First Record of the Thornbush Dasher (Micrathyria hagenii) for Oklahoma

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During a visit to The Nature Conservancy’s J.T. Nickel Preserve in Cherokee County, Oklahoma on 3 July 2015, we found the first state record of the Thornbush Dasher (Micrathyria hagenii). We located eight male dashers, but we could not find any females. We collected two of the males (specimens, SP 1695 and SP 1696, in the Smith-Patten/Patten Collection [SP]; photos of SP 1695 submitted to Odonata Central [OC] as record number OC 432602; Fig. 1) and photographed others. Michael A. Patten [MAP] returned to the site on 5 July, at which time he checked multiple ponds in the vicinity of the original location and checked nearby grassy areas in hopes of stirring up females. He found seven males (1 collected as SP 1700) at the original pond, but again no females. Bill Carroll returned to the site on 14 July. He conducted a similar intensive survey to that done on 5 July but he was unable to find any Thornbush Dashers. Jim Arterburn was just as unlucky when he checked the pond on 31 July.

The J.T. Nickel Preserve is located in the Ozark Plateau. The pond where the Thornbush Dashers were found is a small (approximately 30 m²), man-made impoundment. The pond is situated in a pasture that was previously planted in tall fescue (Festuca arundinacea), an introduced species, but is being restored to tallgrass prairie vegetation. The habitat in the pond consisted of open-water and submersed vegetation, primarily Canadian waterweed (Elodea canadensis) and humped bladderwort (Utricularia gibba), and emergent species on the periphery such as blue mudplantain (Heteranthera limosa), squarestem spikerush (Eleocharis quadrangulata), and Kansas arrowhead (Sagittaria amibaigua).

We visited the pond in hopes of collecting specimens of the Amber-winged Spreadwing (Lestes curinus), a species that was added to the Oklahoma state list in 2013 (a single female, SP 688, OC 400672, Pushmataha Co.; Patten and Smith-Patten, 2013). The second state record of the spreadwing was found the following year at the Nickel Preserve by Jim Arterburn (OC 423037, June 2014). Later in 2014 and earlier this year the species appeared at nearby ponds (OC 424690, July 2014, and OC 431433, June 2015). We were fortunate that the day before our visit to the Nickel Preserve we found another population (or likely population, as only males have been seen thus far; one male collected as SP 1688) in the Adair County portion of Cookson Wildlife Management Area; nonetheless, we still wanted vouchers of the Cherokee County population.

To our dismay we found no spreadwings, Amber-winged or otherwise, at the pond (or any nearby) but we were, of course, thrilled to stumble across the Thornbush Dashers. Admittedly we were quite puzzled by finding Thornbush Dashers in northeastern Oklahoma. Although BS-P predicted the species would be found in Oklahoma, she predicted it to show in southern Oklahoma, likely in the southcentral or southwest. Upon looking more closely at the range map (Paulson, 2009), the northeastern Oklahoma record, though still surprising, is not so terribly shocking. There is one record of the species reported for northwestern Arkansas, also in the Ozark Plateau: a single specimen, gender unspecified, that was collected on 8 June 1968 in Franklin County (Houston, 1970; Harp and Rickert, 1977). This specimen, collected some 100 km (63 mi) southeast of the Oklahoma locality, has not been located and we (and George Harp, pers. comm.) have been unable to contact the author of the record. Until that record can be verified, we suggest it be treated with caution.

With or without the Arkansas record as context, the northeastern Oklahoma record remains somewhat of a puzzler. If we consider that the Oklahoma pond is some 650 km (400 mi) northeast of where the species breeds regularly in Texas and 400 km (250 mi) from the northemmost Texas record, the obvious question, then, is how did a group of male Thornbush Dashers end up so far from where they normally occur (Fig. 2)? The question came up again eleven days after the Oklahoma dasher find when the species was discovered in Tennessee (Owl’s Hill Nature Sanctuary, Brentwood, Williamson Co., Robert English, 14 July 2015, OC 433072; see note in this issue). Such long-distance displacement or dispersal of organisms is not unheard of, and certainly we have seen it several times with North American odonates; for example, Twilight Darner (Gynacantha

Figure 1. Thornbush Dasher (Micrathyria hagenii) found at the J.T. Nickel Preserve, Cherokee County, Oklahoma, on 3 July 2015. This male was collected as specimen SP 1695.
nervosa), Persephone’s Darner (Aeshna persequens), Tawny Pennant (Brachymesia herbida), Great Pondhawk (Erythemis vesiculosa), and Evening Skimmer (Tholymis citrina; Paulson, 2009).

Long-distance dispersals happen for various reasons, some active and others passive. We tend to be more familiar with the active forms, such as migration, because we have heard much about birds and monarch butterflies, for instance, migrating south for the winter and returning in the spring. And in recent years, many of us have also become aware that even some odonates migrate (<http://www.migratorydragonflypartnership.org>). But active dispersal does not have to be associated with migration; it can just be that an animal moves to find food, to avoid temperature extremes, or for reasons that scientists have yet to discern. Passive dispersal, on the other hand, is less well known. Both plants and animals can disperse passively via wind, water, or by being transported by animals, including humans. Passive dispersal by storms is a long-held notion (Webster, 1902; Wood Jones, 1909; Felt, 1925; Darlington, 1938; Holzapfel and Harrell, 1968), although a largely untested one (Gillespie et al., 2012).

Thinking about the Oklahoma and Tennessee records of the Thornbush Dasher leads one to ponder whether those individuals actively or passively arrived at the localities where they were discovered and to further question the dispersal mechanism. The Thornbush Dasher is generally not considered a migratory species or a really strong flier, so it seems unlikely that the species would have actively dispersed. Although perhaps these two extralimital records reflect an especially good breeding season in which individuals dispersed much farther than normal. However, the distance traversed is rather great, especially when considering the distance between the normal breeding range and the Tennessee record (over 1,100 km [700 mi]).

An arguably more plausible scenario lies in the weather, specifically Tropical Storm Bill (which was initially suggested by MAP as the dispersal mechanism). Looking at the track of the storm and the outflow bands (Figs. 2 and 3) it is easy to construct a beautiful story that a horde of Thornbush Dashers were scooped up in Texas and sent on their way to northeastern Oklahoma and central Tennessee via high-powered winds. Although this is reasonable conjecture, unfortunately researchers have yet to come up with a way to test the hypothesis of passive dispersal by storms (Gillespie et al., 2012). Gathering evidence to test such a hypothesis is formidable, and would require a researcher to know when a storm was coming, somehow to GPS tag insects, and then track them before, during, and after the storm.

Figure 2. Species range for the Thornbush Dasher (Micrathyria hagenii) in northern Mexico and the southern United States (hatched green; Mexico range approximated from Paulson & González Soria, 2015 and Doug Danforth, pers. comm.; Paulson, 2009). Extralimital records for Arizona, Arkansas, Tennessee, and Oklahoma are shown with year of record. In June 2015 Tropical Storm Bill tracked through eastern and central Texas, where the Thornbush Dasher breeds, into Oklahoma and onto the east, affecting Tennessee and Kentucky, where it finally was downgraded to a post-tropical storm. The tropical storm is one of the dispersal mechanisms that may explain the presence of Thornbush Dashers in Oklahoma and Tennessee.
and after a storm, to determine how many individuals were sucked into the storm (ideally also where in the storm they were carried and how they were released from the storm), how many survived the storm, and where they ended up after they were released from the storm. Nonetheless, Tropical Storm Bill may be a plausible explanation for the Oklahoma and Tennessee records.

Other extralimital records for the species do not fare so well under the storm hypothesis. The Arkansas record in particular is problematic because there were no storms in 1968 (Stark, 1968; Green, 1968) that would explain that occurrence. The Arizona records fare a little better. The species was first found in Arizona in late September 2005 when Rich Bailowitz found several at a pond at the Buenos Aires National Wildlife Refuge, Pima County (Bailowitz specimen; Doug Danforth, pers. comm.). Bailowitz returned to the site a few days later, on 26 September 2005 with Doug Danforth, who photographed the species. They found an additional individual on that same day a few miles away from the original location. The species was found again on 1 November 2014, this time at The Nature Conservancy ponds near Dudleyville, Pinal County (Justin Jones, OC 427607, and also photographed by Pierre Deviche). During 2005 and 2014 there were tropical storms and hurricanes on the Pacific coast of Mexico (NOAA 2006, 2015) that theoretically could have pushed Thornbush Dashers northward, but the storms did not directly track through Arizona as Tropical Storm Bill did with Oklahoma and Tennessee. We also do not have a clear idea of the species’ range in Sonora, so the apparent gap between the Guaymas area in central Sonora, where the species is known to be rather common (Doug Danforth, pers. comm.), and southern Arizona may be simply an artifact of survey effort, whereas the gap between central Texas, where Thornbush Dashers breed, and northeast Oklahoma is much better documented as a true gap.

Whether brought northward passively, via a storm, or actively, via regional dispersal, perhaps due to climate change, what remains to be seen is whether these extralimital records are an indication of a range expansion of the Thornbush Dasher or if they are just random records. Latitudinal range shifts and expansions have been documented for a wide variety of organisms, including odonates (e.g., Hickling, 2006; Menéndez, 2007; Walther et al., 2002). There have also been specific discussions regarding Neotropical odonates, i.e. *Chrysobasis* [Leptobasis]*lucifer* (Lucifer Swampdamsel), *Lestes forficula* (Rainpool Spreadwing), *Nebalonia minutum* (Tropical Sprite), *Orthemis discolor* (Carmine Skimmer), *Erythemis vesiculosa* (Great Pondhawk), *Micrathyria hagenii*, *Itolymis citrina* (Evening Skimmer), and *Tramea calverti* (Striped Saddlebags) expanding their ranges into, or further into, the United States (Behrstock, 2000; Paulson, 2001).

For Texas, we know that the Thornbush Dasher was present in the Rio Grande Valley at least as early as 1905 (University of Kansas specimen, SEMC 1326749, Brownsville, Cameron Co., coll. by Francis Snow; Eaton and Calvert, 1892–1908). We also know that Needham (1943) commented that he tried to find the species there, but was unable to, although he did not indicate the level of survey effort. The species is currently fairly common in Texas from the border with Mexico, north to the Austin area (John C. Abbott, pers. comm.). It is often difficult to tease apart range expansions from level of effort in documenting ranges, but perhaps the Thornbush Dasher will prove to be a good case study.

And finally, whether we simply overlooked females or there really were none present will remain to be seen. It is certainly disheartening to discover that the males were only present at the Oklahoma pond for a few days for sure but no more than about a week and a half at the longest. Such a duration does not fare well for founding a population in northeastern Oklahoma. Nonetheless we do suspect that one day the species will colonize the southern part of the state.

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