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Landolt's collection 2.0 – Valorization and Digitization of duckweed germplasm resources

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Duckweeds are powerful model plants thanks to their reduced anatomic structure and promising novel crops due to rapid production of valuable biomass. However, transforming this small family into an agricultural crop requires understanding its unexpected complexity and exploring its significant genotypic and phenotypic diversity. Beyond his extensive research, Elias Landolt (1926–2013) left an invaluable legacy: hundreds of living clonal accessions from worldwide and a comprehensive herbarium with over 2,000 specimens, recently transferred to the Italian Central Herbarium. This material serves as a fundamental resource for taxonomy, phylogenomics, basic and applied research. To unlock the potential within these germplasm collections, a collaborative effort is ongoing to genetically characterize available accessions, clarify taxonomy, and identify cryptic species, soon integrating living clones with herbarium specimens. This work establishes a robust framework for genomic studies and phenotypic screening, aiding the selection of key target traits for sustainable technological applications. To fully exploit these resources, physical collections must be paired with standardized digital metadata, ensuring long-term preservation and alignment with FAIR (Findable, Accessible, Interoperable, Reusable) principles. Metadata, integrated with sequence data, genome size values, images, references, are being digitized and hosted in the Biomemory repository, the network of germplasm collections of the National Research Council (CNR). Ultimately, these data are directly accessible via GBIF and integrated in the nascent Distributed System of Scientific Collections (DiSSCo) a European Research Infrastructure, also aimed at providing services through its community. We believe this work represents the due tribute to E. Landolt, in the centenary of his birth.

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