



Ernst Hadorn
1902–1976

A recent photograph taken
in the Zoological Institute in Zürich.

Courtesy of M. Eich

ERNST HADORN

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It was sometime in May, 1951, when George Beadle came into my laboratory at Caltech with a visitor from Zürich, a Professor Ernst Hadorn. At the time I was much immersed in the characterization of a new nucleoside accumulated by a *Neurospora* mutant and I was not delighted at the suggestion that I drop that for a time and assist the visitor with a project of his. He wanted to learn about the relatively new technique of paper chromatography and to make use of it for studies of *Drosophila* mutants. I didn't know much about *Drosophila* at the time but I was at once caught up in the infectious enthusiasm of this man. After an hour or so of remarkably lucid explanations and expectations I found I had agreed not only to demonstrate the technique but to participate fully in the whole program for the next few weeks. To top it off, "So—," said Professor Hadorn in a characteristic manner, "for the next three weeks you will come to work at seven in the morning, there will be no time for lunch, very little for dinner, and there will be no weekends." There was a smile when he said it but I had the feeling he meant it and in actual fact that is the way we did it. So—that same day we squashed some flies on filter paper and ran the first of many chromatograms.

So it went with "at least one new discovery every day" until near the time Ernst was to return to Switzerland. Now, it had been my habit in May each year to make an expedition into the headwaters of the San Gabriel river a few miles from Pasadena. There one could leave civilization completely behind for a time and, incidentally, one could catch a few trout. By this time I had learned that Ernst was an adventurous kind of classical biologist and that one of his pleasures was ornithology. Therefore I invited him to go on our expedition with a guarantee that I would lead him to a favorite nesting place of that fascinating little mountain bird, the water ousel. To my surprise he agreed at once. Thus two days later at two in the morning and in company with two of my graduate students of the time, Francis Haskins and David Hogness, we took off heading up the San Gabriel Canyon in the dark. There was essentially no trail and about forty wet river crossings in

the twelve miles or so to the upper reaches of Iron Fork. There we observed the water ousel at its best in its aqueous domain as promised. I caught a fish and then I offered my pole to Ernst. That was the last I saw of my fishing pole that day and that was how I learned that the Swiss professor was also an ardent fisherman.

It was late afternoon when we started home, and since Ernst was the senior member of the party I asked him to go in front to set the pace. He did and with much effort we managed to keep up. A few weeks ago at a *Drosophila* meeting I asked Dave Hogness what he remembered of this expedition of some 26 years ago. I found that his memory was as vivid as mine. In particular, he recalled the repeated domino effect as we moved rapidly in single file on the return trip each time that Ernst stopped abruptly to look at a bird or beast with his binoculars. The point is that all of us who were here during that brief encounter many years ago remember well that exceptional man, for his intelligence, his vigor, his humor, and his compassion.

This early collaboration with Ernst Hadorn yielded a publication, in 1951, which contained a variety of data on the biochemistry of *Drosophila* mutants and on biochemical changes during development. It set the stage for many years of subsequent investigations by Hadorn and his associates and for my own eventual conversion to developmental biochemistry. Active programs today such as in the enzymology of pteridine biosynthesis and on the genetics of *rosy*, *maroon-like*, and other mutants related to the xanthine dehydrogenase system can be traced easily and directly to this original idea of Ernst Hadorn.

I became aware soon after we met that Ernst Hadorn was a highly skilled and strongly dedicated scientist who was himself a "critical mass" in that he had ideas, techniques, and a fly wheel to keep it all going. I am fully aware that if I had not been around to help him with the chromatography of flies he would have done it himself. In any case, his background was in classical biology. He had studied at the University of Bern with Fritz Baltzer, a fact which made him an academic grandson of Theodore Boveri. With this lineage it is not unexpected that he began by transplanting nuclei to see what they would do in a foreign cytoplasm. This work on interspecific hybrid merogones in amphibia perhaps gave a pattern for a good deal of experimental work in the many productive years to come. That is, he did a great variety of transplantation experiments, e.g. of nuclei and of cells and tissues, of normal and of mutant material from normal to abnormal surroundings. I think this was always done for sound and logical reasons and with well-defined expectations but his self-esteem did not require that he be right and it did not blind him to the unexpected nor did it interfere with careful observations of what really happened.

New ideas on stage specificity of cell damage and on the significance of cytoplasmic control of differentiation in epidermal cells came from the work on amphibia. Then after a year (1936–1937) in the United States as a Rockefeller Fellow (Harvard, Rochester, and Woods Hole), *Drosophila* became part of his repertoire of experimental animals. He transplanted ring glands to show their role in the hormonal control of development. He transplanted imaginal discs and fragments to demonstrate patterns of determination, and he cultured disc cells in the abdomen of adults to show that such an environment could reprogram directions of development. This latter phenomenon, transdetermination, was perhaps the one Hadorn found most intriguing and he pursued it to his last days.

Along with all the transplants were classical works by Ernst Hadorn on mutant lethal factors and a book *Developmental Genetics and Lethal Factors* was one important result. *Experiments in Embryology* with emphasis on amphibia was another and he was also senior author of a revised textbook of zoology (originally written by Alfred Kühn). These were in addition to something over 200 published papers.

Following some teaching experience Ernst Hadorn was a lecturer at the University of Bern and from there he became professor of zoology at the University of Zürich in 1939. From 1943 to retirement in 1972 he was director of the Institute of Zoology and Comparative Anatomy at the University of Zürich. During that period he served for a time as president of the university and for a time as dean of the faculty. Numerous other services and honors included vice-chairmanship of the Swiss Science Council, presidency of the XIth International Congress of Genetics (The Hague), and membership in the National Academy of Sciences, USA. Above all these things he served as an outstanding teacher and advisor to many outstanding students who carry on and amalgamate his influence with their own.

This account in memory of an outstanding scientist is more personal than scientific and it relates mostly to early impressions of the man, Ernst Hadorn. I did have a more extensive encounter with him some years later when I went to spend a year in his laboratory in 1959–1960. At first I was taken aback by the apparent greater degree of formality between us than had existed before. But I soon found that he was the same man; it was just a different environment. I could relate more interactions, both personal and scientific, from that year and later visits but they would have more to do with me than with him and would not alter the early impressions. Ernst was still the same person when I last saw him in 1975 at the *Drosophila* meeting in France at the marine station in Roscoff. He was still a dynamic, enthusiastic, and dedicated man of science but I remember him most as a warm and personal friend.