Phytohemagglutinin: Transitory Enhancement of Growth in *Phaseolus* and *Allium*

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*Summary.* Phytohemagglutinin (Difco) stimulates germination and early seedling growth in *Phaseolus coccineus*, but not in *Ph. vulgaris*, the species from which the compound is extracted. The differences to the controls reach a maximum at day 8, then they disappear. Root growth in *Allium cepa* is enhanced by phytohemagglutinin during the first 12 days of treatment, but only at temperatures below 20°C.

Phytohemagglutinins are compounds occurring in various plants and are characterized by their ability to agglutinate blood cells. The most common phytohemagglutinin (PHA) is isolated from *Phaseolus vulgaris* seeds, and was found to stimulate blastogenesis and mitosis in lymphocytes of man and mammals (Hungerford *et al.*, 1959; Nowell, 1960). Today, investigations in human and vertebrate cytogenetics are generally performed on PHA-stimulated metaphases (Pfeiffer, 1970). However, PHA was also demonstrated to induce divisions in protozoa (Agrell, 1966; Zech, 1966), and recently, Bangerth *et al.* (1972) reported that it induced parthenocarpic fruit set in a male-sterile mutant of the tomato and in the Bartlett pear. To stimulate further studies on PHA effects in plants, the following tests on the effect of PHA solutions on germination and growth in *Phaseolus coccineus* L. and *Ph. vulgaris* L., and on root growth in *Allium cepa* L. are briefly reported.

Bacto-Phytohemagglutinin M and P (Difco) were used in concentrations between 0.5 and 2.5%, and 0.1 and 0.5%, respectively. The experiments with *Phaseolus* were done in growth rooms at constant temperatures (15–27°C) and light-dark cycles of 16:8 h, those with *Allium* in the dark. The solutions were aerated and replaced every other day to reduce bacterial development. Each experiment included 25 seeds and plants, respectively, and 25 controls; at least 5 repeats were made between 1968 and 1971.

*Phaseolus vulgaris:* No response to PHA was found in this species. Since the commercial PHA is extracted from this species, lack of an effect...
Fig. 1. Effect of 1% PHA M upon seedling growth (epicotyls, primary roots, total secondary roots) in *Phaseolus coccineus*. • PHA, o control. Means of 150 plants.

Significance of differences given in the text

may be due to the high concentration of the compound already existing in the cells.

*Phaseolus coccineus*: Germination of seeds soaked in the PHA solution occurred on an average 1.5 days earlier than in the controls. The effects of PHA upon shoot growth were tested in young seedlings which were treated when the primary roots reached a length of about 5 cm. The treated seedlings grew faster at any temperature given. On an average, the length of the epicotyls reached 180% of the controls at day 8, the length of the primary roots 150%, and the total length of the lateral roots 160% (Fig. 1). The significance of the differences to the