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学歴・職歴

- 2011年3月 名古屋大学理学部化学科卒業
野依 良治 教授
- 2013年3月 名古屋大学大学院理学研究科物質理学専攻（化学系）修士課程修了
野依 良治 教授
- 2019年12月 Ph. D., Department of Chemistry, The University of Texas at Austin
Prof. Hung-wen (Ben) Liu
- 2020年1月 東京大学大学院薬学系研究科・助教（現職）
- 2020年10月 JST 戦略的創造研究推進事業 ACT-X「生命と化学」研究者（兼任）
- 2022年11月 令和4年度 東京大学卓越研究員
- 2024年10月 JST 創発的研究支援事業（有田パネル）研究者（兼任）

受賞歴

- 2018年9月 Research Excellence Award (The University of Texas at Austin)
- 2018年9月 Leon O. Morgan Fellowship (The University of Texas at Austin)
- 2020年7月 日本薬学会 生薬天然物部会奨励賞
- 2022年3月 日本化学会 第35回 若い世代の特別講演証
- 2023年6月 第24回 酵素応用シンポジウム 研究奨励賞
- 2023年6月 日本生薬学会 学術奨励賞
- 2023年7月 第22回 天然物化学談話会 奨励賞
- 2024年3月 日本薬学会 奨励賞
- 2024年5月 化学情報協会 JAICI 賞
- 2024年5月 酵素工学研究会 酵素工学奨励賞

学術論文リスト

1. **Ushimaru, R.**, *et al.*, "TBA." *Nature Catalysis*, in revision (2024)
2. Awakawa, T., Mori, T., Barra, L., Ahmed, Y., **Ushimaru, R.**, Gao, Y., Adachi, N., Senda, T., Terada, T., Tantillo, D. J., Abe, I. "The structural basis of pyridoxal 5'-phosphate dependent β -NAD alkylating enzyme." *Nature Catalysis* 7, 1099-1108 (2024)
3. Wenger, E., Martinie, R., **Ushimaru, R.**, Pollock, C., Sil, D., Li, A., Hoang, N., Palowitch, G., Graham, B., Schaperdoth, I., Burke, E., Maggiolo, A., Chang, W.-C., Allen, B., Krebs, C., Silakov, A., Boal, A., Bollinger, J. M. Jr, "Optimized substrate positioning enables switches in C-H cleavage site and reaction outcome in the hydroxylation-epoxidation

sequence catalyzed by hyoscyamine 6 β -hydroxylase." *J. Am. Chem. Soc.* 146, 24271-24287 (2024)

4. Zhou, L., Awakawa, T., **Ushimaru, R.**, Kanaida, M., Abe, I., "Characterization of aziridine-forming α -ketoglutarate-dependent oxygenase in L-isovaline biosynthesis." *Org. Lett.* 26, 724-727 (2024)
5. **Ushimaru, R.**,* Cha, L., Shimo, S., Li, X., Paris, J., Mori, T., Miyamoto, K., Coffey, L., Uchiyama, M., Guo, Y.,* Chang, W.-c.,* Abe, I.* "Mechanistic analysis of the stereodivergent nitroalkane cyclopropanation catalyzed by nonheme iron enzymes." *J. Am. Chem. Soc.* 145, 24210-24217 (2023)
*co-corresponding author
6. **Ushimaru, R.**,* Ding, Y., Mori, T., Miyamoto, K., Uchiyama, M., Abe, I.* "Structural and mechanistic insights into the C–C bond forming rearrangement reaction catalyzed by heterodimeric hinokiresinol synthase." *J. Am. Chem. Soc.* 145, 21966-21973 (2023)
*co-corresponding author
7. **Ushimaru, R.**,* Lyu, J., Ling, M., Abe, I.* "Multiple C–C bond cleavage reactions catalyzed by tolyporphin tetrapyrrole biosynthetic enzymes." *J. Am. Chem. Soc.* 145, 9834-9839 (2023)
*co-corresponding author
8. Ueno, K., **Ushimaru, R.**,* Abe, I.* "Photoinduced reductive dehalogenation of phenacyl bromides with pyridoxal-5'-phosphate." *Chem. Pharm. Bull.* 71, 675-677 (2023)
*co-corresponding author
9. Tao, H.,† **Ushimaru, R.**,†* Awakawa, T., Mori, T., Uchiyama, M., Abe, I.* "Stereoselectivity and substrate specificity of the Fe(II)/ α -ketoglutarate-dependent oxygenase TqaL." *J. Am. Chem. Soc.* 144, 21512-21520 (2022)
†co-first author, *co-corresponding author
10. Li, X., Chen, H.-P., Zhou, L., Fan, J., Awakawa, T., Mori, T., **Ushimaru, R.**,* Abe, I.,* Liu, J.-K.* "Cordycicadins A–D, antifeedant polyketides from the entomopathogenic fungus *Cordyceps cicadae* JXCH1." *Org. Lett.* 23, 8627–8632 (2022)
*co-corresponding author
11. Lyu, J., **Ushimaru, R.**,* Abe, I.* "Characterization of enzymes catalyzing the initial steps of the β -lactam tabtoxin biosynthesis." *Org. Lett.* 24, 3337-3341 (2022)
*co-corresponding author
12. Shimo, S.,† **Ushimaru, R.**,†* Engelbrecht, A., Harada, M., Miyamoto, K., Andreas, K., Uchiyama, M., Kaysser, L.,* Abe, I.* "Stereodivergent nitrocyclopropane formation during biosynthesis of belactosins and hormaomycins." *J. Am. Chem. Soc.* 143, 18413-18418 (2021)
†co-first author, *co-corresponding author

13. Mori, T., Zhai, R., **Ushimaru, R.**, Matsuda, Y., Abe, I. "Molecular insights into the endoperoxide formation by Fe(II)/ α -KG-dependent oxygenase Nvfl." *Nature Commun.* 12, Article number: 4417 (2021)
14. **Ushimaru, R.**, Chen, Z., Zhao, H., Fan, P.-h., Liu, H.-w. "The enzymes mediating maturation of the seryl-tRNA synthetase inhibitor SB-217452 during biosynthesis of albomycins." *Angew. Chem. Int. Ed.* 59, 3558-3562 (2020)
15. Wang, S. A., Lin, C. I., Zhang, J., **Ushimaru, R.**, Sasaki, E., Liu, H.-w. "Studies of lincosamide formation complete the biosynthetic pathway for lincomycin A." *Proc. Natl. Acad. Sci. USA* 116, 24794-24801 (2020)
16. **Ushimaru, R.**, Liu, H.-w. "Biosynthetic origin of the atypical stereochemistry in the thioheptose core of albomycin nucleoside antibiotics." *J. Am. Chem. Soc.* 141, 2211-2214 (2019)
17. **Ushimaru, R.**, Ruszczycky, M. W., Liu, H.-w. "Changes in regioselectivity of H atom abstraction during the hydroxylation and cyclization reactions catalyzed by hyoscyamine 6 β -hydroxylase." *J. Am. Chem. Soc.* 141, 1062-1066 (2019)
18. **Ushimaru, R.**, Ruszczycky, M. W., Chang, W.-c., Yan, F., Liu, Y.-n., Liu, H.-w. "Substrate conformation correlates with the outcome of hyoscyamine 6 β -hydroxylase catalyzed oxidation reactions." *J. Am. Chem. Soc.* 140, 7433-7436 (2018)
19. **Ushimaru, R.**, Nishimura, T., Iwatsuki, T., Naka, H. "A fluorinated cobalt(III) porphyrin complex for hydroalkoxylation of alkynes." *Chem. Pharm. Bull.* 65, 1000-1003 (2017)
20. **Ushimaru, R.**, Lin, C.-I., Sasaki, E., Liu, H.-w. "Characterization of enzymes catalyzing transformations of cysteine S-conjugated intermediates in the lincosamide biosynthetic pathway." *ChemBioChem.* 17, 1606-1611 (2016)
21. Tsarev, V. N., Morioka, Y., Caner, J., Wang, Q., **Ushimaru, R.**, Kudo, A., Naka, H., Saito, S. "N-Methylation of amines with methanol at room temperature." *Org. Lett.* 17, 2530-2533 (2015)
22. Tachinami, T., Nishimura, T., **Ushimaru, R.**, Noyori, R., Naka, H. "Hydration of terminal alkynes catalyzed by water-soluble cobalt porphyrin complexes." *J. Am. Chem. Soc.* 135, 50-53 (2013)

著書・総説

1. **Ushimaru, R.**,* Abe, I.* "TBA" *Chem. Soc. Rev.*, in preparation (2024)
*co-corresponding author
2. **Ushimaru, R.*** "Functions and mechanisms of enzymes assembling lignans and norlignans." *Curr. Opi. Chem. Biol.* 80, 102462 (2024)

3. **Ushimaru, R.*** “Three-membered ring formation catalyzed by α -ketoglutarate-dependent nonheme iron enzymes.” *J. Nat. Med.* 78, 21-32 (2024)
4. **Ushimaru, R.*** "Characterization of enzymes catalyzing unusual C–C bond formation and cleavage reactions during natural product biosynthesis." *Chem. Pharm. Bull.* 72, 241-247 (2023)
5. **Ushimaru, R.**,* Abe, I.* “Back-to-back cycloadditions in nature.” *Nature Chemistry* 15, 1056-1057 (2023)
*co-corresponding author
6. **Ushimaru, R.**,* Abe, I.* “Assembling neuroactive alkaloids.” *Nature Plants* 9, 1946-1947 (2023)
*co-corresponding author
7. **Ushimaru, R.**,* Abe, I.* “Unusual dioxygen-dependent reactions catalyzed by nonheme iron enzymes in natural product biosynthesis.” *ACS Catalysis* 13, 1045-1076 (2023)
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8. **Ushimaru, R.**,* Abe, I.* “C–N and C–S bond formation by cytochrome P450 enzymes.” *Trends in Chemistry* 5, 526-536 (2023)
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9. **Ushimaru, R.**,* Lyu, J., Abe, I.* “Diverse enzymatic chemistry for propionate side chain cleavages in tetrapyrrole biosynthesis.” *J. Ind. Microbiol. Biotechnol.* 50, Article number: kuad016 (2023)
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10. Awakawa, T., Mori, T., **Ushimaru, R.**, Abe, I. “Structure-based engineering of α -ketoglutarate dependent oxygenases in fungal meroterpenoid biosynthesis.” *Nat. Prod. Rep.* 40, 46-61 (2023)
11. 森貴裕, **牛丸理一郎**, 「これからの天然物化学に向けて」 *月刊ファインケミカル*, 51, 5-10 (2023)
12. **牛丸理一郎**, 「飛翔する若手研究者：天然物の三員環構造をつくる鉄酵素の機能解析」 *化学と工業*, 75, 820 (2022)
13. **牛丸理一郎**, 「期待の若手」 *ファルマシア*, 57, 665 (2021)