Faculty members
Professor: Minoru Ishikura, Ph.D.
Associate Professor: Koji Yamada, Ph.D.
Assistant Professor: Takumi Abe, Ph.D.
Graduate Student: Tomoki Ito

Research projects
The synthesis and reactivity of indole derivatives has been a topic of research interest for well over a century. Indole alkaloids constitute an important class of natural products including a large number of pharmacologically important substances such as the antitumor alkaloid, vinblastine, the cardioarrhythmic alkaloid, ajmaline, and the blood pressure lowering substance, reserpine. Our research interests lie in the development of efficient synthetic methods and their application for syntheses of indole alkaloids. Our recent research projects are as follows.

Development of indolylborate as a pivotal synthetic intermediate for indole alkaloids

\[
\text{Indolylborate} \xleftarrow{n- \text{or} \text{tert-}BuLi, \text{THF}} \xrightarrow{\text{in situ generation}} \text{Indolylborate}
\]

(P: protecting group)

Pd-Catalyzed tandem cyclization/cross-coupling reaction

\[
\text{Indolylborate} + R\text{Br} \xrightarrow{\text{PdLn}} \text{one-pot formation from indole}
\]

Pd-Catalyzed carbonylative cross-coupling reaction

\[
\text{Indolylborate} + R\text{CHO} \xrightarrow{\text{PdLn, CO, THF}} \text{Yuechuken}
\]

Development of a base-promoted Pictet-Spengler cyclization of 5-hydroxytryptamines/5-hydroxytryptophans

A one-pot formation of azepinoindoles and their transformation into azepinoindole alkaloids
Publications

- Simple indole alkaloids and those with a nonrearranged monoterpenoid unit; Minoru Ishikura, Tominari Choshi, and Takashi Nishiyama, *Natural Product Reports*, 2017, in press


- Total Synthesis of Carbazole-1,4-quinone Alkaloid Koeniginequinones A and B based on a One-pot Cyclocarbonylation Procedure from 2-Alkenyl-3-indole; Takashi Nishiyama, Nanase Satsuki, Satoshi Hibino, Mami Fujii, Takumi Abe, Minoru Ishikura, and Tominari Choshi; *Heterocycles*, 2017, in press. (DOI: 10.3987/COM-15-S(T)5)


- Simple indole alkaloids and those with a nonrearranged monoterpenoid unit; Minoru Ishikura, Takumi Abe, Tominari Choshi, and Satoshi Hibino, *Natural Product Reports*, 2015, 32, 1389–1471

