CXXVIII. THE PIGMENTS OF BUTTERFLIES' WINGS.

II. OCCURRENCE OF THE PIGMENT OF *MELANARGIA GALATEA* IN *DACTYLIS GLOMERATA*.

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THE author [1926] has previously described the isolation of a flavone-like pigment from the wings of the Marbled White butterfly, *Melanargia galatea*, and has suggested that it is probably derived from the grasses upon which the larva feeds. *Zea Mays* is the only member of the Gramineae from which flavones have been isolated [Sando, 1921; Remy, 1922], and the present research was undertaken in the hope of showing that they occurred also in one of the known food-plants of the larva. For this purpose common cock's-foot grass, *Dactylis glomerata*, was selected.

1 kg. of fresh *Dactylis* was chopped, dried in air, and soaked in cold water for 6 hours. It was then extracted with boiling 85 % alcohol for 12 hours, under reflux, and the extract concentrated to small volume and freed from alcohol. The aqueous suspension was then repeatedly shaken with ether, which removed the chlorophyll, lipochromes and uncombined flavones, the flavone glucosides and other pigments remaining in the aqueous layer.

The ethereal solution was washed with water and then shaken with dilute aqueous ammonia, into which the flavone passed. From the ammoniacal solution it was precipitated by acidification, dissolved in alcohol, and boiled with charcoal and filtered. From the filtrate the flavone was precipitated by diluting with water and removing the alcohol under reduced pressure. The precipitate was then redissolved in hot dilute alcohol and recrystallised four times until a constant melting point was obtained.

The aqueous solution containing the flavone glucosides was freed from ether and boiled for 24 hours with 5 % HCl. The liberated flavone was removed from the hydrolysate by shaking with ether, transferred thence to dilute ammonia and precipitated by acidification. The precipitate was washed with water and dissolved in dilute alcohol, and normal lead acetate solution added until precipitation ceased. The lead salt was washed with hot water and suspended in boiling alcohol, into which a stream of H_2S was passed for half

an hour. The alcoholic solution thus obtained, after removal of the lead sulphide, was filtered through asbestos, boiled with charcoal and filtered again, and finally precipitated and recrystallised from dilute alcohol as described above.

The isolated free flavone proved to be identical in all its properties with the flavone isolated from glucosidic combination. It is soluble in alkalis or concentrated mineral acids, with a bright yellow colour; very slightly soluble in water, even at boiling point, and sparingly soluble in ether; readily soluble in alcohol and acetic acid, and recrystallisable from these solvents. The alcoholic solution gives, with normal lead acetate, a deep yellow precipitate, with ferric chloride a dark brown coloration and green fluorescence, and with magnesium powder and HCl yields after some time a bright pink solution, from which a light green precipitate is obtained by adding excess of alkali. The melting-point was 251° . These properties correspond exactly with those described by the author [1926] for the pigment isolated from the wings of *Melanargia galatea*. The presumed identity of the two substances was confirmed by determining the melting-point of mixtures of the two substances, the results being 251° , 250.5° , 251° . It may be observed that, on account of the slight decomposition which takes place in the neighbourhood of the melting-point, it is not possible to obtain absolute agreement in a series of determinations on a single specimen.

The presence of free flavone in the plant was confirmed by its extraction from the fresh grass by a method which precluded hydrolysis during extraction. The fresh, chopped grass was extracted with boiling ether for 72 hours, the ethereal solution filtered hot, washed with water, and shaken with dilute aqueous ammonia, which removed from the ether a considerable quantity of free flavone (recognised by the colour tests described above).

It should be noted that the possible presence of smaller amounts of other flavones or flavone glucosides in *Dactylis glomerata* is not excluded.

SUMMARY.

The grass *Dactylis glomerata* contains a flavone or flavonol which is present both free and in glucosidic combination, and which is identical with the pigment of the wings of the butterfly *Melanargia galatea*.

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