

## POSSIBILITIES AND LIMITS OF MOLECULARGENETIC DIAGNOSIS

by Peter F. Wieacker (p. 3)

Since moleculargenetic techniques have been introduced in human genetics, the diagnostic potential in genetic diseases has increased considerably. According to this rapidly expanding knowledge, genetic counseling and decision-making for patients become more and more complex. Ethical issues in genetic diagnosis depend largely from the diagnosis intentions. Moleculargenetic diagnosis can be performed for verification of a clinical diagnosis, carrier detection, predictive testing of late-onset diseases and prenatal diagnosis. In this context ethical issues of alternative methods of prenatal diagnosis such as preimplantation diagnosis or polar body analysis are discussed.

## HOW THE WORLD IS CONNECTED BY THE ELECTROMAGNETIC FIELD

by Frank Gronwald, Jürgen Nitsch (p. 19)

The four known fundamental interactions share a fascinating property: They enable us to characterize the change of physical objects. Without interactions this would be impossible. Therefore, interactions are also called connections since they convey within space and time the information about change from point to point. This circumstance is explained by means of the example of the electromagnetic field.

## AN UNUSUAL WAY OF LOOKING AT THE FUEL CONSUMPTION OF PASSENGER CARS

by Helmut Tschöke, Hanns-Erhard Heinze (p. 11)

Conventionally, fuel consumption of cars is given as consumption of volume or mass per distance or as consumption of energy, depending on the objectives. Drivers are mainly interested in fuel consumption in liter per 100 km, while engineers often take the specific consumption values based on energy into account.

A Diesel engine has an advantage of consumption, referring to the volume, of approximately 14 % compared to an Otto engine with the same consumption of energy. The higher density of Diesel fuel compared with its volume causes a higher emission of CO<sub>2</sub> of approximately 10 % more on a basis of a usual consumption of 7 to 9 liter per 100 km.

A more careful consideration on consumption maps of internal combustion engines shows that focusing the minimal specific consumption of fuel is not sufficient to estimate the efficiency of drive unit. A new method of evaluation is proposed in a simple and comprehensible way. Out of the whole area of the characteristic diagram this part is taken out, that refers to an additional consumption of 10 to 20 %. This is compared to the minimal consumption of the engine and used as an evaluation parameter.

This method shows that engines with the same minimal specific consumption of fuel have a different „quality of consumption“.

To carry out a so called „1- to 2-liter-car“ considerable improvements regarding air resistance, rolling resistance, drive efficiency and mass are necessary. The target values are defined by means of simple examples.

Besides consumption and the number of persons or load carried, a new factor of mobility also considers the driving time, which is important for characterizing mobility. Coach and ICE trains show most reasonable factors of mobility in short- and medium-distance traffic (up to 300 km).

**SYSTEMORIENTED BIOPROCESS  
ENGINEERING: AN INTERDISCIPLI-  
NARY RESEARCH FIELD IN BIOLOGY,  
SYSTEMS ENGINEERING AND  
COMPUTER SCIENCE**

*by Andreas Kremling, Katja Bettenbrock, Jörg Stelling, Udo Reichl, Ernst-Dieter Gilles (p. 29)*

Although being one of the most important challenges in modern biology, a system-level understanding of how cells and organisms function is very rudimentary. This results mainly from two reasons: The overwhelming part of experimental investigations can be characterized as qualitative and descriptive, directed towards understanding of biomolecular details. The concomitant lack of quantitative data will certainly be reduced by further development and wider application of massively parallel experimental methods in functional genomics and proteomics. However, due to the complexity of cellular systems even the (nearly) complete measurement of the systems' states per se will not enable an integrated understanding of all relevant functional relations and their influence on the observable behavior.

Recent efforts for a system-level understanding in biology rely on interdisciplinary approaches combining concepts from biology, information science and systems engineering. They especially stress the importance of mathematical modeling of complex biological systems in order to come to a virtual representation of cells and organisms. In the end, this representation should allow for computer experiments similar to experiments with real biological systems.

Focusing on the internal structure of cellular systems, one central, increasingly accepted notion is that these systems are composed of 'functional units' or 'modules'. In this respect, biological systems are more closely related to synthetic, engineered systems than to e. g. physical systems. Therefore, a promising way to come to a system-level understanding of cells and organisms is to extend theoretical concepts successfully established for the analysis and synthesis of complex technical systems to biological systems.

**MARKUP LANGUAGES  
FROM TEXT PROCESSING  
TO „CONTENT MANAGEMENT“**

*by Dietmar Rösner (p. 37)*

Starting from a discussion of problems with nowadays text processing and document management, we first present the basic ideas of markup languages with special emphasis on XML, the extensible markup language. We then report about our work in the EC funded project CATCH II. In this project a methodology of the authoring process has been developed that – in combination with supporting software tools – promises to allow to fully exploit the potential of markup languages and to open way to content management based on metadata and explicit structural and semantic markup.

**COGNITIVE NEUROBIOLOGY:  
THE MYTH OF AWARENESS**

*by Hans-Jochen Heinze (p. 45)*

The search for consciousness has become a major issue in the field of cognitive neuroscience. Combined evidence of neuropsychological studies, neuroimaging experiments and single-unit recordings argues against a single unitary system of consciousness. Instead, the data suggest that conscious experiences are linked to the integrity of specialized neural circuits with distinct temporal and spatial patterns of activity. These pattern of brain-mind associations, however, do not necessarily imply that we will be able to explain consciousness in a sense that we can define sufficient neural conditions for awareness, I-perspective, and personal time. It is possible that the technological progress will provide a precise neural description of certain types of subjective experiences and, in this way, establish a kind of equivalence between mental and neural life. But this progress is a practical one: It will improve human conditions e. g. by designing new strategies against neurological and psychiatric diseases, but it does not, as it is sometimes claimed, solve the body-mind problem by reducing the subject to a neural reflex.

## PRUSSIA AND THE GERMAN HISTORY

by Klaus Erich Pollmann (p. 51)

The 300. anniversary of the beginning of the Prussian kingdom in 18. January 1701 is an actual occasion to remind of Prussia. In 2001 however the controversies and debates were much more moderate than in former decades. The articles depicts the origins of Prussia and discusses the question when Prussia came to its end: 1947 when the Allied Control Council resolved the end of Prussia, 1932 when the so-called Papenputsch against the Prussian government took place or 1866 already when the German Federation shattered as result of the German war as well as the national revolution from above. The German Kaiserreich of 1871 was founded by the Prussian Otto von Bismarck but it changed the Prussian character and identity profoundly.

## THE ANAESTHETIST AND HIS FIVE SENSES

by Wolfgang Röse (p. 61)

Normally everyone enjoys to be able to see, to hear, to smell, to taste and to touch. Surprisingly, there is a medical speciality which intentionally prevents people from using these very important senses – anaesthesiology.

In connection with anaesthesiological tasks in pain relief, emergencies and critical care not only feeling of pain is inhibited. Patients under general anaesthesia or in artificial coma during intensive care lose the use of their other senses, too. To prevent complications arising from this state of more or less long lasting sense-loss the anaesthetist has to take care for the artificially handicapped patient – using his normal five senses.

In pioneer times of modern anaesthesiology, i. e. in the second half of the 19<sup>th</sup> century, the anaesthetists had only their senses to control the patient. Today sophisticated monitors assist the physician to administer anaesthetics and to detect effects and side-effects of his work. Unfortunately, under these circumstances the use of the anaesthetist's five senses gets lost more and more.

Also practising medicine with modern technical equipment, the primary and principal use of the five senses, especially watching, listening and feeling, is irreplaceable in the daily work of the responsible anaesthetist. Additionally, the anaesthetist needs to have sensibility in all his fields of clinical activities. Perhaps here is the secret of his sixth sense.