Proceedings of the 3rd International Workshop on

GLUTEN PROTEINS

Budapest, Hungary
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GLUTEN PROTEINS

PREFACE

After the successful first international workshop on gluten proteins held in Nantes (France) and second one held in Wageningen (Netherlands), the place of the 3rd International Workshop on Gluten Proteins was held in Budapest (Hungary). This meeting was attended by about 80 participants from 17 countries all actively engaged in research on wheat protein chemistry and biochemistry. More than 40 papers and additional posters of high scientific level were presented on various aspects of gluten proteins. The increasing role of genetical and molecular biological aspects in wheat protein research as well as the problems of structure-functional properties relationships were clearly expressed during the discussions.

This book contains the edited proceedings of this workshop. The editors hope that the contributions from well known specialists will make the Proceedings a valuable source of information for agronomists, food scientists, plant biologists, food technologists in the improvement of cereal breeding and cereal processing.

Editors

The Workshop was organised by:

International Association of Cereal Science and Technology (ICC)
Hungarian Biochemical Society
Hungarian Scientific Society for Food Industry
Hungarian Grain Trust

WELCOME TO THE PARTICIPANTS

On behalf of the Hungarian Scientific Society for Food Industry, Hungarian Biochemical Society and Hungarian Grain Trust I am pleased to welcome you to the 3rd International Gluten Workshop organized under sponsorship of the International Association for Cereal Science and Technology. It is a great honour and pleasure for us that this important international scientific event will take place in Budapest in Hungary: Cereal growing will always play an important role in Hungary so it is understandable that in every period great attention is paid to cereal breeding and cereal research. Wheat varieties produced by Hungarian breeders, quality controlling methods developed by such scientists as Kosutány and Hankóczy, first high milling technology all originate from Hungary.

This workshop provides an opportunity for experts in wheat gluten research from all parts of the world to meet and exchange views about the newest results in this field and about future trends in wheat protein research. I also hope that this scientific event will be an opportunity for the participants to obtain information about the Hungary scientific institutions working in this field to have a better knowledge about cereal science and technology in Hungary.

I hope you will find the workshop useful and that the discussions will help further the progress in this field and also in international cooperation and understanding. We also invite you to take time to visit the city of Budapest and eventually other places in our country. I wish you all a successful workshop and a pleasant stay in Hungary.

Dr. Daniel Lacfi, Professor
General Manager, Grain Trust, Hungary

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POSTERS

ORAL LECTURES

The Molecular Genetics of the High Molecular Weight Subunits of Wheat Glutenin

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Introduction

Two lines of evidence suggest that the High Molecular Weight (HMW) subunits of glutenin are important in determining the structure and functionality of wheat gluten. Firstly, experiments in a number of laboratories have shown that the presence of specific allelic forms of HMW subunits is closely correlated with breadmaking quality in *Triticum aestivum*. Secondly, the subunits are predominantly located in high molecular weight polymers, the amounts of which are also correlated with breadmaking quality. Because of this we have made detailed studies of HMW subunits at the molecular and chemical levels. The former are discussed in the present paper, while the latter are described in one following.

Polymorphism of HMW Subunit Genes

Analysis of many genotypes of bread wheat, notably by Payne and co-workers, have shown the presence of between 3 and 6 individual HMW subunits (see Payne and Lawrence, 1983). There are 0 or 1 subunits encoded by chromosome 1A, 1 or 2 encoded by chromosome 1B and 2 encoded by chromosome 1 D (see Fig. 1). Payne *et al.* (1981) classified these subunit pairs into high M_r x-types and low M_r y-types and more recent molecular analyses (discussed below) indicate that this is a valid distinction, in that there is a closer structural relationship between the y-type subunits encoded by the A, B and D genomes than between the x

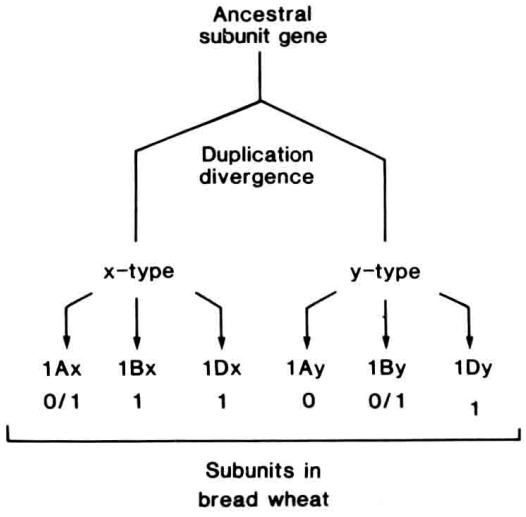

Fig. 1 Hypothetical pathway for the evolution of the HMW subunit genes of hexaploid bread wheat (*T. aestivum*).

and y-type subunits encoded by chromosome 1D. This suggests that the divergence of the ancestral x-type and y-type genes pre-dated that of the progenitors of the A, B and D genomes, as shown in Fig. 1.

Despite the fact that 1Ay subunits are never found in bread wheat, and that 1Ax and 1By subunits may also be absent, analysis of five genotypes by 'Southern Blotting' showed that all had six hybridizing fragments, corresponding to the x- and y-type genes from the three genomes (Harberd *et al.*, 1986). Each of these fragments appeared to contain one gene, and be present as one copy per haploid genome.

Similar analyses of DNA from the AABB tetraploid *T. dicoccum* and diploid species considered to be related to the progenitors of the A and D genomes of bread wheat (*T. monococcum* and *Aegilops squarrosa* respectively) also show the presence of two hybridizing *Bam* Hl fragments