

A new geographical record for *Drosophila desertorum* and a review of the *D. ritae* cluster in the *repleta* group of *Drosophila*.

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The *D. repleta* group is currently comprised of ca 100 species endemic to North and South America. Several of these species are poorly known, sometimes described from only a single specimen or individuals from a single collection (Wasserman 1992). One such species, *D. desertorum*, was described from a collection made in 1958 from northeast of Pachuca, Hidalgo, Mexico, and a second collection made at San Pedro Mines, Hidalgo, ca 120 km north of Mexico City (Wasserman 1962; Vilela 1983). Based on its polytene chromosome similarities, Wasserman (1992) included this species in the *ritae* cluster, comprised of *D. ritae*, *D. mathisi*, and *D. desertorum*, within the *D. mulleri* complex. Another related species, *D. brevicarinata*, was described by Patterson and Wheeler (1942) from a single collection. It was described as morphologically similar to *D. ritae*, including the latter's metaphase chromosomes, but the type specimen was lost and no record of its genitalia is known (Vilela 1983). Thus its relation to the *D. ritae* cluster cannot be re-evaluated here. The purpose of this report is to describe a new geographical location for *D. desertorum* and to untangle the species and geographical relationships of members of the *ritae* cluster given this unforeseen new location for *D. desertorum*.

On March 14-15 2004, eight *D. desertorum* males were collected over banana baits in the Chisos Basin group camping area at 5100 ft elevation in Big Bend National Park, Texas. This site is ca 1100 km northwest from the Hidalgo site from where the species was first described (.op cit. above). The most common species were *D. longicornis* (207 adults) and *D. pseudoobscura* (134 adults), along with a few *D. hydei*. Species identifications were made by dissecting the aedeagus from several males upon return to the laboratory and comparing morphologies to the diagrams in Vilela (1983). The invagination of the tip of the aedeagus and the two pairs of “spurs” or posterior projections are distinctive enough to correctly identify live male *D. desertorum* (males under CO<sub>2</sub> anesthesia will sometimes evert their aedeagus allowing species identification). Overall differences from *D. longicornis* include longer wings, longer legs, lemon yellow testes, and an overall brownish background body color. None of these latter characters are, however, as diagnostic as the morphology of male genitalia.

Prior to this time, only the other two members of the *ritae* cluster were thought to exist north of Mexico. *D. ritae* was first recorded in Texas (including the Chisos Mountains), New Mexico, and into southern Arizona (Patterson and Wheeler 1942). Subsequently, *D. ritae* was found in Chihuahua, Coahuila, Durango, Nuevo Leon, and throughout southern Mexico in Guanajuato, San Luis Potosi (Etges, unpubl. data), Mexico City, Jalisco, Michoacan, Puebla, and Oaxaca (Patterson and Mainland 1944). It is also chromosomally quite polymorphic for gene arrangements (Wasserman 1992). Wasserman (1962) also described a new, closely related species from Mexico City, *D. tira*. However, Vilela (in Wasserman 1992) found that the aedeagus of *D. tira* was indistinguishable from that of *D. ritae*, and thus *D. tira* was synonymized with *D. ritae*, and the name “*tira*” became invalid. Apparently, the reason Wasserman (1962; 1967)

decided that *D. tira* was a new species was due to the particular strain of “*D. ritae*” (A 6.4 from Patagonia, Arizona) he used in laboratory isolation tests with “*D. tira*”. Crosses of the new “*D. tira*” with this strain of “*D. ritae*” produced no offspring and differed in gene arrangements. This strain (A 6.4) of “*D. ritae*” was then recognized as a cryptic undescribed species, “from Arizona” (Wasserman 1982) that was subsequently named *D. mathisi* (Vilela 1983). This species has been subsequently found in much of southern Arizona and New Mexico and is cytologically monomorphic. A form with a *mathisi*-like aedeagus has also been reported from Merida, Venezuela, but little more is known about these latter flies (Wasserman 1992).

Both allozyme and DNA-based analyses suggest a weaker affiliation between Mexican *D. desertorum* and other members of the *D. ritae* cluster. For several enzyme loci, *D. desertorum* shares identical allozymes with *D. longicornis* cluster species (*D. pachuca*, *D. propachuca*, and *D. longicornis*) as opposed to *D. ritae* (Richardson and Smouse 1976). Members of the *D. ritae* and *D. longicornis* clusters were grouped together, i.e. neither group was monophyletic, based on a phylogenetic analysis including mitochondrial and nuclear DNA sequences combined with inversion data (Durando et al. 2000). Possible explanations for these conflicts include possible convergence for allozyme function due to shared patterns of host cactus use (Richardson and Smouse 1976; Richardson et al. 1977) and/or incomplete lineage sorting at the DNA sequence level (O'Grady et al. 2002; Oliveira et al. 2003). Therefore, the existence of the *ritae* and *longicornis* clusters may be uncertain, but further scrutiny of the evolutionary relationships of these species is required.

The discovery of *D. desertorum* in the Chisos Basin of Big Bend National Park represents a significant range extension for this species assuming that collections made

there in the 1940s would have included this species if it had been present. There are few recent records of *Drosophila* collections made in this region of Texas or the Sierra Madre Occidental in Mexico. Perhaps the range of *D. desertorum* is much larger than previously thought simply because it has been encountered so rarely in nature. All three of the *D. ritae* “cluster” species are now known from in and around southern Arizona, New Mexico, and southwest Texas, although only *D. ritae* and *D. mathisi* are known to be sympatric there. *Drosophila ritae* is the most widespread species, occurring from these southwestern states into southern Mexico. Given the protection afforded by the national park, we hope *D. desertorum* will persist there and further collections can be made so we can determine the degree of genetic differentiation and reproductive isolation from the Mexican population of *D. desertorum*, as well as from *D. ritae* and *D. mathisi*.

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