

## Åke Gustafsson on the Occasion of his 70th Birthday April 8, 1978

When I see you eyeing a new mildew resistant barley mutant in the green-house at Lund, when I see your beret moving vigorously among the yellowing yield trails at Svalöv and when most of the trucks in your phytotron at Stockholm even today carry a tag marked ÅG., then my first wish on behalf of all of us, students, associates, and friends is that this may continue for years to come. At



Photo: R. Hochbergs

this very moment you are once more single-handedly preparing a document reviewing all aspects of plant breeding in Scandinavia in a report to the Swedish government. We wish you to be as successful as before in pointing out that biology and efforts in food production need as strong a support as physics and efforts in energy production.

Åke Gustafsson has in the course of 40 years with a grand and enthusiastically pursued experiment decided a vital question in genetics and plant breeding which was first posed around 1930: Are artificially induced mutations of the same type as the spontaneously occurring ones and

thus useful in plant breeding – as was hoped by the eminent H.J. Muller (1927) – or are they detrimental and thus useless in breeding efforts – as maintained by the equally eminent L.J. Stadler (1930). In an article in this Journal (Vol. 41, p. 239-248, 1971) Åke Gustafsson has provided the final answer by presenting the commercial barley varieties which have arisen from his experiment with barley. Many additional successful strains of barley as well as other crop plants which have resulted from mutation breeding attest to the correctness of the view first deduced by him. The induced mutations are not different from spontaneous ones, and all mutation breeding does, is to speed up natural evolution of crop plants by a factor of one hundred or thousand times.

Åke Gustafsson's grand experiment has provided a unique collection of genetically and agronomically analysed mutant genes in barley. It was achieved by an equally unique collaboration of scientists in different disciplines and with different institutional affiliations. It is of general interest to reflect on both these facets.

The production and analysis of the mutant genes and chromosomal variants has created the material for investigations in radiobiology, gene ecology, gene physiology, plant ultrastructure, plant biochemistry and plant physiology, investigations presented by Åke Gustafsson in the majority of his 228 authored or co-authored publications. The grand experiment and the insistence on the continued genetic and agronomic analysis of the mutants produced, has shaped barley into one of the few higher plants in which biochemical genetic and molecular biological studies are now feasible. One of Gustafsson's early deductions, namely that mutagens can act specifically on different loci has been clearly brought to light by the continued analyses.

The recent discoveries of the nucleosome structure and the possibilities to analyse the molecular conformation of eukaryotic genes have brought a causal analysis of the locus specificity of mutagens within reach. In times, when

most geneticists were promoting increasing specialization, Åke Gustafsson enlisted for his grand experiment the collaboration of physiologists, biochemists, biophysicists, ecologists, statisticians, politicians, artists and industrial managers. Everybody remained at her or his laboratory respective office and the only common bond was to cooperate in the grand experiment.

In times, in which the number of scientists has increased drastically and leadership has become a problem, we value immensely Åke Gustafsson's lucid example how to organize this cooperation between so many original and sometimes capricious personalities solely by discussing, planning, and executing important portions of the experiment. We are also grateful to know through his example that a word of generous encouragement or an enthusiastic response to a result means everything to a student, a fellow scientist or a technical collaborator.

The clashing of opinions with regard to the usefulness of artificially induced mutations in the early thirties is not unlike the present discussions with regard to artificial recombination of genes. Experiments on the scale and with the perseverance which have decided the mutation issue are needed to determine whether the artificial recombinations of genes are of the same type as those occurring spontaneously at a very low frequency in nature for example between pro- and eukaryotes.

Apomixis, chromosome cytology and forest tree genetics have seen important and extensive contributions by Åke Gustafsson. For the latter area including forest tree

breeding he has built one of the nicest institutes of its kind at the former Royal College of Forestry. Forest tree genetics and breeding requires planning and carrying out experiments which will last a century and more. By a parliamentary accident this work and the scientists conducting it have been scattered all over Sweden and it must be a disappointment to Åke Gustafsson that his building, which was designed with so much artistic love, will no longer be the focal point of this important work. The example given by the success of the mutation group can help to guide the continued cooperation in the forest tree genetic work until a new parliamentary accident will permit this work again to find a common home.

For those of us, who can read Swedish, your books with poetry and essays have filled many an enjoyable hour. Your talents as a writer together with your knowledge in science have produced some of the most memorable newspaper articles, radio and television productions as well as university and popular lectures. There are few that can rival your success in bridging the communication gap between scientists and the general public. As we extend our birthday wishes to you, we would like to include Maddi, as she has given you the foremost support in carrying out your tasks as scientist and humanist. You and Maddi have created many happy hours in togetherness with interesting human beings at your home. We wish you an exciting birthday party, we will be all there, whether physically or not.

Diter von Wettstein