Plenary lectures

We dedicate the plenary session and lectures to Professor Janusz B. Faliński
– an outstanding Polish geobotanist and co-originator of the theory of synanthropization
of plant cover – on the 10th anniversary of His death

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Botanist on the edge: studies on ecology of plant species and populations at the limits of geographical range. Tribute to Professor Janusz B. Faliński (1934-2004)

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Work 'on the edge' offers a possibility of investigating species that extend to the limits of their geographical range. In the Roztocze Highlands, SE Poland, these include mountain species. During the last 50 years, 44 taxa, i.e. 37.3% of all mountain species of the Polish flora, have been reported in the area. Two of them: silver fir *Abies alba* Mill. and ragwort *Senecio rivularis* (Waldst. & Kit.) DC are the objects of detailed studies.

The analysis on *Abies alba* included habitat conditions in two areas of the central part of the Roztocze Highlands: the Roztocze National Park (RNP) and four river valleys of the right-hand tributaries of the Tanew River, crossing the escarpment zone of the region. The main community formed by the fir in both areas was a mixed fir forest *Abietetum polonicum*, an endemic community of the southern Poland uplands included in the list of EU priority habitats, known as the Holy Cross fir forest (code 91P0). In the RNP, fir forests and other coniferous and mixed forests with fir occur at plain sites. Habitats of fir forests in river valleys are mainly located on steep slopes, while such slopes in the RNP are, primarily, overgrown with the Carpathian beechwood, which is totally absent from the river valleys. The studies conducted in river valleys also widened our knowledge about the ecological scale of fir. Generally, in both landscape types, fir prefered mineral soils – from oligotrophic to mesotrophic that were too leachy for leaf species and even spruce, whereas in river valleys it often colonized organic substrates ovegrown with a wet mixed coniferous forest with spruce, riverside ash-alder and bog alder forests on plain habitats in the close vicinity of river watercourses.

Senecio rivularis, an Alpine-Carpathian sub-element, extends to the north-eastern border of its range in Poland. Its population in the RNP was known since the 1970s of the 20th century. It inhabits a forest community of transient character between bog alder forest and stream-line carr, with introduced Scotch pine. Since 1987, it was an object of long-term studies. Since then, changes in the population area were assessed and the size structure as the status of individuals in the changing population and community was analysed six times (1987, 1991, 1997, 2002, 2007, 2012). A nearly 3-fold increase in the area inhabited by the population was found and it was accompanied by changes in the spatial organisation of the population. The size structure of the individuals in 1987-2012 usually deviated from normal distribution. Simple statistical measures (mean, standard deviation, variation coefficient, skewness, kurtosis) used in a long-term scale characterize well the dynamics of the size structure, reflect the intensification of intra- and interspecific competition, and indicate changes in the conditions within the population area. Living 'on the edge' enables ragwort to form a metapopulation by non-standard means (hydrochory).

From description of vegetation to studies on ecological mechanisms driving vegetation structure and development – Professor Janusz Bogdan Faliński as a phytosociologist and a pioneer of modern plant ecology

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Professor Janusz B. Faliński, from the very beginning of his scientific career in 1950s, was involved in phytosociology, a part of geobotany. According to the Central European paradigm of phytosociology, he was interested in plant communities; in their internal structure, their variability according to present and past site conditions and their spatial arrangement in the geographical space. Finally, he reached a position of a prominent representative of this discipline in Europe. His favourite line of studies was geobotanical cartography: presentation of spatial variability of vegetation phenomena and discovery of spatial patterns in distribution of different vegetation elements: from plant individuals up to plant communities. Descriptive studies form a large part of his scientific output. But among his papers, quite a number of experimental studies can be found. He always strongly emphasized the significance of permanent plots in long-term studies of vegetation dynamics. These long-term studies on many permanent plots scattered mainly over the Białowieża forests and its surroundings led him to formulate in mid-1980s some generalisations on basic phenomena shaping vegetation dynamics, which were considered ecological processes. Fluctuation, regeneration and succession, the three most important processes distinguished by professor Faliński can be linked with the well established understanding of ecosystem dynamics according to modern forest ecology. They are gap phase dynamics, patch dynamics and stand replacing disturbances. These two triads, however, cannot be understood as synonyms.

Plant invasions as a challenge for science and practice: a view from the perspective of studies undertaken in Poland

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It is worthwhile emphasizing that biological invasion is currently one of the greatest global threats to nature. These circumstances have contributed to a significant increase in the interest of nature protection theoreticians and activists in this problem. Already in 1950s, Kornaś drew attention in the Polish scientific literature to the need for research on present-day migrations of plants which accompany humans (the so-called synanthropic species), also regarding the practical aspects of the necessity for controlling troublesome weeds. In the following decade, Faliński introduced the term: 'neophytism' into Polish literature and characterised stages in this process and a consideration of the influence of alien plant species on existing components of the native plant community. As a consequence, dynamic change in floras and vegetation and its scale and rate became the main motive for undertaking numerous investigations beginning with a series of papers under the title "Studies of the distribution ranges of synanthropic plants".

In the present talk, the main areas in the context of the research undertaken on alien plants in Poland (distribution, ecology and biology of the species), the most common thematic studies (new species, new localities, and lists of alien species), and the most often investigated species, as well as tendencies over time are outlined against the background of wider literature. However, apart from the analysis of the directions and scope of the research undertaken in our country devoted to plants of alien origin, the main aim of the presentation is to draw up recommendations for essential new surveys which would create scientific bases for practical actions and, at the same time, incorporate Polish research into our understanding of contemporary world trends.

To succeed in this, it is necessary to develop and achieve acceptance of a robust system based on solid science, with a clear invasion terminology and transparent risk assessments which are also understood by a wider public. In reality, because of a range of limitations, mainly financial, we need: (*i*) a requirement for periodic "changed-category review" of alien plant species; (*ii*) development of rules for monitoring invasive plant species at different scales and (*iii*) concentration of efforts on the species which can potentially cause the biggest losses.

Various aspects of the possible wider implications of plant invasions are now being more often and more widely discussed and examined, particularly in increasing number of interdisciplinary studies. Although much has been done in Poland concerning invasive alien plant species, we still need more effort in prevention, education and monitoring.