

## 概日時計システムに夜明けを告げる時計タンパク質の自律的な複合体解離

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Aziridination of Styrene Derivatives Using Iminoiodinane Catalyzed by Iodine and Ammonium Iodide (<sup>1</sup>CIMoS, Institute for Molecular Science, NINS, <sup>2</sup>SOKENDAI) ○Shuji Akiyama,<sup>1,2</sup>

In general, when a biomolecular complex that is deeply involved in a biological phenomenon is discovered, research on the formation and structure of the complex tends to progress, while research on the dissociation of the complex lags behind. The same is true for the circadian clock system of cyanobacteria. The disassembly process of a ternary complex accumulated at night, in which three Kai proteins (KaiA, KaiB, and KaiC) are bound, has not received much attention from researchers. In this presentation, we will discuss how the "three physiological properties of the circadian clock" emerge in the dawn phase when KaiC ATPase is conjugated with an autocatalytic disassembly reaction<sup>1-5)</sup>, and its relevance to other circadian clock systems, which also dissociates at dawn.

**Keywords :** Circadian Clock; Cyanobacteria; ATPase; Autocatalytic Reaction;

生体分子複合体の形成や構造に関する研究が進む一方で、その解離過程については研究が遅れがちである。シアノバクテリアの概日時計についても同じことが言える。夜間に蓄積する Kai タンパク質複合体の解離は注目されてこなかった。本発表では、KaiC の ATPase 活性が夜明けの位相で自己触媒的な離散反応と共役し、それによって「概日時計の 3 つの生理学的性質」が分子システム全体に顕在化することを議論する<sup>1-5)</sup>。

- 1) Highly sensitive tryptophan fluorescence probe for detecting rhythmic conformational changes of KaiC in the cyanobacterial circadian clock system. A. Mukaiyama *et al.* *Biochem. J.* **2022**, 479, 1505-1515.
- 2) Regulation Mechanisms of the Dual ATPase in KaiC, Y. Furuie *et al.* *PNAS* **2022**, 119, e2119627119.
- 3) Elucidation of Master Allosteric Essential for Circadian Clock Oscillation in Cyanobacteria. Y. Furuie *et al.* *Sci. Adv.* **2022**, 8, eabm8990.
- 4) Cross-scale Analysis of Temperature Compensation in the Cyanobacterial Circadian Clock System. Y. Furuie, *Commun. Physics*, **2022**, 5, 75.
- 5) Slow and Temperature-compensated Autonomous Disassembly of KaiB–KaiC Complex. D. Simon *et al.* *Biophys. Physicobiol.*, **2022**, 19, e190008.