YEAST GATHERS MORE THAN 1 000 SCIENTISTS IN GÖTEBORG

More than 1 000 scientists from all continents will gather for a week (July 7-12, 2003) in Göteborg to discuss – yeast. The conference with 40 plenary lectures, 20 workshops and some 800 posters will take place at the Göteborg Convention Centre.

Yeast – more specifically the one called baker's yeast - has been used by mankind for millennia to make bread, beer, wine and alcohol. While this then sounds like an enjoyable conference these industrial applications of yeast take only a small part of the meeting. What attracts these scientists from far away to meet in Göteborg is - pure science, just like the yeast research that has lead to Nobel Prizes in earlier years!

What can be so interesting about yeast? Yeast is a fungus and the whole organism is just a single cell of about five micrometers (5/1000 of a millimetre) in size, just a bit larger than a bacterium. Our own organism consists of many billions of cells, each of them in principle of the same design as a yeast cell. So a yeast cell and a human cell have a lot in common: they function in very similar ways, they are organised in a similar way and they control their proliferation in essentially the same way. Since yeast cells are so much easier to study, they can function as a "model system" for cells from almost any living systems up to the human cells. Today yeast is the best understood cell in molecular biology and many facts that we know today about human cells were first discovered in yeast. For instance, studies how yeast cells control their multiplication received the Nobel Prize in Medicine in 2001 because the results were important to understand cancer.

To study the details of molecular processes in a yeast cell takes less than a fraction of the time in yeast than in takes with human cells. In nature, yeast lives on fruits and flowers. Pioneers like Robert Mortimer from Berkeley "domesticated" yeasts in the 1950ies to facilitate studies in the laboratory. Mortimer, now in his 70ies but still active and attending the conference, generated first genetic maps setting out landmarks of yeast genes. In 1996 baker's yeast was the first organism whose entire genetic code, the genome, was completely sequenced: some 5 500 genes make a yeast cell, which is about 1/5 of those needed to make a human being – also a reason why yeast is easier to study. Mortimer and the Belgian André Goffeau will receive a prize from the Genetics Society of America at the conference for their contributions to determine the genetic set-up of yeast.

The genome sequence of human is also known today – so why still work with yeast when "all" is known? Well, the genome sequence is only a string of letters/building blocks, A, G, C and T, whose order determines how proteins are formed and how eventually the cell or an organism looks like and behaves. But it is not all trivial to extract that information from this string of AGCT (in yeast altogether 12 500 000 letters long, 1/1000 or so of human). Again, yeast leads the way to do that. In pioneering work, researchers around Mark Johnston (St. Louis), Eric Lander (Boston) and Bernard Dujon (Paris) have recently sequenced the genomes of some ten other yeasts, all very similar to baker's yeast. Comparing the genomes allowed them to correctly interpret the code, to localize sequences that constitute a gene, and to determine the number of genes. Their conclusion: to be able to better read the human genome we need to determine the sequence of that of the chimpanzee! They also learned a lot about how the genetic information is shuffled around during evolution. Further, yeast researchers are developing many novel tools to interpret the function of the genome, which have provided a unique amount on information on yeast itself and which promise to be very useful for learning about human one day in the future.

How do yeast scientists - those 1 000 that will come to yeast2003 and all the other about 5 000 that did not make it to the conference - handle yeast in the laboratory? The organism is so small? They use the enlargement trick, i. e. instead of studying one single cell, they look at billions of identical cells at a time, for instance on a petri dish or in a liquid broth. The yeast geneticists compare billions of identical normal cells with billions of identical “mutant” cells, each of them carrying a specific change in one single gene. The difference how the normal and mutant cells behave can tell us something about the normal function of the mutated gene. While this sounds very basic, yeast genetics has gone a long way to determine the function of genes and proteins at ever increasing resolution. Genetics is supported by yeast biochemists that break billions of identical yeast cells to extract, purify and study the cell content, for instance to analyse a specific protein or to find out how and how much all of the 5 500 yeast genes contribute to the cell’s behaviour.

Nowadays, novel technologies, discussed and demonstrated extensively during the conference, also allow insight into individual yeast cells. Researchers like Trisha Davis from Washington University in Seattle can now visualise the organisation within the yeast cell, which is amazingly complex even though the cell is so small. Even more fascinating, advanced microscopy also allows to follow the movement and interaction of proteins within the miniature yeast cell leading to even more details of how the cell functions.

Taken together, even after 50 years yeast is still a rising star in research, The Göteborg conference is the 21st of its type and the largest ever. It is economically supported by for instance by the European Commission, scientific research councils and foundations and by industries, and it will be especially well attended by young scientists.

Why is Göteborg the place of choice for the a yeast conference? Göteborg has a very active yeast community with some 50 researchers in twelve teams at both Göteborg University and Chalmers University of Technology. Four years ago they formed the Göteborg Yeast Centre with many common activities (such as “jäst i verkligheten” at Vetenskapsfestivalen). This virtual centre runs much internal collaboration and has a highly international orientation: for instance, with support from Brussels students from all over Europe visit Göteborg and learn about yeast research. The Göteborg yeast researchers are involved in many different studies of fundamental science but also industrial research within the wine, beer and alcohol industry. Recently yeast researchers around Lena Gustafsson (Chalmers) and Stefan Hohmann (GU) started a company that aims at improving the use of yeast to produce pharmaceuticals such as insulin: seems that yeast research combines science, health and the good side of life!

Contact: Prof. Stefan Hohmann; hohmann@gmm.gu.se; +46 (0)31 773 2595

Website: http://www.yeast2003.se