded and slightly spatulate, with a small row of spines (yellow peach moth complex)
"Conogethes spp."
$10^{\prime}$. Wings and abdomen not orange with black dots; uncus not elongate and slightly spatulate11

11. Uncus trilobed; valve with mesal spiny patch and comblike spines on
sacculus ..... 12

11'. Uncus not trilobed; valve lacks mesal spiny patch and comblike spines on sacculus
12. Forewing light yellow tan; spined zone of sacculus longer than spineless basal area (Asian corn borer)

Ostrinia furnacalis
12'. Forewing brown to tan with a slight reddish tint; spined zone of sacculus shorter than spineless basal area (non-target, European corn borer) Ostrinia nubilalis
13. Forewing with 2-3 white patches, the largest one elongate and open at the costal margin; dark border of hindwing irregular, never straight; (lima bean pod borer)

Maruca vitrata (testulalis)
13'. Forewing without 2-3 white patches and a large one open at the costal margin; dark border of hindwing absent
14. Tip of uncus clubbed; tegumen with a sharp notch at apex; forewing with a large oval spot bisected by a pointed spike (pattern may be faded) Glyphodes onychinalis 14 '. Tip of uncus not clubbed; tegumen lacks a sharp notch at apex; forewing without a large oval spot bisected by a pointed spike 15
15. Postmedial line with a medial finger like lobe; aedaegus without cornuti

Duponchelia fovealis
15 '. Postmedial line lacks a medial finger like lobe; aedaegus with or without cornuti
16. Forewing white with an irregular red brown lobed spot at the middle of the inner margin; aedaegus with a single thin cornutus 17 16'. Forewing not white with an irregular red brown lobed spot at the middle of the inner margin; aedaegus with or without a single thin cornutus Crambidae not in the key
17. Tegumen membranous (New World origins) Neoleucinodes elegantalis

17'. Tegumen sclerotized (Old World origins)
Leucinodes orbinalis

## THE MOTHS OF NORTH AMERICA



FIGURE 1: CRYPTOBLABES GNIDIELLA
a. Male forewing and hindwing; $b$. Male genitalia (left valva, aedoeagus and some scales and setae of tufts near base of sacculus omitted); $c$. Aedoeagus; $d$. Female genitalia.

## THE MOTHS OF NORTH AMERICA



FIGURE 31: VENATION AND GENITALIA OF CACTOBLASTIS CACTORUM
a. Male forewing and hindwing. b. Male genitalia (most of left valva and aedoeagus omitted) (HHN 3141). c. Aedoeagus. d. Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3142).

medial line, extending from the costa to vein 3, black-brown; both wings with the postmedial line indistinct.

Hab. Khásis; Nágas. Exp. 22 millim.
.5080. Glyphodes hormosalis, Wha. Cat. rviii, p. 516.
Pitamn letivitta, Moore, Lep. Atk. p. 217, pL. 7, fig. 21; C.\&̊ \&. no. 4230.
d. Pale yellow; palpi except at base, frons, antennm, and stripes on shoulders and vertex of thorax black; thorax below with a ridge of large leaden-coloured scales near mid lega; abdomen with the distal half black. Fore wing with the costal ares black, with three spots in cell conjoined to it; an outwardlyoblique nearly straight postmedial line with the ares beyond it black. Hind wing with postmedisl line curved from costa to anal angle, the area beyond it black.
Hab. Sikhim. Khásie:. Borneo. Exp. 36 millim.
5031. Glyphoden permpectalis, FKk. Cat. xviii, p. 515.

Phacellurs advenalis, Lod. Wien. ent. Mon. 1869, pp. 401, 478, pl. 13, Ag. 17.
Head fuscous; palpi white below; thorax and abdomen white and fuscous. Fore wing fuscous, with white spot in cell and discocellular lanule; a broad white fascis belew the cell from base to marginal ares and fascim in the interapsces beyond the cell, the two between reins $2-5$ short. Hind wing white, with broad fuscous marginal band narrowing to anal angle.
Hab. Japan; China; Dharmsáls. Expp. 50-54 millim.
5032. Glyphodes puiverulentais, n. 8p.
$0^{\prime \prime}$. Differs from negatalis ( p .347 ) in being thiokly irrorsted and stristed with black; abdomen with oblique lateral stripes; the anal tuft blsck with brown middle. Fore wing with all the markings obscured by the spots and atries; the antemedial, medial, and posimedial bands broader and less irregular, the 1st dentate inwards on vein 2, the 2nd withont discocallular spot on it, the 3rd with series of pale specks on its outer edge from vein 4 to inner margin; the dentate submarginal line replaced by a series of diffused black patches in the interspaces. Hind wing thickly irrorated and atristed; oblique black-edged brown postmedial and submarginal bands almost meating at a point near anal angle; cilis of both wings fuscous, with fulvous and brown lines at bess.

Hab. Nágas ; Tenasserim (Doherty). Expp. 30 millim. Type in coll. Elwes.
5083. Glyphoder dymalleotalis, n. sp.
ot. Differs from negatalis in being paler. Fore wing with the VOI. IV. 24


 laral i:cquierda; D) Aedeagus $\{z ; x\}$.

 izquierda de la turss oupulaltix (25x).


Fig. 2. Selected morphometric characters of the two types of yellow peach moth. $1:$ Valva of male genitalia, 2: Tegumen of malc genitalia, 3: Ovipositor of female. For abbreviations, see text.
kV under a model SE-430 (Hitachi, Tokyo) scanning electron microscope.
Nine quantitative characters (7 linear and 2 angular) were morphometrically evaluated on the male genitalia and the female ovipositor (Fig. 2). As supplementary characters, structure of the hind tibia and the hind 1st-tarsus of the male moth, papila analis of the female moth, epipharynx, mandible, labrum and pinacular of the larva and cremaster of the pupa were selected for comparisons between the two types. Some parts of these morphological characters were also compared with those of the cardamom shoot borer, C. punctiferalis from India. All morphometrical characters were also compared on photographs.

RESULTS

## Male genitalia

There were definite differences in three characters of the male genitalia between FFT and PFT although the specimens from various host plants and localities showed a little individual variation. The first discriminating character between the males of the two types was the angle of mesal projection of valva (APV) against costa (Fig. 2). As shown in Table 1, APV was distinctly larger in PFT than in FFT but no difference in this trait was observed among the populations from various host plants in each type.

The second discriminating character on the genitalia was the overall shape of valva,


Figs. 97-119. Ostrinia furnacalis (Guenée), sacculus of male genitalia. 97, Vinogradovka, Ussuri, Slide LM 11 AM; 98, Yokohama, Japan, Slide 572 C, AM; 99, Yakovlievka Spas., Ussuri, Slide LM 10 AM; 100, Yokohama, Japan, Slide 572 E, AM; 101, Yokohama, Japan, Slide 572 A, AM; 102, Yokohama, Japan, Slide 572 H, AM; 103, Yokohama, Japan, Slide 572 G, AM; 104, Yokohama, Japan, Slide 572 F, AM; 105, Yokohama, Japan, Slide 572 D, AM; 106 , Yokohama, Japan, Slide 572 I, AM; 107, Tai-shan, Shantung, China, Slide 570 C, AM; 108, Tai-shan, Shan tung, China, Slide 570 AM; 109, Tai-shan, Shantung, China, Slide 570 A, AM; 110, Tai-shan, Shantung, China, Slide 570 D, AM; 111, Tai-shan, Shantung, China, Slide 570 G, AM; 112, Bangalore, India, reared from Polygonum stems, Slide 1353 AM; 113, Kukjail, U.P., India, reared from Polygonum stems, Slide 1354 AM; 114, Kukjail, U.P., India, reared from Polygonum stems, Slide 1335 AM; 115, Amboina, Slide BM 50 AM; 116, Malay Peninsula, Slide BM 47 AM; 117, Amboina, Slide BM 49 AM; 118, Puttalam, Ceylon, Slide Pyr. 2540; 119, Malay
Peninsula, Slide BM 48 AM Peninsula, Slide BM 48 AM.



Figure 37.-Maruca testulalis (Geyer): a, ventral view of male genitalia with left harpe and aedeagus removed; $b$, aedeagus; $c$, ventral view of female genitalia.
(1) ciliate.
4. Antemedial line of forewing: (1) absent; (1) present, outwardly oblique at $45^{\circ}$; (2) present, outwardly oblique at more than $45^{\circ}$.
5. Triangular marking at middle of forewing costa: (0) absent; (1) present.
6. Tornus of hindwing: (0) without any spots; (1) with two small spots, surrounded by metallic marking; (2) with a small, triangular dark spot.,
7. Transparent spot at middle of forewing: (0) absent; (1) two, different size; (2) two, nearly the same size.
8. Sixth abdominal segment of male: (0) without scale tufts; (1) with prominent scale tufts on each side.
9. Hair pencils on lateral margin of male sixth tergum (T6): (0) absent; (1) present on each
lateral side.
10. Bundle of long hairs on lateral margin of male T8: (0) without any bundle of long hairs; (1) with 2 bundle of long hairs on each side.
11. Sclerotized part of male T8: (0) absent; (1) inverted Y-shaped, with posterior portion forming two adjacent, parallel rods (Fig. 3); (2) inverted Y-shaped, with posterior portion forming two outwardly curved rods (Fig. 2); (3) paired longitudinal rods, parallel and widely distant anteriorly then briefly curved towards each other and again parallel and less distant in posterior half (Fig. 4); (4) inverted M-shaped like, strongly sclerotized also between arms (Fig. 1).
12. Anterior edge of male eighth sternum (S8): (0) rounded (Fig. 6); (1) angled (Fig. 5); (2) sinuate (Fig. 7).


Figs. 12-18. Uncus and tegumen. 12, Glyphodes doleschalii; 13, G. caesalis; 14, Metallarcha diplochrysa 15 Coninapila. 16, G. conjunctalis; 17, Agrioglypta itysalis; 18, G. onychinalis. hd: head of uncus; tg: tegumen; tr: transtilla.


Figs. 19-22. Valvae of male genitalia (ventral view). 19, Glyphodes cosmarcha; 20, G. canthusalis; 21, G. doleschalii; 22, Dysallacta megalopa. ct: costa; fb: fibula; pd: pedunculi; pl: plate at medial valvae; sl: sclerotized line; tr: transtilla.


Figs. 23-26. Vinculum of male genitalia. 23, Glyphodes doleschalii; 24, G. cosmarcha; 25, Metallarcha eurychrysa; 26, Dysallacta megalopa. jx: juxta; vc: vinculum.


Fig. III
Duponchelia fovealis (Zeller). Apparato genitale maschile di lato (1); dal dorso (2); dal ventre (3); particolare della culcita (4); pene (5).
ae=sedeagus; $\quad$ am=ampulla; $\mathrm{cl}=$ clasper; $\quad c o=$ costa; $\mathrm{cu}=$ cucullus; du.ej=ductus ejaculatorius; $p=$ penis; $s a=$ saccus; $\operatorname{tg}=$ tegumen; $u n=$ uncus; va $=$ valvae.

Ciascuna valva presenta flessioni sclerificate, dall'asps nella parte ventrale, al di sc estroflessione digitiforme sin

Il penis (p) è allungato $e$ drico con il coecum peris pii due espansioni del tipo rostr.

Apparato genitale femminile


Fig. IV
Duponchelia fovealis (Zeller). AF genitale femminile.
antr=antrum; apo.ant $=$ apophys teriores; apo. $\mathrm{po}=$ apophyses posteriore
=bursa copulattix; du.bu=ductus $k$ $0 . b=$ ostium bursae; pap.a=papillae


Figs. 1-2. Male adult dorsal view. 1, Neoleucinodes silvaniae. 2, N. elegantalis.
with $30 \%$ ethanol. The other fifty percent of the infested fruits were placed in separate rearing containers where larvae matured and pupated within cocoons in paper towels. After emergence, the moths were frozen, wings were spread, and specimens were labelled. The specimens are deposited at COPROICA in Palmira.

Eighty-eight male and female genitalic preparations ( $50 \%$ males, $50 \%$ females) were made from different species feeding on different host plants. The abdomen of the adult was removed, cleared in $10 \%$ KOH , transferred to $15 \%$ ethanol, and brushed to remove scales. Then they were stained with chlorazol black and the
excess color ren Before slide mour the clove oil was ri

Observations и M5 dissecting m Laborlux-S comp ments made using Heerbrugg Switze ed female genital length, and labial cally, the length ( (from the ostium end of the corpus of A7, length from the anterior end from the intersegn anterior margin of the anterior and r camera lucida was of the third labial adults, and its measured from th wing length was n . to apex, and the from the costal margin along the $r$ :

The following a National Museum Washington, D.C logical Museum, National Universi gotá (UNAB); Nat lection of Insect " (CTNI). Morphol according to Mun and Maes (1995) fo (1987) for the larve

The diagnosis of includes only deri napomorphies. Th species were compa species from the W Neoleucinodes ( $N$. N. dissolvens ( D : (Dyar), N. torvis C ialis (Guenée)), an lated genera, Proel Hampson, P. xylo addition, the adult

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Figs. 11-15. Genitalia. 11, Male Neoleucinodes silvaniae 12 N. eleguntulis. 14, Female N. silvaniae. 15, Female N. elegantalis.
subventral setae SV thorax and metathc ventral seta, SV1. A seta on pinaculum d cle. Seta SD2 preser. borne on pigmented to spiracle (Fig. 19). in same pinaculum position in relation D2, D1, SD1 and highly sclerotized f L3 present, L1 and on prolegs of A6 mesally; an incomple outwardly on lateral

Biology.-Neoleuı reared on a wild so num lanceifolium Ja gato" in Spanish b (Figs. 24-25). One one larva of $N$. sil fruits have a scar the oviposition site, and exit hole before pup $N$. silvaniae are paı soma sp. (Hymenop

Distribution.-Cc Cundinamarca.

Type material.-] lombia, Cundinama: Bajo, Finca Villa $74^{\circ} 37^{\prime} 6.41^{\prime \prime} \mathrm{W}, 1,64$ Ex. Solanum Solanu Collected by A.E. $]$ Diaz) [UNAB]. Parz same data as holoty

Etymology.-The niae is the name Silvania, where it wa

Species comparis silvaniae appears ide lis, but it can be disti: third labial palpal se males of $N$. silvan labial palpi in $N$. ele dimorphic, the fema labial palpal segmen shorter (Figs. 4,6). T in the females of $N$. :

