

Kai-Hsiu Chen (陳凱修)

chenkaihsiu@gmail.com

ORCID ID: [0000-0002-8056-5858](https://orcid.org/0000-0002-8056-5858)**Personal website:**<https://chenkaihsiu.wixsite.com/kaihsiuchen>**Employment**

- Post-Doctoral researcher in [Atsushi Kawakita group](#) 2025-
 - Koishikawa botanical garden, University of Tokyo, Japan
- Post-Doctoral researcher in [John Pannell group](#) 2023-2025
 - Department of Ecology and Evolution, University of Lausanne (UNIL), Lausanne, Switzerland
- Research assistant in Chun-Neng Wang group 2015-2017
 - Department of Ecology and Evolution, National Taiwan University (NTU), Taipei, Taiwan

Education

- University of Lausanne (UNIL), Lausanne, Switzerland 2019-2023
 - PhD, Department of Ecology and Evolution
- University of Lausanne (UNIL), Lausanne, Switzerland 2017-2019
 - Master of Science in Behavior, Evolution, and Conservation, Department of Ecology and Evolution
- National Taiwan University (NTU), Taipei, Taiwan 2009-2014
 - Bachelor Life Science, Collage of Life Science
 - Exchange study in Hokkaido University, Sapporo, Japan (2013-2014)

Research Interests

- Ecology and evolution of plant sexual, mating, and pollination systems, Sexual/natural selection, Plant-animal interaction, Alpine ecology, Life-history trade-offs, Plant reproductive ecology

Conferences

- Symposium of International Comparative Biology (SIBC), Portland, USA 2026
 - Talk: " Evolution of sexual systems and sex-allocation strategies in flowering plants: case studies on dioecy and gender diphasy" (as invited speaker)
- Biology 25, Lausanne, Switzerland 2025
 - Talk: "Disruptive selection explains dioecy in a wind-pollinated

herb"

- XX International Botanical Congress (IBC XX), Madrid, Spain 2024
 - Talk: "Andromonoecy as a convergent resolution to sexual conflict in bisexual flowers"
- Annual meeting of the Ecological Society of Japan (ESJ71), Yokohama, Japan 2024
 - Talk: "Andromonoecy as a convergent resolution to sexual conflict in bisexual flowers"
- Scandinavian Association for Pollination Ecology (SCAPE), Gimo, Sweden 2022
 - Talk: "Why do some hermaphroditic species produce male-only flowers? "
- Biology 22, Basel, Switzerland 2022
 - Talk: "Saturating female fitness gains due to pre-dispersal seed predation in an alpine herb."
- Annual Meeting of the Spanish Group for Floral Ecology (EcoFlor), online 2021
 - Symposium organizer for "The role of antagonists in shaping flower evolution"
 - Talk: "The role of antagonists on floral evolution in *Pulsatilla alpina*"
- XIX International Botanical Congress, Shenzhen, China 2017
 - Poster: "Effective pollination of *Aeschynanthus acuminatus* (Gesneriaceae) by generalist passerines, in sunbird-absent East Asia."
- Annual Meetings of the Ecological Society of Japan (ESJ64), Tokyo, Japan 2017
 - Poster: "Effective pollination of *Aeschynanthus acuminatus* (Gesneriaceae) by generalist passerines, in sunbird-absent East Asia."

Teaching Experience

- Assistant for *Evolution and biogeography of semi-arid and island floras* (John R. Pannell in charge), MSc students, Tenerife, Spain 2023
- Organizer of *Botany*, 1st year bachelor 2022
- Assistant for *Field work of botany* (Pascal Vittoz in charge), 3rd year bachelor 2019-2022
- Supervision of MSc thesis
 - Blanche Pioger, "Tri-trophic interactions in *Pulsatilla alpina*: attraction to seed predators and parasitoid wasps." 2022

- Supervision of Master's projects
 - Fabio Opreni, "In the plant of plastic sex, *Pulsatilla alpina*, the colonization of arbuscular mycorrhizal fungi (AMF) in roots changes between sex types and during the sex development " 2022
 - Jonathan Pini, "Plants, flies, and parasitoids: Do floral traits affect the parasitic rate of the seed predator? " 2021
 - Amandine Serrurier, "An evaluation of intraspecific facilitation in cold-stressed annual plants." 2021
 - Mélanie Perret, "Trade-offs among survival, growth, and reproduction in a perennial alpine plant." 2021
 - Marie Bole-Feysot, "Interactions of interactions: the effects of florivory on pollination, seed predation and reproductive success." 2020
 - Zoe Domenjoz, "The effect of within-flower modularity on pollination and seed predation rate of *Pulsatilla alpina*." 2020
 - Lisa Hulaas, "Testing the effects of herbivory on reproductive success in plants of different sizes via defoliation manipulation." 2019

Language Ability

- Mandarin (native level), Taiwanese (native level), English (fluent level), Japanese (fluent level), French (intermediate level), and Korean (basic level)

Awarded Scholarship and Prizes

- ESEB prize of evolutionary biology from the Faculty of Biology and Medicine of the University of Lausanne 2025
- PostDoc Mobility fellowship of Swiss National Science Foundation 2025-2027
- PostDoc Fellowships for Research in Japan (JSPS) (turned down) 2025-2027
日本學術振興會外國人博士後獎學金
- Taiwanese government scholarship to study abroad (GSSA): field of Ecology and Conservation 教育部公費留學獎學金-生態保育學門 2019-2022
- Master's Grant of the University of Lausanne 2017-2019
- Student Exchange Support Program (Scholarship for Short-term Study in Japan) from the Independent Administrative Institution Japan Student Services Organization 2013-2014
- Research Creativity Award from the National Science Council, Taiwan 2011-2012

Major Achievements

Achievement 1: Conceptual advancement of the understanding of plant reproductive strategies
My doctoral research has advanced our understanding of the complex reproductive strategies adopted by hermaphroditic plants [1],[2],[3]. How individual plants allocate their reproductive

resources to the two sex functions (e.g., number of stamens and pistils) represents a key question in Plant Ecology, with important implications for ecological processes at different levels, from floral diversification, demography, to plant-animal interactions. In the 1970s, the powerful framework of sex allocation theory was introduced and elaborated. This theory has been extremely successful in predicting different strategies in dioecious species for the past 50 years. However, its empirical examination remains mostly unsuccessful in hermaphrodites (i.e., 90% of plant species) largely because it assumes a direct linear tradeoff between allocation to male and female functions. This tradeoff may be obscured because individuals vary in their resource status and allocate different resources to their different sexual functions. To address this problem, I showed that projection of reproductive success onto a common plane comprising absolute male and female allocation as two independent axes can reveal how the allocation to one sex affected the reproductive success of the opposite sex, i.e., sexual interference beyond the allocation tradeoff [1]. Furthermore, I found a rigid fitness landscape with two fitness peaks corresponding to the phenotypes of unisexual male and female-biased bisexual flowers, which explains the adaptive significance of the andromonoecious strategy [1],[2]. My work has pointed to novel explanations for the complex reproductive strategy found in many perennial plants and could be applied widely to other organisms.

My work on sex allocation has also led to one of the first empirical demonstrations of ‘intra-locus sexual conflict’ in hermaphroditic plants and how it may be resolved [3]. Intra-locus sexual conflict in hermaphrodites refers to the situation where male and female functions have different fitness optima on the same trait. Based on a detailed tracking over time of the fitness of every individual in a population of the andromonoecious plant using genetic markers, I demonstrated strong sexual conflict on allocation to female function and on phenology in bisexual flowers; furthermore, I showed that the male flowers are expressing traits closer to the inferred fitness optimal of the male function, representing a resolution of the conflict. This work provides a novel and useful framework for studying other sex-allocation strategies of hermaphroditic plants at the flower level.

Achievement 2: Integration of trait-based ecology and natural/sexual selection

My studies aim to integrate trait-based ecology and natural/sexual evolution for understanding diverse reproductive strategies in flowering plants. I have worked on the detailed mechanistic connections between phenotypes (i.e., floral traits) and different fitness components besides reproductive success, e.g., pollination success [4], seed predation [4], selfing rate [5],[6], and pollen dispersal distance [7], and provided important insights into plant reproductive ecology and floral evolution. For instance, until now, the focus on plant-animal interactions related to floral evolution has been largely biased toward pollinators. My study on how flower-visiting mutualists and antagonists imposed selection on different floral traits at the seed maturation stage, indeed found that the seed predators imposed strong non-linear selection on several traits [4]. This work provides evidence for the overlooked role of antagonistic interactions in floral evolution.

Furthermore, noting the extent of fine details of reproduction, especially allocation and the interface with genetics through the mating system, has been rather overlooked in much of the ecological research on plant reproduction. For example, mating systems and inbreeding depression have largely been ignored in studies of phenotypic selection using seed number as a fitness proxy. In a self-compatible insect-pollinated species with strong inbreeding depression, my study revealed that the selfing rate depended on floral traits and that ignoring the effect of inbreeding depression yielded very distinct patterns of phenotypic selection on those traits [5]. This work draws attention to the pitfall of ignoring the mating system in the conventional approach to studying plant reproduction and floral evolution. On the other hand, my study on the wind-pollinated *Mercurialis annua* demonstrated that separate sexes would be favored as a result of the dependence of selfing rate on male allocation under high inbreeding depression [6]. This study, again, demonstrates how the mating system may drive the evolution of sexual systems.

Achievement 3: Understanding the distribution and dynamics of biodiversity of the East Asian flora

Mostly through international collaborations, I have helped to advance our understanding of the pollination ecology and the distribution and dynamics of biodiversity of the East Asian flora, both in the scientific [8],[9],[10],[11] and the public domains [12],[13]. For instance, I studied the seasonal dynamics of pollinators and flowering phenology in alpine communities in subtropical Taiwan in collaboration with Prof. [Gaku Kudo](#) at Hokkaido University, Japan, thanks to an exchange when I was an undergraduate [8]. The dataset, which comprises the phenology and pollinator assemblages of nearly 100 alpine species, not only is the first assessment of plant-pollinator interaction of the alpine ecosystem in Taiwan, but also provides valuable information on the understanding of the relic alpine ecosystem in subtropical regions under climate change. Moreover, through an international collaboration with Prof. [Ko Mochizuki](#) and other researchers, we found that different *Euonymus* species in Taiwan, Japan, and America that grow in similar shady and humid habitats independently shifted to be pollinated by fungus-gnats (Diptera) and evolved similar suites of floral traits, e.g., color, scent, and morphology, that are distinct to those of bee-pollinated congeners [9]. This study provides an example of how environment-dependent plant-animal interactions could lead to convergent evolution of floral traits.

List of Publications (since 2019)

Peer-reviewed articles (* as corresponding author)

1. **Chen, Kai-Hsiu***, and John R. Pannell. "Mapping fitness landscapes to interpret sex allocation in hermaphrodites." *Current Biology* 35.10 (2025): 2354-2364. [\[link\]](#) [PDF]
2. **Chen, Kai-Hsiu***, and John R. Pannell. "Sex allocation and reproductive success in a perennial hermaphroditic herb: both size and timing matter." *American Naturalist* 206.5

- (2025): 452-466. [[link](#)] [PDF]
3. **Chen, Kai-Hsiu***, and John R. Pannell. "Unisexual flowers as a resolution to intralocus sexual conflict in hermaphrodites." *Proceedings of the Royal Society B* 290.2011 (2023): 20232137. [[link](#)] [PDF]
 4. **Chen, Kai-Hsiu***, and John R. Pannell. "Disruptive selection via pollinators and seed predators on the height of flowers on a wind-dispersed alpine herb." *American Journal of Botany* 109.11 (2022): 1717-1729. [[link](#)] [PDF]
 5. **Chen, Kai-Hsiu***, and John R. Pannell. "Ignoring within-flower self-fertilization and inbreeding depression biases estimates of selection on floral traits in a perennial alpine herb." *Journal of Ecology* 112.11 (2024): 2540-2551. [[link](#)] [PDF]
 6. **Chen, Kai-Hsiu***, and John R. Pannell. "Dioecy in a wind-pollinated herb explained by disruptive selection on sex allocation via inbreeding avoidance." *New Phytologist* 247.6 (2025): 2733-2745. [[link](#)] [PDF]
 7. **Chen, Kai-Hsiu***, and John R. Pannell. "Pollen dispersal distance is determined by phenology and ancillary traits but not floral gender in an andromonoecious, fly-pollinated alpine herb." *Alpine Botany* 134.1 (2024): 69-79. [[link](#)] [PDF]
 8. Kudo, Gaku, Tetsuo I. Kohyama, **Kai-Hsiu Chen**, Tsai-Wen Hsu, and Chun-Neng Wang. Seasonal dynamics of floral composition and flower visitors in a subtropical alpine ecosystem in Taiwan. *Ecological Research* 39.1 (2024): 27-41. [[link](#)] [PDF]
 9. Mochizuki, Ko, Tomoko Okamoto, **Kai-Hsiu Chen**, Chun-Neng Wang, Matthew Evans, Andrea T. Kramer, and Atsushi Kawakita. "Adaptation to pollination by fungus gnats underlies the evolution of pollination syndrome in the genus *Euonymus*." *Annals of Botany*, 132.2 (2023): 319-333. [[link](#)] [PDF]
 10. Jiang, Xia, **Kai-Hsiu Chen**, Shengman Lyu, Ling Liu, Meixian Yu, John R. Pannell, and GuoXing Cao. "Variation in pollen limitation among reproductive modules points to likely resource reallocation in the alpine plant *Veratrum grandiflorum*." *Nordic Journal of Botany* (2025): e04873. [[link](#)] [PDF]
 11. **Chen, Kai-Hsiu**, Jing-Yi Lu, and Chun-Neng Wang. "Effective pollination of *Aeschynanthus acuminatus* (Gesneriaceae) by generalist passerines, in sunbird-absent East Asia." *Scientific Reports* 9.1 (2019): 17552. [[link](#)] [PDF]

Popular science articles

12. **Chen, Kai-Hsiu**, Ko Mochizuki, Atsushi Kawakita, & Chun-Neng Wang. "Fungus-gnat-pollination in *Euonymus laxiflorus*." *Science Monthly*. 55.2 (2024): 56-61. (in Mandarin) [[link](#)] [PDF]
13. Lu, Jing-Yi, **Kai-Hsiu Chen**, and Chun-Neng Wang. "Generalized passerine pollination in *Aeschynanthus acuminatus*." *Scientific American*. 222.8 (2020): 2-4 (in Mandarin) [[link](#)] [PDF]