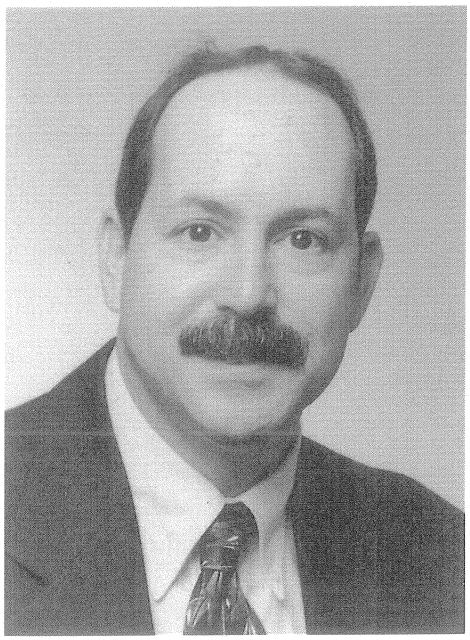
Professor Elliot Martin Meyerowitz



Date of Birth: May 22, 1951

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Education and Career:

1973	A.B., Department of Biology, Columbia University
1977	Ph.D., Yale University
1977-79	Postdoctoral Fellow, Department of Biochemistry, Stanford University School of Medicine
1980-85	Assistant Professor of Biology, California Institute of Technology
1985-89	Associate Professor of Biology, California Institute of Technology
1989	Professor of Biology, California Institute of Technology

Awards and Distinctions:

1991	Member, American Academy of Arts and Sciences
1994	Pelton Award, Botanical Society of America and the Conservation and Research Foundation
1995	Member, U.S. National Academy of Sciences
1996	Genetics Society of America Medal
1997	Mendel Medal, Genetical Society of Great Britain

Academic Achievements:

Prior to his research in plant molecular genetics and plant molecular biology, Dr. Meyerowitz led studies using *Drosophila* as experimental material and had achieved outstanding results as a researcher in molecular genetics. In those days the study of plant molecular genetics was far behind in its progress compared to that of animals or bacteria. To promote a balanced progress in biological science, Dr. Meyerowitz decided to direct his research to experiments with one of the Brassicaceae seed plants, *Arabidopsis thaliana* (a model plant now widely in use for its features suited to research in molecular genetics). This decision of Dr. Meyerowitz and his studies that followed for over 20 years have led to the establishment of techniques for genetic analyses of plant development, differentiation, formation of the organs and tissues, and metabolism. The contribution to the advancement of research in this field has been immense, exerting an enormous impact on the progress of plant science. With his creative work, Dr. Meyerowitz continues to be the leading researcher in plant science, and his remarkable achievements have been introduced in original papers and in the reviews of prestigious international journals.

His major academic achievements may be summarized into the following four areas: His first outstanding achievement was the establishment of *Arabidopsis thaliana* as a model plant for research in molecular genetics. By measuring the DNA in the *Arabidopsis thaliana* nuclei and showing that the genome size is the smallest known in seed plants, he demonstrated it to be a plant model well suited for research in molecular genetics. He was the first in the world to make a restriction fragment length polymorphism(RFLP) map of nuclear DNA which made the analysis of isolated genes possible. Furthermore, by making these data of his experiments and the isolated mutations widely and freely available, Dr. Meyerowitz has greatly contributed to the research of others in the plant science field.

In his second area of research, Dr. Meyerowitz elucidated the action of the plant hormone ethylene. Through genetic experiments on mutations of *Arabidopsis thaliana,* which are insensitive to ethylene (the hormone known to regulate plant growth from seed germination to fruit ripening), Dr. Meyerowitz and his co-workers identified the ethylene response gene *ETR1*. They also demonstrated that this gene encodes a histidine kinase, which is similar to the two-component receptors of bacteria for environmental stimuli. Further, they discovered that the protein synthesized by *ETR1* is an ethylene receptor which binds with ethylene in the initial stages of its action. This first discovery of plant hormone receptors in seed plants is highly significant as it proves the existence of a two-component hormone receptor system in eukaryotes.

The third discovery to be mentioned here was made through the keen insight of Dr. Meyerowitz and is one of the most remarkable among his numerous achievements. In their study of formation of floral organs, Dr. Meyerowitz and his co-workers made genetic analysis of the mutants of *Arabidopsis thaliana* with abnormal floral structure. Demonstrating that the mutants are formed early in the development of flower buds, they went on to construct and analyze double and triple mutants. These experiments led to one of the most significant hypotheses in formation of floral organs, which is now widely known as the ABC Model. This model postulates the independent and overlapping actions

of three types of regulatory genes, A, B, C, which act together to determine the identity of the four floral organs, namely the sepals, petals, stamens and carpels. In his laboratory Dr. Meyerowitz and his co-workers made thorough analyses of the mutants of *Arabidopsis thaliana* defective in the regulatory genes and identified as corresponding genes *AP3* and *PI* for gene B, and *AG* for gene C respectively. One of his former co-workers identified *AP1* as corresponding to gene A, thereby confirming the correctness of the model. On the other hand, by applying molecular biological techniques, Dr. Meyerowitz and his co-workers succeeded in isolation of the regulatory genes, discovered their DNA sequence and thus demonstrated that the protein synthesized by these genes is a DNA-binding transcription factor. Experiments led by other scientists have indicated that these regulatory genes are also found in numerous plants, and the ABC model is now widely accepted as applicable to the formation of floral organs of all species of angiosperms.

Dr. Meyerowitz and his co-workers have carried forward their experimentation on the ABC model, and at the point of cell division before differentiation of flower buds, they succeeded in isolating *CLV1*, the gene that controls the floral cell division. They demonstrated that this gene encodes a transmembrane serine/threonine protein kinase. This is considered to be a major discovery of a fundamental mechanism for cell-cell signaling in plant cell division.

The fourth discovery of Dr. Meyerowitz concerns the adaptability within the ABC Model of the *LFY* gene, which he had identified as the gene that activates the regulatory genes and controls the differentiation of flower buds. Introducing the *LFY* gene isolated and identified by Dr. Meyerowitz into a species of poplar, one of his former co-workers succeeded in drastically shortening from a period of years to a period of months the time required from flower bud development to flowering in transgenic plants. This discovery is highly appraised as having opened the pathway to the wide adaptability of the achievements of Dr. Meyerowitz and his co-workers to the biotechnology of trees.

Through his experiments with *Arabidopsis thaliana* as a plant model, Dr. Meyerowitz proposed the ABC Model for the formation of floral organs, demonstrated the effects of genetic analyses on phenomena characteristic to plant life processes. The ongoing series of his experiments are leading to outstanding achievements which contribute immensely to the progress not only of plant molecular genetics but also to the entire field of plant science.