



Matthias Lentz and Heinrich Rüthing

The Oldest Book of the Library at the University of Bielefeld

A gem of the early art of printing
and its history

In the library at the University of Bielefeld, a most delicate treasure is to be found: the "Epistolae familiares" of Pope Pius II (Enea Silvio Piccolomini), printed in Louvain in 1483 by John of Westphalia. This work deserves special attention not only because it dates from the century in which letterpress printing emerged. Its author, the humanist and *poeta laureatus* Enea Silvio Piccolomini who ended his days in 1464 as Pope Pius II, ranks among the most interesting figures of the Italian Renaissance. His abundant correspondence which he maintained with a great variety of persons during his whole life and in which he dealt with manifold topics ranging from politics to love and poetry in a most sophisticated style, became the model of letter writing. The printer who took care of these texts was a true Westphalian and went down in the annals of book history as an able craftsman of the early "black art". From five entries in the Bielefeld copy of the "Epistolae" which were taken down from the 18th to the 20th century, it can be seen that this rare print has already enjoyed high esteem for quite some time. The book was part of momentous collections of British bibliophiles and connoisseurs (among others M. Wodhull and G. Dunn) before it found its final home in the region whence its printer came.



Frithjof Karsch and Helmut Satz

Quark Matter and Super Computers The investigation of matter at extreme densities and temperatures

When matter is compressed to such high densities that the nuclei of atoms overlap, it undergoes a transition to a new state: quark matter. Normal nuclear matter consists of nucleons (protons and neutrons), and each nucleon is a bound state of three quarks. When these nucleons overlap at high density, the distances between neighbouring quarks become very small, and then the binding forces are no longer effective. Hence the quarks are now "deconfined", and the medium consists of such unbound quarks. The University of Bielefeld is one of the leading centers for the investigation of matter under such extreme conditions. Strongly interacting media are simulated on high performance parallel computers, and these simulations provide detailed information about the transition from hadronic to quark matter and about the new state itself. The results describe the matter of which the universe consisted shortly after the big bang; hence they are also of great importance for experiments in which heavy nuclei are made to collide at high energy, in order to produce such primordial matter in the laboratory.



K. Kohse-Höinghaus and A. Brockhinke

(Bio)chemical Analysis with Short Laser Pulses

Observing molecular change in real-time

High-power picosecond laser pulses from a regeneratively amplified titanium-sapphire laser permit novel spectroscopic approaches in the investigation of chemical systems. In particular, the high pulse energy allows the determination of two-dimensional correlations in laser-induced fluorescence (LIF) spectroscopy. Applications are presented from fields as diverse as pollutant formation in combustion, energy transfer in fundamental reaction dynamics, and the analysis of structural change in biochemical systems.



Andreas Perlick and Helge Küster

Research in a European Consortium: the EU-Project FIXNET

Research groups from five countries
investigate nitrogen fixation in root nodules

The article is based on a presentation of the concepts the European Union pursues in the financial support of European research projects. These concepts include the formation of transnational networks and the more or less mandatory participation of industrial companies to allow an application of the research results obtained. Using the example of the EU programme FIXNET which is coordinated by the Department of Genetics of the University of Bielefeld, the authors present an example of how such a network consisting of seven research groups and two industrial companies from three EU countries and the non-EU country Hungary is structured and managed. The scientific background of the FIXNET programme is the formation of root nodules on certain plant species belonging to the legume family. Within such root nodules, symbiotic bacteria are able to convert atmospheric nitrogen to ammonia, which is supplied to the plant and allows legume plants to grow on nitrogen-depleted soils. Since nitrogen fixation is a highly energy-consuming process, the nitrogen and carbon metabolism is of prime importance in root nodules. Therefore, these metabolic pathways have to be fine-tuned in both the plant and the bacterial symbiont. The partners involved in the FIXNET programme analyze a number of genes both from the plant and the symbiotic bacterium, which are involved in carbon or nitrogen metabolism and can be considered essential for the function of this organ with the aim of getting an integrated view of the processes active in both symbiotic partners. Finally, strains improved in nitrogen fixation might be obtained.



Günter Reiss et al.

Memory and Sensor Technology: New Developments via Magneto-Electronics?

The progress in many technological areas is closely related to the basic research in physics. A recent example is the discovery of the Giant Magneto Resistance: a drastic change of the electric resistance in an external magnetic field. This effect is based on a quantum mechanical coupling of ferromagnetic thin films in a multilayer system consisting of, let's say, cobalt and copper or iron and chromium. The "antiferromagnetic coupling" was discovered at the Forschungszentrum Jülich, Germany, in 1986 by P. Grünberg. The Giant Magneto Resistance has already demonstrated its potential for applications in sensor systems for, e.g., hard disks or automotive devices. A broader field of applications can be found in data storage and a possible transistor function of such film systems. This development is therefore regarded as one of the key issues towards "Nano-Electronics", i.e. the miniaturization of microelectronic devices below 0.1 μm . Basic research is in turn strongly stimulated by this challenging task, especially in understanding the influence of charge as well as spin of an electron on its transport properties.



Uwe Pliquet

Transdermal Drug Delivery by Electroporation

The outer layer of human skin, the 10 to 15 μm thick stratum corneum is a very efficient barrier for water-soluble molecules. In general it is not feasible to overcome this barrier. Hence for purposes like transdermal drug delivery of water-soluble compounds it is necessary to permeabilize the stratum corneum at

least temporarily. The application of brief electric fields yields electroporation, an effect known to create new aqueous pathways in lipid environment. We can show that the application of high voltage pulses has the potential of flux enhancements by orders of magnitudes. The basic features of the mechanism were investigated. It was found that a combination of electric and thermal effects alters skin structure and provides a driving force sufficient even for large molecules like insulin or heparin. This suggests a quite new method for transdermal drug delivery or noninvasive sensing of compounds in body liquids.



Klaudia Witte

Females Copy Females When Selecting a Male for Mating

In most species, males bear extravagant secondary sexual characteristics and display these traits to females. Females choose a mate on the basis of these ornaments and prefer the most beautiful male. Female mate preferences for particular male traits can be genetically based, or females can be influenced in mate choice by other females, e.g. females can imitate the mate choice of older and more experienced females. In this case, a female observes another female during mate choice and afterwards copulates with the same male. We investigated the function and mechanism of this strategy in a fish, the sailfin molly *Poecilia latipinna*. Sailfin molly females copy the choice of other females, but copying does not override strong preferences for particular male traits such as largeness. Mate-choice copying is a kind of social learning. Female mate preferences are socially transmitted by copying and can influence the evolution of male traits in a non-genetic way.

■ Abbildungen

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