

The Systematic Position of *Orthophrys mexicanum* Van Duzee (Hemiptera Heteroptera: Saldidae)

by

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VAN DUZEE (1923: 165—166) described *Orthophrys mexicanus* (sic)³ from Angel de la Guardia Island, Gulf of California, Baja, Mexico. The species was based on a single brachypterous female. He placed *mexicanum* in *Orthophrys* Horváth because of its similarity to *O. pygmaeum* (Reuter), described from Morocco and the only other species in the genus. DRAKE and HOBERLANDT (1950 : 5) transferred *mexicanum* to *Pentacora* Reuter without giving any reasons for the change. DRAKE and HOTTES (1954 : 4—5) made a brief statement about *mexicanum* and published a figure of the holotype female. They stated that the ocelli were more widely separated than in typical *Pentacora* and mentioned that the antennal and pronotal differences were distinctive. DRAKE (1961 : 302) considered *mexicanum* as being in *Orthophrys*, although earlier in the same paper (p. 289) he stated: "The only described species of the little-known genus *Orthophrys* (*O. pygmaeum* Reuter) of the Mediterranean Region is illustrated (Fig. 10)." Thus the position of *mexicanum* has vacillated between *Orthophrys* and *Pentacora* ever since the species was described. Unfortunately, no additional specimens have been collected. A male would be particularly desirable.

With the kind assistance of Dr. Robert L. USINGER, University of California, Berkeley and Dr. Paul H. ARNAUD, Jr., California Academy of Sciences, San Francisco, the authors were able to examine the holotype female of *mexicanum*. Dr. J. CARAYON, National Museum, Paris and Dr. W. J. KNIGHT, British Museum (Natural History), London, presented specimens of *O. pygmaeum* from the collections made by Professor R. BAUDOUIN in Morocco.

When the specimen of *mexicanum* was compared with the drawing published by DRAKE and HOTTES (1954 : 4), several errors in the drawing were apparent. For this reason, new illustrations are included with this paper, together with illustrations of critical characters of *Orthophrys pygmaeum* for comparison.

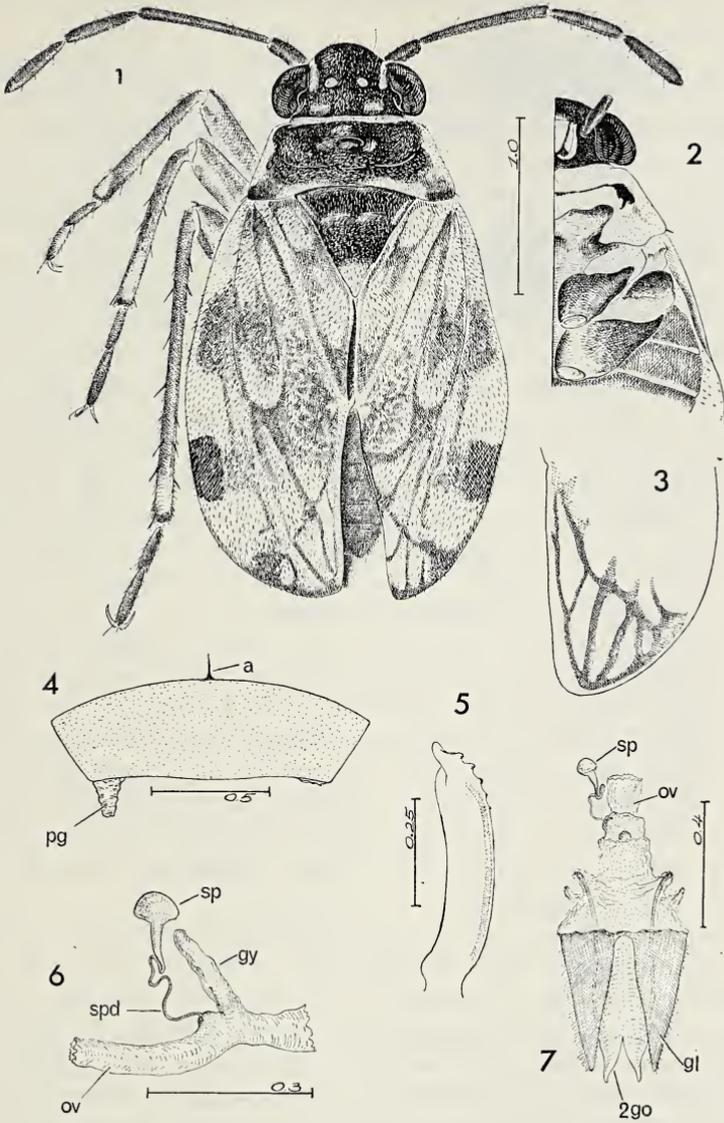
The Female Characters of *O. mexicanum* and *O. pygmaeum*

The head of *mexicanum* is somewhat declivitous; the ocelli are widely spaced, being as far from each other as from the eyes (a character otherwise found only in *Salduncula* Brown, a genus not related to the taxa being discussed here); the transverse swelling (*vide* PARSONS, 1962 : 100, fig. 2) is poorly developed. All of these characters are shared with *O. pygmaeum*. The rostrum of *mexicanum* just reaches the hind coxae (contrary to what VAN DUZEE stated (1923 : 165)),

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³⁾ *Orthophrys* Horváth is neuter rather than masculine, the suffix being derived from the Greek *ὄρρης* (= margin).



Figs. 1—7, *Pentacora mexicana* (Van Duzee), female, holotype. 1, dorsal aspect; 2, left ventral side of head and thorax; 3, apex of left hemelytron, inner view; 4, pregenital plate; 5, first gonapophysis, lateral; 6, genital tract, lateral; 7, external and part of internal genitalia, dorsal. a, apodeme; 2 go, second gonapophysis; gl, gonoplac; gy, gynatrium; ov, oviduct; pg, pregenital gland, inflated; sp, spermatheca; spd, spermathecal duct.

whereas the rostrum in *pygmaeum* attains the fifth ventral segment, a condition without parallel in the Saldidae.

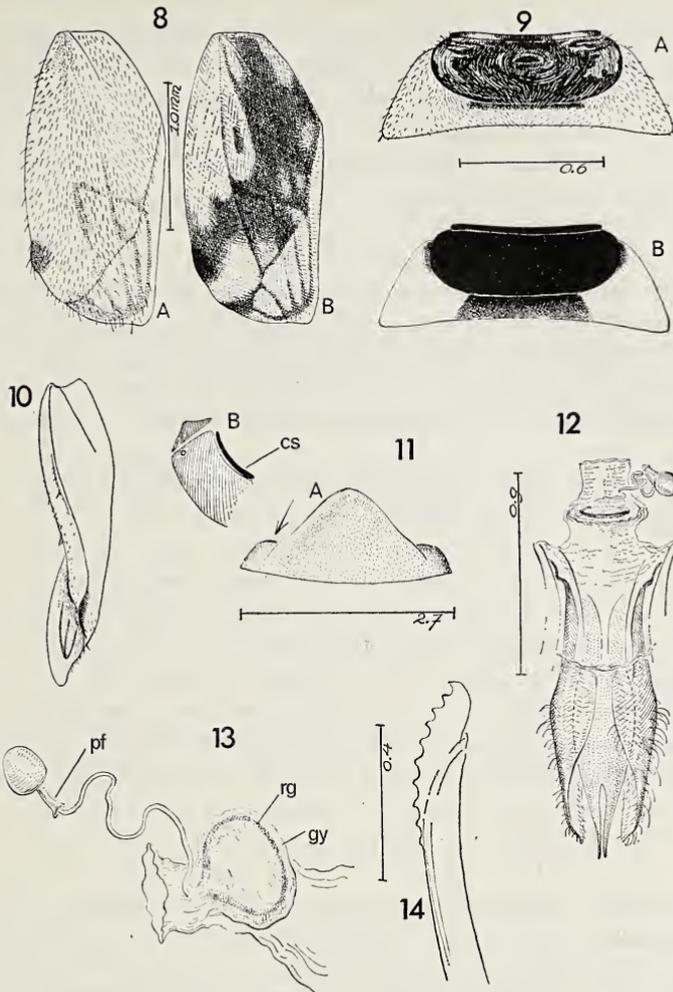
The thorax of *mexicanum* (fig. 1, 2) deviates very little from the general pattern found in the Saldidae except that the posterior margin of the pronotum is only shallowly concave in the middle (it is virtually straight in *pygmaeum*, fig. 9) but it is likely that this condition has resulted from the brachypterous condition of the specimen. The scutellum is as wide as long and the dorsal surface only slightly swollen. The hemelytra are reduced although still slightly surpassing the tip of the abdomen. The membrane is reduced, producing virtually no overlap; there are five distinct cells (figs. 1, 3) contrary to the statement of DRAKE and HOTTES (1954 : 5). The clavus is distinctly discernible and the claval commissure distinct. The subapical costal area grasped by the male during copulation is poorly differentiated and the costal margin slightly concave at that point. The reflexed lateral margin of the fore-wing extends only halfway to the coupling-area. The metathoracic wings are reduced to mere stubs, again a condition resulting from the brachypterous condition. In *O. pygmaeum*, the hemelytra (fig. 8) are even more reduced; the clavus is not clearly demarcated, the claval commissure divergent and membranous, the costal margin is reflexed as far as the area grasped by the male and the latter area is slightly convex, there are four cells in the membrane. The legs offer no particular characters for distinction.

The abdomen of *mexicanum* represents a rather undifferentiated condition with the pregenital plate trapezoidal, the posterior margin straight, the opposite margin medially with a spinous apodeme projecting anteriorly (fig. 4); the pregenital extrusible glands are present, but the crescent-shaped sclerites normally associated with them are absent; rudiments of the larval organs are lacking. In *Orthophrys pygmaeum*, the pregenital plate has the posterior margin projected backwards, ending in a broadly convex plate (fig. 11A); the pregenital gland sclerites are present (fig. 11B); the apodeme of the seventh sternite and rudiments of the larval organs both are absent.

There are slight differences in the ovipositor of both species (fig. 5, 14), but based on experiences with other Saldidae, these differences are not of generic value. However, internally the gynatrium of the single type specimen of *mexicanum* (figs. 6, 7) lacks the sclerotized ring associated with the ring gland (normally present in the Saldidae and also in *O. pygmaeum*, figs. 12, 13; there is some variability in the extent of the sclerotization of the ring gland, so that the positive absence of this structure in *mexicanum* must be affirmed by examining additional specimens). The spermatheca, arising from the slight swelling just anterior to the gynatrium, is mushroom-shaped and lacks a well-defined flange (fig. 6). Normally, the spermatheca is spherical in the Saldidae and has a proximal flange; in this regard, *O. pygmaeum* resembles a typical saldid.

The Systematic Position of *O. mexicanum*

Those characters that suggest a relationship of *mexicanum* to *Orthophrys* and thus to the Saldinae (*sensu* COBBEN, 1959 : 305) are: lack of rudiments of the larval organ; steeply declivitous head and the condition of the ocelli. Those



Figs. 8—14, *Orthophrys pygmaeum* (Reuter), female. 8, left hemelytron of light- (A) and of dark-coloured (B) specimen; 9, pronotum of light (A) and dark (B) form; 10, hemelytron, lateral; 11, pregenital sternite, ventral view (A), lateral edge (B) seen in the direction of the arrow in A; 12, external and part of internal genitalia, dorsal; 13, genital tract, obliquely from above; 14, first gonapophysis, lateral. cs, crescent-shaped sclerite of extrusible gland; gy, gynatrium; pf, proximal flange of spermathecal bulb; rg, ring gland.

characters that relate *mexicanum* to the Chiloanthinae and particularly with *Pentacora* are: length of rostrum; concave posterior margin of pronotum; five cells in the membrane of the hemelytron, well-defined clavus, condition of claval suture, condition of costal region where grasping occurs; trapezoidal shape of pregenital plate (virtually identical with *P. spacelata* (Uhler)); lack of pregenital gland sclerites. The poorly developed transverse swelling of the head (part of post-clypeus) of *mexicanum* is shared with *Orthophrys* (but not the balance of the Saldinae) and with the Chiloanthinae. Those characters that are unique to *mexi-*

canum are: lack of a defined flange on the spermatheca and, somewhat questionably, the lack of the ring gland of the gynatrium. These two characters are of a generalized nature and are shared with *Aepophilus* Puton, although most of the characters clearly show that *mexicanum* does not belong in the Aepophilinae. The preponderance of characters suggests that *mexicanum* does not belong in the Saldinae line but in the Chiloxanthinae line and within the Chiloxanthinae it appears to be most closely related to *Pentacora*. For this reason, we are again placing *mexicanum* in *Pentacora*.

It is quite possible when males are available for study that a new genus will have to be erected to contain *Pentacora mexicana* (Van Duzee). Leaving out the questionable absence of the ring gland, the lack of a proximal flange on the spermatheca is a significant character, for this flange is a very constant feature in the many species of Saldidae that we have studied. Presumably the lack of this character represents a generalized condition. In other respects, *P. mexicana* may be considered as a forerunner of the *Pentacora*: the widely separated ocelli; the very weak folding of the anterolateral edge of the hemelytra and the virtual absence of the wing-locking device on the underside (*vide* COBBEN, 1957 : 246); the median apodeme along the anterior margin of the pregenital plate. This latter apodeme occurs in the Amphibicorisae and in some other Heteroptera. It is retained in *Aepophilus* and in *P. mexicana*, whereas it is nearly lost in *P. sphaelata* and is wholly absent in other Saldidae, including the other species of *Pentacora*. The lack of rudiments of the larval organ in the holotype female strongly suggests its absence in the larvae. A larval organ arose at some time in the Saldinae and the Chiloxanthinae, showing divergence in both subfamilies. Unpublished data indicate that many species of Saldinae apparently have lost this structure secondarily. This loss has occurred in more than one genus although not all members of each genus have lost it. Thus the presence or absence is not always a good generic character. In both *P. mexicana* and *O. pygmaeum*, we feel that the absence is of a primary nature rather than a secondary loss, suggesting that the structure had not yet evolved at the time of the divergence of both of these species. All other species of *Pentacora* and *Chiloxanthus* known to us possess a larval organ. Since both *Aepophilus bonnairei* Sign. and *Orthophrys pygmaeum* (Reuter) are intertidal species and since there is a reasonable chance that *P. mexicana* may also be intertidal (see later remarks), the absence of a larval organ may be associated in some way with the marine habitat.

It would be highly desirable to examine a male of this species to check the many fine characters in the genitalia (for a complete diagnosis of the male characteristics of *O. pygmaeum*, see COBBEN, 1960a : 228). At present, *P. mexicana* superficially resembles *P. sphaelata* (Uhler), a halophilus species ranging along the coast of eastern and southern United States, California, Mexico, the Caribbean Islands, the Galapagos Islands and the western Mediterranean region of the Old World. The rather limited ecological information available for *P. mexicana* suggests that it occupies a habitat similar to *O. pygmaeum* (BAUDOULIN, 1955 : 136—137) and to some extent *P. sphaelata* (COBBEN, 1960b : 48—50). VAN DUZEE (*loc. cit.*: 165—166) stated: "Described from one female taken from under kelp on the beach at Puerto Refugio, Angel de la Guardia Island, June 29. This kelp was

washed by the high tides when the specimen was taken." Only detailed fieldwork similar to that of BAUDOIN (*op. cit.*) on *Aepophilus* and *Orthophrys* will make known its true habits. Collectors working along the shores of the Gulf of California are urged to look for this interesting species of Saldidae.

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POSTSCRIPTUM

We could not possibly expect that our desire to see additional material, particularly males, of this species would be fulfilled so soon. A few weeks after completing this manuscript, one of us (RHC.) received material representing both sexes and the larvae very kindly sent by Mr. John T. POLHEMUS, Englewood, Colorado. Mr. POLHEMUS collected these specimens in Mexico in May, 1966. He recognized them as *P. mexicana* and will devote a separate paper in which he will erect a new genus for this species, describe the characters of the male and the ecological conditions under which he collected the specimens. We look forward to the appearance of his paper with great interest.

Without anticipating Mr. POLHEMUS' results, several comments may be made here. Thanks to the specimens sent, including two additional females, the variability of several characters mentioned in the body of our paper could be checked. The gynatrium does indeed have a thin lining of the ring gland, the holotype had this character occluded. The shape of the head is not as steeply declivitous as we mentioned, apparently the mounting of the type specimen produced a somewhat abnormal condition. The absence of the flange on the spermatheca is confirmed again. The larval organ is definitely absent as we had suggested. Our decision to place this species within the Chiloxanthinae is confirmed.