# Development of a New LED Light Trap Based Visual Edge Effect as Behavioral Mechanism of Insect Phototaxis

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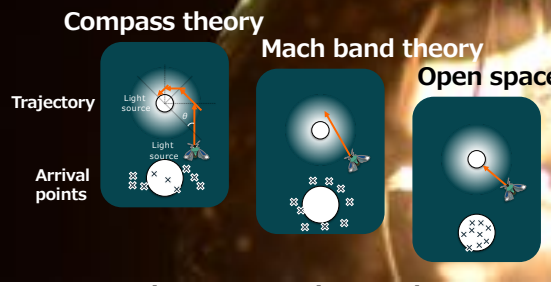
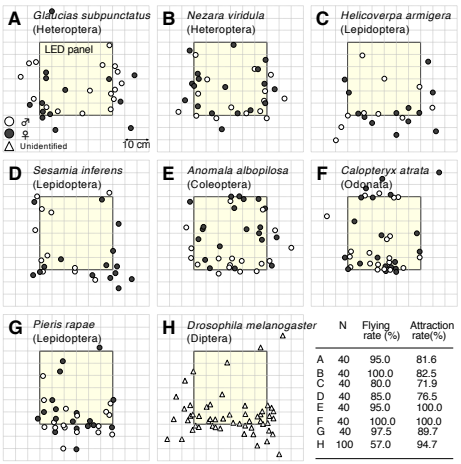



## ▼A Moth into the Flame

・There are three major theories that explain the behavior of insects attracted to light (phototaxis), but we have not been able to determine which of them is correct.
・These hypotheses can be tested by analyzing the flight trajectory and arrival points of the insects.

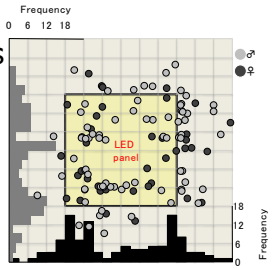
**Arrival points of 8 species of insects flying toward a white LED panel**




## ▼Attraction to the Edges of LED

・We examined the phototactic behavior and arrival points toward LED panels, mainly of agricultural pests in the dark room.
・All species were strongly attracted to the boundary between the light emitting area and the background (visual edge). This is a new discovery that does not conform to any of three theories.

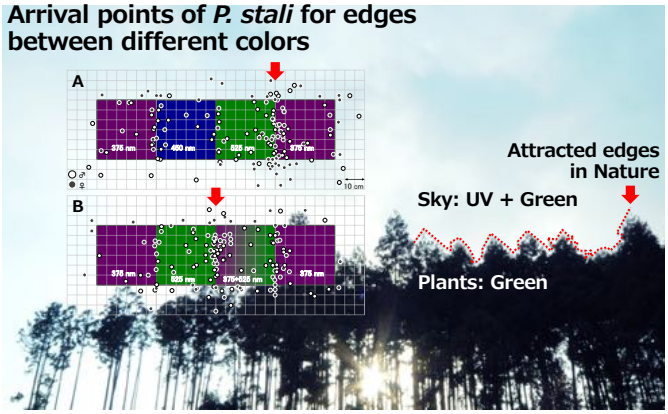
**Arrival points of stink bug, *Plautia stali***




## ▼Visual Edges in Nature

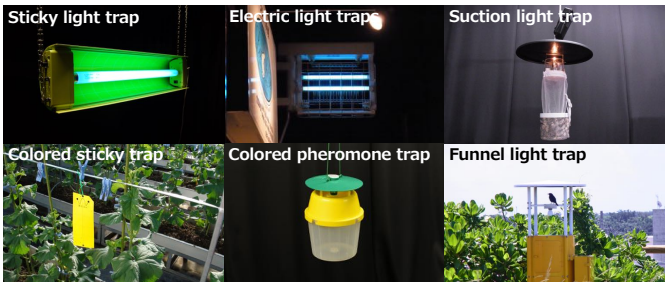
・Why do they go to the edge of the light source?
・The insects in flight are looking for plants as landing sites. We assume that flying insects had acquired an innate ability to land on the edge that is created between the sky and the plants in the natural environment.
・As an indication of this, We experimentally confirmed that phototactic insects preferred the ultraviolet and green "color edges" more than the " light/dark" edges.

**Arrival points of *P. stali* for edges between different colors**



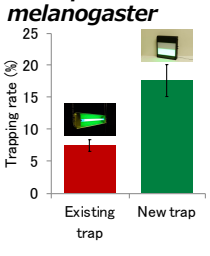

## ▼Development of New Light Traps

・Although various types of visual-based insect traps already exist, all of them are based on the premise that the insects are attracted in the center of the light, i.e., the light emitting and reflecting surfaces, and therefore, often fail to catch the insects.
・We applied for a patent for light traps with an emphasis on the UV and green edges, and developed a new product for food factory with an insect protection company. In May 2018, the new product (ESCO LED641) was launched.





**Trapping efficiencies of two types of light traps for 1h in *Drosophila melanogaster***




## ▼Patents

・Uozu, Y., T. Hariyama and M. Hironaka, “Luminous apparatus”, US10,352,527 B2, July 16, 2019.
・Uozu, Y., T. Hariyama and M. Hironaka, “Light emitting device”, JP6384005B2, Sept. 5, 2018.
・Hariyama, T. and M. Hironaka, “Attraction device, insect-capturing apparatus and insect-capturing method”, US10,051,851 B2, Aug. 21, 2018.
・Hariyama, T. and M. Hironaka, “Attracting device, insect trapping device, and insect trapping method”, JP5773374B2, Sept. 2, 2015.