

# THE NATURE OF PIGMENTATION IN *DIONAEA MUSCIPULA* ELLIS

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A mature *Dionaea* plant often develops a blood-red coloration on the inner surface of the traps. (Fig. 1.) The probable function of this pigment is to aid in the luring of prey.<sup>5</sup> The pigment is located in the vacuoles of the digestive glands, thus rendering them conspicuous.<sup>2</sup> The alluring or nectar-secreting glands possess no such coloration.<sup>2</sup>

This red pigmentation is due to the presence of an anthocyanin<sup>(1-4)</sup>. Anthocyanins are not unique to the Venus Flytrap and are distributed universally throughout the plant kingdom.<sup>4</sup> Their presence imparts a characteristic color to the leaf, stem or flower.<sup>4</sup>

The specific anthocyanin of *Dionaea muscipula* is the secondary metabolite cyanidin-3-glucoside.<sup>1</sup> The chemical structure of this compound is illustrated in Figure 2. Cyanidin-3-glucoside is a flavanoid consisting of two six-carbon aromatic rings linked by a three-carbon unit. (4,7) A molecule of glucose is attached beta to the three positions of the flavanoid nucleus.<sup>6</sup> The presence of glucose is partially responsible for the water-soluble nature of the pigment.<sup>4</sup> The flavanoid moiety is also able to ionize depending upon pH, thus further increasing water solubility. (4,7)

The characteristic color of a particular anthocyanin is dependent upon the pH of the containment vacuole. Cyanidin-3-glucoside *in vitro* is red in acid solution, violet in a neutral solution, and blue in an alkaline environment.<sup>4</sup> The acidic nature of the digestive enzymes of *Dionaea muscipula* are therefore responsible for the red coloration of cyanidin-3-glucoside *in vivo*.

The color of a mature Venus Flytrap is thus a result of the anthocyanin pigment cyanidin-3-glucoside. The acidic environment of the digestive enzymes interacts with the pigment to produce a red coloration typical of this carnivorous plant.

## REFERENCES

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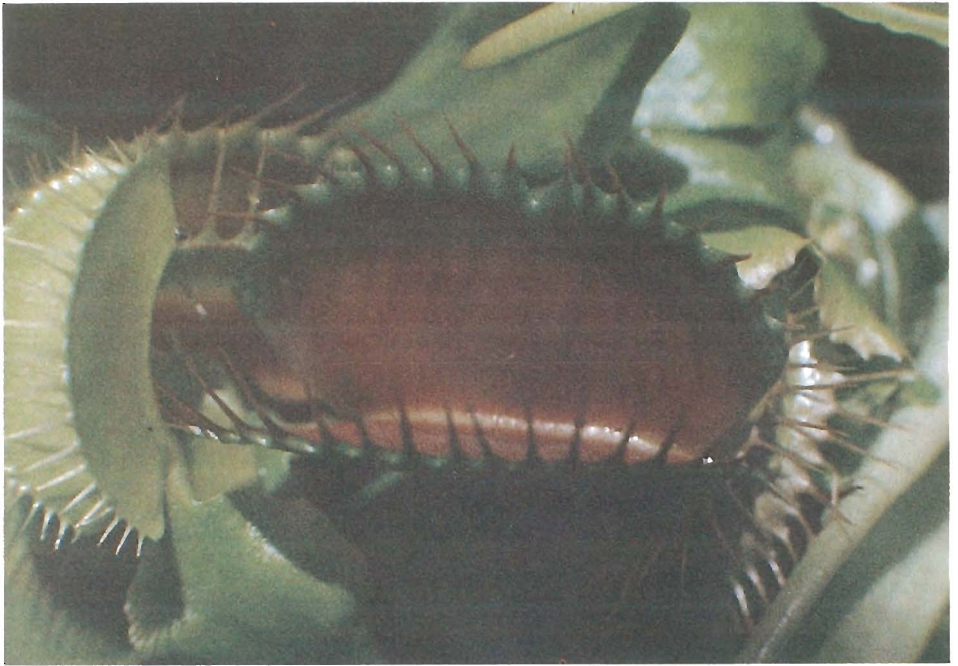


Fig. 1 An anthocyanin pigment is responsible for the red coloration in mature Venus Flytraps.

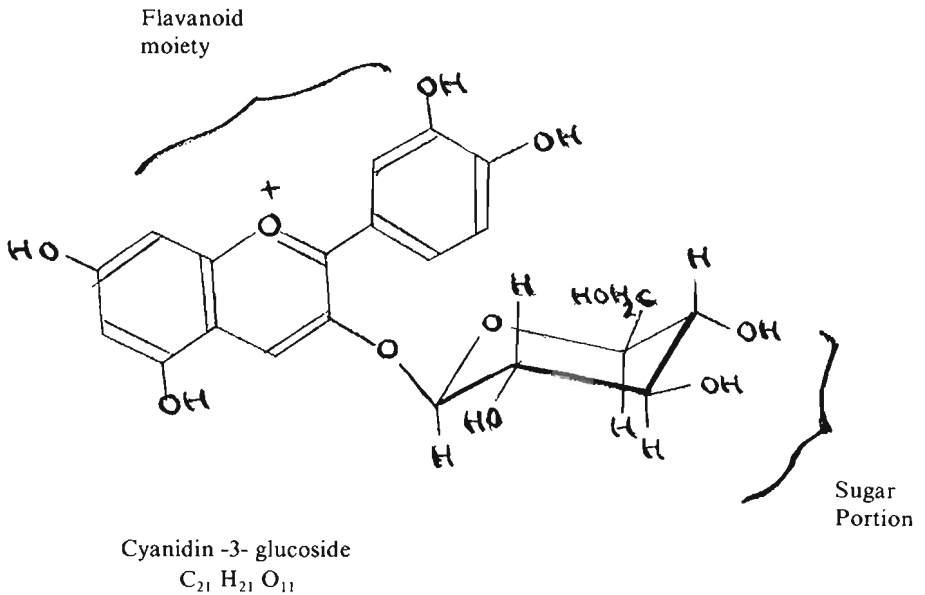


Fig. 2 Chemical structure of *Dionaea* anthocyanin: cyanidin-3-glucoside.