

# A RED-LIGHT-DEPENDENT COMPOUND IN PISUM SATIVUM

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Red light treatment of etiolated plants induces remarkable morphological changes. About the biochemical pathways leading to these effects little is known as yet. It seems logical, however, to suppose a relationship between changes induced in the chemical composition of the plant directly after red light treatment and the morphological changes found later on. Thus, in pea plants the red-light-dependent compound quercetin-3-p-coumaroyltrigluconide has been suggested to be a possible growth mediator by an effect on indoleacetic acid oxidase (BOTTOMLY c.s. 1966).

From my work on the biochemical aspects of red light treatment of 7-day old pea plants another red-light-dependent compound emerged.

Peas – *Pisum sativum* var. Rondo – were grown in sand in absolute darkness for 7 days. After this period the etiolated seedlings were subjected to red light from a red fluorescent tube (Philips Tl 40W/15), provided with a 3 mm red plexiglass filter Rohm and Haas no 501. After the light treatment the plants were kept in the dark until they were harvested. This occurred in complete darkness as well. The desired plant parts were ground in butanol in a mortar and centrifuged. The supernatant was extracted with ammonia, the ammonia layer was separated, acidified with HCl and again extracted with butanol. This butanol extract was evaporated to dryness, the residue was dissolved in a little ethanol and chromatographed two-dimensionally.

Comparison of chromatograms of parts of etiolated seedlings with those of red-light-treated plants led to the following result. After subsection of the seedlings to a substantial amount of red light (about 900 erg/cm<sup>2</sup> sec. for one hour), followed by two hours of darkness, the terminal buds contained a compound which gave a spot with a bluish fluorescence in U.V. light of 254 nm

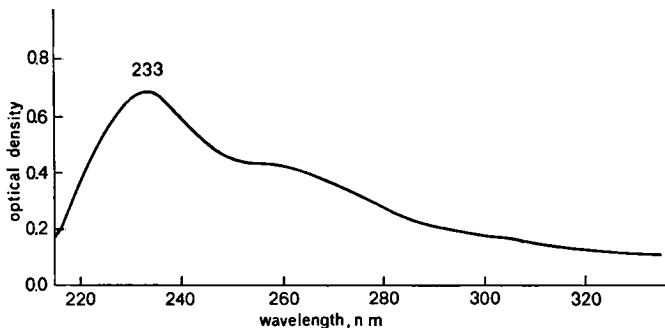


Fig. 1. Ultraviolet absorption spectrum of compound no 7, in ethanol.

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(spot no 7). This spot was found in very small amounts only on chromatograms of epicotyls of both red-light-treated plants and dark control and on chromatograms of the terminal buds of the dark control. The preliminary tests suggest an increased formation after red light treatment of compound no 7 in the bud followed by a transport downwards into the epicotyl.

As to the identity of the compound work is still in progress. Its U.V. spectrum is shown in *fig. 1*.

On Whatman no 1 chromatography paper (descending method) the following Rf values were found:

Solvent	Rf
Butanol-acetic acid-water 4:1:5 (v/v/v) (upper layer)	0.9
Benzene-acetic acid-water 6:7:3 (v/v/v) (upper layer)	0.9
Sodium formiate-formic acid-water 10:1:200 (w/v/v)	0.0
Forestal solvent	0.0
Methanol-acetic acid 1:1 (v/v)	about 0.6

#### REFERENCE

BOTTOMLY, W., H. SMITH & A. W. GALSTON (1966): Flavonoid complexes in *Pisum sativum* - III. The effect of light on the synthesis of kaempferol and quercetin complexes. *Phytochemistry* 5: 117-123.