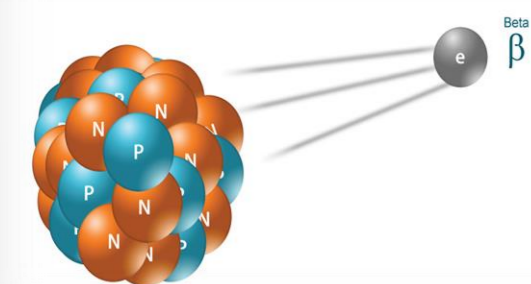


SMALL MAMMALS AS APPROPRIATE RADIOECOLOGICAL MONITORS IN ALPINE ECOSYSTEMS: TOTAL B- ACTIVITY AS AN INDICATOR OF DECREASING CONSEQUENCES OF THE CHERNOBYL ACCIDENT

P. Ostoich, M. Beltcheva, R. Metcheva, I. Alexieva, JA Heredia Rojas, Ch. Angelov

TOTAL β - ACTIVITY IN THE ENVIRONMENT



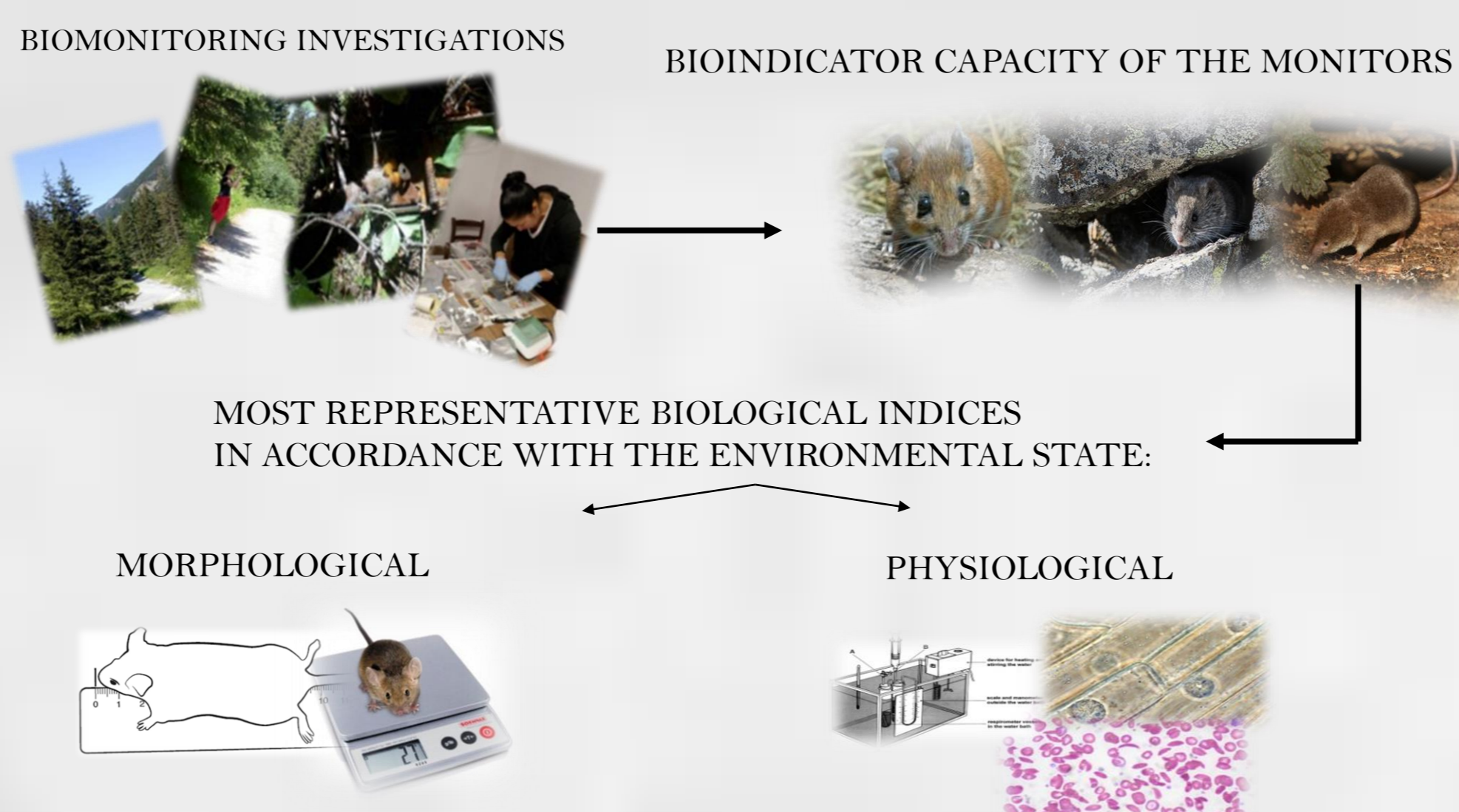
The isotopes Cs-137, Cs-134 and Sr-90 present in the biosphere are the basic β -emitters.

An important natural source is K-40, but it is a relatively weak emitter, responsible for only a small percentage of the dose. Additionally, I-131 and I-133 also emit beta particles but for a very short time.

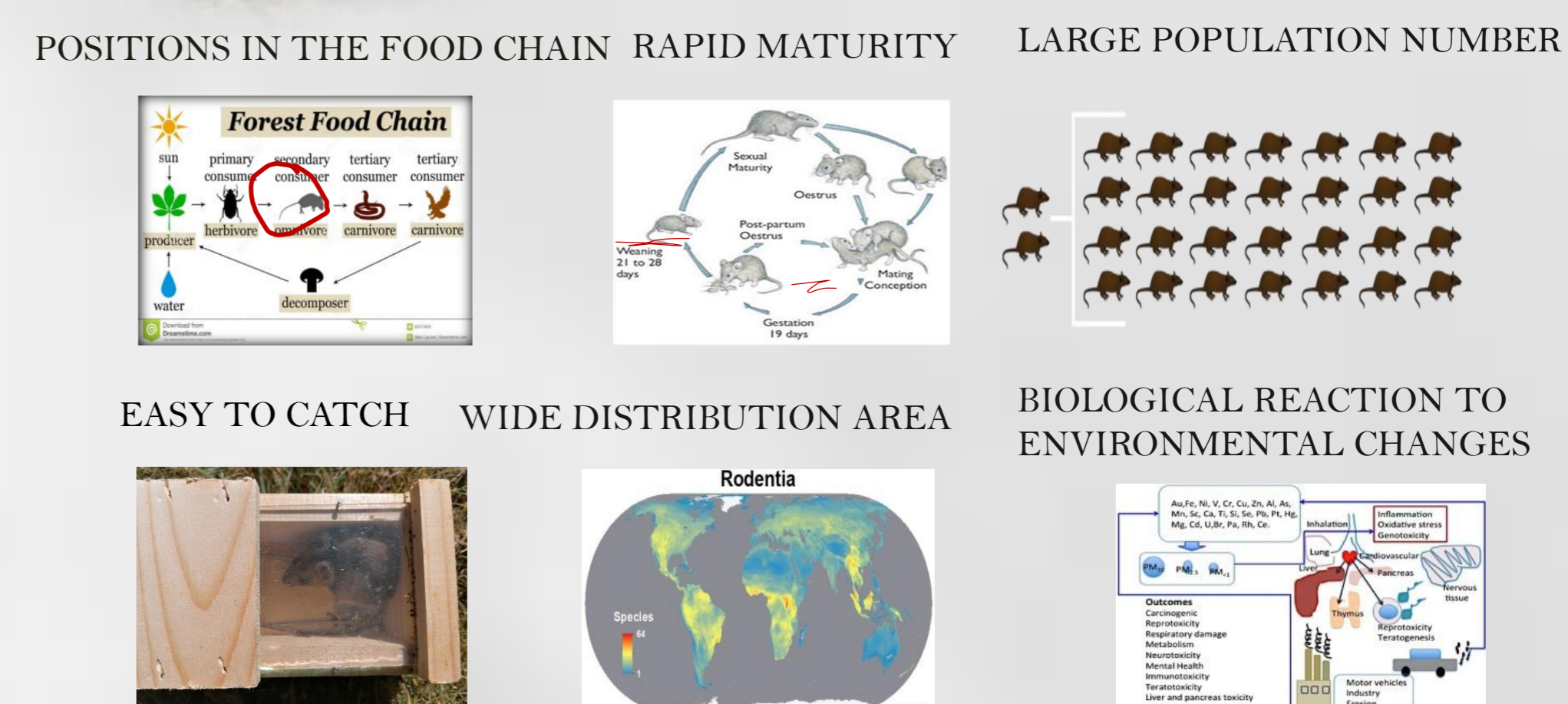
The Chernobyl accident in 1986 was the most significant radioactive contamination event in Europe; during the initial release event, around 33% of the core inventory of ¹³⁷Cs, and 3.5-4.5% of the core inventory of ⁹⁰Sr were released, amounting to 80,000 TBq of ¹³⁷Cs and around 10,000 TBq of ⁹⁰Sr (Devell et al., 1995). Since these two radionuclides are the most significant anthropogenic β -emitters circulating in European ecosystems, 30 years after their initial release and deposition, their monitoring is still an important research topic.

CS - 134
CS - 137
Sr - 90
K - 40
I - 131
I - 133

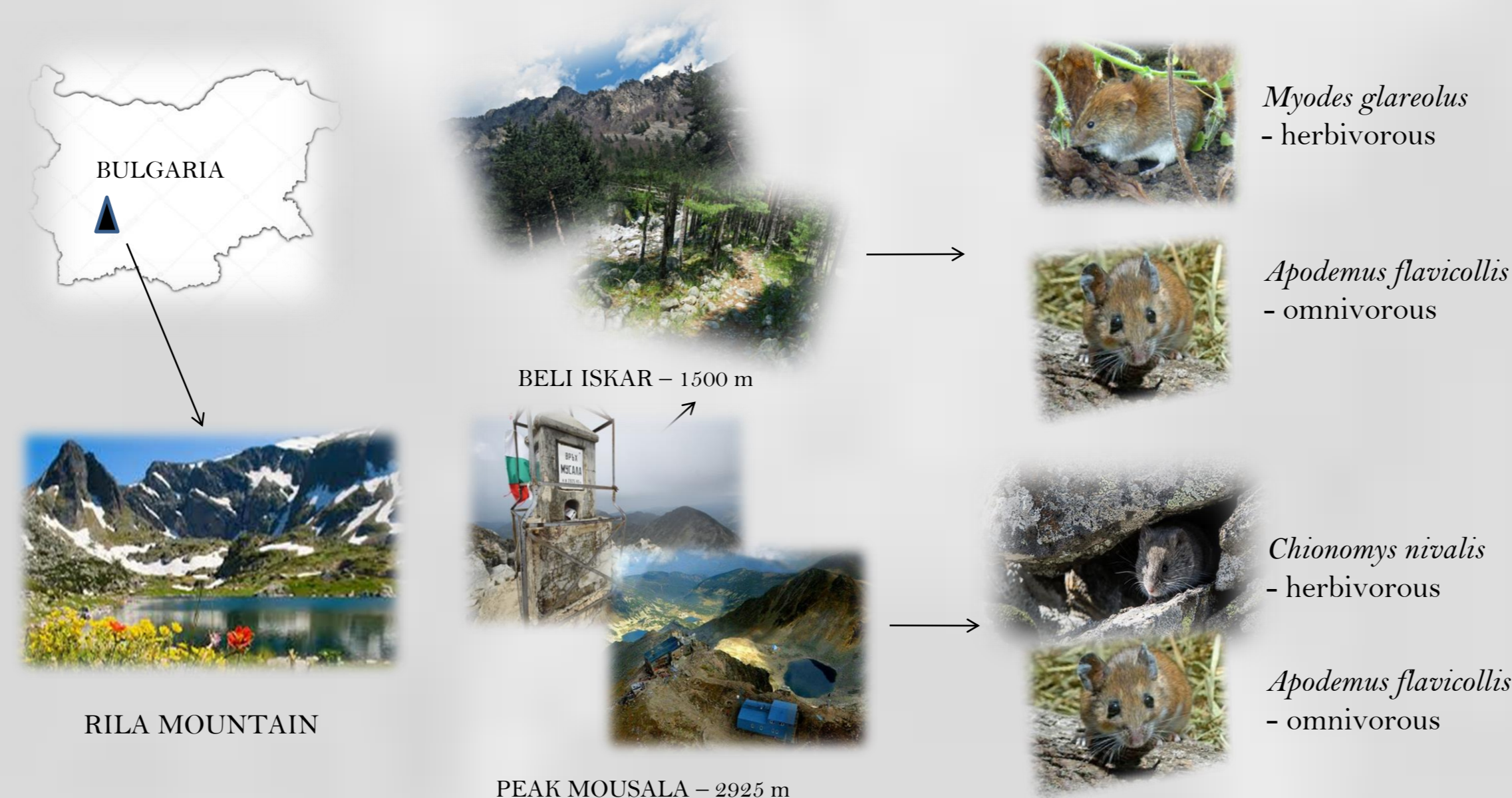
PURPOSE



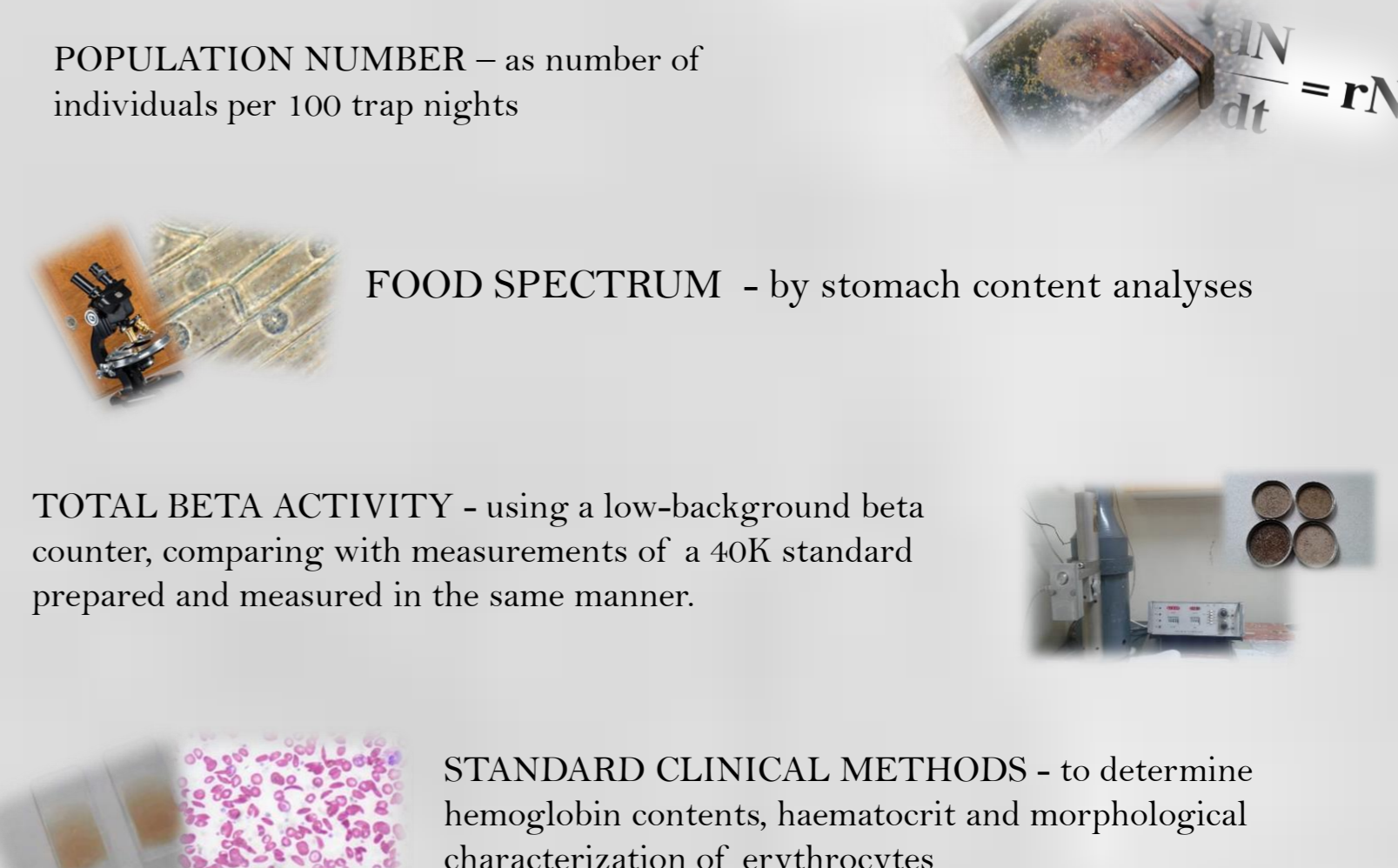
WHY SMALL MAMMALS?



STUDY AREA AND MONITOR SPECIES



METHODS



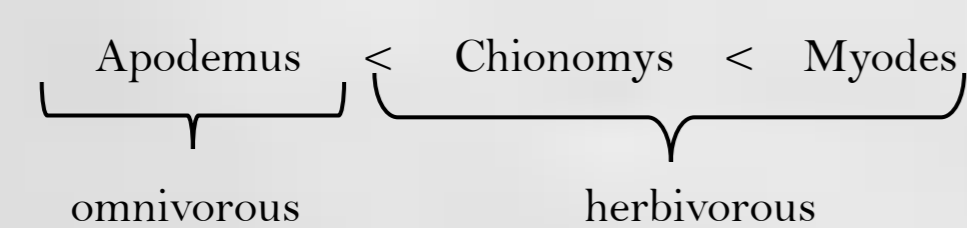
RESULTS

TOTAL BETA ACTIVITY

Principally the organism contamination of a given species depends on the trophic chain position, food, life mode, physico-chemical composition of the atmospheric precipitations, total suspended dust content in atmospheric air, etc.

The total beta activity in Bq/kg in whole body of the studied small mammal species has been investigated.

| reference | Moussala | β activity /mean \pm SD/ | Beli Iskar | β activity /mean \pm SD / |
|----------------|----------------------|----------------------------------|----------------------|-----------------------------------|
| < 4800 Bq/kg | Ap. flavicollis n=12 | 230.3 ± 7.2 | Ap. flavicollis n=13 | 366.3 ± 8.1 |
| | Ch. nivalis n=12 | 382.0 ± 8.3 | M. glareolus n=22 | 424.2 ± 5.3 |



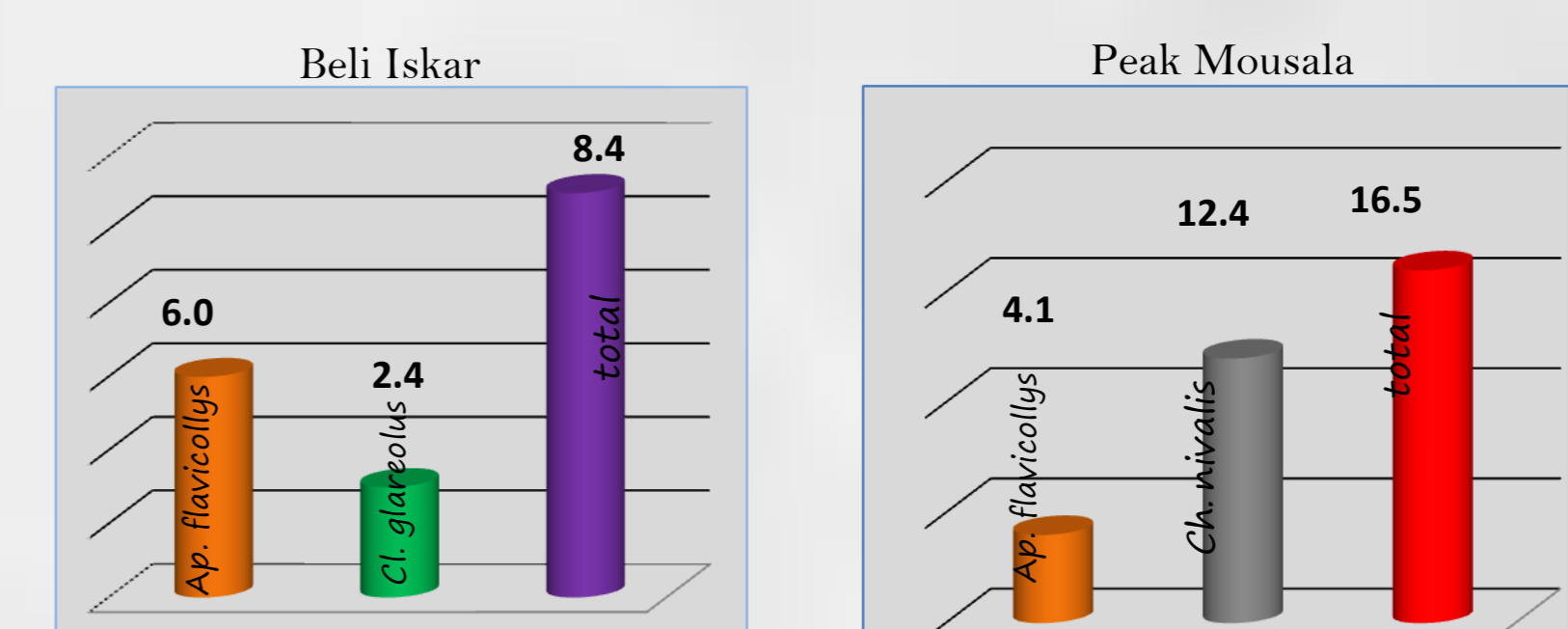
Significant differences between mice and voles were obtained due to the difference in their food specialization. Mice are omnivorous, while voles are mainly herbivorous species. Green vegetable parts accumulate more actively beta-emitters than seeds and the quantity of the consumed low-caloric green food by animals is higher.

When comparing the results obtained in this study with the data twenty years ago it's obvious that the values of total β -activity decreased about ten times.



Data obtained for total β -activity in the bodies of different monitor species of small mammals from Rila Mountain in locations near the peak of Moussala varied from about 3500 Bq/kg in the bodies of the yellow-necked wood mouse to 5000 Bq/kg in the snow vole bodies. The total level of beta-activity in bank vole and yellow-necked wood mouse from Beli Iskar region was between 2000 Bq/kg and 3000 Bq/kg.

POPULATION NUMBER AND SEX STRUCTURE



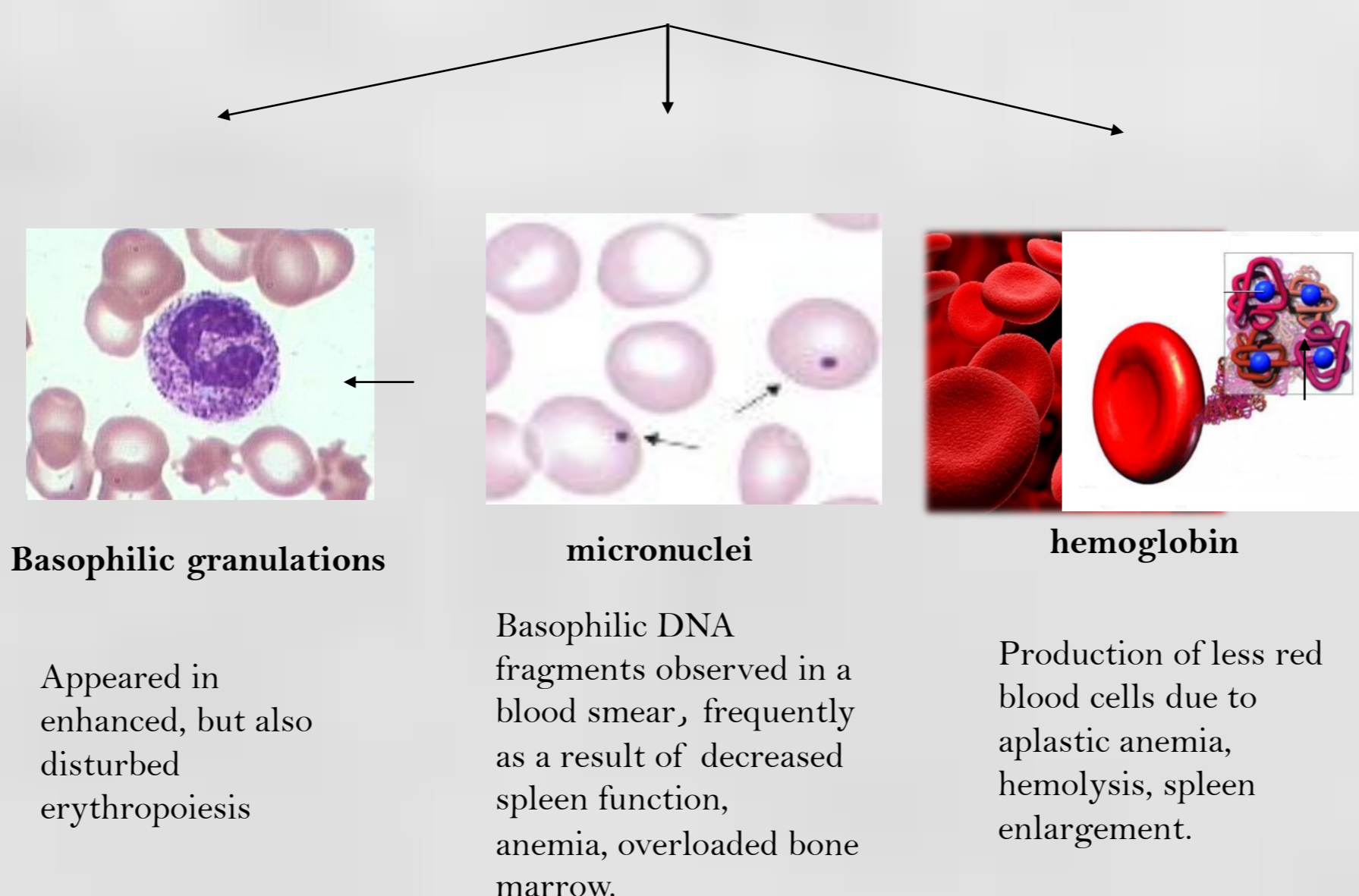
Population density of small mammals populations in Rila mountain in ind./100 t. n.

| area | Beli Iskar | | Peak Mousala | |
|---------------|----------------------|------------------|----------------------|-------------------|
| | Apodemus flavicollis | Myodes glareolus | Apodemus flavicollis | Chionomys nivalis |
| sex | 1.2 : 1.0 | 1.6 : 1.0 | 1.0 : 1.0 | 1.4 : 1.0 |
| Male : female | | | | |

FOOD SPECTRUM



Hematological indices



CONCLUSION

In Bulgaria, as in all countries in South-Eastern Europe, the deposition of the most important tech nogenic radioisotope ¹³⁷Cs originates mainly from the fallout from the Chernobyl accident. Recent studies have indicated that it's amount in the surface soil is comparable to that before the accident. This decreasing is mainly due to the natural decay of ¹³⁷Cs and to a very small degree to migration processes in depth of the soil.

The obtained data may be considered as referent and can be used for further monitoring investigations and also to trace the accumulation in different levels of the trophic chains in the ecosystems.

The diet analyses of the small mammals are the base for further investigations on the passage of beta particles through the rodent populations and the whole ecosystem.