— Opinion —

RESPONSE TO AGUILAR ET AL.'S (2015) CRITIQUE OF OLLERTON ET AL. (2009)

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Abstract—In their response to Ollerton et al.'s (2015) cautions about methods used by Rosas-Guerrero et al. (2014) to test the pollination syndromes, Aguilar et al. (2015) criticize an earlier paper by Ollerton et al. (2009). Here we respond to their concerns.

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INTRODUCTION

In a recent Opinion Paper (Ollerton et al. 2015; hereafter OLT15), we raised some cautions about the methods used by Rosas Guerrero et al. (2015) to test the "universal" nature of the pollination syndromes. When OLT15 was accepted, we encouraged the Editors of JPE to welcome a response. That response has now appeared (Aguilar et al. 2015; hereafter AGI5), and we invite the readers of JPE to decide for themselves whether AGI5 have adequately addressed the concerns that OLT15 raised.

If AGI5 had restricted their remarks to material in OLT15, no further thoughts from us would be warranted. However, they added three complaints about an earlier test of the syndromes by Ollerton et al. (2009: hereafter OLT09). The Editors of JPE have allowed us to address these complaints here.

The first issue raised by AGI5 is that OLT09 "did not properly quantify the effectiveness of each floral visitor. . .". Second, they asserted that "an evaluation of the technique used in OLT09 to assign syndromes [to flowers] is needed, as it led to clear mis-assignment of syndromes to some species. . .". It is true that OLT09 did not attempt to quantify "effectiveness", and in fact they also did not assign syndromes. But this is irrelevant because their test of the predictive value of the syndromes did not rely on doing either of these things. Instead, the approach was to score flowers for a standard series of phenotypic expressions described by the classical syndromes and to place the flowers into a multivariate phenotype space defined by the idealized description of those syndromes. OLT09 then asked 1) whether flowers formed clusters in the phenotype space near the positions of the idealized syndromes, and 2) whether, for a subset of flowers for which we had observations of pollinators, the closest idealized syndrome correctly predicted the most common pollinators. We urge readers to refer to OLT09 for discussion of possible reasons (such as the classical syndromes including phenotypic traits that are not informative) that this analysis did not find flowers clustering in syndrome-defined phenotype space and often failed to correctly identify the most common observed pollinators.

The third concern of AGI5 is that OLT09 did not identify all plant taxa to species. This is correct, but again it is irrelevant. To clarify, of the 482 taxa whose floral traits were scored, 236 could be identified to species, including all of those in a California (USA) community and a Colorado (USA) community where many ecologists and botanists have worked previously. Those remaining taxa that could not be identified to species usually could be assigned to genus, although sometimes only to family or not even that. This is an unavoidable limitation of sampling communities that are at best poorly studied and characterized taxonomically. It also is unavoidable when one insists on including all species that were in flower, as OLT09 did, so as to avoid bias that could be introduced by focusing only on a subset of species. The important thing is that lack of species-level identification for some taxa does not invalidate the syndrome test, as long as the unknown taxa were distinguishable morphospecies whose traits and pollinators were scored individually—as was the case. Furthermore, if the replication or "testing" that AGI5 call for do require species-level identification, two of the communities studied by OLT09 already are available for this, those of California and Colorado (whose results closely resemble those from the other four communities). Furthermore, vouchers of many of the unknown taxa were deposited in herbaria in Cuzco (Peru), Georgetown (Guyana), and Kew (UK), and are being identified (we lacked permission to collect in South Africa, and the Venezuela study was too time-limited for

collecting). We can be contacted directly for details, and for the raw data of OLT09 on floral phenotype scores.

We welcome constructive dialog on how to test the ubiquity and predictability of the classical pollination syndromes, and on how to improve their description—including constructive critique of OLT09. But it is not constructive to criticize a study for methods that it never intended to use, nor to imply that an unavoidable limitation in some data automatically calls into question an entire study.

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