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 but may be hard to find; a slide mounted cleared abdomen shows open tympanal cavities medially (Crambidae) 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 of sacculus; apical portion of gnathos hooked; mesotibia without an oblique black dash (honeydew moth) Cryptoblabes gnidiella 2'. Forewings with pale costal area and black distal dot; apical portion of gnathos bilobed; Cactoblastis cactorum mesotibia with oblique black dash (cactus moth) 3. Gnathos and uncus joined like a pincer; middle of hindwing with a row of scales at base of Cu vein 3'. 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'. 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'. 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 forewing

widens at anal angle; hindtibia not flattened; dorsum of A5-6 dark, the rest white; anal tuft 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'. Wings and abdomen not orange with black dots; uncus not elongate and slightly spatulate 11

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

11'. Uncus not trilobed; valve lacks mesal spiny patch and comblike spines on sacculus13

12. Forewing light yellow tan; spined zone of sacculus longer than spineless basal area (Asian corn borer) Ostrinia furnacalis

12

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

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

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).

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Chilo suppressells 4-6. Male genitalia. 4. Main part, ventral view. 5. Uncus and vinculum, lateral view. 6. Aedeagus, lateral view. 7. Female genitalia, ventral view (Drawn by Mar-Lou Cooley, Systematic Entomology Laboratory, ARS, USDA).



Chilo percellus genitalia. 4-6. Male genitalia, 4. Main part, ventral view, with complex, sclerotized juxta shown tilted to left. 5. Vinculum and uncus removed and shown in lateral view. 6. Aedeagus, lateral view. 7. Female genitalia, ventral view, but ovipositor twisted to left and shown laterally (Drawings by Mary Lou Cooley, Systematic Entomology Laboratory, ARS, "SDA).



Fig. 112-121. Male genitalia. 112. Crocidolomia pavonana; 113, aedeagus; 114, uncus tip; lectotype of comalis, BMNH slide 1425

GLYPHODES.

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

Hab. Khásis; Nágas. Exp. 22 millim.

.5030. Glyphodes hermesalis, WIk. Cat. zviii, p. 516.

Pitama lativitta, Moore, Lep. Atk. p. 217, pl. 7, fig. 21; C. & S. no. 4230.

J. Pale yellow; palpi except at base, frons, antennæ, and stripes on shoulders and vertex of thorax black; thorax below with a ridge of large leaden-coloured scales near mid legs; abdomen with the distal half black. Fore wing with the costal area black, with three spots in cell conjoined to it; an outwardlyoblique nearly straight postmedial line with the area beyond it black. Hind wing with postmedial line curved from costa to anal angle, the area beyond it black.

Hab. Sikhim : Khásis ; Borneo. Exp. 36 millim.

5031. Glyphodes perspectalis, WIk. Cat. xviii, p. 515. Phacellura advenalis, Lod. Wien. ent. Mon. 1863, pp. 401, 478, pl. 13, fig. 17.

Head fuscous; palpi white below; thorax and abdomen white and fuscous. Fore wing fuscous, with white spot in cell and discoccellular lunule; a broad white fascia below the cell from base to marginal area and fasciæ in the interspaces beyond the cell, the two between veins 2-5 short. Hind wing white, with broad fuscous marginal band narrowing to anal angle.

Hab. Japan; China; Dharmsála. Exp. 50-54 millim.

5032. Glyphodes pulverulentalis, n. ep.

d. Differs from negatalis (p. 347) in being thickly irrorated and striated with black; abdomen with oblique lateral stripes; the anal tuft black with brown middle. Fore wing with all the markings obscured by the spots and strize; the antemedial, medial, and postmedial bands broader and less irregular, the 1st dentate inwards on vein 2, the 2nd without discocallular spot on it, the Brd 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 striated; oblique black-edged brown postmedial and submarginal bands almost meeting at a point near anal angle; cilia of both wings fuscous, with fulvous and brown lines at base.

Hab. Nágas; Tenasserim (Doherty). Exp. 30 millim. Type in coll. Elwes.

5083. Glyphodes dysallactalis, n. sp.

d. Differs from negatalis in being paler. Fore wing with the VOL. IV. $2 \blacktriangle$

Martes Google



Morphology of Yellow Peach Moth



Fig. 2. Selected morphometric characters of the two types of yellow peach moth. 1: Valva of male genitalia, 2: Tegumen of male 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; 106, Yokohama, Japan, Slide 570 AM; 107, Tai-shan, Shantung, China, Slide 570 A, AM; 110, Tai-shan, Shantung, China, Slide 570 G, 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 1354 AM; 114, Kukjail, U.P., India, reared from *Polygonum* stems, 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.





FIGS. 140–154. Ostrinia nubilalis nubilalis (Hübner), male genitalia. 140, genitalia (left side omitted); 141–154, sacculus. 140, Port Washington, Long Island, N.Y., U.S.A., Slide 897 AM; 141, Csehtelek Bihar C., Hungary, Slide BM 38 AM; 142, Csehtelek Bihar C., Hungary, Slide BM 42 AM; 143, Csehtelek Bihar C., Hungary, Slide BM 40 AM; 144, Csehtelek Bihar C., Hungary, Slide BM 36 AM; 145, Csehtelek Bihar C., Hungary, Slide BM 37 AM; 146, Csehtelek Bihar C., Hungary, Slide BM 36 AM; 145, Csehtelek Bihar C., Hungary, Slide BM 37 AM; 146, Csehtelek Bihar C., Hungary, Slide BM 36 AM; 147, E. Lansing, Mich., U.S.A., Slide 901 AM; 148, Chatham, Ont., Canada, Slide 896 AM; 149, Moose Factory, Ont., Canada, Slide 898 AM; 150, Port Washington, Long Island, N.Y., U.S.A., Slide 897 AM; 151, Indiana Dunes St. Pk., Fremont, Ind., U.S.A., Slide 902 AM; 152, Indiana Dunes St. Pk., Fremont, Ind., U.S.A., Slide 903 AM; 153, Indiana Dunes St. Pk., Fremont, Ind., U.S.A., Slide 899 AM.



Cladistic Analysis of Glyphodes Group

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(1) ciliate.

- Antemedial line of forewing: (1) absent; (1) present, outwardly oblique at 45°; (2) present, outwardly oblique at more than 45°.
- Triangular marking at middle of forewing costa:
 (0) absent; (1) present.
- 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.
- 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.

- Bundle of long hairs on lateral margin of male T8: (0) without any bundle of long hairs; (1) with a bundle of long hairs on each side.
- 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).
- Anterior edge of male eighth sternum (S8): (0) rounded (Fig. 6); (1) angled (Fig. 5); (2) sinuate (Fig. 7).







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=aedeagus; am=ampulla; cl=clasper; co=costa; cu=cucullus; du.ej=ductus ejaculatorius; p=penis; sa=saccus; tg=tegumen; un=uncus; va=valvae. Ciascuna valva presenta flessioni sclerificate, dall'aspe nella parte ventrale, al di sc estroflessione digitiforme sin Il *penis* (p) è allungato e drico con il *coecum penis* più due espansioni del tipo *rostr*.

Apparato genitale femminile



Duponchelia fovealis (Zeller). Ar genitale femminile.

antr=antrum; apo.ant=apophys teriores; apo.po=apophyses posteriore ≈butsa copulatrix; du.bu=ductus k o.b=ostium bursae; pap.a=papillae 898

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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

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excess color ren Before slide mour the clove oil was ru

Observations w 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 m 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). Morphola according to Mun and Maes (1995) fo (1987) for the larva

The diagnosis of includes only deriv 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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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 r L3 present, L1 and on prolegs of A6 mesally; an incomple outwardly on lateral

Biology.—Neoleuc 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 pai soma sp. (Hymenop Distribution.—Cc

Cundinamarca.

Type material.—] lombia, Cundinama Bajo, Finca Villa 74°37′6.41″W, 1,64 Ex. Solanum Solanu Collected by A.E. 1 Diaz) [UNAB]. Para 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). 7 in the females of N. 4