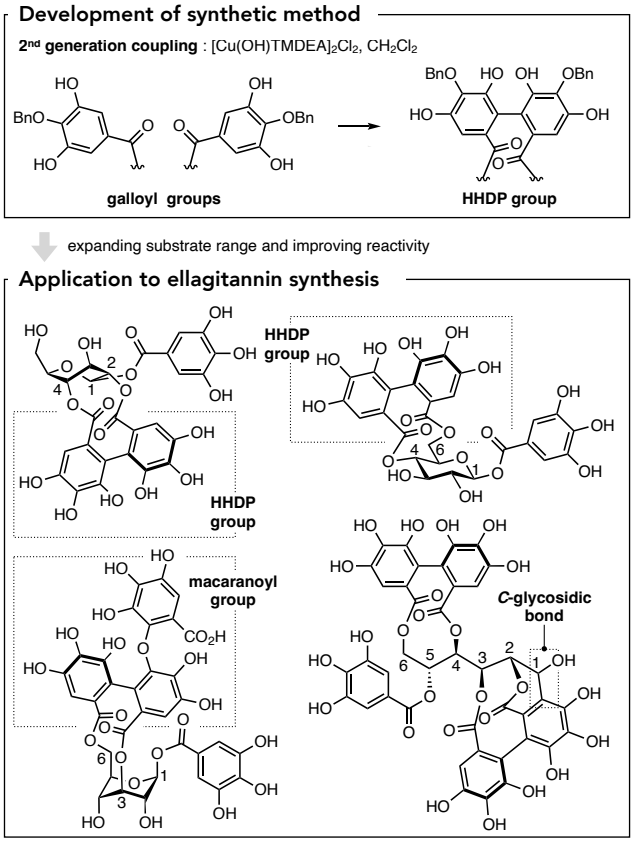
Resent Advances on Ellagitannin Synthesis

Shinnosuke Wakamori
Faculty of Life Sciences, Tokyo University of Agriculture, 1-1-1 Sakuragaoka, Setagaya-ku, Tokyo 156-8502, Japan, sw207675@nodai.ac.jp

Abstract

Ellagitannins are a type of hydrolyzable tannins that fall under the category of polyphenols. They are primarily known for their antioxidant properties, among other biological activities. The structures of ellagitannins are complex and consist of several standard components, such as D-glucose esterized with galloyl groups. These galloyl groups can bond through a carbon-carbon link to form a hexahydroxydiphenoyl (HHDP) group. The diversity of their structures arises from the flexibility in the position of the HHDP group on D-glucose, as well as the appearance of the axial chirality. Although previous studies have isolated over 1,000 natural ellagitannins that exhibit various biological activities, conventional methods have faced challenges due to the unique three-dimensional structure and chemical properties.



To address this issue, our research focused on advancing organic synthetic methods for ellagitannins. The development of a second-generation method, such as the construction of the HHDP structure using a binuclear μ-oxo-copper(II) complex, expanded substrate range and improved reactivity.[1] This breakthrough enabled the chemical synthesis of natural ellagitannins, a feat that was previously impossible with the first-generation method. Additionally, this new method also provided valuable insights into the biosynthetic pathway and structural diversity of ellagitannins.[2] Furthermore, we successfully constructed the unique *C*-glycosidic bond and C–O digallate, specifically the macaranoyl group.[3–5] In this lecture, we will present the details of our research findings.

References

1) S. Matsumoto, S. Wakamori, K. Nishii, T. Tanaka, H. Yamada, *Synlett* **2020**, *31*, 1389–1393.
2) S. Wakamori, S. Matsumoto, R. Kusuki, K. Ikeuchi, H. Yamada, *Org. Lett.* **2020**, *22*, 3392–3396.
3) S. Matsumoto, A. Aoyama, S. Wakamori, H. Yamada, *Biosci. Biotechnol. Biochem*. **2021**, *85*, 1937–1944.
4) S. Wakamori, R. Osada, S. Matsumoto, R. Kusuki, K. Murakami, *Org. Lett.* **2022**, *24*, 8130–8135.
5) R. Kusuki, K. Murakami, R. Katsuta, K. Ishigami, S. Wakamori, *Chem. Eur. J.* **2023**, *29*, e202301096.

Shinnosuke Wakamori, Ph.D., Assistant Professor
Department of Chemistry for Life Sciences and Agriculture, Faculty of Life Sciences, Tokyo University of Agriculture, 1-1-1 Sakuragaoka, Setagaya-ku, Tokyo 156-8502, Japan, +81-3-5477-2410, sw207675@nodai.ac.jp.