

the same areas. The data were subject to factor analysis and the first two common factors were extracted. The plot of factor pattern, modified by means of Varimax rotation technique, showed that there were three tight clusters of variables: 1° metal contents (Cd, Pb), 2° anthropometric indices (W/H, H/A) and 3° educational achievements. Finally estimated communalities indicate that the variances of the variables are accounted for in most part by the common factor. No relationship was revealed between metal content (Pb or Cd) and either anthropometric indices (W/H or H/A) or educational achievements. We conclude that, at relatively low levels of exposure to toxic metals, there was about no retarding effect on parameters expressing body growth and intellectual scores.

(Accepted for publication in *The Analyst*)

## Use of Pattern Recognition Methods in Preparation of Map of Natural Radioactivity ( $^{40}\text{K}$ , $^{226}\text{Ra}$ , $^{228}\text{Ra}$ ) in Poland

J. W. Mietelski and P. Zagrodzki

The aim of this work was to find out if there is any difference in radioactivity of  $^{40}\text{K}$ ,  $^{226}\text{Ra}$ ,  $^{228}\text{Ra}$  between the areas seriously influenced by industry and the not polluted ones. In statistical analysis 8 parameters were taken into account: the activity of  $^{40}\text{K}$ ,  $^{226}\text{Ra}$  and  $^{228}\text{Ra}$  in two upper layers of forest litter (A0 - holorganic, A1 - hemiorganic), and the density of these layers. Stepwise discriminant analysis was used to evaluate the results. All calculations were performed using the STATISTICA package. The first two discriminant functions were statistically significant. Cumulated percentage of parameter variance explained by them is 91%. Factor structure matrix is consistent with standardized coefficients for canonical variables. Linear discriminant analysis (LDA) allowed us to classify correctly only the samples of soil originating from eastern and central Poland. The heavily polluted region in southern Poland does not have any distinct radioactive isotope content which could be detected with the help of LDA. Probably, the geological basis has a bigger influence on the soil content than the industrial emission.

## A Program for Interactive Calculation of Radionuclide Activities

P. Grychowski

To calculate absolute radioactivities measured with germanium detectors in various geometries, a program AKT has been written and tested. The activity is calculated basing on calibrated efficiency of the detector. The calibration data, are stored in parametric form, in an external file. Calibrations can be performed for any geometry, and the efficiency functions  $Ef(E_n)$  can be fitted for each geometry and stored in separate files. Each file represents a particular geometry of the measurement.

The activity of a sample is calculated basing on the correlation between the measured intensity of the line with quantum yield of the corresponding transition known from the tables. Input data for the AKT program are the files containing, in subsequent records, information about the number of counts in each peak of interest.

Energetic calibration of the gamma spectrum is not necessary because the analytical line is selected interactively on the computer screen. The program displays contents of the input file and the appropriate record can be selected from the screen using the cursor. Table data can be grouped in sub-libraries, each of which containing just the data on the nuclides of interest. The library data are also selected interactively from the screen.