



## Major studies and research projects

- **Studies on Life Strategies of Organisms in Various Environmental Conditions.** Research in this field examines high aerobic capacity of selected bank voles, phytoremediation, and life strategies of social insects. Research also focuses on issues related to organisms' responses to chemical and physical stress, and the role of olfactory and sonic impulses in intraspecific and interspecific communication.
- **Genetic and Biochemical Diversity.** The subject of scientific analysis within this field is the variability of different species at individual and population levels, the influence of high concentrations of heavy metals in soil on the development of new genotypes (ecotypes) of plants, and interspecific hybrids.
- **Ecosystem Functioning.** Worth mentioning here are studies on the influence of natural and anthropogenic factors on the process of decomposition and carbon balance in nature, chemical analysis of land invertebrates, and interactions within food chains of aquatic ecosystems.
- **Cellular, Developmental, and Reproductive Biology.** Scholars from the Faculty participate in the world's largest programme of melanoma cell specification. Studies conducted by Faculty scientists also focus on researching genetic causes of human hereditary diseases and reproductive disorders, as well as researching hormonal mechanisms regulating the development and functioning of female and male reproductive systems.
- **Neurobiology and Immunobiology.** Significant research in this field involves analysing the mechanisms responsible for the functioning of the biological clock and the mechanisms of circadian regulation of various body processes, as well as studying the structure and functioning of the brain in order to learn the causes of the nervous system diseases, e.g. epileptic fits, and the mechanisms behind the regulation of immunity.
- **Anthropogeography.** Within this field studies on changing factors and barriers of local and regional development may be distinguished, including the influence of social and economic features on enrooting and the sustainability of activities of large corporations. Other studies cover the ability of companies to restructure and provide more advanced products and services, the flow of knowledge, local entrepreneurship, and resilience to crisis.
- **Physical Geography.** Scholars from the Faculty analyse the functioning and transformation of abiotic environments with special attention paid to the mountains and highlands of Poland.
- **Paleoenvironmental Analysis and Geochemistry.** Research in this field investigates the reconstruction of paleoenvironmental changes on the basis of the fossil record of microorganisms (foraminifera, nano-fossils), trace fossils (ichnofossils), travertines, as well as biochemical signatures (rare earth elements, biomarkers).
- **Tectonics and Sedimentology.** The subject of scientific analysis within this field is geological structure as well as paleobiogeographic development and sedimentation of Carpathian sediment and the foreground of the Carpathians.

## Collaboration

National and international cooperation result in research projects, PhD studies, scientific achievements, and numerous publications in prestigious journals. For example, the possibility of using antiepileptic drugs in support of chemotherapy is explored in collaboration with the Department of Neurology at Oslo University Hospital (Norway).

Researchers from the Faculty send data to the international journal *Atlas Florae Europaeae*, which presents the distribution of plants in Europe (sixteen volumes published), and to the global data network GBIF (Global Biodiversity Information Facility). The Faculty has also made a significant contribution to the development of the international scientific network "Science for the Carpathians" (S4C), which promotes interdisciplinary research about the Carpathians.



## Scholars

**Prof. Szczepan Biliński** – an outstanding Polish embryologist. Studies on developmental and cellular biology are his most significant scientific achievements. He is a member of the Polish Academy of Sciences and the Director of the Class of Natural Sciences of the Polish Academy of Arts and Sciences.

**Prof. Zbigniew Dzwonko** – an ecologist who explores diversity and dynamics of plant communities in central and southern Europe. He also investigates factors and processes determining biotic diversity in contemporary landscapes. He is an active member of Polish and international scientific societies.

**Prof. Jan Kozłowski** – a renowned researcher of life strategies of organisms. He uses mathematical modelling methods and empirical verification of modelling methods. He is currently investigating the impact of temperature and oxygen availability on body measurements, cell size, and metabolism rate in cold-blooded animals. He is the Chair of the Committee on Evolutionary and Theoretical Biology of the Polish Academy of Sciences, and a corresponding member of the Polish Academy of Arts and Sciences.

**Prof. Alfred Uchman** – a geologist. His scientific research interests include invertebrate ichnology, stratigraphy, and sedimentology. Prof. Uchman is the President of the International Ichnological Association, a national representative of the Carpathian-Balkan Geological Association, the editor-in-chief of the journal *Annales Societatis Geologorum Polonicae*, a member of the Committee on Geological Sciences of the Polish Academy of Sciences, and a corresponding member the Polish Academy of Arts and Sciences.

**Prof. Zbigniew Ustrnul** – a climatologist and a Fulbright Program scholar. He explores climate change and variability, weather extremes, and atmosphere circulation through the use of latest methods as well as in collaboration with the Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). He represented Poland in two pan-European projects for the EU.

## Achievements

Some of the most significant scientific achievements of the Faculty's scholars include: discovering previously unknown species in different parts of the world, explaining the extra-testicular role during embryonic development, and discovering the phenomenon of circadian changes in the morphology of nerve cells and the connections between them.

Other achievements include proving that nervous and endocrine systems regulate the course of inflammatory reaction in vertebrates, reconstruction of paleoclimatic conditions of the Late-glacial and Holocene periods, as well as determining contemporary (natural and anthropogenic) regularities concerning changes in the natural environment and landscape.

Faculty employees obtained a patent for the technology that limits the growth of filamentous bacteria in activated sludge and using rotifers to prevent its bulking (this technology might be used in sewage treatment).

Achievements in knowledge popularisation include the noteworthy activity of the Botanic Garden, which is visited by approximately 70,000 people every year.



JAGIELLONIAN UNIVERSITY  
IN KRAKÓW

Specialisation

- Biodiversity
- Botany • Ecology
- Embryology
- Nature Conservation
- Human Biology
- Zoology • Geochemistry
- Physical Geography
- Anthropogeography
- Sedimentology

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