A NEW SUBGENUS OF THE GENUS SABETHES (DIPTERA: CULICIDAE)

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ABSTRACT. A new subgenus, Peytonulus, of the genus Sabethes Robineau-Desvoidy is established for seven species previously included in the subgenus Sabethinus Lutz. The subgenus is contrasted with the other subgenera of Sabethes and the type species is illustrated.

INTRODUCTION

Because mosquitoes of the genus Sabethes Robineau-Desvoidy are known to harbor and transmit arboviruses (Galindo et al. 1959, Mattingly et al. 1973), information on their identification and phylogenetic relationships is of great importance. This is the third in a series of papers that deals with taxonomic problems involving nominal taxa within this genus. The first paper dealt with the transfer of a species from Sabethes to a new subgenus in Wyeomyia Theobald (Harbach and Peyton 1990a). The second dealt with the transfer of the subgenus Davismyia Lane and Cerqueira and its type species from Wyeomyia to Sabethes (Harbach and Peyton 1990b).

On reviewing the genus Sabethes, it became apparent that the species presently included in the subgenus Sabethinus Lutz actually belong to two separate phyletic lines. In this paper, a new subgenus is introduced for seven of these species: aurescens (Lutz), fabricii Lane and Cerqueira, gorgasi Duret, identicus Dyar and Knab, soperi Lane and Cerqueira, undosus (Coquillett), and whitmani Lane and Cerqueira. This action leaves only intermedius Lutz, the type species, and melanonymphe Dyar within the subgenus Sabethinus.

The new subgenus is uniquely characterized by several autapomorphic features, the highly modified larval seta 1-VII and its missing pupal homolog being the most notable and conspicuous. Based on these distinctive features, the subgenus Peytonulus is erected for the seven species listed above, and the following information is provided for its separation from the other subgenera within the genus Sabethes.

The descriptive terminology and abbreviations follow Harbach and Knight (1980, 1982) and Harbach and Peyton (1990a, 1990b). The illustrations are based on specimens deposited in the National Museum of Natural History, Smithsonian Institution.

TAXONOMIC TREATMENT

Sabethes subgenus Peytonulus, New Subgenus

Type species (Figs. 1-3). Sabethinus aurescens Lutz, 1905.

Sabethes (Sabethinus) in part of Lane and Cerqueira, 1942: 481, 659-662, 676, 679-688; Lane, 1953: 1055-1060, 1082-1096; Stone et al., 1959: 93-94; Knight and Stone, 1977: 307-308; and authors.

Sabethoides (Sabethinus) in part of da Costa Lima, 1931: 56, 59, 60-61, 62-63; and authors.

Sabethes (Sabethoides) in part of Theobald, 1907: 618; Theobald, 1910: 586; Howard et al., 1915: 31-37; and authors.

Sabethes (Sabethoides) in part of Dyar, 1924: 97-98; and authors.
Fig. 1. Adult habitus of *Sabethes (Peytonulus) aurescens* (based on specimens from the State of Sao Paulo, Brazil). Coloration is characteristic of all but one undescribed species of the subgenus. The presence of lower mesokate-pisternal setae (MkSL) distinguish species of *Peytonulus* from those of *Sabithinus*.

Fig. 2. Fourth-instar larva of *Sabethes (Peytonulus) aurescens* (based on specimens from the State of Sao Paulo, Brazil). The modified seta 1-VII is diagnostic for the subgenus.
Fig. 3. Pupa and mouthparts of the fourth-instar larva of *Sabethes (Peytonulus) aurescens* (based on specimens from the State of Sao Paulo, Brazil). The absence of seta 1-VII is diagnostic for the subgenus. The large, elongate maxilla with its well developed teeth and long terminal clawlike process are characteristic of all species within this group.
Sabethoides in part of Theobald, 1910: 584; Bonne and Bonne-Wepster, 1925: 22, 37-41; Dyar, 1928: 6, 16-17, 21-24; Edwards, 1932: 80-81; and authors.

Except for the adult stage of one undescribed species which lacks metallic scutal scaling and bears certain other stasimorphic characters, this subgenus possesses the general characteristics of the genus Sabethes as noted by Harbach and Peyton (1990b). It differs from the other subgenera in the diagnostic and differential features given below. These features are illustrated in figures 1-4 and contrasted with homologous features in the other subgenera in Table 1.

**Adult.** Adults of the subgenus Peytonulus are readily recognized by the following combination of characters: thorax with upper proepisternal and lower mesokatepisternal setae; legs without paddles, midleg entirely dark-scaled; most species with conspicuous white scaling on ventral surface of hindtarsomere 5.

**Larva.** Maxilla large, with well developed teeth (= laciniarastrum 1) and long terminal clawlike process; seta 4-C in line with or lateral to 1-C, normally lateral; seta 8-T anterior or anteroventral to pleural setal group; seta 1-I mesal to 2-I; seta 10-I in line with or mesal to 13-I, usually mesal; seta 9-II,III anterior or anteroventral to seta 7; seta 12-IV,V lateral to seta 13; seta 1-VII uniquely developed into a stout spine-, hook- or clawlike process borne on a prominent tubercle, apparently not innervated, without pupal homolog (Fig. 4); comb with relatively few large spines, without comb plate; setae 1a,2a-S not duplicated; auxiliary seta 4b-X absent.

**Pupa.** Seta 5-III much smaller than 5-IV-VI; seta 9-III-VI often spineike; seta 1-VII absent; seta 8-VII ventral, small; paddle normal, without differentiated membranous dorsal area at base.

**Etymology.** The subgeneric name is a Latinized diminutive patronym to recognize E.L. Peyton for his special knowledge of sabethine mosquitoes and his many contributions to the field of mosquito systematics. The three-letter abbreviation Pey. is recommended for this subgenus.

**Discussion.** Peytonulus exhibits the most divergent morphology of any subgenus of Sabethes. Larvae of this group possess a uniquely specialized seta 1-VII which reaches terminal development in the fourth instar, i.e., it does not develop in the pupal stage. This ontogenetic distinction represents a synapomorphy for Peytonulus. Nevertheless, species of this group, like many other groups of mosquitoes, are mosaics of primitive and derived characters. The undescribed species mentioned above is a good example of this. It shares a plesiomerphory with Wyeomyia in the retention of dull scutal scaling, yet bears the autapomorphic immature characters diagnostic of Peytonulus.

The species included in Peytonulus were formerly placed in Sabethinus. These subgenera, however, have very little in common other than overt similarities in the ornamentation of the adults. Based on character agreement, Peytonulus appears to be more closely related to Sabethoides and Davismyia. Nevertheless, these three subgenera differ rather markedly in all stages as indicated in Table 1. Particularly noteworthy is the presence of prealar setae in the adults of Davismyia. Prealar setae are plesiomorphic for Sabethes and represent a clear case of symplesiomorphy with Wyeomyia.

Although Peytonulus seems to show affinities with Davismyia and Sabethoides, the morphological data have not been thoroughly compared against all species of the subgenus Sabethes. This subgenus is poorly known at present and appears to be a rather heterogeneous assemblage of species. Thus, the relationships suggested here are tentative and await further analysis of the entire genus.

**ACKNOWLEDGMENTS**

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Table 1. Comparison of diagnostic and differential characters for the five subgenera of *Sabethes*.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Character</th>
<th>Peytonulus</th>
<th>Sabethes</th>
<th>Sabethoides</th>
<th>Sabethinus</th>
<th>Davismyia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>Prealar setae</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Upper proepisternal setae</td>
<td>Yes</td>
<td>No, except <em>batesi</em></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Lower mesokat-episternal setae</td>
<td>Yes</td>
<td>Yes/no, variable</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Leg paddles</td>
<td>No</td>
<td>Yes, but not all species</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Midtarsus largely white-scaled on ventral side</td>
<td>No</td>
<td>No, but some species with white scaling on both sides</td>
<td>Yes</td>
<td>No</td>
<td>No, but females with some white scaling on ventral side</td>
</tr>
<tr>
<td>Larva</td>
<td>Seta 4-C lateral to 1-C</td>
<td>Yes, rarely in line with 1-C</td>
<td>Yes/no, usually mesal to 1-C</td>
<td>No, mesal to 1-C</td>
<td>Yes, occasionally in line with 1-C</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Seta 8-T anterior or anteroveleral to 9-T</td>
<td>Yes</td>
<td>No, dorsal or anterodorsal to 9-T</td>
<td>No, dorsal or anterodorsal to 9-T</td>
<td>Yes/no anteroveleral or ventral to 9-T</td>
<td>No, dorsal to 9-T</td>
</tr>
<tr>
<td></td>
<td>Seta 1-I mesal to 2-I</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No, lateral to 2-I</td>
<td>No, lateral to 2-I</td>
</tr>
<tr>
<td></td>
<td>Seta 10-I in line with or mesal to 13-I, usually mesal</td>
<td>Yes</td>
<td>No, in line with or lateral to 13-I, usually lateral</td>
<td>Yes</td>
<td>No, in line with or lateral to 13-I</td>
<td>No, far lateral to 13-I</td>
</tr>
<tr>
<td></td>
<td>Seta 9-II,III anterior or anteroveleral to seta 7, usually anteroveleral</td>
<td>Yes</td>
<td>No, anterior or anterolateral to 7</td>
<td>Yes</td>
<td>Yes/no, sometimes anterolateral on segment III</td>
<td>Yes</td>
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<tr>
<td>Character</td>
<td>Pupa 5-III much smaller than 5-IV-VI</td>
<td>Seta 1-VII modified, on tubercle, mesal to seta 2</td>
<td>Comb scales large, separated</td>
<td>Comb plate present</td>
<td>Setae 1a,2a-S each represented by one seta</td>
<td>Auxiliary seta 4b-X present</td>
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<tr>
<td>Seta 12-IV,V lateral to seta 13</td>
<td>Yes</td>
<td>Yes/no, usually mesal to 13</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes/no, each usually duplicated</td>
<td>Yes</td>
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<tr>
<td></td>
<td>Yes</td>
<td>No, normal, lateral to 2</td>
<td>No, normal, lateral to 2</td>
<td>No, normal, posterior to 2</td>
<td>No, smaller, close-set</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No, smaller, close-set</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes/no, each usually duplicated</td>
<td>Yes</td>
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<td></td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
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<td></td>
<td>Yes</td>
<td>No</td>
<td>No, except <em>chloropterus</em></td>
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<td>No, except <em>chloropterus</em></td>
<td>Yes</td>
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<tr>
<td></td>
<td>Yes</td>
<td>Yes, except <em>shannoni</em> and <em>purpureus</em></td>
<td>Yes</td>
<td>Yes</td>
<td>No, as large as 5-IV-VI</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No, very large, dorsal</td>
<td>Yes</td>
<td>Yes</td>
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<td></td>
<td>Yes</td>
<td>Yes, some species with differentiated membranous area at base dorsally</td>
<td>No, with differentiated membranous area at base dorsally</td>
<td>Yes</td>
<td>Yes</td>
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</table>
Fig. 4. Lateral view of abdominal segment VII of the prepupal stage of *Sabethes (Peyronodus) undosus* showing the neural connections between larval and developing pupal setae. Note that seta 1 is not innervated in the larva and absent in the pupa. Setae 12 and 13 are innervated in the larva but their structural homologs are absent in the pupa. Illustration is based on specimen number TR 700-1A (from Trinidad) in the NMNH.

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