A New Species of Bromeliad-Breeding *Culex (Culex)* from Cocos Island[1]

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Cocos Island (5°32'57"N and 86°59'17"W) has been visited by few entomologists and its insect fauna is very imperfectly known (Hertlein, 1963:250-252). Although the existence of an unnamed *Culex* was indicated to J. N. Belkin in 1964 from a few specimens taken by R. O. Schuster with the Galapagos International Scientific Project, it was not until I was able to make further collections of this mosquito and complete individual rearings during a stay on the island in April, 1975, that the species' status could be confirmed.

For the great privilege of seeing Cocos Island and being able to carry out this work I am indebted to Mr. Timothy M. Doheny of Los Angeles, California, who personally sponsored a general zoological expedition to Costa Rica in 1975, including five days on the island, 17-22 April. Operations were based at Wafer Bay and supplied from the R/V Qualifier 105 out of San Diego (Mr. Bruce Barnes, owner). In recognition of this and his many past contributions to zoology, I am delighted to name the species after Mr. Doheny.

In addition to thanks due to him and other members of the expedition, I wish to express my special appreciation to Profs. Manuel M. Murillo and William A. Bussing, Universidad de Costa Rica, for assistance in arranging and conducting the trip. Permission to carry out these investigations was kindly granted by Ing. Eduardo Bravo F., Director, Direccion General de Recursos Pesqueros y Vida Silvestre, Ministerio de Agricultura y Ganaderia, Government of the Republic of Costa Rica. I thank also Miss Loraine E. Greve for assistance in preparing the illustrations and Dr. John N. Belkin and Sandra J. Heinemann for criticizing the manuscript and offering valuable suggestions and inclusions.

Culex (Culex) dohenyi Hogue, sp. n.

Figs. 1,2

TYPES. *Holotype* male (CR 591-50) with slides of associated pupal and larval skins and genitalia: Wafer Bay, Cocos Island, Costa Rica, sea level, larva from arboreal bromeliad, 18 April 1975, C. L. Hogue collector [USNM]. *Allotype* female (CR 591-56) with slides of associated pupal and larval skins, same data as holotype [USNM]. *Paratypes:* 21 1pM (CR 591-19-21,24,26,28,29,32-35, 37,39,42,49,50,53-55,57,58), 16 1pF (591-14-16,23,25,27,30,36,40,44,45,48,51,52,56,59), 3 pM (591-10-12), 2M (593), 4F (593) and 276 L (591), same data as holotype. 1F, 7L (CR 200), Chatham Bay, Cocos Island, Costa Rica, 8 April 1964, R. O. Schuster collector [LACM, UCLA, BM].

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FEMALE. *Measurements:* Wing length 2.6 mm. Proboscis 1.5. Palpus 0.25. Forefemur 1.5. Abdomen 1.8. *General:* A medium-sized *Culex,* nearly identical with *C. (C.) nigripalpus* Theobald. Integument light brown, thoracic pleuron distinctly paler than mesonotum. *Head:* Decumbent scales light coppery brown, white laterally; erect scales dark brown. Proboscis and palpus dark brown-scaled, the former slightly paler ventrally. *Thorax:* Mesonotal scales all light bronzy or coppery brown, white scale patches entirely absent. Pleuron without scales except for a few narrow ones in upper *ppn* and rarely *stp. Legs:* Almost completely dark, metallic-scaled. Ventral and posterior surfaces of femora pale-scaled. Often a few white scales ventrally at apices of tibiae, usually forming an obscure band on hind tibia. *Abdomen:* Tergites metallic dark brown-scaled with basolateral white patches; basal transverse pale markings or bands completely absent.

MALE. *Measurements:* Wing length 2.4 mm. Proboscis 1.7. Palpus 2.12. Forefemur 1.5. Abdomen 2.0. *General:* Identical to female except for usual sexual differences.

MALE GENITALIA (fig. 1). *General:* Very similar to those of *nigripalpus. Segment VIII:* Caudal margin of tergite with a small group of short, heavy, apically curved bristles, which are only slightly shorter mesally than laterally and are narrowly separated along the midline. *Segment IX:* Tergite deeply emarginate on posterior margin between lobes which appear prominent. Lobes with 10-13 short, strongly curved setae. *Sidepiece:* Smoothly conical. Subapical lobe simple, with setae *a-c* present, *b* and *c* subequal in length, *a* slightly smaller than others (length 0.9 of *b*); setae *d-f* absent; leaf (*g*) with broadly acute apex; accessory seta (*h*) slender. *Clasper:* Evenly tapering to apex, no lateral expansions or irregularities in shape. *Phallosome:* Lateral plate without inner division; outer division complex: mesal spine long, slightly curved, sharply pointed; median process with 3-5 strong teeth along mesal margin, lateral margin variably dentate or smooth (fig. 1a); dorsal process very broad, flat and rounded, projecting posterolaterally; ventral cornu a curved inner spine with rugulose apical portion. *Proctiger:* Tergal lobe of basolateral sclerotization with conspicuous group of spicules; basal sternal process long, with widened distal part curved ventrad. Paraproct crowned with short, pointed spines at the apex and short, spatulate spines on apicolateral margin.

PUPA (fig. 1). *Measurements:* Trumpet length 0.49 mm. Abdomen 2.5 (2.1-2.8). Paddle length 0.68. *Cephalothorax:* Integument lightly pigmented, areas laterad of trumpet slightly darker. Trumpet moderately long, index 8.0-10.0; tracheoid portion distinct and strongly pigmented. *Abdomen:* Integument lightly pigmented, slightly darker anteriorly. Median posterior region of sternite II with small spicules. Hair 6-V,VI long (on V about equal to length of segment, on VI exceeding this length), usually single. Hair 5-IV-VI very long (almost twice the length of segment), usually double. Hair 3-IV usually 3-branched (2-4). Hair 4-V-VII usually single. *Paddle:* Oval, slightly longer than wide, 2.5 times length of segment VIII. Male genital lobe extending to 0.4, and female genital lobe 0.2 length of paddle.

FOURTH INSTAR LARVA (fig. 2). *Measurements:* Head width 0.96 mm. Siphon length 1.34. Anal saddle 0.29. *General:* Integument with variable spiculation but usually with fine, short spicules over entire trunk. Chaetotaxy basically similar to *nigripalpus* except for significantly greater length and number of branches of many hairs. *Head:* Width about 1.3 of length. Hair 1-C heavy, with well developed secondary spinules basally. Hair 4-C heavy, long, nearly reaching anterior head margin. Other hairs as follows: 5-C (7,6-10), 6-C (6,4-8), 7-C (11 or 12,9-12), 11-C (9,7-14), 12-C (5,4-9), 13-C (6,5-8). Mental plate triangular, usually with 17 teeth, penultimate lateral and

apical teeth larger than others. *Antenna:* Constricted beyond hair 1-A which is located near distal third. Hair 1-A with 19-28 branches (mean = 23.2). Basal portion of shaft spiculate. *Thorax:* Hairs 0-P and 1-M,T large and with numerous branches: 0-P (7 or 11,6-11), 1-M (7,3-9), 1-T (8,5-11). Hair 7-P usually double (2-4). *Abdomen:* Hairs 1-I-VIII and 13-II-VII large and multibranched: 1-I (9,8-19), 1-II (7 or 8,6-11), 1-III (7,4-9), 1-IV (6,4-9), 1-V (6,5-8), 1-VI (6,5-8), 1-VII (6,5-8), 1-VIII (9 or 10,8-13), 13-II (7,5-11), 13-III (8,4-9), 13-IV (7,4-9), 13-V (7,4-8), 13-VI (mean 16,11-23), 13-VII (4 or 6,4-8). Hairs 6-VII (8,5-11) and 4,5 and 7 also tend to be large and multiple, the latter branching as follows: 4-I (7,5-11), 4-II (5,3-8), 5-IV (6 or 7,4-12), 5-V (6 or 7, 4-10), 5-VI (5,3-12), 5-VII (6 or 8,5-10), 7-III (8,6-11), 7-IV (7 or 9,6-11), 7-V (6,5-9). Hair 6-I,II usually 5 or 6-branched. *Segment VIII:* Comb scales in a patch of 3 irregular rows, 20-25 in number; individual scales with long median spine, 1 to 3 lateral spinelets and basolateral fringing spinules. *Siphon:* Index 6.1-6.8. Integument lightly pigmented; imbrication weak but complete. Subventral hairs (1-S, 1av-S) 2 pairs and subdorsal (1ad-S) 2 pairs; hair 1-S usually 4-branched (3-7), others usually triple; whole series progressively shorter distad. Pecten teeth usually 11 or 12 in number, the series extending to about 0.4 from base; individual teeth usually simple, occasionally with 1 to 3 weak lateral teeth. *Anal Segment:* Integument of saddle spiculo-imbricate basally, spiculose distally, spicules longest along posterolateral border. Hair 1-X short, usually 3-branched (2-5); 2-X usually double (2-4). Ventral brush with 6 pairs on a grid. Gills long, slender, with narrow apices; ventral subequal to dorsal in length and 2.6-3.2 times saddle length.

SYSTEMATICS. The new species exhibits close similarity to *C. (C.) scimitar* Branch and Seabrook (Bahamas and Cuba), *sphinx* Howard, Dyar and Knab (Bahamas) and *nigripalpus* Theobald (widespread), especially the last species from which it is indistinguishable by constant characters in the adult stage. Specimens of *nigripalpus* commonly have some whitish scalation on the sternopleuron and mesepimeron, and transverse, pale, basal bands across the abdominal tergites, characteristics of vestiture absent in *dohenyi,* but are nearly as likely to lack these and resemble that species perfectly. This resemblance extends to the male genitalia of the two species although several salient features easily separate it from *scimitar* and *sphinx* (see Bram, 1967).

That *dohenyi* is very different genetically, however, is evidenced by its highly divergent larva and pupa. Geographic isolation on a very small land mass over 300 miles from the mainland and restrictive breeding in arboreal bromeliads apparently have resulted in adaptations in these stages sufficiently unique to define a distinct species. These adaptations are expressed in the nature of the chaetotaxy, in general involving a proliferation in the branching and thickening of certain hairs. In larvae of the relatives of *dohenyi* listed above, the number of branches of hairs 0-P, 1-M,T, 1-I-VIII and 13-II-VII generally tends to be small, only 3-5, while in *dohenyi* the normal range is significantly greater, 7 to 9. The same applies to hair 6-I,II, which is usually 5,6-branched in *dohenyi,* 3-branched in the others. These hairs and others also are thicker in *dohenyi* than in its relatives and longer as well; the nature of hair 4-C is a useful character, this hair being heavy and long enough almost to reach the anterior margin of the head capsule in *dohenyi,* very fine and short (about equal to space between bases of 5-C and 6-C) in the other species. Other unique character states in the larva of *dohenyi* are as follows: hair 1-C heavy, with secondary spinules basally, not fine and simple; individual comb scales with dominant median spine and lateral spinelets and basal fringe of spinules, not of the fringe type of other species (i.e., no dominant median spine); individual pecten teeth usually simple (at best with weak lateral teeth), not bearing strong lateral denticles.

In the pupa, the major features of chaetotaxy distinguishing *dohenyi* are the long single hairs

6-III-VI (exceeding the segment length on VI) which are multiple and shorter than the segment lengths in *nigripalpus, scimitar* and *sphinx;* the very long (almost twice the segment length), always double hairs 5-IV-VI, which are otherwise much shorter (slightly longer than the segment length) and usually 4-branched on IV; 3-branched hair 3-IV which is otherwise 5,6-branched; and usually single hairs 4-V-VII which more commonly are multibranched in the other forms.

BIONOMICS. The exclusive breeding place of *Culex dohenyi* is in the leaf axils of water holding arboreal bromeliads. During my collecting at sea level at Wafer Bay I found the larvae very abundant in the bromeliad *(Guzmania sanguinea* Andre ex MeZ.) which grows profusely on trees from ground to canopy level. These collections were made at the end of the short dry season, January to March.

Adults were found to bite humans readily although they were neither aggressive nor abundant enough to be pests.

DISTRIBUTION. *Culex dohenyi* appears to be strictly endemic to Cocos Island. No *Culex* occurs in the Galapagos Archipelago other than the introduced *quinquefasciatus* Say and no other insular or mainland populations of the species are presently known.

FIGURES

1. *Culex (Culex) dohenyi:* male genitalia and pupa.
1a. Common variant of outer plate of phallosome with entire lateral margin.
2. *Culex (Culex) dohenyi:* larva.

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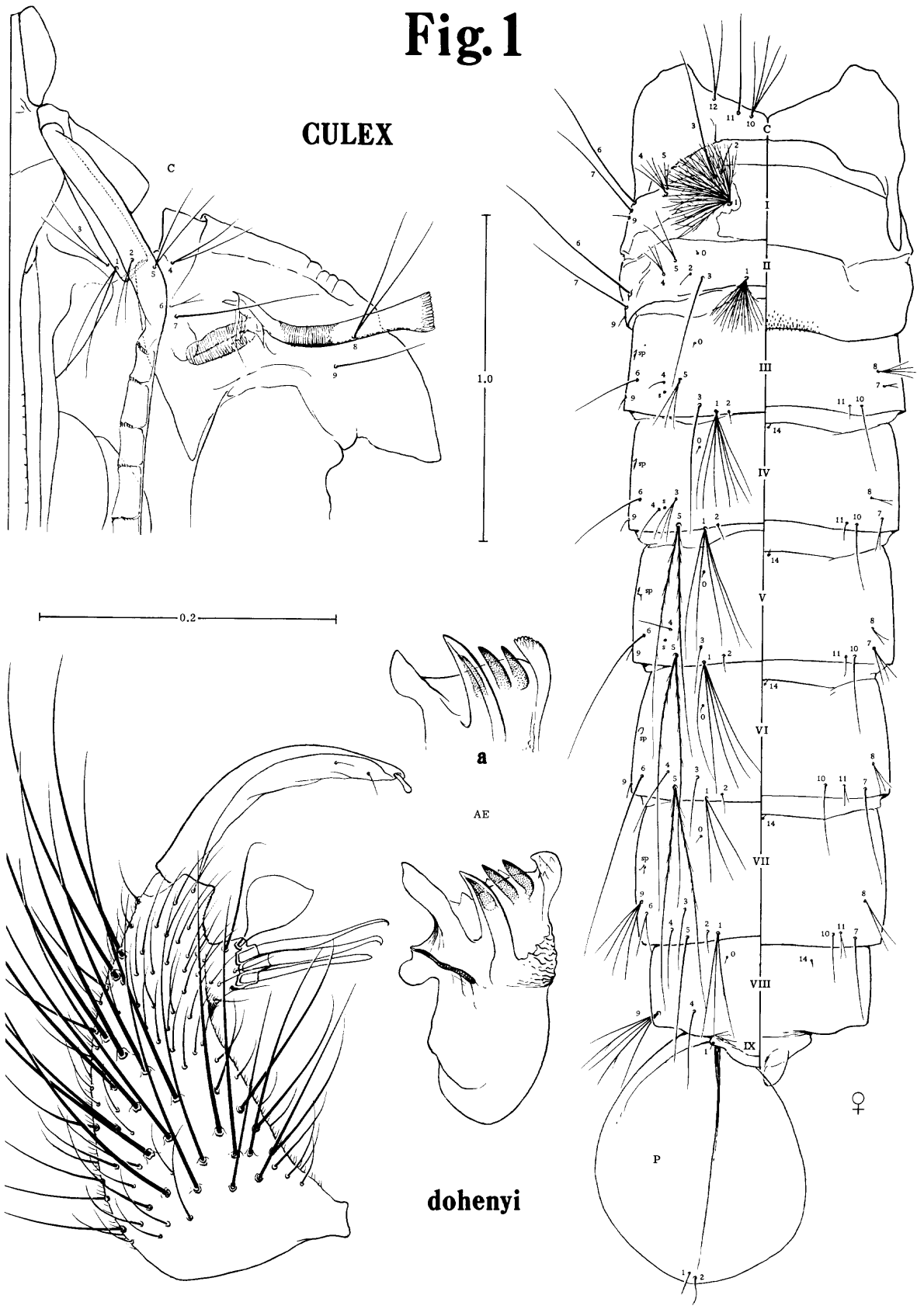
Fig. 1



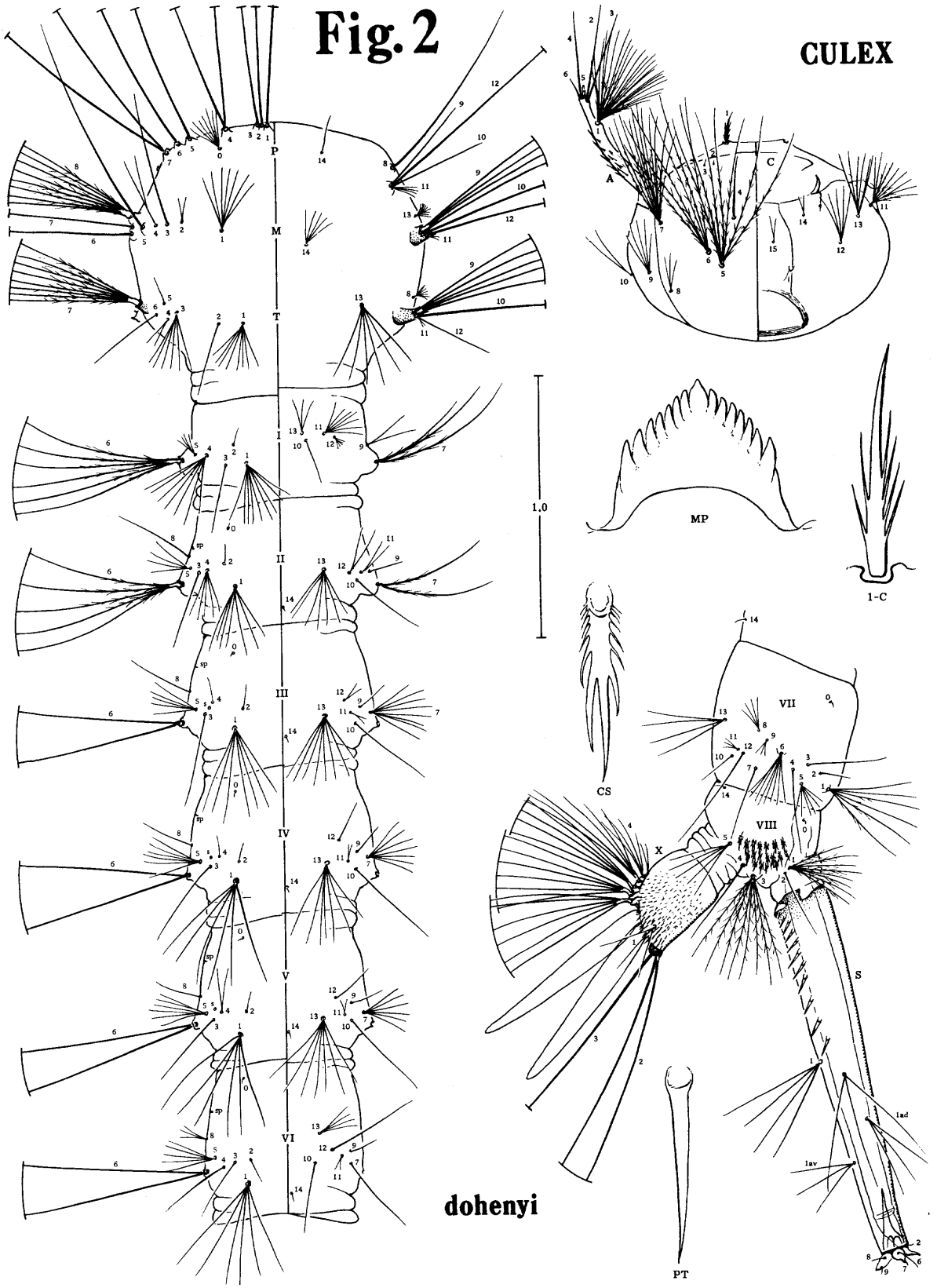


Fig. 2
CULEX
dohenyi
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