

Notes on the nomenclature of the endemic Hawaiian Drosophilidae

P.M. O'GRADY (American Museum of Natural History, Division of Invertebrates, Central Park West at 79th Street, New York, New York 10024, USA; email: ogrady@amnh.org)

Hardy's revision of the Hawaiian Drosophilidae included 9 genera, *Antopocerus*, *Ateledrosophila*, *Celidosoma*, *Drosophila*, *Grimshawomyia*, *Idiomyia*, *Nudidrosophila*, *Scaptomyza*, and *Titanochaeta* (Hardy, 1965). These were considered to be part of two major lineages, "drosophiloids" and "scaptomyzoids," based on a number of morphological synapomorphies (Throckmorton, 1966). The drosophiloid, or Hawaiian *Drosophila*, lineage contained the *Drosophila* species endemic to Hawai'i, as well as the endemic genera *Antopocerus*, *Ateledrosophila*, *Idiomyia*, and *Nudidrosophila*. The scaptomyzoid lineage included all the Hawaiian *Scaptomyza*, as well as members of the genera *Celidosoma*, *Grimshawomyia*, and *Titanochaeta*.

Table 1. Taxonomic History of the Hawaiian *Drosophila* Lineage

clade	Hardy (1965)	Carson et al. (1968)	Kaneshiro (1975)	Hardy (1978)	Grimaldi ¹ (1990)
<i>Antopocerus</i>	genus		<i>Drosophila</i> , in part	<i>Drosophila</i> , as subgenus	<i>Idiomyia</i> , as subgenus
<i>Ateledrosophila</i>	genus		<i>Drosophila</i> , in part		<i>Idiomyia</i> , as subgenus
<i>Drosophila</i>	genus				<i>Idiomyia</i>
<i>Idiomyia</i>	genus	<i>Drosophila</i> , in part			<i>Idiomyia</i>
<i>Nudidrosophila</i>	genus		<i>Drosophila</i> , in part		<i>Idiomyia</i> , as subgenus

1. In part. Only the 19 taxa Grimaldi (1990) used were formally moved into the genus *Idiomyia*. The remaining taxa remain in the genus *Drosophila*.

The status of the genera within the Hawaiian *Drosophila* lineage has been changed several times since Hardy's initial treatment 7 years ago (Table 1). Carson *et al.*, (1967) sank the genus *Idiomyia* into the genus *Drosophila* based on polytene chromosome banding patterns. Kaneshiro's work on male genitalic morphology (Kaneshiro, 1976) supported the notion that *Idiomyia* was a synonym of *Drosophila*. He also considered *Antopocerus*, *Ateledrosophila*, and *Nudidrosophila* to be species groups within the genus *Drosophila*, rather than distinct genera, and sank them accordingly (Kaneshiro, 1976). Hardy (1977) published a revision of *antopocerus* and treated this group as a subgenus of *Drosophila*, even though he states that "these characters found only in males are probably not more than species group importance" even though he concludes "for convenience sake, to treat *Antopocerus* as a subgenus" of *Drosophila* (Hardy, 1977: 83). The subgeneric status of *antopocerus* was maintained by Wheeler (1981) in his world catalog of Drosophilidae.

In his revision of the family Drosophilidae, Grimaldi (1990) resurrected the genus *Idiomyia* to contain all endemic Hawaiian *Drosophila*. This concept included the *Drosophila* endemic to Hawai'i, *Idiomyia* (*sensu* Hardy, 1965), and the species placed in the *antopocerus*,

ateledrosophila, and *nudidrosophila* species groups (*sensu* Kaneshiro, 1976). These latter groups were originally considered subgenera of *Idiomyia*. Only those species formally combined with *Idiomyia* in Grimaldi's (1990) phylogenetic study were included in *Idiomyia* in the most recent checklist of Hawaiian terrestrial arthropods, which was based solely on published information (Nishida, 1997). The result is that 19 species in various *Drosophila* species groups (Table 2) are listed in the genus *Idiomyia* in Nishida (1997).

Table 2. Redesignation of Hawaiian *Drosophila* species

Grimaldi (1990)	This Study	Species group
<i>Idiomyia achyla</i>	<i>Drosophila achyla</i> Hardy	unplaced
<i>Idiomyia adiaastola</i>	<i>Drosophila adiaastola</i> Hardy	adiaastola
<i>Idiomyia adunca</i>	<i>Drosophila adunca</i> (Hardy)	antopocerus
<i>Idiomyia aenicta</i>	<i>Drosophila aenicta</i> Hardy	nudidrosophila
<i>Idiomyia araiotrichia</i>	<i>Drosophila araiotrichia</i> Hardy	modified mouthpart
<i>Idiomyia atroscutellata</i>	<i>Drosophila atroscutellata</i> Hardy	modified tarsus
<i>Idiomyia attigua</i>	<i>Drosophila attigua</i> Hardy and Kaneshiro	primaeva
<i>Idiomyia basimacula</i>	<i>Drosophila basimacula</i> Hardy	modified tarsus
<i>Idiomyia bipolita</i>	<i>Drosophila bipolita</i> Hardy	haleakalae
<i>Idiomyia crucigera</i>	<i>Drosophila crucigera</i> Grimshaw	grimshawi
<i>Idiomyia dissita</i>	<i>Drosophila dissita</i> Hardy	modified mouthpart
<i>Idiomyia engyochracea</i>	<i>Drosophila engyochracea</i> Hardy	grimshawi
<i>Idiomyia fungiperda</i>	<i>Drosophila fungiperda</i> Hardy	haleakalae
<i>Idiomyia perissopoda</i>	<i>Drosophila perissopoda</i> Hardy	modified tarsus
<i>Idiomyia perkinsi</i>	<i>Drosophila neoperkinsi</i> (Grimshaw)	planitibia
<i>Idiomyia preapiculata</i>	<i>Drosophila preapiculata</i> (Hardy)	ateledrosophila
<i>Idiomyia primaeva</i>	<i>Drosophila primaeva</i> Hardy	primaeva
<i>Idiomyia scolostoma</i>	<i>Drosophila scolostoma</i> Hardy	modified mouthpart
<i>Idiomyia spectabilis</i>	<i>Drosophila spectabilis</i> Hardy	adiaastola

Grimaldi (1990: 118) argued that "it is biologically and scientifically preferable to have a classification reflecting phylogenetic relationships". However, recent phylogenetic analyses indicate that the use of the genus *Idiomyia* for any or all Hawaiian *Drosophila* is misleading because (1) there are no synapomorphies defining this clade, (2) it is not supported as monophyletic in phylogenetic analyses of any character set (including that used in Grimaldi, 1990), and (3) it does not have precedence over *Drosophila* as a genus name.

Hardy (1965) stated that *Idiomyia* "is very close to *Drosophila*, and the only reliable character I have found separating it is the extra crossvein present in cell R₅" (Hardy, 1965: 539). However, this extra crossvein is present in several other Hawaiian taxa, rendering its use as a synapomorphy to define *Idiomyia* invalid. No other synapomorphies are exclusive to the group of taxa listed under *Idiomyia* in Nishida (1997). Reanalysis of Grimaldi's (1990) data, as well as a number of molecular loci (Remsen & O'Grady, 2002), show that the Hawaiian *Drosophila* are nested within the genus *Drosophila* as it is presently defined (Fig. 1). Furthermore, based on a number of recent taxonomic (Hardy *et al.*, 2001; O'Grady *et al.*, 2001; 2002) and molecular phylogenetic studies (Bonacum 2001; Remsen & O'Grady, 2002), the Hawaiian *Drosophila* species all form a single, well-supported

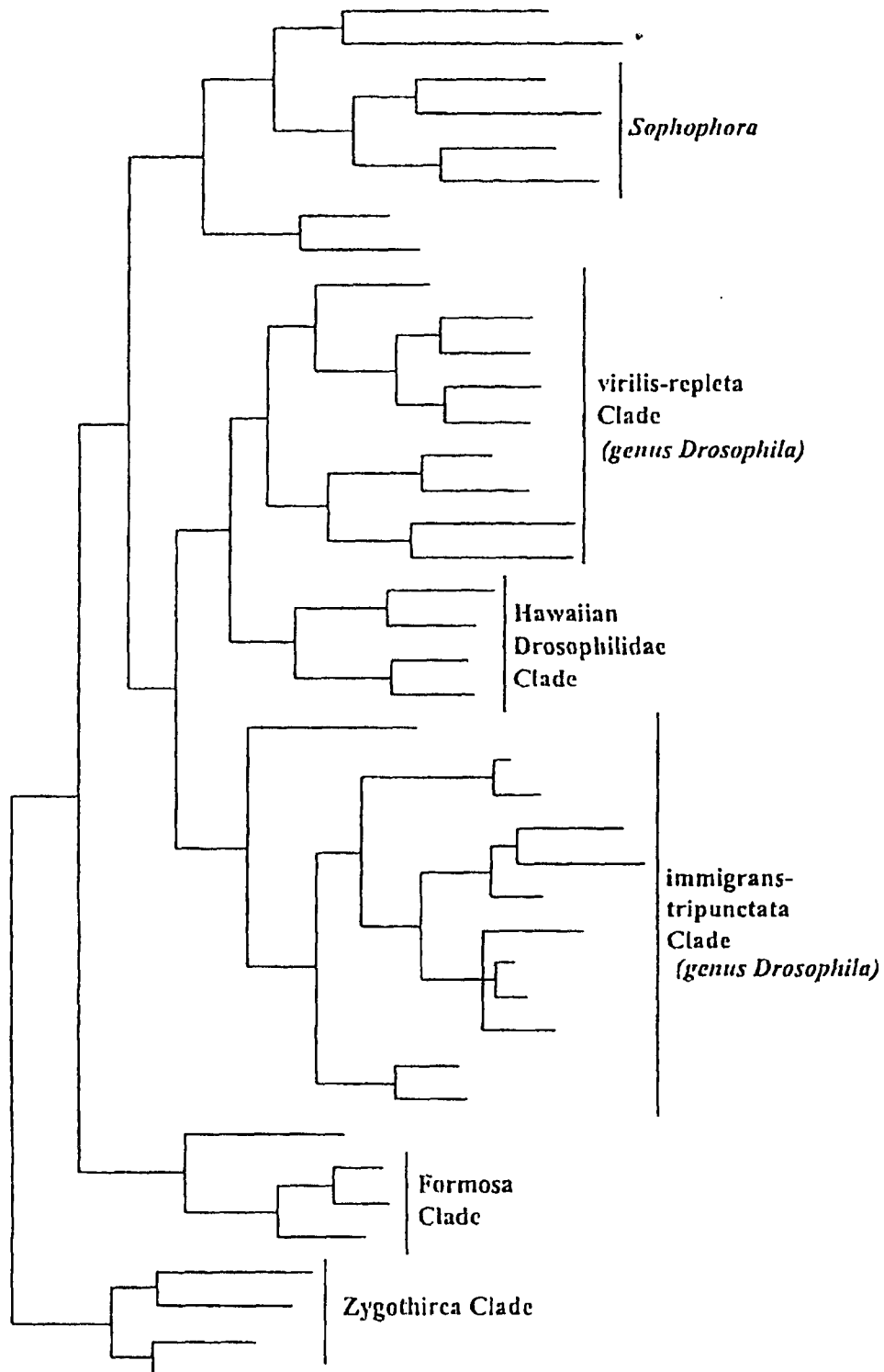


Figure 1. Phylogeny of the genus *Drosophila* and related groups showing the placement of the endemic Hawaiian *Drosophila* (Remsen & O'Grady, 2002). The Hawaiian *Drosophila* clade is nested within the genus *Drosophila*.

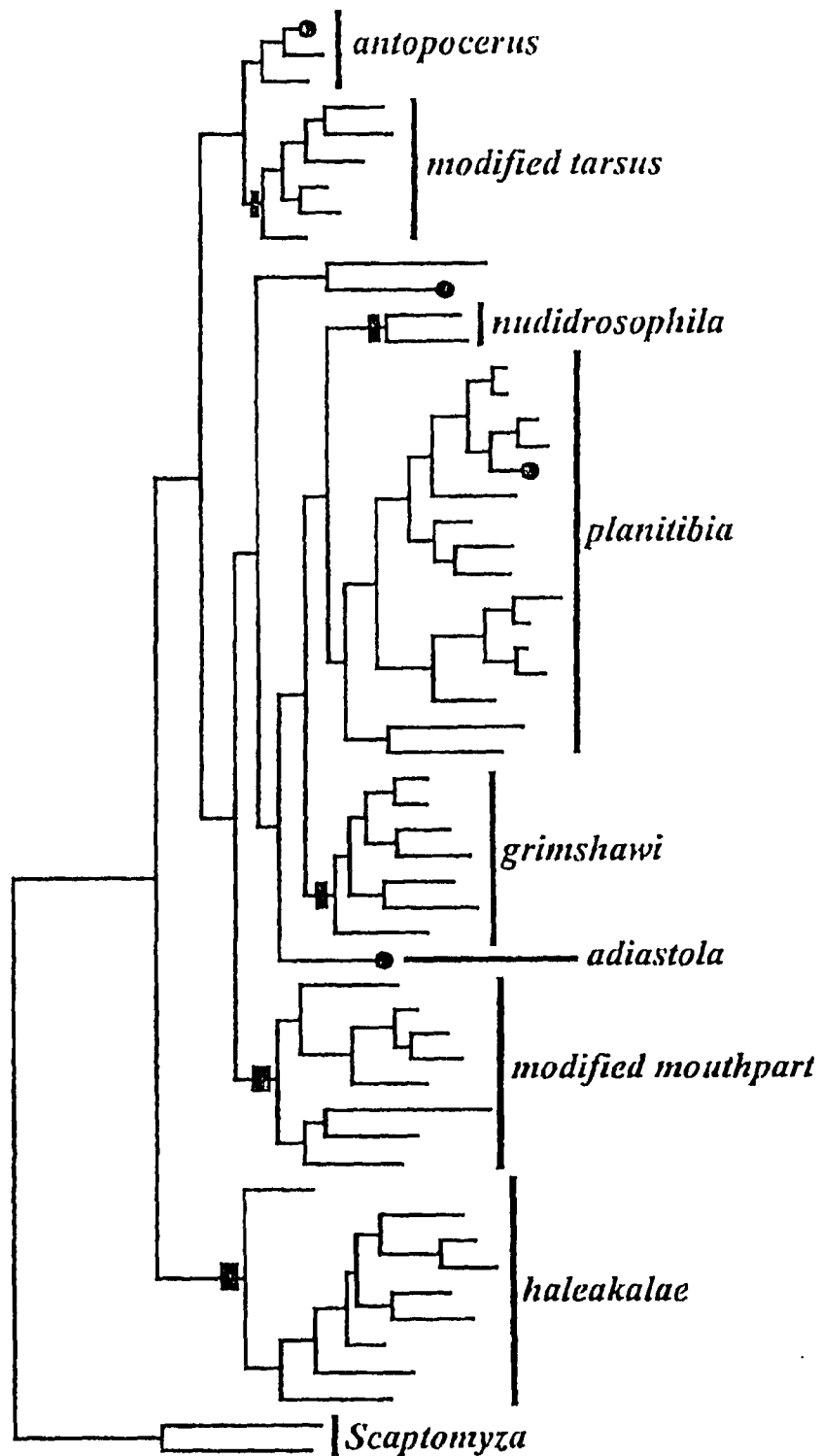


Figure 2. Phylogeny of the major lineages within the endemic Hawaiian *Drosophila* (Bonacum 2001). Circles indicate taxa placed in *Idiomyia* by Grimaldi (1990). Some species that were moved to *Idiomyia* by Grimaldi (1990) were not available for sampling, although the sister taxa were sampled. These clades are indicated by squares.

clade (Fig. 2). Although several taxonomically defined species groups are monophyletic, *Idiomyia*, as defined by Grimaldi (1990), is not. Finally, Grimaldi states that in choosing *Idiomyia*, he was merely selecting "the name with date precedence" (Grimaldi, 1990: 118). However, since *Idiomyia* is nested within the genus *Drosophila* and not monophyletic (as discussed above), and because several species in the Hawaiian *Drosophila* lineage were described in the genus *Drosophila* at the same time *Idiomyia* was erected, this name does not have precedence over *Drosophila*. Based on these arguments, we propose that the species placed in *Idiomyia* by Grimaldi (1990) be reinstated as members of the genus *Drosophila*, providing a firm taxonomic and phylogenetic framework for further evolutionary and systematic studies.

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