RESURRECTION OF THE GENUS MORPHEIS (COSSIDAE), WITH DESCRIPTION OF A NEW SPECIES IN THE COGNATUS GROUP FROM SOUTHERN ARIZONA

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ABSTRACT. The New World genus Morpheis Hübner is resurrected and distinguished from the Old World genus Xyleutes Hübner, with Neocossus Houlbert and Xylotrypa Turner as synonyms of Morpheis. A new classification is proposed for the 12 known species of Morpheis, of which 10 are new combinations. Morpheis clenchi (Santa Cruz Co., Arizona, U.S.A.) is described as new, and a key and photographs are provided for the three species in the cognatus group.

For more than a decade, moth collectors working in the vicinity of Peña Blanca Lake, west of Nogales, Arizona, have been finding a strikingly patterned, large cossid moth. Because of its large size and conspicuous appearance, a collector's initial response might be that he had discovered a bizarre new sphinx moth. In addition to describing that new species here, I am taking the opportunity to associate it with its previously described congeners, all 11 of which are Latin American species that have been erroneously placed, most recently, in the Old World genus Xyleutes Hübner, and earlier in the largely overlooked genera Neocossus Houlbert and Xylotrypa Turner.

HISTORICAL BACKGROUND

Hübner (1820: 196) erected the genus Morpheis for two species, Hepialus scalaris Fabricius (1775: 590) and Sphinx pyracmon Cramer (1780: 169). The former species is currently placed in the Oriental and African cossid genus Azygophleps Hampson (1892: 309), of which it is the type species, and the latter species was designated the type of the Neotropical genus Morpheis by Roepke (1957: 18), who at the same time retained Morpheis in the synonymy of Xyleutes.

In a revision of the world species of Xyleutes, Houlbert (1916: 89) proposed the new subgenus Neocossus for all but one of the American species he knew at the time; later in the same work (p. 105) he designated [Endoxyla] strigillata Felder (1874: Pl. 81, Fig. 5) as the type species. Houlbert's segregation of this subgenus was based partly on geographical distribution and on the presence of a distinctive longitudinal color stripe through the center of the forewing.

Apparently unaware of Houlbert's work, Turner (1918: 162) recognized the distinctiveness of at least one of the New World "Xyleutes," and, based on structural characters (palpi, tibial spurs, and venation), proposed the new genus Xylotrypa, with strigillata Felder
the type (by monotypy). *Xylotrypa* is thus a junior objective synonym of *Neocossus*, and both fall as junior subjective synonyms of *Morphes*.

While *Morphes* has lain in the synonymy of *Xyleutes* virtually since it was proposed, *Neocossus* and *Xylotrypa* remained overlooked or unmentioned for decades; both were omitted from *Lepidopterorum Catalogus* (Dalla Torre, 1923) and *Macrolepidoptera of the World* (Dyar & Schaus, 1937). Costa Lima (1945: 151) appears to have been the first to notice *Xylotrypa*, but treated it as a synonym of *Xyleutes*. Viette (1952: 60), in his catalog of the world genera of Cossidae, appears to have been the first to “rediscover” *Neocossus*, although he overlooked *Xylotrypa*. Roepke (1957: 18) recognized *Neocossus*, but as a synonym of *Xyleutes*, and likewise overlooked *Xylotrypa*.

**Classification**

As presently defined, the Zeuzerinae are easily distinguished from all other cossids, at least in the New World, by the distinctive male antennae, which are bipectinate—with long, downcurved rami—for only one-half to two-thirds the length of the shaft, and then become abruptly short uniserrate to the tip. Additionally, in members of this subfamily vein R₁ on the forewing arises from the areole, or from the discal cell very near the origin of the areole. This latter condition is not unique, however, because at least two genera of Cossinae share it (*Trigena* Dyar and *Cossula* Bailey). Both sexes of these, however, may be distinguished from the Zeuzerinae by having antennae uniformly uni- or bipectinate to the tip.

*Morphes* may be distinguished from other New World zeuzerines by the following combination of characters: a contrastingly dark, broad, irregular, longitudinal stripe on the forewing, extending from the bases of the costa and discal cell, crossing the lower outer angle of the discal cell and reaching (in well-marked species) the termen at the distal end of vein R₅; few or no transverse wing markings; arolium absent; forewing with vein R₁ arising from the areole; forewing with vein M₁ arising at or very near the distal end of the chorda (the common vein dividing the areole from the discal cell); and by the prominent development of the gnathos and presence of a process on the sacculus of the male genitalia. Several American species formerly placed in *Xyleutes* (see Dyar & Schaus, 1937; Forbes, 1942) are not referable to *Morphes*, but belong in *Psychonoctua* Grote (1866: 249) or an undescribed genus.

The type species of *Xyleutes* is the south Asian *Phalaena strix* Linnaeus (1758: 508), designated by Kirby (1897: 144), and not the
African Noctua crassa Drury (1782: Pl. 2, Fig. 1), which was designated by several subsequent authors and which has been erroneously accepted as the type species by virtually every worker in this century.

In addition to the geographical distribution and color pattern, Morpheis differs strikingly from Xyleutes Hübner (1820: 194) in the male genitalia; although the two are similar in basic structure, Morpheis has a massively developed gnathos (absent in Xyleutes) and lacks the sclerotized digitate process on the aedeagus of Xyleutes. Additionally, in the species of Morpheis examined to date, there is a digitate process on the sacculus (absent in Xyleutes), although it may sometimes be minute (cognatus).
Morpheis clenchi Donahue, new species

Fig. 3, 4, 7-9

Diagnosis. The strongly contrasting black (or dark brown) and white wing pattern, with reduced striations, black disc of thorax, and dark gray to blackish dorsum of abdomen readily distinguish this species. It is the largest zeuzerine known from the United States or adjacent northern Mexico.

Male. Head: Antennal shaft dark brown with scattered white scales, bipectinate to about one-half (24–29 segments), rami light brown, then uniserrate and dark brown to tip. Labial palpi cylindrical, smoothly scaled, brownish-black, first segment paler. Vestiture of frons fine, hair-like, semi-erect, dark brown to blackish scales with bluish reflection in certain light; scales more erect on center of frons above end of palpi, forming a bilobed tuft. Vertex with prominent tuft of brown, hair-like scales ventral of base of antennae; inter-antennal area with a long shaggy “crest” of loose, brownish-black, hair-like scales. Thorax: Vestiture of pronotum concolorous with and in continuation of inter-antennal “crest”; disc of thorax concolorous brownish-black, the scales becoming gradually more spatulate and more appressed posteriorly, with a whitish spot on posterolateral corners of metathorax. Tegula bright white, scales long, slender, appressed. Venter dark grayish brown, scales hair-like and loose. Legs blackish-brown, distal ends of all tibiae and tarsal segments, and tibial spurs, whitish. Abdomen: Vestiture of fine, hair-like, appressed scales, dorsally gray to fuscous, paler on anterior edge of each segment (forming ill-defined, narrow, transverse bands); lateral pale line present, diffuse, anteriorly white (in continuation of white posterolateral thoracic spot), posteriorly becoming grayer; venter grayish to pale brown, not or poorly differentiated from lateral coloration; genital scaling fine, hair-like, mixed gray and brownish.

Wings. Ground color chalky white, markings of forewing upperside brownish-black, of hindwing dark gray except for brownish-black spots on outer margin at vein ends. Wing scales short, spatulate, appressed, except: long, slender, with notched apex, and erect in base of forewing discal upperside; short, spatulate, erect in discal and accessory cells, and posteriorly to vein 2A on forewing upperside; long, hair-like on hindwing upperside in basal portion of area between discal cell and inner margin; forewing underside with mixed long hair-like and long spatulate scales in discal and accessory cells and posteriorly to vein 1A and in bases of cells between veins M2 and Cu1. Forewing upperside (Fig. 3): dominant color pattern an irregular longitudinal brownish-black stripe extending distally from basal 30% of costa through discal cell to and filling basal ¾ of cell M2-M3, then narrowing and continuing to outer margin in cell R1-R3; the anterior edge of stripe bounded by vein M2, with several small, dentate projections anteriorly in cell M1-M2; posterior margin of stripe bounded by posterior side of discal cell with several small dentate or linear projections below discal cell, then expanding to form a large, quadrate projection from before origin of vein Cu2 to vein 1A, the posterior margin of stripe then continuing distally and irregularly across bases of cells Cu1-1A, Cu1-Cu2, and M3-Cu1, the last cell with one or more posterior projections partially or completely enclosing the ground color to form one or more open or closed white circles, then across cell M2-M3, narrowing abruptly at vein M2 and then to outer margin at end of vein R3. This longitudinal stripe very sparsely irrorate with minute white scales (invisible to the naked eye in greasy specimens). Remaining brownish-black markings consisting of a series of small costal spots, the largest a blotch at %, at end of vein Sc, followed by smaller blotches at ends of veins R1, R2, and R3; a series of small subcostal spots, usually complete to end of vein R3; a series of small spots in accessory cell; a series of small, irregular spots in cell R2-R4; a series of transverse marks in cell R2-M1, the outermost fusing with the main longitudinal stripe; subterminal white space between veins M1 and Cu1 sparsely irrorate, occasionally appearing striate; a series of short striations in cell 1A-2A, fusing with the quadrate projection below origin of vein Cu2; very variable iroration of the remaining white ground color, usually most prominent as well-spaced short striations on inner margin and in cell Cu2-1A. Fringe white except at distal end of longitudinal stripe in vicinity of end of vein R5, and terminal spots on veins R1 to 2A. All veins concolorous.
with ground color and color pattern. **Hindwing upperside** white with an irregular, prominent, broad, fuscous, striate, sub-reticulate shade through center of wing from vein 2A across lower corner of cell to outer margin at end of vein M₁, and only partially filling cell R₅-M₁; the shade usually radiating distally along posterior margins of veins, and becoming distally striate in cells between veins Cu₂ and 2A. Costa white, tending to be striate distally, with a longitudinal fuscous patch along distal end of vein Sc₊R₁. Fringe white, with brownish black terminal spots on ends of veins R₁ to 2A. **Underside** (Fig. 4) color pattern of both wings similar to that of upperside, ground color dusker, with the following exceptions: **Forewing underside**: basal costal patch absent, indicated only by dark leading edge of costa; longitudinal stripe originating in center of cell, formed by long gray scales in cell, and distad of cell by dark brown scales with intermixed paler scales (bluish in certain light), producing the effect of a more diffused, less well-defined pattern than on upperside; striations less sharply defined; **Hindwing underside** with additional diffuse brownish discal patch present, extending obliquely (in well-marked specimens) from anterior half of cell nearly to costa, most evident as an irregular, offset patch on vein Sc at ½₂; costa striate from this patch to near apex.

**Genitalia** (Figs. 7–9). As illustrated, proximal half of digitate process of sacculus fused to valva, the distal half free. A thorough survey of the genus is required before the significance of any differences in genitalic structure among the species can be appreciated.

**Size** (measured to nearest mm). Forewing length 28–36 mm, mean 33 ± 2.34 mm (n = 13).

**Female.** Unknown, probably similar to male in appearance but larger, with antennae uniformly filiform or minutely uniserrate.

**Early Stages.** Unknown; larva undoubtedly a borer in roots or wood, as in other members of the family.


**Etymology.** I take great pleasure in naming this moth in honor of the late Harry K. Clench, who had a research interest in the Cossidae before he succumbed to the lure of fulltime work on butterflies. He generously gave me a copy of his unpublished draft revision of the New World Zeuzerinae, with his blessing to continue work where he left off. This paper is the first of a series of papers on the Cossidae, a project stimulated in large part by Harry’s encouragement and cooperation.

**Remarks.** As noted above, this moth has only been collected during July, in the Peña Blanca and Sycamore Canyon area of southern Arizona. It undoubtedly occurs in adjacent Mexico, and is perhaps more widespread in Arizona.

The three known species of the *cognatus* group of *Morpheis* are distinguished from other members of the genus by the white ground color of the forewing, with strongly contrasting dark color patches, and by the greatly reduced transverse striations.

**Key to species of the *cognatus* group of *Morpheis* (males)***

1a. Disc of thorax black, contrasting sharply with white tegulae; dorsum of abdomen dark gray to fuscous, weakly annulated with paler scales (Arizona)........................................................................................................... **clenchi** Donahue, n. sp.

1b. Disc of thorax and tegulae concolorous, white; disc with sharply defined, narrow, longitudinal brown or black line; dorsum of abdomen white, with or without a median line..........................................................
Figs. 7–9. Male genitalia of *Morpheis clenchi*, paratypes. 7, left lateral view, aedeagus and left valva removed, ARIZONA: Santa Cruz Co., Peña Blanca Lake, Oro Blanco Mts., 10 air mi. WNW Nogales, elev. 3700 ft., 26 July 1973, R. J. Ford (LACM). 8, ventral view of same specimen, aedeagus and left valva removed. 9, left lateral view of aedeagus (vesica not fully everted), figured from a second specimen, same locality, 24 July 1973, W. A. Harding (LACM). (All to same scale.)

2a. Larger species (forewing length 40–50 mm); abdomen with distinct mid-dorsal black line on distal half (Peru) __ __ __ __ __ __ __ __ mathani (Schaus)

2b. Smaller species (forewing length 18–30 mm); mid-dorsal dark line of abdomen indistinct or absent (Mexico to Honduras; southern limit of distribution not established) __ __ __ __ __ __ __ __ cognatus (Walker)
Although this paper is not a generic revision, it seems appropriate to associate all those species which appear to belong to *Morpheis*. The synonymy is based largely on previously published work, but a few taxa are reclassified here as proposed by Clench (in his manuscript revision of the New World Zeuzerinae). Since I have not examined all these species and their types, this classification is tentative.

Proposed classification and synonymy of *Morpheis*

*Morpheis* Hübner [1820: 196]; Type-species: *Sphinx pyracmon* Cramer, 1780: 169, designated by Roepke, 1957: 18. (Gender: Masculine.)

= *Neocossus* Houlbert, 1916: 89; Type species: [*Endoxyla* *strigillata* C. Felder, 1874: Pl. 81, Fig. 5, by original designation. New Synonymy.

= *Xylotrypa* Turner, 1918: 162; Type species: [*Endoxyla* *strigillata* C. Felder, 1868: Pl. 81, Fig. 5, by original designation and monotypy. New Synonymy.

= *Xyleutes* of authors, in part, not Hübner [1820: 195].

*xylotribus* (Herrich-Schäffer, [1853] 1850–1858: Figs. 37, 38) (Cossus), New Combination.

*pyracmon* (Cramer, 1780: 169) (*Sphinx*).

= *putridus* (Percheron, 1838: Pl. 4, Fig. 1) (*Zeuzera*), New Combination.

= *palmarum* (Herrich-Schäffer, [1853] 1850–1858: Fig. 36) (*Cossus*), New Combination.

= *fractus* (Walker, 1856: 1542) (*Zeuzera*), New Combination.

= *pyracmonides* (Schaus, 1901: 45) (*Duomitus*), New Combination.

discretus (Dyar & Schaus, 1937: 1267) (*Xyleutes*), New Combination.

*comisteus* (Schaus, 1911: 628) (*Zeuzera*), New Combination.

*lelex* (Dognin, 1891: 121) (*Zeuzera*), Revised status, New Combination.

*strigillatus* (C. Felder, 1874: Pl. 81, Fig. 5) (*Endoxyla*), New Combination.

*impeditus* (Wallengren, 1860: 44) (*Phragmataecia*) (see Gaede, 1933: 822), New Combination.

*melanoleucus* (Burmeister, 1878: 407) (*Cossus*), New Combination.

*votani* (Schaus, 1934: 95) (*Xyleutes*), New Combination.

*cognatus* (Walker, 1856: 1532) (*Zeuzera*), New Combination.


*mathani* (Schaus, 1901: 45). (*Duomitus*) Revised status, New Combination.

= *oberthueri* (Houlbert, 1916: 86) (*Xyleutes*, subgenus *Neocossus*), Emendation,

Revised Synonymy, New Combination.


= *cognatus distinctus* (Bryk, 1953: 267) (*Xyleutes*), New Synonym, New Combination.

clench Donahue, new species

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**LITERATURE CITED**


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