2022 年 10 月 1 日現在

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## 学歴・職歴

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| 2011 年 4 月 | 東京大学大学院薬学系研究科・助教 |
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## 受賞歴

| | |
|---|---|
| 2013 年 6 月 | 日本薬学会 生薬天然物部会奨励賞 |
| 2013 年 9 月 | 日本生薬学会 学術奨励賞 |
| 2019 年 9 月 | 日本放線菌学会 浜田賞（研究奨励賞） |
| 2020 年 3 月 | 日本薬学会 奨励賞 |
| 2020 年 3 月 | Kenji Mori Medal, Isoprenoid Society |
| 2020 年 8 月 | 酵素工学研究会 酵素工学奨励賞 |
| 2021 年 4 月 | 科学技術分野の文部科学大臣表彰 若手科学者賞 |
| 2023 年 4 月 | 長瀬科学技術賞 |

## 学術論文リスト（～2021 年まで）

1. Barra, L.,† **Awakawa, T.**,†,* Shirai, K., Hu, Z., Bashiri, G., Abe, I.* "β-NAD as a building block in natural product biosynthesis." ***Nature*** 600, 754-758 (2021)
   **†co-first author, *co-corresponding author**

2. Li, X.,† **Awakawa, T.**,†,* Mori, T., Ling, M., Hu, D., Wu, B., Abe, I.* "Heterodimeric non-heme iron enzymes in fungal meroterpenoid biosynthesis." ***J. Am. Chem. Soc***. 143, 21425-21432 (2021)
   **†co-first author, *co-corresponding author**

3. Bunno, T.,† **Awakawa, T.**,†,* Mori, T., Abe, I.* "Aziridine formation by a Fe(II)/α-ketoglutarate dependent oxygenase and 2-aminoisobutyrate biosynthesis in fungi." ***Angew. Chem. Int. Ed.*** 60, 15827-15831 (2021)
   **†co-first author, *co-corresponding author**

4. Mori, T.,† Kumano, T.,† He, H.,† Watanabe, S., Senda, M., Moriya, T., Adachi, N., Hori, S., Terashita, Y., Kawasaki, M., Hashimoto, Y., **Awakawa, T.**, Senda, T., Abe, I., Kobayashi, M. "*C*-Glycoside metabolism in the gut and in nature: Identification, characterization, structural analyses and distribution of C-C bond-cleaving enzymes." ***Nature Commun.*** 12, Article number: 6294 (2021)

5. Song, X.-J., Lv, J.-M., Cao, Z.-Q., Huang, H.-Y., Chen, G.-D., **Awakawa, T.**, Hu, D., Gao, H., Abe, I., Yao, X.-S. "Extensive expanding the chemical diversity of fusidane-type antibiotics using a stochastic combinational strategy." ***Acta Pharm. Sinica B***, 11, 1676-1685 (2021)

6. Jiang, J., Li, X., Mori, T., **Awakawa, T.**,* Abe, I.* "Novel cyclohexyl meroterpenes produced by combinatorial biosynthesis." ***Chem. Pharm. Bull.*** 69, 444-446 (2021)
   ***co-corresponding author**

7. Kudo, Y., **Awakawa, T.**, Du, Y.-L., Jordan, P. A., Creamer, K. E., Jensen, P. R., Linington, R. G., Ryan, K. S., Moore, B. S. "Expansion of gamma-butyrolactone signaling molecule biosynthesis to phosphotriester natural products." ***ACS Chem. Biol.*** 15, 3253–3261 (2020)

8. Lv, J.-M., Gao, Y.-H., Zhao, H., **Awakawa, T.**, Liu, L., Chen, G.-D., Yao, X.-S., Hu, D., Abe, I., Gao, H. "Biosynthesis of biscognienyne B involving an unprecedented cytochrome P450-dependent alkynylation." ***Angew. Chem. Int. Ed.*** 59, 13531-13536 (2020)

9. Hu, Z.,† **Awakawa, T.**,†,* Ma, Z., Abe, I.* "Aminoacyl sulfonamide assembly in SB-203208 biosynthesis." ***Nature Commun.*** 10, Article number: 184 (2019)
   **†co-first author, *co-corresponding author**

10. Araki, Y.,† **Awakawa, T.**,† Matsuzaki, M.,† Cho, R., Matsuda, Y., Hoshino, S., Shinohara, Y., Yamamoto, M., Kido, Y., Inaoka, D. K., Nagamune, K., Ito, K., Abe, I., Kita, K. "Complete biosynthetic pathways of ascofuranone and ascochlorin in *Acremonium egyptiacum*: branched pathways encoded at two separate loci."

***Proc. Natl. Acad. Sci. USA*** 116, 8269-8274 (2019)
**†co-first author**

11. He, F., Mori, T., Morita, I., Nakamura, H., Alblova, M., Hoshino, S., **Awakawa, T.**, Abe, I. "Molecular basis for the P450-catalyzed C–N bond formation in indolactam biosynthesis." ***Nature Chem. Biol.*** 15, 1206-1213 (2019)

12. Quan, Z.,† **Awakawa, T.**,†,* Wang, D.,† Hu, Y., Abe, I.* "A multidomain P450 epoxidase and a terpene cyclase from ascochlorin biosynthetic pathway in *Fusarium sp.*" ***Org. Lett.*** 21, 2330-2334 (2019)
**†co-first author, *co-corresponding author**

13. Hoshino, S., Mitsuhashi, T., Kikuchi, T., Wong, C. P., Morita, H., **Awakawa, T.**, Fujita, M., Abe, I. "Structural elucidation of tenebrathin: cytotoxic C5-substituted γ-pyrone with nitroaryl side chain from *Streptoalloteichus tenebrarius*" ***Org. Lett.*** 21, 6519-6522 (2019)

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***co-corresponding author**

15. Sato K, Katsuyama Y, Yokota K, **Awakawa, T.**, Tezuka, T., Ohnishi, Y. "Involvement of β-alkylation machinery and two sets of ketosynthase-chain length factors in the biosynthesis of fogacin polyketides in *Actinoplanes missouriensis*." ***ChemBioChem*** 20, 1106-1114 (2019)

16. Cao, Z.-Q., Li, S.-Y., Lv, J.-M., Gao, H., Chen, G.-D., **Awakawa, T.**, Abe, I., Yao, X.-S., Hu, D. "Biosynthesis of clinically used antibiotic fusidic acid and identification of two short-chain dehydrogenase/reductases with converse stereoselectivity." ***Acta Pharm. Sinica B***, 9, 433-442 (2019)

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18. **Awakawa, T.**,* Mori, T., Nakashima, Y., Zhai, R., Wong, C. P., Hillwig, M. L., Liu, X.,* Abe, I.* "Molecular basis for $Mg^{2+}$-dependent allosteric control of indole prenylation by aromatic prenyltransferase AmbP1." ***Angew. Chem. Int. Ed.*** 57, 6810-6813 (2018)
***co-corresponding author**

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20. Wang, G.-Q., Chen, G.-D., Qin, S.-Y., Hu, D., **Awakawa, T.**, Li, S.-Y., Lv, J.-M., Wang, C.-X., Yao, X.-S., Abe, I., Gao, H. "Biosynthetic pathway for furanosteroid

demethoxyviridin and identification of an unusual pregnane side-chain cleavage." ***Nature Commun.*** 9, Article number: 1838 (2018)

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**†co-first author, *co-corresponding author**

22. Nakashima, Y., Mori, T., Nakamura, H., **Awakawa, T.**, Hoshino, S., Senda, M., Senda, T., Abe, I. "Structure function and engineering of multifunctional non-heme iron dependent oxygenases in fungal meroterpenoid biosynthesis." ***Nature Commun.*** 9, Article number: 104 (2018)

23. Bai, T., Quan, Z., Zhai, R., **Awakawa, T.**, Matsuda, Y., Abe, I. "Elucidation and heterologous reconstitution of chrodrimanin B biosynthesis." ***Org. Lett.*** 20, 7504-7508 (2018)

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41. Hoshino, S., Zhang, L., **Awakawa, T.**, Wakimoto, T., Onaka, H., Abe, I. “Arcyriaflavin E, a new cytotoxic indolocarbazole alkaloid isolated by combined-culture of mycolic acid-containing bacteria and *Streptomyces cinnamoneus* NBRC 13823.” ***J. Antibiot.*** 68, 342-344 (2015)

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45. **Awakawa, T.**, Zhang, L., Wakimoto, T., Hoshino, S., Mori, T., Ito, T., Ishikawa, J., Tanner, M.E., Abe, I. “A methyltransferase initiates terpene cyclization in teleocidin B biosynthesis.” ***J. Am. Chem. Soc.*** 136, 9910-9913 (2014)

46. Yang, X. L., **Awakawa, T.**, Wakimoto, T., Abe, I. “Three acyltetronic acid derivatives: Noncanonical cryptic polyketides from *Aspergillus niger* identified by genome mining.” ***ChemBioChem*** 15, 1578-1583 (2014)

47. Wakimoto, T., Egami, Y., Nakashima, Y., Wakimoto, Y., Mori, T., **Awakawa, T.**, Ito, T., Kenmoku, H., Asakawa, Y., Piel, J., Abe, I. “Calyculin biogenesis from a pyrophosphate protoxin produced by a sponge symbiont.” ***Nature Chem. Biol.*** 10, 648-655 (2014)

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49. **Awakawa, T.**, Sugai, Y., Otsutomo, K., Ren, S., Masuda, S., Katsuyama, Y., Horinouchi, S., Ohnishi, Y. “4-Hydroxy-3-methyl-6-(1-methyl-2-oxoalkyl)pyran-2-one synthesis by a type III polyketide synthase from *Rhodospirillum centenum.*” ***ChemBioChem*** 14, 1006-1013 (2013)

50. Matsuda, Y., Wakimoto, T., Mori, T., **Awakawa, T.**, Abe, I. “Complete biosynthetic pathway of anditomin: nature’s sophisticated synthetic route to a complex fungal meroterpenoid.,” ***J. Am. Chem. Soc.*** 136, 15326-15336 (2014)

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**著書・総説**

1. **Awakawa, T.**,* Mori, T., Ushimaru, R., Abe, I.* "Structure-based engineering of α-ketoglutarate dependent oxygenases in fungal meroterpenoid biosynthesis." ***Nat. Prod. Rep.***, 39, in press (2022)
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3. Zhang, L., **Awakawa, T.**, Abe, I. "Understanding and manipulating assembly line biosynthesis by heterologous expression in *Streptomyces*." ***Methods Mol. Biol.*** In press (2022)

4. **Awakawa, T.** "Engineered biosynthesis of microbial medicinally active compounds", ***YAKUGAKU ZASSHI*** 142, 347-353 (2022)

5. **Awakawa, T.**,* Abe, I.* "Reconstituted biosynthesis of fungal natural products in *Aspergillus oryzae*." ***J. Fungi*** 7, Article number: 486 (2021)
   ***co-corresponding author**

6. **Awakawa, T.**,* Barra, L., Abe, I.* "Biosynthesis of sulfonamide and sulfamate antibiotics in *Actinomycete*." ***J. Ind. Microbiol. Biotechnol.*** 48, Article number: kuab001 (2021)
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9. **Awakawa, T.**,* Liu, X.* "Biosynthesis of hapalindole type alkaloids." ***Comprehensive Natural Products III: Chemistry and Biology***, Vol. 1, Elsevier, Chapter 18, pp. 486-499 (2020) ***co-corresponding author**

10. **Awakawa, T.**,* Abe, I.* “The molecular basis for the plasticity of the aromatic prenyltransferases in hapalindole biosynthesis” ***Beilstein J. Org. Chem.*** 15, 1545-1551 (2019) ***co-corresponding author**_

11. **Awakawa, T.** “Exploitation and application of unique actinomycetical alkaloid biosynthetic enzymes”, ***Actinomycetologica*** 33, S3-S8 (2019)

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13. Matsuda, Y., **Awakawa, T.**, Mori, T., Abe, I. “Unusual chemistries in fungal meroterpenoid biosynthesis.” ***Curr. Opin. Chem. Biol.*** 31, 1-7 (2016)

14. **淡川孝義**, 阿部郁朗 “補酵素 NAD と SAM を縮合する新奇生合成機構の発見” **バイオサイエンスとインダストリー**, 80, in press (2022)

15. **淡川孝義** “TBA” **ファルマシア**, manuscript in preparation (2022)

16. 荒木康子, **淡川孝義**, 松崎素道, 阿部郁朗 “アスコフラノンの選択的大量生産系の構築～アフリカ睡眠病の根絶を目指して～” **バイオサイエンスとインダストリー**, 71, p. 466-468 (2019)

17. **淡川孝義**, “テルペンインドールアルカロイドテレオシジンの生合成反応” **有機合成化学協会誌**, *76*, p. 410-413 (2018)

18. **淡川孝義**, 阿部郁朗 “微生物由来テルペンインドールアルカロイド-テレオシジン生合成” **アルカロイドの化学**, 化学同人, 第 7 章, pp. 134-148 (2017)

19. **淡川孝義**, “テルペンインドールアルカロイドテレオシジンの生合成反応” **生物工学会誌**, *92*, p. 420-423 (2014)