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SHORT COMMUNICATION

The taxonomic status of *Aldrovanda vesiculosa* var. *rubescens* (Droseraceae)

Aldrovanda vesiculosa L. var. *rubescens* A.T.Cross & Adamec was described in an Appendix to Cross (2012), to accommodate populations of the nearly cosmopolitan *A. vesiculosa* that exhibit a variable burgundy-red colouration in stems and vegetative parts and a pinkish colouration in petals when growing in sunny positions (in plants growing in shaded areas these colours are weakly expressed or absent). The authors state in the protologue that '[a]t present, this varietal status can be applied to all known populations originating from Australia, as well as from Botswana and Lake Balata-to in Hungary' (*l.c.* p. 213).

Cross (2012) elsewhere states 'The key characteristic of *A. vesiculosa* var. *rubescens* is colouration as a highly evolved, stable and inherited trait that has arisen under natural growing conditions (the equivalent of *Sarracenia alata* var. *atrorubra*). The colouration of *A. vesiculosa* var. *rubescens* is not the result of a single or specific gene mutation (i.e. causing the lack of anthocyanin in *S. alata* f. *viridescens*), and as such, formal rank is not appropriate' (*l.c.* p. 9). Presumably, the latter comment is in error, and the author means that specific rank is not appropriate. He speculates that 'all *Aldrovanda* populations once possessed the ability to form anthocyanins, with the required enzymatic pathways either damaged or lost in one isolated refugium during a recent period of short glaciation (possibly southern Russia or Kazakhstan) and retained in another (possibly southwestern Hungary), resulting in the subsequent dispersal of two differently pigmented but otherwise identical ecotypical varieties' (*l.c.* p. 57); this historical hypothesis, however, lacks strong supporting evidence.

Many water- and marsh-plants, as well as many halophytes, are reddish when growing in full sun and/or in summer and green when growing in the shade and/or in winter (in Western Australia examples include *Azolla* Lam., many species of Haloragaceae especially *Myriophyllum* L. spp. and many species of *Tecticornia* Hook.f.). Expression of the reddish colour may be due to increased production of anthocyanin pigments or reduced levels of chlorophyll (the latter unmasking the colour of anthocyanins present in the green leaves; see e.g. Spencer & Ksander 1990). Anthocyanins are highly adaptive for plants exposed to high insolation, as they reduce inhibition of photosystem II at high light levels, and their synthesis reduces the incidence of damaging reactive oxygen species by dissipating excess excitation energy in this photosystem (Nielsen & Nielsen 2006).

Molecular RFLP population studies in *Aldrovanda* from throughout its range, including both rubescent and non-rubescent populations (Elansary *et al.* 2010) show very low levels of divergence between widely disparate populations from four continents. No substitutions were found in four tested chloroplast intergenic spacers or in the *atp*1 or *cox*1 genes. Two haplotypes were identified on the basis of single point indels in *rpl*20-*rps*12 and *atp*B-*rbc*L. All European samples bar one (from Romania) represented one haplotype, and all non-European samples bar one (from Japan) represented the second haplotype. There was no correlation between haplotype and anthocyanin production.

Given that variation in anthocyanin production and expression is common and widespread in aquatic

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plants and is generally regarded as uninformative of taxonomic differences, and given the very low observed genetic variation in the species and lack of correlation between anthocyanin expression and genetic variation, we regard *A. vesiculosa* var. *rubescens* as a mere colour morph and not worthy of recognition as a formal taxon. It is here synonymised with *A. vesiculosa*.

Aldrovanda vesiculosa L., *Sp. Pl.* 1: 281 (1753). *Drosera aldrovanda* F.Muell., *Fragm.* 10(85): 79 (1876), *nom. illeg. Type*: 'Habitat in Italiae & Indiae paludosus. D. Monti.'

Aldrovanda vesiculosa var. *australis* Darwin, *Insectivorous Plants*: 328. *Type*: 'Dried leaves of this plant from Queensland in Australia were sent me by Prof. Oliver from the herbarium at Kew.'

Aldrovanda vesiculosa var. *rubescens* A.T.Cross & Adamec, *Aldrovanda: The Waterwheel Plant*: 213. *Type*: 'Australia, W.A., Kimberley region, Mitchell Plateau. 20 June 1993, *Allen Lowrie* 732 (accession no. 03143937, PERTH!).'

Notes. Cross (2012) erroneously lists *A. vesiculosa* var. *australis* as an illegitimate name. Given that all Australian populations are regarded by the authors as referable to var. *rubescens* (see above) and that the type of Darwin's var. *australis* is from Queensland, if the new taxon were to be recognised it is likely that its correct name would be var. *australis*. Other, non-Australian synonyms of *A. vesiculosa* are listed in Cross (2012).

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Kevin R. Thiele[1,2] and Skye C. Coffey[1]

[1]Western Australian Herbarium, Department of Parks and Wildlife,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
[2]Corresponding author, email: kevin.thiele@dpaw.wa.gov.au