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TWO NEW GYNANDROMORPHS, WITH A LIST OF PREVIOUSLY RECORDED SEXUAL ABERRATIONS IN THE SCOLIOID WASPS

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TRUE gynandromorphs are extremely rare natural freaks among insects, and less than a dozen have been recorded to date in the Scolioidea. These wasps usually exhibit striking sexual dimorphism, so that any aberrancy is ordinarily readily detected because the gynandromorphs present a very bizarre appearance.

A short time ago, while examining a lot of Scolioidea submitted for identification by Prof. T. H. Hubbell, curator of insects, Museum of Zoology, University of Michigan, I was delighted to find two lateral gynandromorphs belonging to the families Tiphidae and Scoliidae. The tiphid is a specimen of *Myzine maculata* (Fabricius) from Florida in which the head and abdomen are completely male, while the thorax is divided, the left half being entirely female and the right half entirely male. The scoliid is a specimen of *Campsomeris ephippium ephippium* (Say) from Mexico and is a complete lateral gynandromorph, the entire left side being male and the right side female. Dr. Hubbell has very kindly permitted me to retain both specimens for the collection of the United States National Museum. Descriptive notes and photographs of the two specimens are presented herein.

MYZINE MACULATA (Fabricius)

PLATE 1, FIGURES 1-3

Tiphia maculata FABRICIUS, *Entomologia systematica* . . . , p. 224, 1793. Female.

As stated above, the entire head and abdomen are completely male and differ in no respect from normal males collected in the same

locality. The thorax is plainly differentiated down the midline of both the dorsum and the venter, the left half with appendages agreeing in all respects with normal females from the same locality, while the right half with appendages is that of the normal male. The pattern of maculations on the thorax and legs of the two sexes is strongly dimorphic and readily apparent in the figure. The sexual dimorphism is marked also in thoracic punctation, details of wing venation, and size of legs. The latter two differences are apparent in the figure.

Label data: 3.9 miles west of Panama City beach, Bay County, Fla.; July 19, 1938 (Hubbell and Friauf; No. 2823).

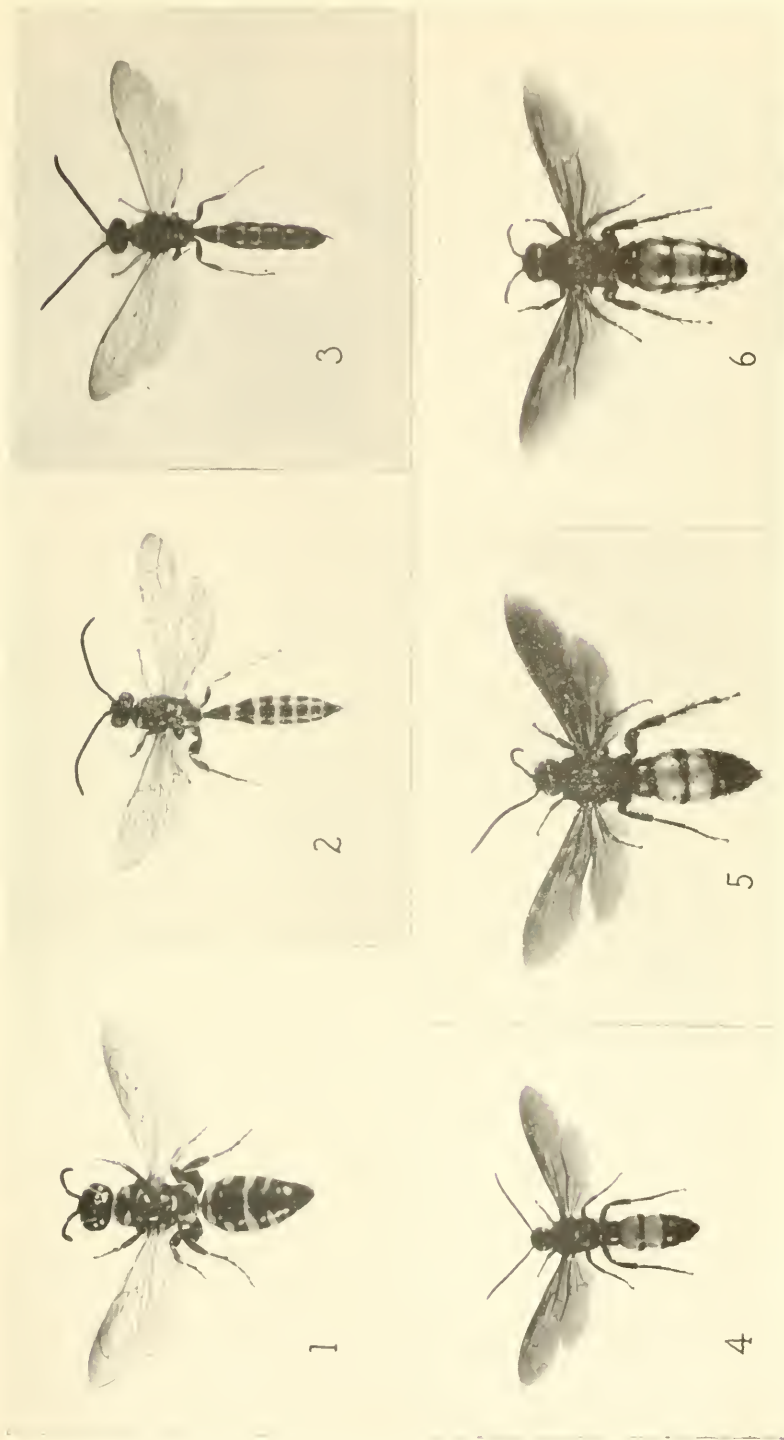
CAMPOMERIS EPHIPIUM EPHIPIUM (Say)

PLATE 1, FIGURES 4-6; PLATE 2

Scolia ephippium SAY, Boston Journ. Nat. Hist., vol. 1, p. 363, 1837. Male.

The present specimen is of exceptional interest because it is one of three complete lateral gynandromorphs known in the Scolioidea and apparently the only one in which the terminal abdominal segments and genitalia have been dissected and figured. The entire left half is male and the right half female. This species exhibits scarcely any sexual dimorphism in the color pattern, and the gynandromorph is not spectacular in that respect as is the *Myzine* described above. However, there is strong dimorphism between the two sexes in the punctation and vestiture, mandibles, clypeus, antennae, legs, and the terminal abdominal segments. The photograph of the dorsal view of the specimen shows the long, slender antenna of the male side as contrasted with the very short, curled one on the female side, the dimorphism of the legs, those of the female stout, very spiny, and adapted for digging, those of the male slender and not adapted for fossorial use. The differences in vestiture and punctation are not discernible in the photograph, but the male side is comparatively more densely punctate and hairy, with finer hairs than on the female side. The only morphological peculiarity not found in normal males is that on the left side of the top of the head there is an oblique callosity. This appears to be due to the male side of the head being much smaller than the female so that the whole head, viewed from above, has a twisted appearance.

The seventh and eighth abdominal segments (morphologically the eighth and ninth) of the gynandromorph also exhibit strikingly the sexual dimorphism in this species. The seventh tergite (pl. 2, fig. 7) in the male is exposed, relatively flat, opaque, strongly sclerotized, and densely haired, while in the female it is retracted, strongly convex to surround the sting and associated structures, transparent, weakly sclerotized, and with a colorless, dorsal U-shaped area along the midline. The seventh sternite (pl. 2, fig. 8) in the male is exposed, flat,



1-3, *Myzine maculata* (Fabricius): 1, Dorsal view of normal female; 2, dorsal view of gynandromorph, left half of thorax female, rest of insect male; 3, dorsal view of normal male. $\times 2.4$.
 4-6, *Campsomeris ephippium ephippium* (Say): 4, Dorsal view of normal male; 5, dorsal view of gynandromorph, left half male, right half female; 6, dorsal view of normal female. $\times 0.75$. (Figs. 1-4 and 6 by H. C. Wilcox; fig. 5 by A. W. Matthews.)



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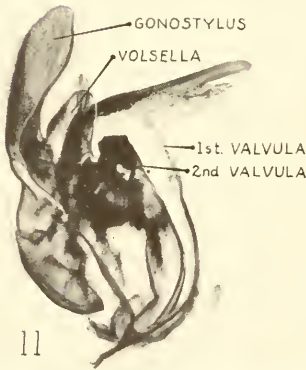
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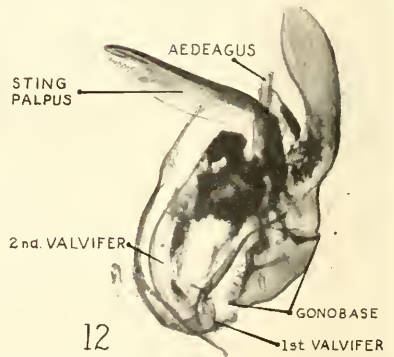
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Campsomeris ephippium ephippium (Say), gynandromorph: 7, Seventh tergite, male half at left, female half at right; 8, seventh sternite; 9, eighth tergite, male half at left, female half at right; 10, eighth sternite; 11, genitalia, ventrolateral aspect; 12, genitalia, dorsolateral aspect. $\times 11$. (All figures by H. C. Wilcox.)

opaque, strongly sclerotized, and densely haired, while in the female this sclerite is entirely lacking (also absent in normal females). The eighth tergite (pl. 2, fig. 9) in both sexes is retracted, transparent, weakly sclerotized, but quite differently shaped, that of the male relatively smaller and more or less triangular with a more weakly sclerotized, colorless rounded lobe at apex in middle, while that of the female is larger, subquadrate in shape, and almost divided in half at the midline. The eighth sternite in normal males is retracted but opaque and strongly sclerotized, ending in three long, slender spines which protrude from the apex of the abdomen. In the gynandromorph the eighth sternite (pl. 2, fig. 10) is present only on the male side (this sclerite lacking in normal females); the lateral spine is normal, but the median spine is shorter than in normal males and slightly curved upward instead of being straight.

The genitalia (pl. 2, figs. 11, 12) are symmetrically divided, the entire left half male and complete in every detail, the right half female. The only difference from the normal male genitalia that can be noted is that the gonobase (cardo) is shorter than in normal males. The female half is much smaller than in normal females. The valvifers and sting palpus are normal in shape, but the valvulae are aberrant, the first valvula being aborted and straight rather than being curved strongly upward near the base to lie adjacent to the second valvifer, while the second valvula is separated from the first, also aborted, flat, and broader than normal. The apices of the valvulae may have been broken off during processing, as there was a great mass of material in the genital chamber (probably the meconium) which had to be cleaned away before the structures could be studied.

The homologies between the parts of the male and female genitalia suggested by Michener (Bull. Amer. Mus. Nat. Hist., vol. 82, pp. 191-193, 1944) seem to be borne out by the genitalia of this gynandromorph.

Label data: Cerro Tancitaro, Michoacán, Mexico; June 10, 1945 (Wm. H. Burt).

ANNOTATED LIST OF RECORDED SEXUALLY ABERRANT SCOLIOIDEA

Dalla Torre and Friese (Ber. nat.-med. Ver. Innsbruck, vol. 24, pp. 1-96, 1 pl., 1899) presented a detailed account of all hymenopterous gynandromorphs recorded through the year 1896 as well as describing a few additional specimens. Enderlein (Stett. Ent. Zeit., vol. 74, pp. 132-140, 1913) brought the list up to date through 1913. The following annotated list includes all records of Scolioidea given in the above papers and brings the list up to date through the Zoological Record for 1947.

SCOLIIDAE

Camposcolia sexmaculata (Rossi). ROMAND, Ann. Soc. Ent. France, vol. 4, pp. 191-192, pl. 4, fig. C, 1835. Recorded as *Scolia sexmaculata* Fabricius from an unknown locality, but the species is Palearctic. The right half of the head is female, the left half male; the posterior legs are said to be female, and the abdomen is said to be female in appearance, but having seven exposed segments as in the male and with five appendages at the tip. I interpret these appendages as being the tridentate eighth male tergite and the tips of the claspers.

Campsomeris ephippium ephippium (Say). Described above.

TIPHIIDAE

Myrmosa melanocephala (Fabricius). BISCHOFF, Zeitschr. wiss. Insektenbiol., vol. 9, pp. 53-54, 3 figs., 1913. A partial lateral gynandromorph from Europe, entirely female, except right half of head which is male.

Myzine maculata (Fabricius). Described above.

MUTILLIDAE

Dasymutilla fulvohirta (Cresson). MANN, Psyche, vol. 22, pp. 178-180, 2 figs., 1915. Recorded as *D. euchroa* (Cockerell); a crossed or decussated gynandromorph from Montana, the left half of head female, the right half male; the left half of both thorax and abdomen male (but lacking wings), the right half female; genitalia not dissected, but male genitalia probably complete as two partially exerted stipes visible, and also apparently a short aborted sting.

Dasymutilla gloriosa (Saussure). MICKEL, Ann. Ent. Soc. Amer., vol. 29, pp. 56-57, 1936. Apparently a partial lateral gynandromorph, locality not stated, but the species ranges from Texas west to Nevada and California, with part of the first to fourth abdominal segments (?—no detailed description) male and the remainder of the specimen female.

Dasymutilla hora Mickel. MICKEL, U. S. Nat. Mus. Bull. 143, p. 28, 1928. Probably an intersex from Georgia as the entire specimen is male except that the first four segments of abdomen are female, the first and fourth, however, exhibiting some degree of maleness.

Mutilla europaea var. *obscura* Nylander. MAECKLIN, Öfv. Finsk. Vet. Soc. Förh., vol. 3, pp. 106-112, 1 fig., 1856. A complete lateral gynandromorph from Finland, the left half male, the right half female.

Pseudomethoca frigida (Smith). WHEELER, Psyche, vol. 17, pp. 186-190, 2 figs., 1910. Recorded as *P. canadensis* (Blake) from Connecticut; a complete lateral gynandromorph, the left half female, the right half male.

Pseudomethoca simillima (Smith). KROMBEIN, Ent. News, vol. 49, pp. 187-189, 1948. A transverse gynandromorph from Washington, D. C., the head completely male, the thorax and abdomen completely female.

Traumatomutilla dubia (Fabricius). BISCHOFF, Mitt. Deutsch. Ent. Ges., vol. 2, pp. 54-56, 1 fig., 1931. The Fabrician type from Central America is a transverse gynandromorph, the head, thorax, and first abdominal segment entirely male, the second abdominal segment part male and part female, and the remaining abdominal segments entirely female.

OBSERVATIONS ON THE OCCURRENCE OF GYNANDROMORPHS
IN NATURE

It has been stated that gynandromorphs are of very rare occurrence in nature. I have attempted to assemble some information from personal knowledge and correspondence and am able to present the following estimates:

Of *Myzine maculata* (Fabricius) I have examined about 2,500 specimens, 1,700 to the date of my revision (1938) and several hundred additional since that time. In the genus I have examined perhaps 10,000 specimens. The specimen recorded here is the first gynandromorph I have noticed.

Mitchell (Journ. Elisha Mitchell Sci. Soc., vol. 47, pp. 52-54, 5 figs., 1932) described a partial lateral gynandromorph of the megachilid bee *Megachile latimanus* Say. In response to my inquiry as to the number of specimens of *latimanus* examined, Professor Mitchell writes: "My belief is that they [gynandromorphs] are exceedingly rare. I can't give you any accurate count or even close approximation of the number of specimens of *Megachile latimana* I have seen, as I have not kept detailed specimen records on all I have identified. I would guess the number to be near a thousand, however. Of at least equal significance it seems to me is the fact that the gynandromorphic specimen of *M. latimana* that I described is the only one I have ever seen, in all of the bees that have passed through my hands. I expect that number would be nearly a hundred thousand, but again, that is just a guess. I have seen quite a number of intersexes, in several genera, but only that one gynandromorph." For an excellent discussion of intersexes and gynandromorphs the reader is referred to Professor Mitchell's article entitled "Sex Anomalies in the Genus *Megachile* with Descriptions of New Species" (Trans. Amer. Ent. Soc., vol. 54, pp. 321-383, pls. 31-37, 1929).

Prof. C. E. Mickel writes that of the species of North American Mutillidae in which gynandromorphs have been reported, he has seen a total of 1,002 *Dasymutilla fulvohirta*, 313 *D. gloriosa*, 154 *D. hora*, 259 *Pseudomethoca frigida*, and 416 *P. simillima*. Dr. Mickel also says that he has seen a second gynandromorph of *Pseudomethoca frigida* collected in Ohio. This specimen has never been described.