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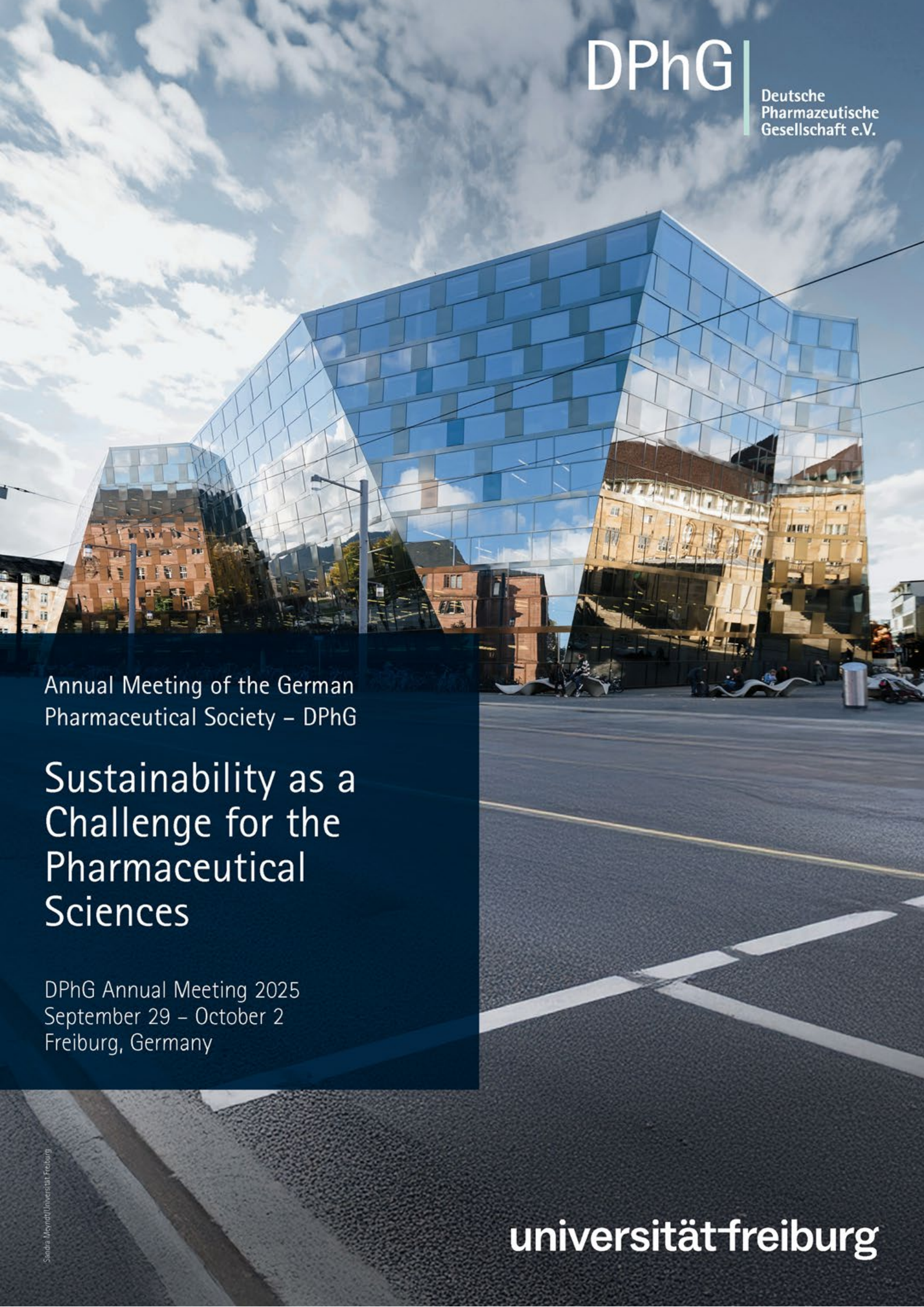

Annual Meeting of the German
Pharmaceutical Society – DPhG

Sustainability as a Challenge for the Pharmaceutical Sciences

DPhG Annual Meeting 2025
September 29 – October 2
Freiburg, Germany

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“Sustainability as a Challenge for the Pharmaceutical Sciences”

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ID: 1094 - DPhG-Annual meeting - Poster Flash Talk (in addition to the poster)

Sustainability sourcing of natural products and herbal medicines – Challenges at the time of climate change and global demands for resources

Prof. Michael Heinrich, Dr. Banaz Jalil, - Marce Inggritha Takubessi, Dr. Olha Mykhailenko *
UCLSchool of Pharmcy, London

Climate change and human activities severely impact the viability of plants and ecosystems, threatening the environment, biodiversity, and the sustainable development of plant-based products. Medicinal plants are essential healthcare resources for ecosystem services, including climate mitigation and socio-economic resilience. However, their supply is increasingly vulnerable to climate change.

We proposed a framework to assess the impact of climate change and guide the sustainable sourcing of natural products and herbal medicines[1]. Key sustainability factors for understanding species vulnerability and mitigating climate impacts include biotic and abiotic (ecosystem) determinants affecting species distribution and long-term survival, which in turn influence the quality of plants used as herbal medicines and other high-value products. We identified four key research areas: (1) climate and climate change impacts; (2) the bioeconomy and ; (3) habitat conditions and human influences; (4) reproductive success and weediness [1].

In a scoping review, we assess the state of research on how climate change affects medicinal plants, focusing on ecological shifts, traditional uses, changes in secondary metabolites, and adaptation strategies[2]. Studies have increased rapidly, with a strong focus on Asia, especially from China and, to a lesser degree, India, while Africa, Europe, and South America remain underrepresented. 357 medicinal plant species, including high-altitude, climate-sensitive species, were assessed, focusing on vulnerability and impact on chemical composition. Shifts in secondary metabolite production are linked to specific factors, e.g., drought stress[2].

The IUCN classified 40.6 of these as threatened by the IUCN, while 59,4% have not been evaluated. Species Distribution Modelling (e.g., MaxEnt) is most widely used tool[2].

Climate change is reshaping ecology and the pharmacological value of medicinal plants. In the context of pharmaceutical research and practice, this calls for refocused Research & Development strategies and a more sustainable regulated approach to commercialising plant-based products also avoiding a strong push towards food supplements and cosmetics.

Acknowledgment:
OM is grateful to CARA (the Council for At-Risk Academics) for a fellowship, which made it possible to continue and expand scientific research at the UCL School of Pharmacy, UK, during the period of Russian military aggression in Ukraine.

References:

Mykhailenko, O.; Jalil, B.; McGaw, L. J.; Echeverría, J.; Takubessi, M.; Heinrich, M. Climate change and the sustainable use of medicinal plants: a call for “new” research strategies. Frontiers in Pharmacology 2025, 15, Policy and Practice Reviews. (1) Mykhailenko, O.; Jalil, B.; McGaw, L. J.; Echeverría, J.; Takubessi, M.; Heinrich, M. Climate change and the sustainable use of medicinal plants: a call for “new” research strategies. Frontiers in Pharmacology 2025, 15, Policy and Practice Reviews. (2) Takubessi, M.; Jalil, B.; Heinrich, M. “Climate change” impact on medicinal plants and bioactive natural products as an emerging challenge in ethnopharmacology: a scoping review. Manuscript (n.d.)Dr. Mykhailenko is grateful to CARA (the Counci

Keyword: *climate change, natural products, medicinal plants, scoping review, species Distribution Modelling, MaxEnt*

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The Potential for Sustainable Sourcing of Epilobium hirsutum in Pharmaceuticals

Prof. Olha Mykhailenko * [1], **Dr. Banaz Jalil**[2], **Prof. Liudas Ivanauskas**[3], **Dr. Zigmanats Gudzinskas**[4], **Prof. Michael Heinrich**[5]

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The pharmaceutical industry depends on plant materials with consistent quality (i.e., active metabolite profiles). Epilobium hirsutum L. is a promising species with anti-inflammatory and antioxidant properties and novel antiviral potential (add ref). However, its optimal collection conditions and quality control standards remain poorly understood. The study aimed to analyse the content of active metabolites/marker compounds of E. hirsutum at different developmental stages and when grown under different habitat conditions. The overall aim is to improve our understanding of the phytochemical variability of the plant materials across habitats and phenological stages, informing future applications in plant material quality assessment and facilitating resource-efficient harvesting practices.

E. hirsutum, plants were sampled at regular two-week intervals from the beginning of the growing season at the end of April until the onset of wilt at the beginning of October 2023 in the vicinity of Wallington, London, United Kingdom. Five well-defined phenological phases of E. hirsutum were defined: intensive growth, flower formation, flowering, seed dispersal and wilting. HPLC and HPTLC studies were performed on the collected samples [1]

We found that chlorogenic acid was predominant in samples from shaded habitats, reaching up to 2.25 mg/g in leaves during the vegetative phase. Flavonoids such as isoquercitrin and hyperoside peaked in leaves from lake shore and wet grassland habitats during flowering. Oenothein B, a key ellagitannin, showed the highest accumulation in wet grassland leaves during flowering (73.97 mg/g). Shaded, moist habitats promoted greater biosynthesis of secondary metabolites [1]

Our findings showed that optimising E. hirsutum harvesting based on vegetation season and habitat is essential for rational or sustainable pharmaceutical production. Environmental factors have influenced the biosynthesis of the corresponding active metabolites/marker compounds. The adherence to sustainable harvesting methods of plant materials from natural sources will support the preservation of the environment and ecosystems.

Acknowledgment:
Dr Mykhailenko express her sincere gratitude to CARA (the Council for At-Risk Academics) for a fellowship, which made it possible to continue and expand scientific research at the UCL School of Pharmacy, UK, during the period of Russian military aggression in Ukraine.

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References:

Mykhailenko O., Jalil B., Uminska K., Ivanauskas L., Gudzinskas Z., Heinrich M. The Phenology of Epolobium hirsutum: Assessing Marker Compound Variability of a Pharmaceutically Important Plant Remedy. Frontiers in pharmacology 2025 https://doi.org/10.3389/fphar.2025.1602819

Keyword: *Epilobium hirsutum, HPTLC, HPLC, marker compounds, industrial crops*

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