

ECOLOGICAL CONDITIONS OF SECONDARY SEXUAL DIMORPHISM IN *SALIX GLAUCA*: FUNDAMENTAL AND REALIZED DIMORPHIC NICHE

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ABSTRACT

This thesis explores the dimorphic niche of ecological conditions hypothesis as the selective force behind secondary sexual dimorphism in *Salix glauca*, a dioecious willow shrub. The dimorphic niche hypothesis predicts trait difference between male and female plants based on sexual allocation theory. Sexual allocation's theory basic tenet is that each sex has unique reproductive demands and females allocate more resources overall to reproduction than males. I address this idea by first examining the main assumption of sexual allocation theory in a comparison of nutrient costs of male and female organs. Then, I examine possible divergence in traits related to a species fundamental niche: resource acquisition and tolerance of abiotic stress at two size stages, mature adults and small vegetative daughter clones. I investigated secondary sexual dimorphism in physiological traits over several years in a mosaic of mesic and xeric habitat patches at timberline in the Colorado Rocky Mountains (USA). Results support the view that gas exchange rates of female plants are maintained despite drought to support greater costs of reproduction whereas physiological plasticity allows male plants to occupy more arid environments. Finally, I examine whether sex morphs have diverged in defensive traits that are related to the realized niche in the presence of insect herbivores. I found little support for the idea that antagonist-related selection has resulted in intrasexual dimorphism, as predicted under the vigor hypothesis.