

A NEW SPECIES OF HELIOTHIS RESEMBLING
HELIOTHIS ZEA (BODDIE), CORN EARWORM
(LEPIDOPTERA: NOCTUIDAE)

GEORGE T. OKUMURA AND WILLIAM R. BAUER



BUREAU OF ENTOMOLOGY
DEPARTMENT OF AGRICULTURE
SACRAMENTO, CALIFORNIA

EDITORIAL BOARD

Fred G. Andrews, *Editor*

Michael R. Gardner, *Associate Editor*

Terry N. Seeno, *Library Chairman*

BUREAU OF ENTOMOLOGY

Robert W. Harper, *Chief*

CALIFORNIA DEPARTMENT OF AGRICULTURE

1220 N STREET

SACRAMENTO, CALIFORNIA 95814

The OCCASIONAL PAPERS of the Bureau of Entomology will serve as a medium for papers dealing with arthropod systematics by various individuals, primarily systematists associated with the California Department of Agriculture.

These papers will have no set publication date, but will be numbered consecutively and will appear as the respective articles are completed. As there will be no definite volumes, when approximately 300 pages are completed a TABLE OF CONTENTS will be provided to cover the issues totaling these pages.

Individual copies will be sent free of charge upon request and a regular mailing list will be maintained, including libraries and specialists. Manuscripts will be considered for publication in the order in which they are received, unless total cost of publication is prepaid. In the latter case publication will be immediate. Address all correspondence to the editor.

This issue mailed on November 19, 1969

A NEW SPECIES OF HELIOTHIS RESEMBLING
HELIOTHIS ZEA (BODDIE), CORN EARWORM
(LEPIDOPTERA: NOCTUIDAE)

George T. Okumura and William R. Bauer
California Department of Agriculture

INTRODUCTION

Heliothis zea (Boddie), commonly known as corn earworm, bollworm and tomato fruitworm, is a serious pest of many agricultural crops in the United States. In California alone this insect caused over 28 million dollars in crop loss and necessitated an additional 14 million dollars worth of insecticide application in 1967. Future research will probably show that part of the above expenditure and loss can be attributed to the following new species of *Heliothis*.

A specimen resembling *H. zea* but possessing strikingly different genitalia was collected at Five Points, Fresno County, California. Subsequent collections of additional material in light traps throughout California have confirmed the existence of a new species, the first known species closely resembling *H. zea* in the United States. The relative scarcity of this new species and its similarity to *zea* possibly explain the long delay in its discovery.

ACKNOWLEDGEMENTS

The authors are grateful to Mr. Victor Stompler of Del Monte Corporation for making the original collection and to Dr. W. H. Lange, Jr., University of California, Davis, and Mr. Clayton Haws, Research Manager for Del Monte Corporation, for making available light trap material from the various parts of California. We are thankful to Dr. E. L. Todd of the U. S. National Museum for his comments and suggestions and for comparing the new species with types in the national collection. We would like to thank the following individuals for providing specimens: Mssrs. Bireley Landis, Lyman McLaughlin, Robert Wallis, Dr. Albert Kishaba and Dr. Harold Toba, USDA Fruit and Vegetable Insects Research Branch, Mr. Terry Sears, University of California, Davis, Dr. Daniel Gonzales of University of California at Riverside and Dr. Louis

Falcon of the University of California, Berkeley. We are appreciative of Mr. Mike Pezzola of Del Monte Corporation for servicing a light trap in Yolo County. The photographs and illustrations were done, respectively, by Mr. George Buxton and Mrs. Iris Savage of the California Department of Agriculture.

Heliothis stombleri, new species

HOLOTYPE MALE (Fig. 1): Vestiture of head and thorax light olivaceous buff, slightly darker than ground color of forewing; abdomen light yellowish buff. Underside of body light yellowish buff. Underside of fore femora with patch of coarse scales.

Forewing. Upper side of forewing light yellowish buff with some darker shading. Basal line barely visible, originating at costa with one outward angle and ending at cubital vein. Transverse anterior (t.a.) line faint, grayish brown with three angles; angled between costa and cubital vein, between cubital and anal vein and between anal vein and hind margin of wing. T.a. line accented with black at costa, cubital, and anal veins. Transverse posterior (t.p.) line grayish brown, originating on costa above reniform, curving outward around reniform, then curving inward to hind margin. T.p. line strongly crenulate with an elongate patch of black scales followed by white scales at points of most crenulations. Subterminal line irregular, somewhat accented between veins. Median shade thin, faintly visible, outwardly angled from costa to reniform mark, then irregularly angled inwardly to hind margin. Subbasal patch of lead-colored scales. Orbicular spot black, nearly round and well defined, encircled by a faint incomplete ring. Reniform mark composed of black scales, well rounded inwardly and concave outwardly. Terminal line composed of black dots between veins. Terminal space slightly paler than basal and median spaces. Subterminal space shaded with olivaceous gray. Fringe brownish with a pale median line.

Underside of forewing pale yellowish buff, paler than upper side. Orbicular spot and reniform mark black-brown, sharply contrasting with ground color. T.p. line broad, blackish brown, becoming fainter towards anal vein where it ends. Subterminal space with distinct band from costa to anal vein, band darkest medially and with reddish scaling at costa. Terminal spots between veins. Fringe shaded with brown.

Hind wing. Upper side of hind wing yellowish white with a broad blackish brown outer marginal band. Patch of yellowish white scales near center of outer margin bisected by the dark scaling of vein cu_1 . Veins clothed with blackish brown scales. An obscure narrow dark line very near inner side of outer marginal band. Inner margin of wing shaded with blackish brown. Discal mark narrow, blackish brown and slightly curved. Fringe yellowish at base and whitish at tips with a darker uneven shade through middle.

Underside of hind wing generally paler than underside of forewing. Pale reddish brown postmedian line extending from costa to cu_2 , with some faint shading beyond postmedian line and a broad wedge of dark shading at cu_2 . Some reddish scaling along costa. Fringe light yellowish, whitish at tips.

Length of forewing: 18 mm.

ALLOTYPE FEMALE (Fig. 5): Vestiture of head and thorax olivaceous brown, somewhat darker than ground color of forewing; vestiture of abdomen light yellowish buff. Underside of body generally light yellowish buff. The terminal genital structures are ventrally exposed, recessed in a pouch which is bordered anteriorly by the strong emargination of the eighth abdominal sternite (Fig. 11).

Forewing. Upper side of forewing yellowish brown, generally darker than male. Transverse lines brown, more pronounced than male. Subbasal patch of lead-colored scales more extensive. Underside of forewing similar to male but reniform mark broader and darker, more sharply contrasting with ground color. Subterminal space more broadly and darkly shaded.

Hind wing. Upper side of hind wing with outer marginal band broader than male. Light colored patch near center of marginal border less pronounced. Inner margin of wing more widely shaded with blackish brown. Discal mark broader. Underside of hind wing similar to male but with a narrow discal mark and more extensive dark shading beyond postmedian line.

Length of forewing: 19 mm.

MALE GENITALIA OF HOLOTYPE (Figs. 9 & 9a): Valve slender, lanceolated, corona absent. Uncus tapering to a point, dorsum with sparsity of hairs. Cornuti absent in reduced slender vesica.

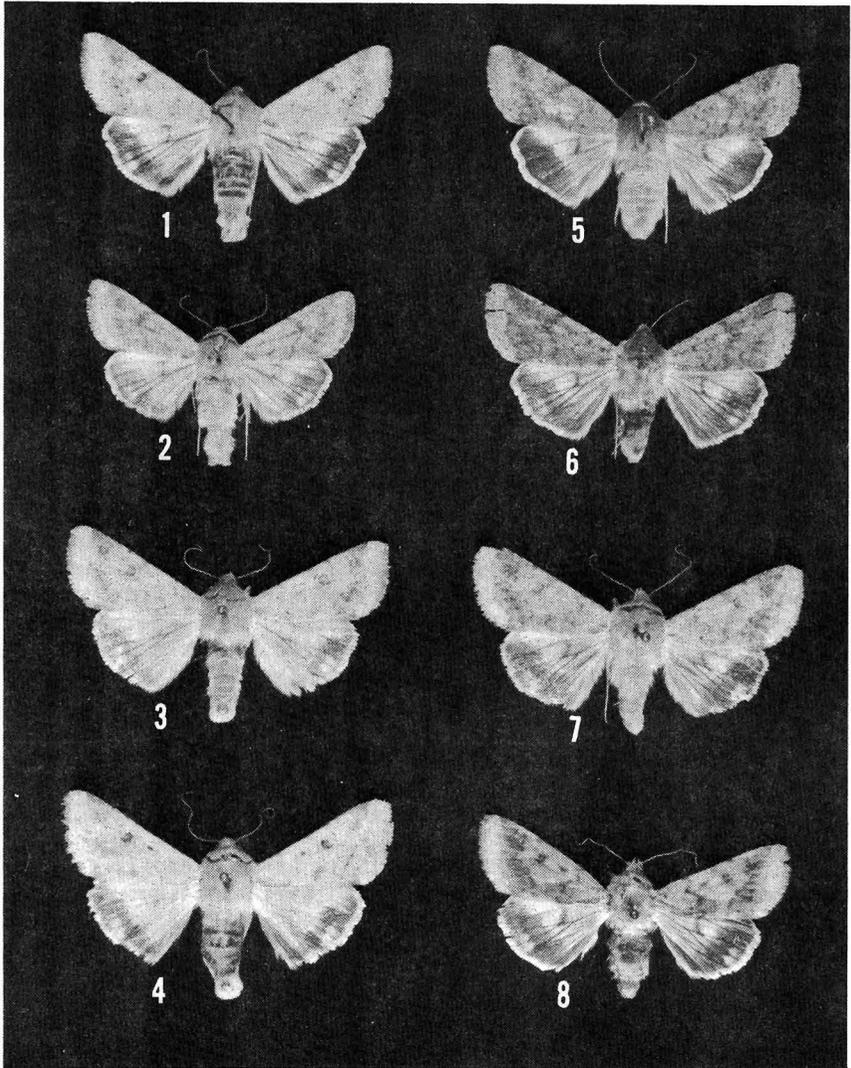
FEMALE GENITALIA OF ALLOTYPE (Fig. 10): Large, heavily sclerotized ostial plate present. Bursa copulatrix continuous with bursa seminalis, both delicately membranous. Bursa copulatrix with sclerotized lobe. Signa absent.

TYPE MATERIAL AND DEPOSITION

Holotype male: Davis, Yolo County, California, fluorescent light trap, IX-2-1969 (W. H. Lange, Jr.). Allotype female; Yolo, Yolo County IX-30-1969 (V. Stomblor).

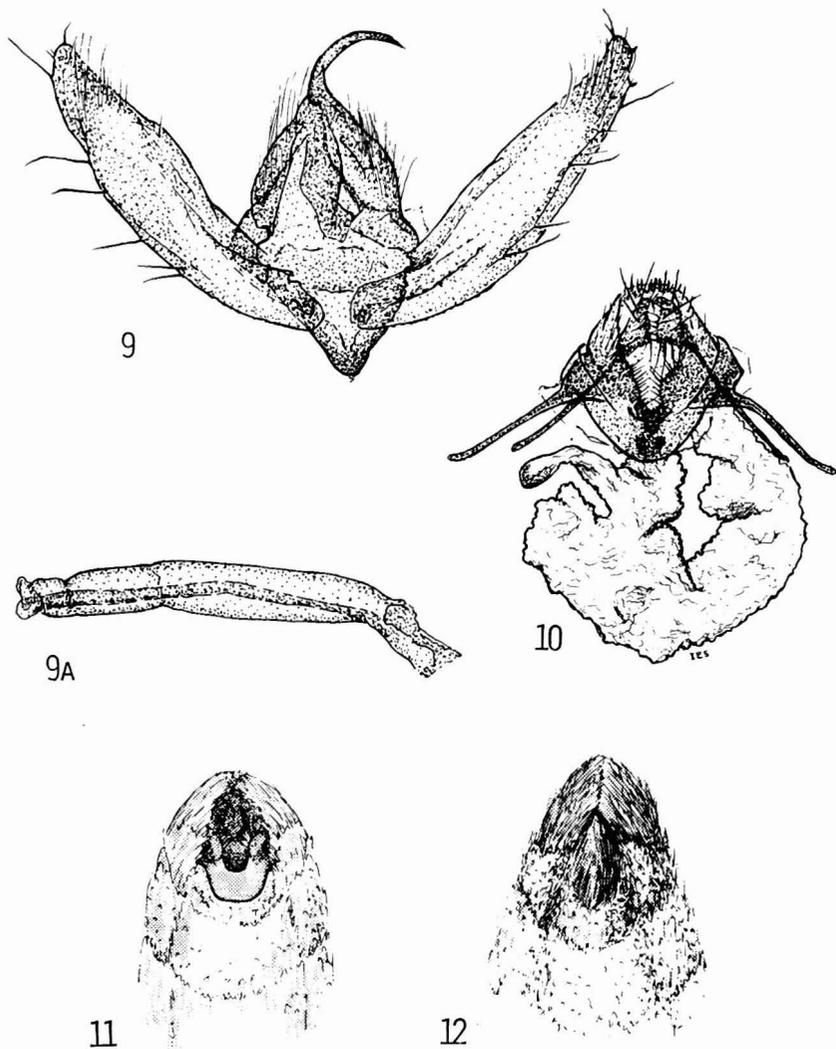
The holotype Male (TYPE NO. 68158) and allotype female will be deposited in the U. S. National Museum. Paratypes will be deposited in the collections of the following institutions: U. S. National Museum, University of California at Davis, University of California at Berkeley, California Academy of Sciences, Southern California Academy of Sciences, American Museum of Natural History, Cornell University, Canadian National Collection, and California Department of Agriculture.

Paratypes: 79 males, 36 females (all from light traps).



Figures 1-8, dorsal aspect of *Heliothis stombleri* Okumura & Bauer

- Fig. 1. Holotype male. Davis, Yolo Co., Calif. IX-2-1969.
Fig. 2. Paratype male. Yolo, Yolo Co., Calif. X-2-1969.
Fig. 3. Paratype male. Yolo, Yolo Co., Calif. IX-14-1969.
Fig. 4. Paratype male. Davis, Yolo Co., Calif. IX-10-1969.
Fig. 5. Allotype female. Yolo, Yolo Co., Calif. IX-30-1969.
Fig. 6. Paratype female. Yolo, Yolo Co., Calif. X-22-1969.
Fig. 7. Paratype female. Davis, Yolo Co., Calif. IX-22-1969.
Fig. 8. Paratype female. Davis, Yolo Co., Calif. VIII-22-1969.



Figures 9-11, *Heliothis stombleri* Okumura & Bauer

- Fig. 9 Male genitalia minus aedeagus, ventral view, holotype.
 Fig. 9a Aedeagus, holotype.
 Fig. 10 Female genitalia, ventral view, allotype.
 Fig. 11 Ventral view of distal end of paratype female abdomen showing rounded emargination on 8th sternite.
 Fig. 12 *Heliothis zea* (Boddie), ventral view of distal end of female abdomen.

California. Colusa Co.: College City, IX-16-1969 (V. Stomblor). Fresno Co.: Five Points, VII-10-1969 (V. Stomblor). Kern Co.: Shafter, VIII-10-1967 (D. Gonzales). Merced Co.: Los Banos, VIII-26-1969 (V. Stomblor). Monterey Co.: Moss Landing, IX-9-1969 (W. H. Lange, Jr.). Riverside Co.: Home Gardens, X-1-1969 (A. Kishaba). Sacramento Co.: Sacramento, X-4-1969 (G. T. Okumura). San Bernardino Co.: Norton Air Force Base, X-7-1969 (W. D. Gardner). San Diego Co.: San Ysidro, IX-16-1969 (D. Weedmark). San Joaquin Co.: Linden, VIII-22-1969 (V. Stomblor). San Mateo Co.: Half Moon Bay, 1969 (W. H. Lange, Jr.). Yolo Co.: Davis, IX-2-1969 (W. H. Lange, Jr. and W. R. Bauer); Yolo, IX-30-1969 (V. Stomblor).

Additional specimens: MEXICO, *Sinaloa*. Choix, III-22-1968, (T. A. Sears), light trap; USA. *Missouri*. Boone Co.: Columbia, VIII-8-1967 (A. T. McClay); *Washington*. Yakima Co.: Yakima, X-10-1969 (L. L. McLaughlin).



Fig. 13. Known distribution of *Heliothis stombleri* Okumura & Bauer in United States and Mexico

Since Victor Stomblor collected the first individual of the new species examined by us and made arrangements to obtain more specimens from various parts of California, we are pleased to name the insect's scientific and common names after him. Some insects, including *H. zea*, have many common names which have caused confusion; therefore, from the start the authors are giving this new species the common name "Stomblor moth" to avoid a similar problem.

DISCUSSION

The male of *H. stomblori* (Figs. 1-4) varies in color from pale yellowish buff to yellowish olive, and in some specimens there is a general mottling of the forewing with olivaceous hues. The maculation is sometimes reduced to black markings of the orbicular spot and reniform mark and points of the crenulations of the transverse posterior line. In other specimens the markings are all present and clearly defined. There may or may not be a claviform mark visible. Color in the female (Figs. 5-8) varies from yellowish brown to olivaceous brown and some may show a slight reddish hue. In most female specimens the terminal space is the lightest part of the wing and the maculation is usually clearly defined, but in some specimens the dark suffusion obscures the pattern. In some female specimens, including the allotype, the light colored patch near center of marginal border of hind wing is obscured by the dark shading.

There are some color forms of *H. zea* which have not appeared in our specimens of *H. stomblori*. These include both the greenish and reddish extremes of *zea*.

The genitalia of *H. zea* and *H. stomblori* are distinctly different in both male and female. The male *stomblori* possesses an acute, tapering uncus with the dorsum sparsely setose, while in *zea* the tip of the uncus is aquiline with a densely setose dorsum. The valve of *stomblori* is slender, lanceolate and without corona. In *zea* the valve is distally expanded and with corona. The eighth abdominal sternite in the female of *stomblori* exhibits a heavily sclerotized ostial plate and the bursa lacks signa, while in *zea* the ostial plate is lightly sclerotized and the bursa has signa.

The authors have studied the corn earworm and the Stomblor moth critically--eyes, antennae, wing venation, legs, abdomen--but could not find any definite external character to differentiate one from the other, except for the emargination of the eighth sternite in the female. At our request, Dr. E. L. Todd kindly examined the two species and commented, "I have been unable to find any reliable external character to separate this new species from *H. zea* except the rounded emargination on the 8th abdominal sternite of the female which you mentioned to me." Until someone finds a definite distinguishing external character, it appears now that the males of these two species can be distinguished only by examining the genitalia.

Stompler moth is at present known to occur throughout California and in Missouri, Washington, and Sinaloa, Mexico (Fig. 13). 1967 collection dates from light trap material in California and Missouri are at present the oldest known. As specimens of *Heliothis* from intervening areas are studied, the disjunct distribution will undoubtedly be filled in and earlier collection dates established.

L. McLaughlin collected eight larvae which he assumed were corn earworm on corn, 17 miles west of Othello on the Royal Slope, Grant County, Washington. He reared them out and sent the adults to the authors for examination. One of the adults proved to be a Stompler moth, thus establishing corn as the first known food plant of this species. Light traps placed in tomato fields have produced several Stompler moth collections and have brought tomato under suspicion as a possible host. We believe it likely that several agricultural crops are in fact attacked by the Stompler moth.

Two female Stompler moths were collected alive and the eggs laid by both specimens were unfertile. Seventy pupae of *Heliothis* are now being reared by Drs. W. H. Lange, Jr., A. Kishaba and H. Toba who are working on the biology.

References

- Hardwick, D. F., 1956. The corn earworm complex. Mem. Entomol. Soc. Can. 40:1-247.
- Lange, W. H. and A. E. Michelbacher, 1937. Two closely related species of *Heliothis* found in tomato fields of Central California. Bull. Dept. Agr. 26:320-325.
- Siverly, R. E., 1947. A morphological study of the male and female genitalia of *Heliothis armigera* (corn earworm moth). Am. Midland Natur. 38:712-724.
- Todd, E. L., 1955. The distribution and nomenclature of the corn earworm. J. Econ. Entomol. 48:600-603.