Intraguild Prey May Not Become Extinct in Highly Productive Environments

Toshiuki Namba[1] **Yasuhiro Takeuchi**[2] **Malay Banerjee**[3]

[1] *Graduate School of Science, Osaka Prefecture University, 1-1 Gakuen-cho, Naka-ku, Sakai, 599-8531 Japan* tnamba@b.s.osakafu-u.ac.jp
[2] *College of Science and Engineering, Aoyama Gakuin University, Sagamihara, Kanagawa, 252-5258 Japan* takeuchi@gem.aoyama.ac.jp
[3] *Department of Mathematics and Statistics, Indian Institute of Technology Kanpur, Kanpur 208016, India.* malayb@iitk.ac.in

Intraguild predation is defined as predation in a guild of consumers which share common resources. One of the consumers which feeds on another one is called IGpredator and the other one preyed upon by IGpredator is called IGprey. Since IGprey is preyed upon by IGpredator, a necessary condition for coexistence of two consumers is that IGprey is superior in resource use to IGpredator ([1]).

Classical mathematical models predicted exclusion of IGprey at high productivity of basal resouce. However, empirical results contradicted this prediction and the prevalence of intraguild predation in productive environments has long been puzzling ecologists. However, we have shown that intraspecific competition among consumers is a stailizing factor and strong self-regulation in intraguild predator prevents extinction of intraguild prey at any high productivity ([2]).

In this presentation, we study effects of the profitability of IGprey and basal resource as diets on the dynamics of intraguild predation. We will show that exclusion of IGprey can never occur even in highly productive environments if the basal resource is not sufficiently profitable for the IGpredator and that even the extinction of IGpredator may result. These results confirm the validity of empirical results.

References

[1] R.D. Holt, and G.A. Polis. American Naturalist 149: 745–764 (1997).

[2] T. Namba, Y. Takeuchi, and M. Banerjee, Mathematical Modelling of Natural Phenomena 13 (2018) 29.

⋆Mini-Symposium: Complicated Population Dynamics in Ecology and Epidemiology