
Details on the participants, papers, and countries represented at the Workshop are given in a separate joint report. All sessions were conducted as joint sessions between the Pathology Section and the Molecular Biology Section of the ISSCT. The organization of the workshop and its associated field tours, physical facilities provided, and helpfulness of the hosting South Africa Association Experiment Station (SASEX) and sponsors were excellent and greatly appreciated by all participants. A special note of thanks is given to the workshop organizers, Dr. Roger Bailey and Dr. Barbara Hackett, SASEX.

The Molecular Biology part of the workshop consisted of sessions on the three topics of (1) genetic engineering, (2) genetic markers, and (3) sucrose accumulation. The genetic engineering session consisted of an invited paper, seven volunteered papers, and six posters. The genetic markers session consisted of an invited paper, three volunteered papers, an invited presentation by a plant breeder/geneticist, and two posters. The sucrose accumulation session consisted of an open discussion period. Collectively, these three sessions lasted one and one half days. The papers and posters of the Molecular Biology Section revealed surprising progress, and potential limitations, in this emerging field of sugarcane research.

Tremendous progress was reported for the last few years in the area of genetic engineering of sugarcane. Our ability to transform sugarcane with a range of potentially useful genes is becoming routine in a number of laboratories around the world. Reported results show that we can now recover transformed lines of sugarcane faster then we can evaluate them to determine which are useful. Post-transformation evaluation is necessary because of the high amount of variability among the transformed lines, which probably results from a combination of random gene insertion and a variable number of gene copies, leading to differential uncontrolled expression of the inserted genes. These problems are compounded by additional variability among lines introduced by tissue culturing, which is a required part of the transformation process. In spite of these problems are compounded by additional variability among lines introduced by tissue culturing, which is a required part of the transformation process. In spite of these difficulties, specific programs reported progress towards obtaining resistance to herbicides, insect pests (cane grub and borer moth), and diseases of leaf scald and sugarcane mosaic virus, and altering metabolic pathways regulating sucrose accumulation.

The primary scientific problems remaining to be solved in genetic engineering involve decreasing variability among transformed lines to reduce the time and costs of evaluation, having access to genes encoding useful agronomic traits, and having promoters for regulating the expression of the useful genes, so that their product occurs at the proper level, time, and site. Research under way is expected, in the near future, to provide information useful for ameliorating each of these problems.

One non-scientific aspect of genetic engineering that was touched upon only lightly, but that should be considered by everyone, is that many advances in genetic engineering are considered intellectual property and thus have been patented. Consequently, there is growing reluctance to freely share properties (eg. technologies, genes, and DNA sequences) that either already are, or “might be,” patented. In addition, sugarcane growers
should expect to incur a cost with licensing required before they can grow sugarcane varieties improved through genetic transformation. Patenting and licensing issues are emerging as critically important. Precedents for solutions to these issues will come from other crops that are more widely grown and have a longer history of transformation, such as maize, soybeans, and cotton. Sugarcane research managers and scientists will need to follow legal decisions about these crops for guidance on how to proceed with implementation of genetic transformation for improvement of sugarcane.

Thus far, sugarcane marker research has been hindered by problems associated with analyzing a large, polyploid genome and the lack of already established breeding populations or families maintained specifically for genetic analyses. The increased polyploidy contributed by *S. officinarum* during the mobilization process and the low level of genetic polymorphism in *S. officinarum* further complicate marker studies in sugarcane. In spite of these problems, several research groups have made tremendous progress towards understanding the sugarcane genome through genetic marker research.

Papers presented at this workshop emphasized the potential for gaining a faster and better understanding of the sugarcane genome through comparative molecular marker studies on other well-studied grasses, such as maize and sorghum, of the tribe Andropogoneae. The occurrence of similar DNA sequences (same molecular hybridization sites) on homeologous chromosomes, in an order that is highly conserved among the Andropogoneae species, allows one to use DNA sequence information from one species to predict a comparable sequence in the other species. The greater ease in working with maize and sorghum and the very much greater quantity of molecular marker data existing on these two crops are contributing to increased progress on sugarcane. Genomic maps are reaching the stage at which they can betested for applicability to sugarcane improvement programs.

A business meeting of the Molecular Biology Section was held May 15. The purpose of the meeting was to share evaluations of the current workshop, develop recommendations about possible future workshops, nominate candidates to serve the Molecular Biology Section following the XXIII Congress, and plan for the Molecular Biology program at the XXIII Congress. All five current members of the Molecular Biology Section, Paul Moore (Chair), Robert Birch, Frikkie Botha, Jean-Christoff Glaszmann and James Irvine, attended the business meeting, which was open to all participants at the workshop.

Expressions were unanimous that the joint Pathology and Molecular Biology Workshop was so successful that, to the degree possible, future workshops of the Molecular Biology Section should be held jointly with other sections of the Biology Commission. A motion was approved that the Molecular Biology Section would seek approval of the Technical Co-ordination Committee to hold a joint workshop with the Breeding Section of the ISSCT approximately 3 to 4 years from now. If the joint meeting is not possible, then the Molecular Biology Section proposed a workshop to be held between Congresses somewhere in Australia. Dr. Birch offered to explore possibilities of hosting that Molecular Biology Section Workshop.

Candidates nominated to serve the next Molecular Biology Section included Dr. Botha (Chair), Dr. Birch, Dr. William Burnquist, Dr. Glaszmann, and Dr. Moore. Dr. Glaszmann notified the Section that he may not be able to serve a future term on the Molecular Biology Section, but he would know for certain and notify the Chair before the XXIII Congress took place. The Section voted to accept Dr. Angelique D'Hont in place of Dr. Glaszmann if he is forced to withdraw.

The decision that eight papers will be allowed for the Molecular Biology Section and the schedule for submitting papers and posters for the XXIII Congress were provided to attendees. Discussion about possible themes for the Congress program indicated that the Molecular Biology Section should continue to emphasize both genetic transformation and genetic analyses. The most popular suggestion was that there could be a session on “Performance evaluations of transgenic sugarcane.” The Chair was asked to invite scientists involved in such research to submit papers for the next Congress. The business meeting adjourned.