A New Species of Conicera (Diptera: Phoridae) from Hawaii, with Observations on the Genera Parafannia Bohart and Gymnoptera Lioy

CHARLES N. COLYER, F.R.E.S.

UPTON-BY-CHESTER, ENGLAND

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In 1954, Dr. D. E. Hardy of the College of Agriculture, University of Hawaii, Honolulu, Hawaii, mentioned to me that the Hawaiian Phorid fauna included only one species of Conicera known to him and that this had been recorded as *C. atra* Meigen. He discussed with me the question of the correctness of this name, to which Schmitz (1929) had given preference over that of *C. dauci* (Meigen) used by Lundbeck (1922). Father Schmitz, to whom I referred the matter, consulted Prof. Dr. R. Richter (the author of *Einführung in die zoologische Nomenklatur durch Erläuterung der internationalen Regeln*, Frankfurt am Main, 1948) who expressed the opinion that in 1833 Haliday, as the first revising author, had unquestionably wished *Conicera atra* Meigen to be made a synonym of *Phora dauci* Meigen. Therefore it emerged that the name *C. dauci* (Meigen) should be revived and *C. atra* Meigen once more sink as a synonym.

The record of *C. atra* Meigen to which Dr. Hardy had referred emanated from Bryan (1923), on material from Oahu, March, 1916, bred from rotten potatoes and determined by Knab. Until that time, Dr. Hardy had tentatively assumed that the Conicera which he had taken from time to time on windows was that species. He sent me some specimens in 1955 from which I could immediately see that they were certainly *dauci* (Meigen) since they clearly belonged to the subgenus *Tritoconicera* of Schmitz (1952), in which the males have a very characteristic sense-organ on the mid-femora, not present in *dauci*. Early this year, Dr. Hardy kindly sent me some more material, including the original specimens upon which Bryan’s 1923 record was based and three males (determined as *C. atra* Meigen by Joyce, 1954), all of which proved to be conspecific with Dr. Hardy’s *Tritoconicera* species. Also included in the consignment was a female Phorid determined by Joyce as *Parafannia molluscovora* Bohart, from decaying shellfish on the beach, Honolulu, Feb. 9, 1952, concerning which Dr. Hardy expressed considerable doubt, thinking it to be nothing more than the *Tritoconicera* species in question; and so it proved to be. (With the consignment Dr. Hardy had very kindly included some of the Guam paratypes of *Parafannia molluscovora* from the Bishop Museum, in spirit, with larvae and pupae, and of these more will be said.
later.) It was clear, therefore, that the records of *Conicera dauci* and *Parafannia molluscovora* must be erased from the Hawaiian list. Further investigation of the *Tritoconicera* species, now that female material was available, showed that it had been hitherto undescribed, and for it I propose the name

**Conicera** *(Tritoconicera) hawaiiensis*, new species

**Male.** A very small species having some affinities with *breviciliata* Schmitz (1926) but adequately distinguishable therefrom in the male by sexual characteristics of the mid-femora and genitalia (fig. 1, A-C, cf. Schmitz, 1952, textfigs. 162 and 167 c, d). Frons dull black, with slight greyish sheen; ratio of median length from vertex to supra-antennals against width of frons about 3:5. Eyes shortly but evidently hairy. Antials somewhat closer together, a little shorter and less stout than the preocellars; the mediolaterals shorter and weaker than either, and further from the preocellars than the preocellars are from one another. Anterolaterals wanting, characteristic of the subgenus. The middle row slightly convex anteriorly, not concave as Schmitz states of *breviciliata*. Third antennal segment (fig. 1, D) brown to reddish-brown with short, pale, shining pubescence, about 2½ times as long in profile as it is broad at the widest part; elongated-conical, reminiscent of *dauci* in general shape. Arista about one-third longer, very evidently pubescent. Palpi yellowish-brown to darker brown, especially basally, rather dilated from middle to apex, with very short bristles; about one-half the length of the third antennal segment.

Thorax dark brown to black on the dorsum with a faint greyish sheen; pubescence black but shining pale golden in an intense light; pleura paler, blackish brown. Legs generally brown, the front legs including the coxae paler; the mid- and hind femora darker, blackish-brown. Front tibia with the usual small sub-basal postero-dorsal bristle and row of setulae. Length of fore-tibia almost exactly four-fifths of that of the fore-tarsi, the segments of which increase consistently in breadth in the direction of the apex, so that the apex of the fifth segment is noticeably wider than the base of the metatarsus—but not so wide as the apex of the tibia. Relative lengths of fore-tarsal segments 36:18:17:13:16, thus differing considerably from *breviciliata*. The sense-organ, characteristic of the subgenus, on the posterior face of the mid-femora (fig. 1, C) differs from *breviciliata* (Schmitz, 1952, textfig. 162) in the longer, thinner form of the pale brown, shining, tubular spur-process (Hohlsporn), but the smaller fovea (Grübchen) within the larger shining, hairless, bristle-encircled depressed area is not quite so narrow, about 3–3½ times as long as wide and broadly rounded at the proximal end. The fissure (Längsspalt) or channel connecting it to the spur-process appears to be within a somewhat raised and narrow plateau-like area; this, however, may be merely the result of exsiccation. Hind femora 3–3½ times longer than wide; hind tarsi a little more than 1½ times longer than the hind tibiae;
the metatarsus exactly two-thirds of the length of the hind tibia; tarsal segments steadily decreasing in width apically, the fifth only one-third as wide as the metatarsus; ratios of lengths of tarsal segments 40:21:15:12:12. Wing (fig. 2, A), very faintly tinged with tarsal segments 40:21:15:12:12. Wing (fig. 2, A), very faintly tinged with greyish, almost hyaline, thick veins brown, thin veins hardly pigmented, a little more than twice as long as wide (2.1 times). Costal index 0.40. Ratio of costal segments 106:48 or 21:10, i.e., 1 just over twice 2. Costal cilia very short, the longest not exceeding 0.047 mm.

Abdomen of the usual shape, narrowed posteriorly, velvety black with slight greyish sheen, in some specimens the hind margins of the segments narrowly paler; venter a little less dark; no evident bristles. By contrast, the hypopygium, which is prominent in size, is of a dingy yellowish-brown, a little shining basally, with numerous very fine, short hairs on the sides. The claspers or hypopygial forceps (the "Zangenarme" of Schmitz) as in fig. 1, A, B, the left with the hairless area, indicated by a dotted line, rather more elongated and narrow than in breviciliata (Schmitz, 1952, textfig. 167 d) and with a double row of the usual black stubby spinules ("papillen" of Schmitz), only one of these being visible in the figure, the other beyond the margin; the right having the proximal lobe relatively larger than in breviciliata, thus
the general outline rather more resembling *tibialis* (Schmitz, 1952, textfig. 167 b), otherwise very similar (cf. Schmitz, 1952, textfig. 167 c).

Length 0.9–1.3 mm.

Female. Generally coloured more uniformly dark-brownish, rather than black, than in the male, with somewhat paler pubescence, but this may be due to immaturity of some of the type material. Frons about 1½ times wider than high; the antials about as far apart as the preocellars. Supra-antennals somewhat variable in length but not longer than in the male as Schmitz says of *breviciliata*. Second row slightly convex anteriorly; mediolaterals again slightly weaker than the preocellars and further from them than the preocellars are from one another. Third antennal segment (fig. 1, E) small, lemon-shaped; the arista inserted almost apically and about 4 times the length of the third antennal segment. Palpi paler, yellowish or orange, and larger than in the male with relatively longer and stronger bristles, but of similar shape. Sixth abdominal tergite an isosceles triangle, with blunt apex, the length about 1½ times to twice the width of the base, but this appearing variable due to exsiccation. Fore tarsi not increasing in width apically. Ventral spur on mid-tibiae only about two-thirds of the length of the mid-metatarsi, and that on the hind legs about one-third. Wings of same shape as in the male—costal index 0.45–0.46. Ratios of segments 16:10, i.e., 1 much less than double 2. Costal cilia exceptionally short (0.037 mm.), i.e., even shorter than Schmitz states of *breviciliata*; the dorsal row not quite reaching the apex of vein 2; the second costal segment bearing 7 cilia of the lower row (Schmitz states 6 of *breviciliata*). Third vein thicker than the costa (0.020, 0.017 mm. respectively); the seventh practically reaching the margin.

Length 1.3 mm.–1.5 mm.

Schmitz (1952) draws some distinctions between Brues' (1911) description of *formosensis*, known only from the female, and his own very fully detailed description of *breviciliata*. All of these distinctions apply to *hawaiensis*, n. sp., relative to *formosensis*, but it can be stated additionally that whereas the pubescence on the dorsum of the thorax is dark in normal direct light and shines pale golden in more intense oblique lighting, contrasting with the darker ground colour of the integument, there is certainly no duplicated system of pubescence, or what Brues describes as a finer glaucous pubescence.

Holotype ♂, Honolulu, Oahu, January, 1953, D. E. Hardy, on window. Allotype ♀, Oahu, March, 1916, J. Illingworth, ex rotten potato; one (indicated by red arrow) of four specimens pinned on card. Paratypes, ♂ ♂, about 40 specimens stuck on card, details as allotype; 8 ♂ ♂, details as holotype; 2 ♂ ♂, February, 1952, otherwise as above; 2 ♂ ♂, October, 1953, otherwise as above; 1 ♀, Feb. 9, 1952, 2♂ ♂, March 9–11, 1954, 1 ♀, Jan. 28, 1955, Honolulu, Oahu, C. R. Joyce; 1 ♀, Honolulu, Oahu, Jan. 24, 1952, M. S. Adachi, on window. Holotype in U. S. National Museum; allotype (no. 2237) and other paratypes in Bernice P. Bishop Museum; para-
types in the British Museum (Natural History) and the collections of the University of Hawaii, Father H. Schmitz, and the author.

As regards the paratype material of Parafannia molluscovora Bohart, the most immediately striking feature was the phenomenal likeness of the larvae (incidentally strongly reminiscent of those of Fannia, Muscidae, and doubtless inspiring Bohart’s generic name, although not, at the time, described or figured by him) to those of Gymnoptera orientalis (de Meijere) (vide Schmitz, 1952, textfig. 169). In fact, I was unable to find any really satisfactory characters for distinguishing the two. This of course led to a comparison of the wings of the adult material with species of Gymnoptera (tropical material kindly given by Father Schmitz), with the discovery that Bohart’s (1947) fig. 46 of P. molluscovora was certainly inaccurate as regards the course of the fourth vein (vide fig. 2, G, prepared from photograph), the number of costal cilia, and certain other minor particulars. The wing was obviously that of a Gymnoptera, and the only one of Bohart’s generic characters to distinguish molluscovora from a species of that genus was “arista inserted dorsally.” Bohart had described the third antennal segment of his female type material (only the female being known up to the time of this paper) as sub-spherical, which his figure also indicates; the profile view illustrates what, presumably, he meant by “inserted dorsally,” but the anterior view leaves much room for doubt. My examination of the paratype material led me partly to agree with his description, but not with his figure. The shape of the third antennal segment, I found, was somewhat variable and obscured by pubescence in some cases; but I considered that “sub-spherical” was an accurate description in that it was not possible for me to discern an “apex” to the third antennal segment; nor, consequently, to say positively that the insertion of the arista was “dorsal,” or “apical.” All the type material is in spirit; and so some illusions are created not infrequently in such matters which might conceivably be dispelled by seeing pinned material. Certain it was that if the arista in a specimen of molluscovora were to be extended in a direction vertical to the plane of the junction of the third and second antennal segments, it would appear “apical”; were it to be extended in some other direction relative to that plane it would appear “dorsal,” as in most cases it does in fact (fig 1, H); the figure is prepared from a photograph and the “plane” indicated by a dotted line.

Bohart had indicated in his generic description that Parafannia “runs close to Citrago Schmitz in his key to the world genera (1929).” It seems abundantly clear that he was led to this conclusion by couplet 12 of this key, whereas if he had considered that the insertion of the arista in his types was apical, he would have certainly been led to Gymnoptera and thence, by the synonymy, to Lundbeck’s wing-figure (p. 178) of vitripennis. There seems to have been considerable difference of opinion between authors on this question of the apical or other insertion of the arista in the genotype of Gym-
noptera Lioy, i.e., vitripennis (Meigen). Becker (1901) says of it (as a Phora) on p. 71, "... aber die Fühlerborste ist nicht endständig, sondern deutlich rückenständig"—he was referring to males. Lundbeck (1922) says of his conception of Hypocera Lioy (in which he included vitripennis), "... arista dorsal, in vitripennis rather sub-apical ..." and even says, on p. 181, of Conicera, "... it comes especially near to (Hypocera) vitripennis with its ... sub-apical arista and it is just possible that vitripennis should be placed in Conicera ..." But Schmitz (1929) on p. 122 says of his conception of Gymnoptera Lioy, "... mit apikaler ... Arista. Bei der melanesischen Art ist die apikale Insertion der Arista ganz evident; bei den europäischen kann die Entscheidung durch die Fühlerform (lange Vorderseite, kurze Hinterseite) und durch die starke Pubeszinz der Vorderseite etwas erschwert werden; gut erhaltene Exemplare mit nicht geschrumpftem 3. Fühlergliede zeigen auch hier meist zweifellos apikale Einlenkung." He repeats this more or less verbatim later (1952). Hitherto there have been four species of Gymnoptera known, viz., vitripennis (Meigen) and longicostalis Schmitz from Europe, orientalis (de Meijere, 1907, as a Syneura) from Java, and simplex (Brues, 1905, as a Coniceara), the last named being the Melanesian species to which Schmitz was referring. Reference to Schmitz' Taf. I. 9, 10, will show clearly what he meant about simplex, whilst the present writer's fig. 1, G, will illustrate what he meant about the European species—it being prepared from a photograph of a preparation of the third antennal segment of vitripennis ♀, in which the arista has been deliberately floated back in the mounting medium. In its normal position it would extend more or less parallel to the long axis of the antenna and thus create an illusion of being sub-apical, or even apical from a different angle where the point of insertion was concealed on the opposite side of the third antennal segment. In the male of orientalis (fig. 1, F) the insertion is not strictly apical although Schmitz refrained from specifically mentioning the fact, but oddly enough in the female it is apical, in the present writer's view. The range from Conicera through Gymnoptera to Citrago (fig. 1, D-I) now seems to make the character of the insertion of the arista of much less generic and specific value, particularly in view of the possibilities of differing interpretations. I consider, therefore, the generic name Parafannia Bohart, 1947, must sink as a synonym of Gymnoptera Lioy, 1864.

Now, as regards the species molluscovora (philologically more correctly molluscivora), it will be seen from the illustrations (fig. 2, F-J) of the female wings of Gymnoptera, that it has many affinities with the other two tropical species, orientalis and simplex; and it is interesting to note that the known biology of molluscovora and orientalis shows them to be saprophagous—giving further point to Schmitz' comment of simplex, "wahrscheinlich Aasfresser." In general facies the wings of the five species seem to separate themselves into two groups consisting of the three tropical species on the one hand and
the two European on the other. Micrometric measurements, however, from the material before me yielded the following results:

<table>
<thead>
<tr>
<th>Species</th>
<th>Index length</th>
<th>Costal index</th>
<th>Segment Ratios</th>
<th>Index 2 to 1</th>
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<tbody>
<tr>
<td>orientalis</td>
<td>2.12</td>
<td>0.49</td>
<td>26:33</td>
<td>1.27</td>
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<tr>
<td>molluscovora</td>
<td>2.23</td>
<td>0.54</td>
<td>24:31</td>
<td>1.29</td>
</tr>
<tr>
<td>simplex</td>
<td>2.25</td>
<td>0.55</td>
<td>22:30</td>
<td>1.44</td>
</tr>
<tr>
<td>vitripennis</td>
<td>2.26</td>
<td>0.52</td>
<td>21:30</td>
<td>1.34</td>
</tr>
<tr>
<td>longicostalis</td>
<td>2.42</td>
<td>0.59</td>
<td>25:41</td>
<td>1.64</td>
</tr>
</tbody>
</table>

For the first column the length was taken as indicated for arriving at the costal index by Schmitz (1938, textfigs. 44, 45), and the width as from the apex of the costa to a point on the hind margin ascertained by a perpendicular from the line of the costa. All other measurements taken as for the standard method of Schmitz. It will be noticed that for the two European species the figures in columns 2 and 3 show small variations from those of Schmitz (1952). This may well be due to the fact that Schmitz' figures are nearly all condensed into single-figure approximations for the particular purpose of his work and partly also, no doubt, to bias arising from the limited amount of material examined, individual variation having been noticed. Nevertheless, the table may prove to be of some corroborative diagnostic value if used in conjunction with the figures, which themselves will be subject to some divergence from the table arising from the small inaccuracies inseparable from the process of preparing and reproducing line illustrations from photographs. In order to obtain as much accuracy in the figures as possible, the method of inking in with waterproof ink on photographic enlargements was employed, the photographs being subsequently bleached out and the resulting line figures reduced in reproduction.

A study of the male wings (fig. 2, B-E) is interesting in its demonstration of the affinities with Conicera (fig. 2, A). Generally speaking, the male wings seem to be shorter and wider relative to those of the females, and there is a similarity in general facies in the figures between orientalis, simplex, and longicostalis (fig. 2, B-D); while vitripennis (fig. 2, E) looks somewhat different owing to the width at the basal end being relatively less. Comparison of the figure of longicostalis (fig. 2, C), however, with Schmitz' figure (1952, Taf. VII, 82) shows that Schmitz' specimen was less wide relatively at the basal end. Possibly the reverse may also obtain in some specimens of vitripennis, but owing to the limited amount of material on hand the point cannot be checked. Micrometric measurements of the material available yielded the following:
It will be interesting to see just how the male of molluscovora will fit into the pattern when it is discovered.

**Summary**

1. A new species of Conicera, indigenous to Hawaii, is discussed, together with its synonymy and that of C. dauci (Meigen).
2. Conicera hawaiiensis, n. sp., is described.
3. The larval and adult forms of Parafannia molluscovora Bohart are discussed and the generic name Parafannia Bohart, 1947, shown to be a synonym of Gymnoptera Lioy, 1864.
4. Gymnoptera molluscovora (Bohart) is confirmed as a good species and compared with the remaining known species of the genus.

**References**