BIOLOGICAL AND ECOLOGICAL METHODS FOR DETERMINATION OF ENVIRONMENTAL RISK

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The research activities coordinated by Mauro Cristaldi are aimed at the determination of environmental risks through the use of biological and ecological indicators such as wild small mammals (Rodents and Soricomorphs). Ecological indicators are used for the determination of ecosystem damages due to global warming. In a recent study alterations in the microteriocoenoses structure during several years were analysed. Barn owl (*Tyto alba*) pellets collected in localities which were studied already thirty years ago, were analysed. Pellets were dry dissected and small mammal bones were observed at the stereomicroscope for specific identification, subsequently obtained through the use of dichotomous keys. Results showed a significant increase in the relative abundance of small mammal species which live in arid and hot environments (thermoxerophilic species), such as *Suncus etruscus*, *Mus domesticus* and *Rattus rattus*, in conjunction with a rise of average temperatures and a reduction of rainy days. In the near future our research group is going to collect new Barn owl pellets in some localities of Spain, in order to compare the two mediterranean countries. Biological indicators are used for the determination of mutagenetic damages due to the environmental pollution by using suitable biomarkers. In this field our researches are focused on the determination of biological effects due to the exposure of free living rodents to heavy metals and radionuclides, and of laboratory mice to Radon and electromagnetic fields. In order to highlight mutagenetic effects suitable biomarkers have been chosen, such as micronucleus test, comet test and chromosome aberrations analysis. All the results showed a positive significant correlation between the concentration of pollutants detected in the environment (mainly in the soil) or in the target organs and the mutagenetic effects detected in the studied animals. The researches have started in the ‘80ies and have been conducted in electro-nuclear sites (Italy), industrial areas (Czech Republic and Italy), Chernobyl’s radioactive areas (Sweden and Italy), monoculture and urban areas (Italy), areas polluted by heavy metals and arsenic (Spain), and also in protected areas (Czech Republic, Spain and Italy) which represent control areas. In particular, 6 protected areas of Central Italy have been monitored in the last years. Totally, data from about 500 animals have been collected. Results showed a significant difference in genetic damage between animals collected in coastal areas (Castelporziano Estate and Circeo National Park) and those collected in inland areas (Gran Sasso-Laga National Park, Majella National Park, “Lago di Penne” Regional Natural Reserve). Actually the coastal areas, although protected by national laws, are characterized by a non negligible genotoxic impact. Furthermore, the Wood mouse (*Apodemus sylvaticus*) seems more susceptible than the Yellow necked mouse (*A. flavicollis*) to genotoxic damage. All the comparisons have been made after genetic distinction (PCR) between the two sister species (*A. flavicollis* and *A. sylvaticus*). At the present time our research group is studying the environmental quality of an area characterized by industrial pollution (mercury emissions) in Central Italy. Furthermore, we are investigating the mutagenetic effects on small mammals of the experimental use of weapons (also containing depleted uranium) inside the “Poligono Interforze Salto di Quirra” (CA) as required by the Public Prosecutor’s Office of Lanusei (Ogliastra Province).