

Does a Morphological Survey Support the Distinction of *Allium marvinii* from *Allium haematochiton*?

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Abstract

This study aimed to determine if there are two measurably distinct forms of the ovary crest/cap that distinguish *Allium marvinii* David. from *Allium haematochiton* Watson in the Jepson Manual. Ovary dimensions of 75 *A. haematochiton* and 7 *A. marvinii* herbarium specimens were measured. Crest heights and crest-to-ovary ratios are continuously distributed throughout their respective measurement ranges; i.e. no gap in ovary dimensions was shown to underlie the morphological split used in the Jepson Manual. Crest dimensions are greatest, intermittently, in the Peninsular Ranges. There are not two measurably distinct forms of the ovary crest/cap in these two taxa.

Introduction

In 1921 Anstruther Davidson described a species of onion (*Allium*) endemic to the Yucaipa area: the "Yucaipa Onion", *Allium marvinii* David. Yucaipa Onion resembled the common "Red-skinned Onion", *Allium haematochiton* Watson, having the "habit and general appearance of *A. haematochiton*" but differing in bulb color, ovary and fruit^[1]. The species was ignored until its reconsideration by botanist Andy Sanders in 1993^[2] and is included in the 2012 Jepson Manual^[3]. The Jepson puts Yucaipa's "obvious" ovary crests in contrast to the low "caps" of Red-skinned^[3]. The Yucaipa Onion is now listed with CNPS as "seriously endangered in California"^(1B.1)^[4]. Some now question whether the Yucaipa Onion –distinguished by a single structure– should be an accepted species. Plants with large ovary crests have been collected outside the Yucaipa Onion's traditional range. Our hypothesis is that there exist two measurably distinct forms of the ovary crest for these two taxa.

Methods

I looked at all herbarium sheets for *A. haematochiton* and *A. marvinii* in the Rancho Santa Ana Botanic Garden herbarium and sampled those with developed ovaries or capsules. Three dimensions were measured from two ovaries on each of the 82 herbarium specimens sampled: ovary height, ovary width, & crest height (Fig. A). 75 *A. haematochiton* and 7 *A. marvinii* were sampled. Measurements were taken with the calibrated objective lens of a dissecting microscope and data from the two ovaries were averaged.

Fig. A Definitions of dimensions measured.



Results and Figures

● *A. haematochiton* ▲ *A. marvinii*

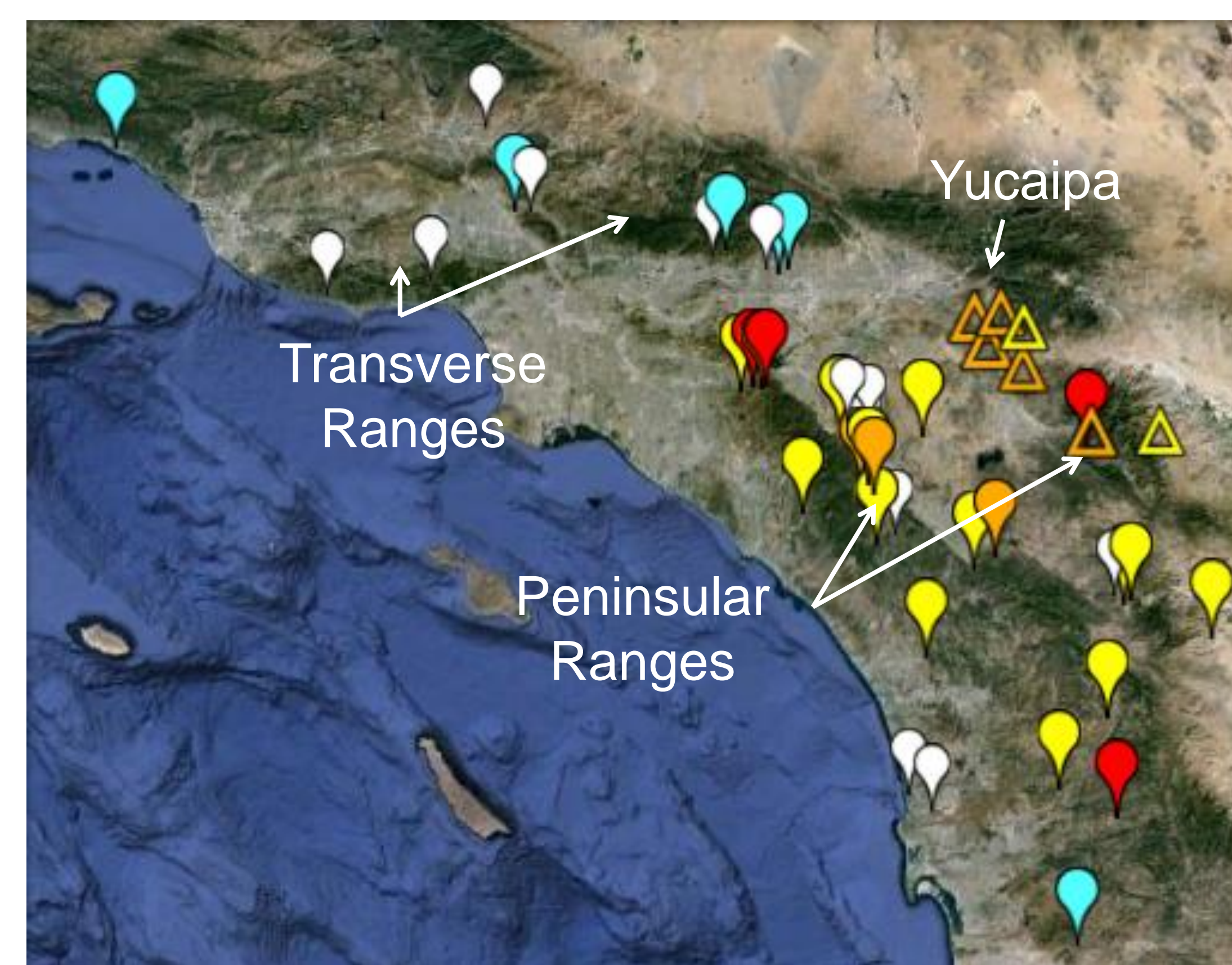


Fig. B Categorized crest heights (mm) of measured specimens.

Fig. C Ovaries of *A. haematochiton* and *A. marvinii*.

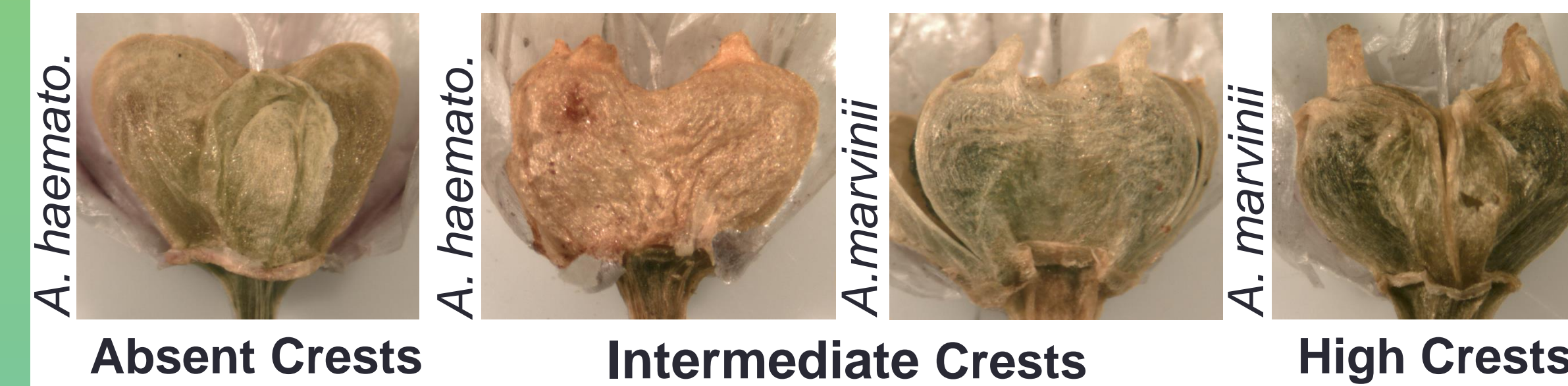
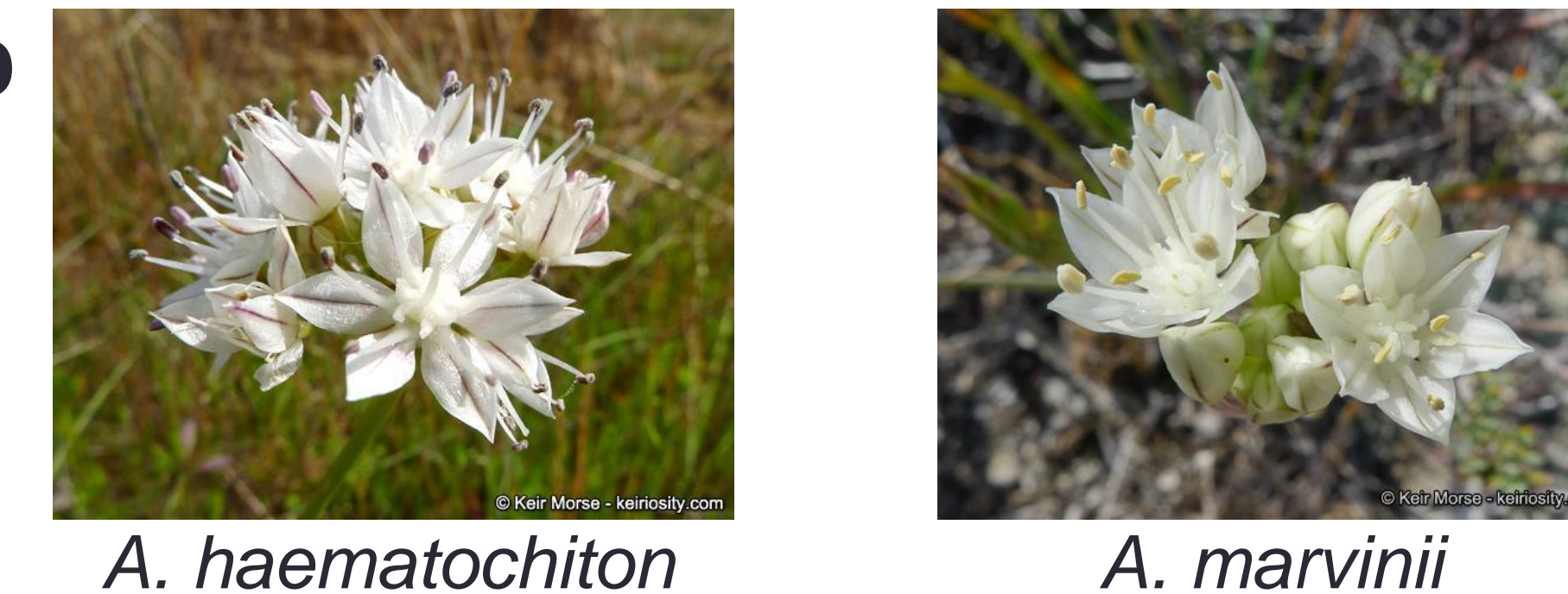
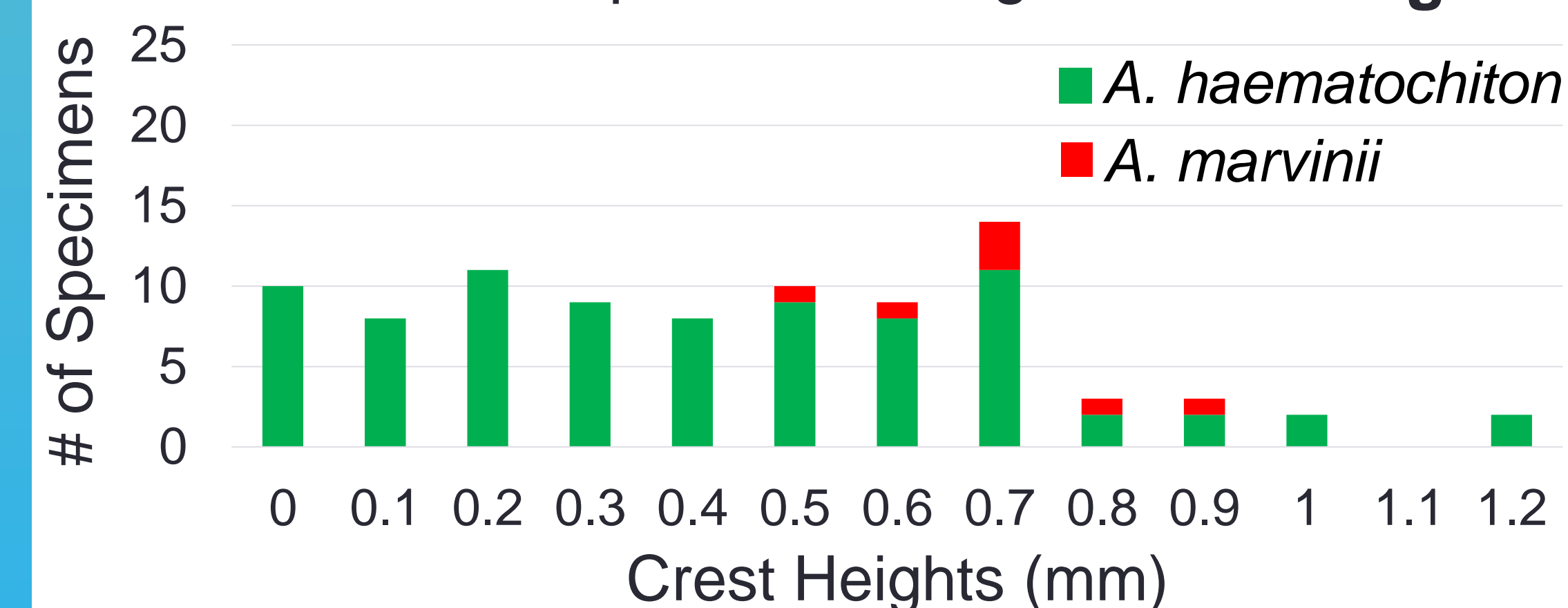


Fig. D

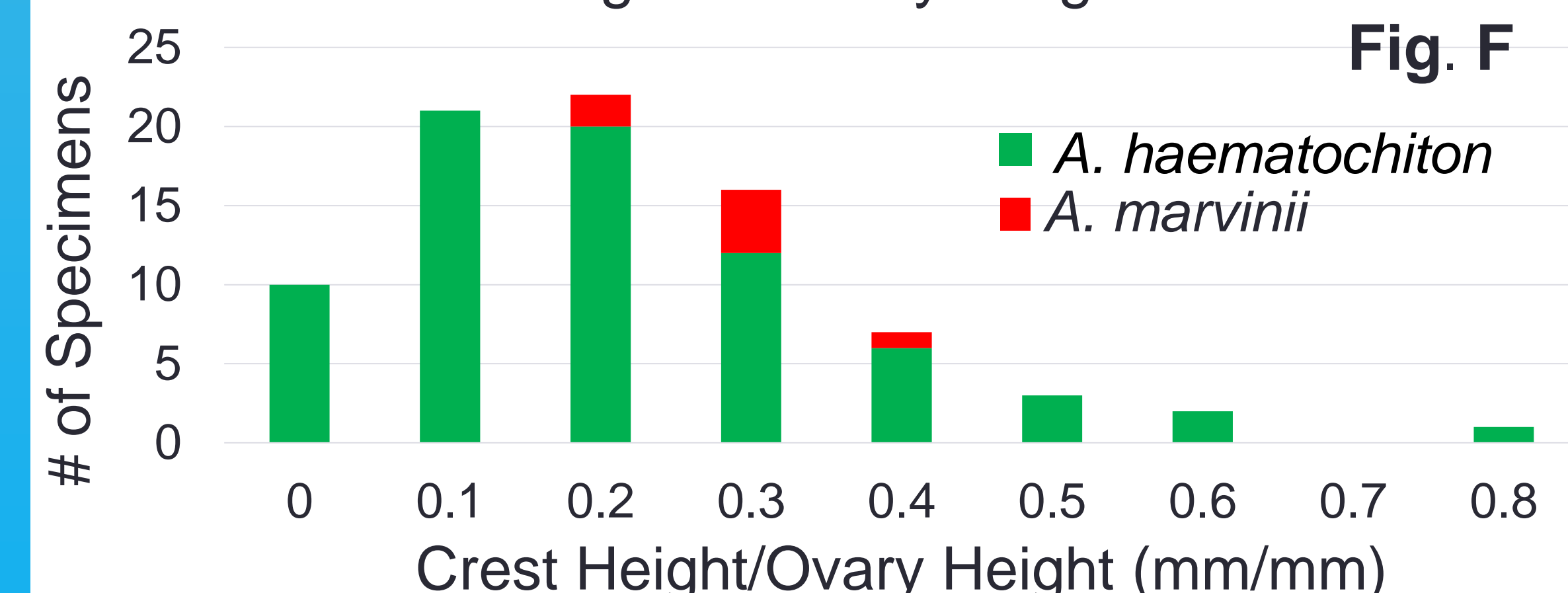


- Crest heights and ratios are continuously distributed and overlap for the two taxa (Fig. E, F).
- The large crest is most pronounced, but intermittent, in the Peninsular Ranges (Fig. B).
- 36% of *A. haematochiton* sampled had crest heights greater than the smallest *A. marvinii* sampled.
- A t-test on crest heights showed significant difference of the means between the taxa.

Simple Crest Heights Fig. E



Crest Height to Ovary Height Ratio Fig. F



Discussion

Continuously distributed crest heights and ratios render the division of these two taxa problematic. The presence of large and small crests in the Peninsular Ranges further complicates the situation. The t-test on crest heights was of limited value as the Yucaipa Onion is defined by its large crests: this group is not different by chance. Though this study does not recommend a cut-off height to divide these species, the species assignment of herbarium accessions of *A. haematochiton* needs to be reconsidered with regard to crest height. Future survey of triangular crest geometry would further address the question of Yucaipa's distinction. Despite these results, continued conservation of the Yucaipa Onion would be prudent pending future corroborating research.

Conclusion

There are not two measurably distinct forms of the ovary crest/cap for these two taxa, though *A. marvinii*'s are larger. Past and future collections need to be evaluated for ovary crest height. A reevaluation of the conservation status of *A. marvinii* may be in order as a consequence of this reassessment.

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References

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