## 1.
## Electricity generators and car exhausts contamination and impact of lead on human beings

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Lead is one of the most important elements that contributes to the impact on human brain. It's in the body from many variable sources. This metal has been of great interest of the specialists and the public, including researchers dealing with the topics of pollution of the air, water, oil, food and their impact on most of the organs. Because of the obvious effect on human beings, in the various countries of the world it is probably one of the sources of appearance of generations with impaired mental health if exposed to high concentration of lead. The agencies responsible for health globally and locally for the legislation of the various dimensions of the metal particulates are of great importance. Most sources of lead that accompany our daily lives need health awareness as the lead does not only affect the brain, but it may cause anemia and affect the fertility of men and women, may cause severe pain in the abdomen and may have an impact on the central nervous system, too. The most important sources of lead exposure are automobile fuel (diesel & gasoline), dyes, food stored in metal cans, coloured soil and house dust. This research aimed to study the impact of lead emitted from the electricity generators and car exhausts on plant life, soil dust and human blood of the citizens of Mosul city. The result showed that the city forest trees contaminated with particulates and the concentration of lead in the trees near the street was more than that away from the source. It also showed the season's fundamental role in the different concentrations of lead. Results showed that the field vegetables deployed in the city in the summer and winter were also contaminated and not used for human consumption. Dust in the whole city contains lead twice as much as the minimum allowable concentration. Traffic policemen's contaminated blood contained lead by 63% higher than the blood of the general public or the generator workers. In the city of Mosul 500,000 cars and 733 electricity generators emit 2.64 tons of lead containing particulates per day.

## 2.
## Global warming potential of solid waste landfills

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Despite the efforts that are directed to the recycling and recovery of solid wastes, landfills will remain an integral part of most solid waste management plans. Landfills have some adverse environmental impacts including the emission of green house gases (GHGs). GHGs (mainly methane and carbon dioxide) are the main cause of the global warming phenomena that leads to climate change. Climate change may directly affect human health through increase in average temperature. Furthermore, indirect impact on human health may be caused by climatic change through degradation in water and food quality and quantity. According to USEPA, globally, landfills are the third-largest anthropogenic source of methane emissions, while in the US, landfills were the second-largest source in 2006. In Jordan, domestic solid waste sector contributes to about 90% of the methane emissions from anthropogenic sources at the national level. Nowadays, both governmental and nongovernmental agencies have joined efforts with environmentalists to stop landfills from contributing to global warming phenomena. These efforts are focusing on mitigating the impacts of landfill gases

by recovering the methane gas and utilizing it for energy production. The main objective of the present paper is to describe the contribution of landfills to global warming phenomena. The impacts of the emitted landfill gases on the atmosphere and the health of human beings are reviewed. In addition, the global warming potential of the landfill gases are estimated. Mitigation measures to minimize the adverse impacts of the gases are recommended.

## 3.
## Plant poisoning among children and young people in northern parts of Jordan

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The aim of the present poster is to present the growing problem of poisoning with some plants like *Mandragora autumnalis*. A multiple case of *Mandragora autumnalis* poisoning among children is described. *Mandragora autumnalis*, a solanaceous plant is common in Irbid province, contains a variable concentration of alkaloids which cause gastrointestinal irritation, and tropane alkaloids, which have anticholinergic properties and produce typical and sometimes severe atropine-like symptoms. Symptomatic treatment, antidote therapy with physostigmine is useful to control acute poisoning. The poster emphasizes the need for awareness and educational measures of the public, in order to prevent poisoning of Jordanian children by eating such plants. Key words: Plant – Poisoning, children, Northern Jordan.

## 4.
## Social responsibility, mining and development

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In the EU we push towards responsible economic growth. In Romania we have approx 500 communities in a state of economic decay after 18 years of abrupt mine closures – yet still with mineral resources in the ground and with the current prices for mine products are reaching record highs. What has gone wrong? Are we trying to understand? Can we learn from the past to build a stronger future? This presentation argues that we can systematically address the difficult issues surrounding the extractive industry through acknowledging the concerns of stakeholders. It shows a solid path to capture and address the issues. And it presents an overview of a robust framework on which to rebuild the mining industry – a framework made easier to apply with the help of the upcoming ISO standard on social responsibility, together with other current social responsibility and management innovations.

## 5.
## Environmental contamination and health risk for residents living around uranium-mining and milling areas

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Operations in the uranium mining and milling industry generate a substantial amount of radioactive and toxic waste products. Some of the solid and radioactive waste is deposited as tailings onto designated waste sites. Of concerns to residents living around such operations are the environmental contaminations from disposal of the waste and health risk from exposure to the contaminants. For example, tailings release the radioactive gas, radon, and solid waste can be dispersed by hydrologic processes. We have conducted a biomarker study to investigate the concern. Using the chromosome aberration assay, the residents showed higher chromosome aberration frequencies than the matched control. Using the challenge assay, we showed that the residents had exposure-associated DNA repair abnormalities. Together the data indicate that the residents may have been exposed to 10 cGy radiation and have increased risk from such exposure. A subsequent and un-related epidemiologic study reported that residents who live near such mining and milling activities had significantly increased cancer mortality risk from lung and kidney cancers. There are several conclusions that can be generated from these studies. First, the challenge assay is useful in detecting exposure-induced DNA repair defects. Second, uranium mining operations can cause health risk to residents in the surrounding areas. Third, more attention needs to be paid to the management of waste from such operations.

## 6.
## Traditional and new biomarkers for monitoring populations for their exposure to environmental toxic substances

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Extensive biomarker research and prospective validation studies indicate that certain biomarkers can be used to provide reliable documentation of excessive exposure to environmental mutagenic agents, expression of detrimental biological effects from the exposure and increased risk for cancer. These biomarkers are useful because they represent parts of an integrated response to the exposure and are components of the complex carcinogenic pathway. Traditional biomarkers are classified into three categories: biomarkers of exposure, biomarkers of early biological effects and biomarkers of health risk. A current interest is in the use of phenotypic functional assays to improve/complement the assessment of cancer risk. Recommended approaches include assays that indicate DNA repair deficiency, i.e. host-cell mediated reporter gene and challenge (mutagen-sensitivity) assays. In addition, genetic susceptibility biomarkers are used to understand inter-individual differences in response to exposure and in health consequences. Novel biomarkers are being developed that utilizes molecular and high technology expertise. These new biomarkers include environmental sensors for real-time detection of toxic substances, biosensors for rapid and specific determination of biological effects, and cell-based microsystems and lab-on-a-chip technology to enhance detection and risk assessment. An emphasis is on the need for carefully designed investigations that involve adequate sample sizes and a combination of appropriate biomarkers to generate reproducible results that can be translated into more reliable cancer

risk assessment. The improved assessment can be used to drive the implementation of disease prevention and intervention activities.

## 7.
## Impact of air pollution on DNA damage of bus drivers in Prague

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Aim of study: to assess the possible negative effects of air pollution on DNA of city bus drivers. Methods: Blood samples of 50 bus drivers, 20 garagemen and 50 controls were collected during winter 2006. Exposure to environmental pollutants (carcinogenic polycyclic hydrocarbons, c-PAHs; and volatile organic compounds, VOC) was measured by personal monitors. The data were completed by a detailed lifestyle questionnaire. DNA damage was analyzed in peripheral lymphocytes using the alkaline comet assay combined with enzymes of excision repair (endonuclease III, ENDO III and formamidopyrimidin-DNA-glycosylase, FPG). The extent of DNA migration was quantified using Lucia G 4.81 software (LIM, Czech Rep), and the results were expressed as the percentage of DNA in the tail (tail DNA%). Both total and unspecified DNA damage (with and without enzymes, resp.) were measured in 200 randomly selected cells per individual. The measured data were corrected using an internal standard. Finally, each person was characterized by two medians calculated from (a) the values of the total DNA damage and (b) the values of unspecified DNA damage. Then the level of oxidative DNA damage was calculated as the difference between these medians. Results and discussion: The bus drivers as well as the garagemen were exposed to a higher concentrations of c-PAHs (Mann Whitney U test; $p<0.01$ and $p<0.001$, respectively) and benzene ($p<0.001$ and $p<0.01$, resp.) than the controls. However, neither the highest values reached the winter concentrations of c-PAHs detected in previous study aimed to city policeman (Novotna et al, 2007). Regarding the other VOC (toluene, ethylbenzene, xylene), only the garagemen were exposed more than the controls. Particularly the exposure to toluene in garagemen dramatically (16x) exceeded the concentrations observed in controls. The comet assay revealed in both exposed groups increased levels of unspecified DNA migration when compared to controls: tail DNA% = 1.33 in drivers and 1.82 in garagemen versus 1.04 in controls ($p<0.05$). Although the levels of oxidative DNA damage suggested a similar trend (tail DNA% = 1.67 in drivers and 1.90 in garageman versus 1.40 in controls), the differences between the groups were not statistically significant. Bivariate linear regression analysis of all monitored subjects documented a close association between the level of oxidative DNA damage and exposure to benzene while the concentrations of c-PAHs apparently exhibited no effect on DNA. Parallel study revealed in urine of bus drivers higher levels of 8-oxodeoxyguanosine (8-oxodG) when compared to controls and identified PM2.5 and PM10 levels, measured by stationary monitors during a three-day period before urine collection, as the main factor significantly affecting 8-oxodG levels (Rossner Jr et al 2008). Our present data suggest that besides the particulate matter also the benzene concentrations may represent a source of oxidative stress for Prague city bus drivers and garagemen. The higher levels of unspecified DNA migration detected in these groups could then reflect namely an increased excision repair of oxidized DNA nucleotides. Conclusions: Concentrations of c-PAHs in the air during winter 2006 did not influence the level of DNA damage in Prague bus drivers and garagemen. On the other hand, the levels of benzene could increase the risk of oxidative damage to DNA namely in subjects with “susceptible” genotype. References: Novotna B, Topinka J, Solansky I, Chvatalova I, Lnenickova Z, Sram RJ: Impact of air pollution and genotype variability on DNA damage in Prague policemen. Toxicol Lett. 2007;172:37–47; Rossner P Jr, Svecova V, Milcova A, Lnenickova Z, Solansky I, Sram RJ: Seasonal variability of oxidative stress markers in city bus drivers Part I. Oxidative damage to DNA. Mutat Res 2008, doi:10.1016/j.mrfmmm.2008.03.003. Acknowledgements: The study was sup-

ported by the grant VaV-SL/5/160/05 of the Czech Ministry of the Environment and AVOZ 50390512 of the Academy of Sciences of the Czech Republic.

## 8.
## Assurance and sustainable ecologic arrangement of the mining waste deposits (dirt – heaps and mud-setting ponds)

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One of the important work categories for ecological reconstruction and rehabilitation with respect to mine closing is the one addressing the rearrangement of the surfaces taken by the mining waste deposits (dirt-heaps and mud-setting ponds) that belonged to ex-bed mining or related preparation / processing technological annexes. In the first part of the work the technical principles governing the layout of the dirt-heaps are presented, respectively the evaluation of their stability depending on the constructive types of the dirt-heaps and their geotechnical parameters, the factors influencing their stability and the rehabilitation methods used. Finally, some of the deficiencies occurred in the rearrangement of the mining waste deposits in Romania are presented. In the second part of the work we deal with the management of closing the mud-setting ponds, briefly presenting the analysis stages and solutions, respectively: location of the mud-setting ponds, construction characteristics of the mud-setting ponds, presentation of the wastes in the ponds, geological study – geotechnical, stability study, hydrological study, meteorological data, water control, dust monitoring and conditions required for the protection of the underground waters. Based on these elements, recommendations on the elaboration method shall be made with respect to the closing schedules of the mud-setting ponds, few recommendations with respect to the elaboration of the closing projects of the ponds respectively their cover / insulation and the prevention of the acid drainage.

## 9.
## Scanning electron microscopic aspects and concentration of particulate matter emitted by “apartment” heating appliances fuelled by natural gas in the indoor air

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In the exhaust of “apartment” heating appliances (AHA), as a result of natural gas combustion, in addition to carbon and nitric oxydes or sulphur derivates particulate matter (PM) there is also invariably containing polyaromatic hydrocarbons and derivates (of which benzopyren is the most notorious carcinogen compound). The pathogenic action of these exhaust products on the respiratory tract is well documented. The smaller the particles, the more dangerous to human health they are because they enter deeper into the lungs; on the other hand, smaller particles have larger surface/diameter ratio, so they can absorb more fine particles (in particular those with below 10 µm diameter (PM 10) and below 2.5 µm diameter (PM 2.5). Objectives. 1. to identify PM in the ex-

haust of AHA; 2. to study their aspect and sizes by scanning electron microscopy and 3. to determine the concentration of PM in the indoor air of the apartments with AHA. Materials and methods. Scanning electron microscopy (SEM) was acomplished with a *Jeol JSM 25S* electronic microscope *(Jeol, Japan).* Samples were collected in the stack of AHA on microscope cover glass (1 $cm^2$ area, 1mm width) held for a period of 30 minutes. The microscope cover glass were further covered with a thin silver layer and electron microscope images were taken at 30 kV, then the particles were sized using a *3.0 MicroImage-Image Analysis Software (Silver Spring, USA)*. Indoor air PM 10 and PM 2.5 concentration was determined with a portable *MIE* device (metallic cyclon model *pDR-GK 2.05* with a reading unit model *pDR 1200)*. Results and discussions. The diameter of PM was measured on scanning electron microscopic images and their respective diameters expressed in micrometers. PM distribution according to diameter size gave the following values: the mean diameter 1.35 μm, 40% of PM had 0.5–1 μm diameter, 26% had 1–2.5 μm, 25% had a diameter below 0.5 μm, 8% had 2.5–10 μm, while only 1% had diameters over 10 μm. PM were collected in 12 different locations within the Cluj-Napoca urban area during January–March 2007 interval. The mean PM concentration values in our study (77.5 $\mu g/m^3$ for PM2.5 and 81.5 $\mu g/m^3$ for PM10) were higher than standard references (65 $\mu g/m^3$ within 24 hours, according to NIOSH and 70 $\mu g/m^3$ within 24 hours, according to WHO Europa respectively). Conclusions. Scanning electron microscopy images prove the presence of PM in the exhaust of AHA. PM size distribution confirm that PM susceptible of being inhaled by breathing (PM 2.5 and 10) is abound in AHA emissions. PM concentration values in indoor breathing air were above the maximal admissible limits both for PM2.5 and PM10. This study was achieved with the support of Environment and Health Center, Cluj-Napoca.

## 10.
## GIS: investigations on the re-emerging West Nile virus circulation in Romanian changing environment and the elaboration of control strategy

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For the first time our researches offer an opportunity to explore the impact of environmental changes and other causes, the re-emerging of human infection with West Nile virus (VWN) transmitted by mosquitoes, which represents an important problem for the public health in Romania. Methods and results we will identify, evaluate and catalogue ecosystems at risk from Romania and environmental conditions resulting from global change that can influence the distribution and temporal and spatial dynamics VWN. The team assessed our preliminary data on the cycles of transmission VWN obtained in the first year of study, in correlation with historical data on climate change and other environmental changes and traffic in areas VWN interest taken in the study, namely: the Danube Delta and lagoons, Bucharest region + Ilfov, Giurgiu Counties, Banat region – Timis County. To characterize the weather conditions which could encourage the emergence of epidemics of infection with VWN we analyzed essential climatic factors (temperature and precipitation) in certain periods in those areas and specific data daily air temperature and amounts of daily precipitations, monthly averages of air temperature, average maximum temperature and minimum temperature average of absolute maximum quantities and monthly precipitation. For a better spatial analysis were carried out a series of maps which represents the geo-

graphical distribution of cases of human VWN registered until now in Romania. Geographical Information Systems (GIS) and satellite systems for Earth observation are powerful and sophisticated technologies that allow access in almost real time information on the temperature, soil, elevation, land use and stages of vegetation growing along with a precise geographical positioning of bodies of water, populated settlements, buildings, roads and other infrastructure components. For entry in the records of the types of ecosystems in the areas of investigation has been made a comparative study of maps LC / LU (Land Cover / Land Use) in 2000 and 2003. Land Cover Classification System – LCCS is a complex methodology for the description, characterization, classification and comparing different types of land covering. Discussion and Conclusions In conclusion we can say that the main meteorological factors, temperature and rainfall, which operate simultaneously with higher values (in certain limits) toward multi-media in certain period of pre-epidemics, are significant in the complex causes of epidemics that induce the emergence of infections VWN, determinants, among others, the occurrence of mosquitoes population Culex sp. Analysis maps of coverage and use of land in 2000 and 2003 showed changes proportions of the classes of coverage and use of land in the area south of Romania (Bucharest Metropolitan Area to Ipswich, the Danube Delta and lagoons area). Among the significant changes are recorded lower areas of arable land and increase the constructed area but also increase the area with pastures in all areas and investigate areas with natural vegetation in aquatic Danube Delta. All these changes lead to the emerging of potential places favourable for the development and maintenance of the mosquito populations, vectors for VWN, which requires measures supported by monitoring and control of these populations.

## 11.
## The role of risk assessment in development control

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‘Prevention is better than cure’ and this paper addresses the essential role of development control in helping minimise future risks from existing or new hazard sources. At the heart of the process is the effective recognition and assessment of potential hazard sources and how the risks associated with these hazards can be linked, through various pathways, to potentially sensitive receptors, whether human or otherwise. A key technique for helping prevent future disasters is the creation of ‘Vulnerability maps’ for features such as hydrological and hydrogeological regimes where the consequences of pollution can be most significant. Such maps, together with an enhanced appreciation of relevant environmental, social and economic factors, can allow relevant regulators to generate more effective land-use planning-maps that help define more appropriate sites for both industrial installations and residential or amenity features. However, it can be difficult to create an integrated development control process that recognises the balance that should be drawn between national and local environmental, social and economic needs.

## 12.
## Pb-210 and Cs-137 dating methods applied for Red Lake's sedimentation (Romania)

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This work presents the first calculation of the Red lake's sedimentation rate by radiometric methods. The determinations of the sediment accumulation rate were estimated by using two well-known methods of recent sediment dating the Pb-210 and the Cs-137 method. Both methods are based on using gamma emission radio nuclides. The Pb-210 and Cs-137 concentration in the sediment were measured by using a gamma spectrometer with a Hp-Ge detector, GMX type. Then the activities have been found between 40–111 Bq/kg for Pb-210 and 8–1054 Bq/kg for Cs-137. Using the CRS (constant rate supply) and CIC (constant initial concentration) methods for the calculation of sedimentation rate, we obtained values between 0.5–1.4 cm/year with an average of 0.8 cm/year. Keywords: radioisotopes, Pb-210, Cs-137, dating methods, sedimentation rate.

## 13
## New versus old technologies in a polluted area, Turda, Romania

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For a long period of time, the humankind was the beneficiary of resources offered by nature, but the past decades of the 20$^{th}$ century determined people to be aware of the environment and of their irreversible influences on it. So, the maintenance of the natural balance, rational exploitation and management of natural resources, waste management, pollution control, rehabilitation of affected areas and water management have became a priority for all industrial players guided by the sustainable development.

Since its coming to Romania, Holcim has guided all its activities by the principles of sustainable development: economic growth, environmental protection and social responsibility. In order to support the economic growth of Romania and the booming constructions industry, Holcim (Romania) has planned to expand its production capacities for satisfying the growing demand for cement. And for this, the company has two options: either to further expand its existing production lines or to build a new cement plant. The final decision is to be taken by the Board of the Holcim Group in Switzerland.

Should the second option be chosen, Holcim (Romania) will bring latest state-of-the-art technologies in order to employ the best available techniques for the cement industry. In this way, the production process will have a minimum impact on the environment with continuously monitored emissions. The main environmental benefits of the latest available technologies include energy, water, raw material savings, as well as production yield increases and last but not least energy efficiency.

From the economic point of view, a new cement plant generates consistent revenues for the local community where the facility is located, both during its construction and its operation.

From a social perspective, a new plant brings new work places, contributing to the well being of the local community. In addition, through its social responsibility programs, Holcim (Romania) supports the local communities where the company operates plants.

## 14.
## Fluoride-induced oxidative stress in rat's brain and its amelioration by buffalo (Bubalus bubalis) pineal proteins and melatonin

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Fluoride (F) is an essential trace element that has protective effects against bone mineral loss. However, it becomes toxic at higher doses and induces some adverse effects on various organs, including brain. The mechanisms underlying the neurotoxicity caused by excess fluoride still remain unknown. The aims of this study were to examine F-induced oxidative stress that promotes production of free radicals and induction of oxidative stress and to investigate the role of melatonin (MEL) and buffalo pineal proteins (PP) against possible F-induced oxidative stress in brain of rats. The twenty four rats were taken in present study and were divided into four groups: control, F, F+ pineal proteins, and F+ melatonin. The F group was given 150 mg/L orally for 28 days. Combined 150 ppm F and 100 µg/kg BW (i.p.) pineal proteins and F (150 ppm) + melatonin (10 mg/kg BW, i.p.) were also administered. The activities of superoxide dismutase (SOD), glutathione peroxidase (GPx), catalase (CAT), glutathione reductase (GR), and reduced glutathione (GSH) concentration and the levels of malondialdehyde (MDA) in the brain tissue were measured to assess the oxidative stress. Fluoride administration significantly increased brain MDA compared with control group, while GSH levels were decreased in fluoride-treated groups, accompanied by the markedly reduced SOD, GPx, GR, and SOD activity. Buffalo pineal proteins (PP) and melatonin administration caused brain MDA to decrease, but SOD, GPx, GR, GSH and CAT activities to increase, to significant levels in F treated animals. These findings indicate that fluoride causes oxidative stress in brain, may contribute to the neurotoxicity induced by fluoride. Buffalo pineal proteins as well as melatonin have ability to ameliorate F-induced oxidative stress in brain of rats. Our study herein suggested that pineal proteins and melatonin can be useful in control of neurotoxicity induced by fluoride.

## 15.
## Assessment of polychlorinated biphenyl and organochlorine pesticide concentrations and thyroid function among New York State anglers

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The epidemiology literature increasingly suggests that polychlorinated biphenyls (PCBs) may alter human thyroid function, which is corroborated by a substantial body of animal research. Eaters of Lake Ontario sportfish may comprise a population with greater exposure to persistent or-

ganochlorine pollutants (POPs), including PCBs, than non-eaters. This preliminary study investigated associations between POPs and thyroid function biomarkers in a sample of licensed anglers selected from among participants in the New York State Angler Cohort Study. A cross-sectional design was employed with the primary goal being the screening of hypotheses regarding PCB congener specific exposures and human thyroid function. Between 1995 and 1997, 38 participants aged 29 to 45 years, including 6 (15.8%) women, donated a blood specimen and completed a questionnaire regarding demographic, clinical, and sportfish consumption behaviours. Blood specimens were analyzed for 77 PCB congeners, β-HCH, DDE, HCB, mirex, oxychlordane, and trans-nonachlor using GC-ECD, as well as for serum enzymatic lipids components. Residual serum specimens were analyzed for thyroid stimulating hormone (TSH) and free thyroxine ($fT_4$), as biomarkers of thyroid function, following 5.3 to 7.6 years of storage at –70 °C. Based on the literature, PCB congener IUPAC #s 19, 28, 31, 33, 48, 49, 52, 66+95, 70, 77+110, 94, 99, 101, 105, 118, 126, 128, 136, 138, 153, 169, 170, 171+156, 180, 183, and 187, as well as DDE and HCB, were a priori selected as potential predictors for thyroid function; their sum as well as the sum of all measured PCB congeners were considered as well. Age, body mass index, cigarette smoking, gender, and use of thyroid relevant prescription medications were considered as potential covariates of importance. Adjusted for log total serum lipids, significant ($P<0.05$) bivariate correlations were demonstrated for log PCB IUPAC #s 153 ($r=0.33$), 170 ($r=0.38$), 171+156 ($r=0.36$), and 180 ($r=0.35$) with $fT_4$. No statistically significant correlations were demonstrated for log TSH. Multiple linear regression models were employed to identify statistically significant predictors of $fT_4$ while adjusting for intercorrelations among POPs, including individual PCB congeners, serum total lipids, and relevant covariates. Using a forward stepwise selection procedure, and confounder evaluation algorithm, log PCB #170 was identified as a significant positive predictor of serum $fT_4$ (β=1.55 95%CI 0.04–1.07) adjusting for log PCB #187 (β=–0.88 95%CI –2.46–0.71) and log serum total lipids (β=–0.20 95%CI –0.43–0.02). Approximately 19% of the variability in $fT_4$ was explained by this model, though of 'borderline' statistical significance ($R^2=0.19$, $P=0.060$). Competitive binding to serum thyroid binding proteins, by PCB #170 or its hydroxylated metabolites, may explain this association. PCB #170 correlated to the majority of the remaining a priori selected POPs in a moderate to strong ($r=0.5$–$1.0$) and statistically significant ($P<0.01$) fashion. Considering serum PCB #153 as a biomarker of overall PCB exposure, the median concentration (0.42 ng/mL serum 95%CI 0.20–0.56) in our sample exceeds that reported for the 2001–2002 general U.S. population (0.19 ng/mL serum 95%CI 0.17–0.21). The results of this preliminary study suggest that Lake Ontario sportfish consumers may comprise a high risk population for PCB related thyroid function alteration and warrant a larger confirmatory investigation.

## 16.
## Detection of gaseous volatile organic compounds with a subsurface ion mobility spectrometer

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Soil and water contamination from volatile organic compounds (VOCs) emanating from accidental spills, leaking underground storage tanks or unlawful dumping is a serious environmental health concern. The United State Geological Survey found in a study of 98 aquifers in the United States, 90 contained one or more VOCs, with the most common being tetrachloroethylene (PCE) and trichloroethylene (TCE). It is further estimated by the United States Environmental Protection Agency that between nine and 34% of drinking water supplies have some TCE and PCE contamination. The relatively frequent detection of TCE and PCE in groundwater verifies their mo-

bility in soils and is further confirmed by soil column studies and river bank infiltration studies. From 1987 to 1993, according to EPA's Toxic Chemical Release Inventory, TCE and PCE releases to land and water totaled 291,000 lbs and 1 million lbs respectively. BTEX compounds (benzene, toluene, ethylbenzene and xylene) occur in professional or environmental settings where inhalation is considered to be the most significant exposure pathway; combustion engine fuels and their emissions are considered the chief source of exposure. In the subsurface, leaking gasoline storage tanks have resulted in widespread soil and groundwater contamination with the BTEX compounds. Numerous health problems are related to exposure to PCE and its daughter products, including central nervous system (CNS) damage and developmental effects. Exposure to the BTEX compounds has been linked to CNS depression, cardiac arrhythmias, hematoxicity, neurotoxicity, and carcinogenicity. The need for accurate, cost-effective detection and long-term monitoring methods for these compounds has led us to develop a small ion mobility spectrometer sensor system for deployment in the subsurface, with the ultimate goal of unattended operation for long-term monitoring applications. A key attribute of the system is that the sensor is placed in close proximity with the media being sampled, thus reducing the potential for sample degradation or dilution prior to analysis. In addition, our IMS sensor system can provide for real-time identification and quantification of target compounds without expensive equipment associated with current active sampling methods, or the time consuming off-site analysis associated with passive methods. Here we present a description of our IMS system and its capabilities, and the results from a series of field studies that demonstrate the potential of this system for use at VOC-contaminated sites.

## 17.
## Volcanism and environmental health: a multidisciplinary approach applied to the Mt. Etna region

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Mt. Etna is the highest and the most active basaltic volcano in Europe (Aiuppa et al., 2000) Approximately 1,000,000 inhabitants live in this area. Natural, often untreated, groundwater represents the main resource for drinking and cooking purposes. Volcanic CO2 in the Etnean aquifer induces an intense rock weathering that result in the natural leaching of rock elements to the groundwater (Aiuppa et al., 2000). Maximum concentration levels (MCL) for some trace elements, including Mn, As, V, Fe and Se, have been reported to exceed both EU and national guidelines for drinking water (European Directive 98/83 and D.Lgs. 31/2001) (Roccaro et al., 2007). As yet no studies have been reported in the literature that explore possible relationships between exposure to such levels of trace elements in drinking water and diet and the state of health in the local population. We are currently applying an interdisciplinary approach to investigate the possible relationship between chronic exposure to geogenic trace elements and development of pathologies in the area. A possible Multiple Sclerosis (MS) cluster has been reported in the area (Nicoletti et al., 2005). Exposure to trace elements of anthropic origin has been previously re-

ported in association with an MS cluster in North-Central Illinois (Schiffer et al., 2002). Collection of existing and new epidemiological data, environmental and human samples have been carried out. Inductively Coupled Plasma Mass Spectrometry (ICP-MS) is being used to determine the levels of different trace elements, including Mn, As, V, Fe & Se, in hair, nail and urine samples from subjects residing in the vicinity of Mt. Etna. Proteomic analysis of urine samples using Matrix Assisted Laser Desorption Ionization time of flight (MALDI-TOF) is being used to identify possible biomarkers of exposure to geogenic elements. Information, including dietary and drinking habits, has been collected by the use of a questionnaire. Epidemiological data, environmental variables and analytical results will be integrated in geographical information System (GIS) and treated statistically through the application of geostatistical techniques to detect possible links between environmental factors and human health.

## 18.
## Irrigation practices and topsoil As accumulation in the As-rich geothermal fields, Chalkidiki prefecture, Northern Greece

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Arsenic in soil is ubiquitous and its natural sources are primarily oxysalts and sulphur-containing minerals. Clayey soils generally have a higher As content because FeOOH is usually present in the clay fraction. In not mineralised area, literature commonly reports As topsoil concentration between 15 and 50 mg/kg. Its mobility is influenced by a number of factors as pH, microbial activity, organic matter, soil texture, redox conditions, soil aging processes and presence of phosphate or Fe/Al/Mn oxides. Arsenic concentration in drinking well water, exceeding the 10 µg/l allowed concentration, is worldwide reported and studied as primary exposition pathway for human people. Nowadays more focus has been given also to As accumulation in topsoil due to irrigation with As-rich waters. Risks to food safety and yield are likely to increase with the buildup of As in the soil, even if many authors underline the paucity of studies on bioavailability to crops, plant uptake mechanisms and exposure pathways quantification through food or soil ingestion. A review on EU national regulations for soil screening values (EUR 22805-EN, 2007) highlighted a quite not harmonized situation with a range of 10–200 mg/kg dw for intervention values. The accepted As level in soil to reduce the soil to plant transfer is 0.4 mg/kg dw (Ammonium acetate extraction). Our case study area is located in Chalikidiki prefecture, Northern Greece, where the presence of geothermal fields results in extremely high arsenic concentration in groundwater. The karst aquifer is the only water source since no surface water is available. Agriculture is the first economical activity and fields are irrigated during the dry period from May to September (600 mm/yr). Main crops are wheat, cotton, vegetables, cabbages, olive and pistachio trees. In this area As groundwater concentration is mostly above 10 µg/l, with values up to 3000 µg/l. Every year the calculated As added to topsoil through irrigation varies from 0.4 to 3 mg/kg. The soil analyses showed a significant correlation between water As concentration and topsoil accumulation. Values of 15–20 mg/kg were measured in the area outside the geothermal fields (background values) while values above 100 mg/kg (max 500 mg/kg) found in fields irrigated with As-rich water. A 4 days soil leachate experiment showed As values in solution above 100 µg/l for all the samples, with a maximum of 1500 µg/l. This aspect can be interpreted as positive due to probable topsoil arsenic washing out during raining season, but negative if percolation into rhizosphere and finally to underlying aquifer is occurring. Core sample (0–50 cm) indicated that the vertical profile depends also on the agriculture practices applied (ploughing, irrigation system). In ploughed area the As content in the profile is homogeneous and usually lower in average, while in not ploughed and drip/mini-sprinkler irrigated orchards (as olive and pistachio), As ver-

tical distribution is more evident with accumulation on top soil (if recently irrigated crops) or in bottom layer for older irrigation profiles, evidence of occurred percolation. No studies in the area have been conducted on crops uptake or health exposure risk assessment. A water/soil/crop quality monitoring system to quantify the sustainability and long-term changes in the agricultural system, including not only As but also other parameters determining soil quality and crop production is advisable in this region.

## 19.
## Impact of the 1990 Hong Kong legislation restricting sulphur content in fuel – trends of respirable suspended particulate sub-species

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Background: On July 1st 1990, Hong Kong government restricted the sulphur content of fuel to 0.5% by weight. Ambient sulphur dioxide ($SO_2$) fell sharply about 40 to 80%. Seasonal annual deaths due to cardio-respiratory deaths were reduced up to 2 years after the intervention. Changes in particulate subspecies may be one of important factors to contribute to the health gains. Therefore we assessed the trends in respirable suspended particulates subspecies 5 years before and after the intervention. Data and Methods: We extracted the data from five monitoring stations of Hong Kong Environmental Protection Department from July 1985–June 1995. The five monitoring stations were at residential regions (CW and SSP) and industrial regions (KT, KC and TW). Changes in trends were assessed by putting the interaction terms between the trend and indicator of the intervention into the regression models. CUSUM approach was used to detect a turning point at a specific time. The occurrence of turning point was after the maximum of CUSUM series. Significance was detected by bootstrap approach. Results: Nickel (Ni) and vanadium (V) particulates concentrations decreased by 47–76% and 12–77% after the intervention respectively. Ni and V decreased in mean level after the intervention at all monitoring stations. Ni and V at station KC/TW demonstrated a significant change on mean after June 1990. Discussions and conclusions our results showed Ni and V in particulates showed similar decreasing pattern as ambient $SO_2$ after the intervention. Ni and V are signatures of residual oil which can cause cardiopulmonary injuries. Decline in Ni and V may be one of the attributor to the health gain due to the restriction of fuel. Furthermore, heterogeneous changes on trends among all stations were found as industrial regions showed higher impact. Health impact assessment needs to take into account of spatial variations.

## 20.
## Approaches to substantiation of acceptable levels in the risk assessment process of 2,4-D for operators, bystanders and population

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Acceptable levels (ALs) are used in the process of pesticide risk assessment for operators, bystanders and population. ALs are the final stage of hazard identification and dose-response assessment in risk assessment paradigm. Doses of exposure, which are formed during pesticide application and its behaviour in the environment, are then compaired with ALs. 2,4-D is a group of

herbicides on the base of dichlorophenoxiacetic acid. It is widely used in agriculture all over the world to control broad-leaved weeds due to its relatively cheap cost. Its safety is the item of big amount of investigation and discussion. Analysis of 2,4-D physical and chemical properties is given. Full toxicological assessment of available data is discussed, including the delayed effects of 2,4-D and the lack of full dossier. It is suggested to use equitoxicity principle for substantiation of 2,4-D ALs – possibility of identical effect at different routes of exposure. No-effect level in the critical effect at 2,4-D oral administration is used for ALs setting taking into account routes of exposure (the appropriate oral-inhalation and dermal-oral coefficients are used in case of necessity). Different 2,4-D ALs are substantiated for operators, bystanders and common population (self applicants and consumers).

## 21.
## Environmental contamination and risk assessment of arsenic and heavy metals in the vicinity of the abandoned gold mine sites in Korea

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Most of gold mines in Korea have been abandoned during 1970s–1980s without any environmental treatments of the mine sites. The objectives of this study are firstly to investigate the level of arsenic and heavy metals in tailing, soils, and sediments, crop plants, and stream water and groundwater around gold mine sites, secondly to estimate the bioaccessibility of the metals in soil and plant by using the EHS (extraction of heavy metals in stomach and small intestine) test, and finally, to assess human health risk for residents around the mine sites. Two gold mines, the Songcheon and the Dongjung mines, have been selected, and the above geochemical samples were collected for the analysis of As, Cd. Cu, Pb, Zn and Hg. Contamination level of As and heavy metals were plotted around the mine sites, and the concept of the pollution index (PI) of multi-elements in soil was proposed in this study. The main contamination sources in study areas are from tailings and their effluents. Contamination metals of the nearby mine sites are As, Cd, Cu, Pb, and Zn according to ore and gangue mineralogy. The pathways of contaminants from mine tailings to finally human were suggested. The extracted arsenic and heavy metal concentrations in simulated stomach and small intestine were determined from the samples of tailings, soils, and sediments, and the bioaccessible fractions in crop plants were also measured from the EHS test. The hazard index (HI) value of the Songcheon and the Dongjung mines is 16 and 46, respectively, and particularly hazard quotient (HQ) value of As of each mine is 15 and 23, respectively. The cancer risk for As of each mine is estimated as 2.7 E-03 and 4.0 E-03, respectively, which exceed the acceptable risk (1 in 100,000) for regulatory purposes.

## 22.
## Sustainable development and public health in the Romanian region of the Lower Danube

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The authors analyse the impact that some components of sustainable development have on the Danube area (counties Olt, Dolj and Mehedinti). They highlights the results of radon measurements in the industrial area of Olt county, in several sites of southern Dolj and the county Mehedinti. In this second case the weighting of radioactivity was presented on a few earth coals profiles that are being exploited in Huznicioara career, as well as the environmental influence of an industrial process for obtaining water from heavy Halânga-Severin area.

## 23.
## Lung cancer risk and residential radon exposure in Romania

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The origin of the common cancer was still predominantly viewed as environmental in 1980. This view was based on the studies from the 1960, 1970, that identified large difference in the incidence of specific cancer among populations, and that showed that the immigrants acquired the pattern of cancer risk of their new country [1]. Cancer cells often lose their normal primary function and start behaving like rapidly growing embryonic cells rather than fully mature skin or liver or breast cells, in which growth is slow and regulated. They replicate without regard to the signals that normally indicate when it is appropriate to divide. These cells have damaged mechanisms for repairing DNA errors and often have even lost the fail-safe mechanisms that normally eliminate highly damaged cells. More than half the cancer deaths in the U.S. – perhaps even 60 percent – can be tobacco smoke and diet [2]. After smoking, radon represents the second cause of risk in releasing of pulmonary cancer. This fact was clearly demonstrated [3, 4] by many cohort studies on miners from uranium and non-uranium mines. In 2005 respectively 2006, two big pooled studies (European and American) clearly show the risk of lung cancer due to radon exposure to indoor radon for all population [5]. In Romania, also in Transylvania the first long time radon measurement were provided by using Makrofol detectors and in the last years CR-39 track detectors were used. Data of short time radon descendants measurements using filter sucking method in Moldavia are published. The work [6] reports for equilibrium equivalent concentration (EEC) in Romanian houses a value of 25 Bq/m$^3$ and using the average equilibrium factor of 0.51 determined in the same work, the average indoor radon concentration in Romania seems to be 49 Bq/m$^3$, resulting an annual individual effective dose of 1.48 mSv. Comparing with other European countries this average indoor radon concentration is small enough: Serbia – 144 Bq/m$^3$, Slovak Republic – 104 Bq/m$^3$, Hungary – 73 Bq/m$^3$, Slovenia – 87 Bq/m$^3$, Austria – 97 Bq/m$^3$, Spain – 90 Bq/m$^3$, Italy – 70 Bq/m$^3$. In this work, Romanian reported value is 45 Bq/m$^3$. This work presents more than 600 integrated indoor radon measurements in Transylvania and about 100 measurements in other zones. Excluding some higher values from Stei region – a prone radon area in Transylva-

nia – a log normal distribution is obtained. For Stei area, the data present a double log normal distribution with two maxima, the last maximum being related to the houses built by using uranium tailing. Based on these data and on the last radon-lung cancer risk factor from above mentioned study an estimation of lung cancer annual rate due to radon exposure in Romania is made. References: 1. A. Balmain, J. Gray, B. Ponder, The genetics and genomic of cancers, Nature Genetics, 2003, 33, 234–252 2. J. H. Lubin, J. D. Boice, Lung cancer risk from radon, J. Natl. Cancer, 1997, 89, 49–55 3. F. Bochicchio, International radon-lung cancer risk studies analysis, Arch. Oncol 2004, 12, 19–24. 4. BEIR VI, Effects to exposure to radon, Washington DC, National Academy Press (1998) 5. S. Darby et al., Radon in homes and risk of lung cancer: collaborative analysis of individual data from 13 European case-control studies, British Med. J, 330, 223–276, 2005 6. O. Iacob, C. Grecea, E. Botezatu, Population exposure to inhaled radon progeny, The natural radiation environment, NRE – VII, Elsevier, 2005, pg. 232.

## 24.
## Environmental aspects of negative impact of mining wastes from Baiut mining field, Baia Mare region, Romania

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Mining industry has special influences on the environment, which are seen in all phases of the technological process of production. The influence upon the environment factors starts at the same time as the preparation and exploitation does and this goes on and gets bigger at the same rate as the productive activities are developing. In some cases the negative influence is to be seen a very long time even after the entire productive activities stop in that area. Waste rocks are materials considered without value or utility. Mine wastes are constituted from pieces of rock and poor ores resulted during mining processes. Ore processing operations create a concentrated material with economic value and a sterile material deposited in tailings impoundments. This paper presents the consequences and the influences made by Bloaja Vechi pound, the actual deposit of pyrite concentrate situated nearby Baiut village. Baiut mining field is situated in the east side of volcanic chain of Oas – Gutai – Tibles, at 13 km SE of Gutai peak and at 51 km from Baia Mare city, in Maramures County. Baiut zone is well known for the mining activities since the medieval age and it is famous for the mine flours. Environmental impact of the pyrite concentrate deposit was assessed during three fieldtrips. The field observations were correlated with the results of electrochemical parameters measured on the collected water samples. The pyrite concentrate reacts with air and water creating acid mine drainage. This is the main pollution source of surface water from the region which impacts the water quality and ecosystem. Although the tailings pond is in conservation, it presents unsupervised infiltrations which affect the environment with acid water resulting from concentrate and sterile oxidation. In the base of the lake exfiltrations of acid water are recorded. The high values of Total Dissolved Solids indicate that the surface water is polluted probably with dissolved metals and suspensions. The longitudinally cracks, parallel with talus indicates the starting of a possible earth material flow in pyrite concentrate deposit. Physical stability of the pyrite concentrate is poor due to the gulch-forming process caused by the intense surface flow of the rain water. Taking into account the very small dimensions of pyrite material (tens to hundreds of micrometers), the wind can have an erosion action carrying various amounts of dust. This process takes place in the droughty periods. The first rehabilitation measures must be the wall reinforcement which surrounds the pyrite concentrated deposit and the application of safety measures for the elimination of exfiltrations of acid waters. The acid waters will be a problem in the future over many years. The control measure can be collection and neutralization of acid water. It is necessary to have a rearrangement plan for the concentrate in the interiors of the

deposit. The final solutions could be the elimination of pyrite concentrate and tailings pond rehabilitation on which the pyrite concentrate deposit is built.

## 25.
## Studies of the toxicity of *Aristolochia Clematitis* in traditional medicine recipes

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Aristolochic acid (AA) found in Aristolochia clematitis is considered to be the toxin responsible for the Chinese herbs nephropathy (CHN), and is supposed to be a cofactor for Balkan endemic nephropathy (BEN). This plant is used as natural remedy in order to treat various diseases, in both rural and town settings. However, it is unclear if this plant has any nephrotoxic and/or carcinogenic effects at the levels of exposure acquired through the natural remedy preparations. One purpose of this study was to establish the presence of the aristolochic acid in Aristolochia clematitis leaves and seeds extracts, prepared following traditional recipes, and to analyze them by HPLC. These extracts were also prepared in order to be analyzed by GC-MS. These extracts were tested on mesenchymal stem cells and different commercial cell lines; the cytotoxicity was assessed using a standard MTT (3-(4, 5-dimethylthiazolyl-2)-2, 5-diphenyltetrazolium bromide) assay and Alamar Blue assay. The cytotoxic effects of plant extracts were compared with those of the standard of aristolochic acid I and statistically analyzed.

## 26.
## Health effects of metals polluting the environment

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Many metals are essential to biological life, but some are only toxic. Others are beneficial at low doses, but toxic at higher levels. This paper briefly reviews the major patterns of metal toxicity. Most of the knowledge concerning the health effects of toxic metals largely stem from studies conducted on populations with relatively high exposure usually to individual metals in industry or in heavily polluted environments. Very few studies have addressed the possible effects of chronic low environmental exposure to mixtures of these metals, particularly with regard to their possible interactions. The kidney is a privileged target for a number of toxic chemicals. Its high vulnerability to xenobiotics mainly stems from its function of maintaining the body fluids constants. Some metals are mutagenic and as a result cause either cancer or birth defects. Many of the effects of metals are expressed as altered nervous system function or altered immune system. These

findings provide a framework in which to understand how metals can harm people, and reinforce the need to control and regulate potential sources of contamination.

## 27.
## Environmental electromagnetic field, human health and threshold exposure levels

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With the growth of electric power generation and transmission, the development of new telecommunication systems and advances in medical and industrial applications, humans are increasingly exposed to electromagnetic fields (EMF). The need to understand the potentially harmful effects of EMF on human health has been met by several decades of research, but the development of exposure standards is more recent and a variety of national standards now exist. The very important questions are how quantitative exposure standards can be developed. The general steps in this process include an evaluation of the scientific literature, determination of threshold levels, choice of safety factors for different populations at risk, and derivation of exposure limits. This article try to establish what the threshold levels mean for in vitro exposure of human blood inside of Helmholtz coil system, respectively in zero magnetic field. Key word: very low electromagnetic field exposure, zero magnetic field, threshold levels.

## 28.
## Evaluation of estrogenic and anti-estrogenic effects of Aroclor 1221 and 1254 in transfected MCF-7 breast cancer and rat hepatoma cells using luciferase assay

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Polychlorinated biphenyls (PCBs) are persistent environmental pollutants. They can bioaccumulate because of their lipophilic features. Some PCB congeners (nonplanar) resemble to oestradiol-17-beta (E2) in terms of chemical structure and thus can bind to estrogen receptor (ER) and mimic the effects of the endonegous ligand. PCB congeners resembling to dioxin (TCDD) may display anti-estrogenic actions by binding and activating the cytoplasmic aryl hydrocarbon receptor (AHR) and initiating transcription of cytochrome p450 enzymes that metabolize E2. We have examined endocrine disrupter effects of two commercial PCB mixtures, Aroclor 1221 (A1221) and 1254 (A1254) in transfected MCF-7 and rat hepatoma cells using luciferase-reporter assays. Stably transfected MCF-7 cells for ER (MVLN) and rat hepatoma cells for AHR (H4IIE-luc) were used. Cells were seeded to 24-well plates at 50,000 cells/well in growth medium and incubated at 37 ºC and 5% CO2. After overnight serum starvation of cells, E2, A1221 and A1254 were added at concentrations between 0.04 and 10 µg/ml. Both MVLN and H4IIE cells were incubated for 24 hours with the test compounds and then they were lysed in passive cell lysis buffer. Luciferase activities were measured using Luciferase Assay System. ER reporter activity was dose-dependently decreased by A1221 in stably transfected MCF-7 cells. These changes signifi-

cantly differed from the DMSO-group values at 5 and 10 μg/ml concentrations ($p<0.001$). Luciferase activity for ER was significantly decreased by A1254 in MVLN cells in a dose-dependent manner ($p<0.001$). ER reporter activity detected after incubation with the lowest concentration of this PCB mixture was found to be similar to that of vehicle control. AHR reporter activity in H4IIE cells was significantly increased by A1221 in a dose-dependent manner ($p<0.001$). Incubation of H4IIE cells with A1254 resulted in dose-dependent increases in ER reporter activity ($p<0.001$; except at 0.004 μg). High concentrations (5 and 10 μg/ml) of both A1221 and A1254 were cytotoxic to H4IIE cells. In conclusion, results of the present study indicate that both PCB mixtures are anti-estrogenic in luciferase-reporter assays. Acknowledgement: This study was supported by TUBITAK Project # 104-T240.

## 29.
## Environment strategy of the Republic of Moldova

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Line priority and the elements of strategy in the field of environmental protection have been drawn by the Central Environmental Authority since 1995 in the Strategic National Programme of Action on Environment Protection and the National Plan of Action on Environment Protection. But the environmental policy Concept of the RM was developed by the Ministry of Ecology, and approved by the parliament by Decree No. 605-XV 02. 11. 2001 and the principles of sustainable development require new paths for solving ecological and environmental protection. Republic of Moldova has included active international action to protect the environment by joining 18 international environmental Conventions. In the field of activity of three agreements sectoral strategies and action plans have already been developed. These strategies and action plans can be considered as consecutive stages in dealing with environmental issues and practical implementation in the Republic of Moldova to the international Environment Conventions. Currently, the seriousness of environmental problems, limited financial means, the large number of international Conventions and the diverse actions of environmental protection in Moldova require the development of a strategy integration, which will allow the complexity of actions in environmental protection, financial management flow to the most important environmental issues, join the efforts to solve environmental problems at a higher level. Another essential point is a combination of environmental bonds RM Government which is made separately for each Convention. Developing an Environment Strategy allows optimization of these things. The object of study of Environment Strategy of the Republic of Moldova (ESRM) is the ecosystem and its properties. The Integrated Plan of Action are summarized bonds Government of the Republic of Moldova assumed in all international conventions Environment, synthesis of these issues to the ecosystem level, hierarchy after their priority and in the meantime, the determination of financial sources to ensure their attainment. At the current stage of transition to a market economy and implementation of environmental policy, ESRM will serve as a basis for elaboration of protective measures of environment at ecosystem level. The general aim of ESRM is conservation, rehabilitation, reconstruction and rational use of the environment to ensure the development of sustainable socio-economic territory under the principles of sustainable development. The basic objectives: – determining the current status of ecosystems quality, impact and trends of anthropogenic change; – Determine priority environmental problems; – Filling and completing the legislative requirements ESRM; – Filling environmental management system. Conclusion: Serious status of ecosystems in the Republic of

Moldova requires urgent need to draw up and implement the Environment Strategy of the Republic of Moldova and Action Plan.

## 30.
## Obesity among young people – a central issue of the European health policies

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Health is mainly determined by the environment, socio-cultural and economic conditions we are living in. As a result of the social and behavioural factors, lifestyle influences the health condition in a percentage of more than 40%. The dramatic increase in weight is defined by WHO as a global epidemic, with important consequences on public health. Three main factors which lead to obesity were identified: poor nutrition (in the EU countries, people consume around 500 calories daily, more than 40 years ago), the lack of physical activity (more than one person out of three do not make exercises in their spare time and, on average, the population of the EU spends almost 5 hours sitting) and to a great extent, the genetic factors (for example, the absence of the lutein hormone secreted by the adipose tissue which transmits to the brain the quantity of fat deposited, may lead to severe obesity). According to WHO, poor nutrition, lack of physical activity and obesity are liable for almost 10% of the disability-adjusted life years (DALY) and is larger than the loss due to smoking. It is estimated that obesity is liable for up to 7% of the costs related to health in the European Union. 3 million of school-aged children are considered obese – and the number is increasing with 85,000 yearly. The relation between the excess weight and the health problems is obvious, if we take into account that one third of the EU population suffer from chronic diseases or are overweight. Obesity may bring about a series of physical or mental health problems, starting from diabetes, cancer, cardiovascular diseases, infertility up to physical disorders. Adolescence (according to WHO – the age between 10–19 years old) requires special attention. The strategies for obesity prevention have greater effects on children and young people for many reasons: the children, according to their height-weight potential have better chances to revert to a normal development of the body, if their weight is controlled; lifestyle behaviours are shaped during childhood and continue in youth; the young people are more flexible in changing their life patterns. In Romania, obesity among the uninstitutionalized adult population (20–64 years old) was assessed within a study developed on a bi-stadial stratified sample, made up of 3,000 subjects. The total error was of ± 1.8% and the probability was of 95%. The results showed that 51% of the Romanian population have a normal weight (BMI = 18.5–24.9), 5% are underweight (BMI less than 18.5) and 44% are overweight and obese. The share of the overweight people is of 33% and of the obese people is 11% (BMI above 30%), out of which 9% are registered with obesity level I (BMI = 30–34.9). The differences are significant in gender and marital status. The continuation of the increasing trend of the weight average, with an average increase of 0.55% would lead in the next three years, to the continuous increase of the BMI and to the exceed of the normality level of 25, what means that the population of Romania will soon belong to the overweight peoples. It was thus identified the need to develop and implement the strategy at national level, as well intersectorial strategies for promoting healthy food customs and psychical activity and the lessons learnt in order to implement these polices from some of the member states, such as: Croatia, Denmark, France, Germany, Italy, Norway, Slovenia, Spain, Scotland and Wales.

## 31.
## Outdoor air pollution and the health of children in two districts of the Czech Republic

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The study compares the incidences of acute respiratory infections in children born and living in the more polluted district Teplice and less polluted district Prachatice in the Czech Republic. The cohort of children was recruited at their birth. We have got maternal questionnaires from 443 mothers of children born 1994–1996 when aged 3 years, and from 685 mothers of children aged 4.5 years (born 1997-1998) and permission to abstract medical documentation to evaluate the health status of children. Medical records of pediatricians were abstracted using the ICD-10 codes, and analyzed separately for the age 0–2 and 2–6 years (N=1007). Multivariate statistical analyses of frequencies of upper respiratory infections, bronchitis, laryngitis & tracheitis, otitis media, pneumonia, tonsillitis and influenza included all identified confounders, such as ethnicity, age, gender, atopy, etc. In the first two years of life, the incidence of laryngitis & tracheitis was twice and that of otitis media and pneumonia three times higher in the Teplice district. During the following four years (age 2–6 years) the incidences of laryngitis & tracheitis as well as that of pneumonia persisted to be higher in the Teplice district. The incidence of bronchitits was higher in the Prachatice district in both age groups. Sensitization to pollens and the incidence of allergic rhinitis and conjunctivitis was higher in the more "green" district Prachatice. The occurence of respiratory diseases in the Teplice district was not homogenous and was clearly associated with the level of urbanization. Supported by the Czech Ministry of Environment VaV/-SL/5/160/05, SP/1b3/50/07, SP/1b3/8/8/08 and by the AS CR AV0Z50390512.

## 32.
## The drinking water exposure to arsenic in Slovakia regions

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The present study will provide data on the exposure related to arsenic through drinking water. This study was done in the framework of the ASHRAM project. This project was designed as typical case-control study, which involved recruiting incident cases of skin, bladder and kidney cancer from local hospitals. Dermatology, urology and nephrology specialists, as well as general surgeons, provided cases of cancer. Controls were obtained from other hospital departments. Both the cases and the controls were selected among the residents of counties in Hungary, Romania, and Slovakia where many of the residents are currently drinking water with concentration of arsenic >10 µg/l. For determination of average dose which were taken in each individual case the widespread data were collected. For all Slovakian participants in the projects, information on past residential histories and patterns of water consumption was collected, from which estimates of average and cumulative intake were made. Cumulative exposure to inorganic arsenic over the 40 years before the diagnosis was estimated combining the following information: (i) Measures of current exposure; (ii) Information from individual interviews; (iii) Information from Water Au-

thorities records, available from records of sanitary engineers. Results from analytical work, interviews, and analysis of metabolism, were integrated to produce indices of exposure to be used in the analysis of the case-control studies. In addition, data on historic exposure were collected. The seven Slovkian districts were evaluated: Banská Bystrica, Brezno, Žiar nad Hronom, Žarnovica, Levice and Nove Zámky. This study presents the individual variations between single districts. The database contains a historical review from 1989 to 2004, separately for each resident included into the study (330 residencies). Altogether 196 water samples were analysed. The mean concentration in Nitra regions was 1,9 µg/l, in Banská Bystrica region 2,0 µg/l.

## 33.
## Considerations regarding the recycling of the wastes resulting from the electronic industry (WEEE)

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WEEE raises two problems for the environment: the continuously increased volume of wastes and the source of toxic elements (Pb, Hg, Cd), contained in some components which are not properly treated. Once released in the environment, the above-mentioned heavy metals have the potential to remain in the environment for decades or even centuries thus increasing the risk for human exposure. The recovery of the useful materials (metals, plastics, etc) contained within the waste materials coming from the electric and electronic industry represents a priority for the WEEE management policy in many industrialized countries. Handling of the WEEE recycling and incineration raises specific problems due to the toxicity of some components and to the fact that their burning is inefficient due to the fireproof substances they contain. This paper compares the efficiency of some world-wide known recycling methods used for the electric and electronic industry wastes, to those used in Romania, in the recovery of the nonferrous metals they contain. At international level, efforts are made to develop ecological and efficient technologies for recovery of the useful or toxic elements as well as precious metals from the WEEE. For Romania, the possibilities for waste treatment resulting from the electrical and electronic equipments are relatively low because of the lack of specialized plants, the dismemberment being made, in most cases, by hand and the recovery rate of the resulted components being achieved in a very small percentage. The Romanian national wastes management policy and legislation deal with introducing the system of selective collection, stressing the necessity of informing the people, awareness and education regarding this essential practice.

## 34.
## PHIME project: Public health impact of long-term, low level mixed element exposure in susceptible population strata

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Objectives: To improve the integrated public-health risk assessment of environmental exposure to toxic and essencial metals via food, addressing the complexity of exposures, interactions, risk groups (including women and children), nutrition and mechanisms of action. To increase the understanding of mechanisms for uptake of metals in plants, and thus into the human food chains. To establish a new, high-quality sampling and analysis strategies for monitoring of exposure to toxic metals, in particular in Eastern Europe, and its determinants. To map geographical patterns of exposure to, in particular, Cd, Hg, Pb in these parts of Europe. Performance in Slovakia: Pillar III. and work package WP III. 1. Sensitive population biomonitoring in selected areas. Gestor in Slovakia: Regional authority of public health in Banská Bystrica, Central Slovakia Biomonitoring WP III. 1 is realized in: Slovenia, Lithuania, Czech republic, Crotia, Slovakia, China, Poland, Switzerland, Marocco, Ecuador Methods: 3 areas in Slovakia were chosen: 1. Rural area – village with agricultural activities, 2. Urban area – city with metropolitan type of settlements and 3. Industrial area – close to source of heavy metals emissions (smelter industry). The monitored population consisted of children (50 children aged 7–10) in each chosen area. Blood samples were taken by health professionals. The concentrations of heavy metals in blood samples (Pb, Cd, Hg) were determinated in laboratory of Lund University Hospital, Sweden. The basic information about children and their family, living conditions, nutrition habits, possible professional exposure of parents were gathered by questionnaires filled by the parents. Results: Recommended lead value (50 µg/l) in blood samples was exceeded in Industry area at 4 cases. Lead value 40 µg/l was exceeded in Industry area at 17 cases, in Urban area at 1 case and in Rural area at 1 case. Recommended mercury value (1.5 µg/l) was exceeded in Urban area at 3 cases. Recommended cadmium value (0.5 µg/l) wasn´t exceeded. Conclusion: The evaluation of the results of Cd, Hg, Pb in drinking water in investigated areas proved that the limits of cadmium, mercury and lead established for drinking water quality were not exceeded. The evaluation of other exposure pathways is ongoing (air pollution, professional exposure of parents, free-time activities of children...). Key words: heavy metals, toxic, health impact, sensitive population, nutrition, water supply.

## 35.
## Arsenic doses from soil exposures: soil concentrations of public health concern

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The adverse health effects of exposure to high concentrations of arsenic have been well documented and include a variety of effects ranging from death to skin, lung, kidney, and bladder cancers, as well as kidney/liver/gall bladder diseases, nausea, cardiovascular disease, developmental and reproductive effects, and skin keratosis and hyperpigmentation. Arsenic is ubiquitous in soils with naturally-occurring concentrations that are log-normally distributed. There are also a number of man-made processes that create elevated localized soil and water concentrations, such as mining and ore-processing, application of arsenical pesticides and runoff or leachate from coal ash and landfills. In order to determine doses likely to produce adverse health effects, potential doses

must be calculated from soil concentrations and intake rates. This paper evaluates the potential for adverse health effects from exposures to arsenic in soil using probabilistic arsenic dose calculations and compares these estimated doses with various health effect levels. The primary variables underlying a dose calculation from soil exposure are the contaminant concentration (mg/kg), soil ingestion rate (IR; mg/day), the duration of exposure (or exposure factor; days/day), body weight (kg), and the bioavailability factor (BF; mg/mg). Each of these variables can be represented by a discrete value or by a probability function. In the following calculations, body weight is represented by a log-normal probability distribution, and IR and BF are represented by triangular distributions. Daily exposure is assumed so that the exposure factor is one. For constant daily exposure to a soil with 100 mg/kg As, the resulting 95th percentile dose for a child is 0.0009 mg/kg/day and for an adult the 95th percentile dose is 0.0002 mg/kg/day. These doses are comparable to the average dietary intake of As (average values of 0.0005 to 0.0008 mg/kg/day) and much lower than doses associated with adverse health effects. A number of studies have examined soil As exposure by measurement of urinary As concentrations of residents living on properties with high As soil concentrations. Several of these studies have derived empirical, linear relationships between soil As concentrations and urine As concentrations. These linear soil-urine equations have significantly lower slopes relative to the calculated dose-soil concentration equation. None of these studies have shown a statistically elevated urinary As concentrations (above population norms or control groups) at soil concentrations less than 100 mg/kg. When these dose evaluations are compared with state-mandated As soil clean-up levels that range from 0.14 mg/kg to 250 mg/kg, it is very clear that we are either not uniformly protecting the public, or spending way too much on unnecessary soil remediation.

## 36.
## Ecological assessment of irrigation run-off lakes in Khorezm Region

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It is well known that extensive anthropogenic impacts on the Amu Darya including water diversions and pollution have caused significant damage to the aquatic ecosystem of the river and the Aral Sea Basin. The aquatic ecosystem will be further impacted as agricultural practices shift from a cotton monoculture towards a higher share of food crops in order to feed an independent nation. In order to properly manage a sustainable ecosystem, it is imperative to understand the existing ecosystem and identify its responses to human influence. We are doing a study that is funded by NATO Science for Peace Program (Project 982159 “Using stable isotopes, passive organic samplers and modelling to assess environmental security in Khorezm, Uzbekistan”, 2006–2009). This project uses innovative technology (semi-permeable membrane devices and stable isotopes) to detect anthropogenic impacts on the aquatic ecosystem in lakes formed from irrigation runoff and the Amu Darya in the Khorezm Province of Uzbekistan, and to employ the results of the monitoring in interdisciplinary predictive modeling efforts. The use of this technology with water quality monitoring and modeling will enhance knowledge of effects of anthropogenic im-

pacts such as agricultural activities, industrial discharges, and urbanization, especially in Central Asia, where little data is available on the effects of such activities on the aquatic ecosystem. It will also result in technology transfer and allow Uzbek scientists and land managers to develop informed decisions on environmental problems. This research provides important information about 1) the potential water resources available from irrigation runoff lakes, and 2) the food web structure of the Amu Darya in the Khorezm region and 4 of these lakes, as well as insight into how anthropogenic impacts may be altering these aquatic food webs. By understanding the existing ecosystem and human impacts on it, steps can be taken towards managing these resources sustainably, and improving the quality of life in Uzbekistan. The results of this project will be models of several of the irrigation runoff lakes, and models of the aquatic food web structure for the lakes. These food webs will be evaluated with water quality and organic contaminant information to determine if anthropogenic influences such as wastewater effluent and agricultural runoff appear to be linked with water quality and food web impacts. These results will allow better management of the river and irrigation runoff lakes for possible use as irrigation water, fish ponds, or for domestic use.

## 37.
## Arsenic in residential drinking water and cancer in Central Europe – the ASHRAM study

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Methods: The ASHRAM study is a case-control study investigating arsenic in drinking water and cancer, in counties with arsenic exposure in Hungary, Romania and Slovakia. The exposure history for cases of cancer of the bladder, kidney and skin, plus hospital controls, was constructed taking into account how much water was consumed (as water, in drinks and in food), sources of drinking water in their various residences over their lifetime and the concentrations of arsenic in the water supply, in many cases measured in the ASHRAM study, or from routine data based on measurements performed by the authorities in each country. From this detailed information, four indices of exposure were calculated: the current concentration of residential drinking water, the time weighted average concentration of residential drinking water, the highest daily dose of As derived from residential drinking water and the lifetime cumulative dose. Odds ratios for cancers in relation to arsenic exposure measures were computed, adjusted for important confounders, fitted in both categorical and continuous models. Results: The study included 1392 participants of whom 852 were cancer cases (529 basal cell carcinoma of skin (BCC), 214 bladder, 109 kidney) and 540 were controls. For these participants, the assignment of concentrations to water supplies was very successful with 81% of the population lifetime residential person time being matched to an arsenic concentration. The exposure indices were all log-normally distributed and the median lifetime concentrations were in Hungary 13.3 μg/l, Romania 0.7 μg/l and in Slovakia 0.8 μg/l. Overall 25% of the population has average concentrations over 10 μg/l and 8% with exposure

over 50 µg/l. Significant associations between As and each of the three cancers were found with at least one (but not every) exposure metric.

## 38.
## Geogenic element behaviour in soil-rainwater interaction at Mt Etna, Sicily: preliminary results

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Active volcanoes emit considerable amounts of contaminants such as As, Se and V. Previous studies have shown that the volcanic activity at Mt Etna (Sicily) has a strong influence on local rainwater compositions. However to date, the behaviour of trace elements in the soils around Mt Etna is poorly understood. 4-hr batch experiments have been performed with 1:5 soil solutions of air-dried soil (fraction <2 mm) and synthetic (acid) rainwater (using either deionized water with a pH of ~6 or a ~500 ppm of sulphuric acid solution with a pH of ~2). In general trace element concentrations are more enriched in soil solutions with low pH (e.g. enrichment factor (EF) acid compared to neutral soil solution is up to $4.3\times10^2$ for V, $2.5\times10^2$ for As and 50 for Se). However, it seems that the EF especially for As and V has a correlation with the distance to the crater. Additional, some soils located downwind of the volcano have EFs smaller than 1 (i.e. the elements are more enriched in neutral rainwater), for several elements like V, As and Se. For As and V the EF seems to be vary with distance to the crater. Some possible explanations for these trends will be discussed. These results might have important implications for the chemical composition of the Etnean aquifer, the only water resource to the one million inhabitants around Mt. Etna, as well as the bioavailability and therefore potential toxicity through agricultural activities, essential to the local economy.

## 39.
## Assessment of environmental and human health using cytogenetic methods

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The methodology devised for socio-ecological monitoring using cytogenetic methods was based on Ukrainian and international experience. The methodology structure described allows the estimation of integral indexes of environmental conditions based on a complex bio-test, using cytogenetic methods, and the integral indexes of public health-based medical statistics. This enables a comparison to be made between areas with different levels of anthropogenic loading by using an integral criterion for environment conditions and the state of public health. In accordance with the methodology the investigation was conducted at three monitoring levels: local level (Dnipropetrovs'k city), regional level (Dnipropetrovs'k region, comprising 12 towns and 24 districts), and national level (Ukraine, only by public health estimation). The application of cytogenetic

testing, using a videlicet micronucleus assay in exfoliated buccal cells, of the child population for an estimation of the general mutagenicity of the area in which they live, is substantiated. It has been established that the level of micro-kernels in the cells of children who live in industrial regions have a high technogenic load, i.e. it is 2.2–10.9 times more than in the "conditionally clear" control. The positive modifying cytogenetic influence of natural adaptogens in the improvement to the health of organisms damaged by adverse factors is established. Experiments held at the Pulmonary Sanatorium of Dnepropetrovsk proved that children suffering recurring bronchitis after being treated by huminate (involving a 21-day drinking course) displayed normalization of the immune system condition, and the frequency of genetic damage in somatic cells was reduced. Within the following autumn and winter period the amount of respiratory diseases of those children reduced significantly. Molecular-cellular mechanisms of the influence of physiologically-active humic substances on various organisms were studied. Adaptation-caused mechanisms of the effects of these substances, in the case of radiation and chemical damage, were examined. Based on the findings for the anti-mutagenic and anti-toxic effects of physiologically-active humic substances, their usage was recommended for the recovery of damaged abiotic and biotic environmental and human media, especially in industrially developed areas. Here the opportunity for using humic substances to improve the ecological condition of soils was shown, based upon an example of industrially developed areas adjacent to the Dnepr River. Experiments made on various biological matter proved the opportunity to reduce the level of genetic damage caused by the aggregate impacts of the physical and chemical factors. A theoretical basis for using humic substances for blocking the migration paths of ecologically toxic matter within a soil-to-plant system, and for increasing live organism's resistance capacity to anthropogenic effects, was formulated. Recommendations were made for improving the environment conditions, population health, and the recovery of land damaged by the man-made impacts, based upon the application of the physiologically-active substances of a humus nature.

## 40.
## New sensor developments at the Boise State University Center for Environmental Sensing

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This poster will provide an overview of the activities of the Center for Environmental Sensing (CES) at Boise State University in Boise, Idaho, USA. The CES was created in 2005 to provide a focal point for sensor-related research at Boise State University. Our goals are to provide a comprehensive source for information about sensor-related research at Boise State University, provide external advisory board review of proposed and existing Center projects, sponsor symposia on environmental sensing, provide seed grant funds for new sensor development projects, and promote multidisciplinary sensor research. Projects aimed at providing portable, high-resolution, cost-effective sensors to identify and monitor harmful chemical compounds in air, water, and soil and early detection of chemical warfare agents in our environment are supported by the Center

with funds from the United States Environmental Protection Agency. In addition, we are also developing new cost-effective, minimally invasive measurement methods, protocols, and modeling tools to characterize and image variations in subsurface properties and contaminant movement in subsurface soils and aquifers. One of the many sensor projects underway at Boise State University is the development of a small ion mobility spectrometer (IMS) for deployment below ground to detect and quantify volatile organic compounds (VOCs). This research project represents a new application of IMS as a method for identifying gaseous VOCs in subsurface soils. Other research supported by the Center includes development of: * An integrated chip-scale surface plasmon sensor that allows identification and characterization of contaminants including chemical warfare agents. The objective of the research is to produce a monolithic integrated solution where the surface plasmon resonance sensing, electric current generation, and signal processing are achieved on the same plane. This approach offers a path to a lower cost, more portable, more functional, and even personalized sensor chips. * An arsenic sensor for groundwater, that senses arsenic based on molecular recognition binding of polyatomic arsenic species to the sensing element, followed by electrochemical detection. This microchip device has discrete sensing elements for several different arsenic species. It has a low power requirement, and is battery powered, field portable, and suitable for hand-held or autonomous deployment. Detection limits are presently in the sub-ppb range. * A miniature polymerase chain reaction (PCR) device: This device will allow for amplification of minute amounts of DNA (down to the single molecule) to allow for rapid detection of bioterrorism agents. In this project, a miniature, lightweight PCR device with minimal power requirements is being designed. Three Category A Diseases/Agents (Bacillus anthracis, Francisella tularensis, and Yersinia pestis) are being used as test species.

## 41.
## Evaluation of complex exposure to risk factors in the environment of some categories of workers in Braşov city

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In the city of Brasov, the main source of air pollution is the notably intensive traffic that generates pollution with lead, NOx, $SO_2$, CO, $O_3$, HAP, dust and others. In the urban area, amongst the most affected active populational groups we considered: the traffic policemen, the workers in the gas stations, the waste management and sanitation service workers and the salespersons in stands in the street. The above-mentioned work, especially in the open air, totally or partly unprotected against the pollution of the ambient air and the climatic conditions (warm or cold). In the present paper several workplaces are analysed that are totally different from the "usual" ones, as we know them, well defined in terms of spatiality, sources, noxa and the lack of some major influence factors (like environment factors – speed and direction of air currents, etc). The values of inhalable particulates, $NO_2$, $SO_2$ and lead in the workplace atmosphere for the exposed workers clearly surpass the values recorded for the control group (teachers), even if these values are not higher than the admitted limits for the communal domain and, not higher than the admitted limits for the classical workplaces (closed spaces). The patternings used in the exposure evaluation were highly complex, ranging from patterns for estimation of emissions in the atmosphere (in fact, the workplace air for the investigated employee categories), to patterns of dispersion for the distributions of dangerous substances concentrations, from measurements of the studied noxa to human dosimetry. The risk evaluation has shown that for most of the investigated symptoms there are no statistically significant correlations related to the exposure and highlighted some situations which show once more the appropriateness of the topic choice for this paper, situations that show significant risks for two diseases: polyneuropathy and arterial hypertension. The type of approach

we used, may stand as a ground for the development of an exposure evaluation strategy for the categories of workers studied in the present paper, exposure evaluation that would enable, on the one hand, a better risk evaluation for these occupational groups and, on the other hand, a better intervention/prevention policy.

## 42.
## Awareness rising on adverse effects of climate change on population health in Armenia

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Armenia is one of South Caucasian Republics with 3.5 million population. Armenia is mountainous country characterized with cold winters and hot summers, distinguished by droughts and shortage of water and so is especially vulnerable to the unfavourable consequences of the forecasted global climate change. The severe droughts of last 2-3 years when the water flow in rivers was less than the norm by 40-50%, the air temperature, which was higher than the norm by 2.0–2.6 °C, are the examples of the forecasted future climate for Armenia. This will have serious consequences for the agriculture, thus for food provision in the republic, therefore on the health of population, especially children. Human beings, like all other species, are adapted to the climate in which they live. Increase of temperature and decrease of precipitation can affect human health both directly and indirectly. We have published simple brochures describing in simple words the climate change threat, basic hygienic norms, the first symptoms, which must alert to apply to the hospital. Such work is very appreciated in far regions as there is lack of information and they fill themselves neglected in the state policy. Cooperating with "Climate Change" Project, "Ozone National Centre" in Armenia, "Khazer" NGO conducts its activity mainly in the areas remote from the large cities, where the health institutions are abandoned. The sharp decrease of the social protection level in the country is becoming the reason of mortality increase among children, so it should serve as a signal – prevention for the persons taking decisions. Moreover, without raising the public awareness level even the strong legislation will not be able to ensure the effective protection of population health. The system of informing should consist of periodical information on the latest state of environmental conditions, information on the impact on environment and health of the population, particularly children, on the notification systems and measures of response. The awareness rising campaigns are of course important but drastic decline of social security level in our countries take away a lot of child lives and that must be an alarm also to our political leaders.

## 43.
## Effect of water salinity and waste water on soil degradation in Tallafer Area

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The developments which happened by remote sensing techniques gives a probability not possible before by saving a great deal of accurate and periodic information which are giving a deep impact to the researchers and to control and to overcome the problems of environmental degradation, especially land degradation and vegetation. Due to the expansion in the exploitation of land in sev-

eral fields, such as agriculture, especially in recent years, researches directed to find other sources of water and the exploitation of the available water resources in a better form. The study area located in Tallafer northwest of Mosul province, at a distance about 60 km, depends upon water of springs which is flowing from the city centre towards the south, to agricultural lands. This water flows in drainage pattern mixed with waste water flowing from the highland regions. Four sites have been selected, starting varying distances from the source to the end of the study area, in order to study the effect of water quality on the chemical characteristics of soils irrigated by this water at each location. This research also aims to investigate the water quality in the study area and the extent of its impact on soil and chemical characteristics in the orchards and land use in the cropping area south of Tallafer region. The satellite image TM with three band (TM3,TM4 and TM5) have been incorporated to get an image in a false colour by using ISMIC program to give a big difference of spectral signatures for soil and vegetation in the study area, where the areas with high vegetation cover appear in dark red colour, meaning also that there is a high moisture content and nutrient minerals in that area. Whereas, some of the regions appear in bright colour because of the decreased moisture content and high salinity dominion. The study area is near Sasan and Shaikh-ibrahim mountain where the rocks mostly contain calcium sulfate which has an effect on soil degradation in the study area through sheet and Gally erosion which help the water at the end to flow to the canal leading to the fields in the study area south Tallafer. Chemical analysis which have been done on soil samples and water quality gives results that confirm that the water in the first location was classified as C3 according to the classification of the American Salinity Laboratory. While the water in other locations was classified as Saline type at C4 and unsuitable for irrigation, where electrical conductivity (Salinity) ranged between 2.54–2.62 dcm.m-1. In either terms of soil samples large significant differences have been observed in samples irrigated by the springs water compared with other lands which depend on rains, especially in Electrical Conductivity and Sodium Ion Concentration.

## 44.
## Radioactive pollution impacts on human health in Iraq

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The impacts of the regional radioactive pollution, over all Iraq, and impacts of a domestic site pollution, 30 km West Mosul city at Northern Iraq, were highlighted in this study. The Depleted Uranium-DU weapons used against Iraq since 1991 till now, is the source of the regional radioactive pollution. The pollution rate were estimated using an international computer programme (LUDEP20) designed by FCRP for this purposes. The pollution effects on human health noticed not only in Iraq, but distributed outside Iraq to the surrounding countries, for example Kuwait. The authorized communities announced that more than thousand tons of DU missiles were used in Iraq during 1991, and the rate increased several times in 2003. The data show very high equivalent radioactive dose at the Battle Field which reach 62.7 mSv/y and then decreasing to 28.4 mSv/y at Basrah, 27.7 mSv/y at Zubair and 7.9 mSv/y at Safwan, in comparison with the international accepted level 1.0 mSv/y of ICRP. While the domestic radioactive pollution was due to an accident case at U-Radioactive Waste Grave. The accident allows releasing and distribution of radioactive waste material on the earth surface on about 500m x 500m. The two events induce the air, water and soil environmental pollution. A total of 91 blood samples from persons (male and female) living near the domestic polluted site were analyzed to determine and calculate the White Blood Corpuscles-WBC, Hemoglobin Blood Concentration-Hb, Packed Cell Volume-PCV, Erythrocyte Sedimentation Rate-ESR and Platelets Count-PC. The results show significant abnormalities in the studied phenomena which is a preliminary probable indication of an effect on

human health and inducing different types of cancers of many sensitive organs. According to Mosul General Hospital documented information for the period from 1991 till now, the data shows an abnormal increase in the number of cancers. The reported data for 45 affected organs show different ratios of response (%) to cancer. The number of organs affected by cancer and percent increasing during the period 1991 till 2008 are as follows: 10 organs 0%, 12 organs 50%, 10 organs 100%, 1 organ 200%, 4 organs 300%, 1 organ 400%, 1 organ 500%, 1 organ, 800% and 1 organ 6400%. The ratio 6400% is related to the skin cancer in the polluted site. It is a very good indication for the radioactive air pollution in this site especially for radioactive alpha particle emitters within depleted waste Uranium compounds.

## 45.
## Nutritional modulation of proatherogenic effects of persistent organic pollutants

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Epidemiological studies support the hypothesis that cardiovascular diseases such as atherosclerosis are linked to environmental pollution. There is also evidence linking the arylhydrocarbon receptor (AhR) with mechanisms associated with cardiovascular diseases and that AhR ligands such as coplanar PCBs may be atherogenic by disrupting the functions of endothelial cells in blood vessels. Because PCBs are in general very persistent and proinflammatory, life-long exposure to these pollutants may fuel vascular inflammation and the pathology of atherosclerosis. We are exploring the paradigm that nutrition can modulate environmental insults in the vasculature and thus modulate endothelial dysfunction induced by exposure to PCBs. Nutrition can dictate the lipid milieu, oxidative stress, and antioxidant status within cells. The modulation of these parameters through diets may influence the effects of environmental pollutants to cause disease such as vascular dysfunction. For example, certain dietary fats may increase the risk to environmental insults induced by PCBs, while fruits and vegetables, rich in antioxidant and anti-inflammatory nutrients or bioactive compounds, may provide protection. Our studies indicate that an increase in cellular oxidative stress and an imbalance in antioxidant status are critical events in PCB-mediated induction of inflammatory genes and endothelial cell dysfunction. We have demonstrated that diet-derived lipids and bioactive compounds can alter the cellular lipid milieu, oxidative stress and antioxidant status, and thus modulate mechanisms of cytotoxicity mediated by PCBs. We also have evidence that the plasma membrane microdomains called caveolae play an important role in endothelial activation and toxicity mediated by coplanar PCBs. Caveolae are particularly abundant in endothelial cells and play a major role in endothelial trafficking and the regulation of signaling pathways associated with the pathology of vascular diseases. There is a great need to further explore this nutritional paradigm in environmental toxicology and to improve our understanding of the relationship between nutrition and lifestyle, exposure to environmental toxicants and disease. (Supported by grants from NIEHS, NIH (P42ES07380) and the University of Kentucky AES).

## 46.
## Fungi in the air and the treatment of otomycosis

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Today the fungal infections have become a major health care problem. Fungi, especially Aspergillus, Penicillium and Mucor species are almost always present in the air. Over the last years the problem of human mycotic diseases obtains the important social implication because of substantial growth of their frequency. Quantity of fungal spores in the air changed with the season, weather, geographical location, and the presence of local spore sources. One of the reasons of significant affection with fungal diseases among the population is insufficient awareness about fungal infection, ways of its distribution and prophylaxis measures. Treatment of mycoses has certain difficulties and it demands complex therapy. The purpose of this research was the usage of the preparation Fungolon in clinical practice in patients with fungal infections. The current studies were carried out in the Department of Otorhinolaringology (ORL) of hospital N3, city Yerevan. The strains isolated from otomycosis suffering patients were studied in 2–10 days after inoculation. The main pathogens of ORL-organs fungal diseases are yeast-like fungi of genera Candida, Geotrichum; mould fungi of genera Aspergillus, Penicillium, Scopulariopsis, Mucor, Cephalosporium, Alternaria and others. The diagnosis were conducted on the basis of clinical and laboratory data. We have examined 32 patients with otomycosis at the age of 20–66 years. Depending on the applied method of treatment patients were divided into 2 clinical groups: I group – (15 patients) – where conducted local treatment with 1% Nitrofungin solution thrice a day within 2 weeks. II group – (17 patients) – alongside with local application of 1% Nitrofungin solution also were prescribed Fungolon (100 mg) daily within 2 weeks. Observed patients from first group had full recovery in 55%, patients from the second clinical group that had combined treatment had full recovery in 82%. Efficiency of therapy has been defined on two parameters: absence of clinical presentations (itch, stuffiness in ear, and patch in acoustic duct) and negative laboratory research of smear from acoustic duct. Fungal processes of ORL are inclined to relapse; therefore it is necessary to repeat the courses of treatment. Thus, it is possible to note, that combined usage of Fungolon (Flukonazol) with Nitrofungin, is effective in the treatment of otomycosis, and it can be used as a preventive measure among the patients that receive antibacterial therapy. As a whole under the correct medical treatment of ORL mycoses therapy is effective enough.

## 47.
## The comparison of amosite and ceramic fibre exposure and their combined effect with cigarette smoke

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Refractory ceramic fibers (RCF) are used as one kind of asbestos substitutes. Because RCF are relatively durable and some RCF are respirable, they may present a potential health hazard by inhalation. The aim of study was: 1) to find and compare the effects of subchronic exposure to amosite (AMO), refractory ceramic fibres (RCF), cigarette smoke (CS) and combined exposure to AMO+CS and RCF+CS by inflammatory and cytotoxic parameters of bronchoalveolar lavage (BAL), 2) to find out if smoking amplifies the possible adverse effect of RCF as it is known after combined exposure to asbestos + CS. Four groups of Wistar rats were treated: 1) intratracheally

instilled by saline solution (0.4 ml) – control group; 2) intratracheally instilled by 4 mg of AMO or RCF; 3) exposed only to CS (85 mg of total particulate matter/$m^3$ air) for two hours daily; 4) exposed to AMO+CS or RCF+CS. After 6 months the animals were exsanguinated and BAL was perfomed. Following BAL parameters were examined: BAL cell count; Alveolar macrophages (AM) count; Differential cell count (% of AM, polymorphonuclears and lymphocytes); % of immature AM, binucleated cells, viability and phagocytic activity of AM. The results of our work suggest: serious inflammatory and cytotoxic changes in lung after subchronic exposure to AMO, RCF or CF and amplification RCF effect by CF. There are no large differences between AMO and RCF exposure and their combined effects with cigarette smoke under our experimental conditions in BAL parameters. This work was supported by Ministry of Health of the Slovak Republic – contract 2005/29-SZU-07.

## 48.
## Children's genome instability – methodology of comparative analysis

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In the report comparison will be presented of somatic, genetic and psychologic health of children (5–7 years) constantly living in regions, officially announced as zones of extreme ecological situation: Aral Sea Basin (Kazakhstan) and Magnitogorsk – Russian town with big metallurgical combine. Groups were formed by results of preliminary psychological testing for estimation of anxiety. Results: i) in Kazakhstan chemical analysis of water, air and soils revealed levels of pollution not significantly excessed from ones in industrial regions of Europe; estimation of total effects of the same environmental samples using biological models has not found bigger negative effects than in Europe, either. Differently, in Magnitogorsk significant air pollution was detected with organic compounds (for example, benz(a)pyrene – up to 30 MPC), as well as significant genotoxic effects of snow samples was revealed using Drosophila. ii) common children's morbidity in Magnitogorsk was considerably higher than in Kazakhstan, and respiratory diseases were on the first rank place. iii) children's anxiety expression as well as frequency of emotional disadaptation in Kazakhstan was higher than in Magnitogorsk. iiii) for correct comparison of genome instability and sensitivity we used results of cytogenetic analysis (micronucleus test) only for children with adaptive (normal) level of anxiety. Results of comparison have shown, that among children from Kazakhstan levels of genetic damage in blood cells was 2.5-3 times higher than in Magnitogorsk, what was observed on a high background level of proliferative activity of cells in culture. Obtained data testify that in rather clean places in Kazakhstan, but in conditions of social disaster (poverty, unemployment and all of their social consequences) which has developed in Aral Sea Basin on a background of ecological accident, children's genetic health has appeared much worse than among children in Magnitogorsk, exhibited by significant emissions of huge metallurgical combine. In the relevant evaluation of state of an organism, a comparative analysis

of human genotoxic effects plays an important (may be, the most important) role. For this aim it is reasonable to use psychological testing, characterizing the adaptative potential of an organism.

## 49.
## Mosses as accumulators and indicators of a level of radioactive environmental contamination

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In this article the method of quantitative-qualitative evaluation of a degree of radioactive environmental contamination is examined by means of bioaccumulators from Mosses Class. The problem of irradiation by small dozes of a human body is poorly investigated, and given direction of researches is directed in definition, by means of bioaccumulators and indicators of radioactive contamination, an effective doze for each population of people in different contaminated area. It has been established, that representatives of this Class possess the increased ability of accumulation of different radionuclides, inclusive of the – Cs-137 and Sr-90. On the basis of statistical processing results of the radiological researches, it is established, that there is a positive correlation between the contents of the radionuclides in an environment and their contents in mosses that allows to use mosses as quantitative-qualitative indicators of radioactive environmental contamination. In this article empirical formulas are given for definition of contents of Cs-137 and Sr-90 in a layer of 0–20 cm of the untreated soil, proceeding from the contents of these radionuclides in a moss, selected in the given area. The use of these organisms and methods allows to increase accuracy of classical and modern radioanalytical methods with reduction of expenses for carrying out the given kind of researches.

## 50.
## Children's health in Azerbaijan

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Background. Child mortality is a sensitive indicator of a country's development and telling evidence of its priorities and values and ensuring their healthy growth and development ought to be a prime concern of all societies. Azerbaijan is located on the western coast of the Caspian Sea and it is the largest of the three Transcaucasian republics of the former Soviet Union. Azerbaijan has experienced a prolonged and difficult political, social and economic transition. The country has also had the reputation of being an environmental disaster zone. Environmental degradation and contamination in the country, specifically in Absheron Peninsula have been explored recently. Purpose: The purpose of this study was to analyse current situation and problems in Azerbaijan Health System and make recommendations to improve children's health, prevent and reduce child mortality in Azerbaijan. Methods. Child mortality and morbidity rates were compared by regions, health problems, and limitations in health data system were analysed using reports of Statistical Committee of the Republic of Azerbaijan, Azerbaijan Ministry of Health, WHO, UNICEF and USAID. Results: According to UNICEF data Azerbaijan has the highest child mortality rate in the Commonwealth of Independent States. The infant mortality rate is high, at 74 per 1,000 live births. Discrepancies with official statistics, according to which this figure is about five times less, make international comparisons and assessment of trends difficult. Estimates on child mor-

tality in Azerbaijan are complicated by the large discrepancy between official and survey figures. According to official data there is inequality in infant mortality among regions. The exiting data shows that the main causes of infant death are diseases of respiratory system, certain conditions originating in perinatal period and congenital anomalies. Death from congenital anomalies increased about 3 times for the last 6 years. A project proposal was developed to improve child health and reduce child mortality in Azerbaijan.

## 51.
## Uranium contain waste storage of mining plants and civilian health conditions at the zone of risk

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Tajikistan as a Central Asian country has environmental health problems traditional for this region's populations. In the summer period for the past ten years epidemics of gastric and infectious illnesses are continuously observed. One of the biggest problems causing them is insufficient access of rural communities and partial access of industrial cities to drinking water. High percentage of children mortality, anemia and unbalanced food consumption could be mentioned as persistent problems. One of the major, specific factors which could play a role in the population's health in Northern Tajikistan and which is the topic of our presentation is the long time accumulated industrial waste from mining. The region with current population exceeding one million possesses dangerous exposures to radioactive emissions and to influence of heavy metals from waste storage. The history of mining production in Northern Tajikistan (Sogd Oblast) stems from the mid 50s of the 20$^{th}$ century after discovery and extraction of radioactive uranium. Hence today we have 10 tailing pits that contain excess amounts of radionuclide and heavy metals. Most of them were formed during 1949–1965 when the technology wasn't mature. Predominantly tailing pits are located close to residential areas and covered with soil. However, there are eroded spots that bear both ecological risk and risk to public health. Among these pits only one complies with safety requirements. Others need to be repaired and rehabilitated. Gamma emission at those sites is detected at levels of 12–180 mr/h. According to our preliminary estimations amount of radioactive waste in each of these 10 storages ranges from 400,000 to 20,000,000 tons. Presentation summarizes data comparison of typical illnesses outbreaks in Sogd area with the same in other regions of Tajikistan. Khujand, Taboshar and Chkalovsk – are the Sogd region's cities geographically located close to radioactive waste storages and can be considered as "zone of risks": for comparison, birth rate was lower but mortality rate was higher than the regional average. In the same cities high rates of blood illnesses, respiratory, endocrine, and urogenital systems were determined. Details of this investigation and recommendation for minimising the dangerous influence of radionuclide and heavy metals waste to population health are the subject of this presentation.

## 52.
## Exploring the public health impact of a miner autopsy service in South Africa

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Background. The purpose of this study is to investigate the public health impact of a miner autopsy service in South Africa. The study will focus on autopsy data of about 100,000 miners, stored in a computerized database at the Pathology department of the National Institute for Occupational Health (NIOH) in Johannesburg. The major goal of the study is to examine how this systematic examination and documentation of purposeful autopsies has impacted the prevalence of occupational respiratory diseases among South African miners. Methods. To achieve this goal, outputs in the form of annual surveillance reports of autopsy data, peer-reviewed publications, departmental reports, and education and training materials, produced as a result of findings from autopsy data, will be reviewed to determine trends in the prevalence of these occupational respiratory diseases and to assess the impact of the autopsy service on scientific knowledge about these diseases. In addition, interviews have been conducted on miners to determine their awareness of the autopsy program and their knowledge of mine-related respiratory diseases. The miners were asked questions about measures they take to protect themselves from dust while underground. The study also includes a survey of the opinions of medical professionals in Johannesburg on the public health role of the autopsy in general. Statistical Analysis Data collected from the miner interviews and medical professionals survey will be analyzed using the statistical analysis system (SAS) 9.1 software package, where appropriate. The interviews with miners will follow a qualitative descriptive study pattern and will be analyzed by looking for similarities in themes and content. Chi-square tests will be performed on the results from the survey of medical professionals in order to determine associations between several variables and responses to questions. Public Health Significance This project will facilitate the understanding of occupational respiratory diseases among miners in South Africa.

## 53.
## A survey into basic school pupils´ lifestyle

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The article studies key areas of lifestyle by basic school pupils of adolescent age. The study questioned 204 basic and grammar school pupils through an anonymous questionnaire consisting of 15 questions with close-ended answers. Out of the sample of respondents 89 were students of schools with expanded physical education curricula and 115 were studens of schools with regular

curricula. The aim of the study was to discover whether an appropriately applied physical activity helps to an appropriate nutritional and physical behaviour and whether it minimalises the addictional behaviour occurrence by the pupils. The data were statistically analysed (EpiInfo v. 6, Statistica v. 7cz). Pupils of schools with expanded curricula showed better nutritional and physical behaviours and less smoking or drinking alcohol. From a total amount of 15 questions a statistically significant difference ($p<0,05$ and better) ocurred at 8 questions. When nutrition being investigated the differences ocurred by 2 out of 5 questions, in case of physical acitvities it was 4 out of 5 questions and by pathological addictions it showed by 2 out 5 questions. The statistically significant differences in our sample refer to pupils from schools with expanded curriculum as to those who, compared to pupils from regular basic schools, eat a daily food divided into more portions ($p<0,05$, x2), care more for their appropriate drinking and drink a bigger amount of liquid per day ($p<0,001$, x2), spend more of their school and leisure time by physical activities (both $p<0,001$, x2), and are more often nonsmokers and non alcohol drinkers (both $p<0,001$, x2). As a result we could claim that a process of preventing an appropriate lifestyle from negative factors may be significantly empowered by an existence of expanded physical education curriculum. Increasing amount of physical activities within regular basic schools curricula both the children´s health and their addiction resistance may be positively enhanced. It would be very interesting to have the hereby outcomes provided with further verifications and a more complex research with bigger samples. This survey is a part of a research plan of the Faculty of Education Masaryk University for the period 2005–2010 "School and Health for the 21st century", identification number MSM0021622421, lead by doc. PhDr. Evžen Rehulka, CSc.

## 54.
## "Biological prophylaxis" – one of the ways to proceed from the analytical environmental epidemiology to the population health protection

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Population (and especially children's) health in industrialized urban areas of the Middle Urals, Russia is generally rather poor, and our epi studies demonstrated that some diseases and subclinical conditions could be conclusively associated with environmental exposures to toxic metals and to some organic chemicals emitted by industries characteristic of this region. Theoretically sound and tested in a lot of animal toxicological experiments is a concept of "the biological prophylaxis" (BP) meaning a complex of methods aimed at the increase in the effectiveness of general and specific host's biological protective mechanisms. The system of the BP that is functioning in our region comprises 4 stages. Stage 1. This stage involves analytical epidemiological studies and prognostic risk assessment projects with the purpose of characterizing the real significance of certain problems of environmental medicine in the context of our region and, thus, setting specific tasks for biological prophylaxis. Stage 2. Based on theoretical premises, we propose a complex consisting of innocuous bio-protectors with expected beneficial influence on the toxico-kinetics and toxico-dynamics of certain chemicals acting either separately or in combinations characteristic of a particular urban area. Then we test this complex for its protective efficacy on an animal experimental model of the individual or combined toxicity of those chemicals. Stage 3. Bio-protective complexes (BPC) which proved effective in animal experiments are subject to controlled field trials on limited groups of individuals exposed to a particular health risk (mostly of children aged 4–7) under well-qualified medical and laboratory supervision. When the protective effectiveness and the absence of adverse side-effects of a BPC is proved, it is recommended for the prophylactic practice. Stage 4. Based on available data on environmental contamination,

areas of the highest potential health risks are determined and then subpopulations of these areas' residents who need a protective treatment the most are singled out. For example, preschool children residing and attending kindergartens in such an area and having some explicit disease are hospitalized for clinical treatment including elimination therapy, whilst the rest of the selected children population is being given a course of presumably effective BPCs for 4-5 weeks once or twice a year through kindergarten's or school's medical personnel under the supervision of local pediatricians. About 10% of the children receiving BPCs at the 4th stage are chosen each year by local pediatricians and examined before and after this treatment as to check their general health status which proved bettered in 70%–80% of the examined children. The experience gained when implementing the project has been used to expand its scope within the Middle Urals region. Thus if in 2002 only 253 children in 2 towns received the BPCs, in 2003 they were received by 2915 children in 5 towns, and so on – up to 8389 children in 11 cities and towns in 2006 and 8096 children in 2007. Conclusion. We believe that experience gained when implementing the project of biological prophylaxis should be used to expand its scope both within and outside Russia.

## 55.
## Effect of the ground water quality on land degradation in Al–Muhalabia and Sinjar region

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The study of ground water is very important to determine the quality and validity of water for different uses as one of the important sources, because the need to use ground water for different purposes has been dramatically increasing recently, and these uses require appropriate water type due to the variation of water kinds. The quality of ground water is different from one area to another depending on the combination of factors, such as chemical and physical composition of rocks, water movement, in addition to different environmental and weather conditions, as well as vegetation cover type and human influences. The ground water is pure and free of sediments and organic materials but it often contains dissolved materials and metal compounds stored for long periods in aquifers of different rock types and chemical composition. Many researchers pointed out that most of the dissolved salts in the ground water exist in form of ionized salts, some of them are negatively charged (chlorides, sulphates, carbonate, and bicarbonate) and others with a positive charge (potassium, calcium, magnesium). Research includes study of water wells in various locations in Al-Muhalabia and Sinjar regions, west of Mosul, at a distance of 40–110 Km respectively; these areas suffer from lack of water sources, so the population relies on water wells as a major source in their daily life, which have many risks on public health in those regions. Research aims to determine the quality of water wells in these regions, and to define their suitability in daily use, as well as in irrigation, where orchards and the most adjacent lands to the wells that depend on water wells. Recently, noted a distinct deterioration in soil and crop production, so these regions are suffering now severe desertification. Thirty wells have been selected from these regions, laboratory tests were done to determine the quality of water, included estimation of sulphates ($SO4^{-2}$) and calcium ($Ca^{+2}$), magnesium ($Mg^{+2}$) and chlorides ($Cl^{-1}$), phosphorus ($P^{+4}$) in addition to measuring the pH and electrical conductivity (EC). The values of dissolved substances for all studied wells exceeded the accepted limits for drinking water according to the Kamensky water classification and specifications of the World Health Organization (WHO). The results of the study pointed out that the high concentration of magnesium and gypsum in the water gives unpalatable taste and leads to an increase of diarrhea when using this water for drinking. It was also observed that the studied samples contained magnesium concentration higher than 125 mg/liter, therefore most of the studied samples were unsuitable for drinking, and 90 per cent of the studied samples were unsuitable for domestic use, as classified in Kamensky, either.

## 56.
## Effect of environmental and climatic changes for Tigris River in Nineveh province northern Iraq

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One of the most important natural resources which can not be dispensed with is water, despite the fact that three quarters of the Earth's surface is covered by water, but the part that needs rights directly constitute a small percentage is in decreasing for many reasons and factors, a fresh water necessary for life is the most exposed to contamination. The study area is located in Nineveh province in northern Iraq in the area extending between the Mosul Dam as the northern and Al – Qayarah city as southern of the study area from Tigris River. The research aims to study the river deposits in the area by using volumetric analysis, and determination of gravel forms by using (zing's diagram), and quality of rock type of the river sediments that taken from the Mosul Dam and another from south of the Mosul city, then compared with the terrace deposits belonging to the Quaternary period to find the environmental and climatic indications. The research aims also to identify the river water quality in terms of SAR and EC value in ten sites of the study area, in addition to identifying the sources of pollution of the Tigris River in Nineveh province. Results of the study showed alternately four periods of rain and dry stages during the Quaternary period, and we are living the most dry time of the fourth quaternary stage supported by four Tigris river terraces in the study area, the recent deposits indicate that Tigris river suffers the most stage of water quantity regression, thus the river reached the maturity stage in this part of it, that indicated by the volume of gravel and river islands in the Mosul city, the results of the study also showed that the water quality of river in Nineveh province, ranged between normal and severe according to standard criteria (SAR and FAO, Rome, 1976), it needs quick care of treatment to safety use irrigation. The high value of sodium adsorption ratio in the water leads to permeability soil degradation and thus to the deterioration of crop production, which requires the use of economized irrigation to prevent soil pollution in salt. They also showed that the increasing number of population and settlement with the bordering of the river results increased pollution of water sources of the Tigris River. Pollution sources of the Tigris River include waste material of Mosul city, waste material of remedied stations, waste material of plants and industrial and agricultural land and non-agricultural wastes. The amount decreasing of the Tigris River helped to increase its water pollution, and some studies declared that more than 80% of the disease in the Third World due to the use of contaminated water, specially the diseases of Para-Typhoid, Cholera, Water Fever, Yellow Fever and ALdezntre (Diarrhea).

## 57.
## Volatile organic compounds in the atmosphere of Karachi

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Atmospheric pollution caused by industrialisation and vehicular traffic in the urban centres of Pakistan is affecting public health badly. World Health Organization (WHO) defines air pollution as a "situation in which the outdoor atmosphere contains materials in concentrations which are harmful to people and/or their environment." Only in North America and Europe, the effects of pollutants on environment have generated intensive scientific and public concern due to deleteri-

ous effects on human health, visibility, crops and vegetation, buildings, and animal life. In the context of developing countries, such as Pakistan, WHO's definition needs to be more specific. It ignores the impacts on ecology posed by emissions from anthropogenic sources. The concurrent increase in the population, industries, and number of automobiles on the roads every year is giving rise to a threateningly high rate of increase in air pollutants in the urban areas of Pakistan, and calls for an urgent need for an effective programme to control further air pollution and remedial action to minimize the existing ones. An essential component of an effective air pollution control programme is a knowledge of the relative strengths of emitted pollutants and the sources. Very little is known about the extent and impact of atmospheric pollutants even for the major cities. Mixing ratios of carbon monoxide (CO), non-methane hydrocarbons, halocarbons and alkyl nitrates (a total of 72 species) were determined for air samples collected in Karachi, Pakistan. This is the first time that volatile organic compound (VOC) levels in Karachi have been extensively characterized. The overall air quality of the urban environment was determined using air samples collected at six locations throughout Karachi. Methane and ethane levels were much higher than in other cities in the world, highlighting the strong influence of natural gas leakage on Karachi's hydrocarbon composition. Benzene levels in Karachi exceeded recommended levels in other countries, suggesting that high benzene levels are of concern for Karachi air quality. The VOC data were used to estimate the amount of ozone produced in Karachi by each VOC. In addition to photochemical reactivity and ozone production calculations, the VOC data obtained in this study will serve as inputs to toxicity (human exposure) and air quality and fuel policy related studies of air pollution control in the urban centres of Pakistan. Improvement in fuel quality and implementation of emission controls are needed in order to significantly improve Karachi air quality.

## 58.
## The health and the environment – concentration of mercury in medical plant – Dandelion (Taraxacum officinale)

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The environment is made up of all the living and non-living things surrounding an individual or a community. Environmental health problems are often caused by pollution. Pollution is the dirtying of the air, water, or soil by chemicals, disease, or waste products. Many forms of pollution have been linked with serious diseases, including cancer. Mercury (Hg) poisoning has become a problem of current interests as a result of environmental pollution on a global scale. Mercury is widespread in the earth crust. Natural processes such as erosion and volcanic activity release mercury measured in the environment. The highest concentrations of mercury generally occur in the upper levels of soil, probably as a result of airborne deposition. Mercury and its compounds are widely distributed in the environment, both through natural processes and through industrial contamination and incinerator emission. Mercury compounds have had many uses, including metallurgy, electronics, batteries, and biocides. The history of mercury use goes back more than 2000 years. Sources of soil contamination with mercury are related to metal processing industries, to some chemical fungicides containing Hg (and seeds dressing). Hg behaviour in soils is subject of wider interest, as its availability for plants can cause serious health problems. One of the most polluted areas in Slovakia by mercury is Central Spiš region. Geochemical anomalies are found in mining areas and it is the case of Slovakia. The presentation deals with the determination of the mercury concentration in particular parts of the plant Taraxacum officinale (Dandelion). The plant does have several culinary uses, and the specific name officinalis refers to its value as a medical herb. The leaves can be eaten cooked or raw in various forms, such as in soup or salad. The leaves are high in vitamin A, vitamin C and iron. In medical practice it is also widely used. Dan-

delion roots can be used as a diuretic and leaves are used for the treatment of anaemia, jaundice, and also for nervousness. Drunk before meals, dandelion root coffee is claimed to stimulate digestive functions and function as a liver tonic. The subject of our analysis was the mercury presence in Dandelion (n=53) and we also analyzed the soil. Concentrations of mercury and methylmercury were detected on AMA 254 Advanced Mercury Analyser. Values of monitored heavy metal is presented on a wet weight basis in mg/kg and compared with Codex Alimentarius in the Slovak Republic. We found nearly linear dependence between the amounts of mercury in particular parts of the plant. The lowest concentration was in roots – 0.00037 $mg \cdot kg^{-1}$, the higher one in stalks within 4.83242 $mg \cdot kg^{-1}$ 6.65471 $mg \cdot kg^{-1}$ and the highest concentration was measured in leaves – 11.55874 $mg \cdot kg^{-1}$. In all plants from soil contaminated by Hg were over limited concentration of Hg measured. We have to take into account that the soil is important and the amount of mercury is important as well as the distribution of mercury in the body of a plant. That is the reason why it is important to continue monitoring the mercury concentration in medical plants. Acknowledgment. This study was supported by VEGA Scientific Grant 1/4238/07 from the Ministry of Education of Slovak Republic.

## 59.
## Research of PCB in the environment of Slovakia at the Faculty of Medicine University of P. J. Šafarik Košice

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Polychlorinated biphenyls (PCBs) are a class of organic compounds with 1 to 10 chlorine atoms attached to biphenyl which is a molecule composed of two benzene rings each containing six carbon atoms. The chemical formula for all PCBs is C12H10-xClx. Polychlorinated biphenyls are mixtures of up 209 individual chlorinated compounds. Some PCBs can exist as a vapour in air, soil and water. PCB show wide toxic effects. Persistent PCB exposures have showed varying harmful effects on human health. These effects result partly because of their high liposolubility and very slow process of degradation, half-life ranging from 2.6 years in less chlorinated to 4.8 years in more chlorinated. Intoxication of the environment by PCB has taken on substantial extent. Manufacture of PCB started in 1929 in the USA and later in other parts of the world. The Slovak Republic manufactured and was a significant exporter (products like Delor, Hydelor, Delotherm) of PCB within 1959–1984 with more than 21 482 tons has been produced. Production was concentrated in Eastern Slovakia and therefore Eastern Slovakia was considered as high-risk area. Some of the studies reviewed here confirm this. One of the main problems is that PCBs persist in the environment for a very long time in the lithosphere and subsequently they are absorbed into the hydrosphere and atmosphere. More than 90% of PCB are concentrated and persist in the soil, from where they are absorbed into the water and subsequently into the bodies of animals. In the hydrosphere, the PCBs are absorbed on sediments and other organic substrates. The greatest amount of PCB was released into the hydrosphere from industrial effluents. Although PCB has low volatility, there is some amount in the air which depends on temperature and evaporation pressure of specific PCB congener, being higher as the temperature rises. Overall amount of atmospheric PCB is estimated on 10 000 to 100 000 kg. The problems of PCB in the environment of Slovakia has been the subject of research at Faculty of Medicine University of P. J. Šafárik Košice for a longer period of time. Many scientific workers and doctors of the Faculty of Medicine were involved in studying effects of PCB that was produced in Chemko Strážske, on the environmental and health problems. Among the first ones belong Šak M, Guzy J, Barna K, Bil?ík P, Andrašina J, Ahlers I, Rozdobudkova V, Poracká ?, Longauer F etc. The subject of research was the health status of people, exposed directly at work to the harmful effects of PCB. Although the

production of PCB had been terminated, the problems are still present in the environment in Eastern Slovakia, mainly in the regions Strážske, Michalovce and Trebišov, where the concentration of PCB in soil and water sediments is one of the highest in the world. The problems caused by this pollution are subject of research even nowadays. Many doctors and researchers try to find some health problems resulting from the environmental pollution of previous industrial activities. We can mention namely some of them – Tajtáková M, Pidanicová A and also researchers from other universities – Trnovec T, Dercová K, Kocan A etc. take part in the research.

## 60.
## Monitoring of occupational exposure to polyaromatic hydrocarbons in Slovakia

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The objective of this study was to assess external and internal exposure to polycyclic aromatic hydrocarbons (PAHs) of workers who are employed in a graphite-electrode producing plant and workers exposed during road coating asphalt operations. In two plants, at 6 different working places 65 personal air measurements were carried out to determine the concentrations of 16 PAHs regarded by the EPA as priority pollutants. Sampling and analysis was performed according to NIOSH methods 5506 and 5515. In addition, the excretion of 1-hydroxypyrene (1-OHP) in the urine of 67 workers was investigated by the high-performance liquid chromatographic (HPLC) method with fluorescence detection. Results: During the production of graphite electrodes significantly higher average PAH concentrations were found in the mixing (733,6; 104,9 μg/m$^3$) and pressing (208,3; 70,4 μg/m$^3$) areas. The 1-hydroxypyrene determinations yielded the same observations. Significantly higher 1-OHP concentrations were found in the urine of exposed workers in the mixing and pressing areas (2,3–10 μg/g creatinine). PAH concentrations (0,2–5,6 μg/m$^3$) determined in personal air samples and 1-OHP concentrations (0,5–1,5 μg/g creatinine) found in the urine of road coating asphalt operators were low. Conclusions: It must be concluded that both external and internal PAH exposure is too high at some work places in the graphite-electrode producing plant. This is probably caused by skin absorption of PAHs. So, for the prevention of health hazards by PAH, both measurement of PAHs in occupational air and biological monitoring of 1-hydroxypyrene as biomarker of PAH exposure should be performed. Key words: Polycyclic aromatic hydrocarbons ; Occupational exposure ; Work place ; Biological monitoring ; Urine ; Biological fluid ; Biological marker.

## 61.
## Heavy metals in soils in the area influenced by polymetallic ore deposits in the area of Zelezniak, Kaczawskie Mts, Poland

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The area of Zelezniak is situated in Kaczawskie Mts. range, in southwestern Poland. With regard to geology, the rocks are rich in arsenic and heavy metal ores. Mining began in the 12$^{th}$–13$^{th}$ centuries when pyrite, arsenopyrite and chalcopyrite were extracted from the open-pit mines. In 1925 all mines were closed because of economical reasons. The ores were processed in local smelters, and part of the extracted material was transported to other smelters in Lower Silesia. This research was carried out to examine present As and heavy metal concentrations in soils in the area of 15 sq km, potentially affected by former mining and ore processing. Soil samples were collected in 110 sites, from surface and subsurface layers, both from natural and anthropogenically created soils. Soil types differed highly because of diversity of parent rocks. Basic soil properties were determined: particle size distribution of the fraction <2 mm, pH, organic carbon, base cations, acidity and cation exchange capacity (CEC). Total As and heavy metal concentrations were measured after acid digestion in concentrated perchloric acid. Then, concentrations of Pb, As and Cd were analysed by ICP and the other metals – by flame AAS. All analytical procedures were validated using certified reference materials and internal standards. Potentially soluble forms of As and other metals were determined by extraction with 1 M hydrochloric acid, and actually soluble forms – by extraction with 1 M NH4NO3. In selected soil samples, operationally defined species of elements were determined, and for this purpose, we applied three different sequential extraction procedures: by BCR [2] as a universal method, by Wenzel [3] – for As, and by Zeien and Brummer [1] – for other metals. Total concentrations of heavy metals, especially of Cu, Pb, Zn and Cd, differed very much. Material collected from mine dumps contained high concentrations of Cu (589 mg/kg on average), Pb (2140 mg/kg on average) and Cd (87,5 mg/kg on average). It is very interesting that in selected samples collected from woodland and arable lands, the concentrations of Pb and Zn were higher even than those in mine dumps, whereas Cu and Cd concentrations remained lower. We examined total arsenic concentration in material collected from mine dumps as well. The maximum concentration was 18080 mg As/kg, but the average was about 3390 mg As/kg In the northern part of the area examined, the concentrations of As and heavy metals were not that high as those in the close vicinity of former mines. The contributions of potentially soluble metals in their total concentrations were the lowest in the case of Fe, Ni and Cr, and the highest – for Mn, Pb and Cd. For example, potentially soluble Fe made up 14,5% of total Fe (on average), and potentially soluble Pb – as much as 62,8% of total Pb. Similar relationships were found if considering actually soluble forms, which in the case of Pb and Mn were relatively high and made up 5,5 and 8,5% of total concentrations, respectively. According to Polish law, acceptable concentrations of Cu and Pb in forest and arable soils should remain below 100 mg/kg. If that level is exceeded, the area should be reclaimed. In the area of Zelezniak, permissible levels of As and some metals are exceeded by manifold. It should be stressed, however, that not only total concentrations of pollutants but also their soluble forms, will determine a real risk to environment, especially to drinking water and food chain.

## 62.
## The use of a permeable reactive barrier against contaminated groundwater in Ukraine

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Over the past decade numerous studies have shown promising results for groundwater remediation of dissolved inorganic contaminants using permeable reactive barriers (PRB). Such walls which may include elemental iron, zeolites, hydroxyapatite, limestones and other active materials which are placed in the path of a migrating plume of contaminated groundwater. Biological approaches utilizing sulfate-reducing bacteria are also very perspective. The development of mining and processing industry in Ukraine increased the risk of different diseases as a result of economic crisis and infrastructural changes in the health care system. Dangerous situations now occur at uranium mines. One of the largest European (and one of the largest in the world) uranium ore provinces is located in the Kryvyi Rig basin in Ukraine. In the summer of 2008 a synoptic sampling survey was conducted by our team to describe the geological, hydrologic, ecological characteristics of the uranium sites of Zhovty Vody in Dniepropetrovsk region near mining district (Kryvyi Rig basin) as one of the most important mining and contamination areas in Ukraine. Analysis of the spatial and temporal characteristics of metals in environmental media, ground and surface water near the most dangerous sources of contamination in Zhovty Vody district was performed. The most suitable sites in this region for PRB possible application were determined. Now recommendations for PRB use at this problem site are developed and future field tests are planned. Institution: 1- National Technical University of Ukraine (NTUU), 2-Ukrainian Planning and Surveying Institute of Industrial Technologies (UPSIIT), 3-Environmental Protection Agency US (EPA US).

## 63.
## Water quality to children environmental health in Tajikistan

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Currently the environment's hygiene is one of the major factors which determine public health. Among all natural resourses water takes major place because water has found many uses in all kind of civil activity. Due to this it is necessary to know water quality and to create safety for water resourses. In many cities in the Republic of Tajikistan during the past ten years water has become one of the huge ecological problems. According to State Medical University reporting water consumption per capita (60.8 liter/day) decreased in 2002 by more than 76% compared with 1990 (250 liter/day). This is due to the bad condition of the water supplying system. A strong association was shown between drinking water quality and the children's illnesses. It also should be mentioned that water quality and accesses to fresh water are similar to all Central Asia countries. Due to this we have proposed to find convenient indicators which could reflect state of the children's health. Based on available statistical data we have found that water quality is a good indicator for typical child illnesses in our country. As it was detected for the typical kids' illnesses in Tajikistan for the

period of last 15 years there is strong dependence of typical kids' illness with several drinking water quality parameters. We also take into account and summarize data of similar investigations conducted in different national scientific centers. For example number of samples of drinking water in Dushanbe city with bad microbiological analyses increased in the period from 1991 to 2003 from 0.4% to 17.2% and the number of samples with bad chemical composition increased from 42.9% to 73.2% for the same period. Such investigations suggested that water quality should be taken into account as an important preventive measure factor for number of typical illnesses. One of the indicators closely connected with water quality is the different kinds of enteric infections. This could be illustrated with the following data. Tajikistan during the past several years has faced problems with the populations' typhoid, keen enteric infectious illnesses, malaria and acute viral hepatitis. Only during 2001, according to the official statistics, more than 7,200 cases of keen enteric infection and 3,300 acute viral hepatitis were observed. Number of infected patients in first case is 1045 and in second it is 130 out of 100000. This is very dangerous and high index which is mainly caused by the bad water bacteriostatic composition. In most cases bad water quality was caused by out of work water supplies and deficits of chlorinating reagents for water treatment. For example only in the Dushanbe city district nearly 80% of water supply infrastructure needs repairing. Nowadays the situation with reconstruction of water supply system is improving. The great impact to reconstruction of water purification system in the city of Dushanbe is being performed under the grant of the German Government. The process of ecological education constitutes main part of activities in the several local and International NGOs, national scientific organizations, university. As a result many brochures, press realizes, booklets, and popular articles concerning water purification and preservation have been published. The presentation had collected some facts showing that as situation with fresh water in large cities of Tajikistan improves mass epidemic illness cases simultaneously decreases.

## 64.
## Chronic low-dose arsenic in drinking water alters immune responses to respiratory viral infection in vivo

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Arsenic (As) exposure is a significant worldwide environmental health concern. Through mechanisms that have yet to be elucidated, chronic As exposure via the drinking water has been associated with an increased incidence of pulmonary disease. We have recently found that environmentally relevant levels (10 and 100 ppb) of chronic As exposure significantly alters inflammatory cytokine production in mouse lung. Our findings led us to investigate the effect of chronic As exposure on respiratory Influenza A infection, a common and potentially fatal disease. In this study, C57Bl/6J mice (9 wk, n=6 per treatment group) were housed on a casein-based AIN-76A diet and exposed to 100 ppb As in the drinking water for 5 wk. Following As exposure, mice were inoculated intra-nasally with a sub-lethal dose of Influenza A/PuertoRico/8/34 (H1N1) virus. Morbidity (measured by weight loss) was monitored over the course of infection. Multiple endpoints were evaluated post infection (p.i.). Mice exposed to As had a significant increase in morbidity over the entire course of infection and significantly higher pulmonary influenza virus titers on day 7 p.i. Arsenic exposed mice displayed a significant increase in the percentage of neutrophils, as well as the total number of cells recruited to the lungs which may ultimately contribute to pulmonary damage. Respiratory infections with influenza virus and the looming potential of an influenza pandemic

are major worldwide health concerns. Our data indicate that chronic As exposure may be a significant contributor to the susceptibility and pathogenesis of respiratory viral infections. Moreover, these results suggest that chronic arsenic exposure, even at low levels commonly found in drinking water in the U.S., and throughout the world, may compromise immune responses to various infectious challenges, leading to or exacerbating disease risk. (NIH-NIEHS SBRP P42 ES007373 P2).

## 65.
## Changing of biodegradable organic carbon value in some drinking water treatment processes

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Natural organic matters (NOM) determine technology of drinking water preparation and its quality. It is very important to determine that part of NOM or dissolved organic carbon (DOC), which can be degraded by microorganisms. Bioavailability of DOC is a very significant factor, which influences the water quality in the distribution system. Biodegradable organic carbon (BDOC) – it is a part of DOC which can be mineralized by heterotrophic bacteria. BDOC is measured by determination of difference between initial and final concentration of total organic carbon (TOC) after incubation with mixed population of bacteria. The main goal of present work was to establish BDOC content in different types of water (Dniper river basin, artesian, tap and model solution of fulvic acids (FA)) and its change during treatment by different methods. In consideration of the fact that BDOC content in surface water sources depends on natural and climate condition, this information must be extremely useful for the development of water treatment technology and improvement drinking water quality. As water treatment process we used aeration, coagulation, ozonation, and filtration through biologically active carbon. As object of this work were used model solution of FA after treatment by ozone with doses 6; 12 and 18 mg/l. We have chosen FA solution because high content of FA in comparison with humic acids is common for Dniper water. We used technique (presented in Trulleyova and Rulik, 2004) for BDOC determination. We investigated BDOC changing in model solutions of FA. The first series was carrying in acidic and neutral media at pH 2.5 and 6.5. Increasing of FA solution ozonation time in acidic media leads to decreasing of BDOC content. It is stipulated by lower oxidative capacity of ozone in acidic media in consequence of consumption of ozone for decomposition of hydroxohydoperoxides and peracids. In neutral media ozonation of FA solutions (with high initial BDOC content) does not lead to essential change BDOC in content. It was interesting to ascertain, how ozonation influences on BDOC changing at its preliminary removing by aeration during 14 day with biologically active sand. Initial FA solution before aeration contained 16.3 mg/l BDOC, as it was determined in special experiment. Thus, BDOC content decreased during aeration more than in 4 times to the level 3.5 mg/l. Ozonation increased BDOC approximately to the initial level before aeration. It can appreciably increase efficiency removing of DOC and BDOC by filtration through BAC. Ozonation of FA solution is not reasonable more than 6 min because it does not lead to increasing of BDOC. So it is rational to combine preliminary aeration for water with high initial BDOC content with main technological processes for decreasing BDOC content before coagulation. After aeration the ozonation leads to the increase BDOC content contrast to non-aerated solution. Ozonation in combination with biofiltration through BAC after coagulation allows obtaining biologically stable water and preventing toxic product of disinfection formation after chlorination. Trulleyova, S., Rulik, M. (2004) Determination of biodegradable dissolved organic carbon in waters: comparison of batch methods. Science of the Total Environment. 332, 253–260.

## 66.
## Migration forms of heavy metals in the atmospheric air of cities in arid territories

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Among the environmental pollutants heavy metals (HM) and their compounds (Hg, Cd, As, Sb, Se, Cr, U and others) are important because of their cumulative, carcinogenic and mutagenic activities. Toxicity properties of heavy metals for humans are connected with their form of migration in the atmospheric air. In particular, submicron aerosols with a size less than 0.4 microns are more toxic for the human organism. Submicron particles are not held in the respiratory system of people and easily get into the blood through the alveoli of the lungs. For the determination of concentration of large number HM and dispersed element contents of aerosols, and phase contribution of HM in atmospheric air a neutron-activatation analysis method was suggested, based on using a multistage impactor and method of condensation. Aerosol phase was being caught on the filter of type AFA, and vapour-gas phase by method of condensation on traps. Mass median diameters (MMD) of aerosol particles on steps of the modified impactor Mea were as follow: on 1st step – 11.5; on 2nd – 3.6; on 3rd – 1.8; on 4th – 1.03; on 5th – > 0.4 mkm. The efficiency of division of aerosol particles in to the impactor by electronic microscope was estimated. Elements containing in composition of particle with size < 0.4 mkm, was caught after impactor consecutively connected cascade of cryogenic traps. Cryogenic traps were quartz vessel, containing three consecutively connected parts, which are cooling in mixture of hard carbonic acid with spirit or acetone, which gives temperature – 80 °C. Volume velocity pumping of air through the system is V=17.5 l/min. After selection of aerosol and of vapour-gas condensate form of HM, are separately packed and analyzed by method of neutron-activation analysis. Samples are irradiated in nuclear reactor WWR-CM in flow of thermal neutrons $f$=5·1013 $n \cdot cm^{-2} \cdot cm^{-1}$. Radioactivities of samples are measured by semi-conductor Ge (Li) detector and multi-channel analyzer. By using this method we have studied regularity of space-temporarily changes of concentrations and migration forms about 15 HM in atmospheric air of cities of Uzbekistan. Average contents of HM in city aerosols are fluctuated from 10 till 100 $mkg/m^3$ for Fe, Al, Na and Cl, and from 0.001 till 0.1 $mkg/m^3$ for U, As, Co, Se, Cd and Hg. Studying of migration forms of HM in atmospheric air of industrial cities expose following regularities: In atmospheric air cities most of HM such as Hg, Se, Zn, Cr, Au and Br in prevalent quantity migrate in content of particle with size < 0.4 mkm or vapour-gas phase. Depending on year seasons and type of sources of basic industry pollutant emissions in cities is importantly different in the migration forms of HM. In particular for city Almalyk, where located mountain-metallurgical enterprises are functioning, characteristically prevalent migration of Cu, Zn, Cd, As and Pb in atmospheric air cities in content of bringing particles with size < 0.4 mkm. This particle contains HM, which easily migrate in air, insufficiently for catching by dust-gas-cleaning structures and represent more danger for human health. Aerosol particles with size < 0.4, mkm containing HM, badly catch in human nasopharynx. The received data are used for an estimation of distribution, toxicity of heavy metals on the environment and the human organism.

## 67.
## The crisis of Aral Sea and health of the population in Priaraly

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For the last 35-40 years the level of Aral Sea has gone down on 30m, volume of waters has decreased with 1064 up to less than 80 km – 3; salinity of water has reached in the western part 120–130g/l, and in east hollow up to 290 g/l. Aral Sea, practically, has turned to a lifeless reservoir. The area of the drained bottom of Aral Sea makes near 5 million hectare. In waters of a residual Aral reservoir increased contents of organic substances (The dissolved organic substances, benzene, xylene and phenol) and heavy metals (nickel, lead, mercury, and zinc) have been established. In separate sites of the Aral Sea the high contents of vanadium, copper, cadmium, chromium and presence of methanol are established. The level of pollution of ground adjournment by mineral oil, benzene, xylene and toluene, and also chlorine-organic pesticides are much lower than allowable concentrations. Priority of pollutants environment of Priaraly are pesticides, heavy metals and the rests of mineral fertilizers. Radioactive pollution of the natural environment is not established. The analysis of meteorological changes on all meteorological stations in 300–400 km around Aral Sea for the long period shows a zone change of daily amplitude of temperatures. Summer anthropogenesis increase of temperatures and winter downturn is in limits 1,0–1,5 °C. Changes of the climate in Uzbekistan, namely – increases in hot days and, connected to its increase in dusty winds; by increase in warm days during the winter period, causing infringements of adaptation of the organism, are reflected also in growth of diseases of bodies of breath, it is especial at children. Thus, crisis of Aral Sea threatens an ecological situation in the Central Asia. Crisis will cause unpredictable, catastrophic changes of the climate in huge territory. It already threatens with a global trouble. The Aral Sea crisis renders negative influence on conditions and qualities to the life of the population of the Central Asia, but more all it is reflected in a state of health of people living in an epicenter of ecological disaster. Increase of a rate of unemployment, falling of incomes, and reduction in life expectancy other incomplete list of consequences of ecological crisis. Total influence of an adverse environment has resulted serious complication of the state of health of the population, in particular in connection with poor quality of potable water and toxic air pollution. Water seasonally from 30% up to 100% does not meet sanitary requirements. Pollution of water of open reservoirs has total character, in result there is considerably polluted under soil water, including water wells. The water factor and its pollution are playing a determining role in the increase of diseases of people, increase in the general and children's death rate. The level of children's death rate on 16.8% in Priaraly is higher than similar parameters 12.8% of parent death rate on Republic of Uzbekistan. It is connected, particularly, with the increased level of respiratory illnesses, of blood, cardiovascular diseases, and illnesses of kidneys, specifications illnesses, oncological and sharp intestinal diseases. Feature of structure of diseases in Republic Karakalpakstan is high parameters of diseases an anemia which makes in structure of the general diseases – 50.4 of %. The region then closer to Aral Sea, it is above a level of diseases and death rate.

## 68.
## MC1R variants associated susceptibility to basal cell carcinoma of skin: Interaction with host factors and XRCC3 polymorphism

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The variants within the human melanocortin 1 receptor (MC1R) gene are associated with an increased risk of different skin cancers. In this study, we genotyped by direct sequencing, 529 cases of basal cell carcinoma of the skin (BCC) and 533 healthy controls for polymorphisms in the entire MC1R gene. In addition to 10 common polymorphisms, we detected 23 rare variants in the gene. The presence of any non-synonymous MC1R variant was associated with an increased risk in the carriers (odds ratio OR 1.66, 95% confidence interval CI 1.28–2.14) corresponding to a population attributable fraction of about 27%. The odds ratio for the risk in the carriers of 2 MC1R variants was 2.69 (95% CI 1.77–4.08). The risk of BCC in the carriers of MC1R variants with fair complexion was almost twice as much as in the corresponding non-carriers. The carriers of the R163Q variant with a medium skin complexion were at a 3-fold higher risk than the non-carrier counterparts. The interaction, of effect on the BCC risk, between the MC1R variants and types of skin response to sun exposure was greater than multiplicative. We also observed a multiplicative interaction of risk due to the MC1R variants and the common allele (high risk) of the T241M polymorphism in the XRCC3 gene. Our data confirmed the status of the non-synonymous MC1R variants as independent genetic risk factors for BCC. However, the mechanism through which the variants influence the risk likely involves complex interactions with other genetic and host risk factors.

## 69.
## Risk factors for cancers in a small Russian town with unusually high cancer morbidity rates and the search for biological protection of its residents

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The population of Karpinsk, a small industrial community in the northern part of the Middle Urals, suffers from cancer morbidity rates markedly higher than both average regional rates and rates characteristic of many cities and towns in the Region (Sverdlovsk oblast) – even of those much more industrialized and polluted, in particular, with carcinogens. At a distance of 9 kilometers to leeward of Karpinsk a large aluminum electrolysis plant releases carcinogenic PAH-containing emissions, but the cancer morbidity in Karpinsk is higher than in the town situated close to that plant. Lung, colon and breast cancers in Karpinsk are the most prevalent. We looked for risk factors for these cancers in a community-based case-control study using: (a) a special questionnaire on individual features, (b) different approaches to assessment of different exposures (factual monitoring, mathematical modelling, exposure surrogates), and (c) data analysis based on

multivariant logistic regression. Along with some well-known individual carcinogenic risk factors that are not prevalent in this population more than usual, we found a significant unfavourable influence of a complex of features describing a home as "uncomfortable". Primary among these was the unusually widespread use of indoor coal burners for heating, water boiling and in kitchen ranges. This situation arises because Karpinsk had the poorest development of central heating and gasification, easy access to low cost local coal, and high percentage of the population living in small houses. Out of different ambient exposures, only benzo(a)pyrene concentrations in the vicinity of dwellings (as modelled taking into account both the above-mentioned PAH-containing industrial emissions and smoke from boiler-houses and local chimneys) were related in a statistically significant manner with cancer. Breast cancer was significantly associated with a set of risk factors connected with pregnancies, deliveries, breast feeding etc. Against the background of these risk factors, the influence of smoking, alcohol and environmental factors in general proved less distinguo. We found that in rats exposed to subchronic intoxication with a combination of toxic and mutagenic metals (lead-arsenic-chromium-nickel-cadmium) characteristic of soil contamination in Karpinsk due to local industries long ago extinct, fluoride and benzo(a)pyrene sorbed on activated charcoal, treatment with a bioprophylactic complex (BPC) comprising glutamate, pectin enterosorbent, multivitamin and multimineral preparation and calcium additive, reduced the genotoxic effect. The inclusion into the BPC of a bioactive preparation enriched with polyunsaturated fatty acids (as precursors of intracellularly formed eicosanoids) enhanced the antigenotoxic action. The results of a special survey in a female population were analysed allowing for earlier established populational and individual risk factors for the development of lung, colon and breast cancer to form a group of high cancer risk. In this group we selected women who did not have cancer of any type using targeted medical examination showing that they had no cancer. These volunteers were administered a one-month course of a similar BPC which proved no less effective than in the animal experiment as concerns the DNA repair.

## 70.
## Falling down the well: Local peculiarities and the EU policy approach in the case of groundwater contaminated by arsenic in Bekes, Hungary

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Managing a public health threat, such as geogenic arsenic in groundwater, requires effective policy. Within EU member states, policy is shaped by multiple layers of governance, with the EU at the top. Ensuring that individual countries can adequately manage groundwater resources requires understanding the barriers this system creates. This paper presents preliminary findings from a small part of a PhD research project into the effects of Europeanisation on the ability of Eastern European countries to manage groundwater with high concentrations of geogenic arsenic. The research has been conducted via two visits to Békés and the vicinity in November 2007 and June 2008. Interviews have been conducted with water users and with representatives of national and local level governance institutions. The preliminary results show that drinking water legislation at the EU focuses on mains supplied water, bottled mineral water, and medicinal/thermal waters. This emphasis is maintained when translated through into national policy and therefore into local management. However, local water use does not always adhere to this plan. There are a number of artesian wells in the county of Békés. In the town itself, there are two. This is an area known to have high arsenic concentrations in the groundwater, and water from these wells has been shown to have an arsenic concentration in excess of the EU limit for drinking water of 10 ppb. Both are popular with local people, who visit the wells to collect water on a regular basis. This water is used primarily for drinking and bathing. Verbal accounts and local documentation suggest a strong

cultural attachment to these wells. Further, people consistently report a preference for the well water due to a strong dislike of the mains supplied water, and a perception that well water is healthier. Many are aware of the high arsenic content, but do not perceive any negative impacts. These wells supply water that does not fall into any of the aforementioned categories. Responsibility over monitoring and management is therefore unclear. Interviews conducted so far suggest that these wells are not accounted for at any level from national to local. Indeed, awareness of these wells amongst all institutions is limited. These findings have implications on how the national and local governments in Hungary can effectively protect public health. In the context of the wider PhD research, the case study illustrates peculiarities at the local level that are not accounted for at the EU level, and therefore are not automatically addressed when legislation is translated into policy. However, national governments are not detained from addressing such issues in their own policy systems. Therefore, it must be examined why national policy systems do not reflect these peculiarities. The initial results from this case study suggest that 1) national institutions are focussed on fulfilling EU requirements, not on determining their context-specific gaps; and 2) such peculiarities are not necessarily known of at the national level.

## 71.
## Use of resource equivalency analysis in restoration of mining sites

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Although improved mining methods may continue to reduce the level of adverse ecological and human health impacts associated with mining activities, such collateral impacts are unlikely to be fully avoided. Compensatory restoration actions can be a way to counterbalance residual adverse affects, and return the services ecosystems provide to their baseline condition prior to the conduct of mining operations. There is a need to establish the use of objective metrics for measuring the collateral damages associated with mining activities and the benefits derived from restoration or compensation projects, and to scale the latter to appropriately compensate for the former. Resource equivalency analysis (REA) has been used in the United States for more than a decade to quantify natural resource damages over time and space, and to scale compensatory actions. REA has the potential to be used to plan for and assist in the implementation of projects before mining operations begin or upon mine closure, which can be aimed at mitigating those adverse effects of mining operations that have the potential to harm ecological and human health. An overview of REA in the context of mining activities is presented with site-specific examples.

## 72.
## Study on magnesium deficiency detected in several elderly persons

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Introduction: Aging constitutes a risk factor for magnesium deficiency. Primary magnesium deficit originates from two aetiological mechanisms: deficiency and depletion. Secondary magnesium deficit in aging largely results from various pathologies and treatments common to elderly persons. It seems to be well-established that magnesium does not constitute an elixir vitae as P. Delbet proposed. Conversely, magnesium deficit may play a role in the pathophysiology of aging. Magnesium deficit accelerates aging through its various effects on the neuromuscular, cardiovas-

cular and endocrine apparatus, kidney and bone, immunity, antistress and anti-oxidant systems. Methods: The aim of this presentation is to highlight the important role of magnesium deficit in ageing, its physiopathological consequences, and lastly, the importance of its treatment in elderly patients. Results and comments: During the last year, we have measured Mg blood serum level by spectrophotometry, in 40 normal females and 40 normal males (controls) in comparison with 40 females and 40 males with several elderly determined clinical pathologies (cases). The accepted value for serum Mg was considered to be 1.7–2.5 mg/ml. Among the 80 cases, Mg deficiency was identified in 18 females and 6 males (< 1.5 mg/ml) compared with the controls that had normal values. These 18 female and 6 male cases with normal kidney function were treated with magnesium supplementation (5 mg Mg/kg/day). After 6 months of treatment, all 24 patients showed significant increase of Mg ($p<0.001$) and the levels reached the normal values. However, females reacted less than males. Our conclusions are: Magnesium deficiency depends on various pathologies, nutritional deficiencies and treatments common to elderly persons. Aging with its various diseases affect indirectly the magnesium deficiency. Such deficiency may in turn participate in the clinical pattern of ageing – neuromuscular, cardiovascular and other symptomatologies. Females reacted less to therapy than males. Oral magnesium supplementation is a successful treatment method for reversing magnesium deficiency.

## 73.
## Use of toxicogenomics to study mechanisms of the action of environmental pollutants on human health

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The combination of toxicogenomics and molecular epidemiology was employed to study the biological effects of environmental pollution on human health. In the pilot study, gene expression profiles were determined in placenta, venous blood and umbilical cord blood of 80 subjects exposed to environmental pollution in the city of Prague (Czech Republic) using Illumina human Ref-8 expression beadchips with the aim to create standardized protocol for more detailed follow-up study comparing the effects of different levels of environmental pollution in industrial and rural regions of the Czech Republic. In order to get more inside into the molecular mechanisms of various adverse effects of the environmental pollutants on human health and their potential transfer from mothers to fetus, we identify major changes in the gene expression and analyze potential transfer of these changes from mother to fetus. The exposure to genotoxic compounds is simultaneously controlled by stationary monitoring of the basic air pollutants (PM2.5, carcinogenic PAHs), by the analysis of bulky DNA adducts, oxidative damage of DNA, proteins and lipids in placenta and lymphocytes isolated from maternal and umbilical cord blood. The hypothesis will be tested whether increased exposure to toxic compounds in the environment induce specific signature in the gene expression profiles in mother and/or fetus blood. Tobacco smoke exposure is controlled by the analysis of cotinine levels in plasma. Detailed lifestyle and medical questionnaires is filled and evaluated for participating mothers. Gene expression profiles will be related to various biomarkers of exposure, effect and susceptibility to clarify molecular bases of the observed changes. Supported by the Czech Ministry of Education (Grant No. 2B06088).

## 74.
## A reconfigurable wireless sensor fusion system for environment and health research

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This paper describes a reconfigurable sensor system that can be configured to include a wide range of sensors to meet various environmental and health research detection needs. The system is battery powered with a flexible and expandable power sub-system that can supply sensors with varying power requirements. Other features, such as local/remote removable flash memory storage, real-time clock, and mesh wireless networking are also included. The wireless networking allows an area or a group of subjects to be studied simultaneously, making it possible for the data to be fused and studied more effectively. It is envisioned that this system can increase the effectiveness of environmental and health research by providing the capability to combine data using the desired fusion algorithms. At the writing of this paper, this sensor system has CO, CO2, pressure, humidity, temperature, 3-axis accelerometer, GPS, and noise-level sensors.

## 75.
## Effects of comprehensive smoke-free legislation in Europe

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Second-hand smoke, sometimes referred to as passive smoking carries serious health risks, especially for children and those who are chronically and regularly exposed. Laws banning smoking in enclosed public places, including workplaces, restaurants and bars entered into force in several countries from Europe starting with the year 2004. The aim of this study is to review the studies conducted in order to evaluate the impact of the complete ban on smoking in enclosed public places in different countries of Europe. The source of data is represented by articles and short information published in peer reviewed journals or in electronic format between the years 2005 and 2008. Highlights include a consideration of the effects of these laws on the attitudes of the population regarding their implementation, exposure to passive smoking in public places as well as the scientific evidence on the public health and economic impact of these laws. Several studies show that clean indoor air laws are well accepted by the public, lead to a significant decrease of exposure to second hand smoking in public places and contribute to the reduction in overall cigarette consumption.At the same time, different studies documented important short-term effects on the respiratory system health of workers from the bars and restaurants after the introduction of the law. Moreover, important short-term effects on the rates of hospital admission for acute myocardial infarction were observed. The vast majority of scientific evidence indicates that there is no negative economic impact of clean indoor air policies on the hospitality industry, despite the fact that tobacco industry has attempted to create fears to the contrary. The results of smoking ban in public places observed in several parts of Europe support initiatives in many countries toward implementing smoke-free legislation, particularly those who have ratified the Framework Convention on Tobacco Control, which calls for legislation to reduce tobacco smoke pollution. Further progress in the diffusion of clean indoor air laws will depend on the continued documentation of their short term and long-term impact on public health as well of their economical consequences, particularly within the hospitality industry.

## 76.
## Lead exposure assessment in a population group living in the area of influence of a power plant ("CET" South), in Timişoara

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In varying amounts, lead is present in our diets, water, air, soil, and consumer goods. Lead at high concentrations is considered to have a potentially toxic action affecting humans as well as most other life forms. For this reason, there is a need to be concerned about elevated lead levels in the environment, particularly in highly contaminated areas, near industrial facilities. Within this context, lead contaminated soil and dust are the major sources of exposure for the inhabitants in the surrounding area, especially for children, due to their frequent hand-to-mouth behaviour. Such an industrial facility is the Power Plant CET- South located in Timisoara, western part of Romania, operating since 1987, which is supplying the city's heating system during winter time. In order to assess the exposure, lead concentrations in soil, water and air were measured in the area. These data were used to predict blood lead levels using the EPA IEUBK model. Elevated blood lead levels were found in people living in the area, particularly in children. Recommendations have been made within a risk management strategy in order to reduce population exposure: exposed population groups information as regards the risk of lead exposure; monitoring of blood lead levels in susceptible population groups living in the power plant area of influence; rehabilitation strategies of the intensively polluted areas.

## 77.
## The sources of human milk contamination with organochlorine pesticides (OCPs) among the residents of Southern Kyrgyzstan

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Contamination of human milk with OCPs is one of the urgent medical problems. OCPs aggravate the course of disease and are considered to be one of the main causes of different neonatal disorders. Soil (areas requiring irrigation, arable lands, destroyed pesticide storages and airfields, where pesticides were applied for pest control) is one of the sources of human milk contamination with OCPs. At present, the local population cultivates vegetables and fruit on these lands. For detecting the concentration of OCPs in human milk 105 samples were subjected to analyses. Method of a gas-liquid chromatography developed by Klisenko and Girenko was applied. For detecting the sources of human contamination, all the examined women were divided into groups: The first group comprised 24 women, the residents of mountainous zones, which is considered to be "pure zone". Pesticides were not applied there. OCPs were detected in 10 (41.6%)/ As it turned out, DDT was used for pest control. Women applied the pesticide without any protective gears and some part of DDT penetrated into the body through the skin and the rest accumulated in the meat and milk of animals. II group – 55 women (city-dwellers). Pesticides were found in 30 (54.5%). The main source of human milk contamination among the women of the second group were foodstuffs, transported from cotton-growing areas which were contaminated with COPs. III group – 26 women, the residents of cotton- growing area. OCPs were detected in 21 (80.7%). The cotton-

growing area is the main source of human milk contamination with OCPs. Pesticides were and are still being applied in this area. All the examined consumed food-stuffs, contaminated with OCPs. The data obtained during our investigations allow to determine the main sources of human milk contamination with OCPs: food-stuffs, skin and respiratory system. Human milk is of great importance for neonates. And children health is closely connected with its quality. Thus, the monitoring of different sources of human milk contamination and development of OCPs protective means have primary meaning.

## 78.
## The sensibility of the key neurons – Purkinje cells of cat cerebellar cortex to decimetre range microwave radiation

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Two models of acute experiments were performed in cats – de-cerebrated and anaesthetized, where extracellular electrophysiological activities of Purkinje cells (PC) were registered by glass microelectrodes and analysed before, during and after local exposure of Cerebellum to Microwaves (MW) with the parameters of intensity and duration of exposure chosen according to those applied in physical therapy for different neurological disorders – 400 and 1200 mW/cm$^2$, and 10 min. The character of PC reaction to MW appeared to be dependent on the models of experiments, deepness of anaesthetization, intensity of irradiation, duration of exposition, and the methods of application of MW radiation. The PC impulse activity in the state of de-cerebration appeared to be significantly higher (for 2-3 times) than that in the condition of anaesthesia apparently because of depressing effect of narcotic substance on brain activity. Latent Period (LP) of PC reaction to MW of 400 mW/cm2 in the state of de-cerebration (40-45 sec.) was extremely shorter than that in the narcotised animals (6-7 min.), while post-exposure restoration periods of PC pre-exposure activities in de-cerebrated animals (more than 30 min.) turned out to be longer against 8-10 min. observed in intact (anesthetised) animals. In intact model of experimentation, it was established, the deeper the narcosis the longer the LP of PC reaction to MW radiation. The overall duration of the state of narcosis appeared to be significantly less in all experiments in the condition of MW irradiation in relation to those of control that was a testimony to increasing effects of energetic processes in an organism by MW. At a certain point of the depth of anaesthesia, a new portion of the narcotic substance added was less effective in changing of PC impulse activity, probably because of weakened energetic exchange-utilization processes depressed by narcosis, while application of MW immediately caused a decrease in the activity, implying the increase in the energetic processes leading to intensification of absorption of added narcotic substances by the animal organism, which depress PC activity, as a rule. Further application of MW decreased the duration of anaesthesia, and led to the PC activity increase. The MW intensity increase from 400 to 1200 mW/cm$^2$ decreased LP of PC reaction from 6-7 min. to 3-4 min. in intact animals with insignificant changes in restoration periods. In the states of anaesthetisation, it was used reiterated irradiation of Cerebellum by MW by the end of each rehabilitation period of a single PC activity after the previous procedure, which led to significant and continual reductions in LP of PC reaction to each of repeated MW applications until the appearance of “onset” or “offset” reaction. This situation made it possible to regulate – increase or decrease – the activity of a single PC by changing MW intensity slightly. The series of such applications of MW that was named as “Repeated Irradiation” increased the level of PC activity in intact animals up to that of the state of decerebration, and made it sensible to the factor and available to produce the effect of the radiation on PC activity very easily. Experimental data obtained in the experiments permit to estimate MW as an important ecological and medical instrument to apply in different fields of medi-

cine – neurology, anaesthesiology, and biology. This material includes information presented for the first time.

## 79.
## Project introduction and discussion – Exposure assessment of consumers via chemicals used in households. Slovakia specific exposure factors

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The presented project deals with exposure assessment of consumers to chemical substances and preparations used in households. There are preparations of common consumption which are used by every people, without reflection of potential health and environmental effects. The area of chemicals used in these categories at households is quite broad. There are for example different paints, varnishes, shoes polishes; pesticides used against flies or other insects. Some of them contain potentially hazardous substances, sometimes as active components, some other time as aliasing contaminants. The exposure assessment process is really affected through three groups of data: 1.) concentrations data – the concentrations of chemical in the air, water, foods, and consumer products of course, 2.) contact data – e.g. room area, room volume, surface area where substance has been applied, 3.) data about product – chemical properties, composition, safety information. The group of contact data is in the centre of the introduced project interest. This data are often marked as exposure factors – the factors essential for exposure dose modelling in specific condition. The actually used software product applies two different approaches: 1. Using default values, in that case when concrete measured and real data for certain condition (country, town, area) are not available. These factors are developed via specific research studies provided in different countries, on different quality level. This data are not too reliable for specific conditions of another country. 2. Using site specific factors for individual site (country, town, area) with definition of reliability level which depends on methodological and realisation quality of the research study realised for determination of exposure factor. The clear absence of Slovakia specific exposure factors and following use possibility for other Central and Eastern European countries are basic outlet of the project. The default values used for exposure assessment through some software products do not correspond with real data in Slovakia as well as in other surrounding countries. The Slovakia specific exposure factors identification in the case of consumer exposure is the main aim and acquisition of the presented project. The strong increase of the exposure assessment quality, précising of the modelled exposure dose for Slovakian conditions and increase of health risk assessment validity will be the main project outputs. The health risk assessment is realised as basic evaluation tool for chemical preparations production, spreading and marketing purposes at the European Union market area.

## 80.
## Drinking water

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Azerbaijan is poor in terms of available water resources. A large part of the country, notably the Kura-Araz lowlands and the Absheron peninsula, has a significant water deficit due to low precipitation and high evaporation. The Republic of Azerbaijan's WSS sector is burdened by inefficient operations, outdated and rundown physical infrastructure, and severe financial constraints. Azerbaijan's citizens receive water at irregular times of the day and what comes through the pipes is usually unfit for consumption. Starting from 1995 there have been done works on improvement of WSS sector by protecting springs, wells, improvement of public tap, rainwater collection etc. (WHO, World Bank, USAID, NATO and other international/national projects). From the bar chart that i will present in my poster can be determined that from 1990–2004 access to improved drinking water in rural zones increased from 51 to 58 (59)% and in urban zones from 82–95%. For the present moment issues are: Ground water pollution from oil spillage and leakage from pipeline and storage tanks resulting in petroleum hydrocarbons, heavy metals and possibly radiation contamination; run off from heavy usage of fertilizers and pesticides in agriculture; factory wastes dumped into rivers; salinity of water table due to rise in Caspian Sea and sea water intrusion; rusted water pipes; obsolete and broken equipment in water treatment plants. There is concern about transmission of bacterial diseases such as cholera and hepatitis; accumulation of heavy metals leading to health complications; cancers. In Azerbaijan, nearly three quarters of population use drinking water from improved drinking water sources. While the figure is above 94 per cent for the Baku area, it declines to 65 per cent in the South. In conclusion access of the rural population to safe drinking water appears to be a problem (58-59 percent) which cause an increase of contagious disease rates of adults and children.

## 81.
## Study on the oportunity of a new slabstock flexible polyurethane foam facility located in Baia Mare, nw Romania

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The paper is dealing with some aspects concerning the integrated environmental assessment for the impact of pollutants related to the future activity in a new slabstock flexible polyurethane foam plant located in south-western part of Baia Mare city, in Maramures County, NW Romania, with a production of 30,000 tons/year.

Following the project analysis, the pollution sources and the main air pollutants that will be emitted in the environment were identified. Theoretical estimations of the pollutants' concentrations were compared to European and national regulations regarding the emission limit values.

The area impacted by the air pollutants as well as the highest concentrations zones were predicted by atmospheric dispersion modelling. Distances from the plant to these hot spots were estimated.

The characterization of the actual level of pollution in the proposed location was performed in order to define the "zero" option, without implementing the project.

The actual pollution level, the people's health and the results of the environmental impact assessment were the main issues for the impact assessment on the health in order to define the rela-

tion environment-health and consequently for the decision-making for implementing this project. It is known that Baia Mare area is highly polluted due to the mining and metallurgical activities running for more than 150 years without any measures regarding the protection of the environment.

The paper was also identifying measures and supplementary decisions that might be necessary in order to ensure the compliance with the principles of the sustainable development of the community. In this respect the strategic analysis was performed in order to integrate the project into the prioritic directions of the administrative (local – regional) and sectoral development (industry, particularly chemical one). The impacts associated to the project were cumulatively evaluated and the investor was suggested for necessary complementary measures.

The overall study results will support the competent authorities and organizations with the decision-making process, mainly by delivering reliable data for the emitted air pollutants and the compliance with the limit values set by the European and national regulations.

## 82.
## Public health assessment of arsenic and lead exposures from smelter operations (over 100 years) in adjacent communities

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Public health concerns were raised about the possible impact of air emissions from a local metals smelter, particularly the air emissions, prior to the installation of pollution controls in the 1970s. Beginning operations in 1887, the smelter processed primarily lead, copper, cadmium, and zinc. The smelter suspended operations in 1999. Historically, the facility's air emissions have been documented to contain high levels of metals such as iron, lead, arsenic, zinc, and cadmium. Subsequently, the surrounding area and surface soils have been impacted from smelter emissions. Area-wide soil sampling showed that some residential yards contained arsenic and lead levels as high as 81 ppm arsenic and 1,700 ppm lead, respectively. As of 2008, out of approximately 7,000 properties in the area, over 2,100 have been tested and over 1,000 have been cleaned. Federal, State and city/county health agencies agree that residential soil lead levels over 500 milligrams per kilogram (mg/kg), and residential soil arsenic levels over 46 mg/kg could pose an unacceptable level of risk to children in the 1 to 6 year age range. Children with the greatest degree of hand-to-mouth behaviour (1, 2, and 3 year old children) would be at greatest risk. In response, children's blood lead levels have been evaluated in the surrounding communities, an in-vivo bioavailability study was conducted, and site specific clean-up levels for arsenic and lead were developed.

## 83.
## Ecological closing and reconstruction of the mining objectives, dynamic processes in permanent adaptation to the actual field conditions and to the requirements

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The closing of the mining objectives and the ecological reconstruction of the areas affected by the exploitation works, consists in a complex series of activities in a permanent reevaluation of the

technical solutions and implicitly the economical ones, depending on the field condition and on the needs of the local communities affected by the ex-mining activities. In the work, based on the case study on Bodos Stone Pit in Covasna County, the authors present the stages and the working procedures respectively the adaptation modality of the technical solutions, provided in the closing projects, at the actual requirements in the field, respectively at the needs of the local communities and of the institutions of territorial administrations. All the adaptation stages of the technical solutions are analysed and adopted in a realistic and viable economical context.

## 84.
## Elaboration concept of an environmental management plan for the performance of the mining activities

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This assignment comprises the basic concepts and the environmental policy principles of the mining organisations, in compliance with the current tendencies in Romania. The authors emphasize the steps to be taken towards the development and implementation of an Environmental Management System (SMM), respectively the original environmental analysis, the analysis stages, the systematic implementation and the development of the system. Furthermore, the Original Analysis Models (MAI) are presented and recommended to the interested parties, with respect to the environmental parameters, MAI content, the inventory of the target and objectives, the elaboration of the environmental management program for the agreed targets and objectives, the harmonization of the environmental policy with the provisions of the implementation and performance manual of SMM.

## 85.
## Arsenic and heavy metals in bottom sediments of Kaczawa watershed in surrounding of polymetallic ore deposits Żeleźniak (Kaczawskie Mts., SW Poland)

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Through the centuries, Lower Silesia was an important mining region. Local polymetallic copper deposits belong to the biggest in the world. The mining of certain minerals, including gold, copper, and nickel, is associated with acid drainage problems that can cause long-term impairment to waterways and biodiversity (Akcil and Koldas, 2006). Oxidation of pyritic ores is a major cause of acidic drainage (Bednar et al., 2005; Black and Craw, 2001; Gault et al., 2001). The production of iron(III) and hydrogen ions can catalytically dissolve secondary minerals, thereby increasing the metal load to the drainage (Wildeman et al., 1974; Plumlee et al., 1993). The study was carried out in the surrounding of old copper and arsenic mine Zelezniak in the Kaczawskie Mountains where metals were mined and smelted beginning from 15th century until 1925. Arsenic smelter operated in the village Radzimowice, situated on the slopes of Zelezniak, until 1892. The main goal of the study was to examine the occurrence of arsenic and heavy metals and their con-

centrations in bottom sediments of the main streams draining the area. The samples were collected in the years 2002 and 2003 at 16 sites. Basic properties of sediments, i.e. pH, organic carbon grain size distribution, as well as As and heavy metal concentrations were determined. Most of the collected samples had sandy or gravel texture. pH was alkaline and the amount of organic carbon varied from 0,3 to 4,4%. For As and heavy metal concentrations, only fine earth fraction of sediments (< 1mm) was examined. Concentrations of As and all metals examined were higher than natural background in Poland, which resulted from long-term sedimentation of the particles transported by the water. The highest concentrations of As were determined in the sediments of Olszanka stream (16 000 $mg \cdot kg^{-1}$ in 2002 and 9630 $mg \cdot kg^{-1}$ in 2003), that contained additionally the highest concentrations of other heavy metals – Cu (5920–6140 mg/kg), Zn (1240–1560 mg/kg), Pb (762–845 mg/kg), Ni (197–221 mg/kg) and Cd (3,4 mg/kg). Concentrations of metals and As decreased down the streams and were correlated with concentrations of iron oxides, which should be considered as typical for AMD-affected freshwaters (Karczewska et al. 2007). Almost 86% of As, 78% of Cu and 56% of Ni was in potentially soluble forms. The correlations between total and potentially soluble forms of metals and As were not statistically relevant. As and heavy metals were also determined in particular grain size fractions of bottom sediments. Clay fraction (< 0,002 mm) contained the highest amounts of As and other metals. Sequential extraction of As (Wenzel et al. 2001) showed that the main forms of arsenic in the sediments were those occluded in amorphous and crystalline iron oxides. Speciation of other metals, carried out according to Zeien and Brummer (1991), showed various patterns that depended on the metal examined. Conclusions: 1) Concentrations of As and all metals examined near old copper and arsenic mine were higher than natural background in Poland. 2) Concentrations of metals and As decreased down the streams and were correlated with concentrations of iron oxides, which should be considered as typical for AMD-affected freshwaters. 3) Most of the As and heavy metals were in the soluble forms, bioavailable for plants and animals.

## 86.
## Chemical pollution of mother's breast milk from Cluj area, Romania

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The fact that we are surrounded by pollutants makes us exposed every day during our life to different pollutants. It's known that human milk is the best source of nutrition for infants because breast milk contains the optimal balance of fats, carbohydrates and proteins for developing babies. Unfortunately because of the environmental pollution even the breast milk is contaminated with toxic chemicals released into the environment. In this study samples of human milk collected from different patients living in different location of Cluj district were analyzed. The milk samples were collected in sterile vials (40 mL) closed with Teflon lined screw cap, fixed with 16 mg K2Cr2O7 and kept at 4 °C until analysis. After the analysis of milk sample on gas chromatography coupled quadrupole mass spectrometer detector (Focus GC – DSQ II MS, Thermo Electron Corporation) using selective ion monitoring methods and for the quantitative analysis of some organochlorine pollutants the samples were analyzed also with gas chromatography equipped with ECD and FID detectors. In most of the milk samples different organic pollutants such as C2HCl3, C2Cl4, CHCl3 and some isomers of C14H9Cl5 such as C14H8Cl5 were detected. These contaminants are suspected to be carcinogens for humans and cause concern for the public health authority.

## 87.
## Arsenic contamination of groundwaters in the Tisza River Basin and treatment of well water with Al nanoclusters

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Arsenic is one of the most toxic, naturally occurring elements with carcinogenic effects on chronically exposed human populations. Geogenic arsenic concentrations in the groundwater of the Tisza river basin (part of the east Pannonian Basin, at the border area of Hungary and Romania) range between < 0.5 µg/L and 210 µg/L. The majority of the groundwaters can be classified as sodium-bicarbonate type. The dominant inorganic arsenic species is arsenite and the iron content is generally low. In many regions of the studied area, the publicly accessible artesian wells play an important role in the water supply due to the preference for the well water by the local population, and in a few villages also because distributing water pipes are not installed yet. The arsenic contamination of this water therefore represents a potential risk factor for the health of the affected population. This study investigates arsenate and arsenite adsorption on aluminium nanoclusters for the average groundwater composition of the Hungarian-Romanian border area. Batch experiments are conducted with synthetic water based on the composition of the groundwater of the studied area. The effect of pH and phosphate concentrations on arsenic adsorption is studied from pH 6.5–9.0 and 0–0.1 mM dissolved phosphate. The arsenic adsorption onto aluminium nanoclusters is tested for both arsenate and arsenite, at five different concentrations: 20 µg/L, 50 µg/L, 100 µg/L, 180 µg/L and 260 µg/L. Resulting concentrations of aqueous arsenic species remaining in the water are measured by HG-AFS. The aqueous speciation and kinetic reactions for the batch experiments are modelled consecutively. In the present contribution, first results of an arsenic treatment method with aluminum nanoclusters for groundwater compositions representative for the Romanian and Hungarian border area are shown and discussed.

## 88.
## Measuring arsenic volatilisation in the environment

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Arsenic volatilisation in the environment is a scarcely studied phenomenon due to inherent sampling issues (low concentration, stability etc...) though it is supposed to be an important pathway of release in the atmosphere. Implementing a simple sampling method to detect low concentrations of volatile Arsenic species, using flux chamber and silver nitrate impregnated silica gel tubes, will allow us to know in what extent and under which forms arsenic is released from reduced environment, such as rice cultivated paddy fields.

## 89.
## Acute toxicity test of some food additives on aquatic systems

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The occurrence and fate of food additives in the aquatic environment is an emerging issue in environmental chemistry. This paper describes the ecotoxicological effects of the commonly used additives gallates and parabens using the limit test at fish, according to OECD guidelines. There is little available information about the adverse effects of propyl gallate (PG) and parabens on aquatic organisms. Therefore, the toxic effects were compared, using different model systems – acute toxicity test on fish Xiphophorus helleri, bacterium Vibrio fischeri, alga Chlorella vulgaris, cladoceran Daphnia magna, lizozomal function of cell lines PLHC-1 and RTG, and enzymes glucose-6-phosphate-dehidrogenase and succinat dehydrogenase inhibition of cell lines PLHC-1 and RTG – from various trophic levels. A comparison of PG and parabens with carbofuran was made. According to the results, PG should be classified as non toxic to aquatic organisms.

## 90.
## Acute toxicity test of some ionic liquids on aquatic systems

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Acute toxicity resulting from exposure of Poecilia reticulata to several ionic liquids has been evaluated. P. reticulata survival was analyzed, according to OECD guidelines, in response to concentrations of 100 $mg \cdot L^{-1}$ of 1-etyl-3-methylimidazolium chloride [EMIM][Cl], 1-butyl-3-methylimidazolium chloride [BMIM][Cl] and 1-hexyl-3-methylimidazolium chloride [HMIM][Cl], considering that increasing alkyl chain length is a major factor in determining toxicity. Behavioural changes of fishes during the test period were also observed. A comparison between toxicity parameters obtained on different test systems – enzyme acetylcholinesterase, promyelocytic leukemia rat cell line IPC-81, freshwater crustacea (Daphnia magna), saltwater bacteria (Photobacterium phosphoreum) and nematode (C. elegans) – was made for the studied ionic liquids. The results support the choice of such an assay for the prospective risk assessment of these compounds.

## 91.
## Determination of Radium and Radon in drinking water samples

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The 222Rn radioisotope with 3.8 days decay half-life is produced form 238U natural series. The radon gas can enter to the body via respiring, drinking and eating. The alpha emitted by this gas and other radiation emitted by its daughters increase the absorbed dose in respiratory and digestive systems. Nearly 50% of annually radiation dose absorption of humans is due to radon which is one of the main cause of cancers in the respiratory and digestion systems. Radon concentration in water has been measured using the LUK-VR system, that is based on radon gas measurement with Lucas cell. The radium concentration was determined directly, after measuring the radon resulted from balanced with the radium. The results show that the radon and radium concentrations in drinking waters are within the range of 0,5–80 Bq/l for radon and 50–500 mBq/l for radium. From these measurements, the corresponding annual effective ingestion dose was determined.

## 92.
## Oral hygiene practices among adolescents in Kerala

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Oral health behaviour data are needed for planning and evaluation of oral health promotion programmes and also to develop specific oral health messages for behaviour change. Brushing and flossing are good practices to maintain good dental health. Several surveys in different parts of the world have found brushing to be one of the best ways. Objective of this study was to assess oral health behaviour with special reference to tooth picking among adolescents. This descriptive study was conducted in Kannur district in the Northern part of Kerala. A total of 512 children of 11–19 years of age were interviewed during a school health checkup programme. The school was selected based on the proximity to the medical college and their willingness to participate in the study. The school children were selected as the study group because of easy accessibility and availability. Consent from the guardian of the participating children was obtained before starting the study. The questionnaire included questions regarding their age, sex, religion, practice of brushing, tooth picking, flossing and frequency of dental visit. Questionnaires were distributed among all the children studying from sixth to twelfth standard. While administering the questionnaire, the researchers were present in the school to provide support and ensure independent and confidential reporting and also to clear any doubts regarding the answering pattern. Chi square test was performed to find the association between oral hygiene measures and socio-demographic variables. Of the total, 52.5% were females. The prevalence of tooth picking habit was found to be 58%. Students studying in higher classes had lesser tendency for tooth picking as compared to those studying in lower classes. This association was found to be statistically significant ($p<0.000$). There is a natural tendency to use different objects for oral hygiene, the nature of material used is important as use of sharp objects may injure the oral cavity and this in turn is dangerous for oral health. It shows that 76.3% of males and 58.9% of the females used coconut leaf tooth picks whereas 19.9% and 12.1% of the females used pin and thread as oral hygiene measure. All the three religions showed majority using broom stick piece. The study concludes that young age is the ideal period for inculcating good habits among children. The media can be utilized as the predominant source for disseminating good oral hygiene measures as most of the chil-

dren depend on visual media for getting information. This study recommends that, parents should be educated about prevention of certain dental problems and importance of regular oral checkup. Health education would play an instrumental role, to further improvement of oral health among adolescents in schools.

## 93.
## Biodegradation of the books in some libraries of Armenia

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Destructive activity of microscopic soil fungi, having high metabolic activity and elasticity, particularly becomes apparent on the paper and paper products having cellulose fiber, proteins, starch, carbohydrates, resins and other organic substances in their basis. Micromycetes-destructors damage perceptible treasures of world culture. Destructive effect of fungi on ancient manuscripts, handwritten books, documents kept in museums for uncertain years is aggravated in connection with the process of natural senescence. However, mycodestructors also cause considerable damage to the book fund among functioning libraries, where the minimum conditions and precautions about biodamaging situation are not created. Mycological researches of book fund have been conducted in libraries of some cities, villages of Armenia. In connection with hard conditions in libraries in abovementioned regions the species composition of mycobiota differed with great variety. As a results of our investigation in the libraries a great amount of affected books with the following species of fungi were found: Aspergillus niger, A. flavus, A. awamori, A restrictus, Penicillium canescens, P. puberulum, P. hordei, P. verrucosum var. cyclopium, P. gladioli, Trichoderma glaucum, Alternaria alternata, Mucor racemosus, M. mucedo, Cunninghamella echinulata, Rhizopus stolonifer, Chaetomium globosum, Fusarium oxysporum, as well as representatives of the class Agonomycetales (Mycelia sterilia). The constant humidity and lack of ventilation in the lodgments of libraries in some regions of Armenia brought to the air pollution with viable fungal spores-destructors. This kind of environment, with high concentration of mould's spores influence the health of the staff. At the same time the staff doesn't have corresponding knowledge about mycotic disease of people. The staff members of the libraries are registered to have hypostasis and eye reddening, itch and hand burning, the symptoms of bronchial asthma, holding chronic character. In connection with significant expansion of mycosis, mycotoxicosis and allergic diseases of a man the problem acquired relevant social significance. Ecological factors stimulating of hazardous micromycetes and new approaches of the health risk assessment are discussed. Hereby, our investigation point out the necessity of monitoring research as for the reason of getting authentic material, as well as holding activities for increasing the knowledge of the employees and for the insurance of their health safety.

## 94.
## Macronutrients intake and breast cancer risk among Romanian females – Case-control study

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Breast cancer is the most common cancer in women and is the leading cause of death in women throughout the world, accounting for 14 per cent of all cancer deaths worldwide. The etiology of breast cancer is multifactorial. The role of diet in the etiology of breast cancer has been extensively evaluated. The association between risk of breast cancer and dietary fat and intakes of other energy sources remains controversial. Case-control studies generally support an association, while cohort studies have produced inconsistent results. Ecological studies have shown positive correlation between total fat intake and breast cancer rates. The Romanian traditional diet from Transylvania region is characterized by a high total fat, especially saturated fat intake. The diet is based on animal food products and refined cereals products. The objective of this study was to estimate macronutrient intake – fats, protein, carbohydrates- among the Romanian females from Transylvania region and to establish the relationship between macronutrient intake and breast cancer risk. Methods. The case-control study was carried out on 223 patients with confirmed cancer, hospitalized in the Oncological Institute "Ion Chiricuta" Cluj-Napoca and 211 controls, women from the same geographic area, matched by age. Diet was assessed through a quantitative validated food frequency questionnaire, administrated by interview. Macronutrient intakes were estimated using the table of food composition for each specific food item, summed for all items. Data were analysed in Microsoft Excel and Epiinfo 3.3.2. We calculated odds ratio for different levels of nutrient intake represented by quartiles and we used chi-square test to establish the significance of linear trend of cancer risk. The results whose value was $p<0.05$ were considered statistical significant. Results. The risk of breast cancer increased with increasing total fat intake (P for trend 0.01). The odds ratio for the highest quartile of fat intake versus the lowest were 1.82 ($p=0.01$). High intakes of saturated fats were associated with an increased risk of breast cancer (P for trend 0.01), but the intakes of vegetable fats were not significantly associated with breast cancer risk. On the other hand protein intakes were not significantly associated with risk of breast cancer. The carbohydrates were positively associated with the increase risk of breast cancer (P for trend 0.006). Despite of the low consumption, dietary fiber intake were protective against mammary carcinogenesis (P for trend <0.001), the odds ratio for the highest quartile of fiber intake was 0.47, $p=0.001$. Conclusions. The study revealed that energy-dense nutrients, such as fats and carbohydrates, may increase breast cancer risk. The high intake of energy-dense food may lead to obesity and body fatness, another risk factors for breast cancer (postmenopausal). The protective effect of dietary fiber suggest to increase the consumption of whole cereals, vegetables, fruits and legumes, foods rich also in other bioactive compounds that may protect against cancer. These findings highlights the importance of a healthy diet in breast cancer prevention. The diet may be considered a changeable risk factor, while other risk factors (genetic, hormone-dependent) are unmodifiable.

## 95.
## Geographical distribution of chronic diseases in Roşia Montana, a mining area in Romania

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Chronic diseases represent a significant proportion of human illness worldwide. Promoting the prevention of an important number (about 36 million) of deaths caused by chronic diseases, has become a global action on public health for quite some time, focusing efforts on the prevention and correction of risk factors, naming high blood pressure, tobacco, alcohol, high cholesterol, overweight, low fruit and vegetable intake and physical inactivity, for the four frequency leading non-communicable chronic diseases: cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes. According to WHO, people die from all chronic diseases at dramatically younger ages in the central and eastern European countries. In Romania, as in other European countries, cardiovascular diseases are responsible for the highest number of deaths, with heart disease and stroke as the leading causes. Within Romania, Rosia Montana in the Apuseni Mountains is an area where mining in general and gold mining in particular, was a way of life for centuries and the impact of mining activities is reflected on the environment and on the health status of the population living in the area. The representation using a Geographical Information System, showed that in Rosia Montana area, the frequencies of some chronic respiratory, cardiovascular and endocrine (diabetes) diseases were higher within the population group living in Rosia Montana as compared with the population groups living in other localities in the area, while for chronic digestive diseases there was no specific trend in terms of spatial distribution. Non-communicable diseases remain a challenge for the health systems, absorbing substantial amounts of resources.

## 96.
## Aging, body composition, and lifestyle

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Introduction. The amounts of fat and fat-free mass (FFM) in adults change with increasing age as a function of a variety of factors, from physical activity to menopausal status to nutrition and disease. The status of the fat and FFM compartments is associated with and serves as established risk factors for a variety of chronic disease from middle to old age. Body composition can also be used in assessments of functional status, disability, and mortality. Understanding the scope of the age-related change in body composition and the factors associated with them in healthy adults will help to improve our knowledge and understanding of these processes and assist in the pre-

vention of functional limitation and in the management of health status into old age. Objective: The study aimed to study the relationship between body composition and weight changes with age, with the level of physical activity. Results and discussions: The changes in body composition and weight were lower in elderlies which maintained a constant physical activity customized to their age. These changes were less obvious in women. Differences between women and men could be explained also based on the differences between FFM and total FM, FFM in men being better represented. In menopausal women the estrogen level drops, which can be an associated cofactor altering the changes which occur in body composition and weight. Conclusions: A significant decrease in FFM and increases in total body fat, weight and BMI occur with age. Significant positive effects of physical activity are increases in fat-free mass and decreases in total body fat. A lower fat-free mass can be improved by an increased level of physical activity.

## 97.
## Benzo[a]pyrene-induced vascular endothelial adhesion molecule expression can be disrupted by selective flavonoid treatment

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Leukocyte recruitment to the vascular endothelium, mediated by adhesion molecules, such as intracellular adhesion molecule-1 (ICAM-1), plays a critical role in the initiation and progression of vascular diseases such as atherosclerosis. Exposure to the polycyclic aromatic hydrocarbon, benzo[a]pyrene (B[a] P) has been shown to correlate with the increased risk of cardiopulmonary diseases. Increased intake of dietary flavonoids may decrease the risk of developing these diseases. The goals of this research were to investigate the effects of B[a]P on endothelial cell adhesion and if flavonoids could protect against this endothelial pathology. Primary human umbilical vein endothelial cells (HUVECs) were pretreated overnight with vehicle or beta-naphthoflavone (beta-NF) to induce aryl hydrocarbon receptor (AhR) regulated metabolizing enzymes. Cells were then treated with B[a] P for 24 hours. B[a]P increased ICAM-1 protein expression only when pre-treated with beta-NF, suggesting B[a]P requires AhR to be converted into the active pro-inflammatory comound. This effect can be abolished by silencing of AhR by siRNA technology. Since ICAM-1 is necessary for the adhesion and migration of inflammatory leukocytes such as macrophages across the endothelium, macrophage adhesion was measured. Cells pretreated with beta-NF and treated with B[a]P were able to induce adhesion of fluorescently labeled macrophages to the activated endothelium, the physiological representation of ICAM-1 up-regulation. The signaling pathway involved in the up-regulation of ICAM-1 was determined to be through MEK/p38-MAPK/AP-1. Silencing of caveolin-1, the structural protein of the membrane microdomains, caveolae, was able to attenuate the ICAM-1 up-regulation. Finally, various flavonoids were incubated with beta-NF overnight, followed by treatment with B[a]P. Only flavonoids that contained a C-ring hydroxyl substitution and a B-ring double bond were able to protect against ICAM-1 induction by B[a]P measured by flow cytometry. This study suggests that B[a]P is able to increase endothelial cell adhesiveness by increasing ICAM-1, but only when activated by AhR-dependent enzymes and with a functional caveolae, and that this effect can be protected against by pre-treatment with selective flavonoids. (Supported by grants from ORISE Postdoctoral Fellowship, NIEHS/NIH (P42ES07380), NIEHS/NIH Training Grant (T32 ES07266), AHA Predoc-

toral Fellowship, and the UK AES) Disclaimer: The views expressed in this abstract are those of the authors and do not necessarily reflect the views or policies of the U.S. Environmental Protection Agency.

## 98.
## Molecular ecology of groundwater wells in the Pannonian basin: microbial involvement in arsenic cycling

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Arsenic release into groundwaters used for human consumption is of global concern. Groundwaters within the Pannonian basin are known to have arsenic concentrations above the 10 ppb limit proposed by the WHO. The number of individuals exposed to levels greater than the WHO limit in this area is thought to be over 600,000. The mechanisms for arsenic release, however, are unknown but believed to be microbially mediated. Microorganisms are capable of performing a wide variety of biogeochemical transformations that can influence arsenic solubility in groundwaters. Such transformations can include (i) the direct reduction of As(V) to potentially more mobile As(III), (ii) the reduction of arsenic-bearing minerals, (iii) the oxidation of As(III) to potentially less mobile As(V) and, (iv) the production of mineral phases e.g. Fe(III) oxyhydroxides that scavenge arsenic from solution. These processes are mediated by a diverse array of bacterial and archaeal genera. To date it is not known which groups of organisms inhabit aquifer systems within the Pannonian Basin and their role, if any, in arsenic release mechanisms. In order to gain insight into the mechanisms responsible for arsenic release and determine the organisms involved in this activity, we used a combined molecular ecological and geochemical approach. We collected waters from artesian, pumped, and open dug wells within western Romania and eastern Hungary that had soluble arsenic concentrations from less than 1 ppb to over 200 ppb. Our results revealed several types of known and unknown bacterial genera, capable of many types of transformations that can affect arsenic solubility. This presentation will focus on the microbial communities present in groundwater wells in the Pannonian basin and their possible role in arsenic release.

## 99.
## Current menarcheal and pubertal ages in Ghana and risk factors altering age at onset: in progress

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BACKGROUND: Research currently shows that for every 1 year decline in ages at puberty and menarche among girls, there is 7–10% increase in future risk of breast cancer. Breast cancer is the leading malignancy and cause of death among all cancer patients in Ghana. It is believed that factors affecting the ages of puberty and menarche are actually many of the same risk factors for breast cancer. OBJECTIVE: To collect data on the current menarcheal and pubertal ages among girls in the Ashanti Region of Ghana and to use the data to determine possible risk factors responsible for the declining ages. METHODS: In an ongoing cross-sectional study, about 600 consenting 3rd to 11th grade girls (9–16 yr olds) and their mothers participated. Data was collected by self-report using surveys adapted with permission from the "Ghana Nutrition Behavior Risk Survey" and the "Global Student Health Survey – Ghana". Heights and weights were also taken for BMI calculations. Analysis, using SAS (9.1), will be used to calculate the current ages and to identify risk factors for the altering ages. PUBLIC HEALTH IMPACT: This study will be a rich source of information for identifying risk factors for current trends in sexual development in Ghana and provide insight for possible risk factors for future risk of breast cancer. Also, chosen risk factors for investigation, BMI, nutrition and physical activity, are good targets for future interventions.

## 100.
## Combined analysis of maternal hair, maternal blood, infant hair, cord blood and meconium to detect fetal exposure to environmental pesticides

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OBJECTIVE: To determine optimum biomarkers to detect fetal exposure to environmental pesticides by the simultaneous analysis of maternal (hair and blood) and infant (cord blood, infant hair or meconium) matrices and to determine if a combination of these biomarkers will further increase the detection rate. PATIENTS AND METHODS: Pregnant women were prospectively recruited from an agricultural site in the Philippines with substantial use at home and in the farm of the following pesticides: propoxur, cyfluthrin, chlorpyrifos, cypermethrin, pretilachlor, bioallethrin, malathion, diazinon and transfluthrin. Maternal hair and blood were obtained at midgestation and at delivery and infant hair, cord blood and meconium were obtained after birth. All samples were analyzed by GCMS for the above pesticides and some of their metabolites. RESULTS: A total of 598 mother/infant dyads were included in this report. The highest rates of pesticide exposure were detected in meconium (23.2% to propoxur, 2.0% to pretilachlor, 1.7% to cypermethrin, 0.8% to cyfluthrin, 0.7% to DDT and 0.3% to malathion and bioallethrin) and in maternal hair (21.6% to propoxur, 14.5% to bioallethrin, 1.3% to malathion, 0.8% to DDT, 0.3% to chlorpyrifos and 0.2% to pretilachlor). Combined analysis of maternal hair and meconium increased detection rate further to 38.5% for propoxur and to 16.7% for pyrethroids. Pesticide metabolites were rarely found in any of the analyzed matrices. CONCLUSIONS: There is significant exposure of the pregnant woman and her fetus to pesticides, particularly to the home pesticides, propoxur and pyrethroids. Analysis of meconium for pesticides was the single most sensitive measure of exposure. However, combined analysis of maternal hair and meconium significantly increased the detection rate. A major advantage of analyzing maternal hair is that prenatal pesticide exposure in the mother can be detected and intervention measures can be initiated to minimize further exposure of the fetus to pesticides. This study was supported by grants from NIH/NICHD(R01HD

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## 101.
## New medical statistical software trial on Russian children's health data

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Health level is a recognized criterion of environmental quality and societal well-being. Children are especially exposed to negative environmental factors since children are less mobile and more sensitive to external conditions. That is why children sickness rate is a criterion of medical assessment of a territory. There is a range of computer software visualizing multidimensional data. Computer program SpaceWalker was initially developed for cosmic calculations but in Russia it finds an effective application in medical statistics. This software visualizes basic data files in pseudo-three-dimensional graphics. Every dot is a projection of a real object on a given two-dimensional plane. Since previously the SpaceWalker software has not been used for medical environmental calculations, we had a task to probe the program and to reveal its advantages and disadvantages for such investigations. To fulfill this task, database on primary children (0–14 years) sickness in St.Petersburg has been analyzed. The database was given by St.Petersburg Medical Information and Analytic Centre. Environmental, social and economic data on city's districts have been analyzed as well. To analyze the primary sickness, data on 17 pollutants (ammonia, acetone, benzol, nitric oxide, cadmium, xylol, manganese, copper, carbon oxide, dust, lead, sulphuric anhydride, toluol, phenol, formaldehyde, chlorous hydrogen, ethyl benzol) were collected on all monitoring sites of Hydrometeoservice and Statesanitarsupervision. Public health was evaluated based on the municipal statistical reports on 18 nosologic classes in 1997–2005. To evaluate information content and reliability of the conclusions made we used grouping and pair comparison. After grouping, we conducted pair comparison of 18 city districts and average city level. We compared an average primary children's sickness for 9-years period (1997–2005) and air pollution for the same period (7 major pollutants). The conducted research has demonstrated that Space Walker software can be effectively used for medical and environmental calculations, it has some essential advantages: 1.) More precisely and comprehensibly reflects the database structure as compared with grouping methods and cluster analysis; 2.) Gives the opportunity to single out discharges rapidly; 3.) Reduces time for cluster analysis; 4.) Enables a researcher to use his/her graphical thinking; 5.) Gives the opportunity to look through multiparameter database and simplifies work with multidimentional data. We can make a conclusion that the Space Walker programme can serve as an application to GIS. It will give the opportunity to rank and cluster territories and significantly reduces labour and time spent for primary analysis of multidimentional databases.

## 102.
## Association between Deprivation Index and mortality due to major malignant diseases in Hungary, 1994–2004

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Introduction. Association between environmental factors, certain social-economic factors and the state of health is well known and confirmed. There was a growing demand to study the association between the deprivation level based on SES factors and the mortality due to the major malignant diseases. Material and method. A special Deprivation Index was elaborated for Hungary. The socio-economic indicators were chosen at settlement level from the Regional Informational System, from the database of the Ministry of Local Government and Regional Development. Further data were derived from the Hungarian Central Statistical Office (Census 2001) and the Hungarian Tax and Financial Control Administration (2001). Selected SES factors: income, education, unemployment, one parent families, large families, density of housing, car ownership. The following causes of deaths in the age group of 30–64 years old were studied for the period of 1994–2004: mortality due to malignant neoplasms of lip, oral cavity and pharynx; stomach, colon, trachea, bronchus and lung, breast, prostate. The study was carried out by the risk analysis feature of Rapid Inquiry Facility applying GIS, developed by EUROHEIS project. Results: Development of deprivation index: variables were transformed using a natural log-transformation. Each variable was standardized in terms of a Z-score. The weight of each indicator was determined by using factor analysis. The area-specific index was computed as a weighted sum of the Z scores, with higher values representing greater deprivation. Statistically significant direct association was detected between the mortality due to malignant neoplasms of stomach, trachea, bronchus and lung, and quintiles of deprivation status, in both genders. The same association was found concerning the mortality due to malignant neoplasms of lip, oral cavity and pharynx in males. Inverse significant association was observed in case of mortality due to malignant neoplasms of colon (in both genders), breast, and prostate. The described associations proved to be statistically stronger in males. The results could be used as a basis for further, special, detailed, manifold descriptive/analytical epidemiological studies on different levels and could be used in the elaboration of preventive strategy, or planning local health development programmes.

## 103.
## Arsenic pollution and health hazards

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Arsenic toxicity is nowadays a global problem due to ecessive use of ground water and huge exploitation of natural resource materials. The arsenic hazard now appeared as a ‘real disaster’. Tens of millions of persons in many districts of India and Bangladesh are drinking ground water with arsenic concentrations far above the acceptable levels. Thousands of people have already been diagnosed with poisoning symptoms, even though much of the at-risk population has not yet been assessed for arsenic-related health problems. Long-term exposure to arsenic in drinking water and by other exposures can cause cancer in the skin, lungs, bladder and kidney. It can also cause other skin changes such as thickening and pigmentation. The cause of contamination, mapping of the contaminated area, exposure pathways, toxicities and mitigation programmes taken are discussed.

## 104.
## Arsenic pollution and health hazard in Central India by natural and anthropogenic emission of arsenic

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Arsenic toxicity is nowadays a global problem due to excessive use of ground water and huge exploitation of natural resource materials. The ground water arsenic contamination has been found in many countries i.e. Bangladesh, Argentina, Chile, China, India, Mexico, Taiwan, Thailand and the United States, and is a global problem. The arsenic hazard now appeared as a 'real disaster' in several countries. Tens millions of persons in many districts of India and Bangladesh are suffered by drinking ground water with arsenic concentrations far above acceptable levels. Thousands of people have already been diagnosed with poisoning symptoms, even though much of the at-risk population has not yet been assessed for arsenic-related health problems. After several years of low-level arsenic exposure, various skin lesions appear. These are manifested by hyper-pigmentation (dark spots), hypo-pigmentation (white spots) and keratoses of the hands and feet. The main source of arsenic in drinking water is arsenic-rich rocks through which the water has filtered. It may also occur because of mining or industrial activity in some areas. The quantity of arsenic released by human activities exceeds amounts released from natural sources by at least 3-folds. The major sources of arsenic release to the environment are smelters, coal-fired power plants, and pesticides. Air, water, and soil levels of arsenic are highest near smelters. Urban air is far more contaminated than air in remote areas, and water and soil concentrations are far higher in areas where arsenic-mineral deposits are mined. The aim of this presentation is to discuss the arsenic contamination levels, sites, sources, exposure and accumulation in plant and food and health hazard in the most industrialized region of India, Chhattisgarh state. The most of the mineral i.e. iron pyrite, dolomite, alumna, etc. and coal of the Indian subcontinent is deposited in the central region. They contain arsenic at traces. The anthropogenic activities i.e. mining, roasting of ores, burning of coal distributes arsenic in the environment. Arsenic is very soluble element and ultimately it settles in the ground water. In addition, the overuse of the ground water in the bedrock contaminated area also cause emission of arsenic in the water. Arsenic exists in three common valence states: As(0), As(III) and As(V). Arsenic-containing compounds vary in toxicity to humans according to valence state. Inorganic As is generally more toxic than organic As. In this region, As mostly exists in the inorganic form such as As(III) and As (V). The extreme levels of the arsenic in the soil, sediment, sludge, water, biomass and animals were detected. The highest level of the arsenic (> 500 mg/kg) in the soil and sediment of Koudikasa area, Rajnandgaon, Chhattisgarh, India was detected. The huge steel plant sludge is found to contain arsenic up to maximum 30 mg/kg. The maximum level of As detected in soil in the coal-burning site is 50 mg/kg. The ground water is widely used for drinking purposes. The water over a large area is contaminated with arsenic beyond the permissible limit due to natural and anthropogenic emission of arsenic. Arsenic has good tendency for to accumulate in the food and biomass chains. In much area, the surface dust is also contaminated with As. Several As exposures for entry in the humans are seen. How As metabolised in the humans of this region is discussed.

## 105.
## Tissue levels of pesticides and heavy metals in the Black/Azov Seas commercial fish and dolphins

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The Black/Azov seas basin is subject to heavy anthropogenic pollution and is believed to be one of the world's most polluted basins. The pollution sources are numerous and include both a range of industries and intensive agriculture. At the same time the fishery in the basin is well developed and plays an important role for economies of countries lying on the basin's coasts. Therefore, as one of the hot topics for these countries is the assessment of pollutant body burden in commercial fish species. This also concerns dolphins, both from the point of view of their commercial use and protection of sustainable populations. The information on long-term dynamics of pollutant levels is important even if it concerns past since this information provides a baseline for forecasting the future state of problem and is necessary for development of preventive measures. However, till nowadays the data on the above mentioned problems in Black and Azov seas is rather scarce comparing to other regions. This is especially true about fish and dolphins from coastal waters of the former USSR. The present work presents the results of studies on pesticide (mostly organochlorines, OCPs) and heavy metals (HMs) (Pb, Cd, Cu, Zn, Mn, Cr, Hg, Se) tissue levels in several commercial fish species and in two species of dolphins. The presented data covers the period from 1997 to 2000. The study region included Black and Azov sea waters off the former USSR coasts. The OCPs were analyzed in fish lipids and dolphin tissues (epidermis, blubber, etc.) by routine gas chromatography technique. HMs were determined using atom absorption spectrophotometry. It was revealed that in all studied fish and in both dolphin species the OCP body burdens were at levels allowing for reliable quantitative determination. In some species and especially in dolphins these levels were comparatively high reaching levels revealed in polluted marine locations of other hydrographic basins. Revealed levels may be classified as potentially dangerous for fish and dolphins as well as for humans consuming large quantities of relevant products. HM body burdens were also relatively high in many cases. For instance, in dolphins Cd contents reached 0.53 mg/kg, Cu 7.4 mg/kg, Cr 0.71 mg/kg, Hg (metallic form) 3.5 mg/kg. During the study period contents of analyzed xenobiotics varied but no clear trends of their dynamics were revealed. The study has shown that commercial fish species and dolphins from the Black and Azov sea coastal water off the former USSR contained considerable residual amounts of OCPs and HMs. This necessitates continuing monitoring of these contaminant levels even though the production and use of persistent OCPs (such as DDT) was officially banned and economical recession in the former USSR countries lead to drastic decrease in industrial and agricultural activities with concomitant decrease in contaminant loads. The present study allows for the calculation of safe consumption levels of studied fish and dolphins by humans and for the assessment of contaminant-related hazard for the populations of commercially valuables fish and dolphins. The problems related to further research needs are discussed in the presentation, along with the discussion on potential future scenarios concerning the pollution dynamics and their ecological and health impacts.

## 106.
## How might selenium moderate the toxic effects of mercury in stream fish of the western USA?

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The ability of selenium (Se) to moderate mercury (Hg) toxicity need to be considered when assessing risks associated with consumption of fish exposed to Hg. Mercury concentration that ordinarily produce toxic effects in animals are counteracted when Se co-occurs with Hg and Se:Hg molar ratios are >1. We analyzed whole body Se and Hg concentration in 468 fish from 137 sites across 12 western U.S. states. The fish samples were evaluated relative to a published wildlife fish tissue based Hg threshold and the current fish tissue based water quality Hg criterion for humans and relative to the presumed protections when fish tissue Se:Hg molar ratios are >1. Fifty-six percent of the fish sample exceeded the wildlife Hg threshold while 14% exceeded the human consumption criterion. However, 97.5% of the total fish sample had Se:Hg molar ratios >1, leaving only 2.5% vulnerable to potential Hg toxicity. All fish with Hg molar concentrations greater than Se were northern pikminnows (Ptychochelius sp.) Literature describing Se proteciton against Hg toxicity and our findings that the molar ratio of Se:Hg in stream fish of the western USA is only rarely <1, suggest that a limited number of freshwater fish, from a limited number of species, might pose Hg toxicity risks for wildlife or human consumers.

## 107.
## Considerations regarding the genesis and therapeutic potential of some sapropelic muds from several salt areas in Transylvania (Romania)

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The origin of sapropelic muds is based on aquatic organisms (vegetal and animal), pollenospores, continental organic detritus and argillaceous minerals; the entire organic substance is subjected to a putrefaction (fermentation) process developed under reduction conditions. The anaerobe bacteria are responsible for this process, as these use the oxygen from the organic component subjected to fermentation, which they transform into bituminous products, rich in hydrogen. The organic material fell on the bottom of the sedimentation basin is mixed with the mineral debris, forming a muddy-jelly mass with a high content of water (95%). In the shallow cover, the bacteria biochemically transform the albumins, the carbon hydrates, the celluloses and other organic substances, contributing thus to the individuation and evolution of the sapropelic silt. The sapropelic muds are present in continental fresh water lakes, as well as in salty or marine water basins; in all the cases the algae play a significant part. The paper approaches the sapropelic muds from

several perimeters where salt formations exist in Transylvania (Turda, Sovata, Ocna Sibiu). The presence of the therapeutic muds accumulations is an element specific for these areas. The sapropelic mud deposits were identified both as sediments on the bottom of salt lakes, as well as fossil deposits, as bags interlaid with sediment deposits in the bed of some perimeters. The muds existing in the analyzed deposits are black or black-grey muds; they are characterized in most cases by the predominance of the mineral components on the organic ones. Besides the biology of the lakes and the chemistry of the mud deposits in the studied areas, presented based on the literature data, there were performed radioactivity determinations of the muds which have highlighted different values of some elements such as U, Th or 137Cs. The therapeutic effect of the muds was confirmed by the positive results acquired in time while treating different forms of rheumatism, peripheral nervous system damages and gynecological diseases.

## 108.
## Sustainable water management and sanitation in Ukraine: first steps ahead

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Effective environmental health and protection programmes depend on developing and utilizing constantly travelled communication bridges, connecting a wide variety of groups and agencies involved. From that perspective public participation in a process of environmental decision making, strengthening public access to information and level of education in terms of environmental health and sanitation are among priorities, in particular across Eastern European countries which have traditionally limited experience. Many of the health problems in Ukraine are related to environmental threats which the country has had. Environmental problems in Ukraine are mainly caused by antiquated industries with little or no control of toxic discharges to surface water or to soil, deteriorating sanitation infrastructure, deterioration of surface and underground waters from non-point courses in particular in the rural area. Environmental health problems are also connected with insufficient quality of agricultural and food products and weak sanitation control quality. Although many types of environmental activities have been conducted in Ukraine that is indirectly related to environmental health, only a few of these activities have focused specifically on reducing environmental or occupational diseases. To have measurable health impacts, activities have to be concentrated on identifying and managing the most important exposure pathways and health risks for the most exposed and/or most sensitive segments of the population. In 2006–2007 project regarding state of water management and sanitation in Cherkassy region and its impact to the population health was conducted in cooperation with the local sanitation station, Ministry of Health of Ukraine. This part of the country is a typical agricultural area with constantly reported environmental threats caused by agriculture: drinking water and soil contamination, soil erosion which is reflected in aggravation health state of inhabitants: specifically four communities have the constant problems with the quality of drinking water. Water samples were collected from wells which were mainly used for drinking and domestic purposes in this region. An extremely high contaminated level of nitrates was fixed in all selected samples. Obtained results showed the average level of nitrate concentration around 200 mg/l which exceeds the control level by 5-6 times. Another samples were collected from shallow water where concentration of iron exceeded control level up to 4 times, for manganese in 2-2,5 times, for dissolved oxygen in 2 times. It was also fixed that each sixth water sample taken from wells failed to meet the health requirements for bacteriological indicators. As a result it may be concluded that population of Cherkassy region are at high risk of different diseases caused by nitrates: shortness of breath, blue baby syn-

drome, and cardio-vascular system diseases. Violation of water standards for biological indicators is impacted on increasing of diarrhoeal cases. We collected and analyzed statistical data about disease distribution in Cherkassy region. Results showed that number of attendance of clinic increased almost by 2 times in 2004–2006 years, and cases of aggressiveness and sleeping problems increased by 1,3 times. Another part of our research has been connected with public access to information regarding water quality and proper management in terms of sustainability. Sociological survey was accomplished.

## 109.
## Removing of fulvic acids in the process of drinking water preparation by activated carbon in the presence of hydrogen peroxide

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Fulvic acids (FA) are a part of the natural organic matters in the water. FA removal is difficult by convenient processes of drinking water preparation. That is why they transform into the toxic by-products after chlorination. One of the most acceptable methods for FA removal is filtration through activated carbon (AC). Efficiency of water purification by adsorption from organic matters depends substantially on the adsorption filters life time. Combination of adsorption and heterogeneous catalysis is perspective in systems with AC and oxidant. It can prolong AC life time. One of the most perspective oxidant is hydrogen peroxide. High-moor peats FA were used as object of investigation Activated carbon KAU was used as adsorbent. AC was oxidized by hydrogen peroxide (KAU-O) and nitric acid for 3 and 9 hours (KAU-N3 and KAU-N9). AC oxidation by H2O2 both nitric acid decreased adsorption capacity regarding to FA. It is stipulated for heterogeneity of FA structure and increasing of carboxylic and phenolic groups on AC surface. In spite of decreasing of adsorption characteristics by oxidation, they are higher in presence of $H_2O_2$ in FA solution than on non-oxidized sample of AC without $H_2O_2$. Increasing of $H_2O_2$ concentration from 5 to 10 mg/l leads to increasing of catalytic oxidation effect only in case of non-oxidized sample of AC. This effect decrease a little bit on oxidized samples of AC. For estimation of complex mixture of the organic matters adsorption on AC it is possible to use the approach proposed by Smith (1994). According to this method they selected several areas with different slope on Freundlich adsorption isotherm in logarithmic coordinates. These areas correspond to components with different adsorbability. This approach allows to estimate different factors which influence FA adsorbability. In our investigation according to this approach two areas with different slope were selected. Constants 1/n1, 1/n2 and K1 and K2, respectively, were estimated. Constants 1/n1 (weak adsorbed fraction) and 1/n2 (strong adsorbed fraction) characterize heterogeneity of energetic centres on the surface of AC and connect with motive forces of adsorption. These constants increase with introduction of hydrogen peroxide in FA solution. Free energy of adsorption ($-\Delta G_a^\circ$) also increases for weak adsorbed fraction. It does not connect with increasing of adsorption interaction. It is seen from comparison of free energy of adsorption for the samples of oxidized and non-oxidized AC without hydrogen peroxide. It is stipulated by lower value of equal concentration of FA owing to catalytic oxidation at the same initial concentration of FA and adsorbent doses. Thus, analysis of presented experimental dates shows, that introduction of hydrogen peroxide into FA solution appreciably increase efficiency of adsorption owing to catalytic oxidation effect of organic matters. Method of AC oxidation (by $H_2O_2$ or nitric acid) insignificantly influences on catalytic oxidation contribution into total efficiency of adsorption-catalytic removing of FA from water solution by AC. Using of AC oxidized by $H_2O_2$ in system AC/FA+$H_2O_2$ considerably expands range of residual equal concentration, which relate to the weak

adsorbed fraction of FA in water solution. Smith E.H. (1994) Bench-scale tests and modeling of adsorption of natural organic matter by activated carbon. Water Res. 28, 1693–1702.

## 110.
## Probabilistic risk assessment of groundwater arsenic – attributable detrimental human health outcomes in Chakdha Block, West Bengal

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In many areas of the world, the population is chronically exposed to arsenic in groundwater, through its use as drinking water, cooking water or irrigation water. Quantitatively determining arsenic-attributable health risks in such areas is important to the selection and proritisation of implementation of mitigation measures. However, in the regions arguably most severely impacted, West Bengal and Bangladesh, such assessments are difficult because of (i) the scale of the problem; (ii) the nature of health reporting infrastructures; (iii) difficulties in diagnosis of certain, particularly early-stage, end-points; and (iv) particularly for cancers, long latency periods and multiple causes in addition to chronic arsenic exposure. Here we briefly describe the key elements required for a probabilisitic risk assessment model for the population of West Bengal and present preliminary calculations for one of the most arsenic-impacted blocks, Chakdha. The model is based upon systematic consideration of hazard distribution, exposure pathways and dose-response relationships for human receptors, with input data treated in a probabilistic manner. Of the end-points considered, lung cancer appears to have the highest predicted excess deaths, however excess deaths due to skin cancer may be much higher than calculated depending upon the case fatality rate, which is poorly known in the West Bengal context. DALYs arising from non-cancer end-points, such as hyperpigmentation and keratosis, were substantially higher than those from cancer end-points, emphasizing the importance of policy-makers to also consider non-fatal end-points. Areas, including consideration of the genetic polymorphisms, in which the model may be improved are discussed and are the subject of ongoing studies. Acknowledgements: This ongoing research is a result of collaboration within and between the AquaTRAIN MCRTN and PRAMA programmes. PRAMA is a UKIERI (UK India Education and Research Initiative) project funded by the British Council, the UK Department for Innovation, Universities and Skills (DIUS), Office of Science and Innovation, the FCO, Department of Science and Technology, Government of India, The Scottish government, Northern Ireland, Wales, GSK, BP, Shell and BAE for the benefit of the India Higher Education Sector and the UK Higher Education Sector. AquaTRAIN is funded by the European Commission Sixth Framework Programme (2002–2006), Marie Curie Actions – Human Resources and Mobility Activity Area, Research Training Networks. The views expressed are not necessarily those of the funding bodies. We thank Ross Nickson for advice and access to a version of the PHED/UNICEF database, which was generated with funding from the Australian Government through AusAID, the Department of International Development (DFID) of the United Kingdom Government and the Swedish International Development Co-operation Agency (SIDA). This abstract extensively quotes and is largely based on our work recently pre-

sented at the GES8 meeting in London in August 2008 to a largely geochemistry based audience – further details may be found in the published extended abstract of that work (Mondal et al., 2008) and the references therein or by contacting the corresponding author at david.polya@manchester.ac.uk. References: Mondal, D. and Polya, D.A. (2008) Applied Geochemistry, in press. Mondal, D. et al. (2008) Mineralogical Magazine, 72 (1), 461–465.

## 111.
## Adult household smoking is associated with increased child emotional and behavioural problems

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Context: While maternal smoking has been associated with child emotional and behavioural problems, to our knowledge, no study has evaluated the association between overall household smoking and such problems. Objectives: To investigate whether children who live with smokers are more likely than children who do not live with smokers to have emotional and behavioral problems, and to explore this association in households with non-smoking mothers. Design, Setting, and Participants: Nationally representative data from the 2000–2004 Medical Expenditure Panel Surveys, involving 30,668 children aged 5–17 years, were utilized. Associations between child emotional and behavioural problems, household smoking, child, maternal and family characteristics, were examined. SUDAAN software was used to adjust for complex sampling design. Main Outcome Measures: Overall score on the Columbia Impairment Scale (CIS), a 13 item parent-report measure of child emotional and behavioural functioning (range, 0–52). Results: Children in smoking vs. non-smoking households had significantly higher mean total CIS scores (7.78 vs. 5.75, P<0.001), as well as higher mean scores on each of the 13 CIS items, indicating worse behavioural and emotional functioning. After adjusting for all covariates, male sex, older age of child, younger age of mother, un-married mother, maternal depression, below average maternal physical and mental health each were independently associated with increased likelihood of emotional and behavioural problems (CIS>16), as was the presence of one or more adult smokers in the household (Adjusted OR 1.42; 95% CI:1.26–1.60). The odds of CIS>16 increased with increasing number of smokers in the household, even among children whose mothers did not smoke. Conclusion: Children living with smokers are at increased risk for emotional and behavioural problems, and rates of such problems increase with increasing numbers of smokers in the household, even in the absence of maternal smoking.

## 112.
## Environmental medicine: from goals to general practice

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Environmental illnesses are caused by dysfunctional immunological, neurological and endocrinological interactions induced primarily by chronic, seldom by acute, exposure to environmental toxic substances. Since basis of such interactions is not restricted to a single organ, complex disorders result, often considered psychological or psychosomatic. The following effects may be ob-

served: dysregulation of immunological reactions and communication with other systems; disturbances of neurogenic and endocrine interactions; damage to membranes and receptors; impairment of detoxification systems; alterations in bioavailability of nutrients. Environmental factors play a central role in the overall morbidity of the population but an individual's susceptibility to chronic effects of environmental factors can be modulated during lifetime. Thirty percent of the population suffers from environmental illnesses. A chronic environmental burden induces and maintains inflammation supporting widespread chronic diseases like autoimmune processes, diabetes type II, rheumatism etc. Four percent of the population even suffers from severe, escalating environmental illnesses like: multiple chemical sensitivity, chronic fatigue syndrome, fibromyalgia. In contrast to the approach in most areas of medicine, environmental medicine is less focused on treatment of symptoms that on recognition of fundamental pathogenic principles with the goal of monitoring, or where necessary, restoring integrity of functional systems. Recently, attention is focused on the areas of risk management and risk communication concerning environmental health problems. The development of a sufficiently effective risk assessment of the complex interactions fundamental to environmental illnesses, including individual human variations and the special aspects of certain geographic areas, has for the most part been neglected. Any diagnostic concept must allow recognition of individual risks as well as cause and effect relationships. The focus will be less on morphological alterations in single organs but more on functional changes in regulative and communicative systems. The basis of any therapeutic strategy of environmental should be a well-structured concept in which the specific anamnesis and diagnosis dictate sequence and goal of each treatment step. It can be distinguished between the following therapeutic approaches: detoxifying substances, inhibitors of chronic inflammation, substitution of neurotransmitters, restorative substances, regulation of metabolic dysfunctions, high-quality nourishment. Environmental medicine has to be much better integrated into our health care system. An optimally functioning health care system should foster causal understanding of disease, should reduce morbidity in population and should drastically reduce the risk and frequency of developing chronic disease.

## 113.
## The effect of noise intensity on environment and man's health

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Industrialization of every country brings many problems related to environmental pollution by the amount of air pollutants released to biosphere. The greatest threat of pollution of biosphere is primarily in the immediate vicinity of factories. Air pollutants not only affect adversely plants, but they also evoke functional and morphological changes in animals and humans. To the most significant effects of traffic belongs noise, which is different depending on propulsion type. During the traffic noise monitoring in the East Slovakian region, the 1-hour average of traffic situation was monitored on examined road space. The average equivalent noise level – resultant equivalent noise level in the time of the day LAekv dB/A – was calculated from 1-hour equivalent noise levels. The results of measurements of noise and traffic intensity showed increased noise levels of 70.8 dB in the afternoon.

## 114.
## The influence of environment on the occurrence of inherited mental illness

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Genetic disorders are primarily inherited but they can also be developed by the influence of outside elements. Inherited disorders are caused by mutation induced either by endogenous agents or exogenous environmental factors. Mutation arise as the results of spontaneous DNA replication errors or naturally occuring mutagens inside the cells or in the environment. The exogenous factors are: physical, chemical or biological mutagens. The state of environment is considered to be one of the significant factors that can affect the existence of child and youth mental disorders. In the study the attention was focused on application of genealogical methods in the analysis of child and youth mental illnesses.

## 115.
## Depth aquifer – water supply source of the population in drought conditions. Case study: Galati County, Romania

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In the conditions in which, in the latest years several areas from the country have been affected by prolonged drought periods, problems regarding the drinking – water supply of the animals and the population have occurred. Because of the lack of precipitations and of high temperatures, the phreatic aquifer level, aquifer which is exploited in the traditional way in the rural environment, through fountains, has dropped, leading in many situations, at their draining. In these situations, depending on the lithological and hydrological characteristics of each area, the depth aquifers may constitute an additional source of water supply in prolonged drought conditions. In the paper, there are a series of considerations made regarding the depth aquifer as additional water supply sources in extreme conditions of some localities from Galati County. In the West part of the county, the deposits of Candesti Formation (Romanian age – Lower Pleistocene), in the Northern, Central and Southern part, the deposits of Tulucesti Formation (Romanian – the lower part of the Medium Pleistocene) and locally in the North-East, the pontian-dacian deposits, are important for the water supply. These deposits are known through drillings with depths of 60–200 meters, and from lithological point of view they are composed of clay alternant, and sand clays, with sands, clay sands and sometimes sands with gravels. The obtained discharges vary between 1–9 l/s, depending on the lithology and the thickness of the tapped aquifer horizons. From chemical point of view, the water is generally drinkable, with local surpasses of the maximum admitted concentration according to Law regarding the quality of the drinking – water 458/2002, at the organic substances and sulfates indicators. There are relatively high levels of the total hardness, and also the natural presence of iron and manganese. Key words: drought, additional water supply source, depth aquifer.

## 116.
## Considerations on phreatic aquifer water quality in the area from the South of the Curtea de Arges locality, Arges County, Romania

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The research made in the study area emphasized the presence of groundwater in the entire Arges County, but in different quantitative and qualitative conditions depending on the local geomorphological and geological characteristics. The most important aquifer is located in Upper Romanian – Quaternary deposits and is mainly developed in the southern area of the Curtea de Arges locality. The paper presents several geological and hydrogeological general considerations and a detailed analysis regarding the nitrates contents variations in the phreatic aquifer from the Arges County. Also, in the paper those areas are emphasized in which the nitrates concentration surpassed the admitted limit values (according to Law 458/2002, modified and completed with Law 311/2004, regarding the drinking – water quality), and the effects of those surpasses on the supply sources quality from the phreatic aquifer and the consequences on the population's health are discussed.

## 117.
## Environmental hazard mapping using auxilliary variables and logistic regression modelling: Arsenic hazard in shallow reducing groundwaters in Ca

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Uses of geological information, such as sedimentary depositional environment have been used successfully to create logistic regression models of groundwater arsenic contamination (Winkel et al., 2008). Where this level of geological information is not available, the addition of more accessible topographical information has the potential to add significantly to model results. In Cambodia, arsenic concentration data for groundwaters of between 16 and 100 m depth was obtained from 1,437 georeferenced wells. A binary logistic regression model was created with these As measurements as the dependent variable and a number of raster maps, including a digital elevation model, remote sensing images and geomorphology as explanatory variables, and considering an As threshold of 10 ppb. This allowed us to make an As hazard map for groundwaters between 16–100 meters depth: this can be used to help to identify populations vulnerable to exposure. The logistic regression analysis indicates a good correlation between topographic and geomorphologic environmental variables and the As hazard risk in groundwater. Use of easily obtained satellite imagery, such as Digital Elevation Models (DEM) has been shown to contribute significantly to model results in parallel with geological/geomorphological information. The ability to easily update this model with additional variables where available, and to reproduce the results are significant advantages related to this method of analysis. This work is a contribution from the AquaTRAIN Marie Curie Research Training Network funded by the European Commission Sixth Framework Programme (2002–2006), Marie Curie Actions – Human Resources and Mobility Activity Area, Research Training Networks. We are grateful to many colleagues, in particular An-

drew Gault, Helen Rowland, David Cooke and Ed Gilligan for their contribution to sample collection and analysis in Cambodia. We extend our thanks to Michael Berg and Lenny Winkel, who provided the digital geomorphology map of this area. Note: This abstract extensively quotes and is largely based on our work recently presented at the GES8 meeting in London in August 2008. further details may be found in the published extended abstract of that work (Rodgriguez-Lado et al., 2008b) and the references therein. Polya, D.A. et al., 2005. Arsenic hazard in shallow Cambodian groundwaters. Mineralogical Magazine, 69(5): 807–823. Rodríguez Lado, L., Polya, D., Winkel, L., Berg, M. and Hegan, A., 2008a. Modelling arsenic hazard in Cambodia: A geostatistical approach using ancillary data. Applied Geochemistry, In Press, Accepted Manuscript. Rodrígue

## 118.
## Detection of single nucleotide polymorphisms (SNPs)

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SNPs (single nucleotide polymorphisms) are the most often studied DNA sequence variants. Associations between genetic polymorphisms in DNA repair genes, genes regulating cell cycle, metabolic and other genes and incidence of various diseases including cancers are extensively studied. A SNP is a DNA sequence variant with the population frequency of at least 1%. SNPs can be found in both coding and non-coding regions of DNA and their presence affects function of proteins, as well as regulation of proteins expression. Human genome contains approximately 10–30 millions SNPs, or 1 SNP/100–300 bases. SNPs are organized in blocks called haplotypes. Thus, when analyzing the association of SNPs with a disease, it is sufficient to detect only several selected SNPs in a given haplotype. Another problem is to identify the specific SNP within the haplotype that is functionally responsible for the disease. A number of methods of SNPs detection are available. They differ in their requirements of laboratory equipment, the cost of analysis and number of samples that can be analyzed in one experiment. The methods can be performed either in homogenous environment (real-time monitoring is possible, but detection probes tend to be expensive) or on solid phase (methods are usually high-throughput, but laboratory equipment is costly). From a long list of detection methods the following should be mentioned: restriction fragment length polymorphism (RFLP), single-strand conformation polymorphism (SSCP), denaturing high-performance liquid chromatography (DHPLC), genotyping by the 5'-nuclease reaction (TaqMan), primer extension assay with fluorescence polarization detection, pyrosequencing, oligonucleotide ligation assay, invader assay, MALDI-TOF mass spectrometry-based genotyping, or Illumina GoldenGate high-throughput genotyping. After general introduction the presentation will concentrate on principles and comparison of several selected methods (RFLP, DHPLC, TaqMan, GoldenGate). Supported by the Czech Ministry of the Environment SP/1b3/ 50/07, the Ministry of Education 2B06088 and AS CR AVOZ50390512.

## 119.
## Frequency of chromosomal aberrations in Prague's mothers and their newborns

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The capital city of Prague is one of the most polluted areas of the Czech Republic. The impact of air pollution on the level of chromosomal aberrations is systematically studied. Analyses are performed using fluorescence in situ hybridization (FISH) with whole chromosome painting for chromosome #1 and #4. The studied groups were 42 mothers and their newborns, living in Prague. The average age of mothers was 29 years (20–40). The blood samples were collected during fall 2007 and winter 2008. Average levels of c-PAHs and B[a]P from stationary monitoring were 19.35±12.8 ng/m$^3$ and 2.6±1.8 ng/m$^3$, respectively. In the present study, levels of stable (one-way and two way translocations) and unstable (acentric fragments) chromosomal aberrations in both groups were analyzed. The mean genomic frequency of translocations by FISH (FG/100) was 0.09±0.13 vs. 0.80±0.79 ($p<0.001$) for newborns vs. mothers. The level of stable aberrations significantly increased with age. The frequency of unstable aberrations did not differ between those two groups. The results showed how the pattern of different kinds of aberrations changed. We observed 64% of unstable aberrations vs. 36% of stable aberrations in newborns and 20% vs. 80% in mothers. The impact of mother's age on the level of aberrations in newborns showed the significant increase in the group of children born to older mothers. We did not find significant differences in levels of aberrations between fall 2007 and winter 2008. Our present results indicate that after birth the frequencies of aberrations are very low, and are represented mainly by acentric fragments. Different concentrations of air pollutants did not affect genomic frequency of translocations in newborns. The changes observed in mothers show the drift to stable aberrations represented mainly by two-way translocations. Supported by Ministry of Education CR 2B06088 and AS CR AVOZ50390512.

## 120.
## Groundwaters of Eastern Hungary and Western Romania: general geochemistry and controls on arsenic mobilisation

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Aquifers within the Pannonian Basin are known to contain elevated arsenic, with published estimates of 650,000 people affected throughout Hungary, Romania and Serbia. In this study, a range of artesian (n = 39, depths 70–800 m), thermal (n = 5, depths 400–3000 m) and pump wells (n = 7, depths 70–200 m), tapping Quaternary and Neogene aquifers, within Eastern Hungary (Békés,

Csongrád and Hajdú-Bihar counties) and Western Romania (Arad and Bihor counties) were sampled to determine their general geochemistry, and elucidate controls on arsenic mobilisation. Because of the complex variety of water types, hierarchical cluster analysis (Euclidean distance, Ward) was used to separate the data set into 6 dominant groups. Geochemistry of group 1 (n = 2, Na-Cl type, mean pH 7.1), group 2 (n = 4, Na-$HCO_3$ type, mean pH 6. 5) and group 5 (n = 5, Na-$HCO_3$/$SO_4$ type, mean pH 8.1) were indicative of end members, controlled by thermal and Neogene marine influences; based on evidence from Na/Cl and Cl/B ratios, piper plots, typically high conductivity and high $NH_4$, Li and B abundances. These groups contain 4 of the 5 thermal (> 45 $^oC$) wells sampled. By contrast, group 3 (n = 6, Na/Ca-$HCO_3$ type, mean pH 7.9), group 4 (n = 20, Na/Ca-$HCO_3$ type, mean pH 8.1) and group 6 (n = 15, Na-$HCO_3$ type, mean pH 8.2), showed evidence of a mixing trend with meteoric waters and the end member groups 1, 2 and 5. Arsenic was found predominantly in the reduced form (AsIII), with concentrations ranging from <0.5 μg $L^{-1}$ to 210 μg $L^{-1}$, with 52% of wells having over 10 μg $L^{-1}$ As (WHO and EU limits for drinking water). The end member groups 1, 2 and 5 typically had low <5 μg $L^{-1}$ As, implying that elevated concentrations were not due to a external input, i.e. As rich geothermal waters, but from processes occurring within the aquifers. Groups 3 and 4 typically had low As (mean 16 μg $L^{-1}$, range 0.7 to 80 μg $L^{-1}$), while group 6 contained far higher concentrations, (mean 97 μg $L^{-1}$, range 9.9 to 210 μg $L^{-1}$). In addition, group 6 had higher DOC, $PO_4$, $NH_4$ and $CH_4$, but low $SO_4$ and $H_2S$ in comparison to the groups 3 and 4. All groups had similar Fe concentrations (mean 250 μg $L^{-1}$, range 8–1500 μg $L^{-1}$). Geochemical evidence implies that As is being released via reductive dissolution of Fe-oxides under reducing conditions in all 3 groups, with the difference in behaviour of As potentially due to the difference in $SO_4$ concentration. Groups 3 and 4 have higher concentrations of $SO_4$ which, under reducing conditions, typically lead to lower As concentrations due to sulphate reduction, and the formation of As-bearing sulphide phases removing As from the groundwater. By contrast, group 6 contains minimal concentrations of $SO_4$, and so As released by reductive dissolution remains in solution. In addition, elevated levels of $PO_4$ and high DOC could potentially exacerbate the release of As in group 6 by competitive sorption on mineral surfaces. However, further work to determine the mineralogy of the host sediment, the arsenic mineralogical host and the microbial communities present within the aquifers is required to elucidate further the dominant processes occurring.

## 121.
## Associations between air pollution and acute respiratory morbidity in childhood

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Aim of the study was to assess the associations between acute respiratory morbidity of children and air pollution Methods: The daily number of children with acute respiratory diseases was registered by 3-3 paediatricians in the towns Dorog and Veszprém for 1 year, in 4 age groups according to ICD codes from which incidence was calculated. The 24 hour daily mean concentrations of air pollutants were taken from the National Air Pollution Monitoring Network. The associations between morbidity and air pollution were evaluated by assigning each day of the year to categories of pollution level (high, medium and low) and comparing the morbidity recorded on days with high or medium vs. low level of air pollution using logistic regression. Time-series analysis was used to assess the associations between short time changes of air pollution and morbidity. Results: In both towns the acute upper respiratory diseases accounted for the major part of the total acute respiratory morbidity. Significant associations were observed in both towns between the number of children with upper respiratory diseases and concentrations of PM10 and CO while bronchitis morbidity was significantly associated with CO and $SO_2$ pollution. The strongest associa-

tions by time-series analysis were found between the maximum daily PM10 concentrations and the total respiratory morbidity. Conclusion: Besides several other factors, air pollution may play a role in the acute respiratory morbidity in childhood. Acknowledgements: The conscientious collaboration of the 6 paediatricians (Anna Dávid, Eszter Kégel, Péter Mikesy (Dorog), Jusztina Terray, Júlia Takács and Borbála Kovács (Veszprém) is highly appreciated. The study was supported by the 3.1.1.-2004-05-0432/3.0 GVOP and the EU INTERREG III.C. Programme (Op. No: 2E0040I).

## 122.
## Associations between air pollution and adverse pregnancy outcomes

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Background: In the past decade several publications have reported on the associations between air pollution (mostly particulates) and adverse pregnancy outcomes (preterm births, low birth weight, spontaneous abortion etc.). However, a lot of questions have remained to be elucidated before a causal link would be widely accepted, therefore further studies are needed. Methods: Face-to-face interviews were carried out by the district nurses among 2,827 pregnant women in 3 towns of Hungary (Győr, Veszprém and Dorog). The questionnaires collected information on the past and present health status and medical findings, occupation, housing environment, smoking and other life-style and socio-economic factors. All the weeks of the individual pregnancies were characterised by the weekly mean and maximum levels of air pollutants and their associations with the pregnancy outcomes were evaluated by logistic regression (spontaneous abortion and low birth weight) or by Mann-Whitney test (birth weight). Adjustments were made to age, smoking and number of previous pregnancies. Results: The most obvious association was found between birth weight and the CO levels during the end of the second trimester and the first half of the third trimester of pregnancy. $SO_2$ and particulate levels in the second half of the third trimester showed a tendency to be associated with preterm birth and low birth weight. Conclusions: Increased levels of certain air pollutants during different periods of pregnancy may increase the risk of adverse pregnancy outcomes Acknowledgements: The study was supported by the National Research and Development Fund (NKFP 3A-089-2004) and the EU INTERREG III.C. Programme (Op. No: 2E0040I).

## 123.
## Project risks assessment by using mathematical theory of evidence under uncertainty conditions

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Project risk management is one of the project management phases. Risk assessment is one of the principal phases of risk management. Some attributes such as "Occurrence Probability", "Consequence Impact" and "Uncertainty in Estimation" are used to assess the risk. The main objective of this paper is project risk assessment in these attributes under uncertainty conditions. First we clarify aspects and types of uncertainty, i.e. ambiguity and vagueness. In this paper we considered ambiguity. We describe "Fuzzy Measures" and "Mathematical Theory of Evidence", which is described in fuzzy measures framework. Then, three aspects of uncertainties, i.e. "Measure of Dissonance", "Measure of Confusion" and "Measure of Non-Specificity in Evidences" are discussed. Using fuzzy measures and mathematical theory of evidence, we will suggest uncertainty assessment model. A numerical example in energy industry is proposed to illustrate the model. Keywords: Risk Assessment, Uncertainty, Fuzzy Measures, Mathematical Theory of Evidence, Ambiguity, Vagueness.

## 124.
## Influence of preliminary ozonization on the bioregeneration of activated carbon in the process of its longterm exploitation

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Natural organic matters (NOM) are the main source of organic carbon in drinking-water, which determines its quality to a great extent. Incomplete removal of NOM at drinking-water treatment results in undesirable chlorination by-products with carcinogenic and mutagenic properties. The reliable method of complete NOM removal from drinking water is adsorption on activated carbon (AC) with native biofilm. Native biofilm is formed during long-term filtration in non-sterile conditions. This biofilm secure permanent bioregeneration of AC. This process allows significantly prolonged time of AC filter functioning and provides the drinking water with good quality. The purpose of this work was establishment of AC spontaneous bioregeneration degree in a filter with load length 1 m in the process of long-term exploitation for the filtration of the ozonized tap water. Activated carbon KAU was used as adsorbent. Ozonized and non-ozonized tap-water was filtered through this AC. The comparison of the dynamic and static capacities of adsorbent makes possible to estimate the contribution of the biodegradation component to the cumulative effect of adsorbent efficiency. The reference amount of adsorbed organic matters after passing of 200 $m^3$ of water through AC is approximately 1100 g. The amount of organic matters under equilibrium is 900 g according to the isotherm of adsorption. A higher dynamic adsorption capacity as compared with the static one is explained by AC bioregeneration. A spontaneous bioregeneration after adsorption ozonized tap water almost fully restores adsorption-structural characteristics of. Unlike it spontaneous bioregeneration of AC after the non-ozonized water filtration in the first layer of AC was about 58–60%. Increasing of bioregeneration efficiency after pre-ozonized water

conditioned by transformation of TOC into more biodegradable form, increasing of microbiological activity in the filter loading, increasing of AC surface hydrophilicity after its interaction with dissolved ozone. At the contact of the AC first layers with water, where dissolved ozone is present, it is possible that ozone interact with carbon surface. At the concentration of dissolved ozone in water of 2-3 mg/l, the chemical interaction of ozone with AC surface takes place with carboxyl and phenol functional groups formation. It results in the increase of AC surface hydrophilicity degree and to decreasing of Gibbs free energy of adsorption of organic matters. Decreasing of Gibbs free energy of adsorption influences positively the AC bioregeneration. Thus, AC bioregeneration at the filtration of preliminary ozonized water is more effective than bioregeneration in analogical condition at the filtration of the non-ozonized tap water.

## 125.
## PCDD/F/PCBs, pesticides and PBDEs in human milk five years following cessation of chemical manufacturing and decade of remediation programme, Chapaevsk, Russia

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Introduction. In October, 2007 the Guidelines for developing a national protocol of the 4th WHO-coordinated survey of human milk for POPs in cooperation with UNEP was published. In Chapaevsk the source of contamination by the PCDD/Fs, HCH and HCB, is the chemical plant, which in 1962–87 years produced organochlorine pesticides. All chemical production at this plant stopped in 2003. In the framework of remediation programme,, Chapaevsk receives funds since 1997. In 1998 in Chapaevsk 7 pooled samples of human milk were collected from 40 women, and in October, 2007 the repeated collection of human milk has started according to the WHO 2007 Guidelines. Methods. The study protocols were approved by Chapaevsk Medical Association IRB. The selection of donors was conducted in the accordance with WHO Guidelines: 1) primiparae; 2) under 30 years of age; 3) breastfeeding one child only; 4) residence in Chapaevsk for the last 10 years. The collection of breast milk (150 ml) was carried out between 3 and 8 weeks after delivery. Among 305 mothers which had delivery at September 2007–January 2008, 145 women (48%) were eligible by the criteria for inclusion in the study. 54 of them (37%) did not breastfeed alone (used milk formula or a mix of human/formula) and consequently were not invited to participate. Only two mothers have refused (1%). 73 donors (50%) have collected milk samples. Among enrolled women two groups were selected. The group «CLOSE» contained 11 donors, who lived predominantly during the whole life as well as during their pregnancy closer than 3 km from the plant. The group «DISTANT» contained 10 donors, who lived more than 3 km. Appropriate 11 and 10 individual samples were pooled into two samples. Target analytes included 17 congeners PCDD/Fs, 4 co-PCBs, 8 mono-ortho PCBs with assigned WHO-TEFs (1998), HCB, 4 isomers of HCH, DDT and its metabolites, 11 congeners PBDEs. Samples were analyzed at the laboratory of Severtsov Institute of Ecology and Evolution using GC-HRMS, Russia. Results. The mean age is not differing in groups «CLOSE» and «DISTANT», at 21.6 and 22.2 years, respectively. Weight of the «CLOSE» mothers, at 63.8 kg, was slightly higher, than in «DISTANT» mothers, at 59 kg. Donor's breastfeeding, mother smoking during life, duration of pregnancy and sex ratio did not differ between two groups. There were no vegetarians among the

surveyed donors and nobody worked at the plant. All organochlorine POPs levels except DDT were higher in «CLOSE» sample than in «DISTANT» sample: TEQ PCDD/Fs were 2.6-fold higher (15.3 and 6.0 pg TEQ/g lipids, respectively), dioxin-like PCBs 1.2-fold higher (12.0 and 9.9 pg TEQ/g lipids), HCB was 1.2-fold higher (82.9 and 69.5 ng/g lipids), HCH was 1.7-fold higher (196 and 115 ng/g lipids). DDT, which was not produced in Chapaevsk, was higher in «DISTANT» sample, 244 ng/g lipids. Level of PBDEs was low, 0.94 ng/g lipids in «CLOSE» and 0.82 ng/g lipids in «DISTANT» sample. The mean WHO-TEQ PCDD/Fs among all donors has declined 3.8 times over the ten year time period, from 41.1 pg/g lipids in 1998 to 10.9 pg/g lipids in 2007. Although the levels of POPs in human milk in Chapaevsk has decreased over the decade, but levels of organochlorine POPs still remain high in the area adjacent to the plant produced pesticides. The further analysis of individual human milk samples for POPs will allow to investigate the predictors of POPs exposure of Chapaevsk residents living in polluted areas near the plant.

## 126.
## Trends in the health status data on Slovak children and adolescents

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The changes in morbidity of children and adolescents belong to the most important data in population's health. Complexity of the endogenous and exogenous factors impacts health status and optimal development of children and youth. The study has been aimed at the environmental contaminants in Slovakia and the development of chronic morbidity in children and adolescents. Prevalence trends of chronic diseases in young population on the basis of national health statistical data were evaluated during period 1980 – 2004 years (Source: Institute of Health Information and Statistics, SR). Trends in air pollution – total emissions of $SO_2$, NOx, CO, PM10, and persistent organic compound (POP) were analyzed on the basis of Ministry of the Environment of Slovak Republic Reports during the same period. The statistical programs Epi Info™, Version 3.4.3, 2007 and Epi Info™ 6.04, Statcalc were used in the data analysis. From the year 1980 to 2004 gradual significant increase of chronic disease prevalence in Slovak children and youth was detected. The most frequent occurrence and sharp increase has been revealed in the respiratory diseases (9.1 multiple in children; 4.7 multiple in youth) with dominant prevalence of asthma (16.6; 24.3), diseases of kidneys and urinary tract (2; 1.2), vision disorders (1,3; 1,2), mental disorders (1,8; 2), musculoskeletal diseases (1.3; 2.6), diabetes (5; 2.8), hypertension (11; 3.4). The increase of congenital disorders and defects points more on the genetic influences. The trends in emissions of major pollutants have been decreasing in consequences to removal of many stationary sources (heavy industry), but the trends of chronic disease morbidity are in opposite to this. These results are partly different in the other European countries and could be caused by transformation of society (changes in family living standards and changes in health care system, etc.). The increase of chronic disease prevalence shows the impact not only of the followed environmental factors (outdoor air pollution), but also of genetic influences, and of current big social disparities. Prevention requires identification and elimination of known environmental risk factors for children and youth health and construction of healthy life conditions and environment of houses, schools, playgrounds, communications and work places for working youth.

## 127.
## Study of morbidity and mortality of the population of the Kyrgyz Republic with regard to climate change

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Under the UN Framework Convention on Climate Change commitment the First National Communication on climate change in the Kyrgyz Republic was prepared in 2003. However, in the first communication there was given insufficient attention to the health of the population of the Kyrgyz Republic with regard to climate change and the present research was done to address this issue. This work was supported by the GEF/UNDP project "Assistance to the Kyrgyz Republic in preparation of the Second National Communication under the UN Framework Convention on Climate Change". The aim of the study was to investigate levels of non-infectious morbidity and mortality of the population taking into consideration the corrected climate scenarios for the Kyrgyz Republic. To assess population morbidity and mortality from diseases of the circulatory system in the Kyrgyz Republic, data of the Republican Medical Information Centre for the period 1996–2005 were analyzed. Data were analyzed for Bishkek and six regions of the republic using regression analysis. To investigate the effect of climatic factors on the population health, meteorological parameters such as monthly average air temperature, relative air humidity, monthly and annual precipitation were used and annual data of Kyrgyzhydromet for 1961–1990 served as the baseline. For the estimation of predicted indices of population health taking into consideration two scenarios of A2-ASF and B2-MES release in individual regions we used predicted values of air temperature of the corresponding observation stations prepared by the researchers G.A. Desyatkov and O.N. Katkova (2007). Predicted levels of morbidity and mortality of the population from diseases of the circulatory system were calculated for the years 2010 – 2100 for individual regions of the republic taking into consideration the climatic scenarios for A2-ASF and B2-MES greenhouse gas release. References: Desyatkov G.A., Katkova O.N. Computerized analysis of the future change of the climate of Kyrgyzstan. Vestnik KRSU (2007), 7(12):20–26.

## 128.
## The use of GIS for determining the spatial distribution of tuberculosis incidence in the population

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Tuberculosis is an important public health problem in many countries including the Kyrgyz Republic. Tuberculosis is a socially related disease and the greater the crowdedness of the population and the worse the socio-economic conditions the heavier is the spread of the disease. The aim of the study was to use GIS to determine the spatial distribution of tuberculosis in an urban set-

ting. Data were collected from 19 Family Medical Centres in Bishkek. 949 clinico-informational forms for 2005 were reviewed. To investigate the prevalence of tuberculosis personalized data were analyzed using ArcGIS 9.2 (ESRI) software and spatial analysis method. The work was supported by SCOPES JRP# IB7310-110915. Results of data analysis showed that 60% of tuberculosis patients were unemployed persons, which supports the socio-economic connection of the disease. More than 70% of cases were persons of working age (15–45 years) and the greatest number was with the 20–25 years age group. 11% of all cases were children up to 15 years of age. By sex 54% of cases were men and 46% were women. On the basis of geoinformational systems (GIS) and factor analysis the spatial structure of tuberculosis incidence in the population of Bishkek city was established. Using cluster analysis the territory of the city was ranked by the level of tuberculosis incidence in the population. The created maps will be used by the public health service for prevention of tuberculosis.

## 129.
## Environmental and health impacts linked to the transport system in the context of global changes

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Air quality is affected by industry, traffic and domestic heating. While transport services are an essential component of economic and social development, negative side effects are causing considerable concern and drawing corresponding political attention to the social costs of transport. A steady increase in mobility gives rise to large costs in terms of air pollution, climate change, degradation of landscapes and ecosystems, deterioration of cultural monuments, noise, congestion and accidents. Urban traffic emissions have a greater impact on the environment and on human health as more people are exposed in cities and the traffic volume is higher, and the noise nuisance is generally larger than in rural areas. Our countries are in a period of transition toward the market economy. In these circumstances citizens' sensitivity towards the environment and non material aspects of the quality of life is secondary to concerns about short term subsistence. Little attention is being paid to the requirements of sustainable development. However, in many polluted cities the health consequences of environmental harms (asthmatic diseases, mortality rates bigger than the national average, unacceptable environmental effects concerning air and water quality, noise and waste management) have now become obvious not only for experts, but for local inhabitants also. This study discusses the concepts of sustainability, sustainable development and sustainable transportation, and how we can help achieve sustainability goals. Key words: environmental impact, sustainable transport, global changes, $CO_2$ emissions.

## 130.
## Environmental risk factors of children allergy in a heavy polluted region

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Introduction: Increasing prevalence of allergy especially in more developed countries is an actual problem. Therefore prevalence study on allergy was included into the National System of Environmental Health Monitoring in the Czech Republic. Objectives: The aim of the presented study was to analyse relationship between air pollution and allergy prevalence in an industrial region

with heavy air pollution and to evaluate risk factors of occurrence of allergy in children. Material and Methods: The study was conducted in 3 cities (Ostrava, Karvina and Frydek-Mistek) of an industrial region in children aged 5, 9, 13 and 17 years in 2006. Data were retrieved from questionnaires filled out by parents and completed by information from documentation of paediatricians. Diagnosis of allergy (and specifically asthma) from records of physicians were analysed with personal, family history, socio-economic and environmental factors reported by parents using $\chi 2$-test and logistic regression. In addition, for the city Ostrava, the spatial analysis in the relationship between PM10 (based on air dispersion modelling) and health outcomes was provided. Results: Out of total 1.189 children 50.6% were girls. In 31.4% of children allergy was diagnosed by a physician; multiple allergy was found in 13.5% of children. Allergic rhinitis was the most frequent diagnosis (62.0%), followed by atopic eczema (32.6%) and asthma (30.5%). Significantly higher proportion of allergy and asthma was found in older children. No significant relationship was found between allergy and birth weight, number of children living in a household, nursery attendance, mother education, age at delivery, length of breastfeeding and a busy traffic in the neighbourhood as reported by parents. Factors significantly associated with allergy (age, sex, birth order of child, smoking in a household, allergy of parents and air pollution sources in neighbourhood) entered into a model. Results of logistic regression models found significant relationship between allergy and age, smoking in a household (OR=1.77; 95%CI 1.22–2.55) and positive family history of allergy (OR=2.45; 95%CI 1.84–3.27). Prevalence of asthma was significantly higher in 13 years old children (OR=3.73; 95%CI 1.76–6.47) and children with family history of allergy (OR=2.53; 95% CI 1.60–3.99). No other significant relationships were found. The model was further applied to data from Ostrava (the most polluted out of the studied areas) and annual mean concentrations of PM10 were added. The results confirmed the previous findings and also strong association of allergy with concentrations of PM10 (OR=3.76; 95%CI 2.03–6.99 above 40 $\mu g/m^3$ and OR=4.04; 95%CI 2.33–7.01 above 50 $\mu g/m^3$) was found. Similar results were confirmed for relationship of asthma and PM10 concentrations. Discussion: The overall prevalence of allergy corresponded with the national data (32%). No significant differences between boys and girls were found unlike the Czech results where prevalence of allergy in boys was higher. Based on subjective reports of parents, the relationship between air pollution and prevalence of allergy and asthma was not confirmed but using more objective information from dispersion model the association was strongly significant. Conclusions: Age, family history of allergy and concentrations of PM10 were the most significant predictors of prevalence of allergy and asthma confirmed in the study.

## 131.
## Association between SES deprivation index and SMR in two spatial scale studies

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Introduction: In the last year the census socio-economic deprivation index (SESDI) was created in the Czech Republic (CR). Within the original study the correlation was found between the increased total and selected specific mortality rate (SMR) and the highest levels of deprivation on the district level. Objective: The objective of the presented study was: A/ to explore a stability of the relationships in time away from census; and B/ to verify found relationships between SMR and SESDI on smaller spatial units. Material and methods: A/ SESDI was based on census 2001 and was constructed on the level of 77 Czech districts. Relationship between SMR and SESDI was explored using correlation analysis for specific years 2002–2006. B/ SESDI was re-elaborated for the smaller geographical units – ORP (in total 205 in the CR). Comparison was done using 22 ORP data in the Moravian Region with total population of 1.253,000 inhabitants. The total and

specific SMR was calculated for the years 2003–2006 to avoid a bias caused by a lot of missing data in age categories in specific years. Correlation analysis was used for testing of relationships between mortality and SESDI. Results: A/ The results confirmed the relationships between SMR and SESDI in the years following after census. Both in men and women positive association was found between the level of deprivation and total mortality (men 2001 r=0.60; 2002–6 from r=0.41 to r=0.56; women 0.53; 0.35–0.51), cancer mortality (men 0.47; 0.19–0.48; women 0.44; 0.38–0.53), mortality for gastrointestinal diseases (men 0.53; 0.39–0.51; women 0.41; 0.35–0.50) and mortality for lung cancer in men (0.55; 0.22–0.50). The relationships between SMR and SESDI varied between years, not in a systematic way, but more based on between years variability in SMR. These associations were stronger in men than in women. Further results of detail analysis also showed that the investigated total and specific mortality in men and women was more strongly correlated with factors of social deprivation than material deprivation. B/ The analysis of relationship between SMR and SESDI on the ORP level did not confirmed the results on a district level – the only significant relationship was found between SESDI and total SMR and SMR for lung cancer in both sexes, respiratory diseases in men and all cancer mortality in women. The analysis showed that the district level is the smallest unit applicable for analysis of relationship between SMR and SESDI. More detail spatial scale is not acceptable for analysis of specific SMR due to small frequency of mortality in age groups. Conclusion: The relationships between socio-economic deprivation index and total and specific SMR remained stable in the years following after census. Slight variability between years was based more on variability in SMR but not in a systematic way. The smallest unit applicable for analysis of relationship between SMR and SESDI was confirmed to be district level due to small frequency of mortality in age groups in smaller units. Acknowledgement: This study was realized within the program EUREKA (E!3751 ISTAHIS)

## 132.
## Assessment of the health risks from environmental noise exposure – cardiovascular risk score

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Background. Noise exposure risk assessment respresents nowadays an extremely serious problem resulting from an enormous increase of acoustic energy in the environment. In our study concerning mostly the urban acoustic environment we are dealing with health risk assessment of community noise exposure in a special group of young healthy individuals. Special attention has been paid to the cardiovascular risk. Objective: Objectives of the present study were to evaluate the influence of environmental noise on community, community response and the impact on cardiovascular risk score. Methods: The study sample (n=661; 36.9% males, 63.1% females, university students, mean age 22.3 ± 2.2 years) included the exposed group to road traffic noise (n=280, $L_{Aeq,24h}$=67±2dB) and the control group (n=379, $L_{Aeq,24h}$=58.7±6dB). Equivalent noise levels were assessed at the noisy area (exposed group) and in the relatively quiet residential area (control group). Subjective response in our sample was assessed by a validated noise annoyance questionnaire, administered personally. Systolic and diastolic blood pressures (BP), psychogenic stress and blood lipids in capillary blood were evaluated. Ten year cardiovascular risk was quantified – SCORE60, Framingham scoring and Relative risk chart to fit our young sample. Multiple linear regression was carried out to assess and to quantify the association between the exposure to road traffic noise and various cardiovascular risk models taking into account important confounding factors. Major tools in our statistical analysis were Epi Info™, Version 3.4.3, 2007, Epi Info™ 6.04, Statcalc and S-Plus 6.0. Results: Cardiovascular risk varied across several models and it was

mostly significantly higher in the exposed group. The statistically significant result was found using Framingham scoring projected to the age of 60 (OR = 1.69; 95% CI = 1.08–2.65), SCORE60 (OR = 2.00; 95% CI = 1.04–3.86) and Relative risk chart (OR = 2.37; 95% CI = 1.43–3.92). Multiple linear regression revealed a significant positive association between the exposure to road traffic noise (exposed versus control area) and Relative risk chart (b=0.125, p=0.024) taking into account several important covariates (e.g. gender, psychogenic stress). Conclusion: Our study pointed out the significantly higher risks of cardiovascular risk score in the exposed group. Our results indicate that preventive measures should be considered to reduce road traffic noise in the exposed area. This work was supported in part by Grant No. 1/0533/03 from the Scientific Grant Agency of Ministry of Education of Slovak republic and Slovak Academy of Sciences.

## 133.
## Household exposure to secondhand smoke is associated with decreased physical and mental health of mothers in the USA

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Background: Secondhand smoke (SHS) exposure is perhaps the most common toxic environmental exposure in the USA, with numerous negative health consequences for both adults and children. Similarly, maternal health problems have substantial negative effects on child development and functioning. We are unaware of any studies that specifically examine the association of living with smokers and maternal physical and mental health. Objective: To investigate whether non-smoking mothers who live with smokers have worse physical and mental health than do non-smoking mothers who live in homes without smokers in the USA. Methods: Nationally representative data from the 2000–2004 Medical Expenditure Panel Survey (MEPS) were analyzed. The physical and mental health of mothers living with children <18 years who lived with 1 or more adult smokers (n= 3,344) were compared to the health of mothers living in households without adult smokers (n=14,836). Associations between maternal mental and physical health, household smoking, and maternal age, race/ethnicity, and marital, educational, poverty and employment status were examined first in bivariate analyses. Variables significant at p<0.10 were analyzed in multivariate analyses. Scores on the Medical Outcomes Short Form-12 (SF-12) Physical Component Scale (PCS) and Mental Component Scale (MCS), a well validated and utilized, 12 item self report measure of disability, were used to assess maternal health. MCS and PCS score sample mean were applied as cut off binary dependent variables contrasting higher and lower maternal mental and physical health. SUDAAN software was used to adjust for the complex sampling design. Results: 79.2% of all mothers in the USA are non-smokers, and 20.8% smoke. Among non-smoking mothers, 17.4% live in households with at least one adult smoker: 14.2% of non-smoking mothers live with one adult smoker and 3.2% live with 2 or more smokers. In 24.4% of households with non-smoking mothers with other adult smokers there are 3 or more children present. Among non-smoking mothers, mean MCS score is 50.46 (SE=0.096) and mean PCS is 52.89 (SE= 0.08). The presence of an adult smoker as well as increasing number of smokers in the household are both significantly negatively associated with MCS and PCS scores in bivariate analyses (p<0.001 for each). Adjusting for age, race, poverty category, marital status, education and occupation (each significant at p<0.001 in bivariate analyses) in logistic regression analyses,

the presence of at least one smoker is independently associated with decreases of MCS (OR 0.89, 95% CI=0.80–0.99) and PCS score (OR 0.81, 95%CI=0.73–0.90). There is evidence of a dose response relationship with increasing number of smokers in the household both for the MCS and the PCS ($p=0.07$ and $p<0.001$ for each, respectively). Conclusions: These findings demonstrate a previously unrecognized environmental risk factor: living with smokers is independently associated with worse physical and mental health among non-smoking mothers in the USA, and there is evidence that the more smokers mothers live with, the worse their health. These data, however, cannot establish whether this association is due to secondhand smoke exposure, exposure to smokers, or unmeasured confounders. Acknowledgements: This work was made possible by a grant from the Flight Attendant Medical Research Institute and by NIH grant #P60MD000538.

## 134.
## Classification of exposure to pesticides from residential proximity to agricultural crops in New York State

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Pesticides are chemicals applied on a large scale with the purpose to control pests and weeds. Residential proximity to different crops may be a source of environmental exposure given that pesticides applied from air or ground may drift from the treatment sites and can be detected and measured in air, plants, and animals several hundred meters away. Some of the pesticides used in agriculture may contaminate the water, as well. In addition, highly volatile pesticides persist in indoor and outdoor air and constitute another source of exposure. Given this large spectrum of potential sources of pesticide, exposure to these chemicals may be relatively highly prevalent in the general population. Exposure to pesticide has been associated with an array of health outcomes, both acute and chronic. Birth defects are conditions of a significant public health concern that affect 3–5% of all live births. In New York State the overall occurrence of the major malformations is 4.2% of live births. It is estimated that in United States, about 20% of deaths under one year of age occur due to congenital anomalies. In addition to infant mortality, congenital malformations may constitute a major source of disability throughout the entire life of an affected individual. From the public health perspective, birth defects induced by maternal exposure to exogenous teratogens during pregnancy may be preventable if the agents can be identified and avoided. Studies that have addressed the health effects due to environmental exposure to pesticide have yielded inconsistent and inconclusive results and have faced limitations due to difficulties in exposure assessment. The specific aims of this project are: a. to assess potential exposure to agricultural pesticides by using maternal residential proximity to the agricultural field as a proxy measure of exposure; b. to describe the exposure patterns due to maternal residential proximity to agricultural land; c. to compare exposure patterns between cases and controls; d. to assess the impact of automated geocoding errors on exposure classification. Sources of data consist of: National Birth Defects Prevention Study, an ongoing case-control study designed to assess genetic and environmental risk factors associated with the occurrence of the birth defects, and Land Use and Land Cover data files for New York State. Analysis calculated the area of agricultural land within each 800m buffer by type of agricultural land and evaluated the impact of automated geocoding on exposure classification by assigning true location to a randomized sample of the study population. Overall, the percent of agricultural land within 800m buffer was slightly higher for controls than for cases. No statistically significant difference in exposure classification was found

after correction for the true location. The study provides a crude semi-quantitative exposure estimate and addresses the positional errors due to automated geocoding. However, it is not able to assess the dose of pesticides that reaches the developing embryo/fetus, does not address seasonality of pesticides applications as well as the misclassification of exposure due to maternal residential mobility. Other limitations are: discrepancies in land use/cover data, lack of information about occupational and home exposure to pesticides. Next analytical step is to develop a GIS-based agricultural exposure metric.

## 135.
## Silicosis and carcinogenic risk in workers in the Czech Republic

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Objective: Many epidemiological studies identified increased lung cancer risk in workers exposed to dust with content of crystalline form of silica dioxide. The aim of this study was to compare lung cancer risk between workers with diagnosed silicosis and general population of the Czech Republic. Material and methods: The study sample included 804 workers exposed to crystalline silica dust who were as well as registered with silicosis in the National Register of Occupational Diseases in 1992–2001. These workers came from metallurgic, ore-mining, stone-cutting, ceramics and porcelain industry. The most frequent professions were metallurgists, ore-miners, breakers, stonecutters, grinders, tool sharpeners and bricklayers. The data on individual and occupational history of workers were linked with the data from the National Cancer Register and the National Population Register. Data about general male population by 5-age groups were retrieved from Czech health statistics. Lung cancer risk was calculated as a standardized morbidity ratio (SMR) with 95% confidence interval (CI) based on the data about incidence of lung cancer from 1992 to 2006; for people of the age 30 years and older. Program Stata v.9 was used for data analysis. Results: Average age of study sample in time of diagnosed silicosis was 60.4 (SD 10.7), average exposure in years was 24.2 (SD 10.5). In period 1992–2006, 158 workers (19.8%) contracted cancer; of those the most frequent diagnosis was lung cancer – 61 cases. Average age in time of diagnosed lung cancer was 67.2 years (SD=8.6). In this period 335 (42.0%) workers died, average age in time of death was 70.8 years (SD=9.8). The most frequent causes of death were cardiovas-

cular diseases (43.0%), all causes cancer without lung cancer (17.3%), respiratory diseases (16.7%) and lung cancer (15.8%). Study sample contains 31% smokers, 19% non smokers, in 50% lack of information on smoking. Negative association was found between the level of seriousness of silicosis and exposure characteristics – dust intensity and concentration of crystalline form of silica dioxide in dust ($p>0.05$). No association was identified between lung cancer incidence among workers with silicosis and all occupational dust exposure characteristics. Positive association was confirmed between smoking and incidence of lung cancer in workers with silicosis ($p=0.01$), but high proportion of workers without information on smoking (50%) was weakness of this result. Significantly higher lung cancer risk SMR=2.8 (CI: 2.2–3.8) was confirmed in workers with silicosis comparing with general Czech population. Conclusion: The results of this study demonstrate significantly higher lung cancer risk in workers exposed to dust containing crystalline silica and having silicosis comparing with general population in the Czech Republic. Negative association was found between the level of seriousness of silicosis and dust exposure characteristics. No significant association was identified between lung cancer incidence among workers with silicosis and all occupational dust exposure characteristics in the study sample. Acknowledgment: The study was financed by the Czech Ministry of Health – Nr. 8556 Longitudinal prospective study on carcinogenic risk in workers exposed to dust with content of crystalline form of silica dioxide in the Czech Republic (2005–2009).

## 136.
## European hot spot of air pollution by PM2.5 and B[a]P: Ostrava, Czech Republic

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Background. Ostrava Region in the Northern Moravia (Silesia) is the most polluted region in the Czech Republic by particulate matter (PM10 and PM2.5) and carcinogenic polycyclic aromatic hydrocarbons (c-PAHs) as benzo[a]pyrene (B[a]P). Sources of this pollution are industry (steel production, coke oven), traffic and local heating. The increase of air pollution is accompanied by the increase of asthmatic children (up to 15 years) diagnosed in the paediatric district of Bartovice. Objectives. As this region is the most polluted spot in European Union, we put forward a project proposal to gain new knowledge on the mechanisms of the effects of complex mixtures bound on dust particles (c-PAHs and toxic metals) and volatile organic compounds (VOC) in the ambient air on humans. New methods of toxicogenomics will be used to study these effects. The adverse effects of the atmospheric pollutants will be studied on different levels (molecular epidemiology studies, in vitro studies) and in different populations (city policemen, children). Experimental design. Study: Health status of children. Analyses of children respiratory morbidity up to 6 years of age in polluted and less polluted parts of Ostrava City (1000 children in each group). Incidence of acute upper and lower respiratory airways morbidity, bronchial asthma, atopic dermatitis, and alergic rhinitis will be investigated. Study: Asthma bronchiale in children and biomarkers. In the most polluted part (Ostrava-Bartovice) will be selected 100 asthma bronchiale diagnosed children and 100 healthy children, aged 8–12 years. As controls will be selected another 200 children from the district of Prachatice. As biomarkers will be followed: genetic polymorphisms (metabolic and DNA repair genes by RT-PCR), gene expression (toxicologically significant genes by Illumina chips), 8-oxodG, lipid peroxidation, oxidation of proteins, vitamins, cotinine. Study: Response of human cells to complex mixtures in vitro. Analysis of DNA adducts, oxidative damage, gene expression changes and protein expression changes by the organic and inorganic extracts from particles collected in various localities. Study: Molecular epidemiology study. In the Ostrava City will be selected 60 city policemen from the polluted and 60 ones from

less polluted parts, sampled repeatedly during two winters and one summer, as controls 60 city policemen from Prague. Exposure to PM2.5, c-PAHs, VOC and toxic metals will be followed by stationary monitoring, c-PAHs and VOC by personal monitoring. As biomarkers will be followed: DNA adducts, gene mutations, chromosomal aberrations, 8-oxodG, lipid peroxidation, oxidation of proteins, genetic polymorphisms (metabolic and DNA repair genes), gene expression profile, protein expression, vitamins, cotinine. Supported by the Czech Ministry of Environment SP/1b3/8/08 and Ministry of Education 2B08005.

## 137.
## Climatic conditions and vector borne diseases in Kerala, India

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Vector borne diseases particularly Dengue fever, Chikungunya and Leptospirosis are becoming the most dreaded health problem in Kerala especially in the hilly areas of Northern part of Kerala. The climatic factors especially temperature and rainfall has a vital role in the density of vector population and also the vector borne diseases. This study was conducted to assess the relation between environmental factors with special reference to temperature and rainfall and the occurrence of vector borne diseases. This study was conducted with help of vector borne diseases data from District Medical Office, Kannur, Kerala and Environmental data from Center for Plant Crops Research Institute, Kasaragod, Kerala. Data for a period of five years was collected from these centers over a period of three months. Results showed a positive correlation of association between monthly vector borne disease incidence and climatic variables. Though vector borne diseases are mainly occurring in rural area, the Dengue fever and Chikungunya fever are mostly seen in urban areas due to developmental activities leading to mosquito breeding in urban areas. To conclude the prevention and control of vector borne diseases require high political commitment, multisectoral collaboration and community participation. Containment of vector borne diseases requires active support and commitment from many partners to obviate the factors to promote and facilitate breeding of vectors.

## 138.
## Discharge of wastewater from activities of industrial units for inorganic products manufacturing – potential sources generating ecological risk on Olt River

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The activities performed on Valcea platform in the frame of industrial units having profile of inorganic products manufacturing (caustic and calcined soda, chlorine, hydrochloric acid, sodium hypochlorite etc.) have generated wastewater with significant mineral loading. The units' emplacement in the immediate neighborhood of a natural emissary, long period of activities performing and, especially, the nature of substances discharged in effluents were a potential factor of stress for wastewater receptor – Olt River. In the paper, the results of ecological investigation are presented for biotic communities specific for water body – Olt River in the discharging area of wastewater effluents resulted from activities performed into industrial units having profile of inorganic products manufacturing. These results have been analyzed in correlation with the results

of non-biotic factors characterization – physical-chemical parameters of the natural emissary, Olt River. Based on the ecotoxicological tests, are emphasized potential inhibitory/toxic effects produced by the impurities present in these wastewater upon various microorganisms/organisms species test present in the natural receptor (bacteria, daphnies, aquatic algae, fish). Keywords: water body, biotic communities, non-biotic factors, effluent, ecotoxicological tests.

## 139.
## Study of children's health status, living near to a non-ferrous plant and hazardous wastes

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The object of the study is to determine the health status of children living in an environment anthropogenically polluted with heavy metals (lead Pb and cadmium Cd) and to assess the health risk. The main anthropometric indexes are investigated, the overall health and neurological status of 50 children aged from 7 to 11 years old. The assess of their exposure has been done through biological markers – blood, content of lead and cadmium. A control target group for comparison of another 50 children was investigated. Conclusion: The results of the children who are living in the polluted areas are more disadvantageous than those of the children from the control village. A prophylactic programme was prepared for the health risk management in the polluted villages.

## 140.
## 8-oxodeoxyguanosine as a marker of oxidative DNA damage in children in relation to air pollutants and gene polymorphisms

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Exposure to ambient air pollution has been associated with adverse health effects that could cause many diseases. Adverse effects of different pollutants on human health have been well documented in Europe and other parts of the world. Oxidative stress is believed to be one of the mechanisms of effects of air pollution to human health. We investigated variability of 8-oxodeoxyguanosine (8-oxodG), a marker of oxidative damage to DNA, in urine samples of 500 children from Teplice district with higher air pollution and 426 children from Prachatice district with lower air pollution as a background of the Czech Republic. For the analysis of 8-oxodG levels ELISA technique was used. We analyzed the association between exposure to particulate matter PM2.5, PM10, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), benzo[a]pyrene (BaP) and 8-oxodG levels with individual characteristics from human life style as ethnicity, smoking, education level, maternal height and weight, type of heating, vitamins content etc. The concentrations of environmental pollutants (PM2.5, PM10, cPAHs and BaP) were monitored continuously by stationary monitors. The mean levels (SD) of 8-oxodG in Teplice children vs. Prachatice children were as follows: 17.2 (±17.4) vs. 17.3 (±12.0) nmol/mmol creatinine (p=0.37); so there was not a significance difference between these two districts. The high levels of 8-oxodG were connected mainly with cotinine levels, ethnicity, mother¢s education level, mother¢s high, mother¢s weight and children's age. Because it is expected that metabolic and DNA repair gene polymorphisms may modulate individual susceptibility to PAH exposure the relationship between 8-oxodG and

polymorphisms of metabolizing (CYP1A1*2A, CYP1A1*2C, GSTM, GSTP, GSTT, EPHX1) genes and DNA repair genes (XRCC1, XPD6, XPD23, hOGG1) was investigated. The PCR-based FRLP assays were used. However, no consistent effect of genetic polymorphisms was observed. Levels of PM2.5 and PM10 measured in a 3-day period 6 days before collection of urine significantly increased 8-oxodG levels. The significant relationships were observed between 8-oxodG levels and respiratory illnesses in children. The study was supported by the grant VaV-SL/5/160/05, VaV-SP/1b3/50/07 of the Czech Ministry of Environment and AVOZ50390512 of the Academy of Sciences of the Czech Republic.

## 141.
## Deficiencies regarding the activities of the occupational health services in Romania throughout the last decade – cause and effect. Comparative, statistical data between Romania and 12 EU countries

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Occupational diseases declared in Romania have noted a pronounced diminished incidence throughout the past five years, which would suggest deficiencies in employees' health supervision and in the early finding of occupational diseases rather than improvements in working conditions. The authors suggest a review of the occupational diseases' incidence evolution over the last decade in 12 countries of the EU by comparison to Romania and, at the same time, they attempt an analysis of the Romanian Occupational Safety and Health Department's efficiency, advancing a series of improvement measures.

## 142.
## Assessment of motor transport as a factor influencing the quality of environmental conditions and the state of health of the population

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Key words: traffic, environmental health, population health, traffic related traumatism, sociological studies, potential life years lost. Study objects: environment, morbidity and mortality indices, data on accident rate, traffic accidents, public opinion Aim: hygienic assessment of motor transport as a factor influencing the quality of environmental conditions and the state of health of the population in order to develop preventive measures in an urban setting. Methods of study: hygienic, statistical, epidemiologic, sociological Results: hygienic assessment of environmental quality as influenced by transport was made; association with population morbidity rates was found. Data on accident rates and traffic accidents were analyzed. Morbidity and mortality due to traffic accident-related injuries in the cities Bishkek and Osh were assessed. Sociological studies of public opinion were conducted regarding traffic safety in the cities Bishkek and Osh. Hygienic assessment was made of the contribution of transport as a leading source of environmental pollution in the urban setting such as Bishkek and Osh. A comparative study was carried out of air pollu-

tion of near-highway areas by main pollutants and an association with morbidity levels was found. For the first time the main causes of traffic accidents have been identified with determination of the most dangerous time intervals. For the first time potential life years lost due to mortality from traffic accidents in Kyrgyzstan has been calculated. For the first time public opinion regarding traffic safety and traffic accident prevention has been studied.

## 143.
## Caveolae – associated signaling mechanisms in PCB-induced formation of brain metastases

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Polychlorinated biphenyls (PCBs) are known to cause carcinogenesis and tumor promotion and also may affect the development of cancer metastases. We hypothesize that specific PCB congeners can disrupt endothelial integrity and increase the transendothelial migration of tumor cells. Our studies have concentrated on ortho-substituted non-coplanar PCB congeners, because PCBs of this type can accumulate in the brain. Exposure of human endothelial cells to ortho-substituted PCBs induced cellular oxidative stress, metalloproteinase (MMP)-3 expression, endothelial hyperpermeability, and transendothelial migration of tumor cells. PCB-induced MMP overexpression was regulated by the interplay between redox-regulated Janus kinase 3 (JAK3), epidermal growth factor receptor (EGFR) and MAP kinases, such as JNK, ERK1/2, and p38. In addition, PCB-induced endothelial permeability was associated with overexpression of vascular endothelial growth factor (VEGF). The blood-brain barrier (BBB) is a physical and metabolic barrier separating brain microenvironment from the peripheral circulation and is mainly composed of endothelial cells connected by tight junctions. We have evidence that exposure to ortho-substituted PCB congeners can decrease expression of tight junction proteins in human brain microvascular endothelial cells. However, the mechanisms by which PCBs alter tight junction proteins expression are not completely understood. Therefore, we examined whether caveolae-associated signaling can contribute to PCB153-induced dysregulation of tight junction protein expression. Exposure of brain endothelial cells to PCB153 induced phosphorylation of caveolin-1 which is a major structural and regulatory component of caveolae. In addition, several caveolae-associated kinases, such as Src family kinase, Ras, and RhoA were activated within 10 min of PCB153 exposure. Another prominent factor that modulates endothelial cell proliferation, migration, and angiogenesis is interleukin-8/CXCL8 (IL-8). Treatment of endothelial cells with ortho-substituted PCBs dose-dependently increased levels of IL-8 mRNA and secreted protein. Site-directed mutagenesis of the IL-8 promoter and DNA binding assays revealed that AP-1 and NF-?B sites are required for PCB-induced IL-8 transcription. Most importantly, pharmacological inhibition of Src kinase activity or overexpression of dominant negative c-Src in human endothelial cells resulted in a significant decrease in IL-8 expression and promoter activity. In contrast, ectopic expression of activated c-Src markedly increased promoter activity of IL-8. These stimulatory effects of dominant-positive c-Src were abrogated by mutagenesis of AP-1 and NF-?B binding sites in the IL-8 promoter. Thus, c-Src may regulate crucial downstream signaling pathways leading to activation of NF-?B and AP-1, followed by overexpression of IL-8 in PCB-treated endothelial cells. Our results provide strong evidence that caveolae and related signaling mechanisms may be involved in ortho-substituted PCB-induced disruption of the BBB and contribute to the formation of brain metastases. Supported by NIH/NIEHS (P42 ES 07380).

## 144.
## Organochlorine pesticides (OCPs) in the Southern Kyrgyzstan. Problem and possible solutions

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After the dissolution of the Soviet Union, a great number of pesticide storages and airstrips were turned over to the private property, that caused an increase in the prevalence of children's diseases associated with pesticide contamination. And, in view of this situation, the problem of monitoring of the dangerous territories contaminated with pesticides has become actual. On the basis of monitoring results 80 former pesticides storages and 28 airstrips were encountered on the territory of the Southern Kyrgyzstan. 10 out of 35 pesticide storages were not found due to their complete destruction, 2 storages were in normal condition, 4-in satisfactory condition, 6 storages were partly destroyed and 13 – completely destroyed. Kyrgyzstan is a country with economy in transition and there are no funds for elimination of obsolete pesticides on the territory of the republic. That is why Kyrgyz scientists collaborate with international environmental organisations, such as GEF, Milieukontakt to solve this problem. The environmental situation in the Southern Kyrgyzstan is urgent because pesticide storages are decomposed in summer and OCPs are blown away. Every time it rains, pesticides are washed out into the natural system and become concentrated in the blood chain (e.g. Suzak region). OCPs presence in human milk in this place was encountered in 90% of women in spring time and in 30–40% -in winter. OCPs were found in placenta of more than 57.2% of the examined. Moreover, women from this region suffer from breast cancer, neonate children have disorders of biocenosis and supressed immunity. Endemic goiter cases were observed in 35–40% of schoolchildren and schoolgirls had disorders of menstrual cycle. Our Institute carried out analyses to detect the factors which effect the course of diseases and their prevalence. During analyses the following methods were used: inventory method, clinical and epidemiological method, gas-liquid chromatography for detection of OCPs in biomedia. We elaborated optimal ways of treatment and prevention of diseases caused by pesticides in accordance with lifestyle of the population. For this purpose we applied local herbs rich in antioxidants and biologically active agents. Following all complex measures above mentioned OCPs levels decreased 1.5 times, concentration of immunoglobuline increased 2 times, and there is a tendency of decrease of breast cancer morbidity among women and children.

## 145.
## Medical and ecological problems of the town of Mayluusuu and possible solutions

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Uranium wastes buried in the town of Mayluusuu (Kyrgyz Republic) are considered to be one of the major problems of radioactive safety. According to the data of Ministry of Extraordinary Affairs (2006), the total volume of uranium wastes was 7291.6 $m^3$, including 23 tailing pits (1374 $m^3$) and 13 dumps (5845.6 $m^3$). Due to radioactive leakage occurred in the tailing pits ? 3,5,6,7, concentration of uranium and radium in water and bottom mud was hundred times higher than the permissible concentration. 209 measurements were performed with the use of dosimeters

RZC-10 NZ, SRP-08-01, (Type RPG 4-01) to detect the radiation level. Increased radiation level was recorded in 42 cases (20.1%). While detecting radiation level in 163 houses, elevated radiation level was encountered in 28 houses (17.3%). Increased radiation was also observed at levels 180 mk R/h up to 3000 mk R/h in 4 out of 15 public premises. Traps filled up with activated carbon were applied for measuring concentration of radon in air. Water samples were collected with purpose of detecting the level of uranium, thorium and cesium in water. 200 houses and 800 zones were subjected to investigation. In 2002, concentration of radon (over 200 $Bkm^3$) in air was found in 37 (92.5%) out of 40 samples. In 2006, concentration of radon in air encountered in 6 (7.5%) out of 80 samples. The data obtained in 2007 showed uranium concentration in bottom mud at level 3.6 mg/kg, thorium- 1.07 mg/kg. The higher concentration level of these radioactive elements may cause such severe diseases as congenital malformations in children, miscarriages in women, development of different tumours and endocrine pathologies. During 1990–2007 there were 1168 miscarriages (9.13%) and 117 still born cases (1.24%) reported against 9410 births in Mayluusuu maternity hospital. 473 children had congenital malformations (5.2%). This situation demands urgent measures to be taken. In order to prevent congenital malformations and still born cases it is necessary to supply local population with pure drinking water and provide control over the penetration of radioactive elements in the environment.

## 146.
## Carcinogenic risk in black-coal miners with pneumoconiosis in the Czech Republic

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Objective: In 1997 IARC evaluated dust containing crystalline silica as carcinogenic to humans (Group 1). The results of a great number of epidemiological studies confirm a statistically significant increase of lung cancer in the workers from various production areas with the risk of silicosis. The possibility of the increased risk of lung cancer in black-coal miners cannot be explicitly, according to the present knowledge, either confirmed or eliminated. The goal of this study is analysis of lung cancer risk between black-coal miners with pneumoconiosis and general population of the Czech Republic. Material and methods: The sample consisted of 2,511 black-coal miners with pneumoconiosis. These workers were registered in the National Register of Occupational Diseases from 1992 to 2001. The data on individual and occupational history of workers were linked with the data from the National Cancer Register and the National Population Register. Population data were retrieved from Institute of Health Information and Statistics of the Czech Republic. Lung cancer risk was calculated as standardized morbidity ratio (SMR) with 95% con-

fidence interval (CI) by 5-age groups based on the data on lung cancer incidence over a period 1992 to 2006, first group was 30–34 years and last group 85 years and more. Program Stata v.9 was used for data analysis, t-test and □ test was used at the 5% level of significant. Results: Coal workers' pneumoconiosis was diagnosed in average age of 48.8 years (SD=12.5). Average time of exposure was 21.1 years (SD=7.9) based on information about exposure found in 76.5% of sample. Concentration of $SiO_2$ in the black-coal mine's dust was less then 5% in 90% of sample and 5–10% in the rest of sample. Data on smoking habits were available from 73% of workers of those 65.6% were smokers or ex-smokers. In this sample 492 persons died in period 1992–2006 and average age of death was 67.0 years (SD=12.2). Of those, lung cancer was the cause of death in 14.4%. The main causes of death ware cardiovascular diseases (39.4%). In total 91 lung cancer cases were diagnosed with average age of 63.6 years (SD=9.2) and average time of exposure was 24.9 years (SD=8.9). This average time of exposure was significant longer ($p< 0.001$) then in the worker without pneumoconiosis (20.9 years, SD = 7.9). Calculated SMR for lung cancer in miners with coal workers' pneumoconiosis was 2.2 (95% CI 1.8–2.8) comparing with the general Czech male population. Conclusion: This study found significantly higher lung cancer risk in workers with pneumoconiosis who were working in a mine comparing with general Czech population. The miners with lung cancer have longer average time of exposure than the miners without lung cancer. More detailed analysis of risk factors will follow. Acknowledgment: The study has been supported by the Czech Ministry of Health – Nr. 8556 Longitudinal prospective study on carcinogenic risk in workers exposed to dust with content of crystalline form of silica dioxide in the Czech Republic (2005 – 2009).

## 147.
## Study of microbiological quality of drinking water in Timişoara in relation to diseases in the population of the city

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The current study represents the third stage of the research project called "Promoting innovative, lasting technologies in the treatment of water for human consumption" The actions necessary for the completion of the epidemiological survey took place during this stage. The case study consisted of microbiological analysis of the drinking water at the consumer end in the city of Timisoara. The correlation between the prevalence of diseases in the population group surveyed and the microbiological quality of the water distributed through the centralized water systems was determined, in particular that distributed by the water plants U1, U2-4, U5 and the local public drillings. Due to the lack of microorganisms in the drinking water a clear correlation between morbidity by gastro-intestinal diseases and the quality of the water could not be established. To rule out health risks to the consumers, an ongoing monitoring of the water is recommended at the water plants. Assessing health risks still proves to have minimum efficiency due to insufficient information, especially in the case of multiple exposures.

## 148.
## Considerations on the ecological reconstruction and rehabilitation of the mining areas, affected by the operation activities and the processing of the available resources

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The work presents the main principles setting out the activities for closing, ecologic reconstruction and rehabilitation of the mining objectives, of the technological annexes and the affected surfaces by the extra-active activities and the preparation / processing of the available mining substances and the working procedures in Romania. In order to apply these principles and procedures an institutional system has been established and a legislative support complying with the requirements of the European Union institutions.

## 149.
## Drinking waters' radiological indices from sources situated close to uranium ore deposits and death-rate assessment of people living in the same regions

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Some uranium ore deposits were exploiting in the municipalities of Mineralni Bani and Haskovo in Bulgaria. All mines were closed ten years ago except one. The risk of drinking waters' pollution is possible but no investigation has been done. About 25,000 people consume water from these sources. The aim of this study was to analyze the radiological status of drinking water from sources situated close to the old uranium mines and to assess the death-rate of the inhabitants of these municipalities in comparison to the mean country level. The content of Ur-238, Ra-226, Rn-222 and total ?-radioactivity was analyzed and the death-rate of people for 10 year period (1997–2006) was calculated. Results: 1. Ur-238 (mg/l) – 0.0250±20%÷0.0025±20% in the different sources (Bulgarian limit – 0.06); Ra-226 (Bq/l) – 0.1315±25%÷0.0481±25% (Bulgarian limit – 0.15); total ?-radioactivity (Bq/l) – 1.12±10%÷0.11±10% (Bulgarian limit – 2.0); Rn-222 (Bq/l) – 185.5±10.4÷3.5±0.6 (European limit – 200). 2.Death-rate (‰): Municipality of Mineralni Bani – 13.9 (1997) ÷ 18.2 (2006); Municipality of Haskovo – 12.1 (1997) ÷ 13.8 (1998); Bulgaria – 14.7 (1997) ÷ 13.6 (1999). Conclusion: The radiation analysis shows that the overall indicative dose is below 0.10 mSv/year), which corresponds to the ordinance documents. There is no data for drinking waters' pollution from uranium ore deposits in the municipalities of Mineralni Bani and Haskovo. The death-rates of the population of these municipalities are close to the mean country levels.

## 150.
## Cohort study about influence of different air pollution levels during early childhood on respiratory indices at later age – eight year natural experiment

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The transition to market economy (after 1989) in Bulgaria was accompanied by a great drop of industrial production. This led to a considerable decrease in the levels of air pollutants. Taking advantage of the unique opportunity to conduct an epidemiological experiment under natural conditions we performed a full functional study of the external breathing of healthy children throughout 4 consecutive years (1996, '97, '98, '99 y) – First cohort (I) 27 boys at age 10.47±0.49 y and 38 girls at age 10.29±0.46 y (1996), who were born and lived under massive air pollution during first years of age) and 4 consecutive years (2001, '02, '03, '04 y) – Second cohort (II) – 34 boys at age 10.47±0.51 y and 27 girls at age 10.37±0.49 y (2001), who were born after the abrupt production decline and had lived in conditions of considerably lower level of pollution). The two cohorts had lived in the same areas and had attended the same schools, respectively. All series of the study were conducted in Pulmonary Function Testing laboratory of Medical University – Plovdiv by the same team with a diagnostic system Masterscreen Diffusion™ (E. Jaeger, Wuerzburg, Germany). Results: 1.1996 vs. 2001 y, Boys (X±SD): FVC%Pred= 93,19±8,29 vs. 98,43± 11,41 p=0,0421; FEV1%Pred=100,90±6,28 vs. 106,04±10,39 p=0,0274; Tiffneau=84,59±5,30 vs. 87,82±6,66 p=0,0397; TLC%Pred=90,48± 7,96 vs. 102,89±12,37 etc. Girls: FVC%Pred= 94,11±8,93 vs. 102,06±10,80 p=0,0019; FEV1%Pred=103,87±9,28 vs. 111,41±11,25 p=0,0044; Tiffneau=87,70±4,29 vs. 91,91±4,59 p=0,0003; TLC%Pred=91,66±7,94 vs. 101,75± 10,80 p=0,0002 etc. 2. 1999 vs. 2004 y, Boys: Tiffneau=85,40±5,86 vs. 88,55±6,25 p=0,049; Girls: MEF50%Pred=98,32±21,14 vs. 110,06± 19,89 p=0,027 etc. Conclusion: The average levels of respiratory indicators correspond to the referential values in both groups, but lower spirometric indices were found among children who have lived in conditions of massive air pollution during their first years of life. The pubertal stimulus in development contributes for the compensation of the lower lung function parameters from early childhood, but some unfavourable tendencies continue to persist.

## 151.
## Human health risk assessment from transport-related air pollution in Ukraine

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Introduction. The impact of transport-related air pollution is among the leading concerns about air quality these days. The studies of adverse effects of air pollution on human health indicate that, along with industrial enterprises, transport also contributes greatly to the problem. In recent years, a growing number of road transport is likely to become a significant contributor to air pollution in Ukrainian cities. Objective. The research was aimed at human health risk assessment from transport-related air pollution in Zaporizhia, one of the most highly industrialized Ukrainian cities. The work was focused on nine most hardly loaded and problematic crossroads of the city. Popula-

tion exposition to air pollution caused by transport emissions was estimated by applying algorithm of CALRoads View program. CALRoads allows to model pollutant distribution over the studied territory counting in road and traffic characteristics, relief peculiarities, meteorological characteristic of the studied territory. Materials and methods. The work was completed by methods of mathematic, computer modelling (program complex CALRoads Viev v.3.8.0, Lakes Environmental Software Group), and human health risk assessment methodology (EPA). The information concerning roads characteristics (number of lines, road width, crossroads parameters) and traffic intensity (transport flow intensity and structure, speed regime, time of breaks) was prepared in cooperation with Zaporizhia National Technical University. Electronic model of relief was worked out on the grounds of satellite image and resulted in the electronic map, on which all studied crossroads were placed. Meteorological data for one full year observations was obtained from the meteorological observation station UKDE 34601. Meteodata was preprocessed to compatible with CALRoads View requirements format. Results. In the result of research the concentrations were estimated for all nine crossroads for the following transport emission compounds: carbon oxide (CO), nitrogen dioxide (NO2), carbohydrates (CxHy), PM10 and benzo(a)pyrene. The general diapasons of concentration defined on the results of separate calculations for each crossroads were: CO 0,08–2,78 mkg/m$^3$, NO2 0–0,118 mkg/m$^3$, CxHy 0–0,79 mkg/m$^3$, PM10 0–7,7 mkg/m$^3$, benzo(a)pyrene 0,00003–2,46. The received concentrations for all chemicals, except PM10, exceed the means of reference concentrations. Calculated concentrations were used for cancer and non cancer risk assessment. Non cancer risk formed by carbon oxide and nitrogen dioxide was at medium level at crossroads where the exceedance of reference concentration was observed: CO HQ=0,038÷2,34; $NO_2$ HQ=0,49÷2,94. Non cancer risk was not calculated for carbohydrates as they are substances of complex nature and need special deeper study and monitoring. As for individual cancer risk during the lifetime, for benzo (a)pyrene it was at level $10^{-4}$–$10^{-3}$, that is a quite high index even for such industrial city as Zaporizhia, and for PM10 $10^{-7}$–$10^{-5}$, that is acceptable but in accordance with WHO requirements demand periodic control from local authorities side. Conclusion. In the result of presented research human exposure to transport-related air pollution near nine selected crossroads of Zaporizhia was estimated. This gave the possibility to assess cancer and non cancer risk levels from five registered pollutants for the population living on the adjacent territories and to rank crossroads by their impact.

## 152.
## Human exposure assessment to air pollution from industrial sources in Ukraine

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Introduction. The current tendency of globalization and industrialization leads to heavy ecological loads on environment and population. Due to growing number of industrial enterprises and increase in cases of bad or absent ecological management at plants, industrialized cities of Ukraine is currently facing the problem of air quality change and not to the positive side. Objective. This research was focused on exposure assessment of population of Solomianskyi region of Kyiv to air pollution caused by the local enterprises. Exposure assessment is one of the stages of human health risk assessment process and gives the possibility to define the pollutant concentration distribution over studied region. The aim of the research was to estimate the exposition of the Solomianskyi region population to hazardous pollutants emitted by local plants. Materials and methods. The work was completed by using methods of mathematical and computer modelling. The concentrations were received by applying algorithm of programme complex ISC-Aermod v.5.8.0 of Lakes Environmental Software group, namely ISCST3 model. ISCST3 allowed to model pollutant dis-

persion over studied territory taking into consideration a number of parameters: – meteorological data (received from the meteorological station UKKK 33345) – relief and land use data (formed basing on satellite image by using GIS tools) – source parameters data (received from the inventarization papers). Results. The research was concentrated on 62 enterprises of the studied region. Pollutant list included 26 substances, 15 of which were prioritized (10 can cause high toxic effects or are mutagens). Receptor points (points at which calculations were performed). Receptor points (points at which concentrations were calculated) were defined grounding on city plan and satellite image. Average one hour, twenty-four hour, month, and year concentrations were estimated for all 15 pollutants and maps reflecting dispersion over territory for every pollutant were built. Among the studied pollutants the concentrations of the following exceeded reference concentrations in defined receptor points: ammonia, nitrogen dioxide, sulfur dioxide, and carcinogens: metallic nickel, chronium (VI), lead and its compounds, benzpyrene. The exposition load was correlated with the places of people living. Meaning of average concentrations allowed making cancer and non cancer risk assessment from industrial air pollution for the inhabitants of the studied area. Non cancer risk was calculated to be within diapason 0,0001–30,85; cancer risk was reaching the levels of $10^{-3}$–$10^{-4}$ for the whole exposed population during the lifetime. Conclusion. The carried out research gave the possibility to determine the areas with the highest pollutant concentrations within the territory of Solomianskyi region of Kyiv and estimate age and sex distribution of exposed population. The received risk levels prove the need of working out sanitary measures for the region inhabitants, and mostly among children and women of childbearing age. This was already taken into consideration by local authorities while working out new strategy plan of environment protection and resource conservation for the region.

## 153.
## The silts of biological purification plants – a factor of the risk for environment and soil fertilizer

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The silt from biological purification plants (BPP) of residual waters is one of the types of waste with high risk for environment. The quantity of such waste in the OECD countries achieves up to 25% from total waste quantity. The impact caused to the environment by the silts generated by BPP is expressed by the toxic gasses emissions which are formed as a result of anaerobic fermentation. In the Republic of Moldova the annual quantity of the BPP silts up to1 mil.tones. The 350–400 thousands tones of silt are generated only at the municipal Chisinau BPP. The annual volume of the anaerobic fermented silts in the biggest cities of the republic constitutes up to 3,5 mil.$m^3$. This process generates the strong and unpleasant smells. That is why it is necessary to valorificate these silts. The aim of this work is the estimation of the emissions representing the risk for environment and investigation of the conditions for application of the silts formed at the Chisinau BPP as a fertilizer. The impact to the environment caused by the emissions as a result of the fermentation process of the silt deposited for drying and the damage caused by the $CH_4$ emissions at the Chisinau BPP have been evaluated. The area of the platforme of the silts deposited at the Chisinau BPP is 32 ha, but the silt layer exposed to the anaerobic fermentation is 2,5 m, (the total layer thickness – 3 m). The following emissions: $H_2S$, $NH_3$, $C_2H_5SH$, $CH_3SH$, CO, $NO_2$ and $CH_4$ take place in the anaerobic fermentation process of the silt. The damage caused by the emissions to the environment depends on the gas volume and the coefficient of toxicity. The calculations carried out for the silts deposited on the area of 32 ha and with a total thickness of the silt layer – 3 m have demonstrated, that the emissions of biogas are 120000000 $m^3$, from them $CH_4$ – up to 65%. Real weight of emitted methane constitutes 55711 t. The conventional weight of methane,

which takes into consideration the coefficient of toxicity, is 1114 t. The quantum cost for the emission of 1 conventional tone of $CH_4$ in the atmosphere, in mun. Chisinau is 18 lei MDL (equivalent to 1,8 USD). In this case the damage caused to the atmospheric air by $CH_4$ emissions from anaerobic fermentation of the silt at Chisinau BPP, expressed in money, constitutes 20055 lei. There are some methods of the silts valorification and liquidation. The most utile solution can be the silts utilization as a soil fertilizer. But the presence of high heavy metal content and microbiological pathogen characteristics are an impediment factor for such type of valorification. For all that, in the cases where the metals' concentration didn't exceed the maximal admitted concentration, the silt can be used as fertilizer with prevention of toxic gasses emissions in the atmosphere and $CH_4$, as the greenhouse gas with high potential of the temperature enhancing. In this work it is proposed that the aerobic method of fermentation of the silt should be used together with the municipal solid waste by aeration and prevention of methane formation at the BPP. This way, the formation of toxic gasses and of the methane can be excluded and the supplementation of the municipal solid waste to the silt contributes to the heavy metal content diminution in the fertilizer.

## 154.
## Preliminary assessment on indoor air quality in schools – the SEARCH project in Hungary

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Introduction. Numerous researchers have indicated that poor indoor air quality significantly affects human health and productivity. This statement is especially regarded for the schools mainly because children may be more susceptible to adverse effects of air pollutants than adults due to their greater activity and developing lungs. Another consideration is that school facilities are densely populated consequently the task of maintaining an acceptable indoor air quality is more difficult. SEARCH, an international complex research program focused on the assessment of relationship between school environment and children's health was initiated in 7 countries a couple of years ago. Objectives. This study presents the preliminary results on indoor air quality in combination with an evaluation of building characteristics and building use in the selected Hungarian schools. Methods. Formaldehyde, VOCs (benzene, toluene, ethyl-benzene and xylenes), carbon-monoxide (CO), nitrogen-dioxide ($NO_2$), respirable particulate matter (PM10), carbon-dioxide($CO_2$) as the most commonly measured compounds and two characteristic indoor air parameters as temperature (T) and relative humidity (RH) were monitored inside each classroom. A combination of diffusive sampling (HCHO, $NO_2$ and VOCs) with 5 day exposure time and continuous monitoring (CO, $CO_2$, PM10 and T, RH) for one day was conducted. In parallel outdoor air pollution was also controlled. The field program was carried out in heating season, between October 2007 and February 2008. 43 classrooms with 8–11 year old children in 10 schools located in Budapest and three regional cities were controlled between October 2007 and February 2008. Schools were chosen according to building characteristics and environmental terms. Additional information about location of the classroom, its volume, ventilation and heating system, furnishing, flooring, wall-covering, type and use of windows and others has been collected using two questionnaires (for school and classroom) filled out by the measurement team. The aim of filling out the questionnaires was to identify the potential emission sources affecting the indoor air quality. Review and discussion. Maximum, minimum, average and median concentrations were calculated on each pollutant, $CO_2$ and physical parameters merged all data. Measurement results were compared to the outdoor concentrations in the absence of indoor air quality guidelines. *Formaldehyde* pollution level changed in a narrow range (1–6 $\mu g/m^3$). Median was near 2 $\mu g/m^3$. The indoor concen-

trations were lower than outdoors. *Nitrogen-dioxide* concentrations varied 16 to 31 μg/m$^3$. With the exception of two classrooms the indoor pollution level was less than 80% of the ambient concentrations. Weekly average x*ylenes* for 80% of all classrooms were below 10 μg/m$^3$. The median concentration was 2,9 μg/m$^3$, but the upper end of the range was relatively high, 69 μg/m$^3$ likely due to the material of carpet on the floor. Significant differences in xylene concentrations were found between the indoor and the outdoor levels. Ambient air pollution was quite low (average: 1,7 μg/m$^3$ range: 0,3 to 2,7 μg/m$^3$). Average *ethyl-benzene* concentrations in 36 classrooms were lower than 13 μg/m$^3$, while 7 results were below the detection limit (0,1 μg/m$^3$). In the ambient air a trace of ethyl-benzene (0,6 μg/m$^3$) was found. Median *toluene* concentration was 3,2 μg/m$^3$ (range: 1,0–21,4 μg/m$^3$). The highest level was measured in a classroom where the plastic flooring was changed at the beginning of the school-year. Outdoor concentrations were generally below 2 μg/m$^3$. The range of average weekly *benzene* concentrations for the 43 classrooms was 0,4 to 5,9 μg/m$^3$. The indoor concentrations were very similar to the environmental pollution level with the exception of one school where the range was 4,9 to 5,9 μg/m$^3$. The probably reason for this outlining result is that the walls were painted by oil based dye within one year. Measured indoor pollution level of *particulates* (*PM10*) varied in a wide range (9–115 μg/m$^3$). Good correlation (R=0,79) existed between indoor and outdoor PM10 concentrations. During the school-time PM10 pollution was lower than 50 μg/m$^3$ in half of the classrooms and higher than 100 μg/m$^3$ in 4 classrooms. Children's activity affected the variability of indoor concentrations. Despite the ventilation, peak PM10 level (above 200 μg/m$^3$) was measured during the break. 1000 ppm in *carbon-dioxide* concentrations could be considered as a ground level in the morning in most of the classrooms controlled. Sometimes the level was near 4000 ppm at the end of school-time. Variation in $CO_2$ concentrations depended on -among others- number of children in the classroom, area of the classroom, duration of the ventilation and number of opened windows. Inefficient ventilation as the most important factor resulted in very high $CO_2$ concentration in the classroom. 5–10 minute ventilation was enough to decrease the $CO_2$ concentrations to the level measured at the beginning of the lesson. To approach the ambient level effective ventilation is needed in the previous afternoon. Long ventilation in the morning is not recommended in winter because the classroom becomes too cold. Conclusion. This research project demonstrated the importance of IAQ control in schools to provide the best learning environment for the students. According to our intention the results from this research can be used to give guidance to school facilities demonstrated. Acknowledgements. The project was funded by the Italian Ministry for the Environment Land and See. The program was organized by this ministry and the Regional Environmental Centre for Central and Eastern Europe, Country Office Hungary. We gratefully thank the staff of the schools participated for assistance in our field work.

## 155.
## Assessing the ecological risk of man-caused impact on the ecosystem of the Dniester river basin

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The Basin of Dniester River, which flows into the Black Sea, an international river, crossing the Ukraine and the Republic of Moldova (RM) has being exposed to an intensive growing anthropogenic impact for a long time. There are four groups of ecological risk sources: industrial, agricultural, public and power generation-related. In the economical systems of the RM and Ukraine, the

basin represented a multi-branch economical complex characterized by a concentration of industrial enterprises, bearing a potential ecological risk subject to a number of industries: mining, light, chemical, oil, machinery construction, food, radio-electronic etc. The main part of enterprises bearing ecological risk are situated in the upper basin, Lvov and Ivano-Francovsk regions of Ukraine accounted for 70% of the Dniester river water output. Another ponderable complex of large enterprises subject to ecological risks is situated in the lower basin – the big towns of Moldova: Chisinau, Tiraspol, and Bender. A large part of the Dniester basin is involved in agricultural process. The middle and lower parts account for 70% of agricultural process. The intensive agricultural system being developed for several decades had not included ecological agricultural household methods, traditional methods of irrigation etc., having been based on the intensive fertilizer usage, monoculture system and environmentally ungrounded irrigation. These have been adversely impacted the ecological state of the basin, affecting the quality of soils, surface and ground waters, and the consequences being hardly redeemable. The ecological state of the river is affected mostly by the household system and the energy sector. In the upper stream, at the Dniester river inflow in Moldova, the barrage of Ukrainian Novo-Dniestrovsk hydroelectical power station SHE was built. The Ecological state of the river has been affected by the created basin and the operation of the station. The mean temperature of the river water decreased 2 °C. The impact of this fact has produced hydrobionts, and several species of fishes has been replaced with ones of a low nutritive and economical value. The fish productivity of the river has declined by 30 times. Along the middle and lower stream of the river the accumulation reservoirs of SHE Dubasari and CTEM Moldovan Thermoelectrical power stations are situated. Along with a positive role of water stream regulation and flood prevention, these have an adverse ecological impact. In the lower stream of the river the Cuciurgan accumulation lake is situated, which since 1965 has been representing the cooling lake of CTEM. Its operation has a deep adverse environmental impact on the river and accumulation lake by producing fluctuations of water level and temperatures during the day and increasing water turbulences. Another problem is the water mineralization of accumulation lake, which increases from 0,6 g/l in 1960 up to la 1,1 g/l in present. The water could be used for irrigations of agricultural fields. Herewith, the named sources represent heavily polluting sources of air basin. Yearly, only CTEM air emissions account for 27 kt NOx, 15 kt CO. These modifications in the quality of environmental components affect heavily the estate of basin ecosystem and health of population. In order to reduce the risks a complex approach to the basin management is required at the international collaborative level.

## 156.
## ‘Recombomice’ provide a unique tool for studying the impact of age and exposure on DNA damage and repair

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Mitotic homologous recombination (HR) is a critical pathway for the repair of DNA double-strand breaks (DSBs) and broken replication forks. Although HR is generally error-free, recombination between misaligned sequences can lead to deleterious sequence rearrangements, and conditions that stimulate HR are associated with an increased risk of cancer. To study HR in vivo, we used Fluorescent Yellow Direct Repeat (FYDR) mice in which an HR event at a transgene yields a fluorescent cell. To detect recombinant cells in FYDR mice, we developed one- and two-photon in situ imaging techniques that reveal both the frequency and the sizes of isolated recombinant cell clusters within intact pancreatic tissue. We then applied these tools to analyze the effects of cancer risk factors such as age and chemical exposure on HR in vivo. To determine the effect of

exposure to exogenous carcinogens on HR, FYDR mice were treated with the chemotherapeutic agents, cisplatin and mitomycin-C. Results show that exposure to these DNA damaging agents causes an induction of recombinant pancreatic cells in vivo, indicating that HR is an active repair pathway in adult pancreatic cells. Age is a risk factor for many types of cancers. Here we examined the effect of age on HR in two tissues of FYDR mice, pancreas and skin. In the pancreas, a dramatic accumulation of recombinant cells is seen with age, resulting from both de novo recombination events and clonal expansion of recombinant cells. In contrast, the skin shows no increase in recombinant cell frequency with age. In vitro studies using primary fibroblasts indicate that the ability to undergo HR in response to endogenous and exogenous DNA damage does not significantly change with age, suggesting that these skin cells are able to undergo de novo HR events in aged mice. Thus, we propose that tissue-specific differences in the accumulation of recombinant cells with age result from differences in the ability of these cells to persist and clonally expand within the tissue. Thus, our studies demonstrate that FYDR mice combined with in situ imaging technology provide powerful tools to study the relationship between DNA damage, HR and cancer.

## 157.
## Predicting groundwater arsenic contamination in Southeast Asia from surface parameters

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Arsenic contamination of groundwater resources threatens the health of 100 millions of people worldwide, particularly in the densely populated river deltas of Southeast Asia. Although many arsenic-affected areas have been identified in recent years, a systematic evaluation of vulnerable areas remains to be carried out. Here we present novel maps pinpointing new areas at risk of groundwater arsenic concentrations exceeding 10 ug/L. These maps were produced by combining geological and surface soil parameters in a logistic regression model, calibrated with 1756 aggregated and geo-referenced groundwater data points from the Bengal, Red River and Mekong deltas. We show that Holocene deltaic and organic-rich surface sediments are key indicators for arsenic risk areas and that the combination of surface parameters is a successful approach to predict groundwater arsenic contamination. Predictions are in good agreement with the spatial distribution of known arsenic contamination but also indicate elevated risks in Sumatra and Myanmar where no groundwater studies exist. Reference: Winkel L., Berg M., Amini M., Hug S.J., Johnson C.A. Nature Geoscience 1, 536–542, 2008. (doi:10.1038/ngeo254).

## 158.
## Hydrogeologic characterization of ground waters, mine pools and the leadville mine drainage tunnel, Leadville, Colorado

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The 3385 meter long Leadville Mine Drain Tunnel (LMDT) was completed in 1952 to create a free-draining tunnel to dewater existing and future mine workings in the Leadville Mining Dis-

trict in the Sawatch Mountains of central Colorado. Since 1952 mining has been mostly discontinued in the Leadville district and the physical condition of the LMDT, which discharges approximately 82 l/s, has deteriorated. Roof falls have resulted in blockages which can cause water to pool up, increasing the hydraulic head and presenting a potential blowout problem. Using its' authority under CERCLA, the US EPA is planning to implement a number of hydraulic and source control elements which are designed to contain and control mine pool water. To support this work the US EPA has completed a rigorous hydrogeologic characterization aimed at developing a sound conceptual understanding of the hydrologic, geologic and geochemical conditions that control inflow of ground water to the underground workings associated with the LMDT and the outflow of mine water from these workings. The investigations discussed here included hydrogeologic mapping, interpretation of water chemistry data, water level data, tunnel tracing and isotopic tracer analysis. The results of this investigation indicate that the LMDT drains only a small volume of mine pool water and a very large volume of regional bedrock and adjacent alluvial ground water. These understandings have been used to design a containment system will be used to control and manage the ground water intercepted by the LMDT and the mine pool(s) that are connected to the LMDT. Key Words: Mining, loading analysis, end-member mixing analysis, isotope hydrology.

## 159.
## Endocrine disruptive effects of organochlorinated pesticides in transfected MCF-7 breast cancer and rat hepatoma cells using luciferase assay

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Organochlorinated pesticides are persistent environmental pollutants. They can bioaccumulate because of their lipophilic features. Some of these compounds resemble 17ß -oestradiol- (E2) in terms of chemical structure and thus can bind to estrogen receptor (ER) and mimic the effects of the endonegous ligand. Some organochlorinated pesticides may display anti-estrogenic actions by binding cytoplasmic aryl hydrocarbon receptor (AHR) and initiating transcription of cytochrome p450 enzymes that metabolize E2. We have examined endocrine disrupter effects of three organochlorinated pesticides (Aldrin, Endosulfan and Mirex) in transfected MCF-7 and rat hepatoma cells using luciferase-reporter assays. Stably transfected MCF-7 cells for ER activity (MVLN) and rat hepatoma cells for AHR activity (H4IIE) were used. Cells were seeded to 24-well plates at 50,000 cells/well in growth medium and incubated at 37 ºC and 5% CO2. After overnight serum starvation of cells, E2, Aldrin, Endosulfan and Mirex were added at concentrations between 0.2 and 10 µM. Both MVLN and H4IIE cells were incubated for 24 hours with the test compounds and then they were lysed in passive cell lysis buffer. Luciferase activities were determined using Luciferase Assay System. As a result of these reporter assays, Aldrin and Endosulfan were found to be weakly estrogenic whereas Mirex was neither estrogenic nor anti-estrogenic. We have also analyzed the cytotoxic effects of Aldrin and Endosulfan in estrogen-sensitive MCF-7 cells. Our results show that both of these substances increase cell death with increasing concentrations and they induce apoptosis in 24 hours. The mechanisms leading to decreased cell viability are under investigation. Acknowledgement: This study was supported by TUBITAK Project # 104-T240.