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PROFESSIONAL PREPARATION

Cornell University	Animal Behavior	Ph.D., Aug.2003-Jan.2009
National Taiwan University	Zoology	M.S., Sep. 2000-Jun.2002
National Taiwan University	Botany	B.A., Sep. 1996-Jun.2000

POSITIONS

2000	Teaching assistant, Biology, National Taiwan University.
Jun. 2002-Jun. 2003	Research assistant, Institute of Ecology and Evolution, National Taiwan University
2003-2004	Excellence Fellow, Cornell University
2004-2007	Teaching assistant, Introduction to Behavior, Cornell University
Jan. 2009-Feb. 2010	Postdoctoral Research Fellow, Cornell University
Sep.2009-Feb. 2010	Visiting Postdoctoral Research Fellow, University of Cambridge
Mar. 2010-July. 2010	Postdoctoral Research Associate, Department of Forestry, National Taiwan University
Apr.2014-Aug. 2014	Visiting Scholar, Department of Zoology, University of Cambridge
Aug.2010-Jan. 2015	Assistant Research Fellow, Biodiversity Research Center, Academia Sinica.
Jan.2016- Jan 2021	Associate Research Fellow, Biodiversity Research Center, Academia Sinica.
Aug. 2017- Oct. 2019	Coordinator, Biodiversity Program, Taiwan International Graduate Program, Academia Sinica, Taiwan
Mar. 2018- Oct. 2019	Deputy Director, Biodiversity Research Center, Academia Sinica.
Feb. 2021-	Research Fellow, Biodiversity Research Center, Academia Sinica.
2012-	Adjunct assistant, Associate and Full professor, Institute of Ecology and Evolutionary Biology, National Taiwan University.
2016-	Joint Appointment Associate and Full Professor, International Degree Program in Climate Change and Sustainable Development (IPCS), National Taiwan University.

RESEARCH FIELD

Behavioral Ecology, Biogeography, Climate Change Biology

HONORS

2003	College of Agriculture and Life Sciences Excellence Fellowship, Cornell University
2006-2007	Hu Shih Memorial Award, East Asia Program, Cornell University
2008	Postdoctoral Research Abroad Fellowship, National Science Council of Taiwan
2011	Emerging Nations Award, Behavior 2011 conference grant, Animal Behavior Society and the International Ethological Conference
2012-2016	Career Development Award, Academia Sinica
2014	Academia Sinica Research Award for Junior Research Investigators
2017	Ta-You Wu Memorial Award, Minister of Science and Technology, Taiwan, R.O.C.
2017-2021	Investigator Award, Academia Sinica

2019 The Young Scholars' Creativity Award, Foundation for the Advancement of Outstanding Scholarship, Taiwan
2021 Outstanding Research Award, Minister of Science and Technology, Taiwan, R.O.C.
2024 Fei-Yue Lectureship, Foundation for the Advancement of Outstanding Scholarship, Awarded to mid-career scholars to support three years of research.
2025 Y. Z. Hsu Scientific Paper Award (Biotechnology & Pharmaceuticals Category), Y. Z. Hsu Science & Technology Memorial Foundation

PROFESSIONAL SOCIETIES AND COMMITTEES

Societies

International Society for Behavioral Ecology; American Society of Naturalists; American Association for the Advancement of Science

Committees

2011-2019 Faculty of 1000, Associate Faculty Member
2014 - Reviewing Editor, Frontiers in Ecology and Evolution
2015- Associate Editor, Zoological Studies
2018- Associate Editor, PLoS ONE
2021-2023 Editorial Board, Behavioral Ecology
2022- Editorial Board, Ethology
2023- Associate Editor, Proceedings of the Royal Society B

2008 – Ad-hoc reviewer: PNAS, Royal Society Open Science, Behavioral Ecology, Animal Behaviour; Proceedings of the Royal Society London B, Philosophical Transactions B, Evolution; Journal of Avian Biology, Journal of Animal Ecology, American Naturalist, Behavioral Ecology and Sociology, Ecological Research, Nature Ecology & Evolution, Nature Communications, PeerJ, Science Advances. Current Biology. Frontiers in Ecology and Evolution. Global Change Biology, Functional Ecology

2011- Research grants (outside referee): National Science Council of Taiwan
2026 European Research Council (ERC) Consolidator Grant 2026

PUBLICATIONS (2019-, # STUDENT/MENTEE, *Corresponding author)

Journal Papers

1. **S.-F. Shen***, D. R. Rubenstein and M. Liu. (2026) The evolution of group size and kin structure in complex societies. *Royal Society Open Science* 13: 260096.
2. R. B. Dahl, A. Ghimire, Y. Iizuka, J.-P. Huang, P. R. Møller, G.-S. Mai, W.-C. Lin, C.-C. Yang, Y.-C. Chou, T.-H. Huang*, P.-Y. Chen* and **S.-F. Shen***. (2026) Diverse mechanical properties, composition, and performance of shark dermal denticles. *Nature Communications*. **17**, 5853
3. M. Liu, T.-M. Hung, S. Wu, M. Liu, J. Mai, Y.-S. Jang, C.-C. Huang, C.-Y. Hsu, C.-H. Wei, M.-N. Tuanmu, S.-F. Chan, I.-C. Chen* and **S.-F. Shen***. (2026) Warmer environments harbor greater thermal trait diversity in moth assemblages. *Nature Communications* 17: 738.
4. Chen B.-F., Y.-C. Li, D. R. Rubenstein, A. Rolland, S.-J. Sun, M. Liu, D.-P. Chen and **S.-F. Shen***. (2025) Interspecific competition reduces energy expenditure by decreasing intragroup conflict in a social burying beetle. Ecology Letters 28: e70300.
5. S.-F. Chan and **S.-F. Shen***. (2025) Temporal niche modulates species interaction under thermal fluctuations. *Global Change Biology* 31: e70491.

6. H. Chen, D. R. Rubenstein, G.-S. Mai, C.-F. Chang and **S.-F. Shen***. (2025) Circadian activity predicts breeding phenology in the Asian burying beetle *Nicrophorus nepalensis*. *Royal Society Open Science* 12: 250624.
7. S.-F. Chan, M. Liu, D. R. Rubenstein, Y.-A. Chung, W.-R. Lin, L.-Y. Liao and **S.-F. Shen***. (2025) Assessment across life stages reveals superior habitat suitability in reintroduced historical habitats for an endangered salmon species. *Journal of Applied Ecology* 62: 1378-1391.
8. S.-F. Chan, D. R. Rubenstein, T.-W. Wang, Y.-Y. Chen, I.-C. Chen, D.-Z. Ni, W.-K. Shih and **S.-F. Shen***. (2025) Land-use changes influence climate resilience through altered population demography in a social insect. *Ecological Monographs* 95: e1638.
9. I.-C. Chen*, **S.-F. Shen***, and S.-F. Chan[#] (2024) Niche theory and species range limits along elevational gradients: perspectives and future directions. *Annual Review of Ecology, Evolution, and Systematics* 55: 449-469.
10. W.-P. Chan[#], J. Lenoir, G.-S. Mai[#], H.-C. Kuo, I.-C. Chen and **S.-F. Shen***. (2024) Climate velocities and species tracking in global mountain regions. *Nature* 629: 114-120.
11. A. Ghimire, R. B. Dahl[#], **S.-F. Shen** and P.-Y. Chen*. (2024) Shark skin denticles: From morphological diversity to multi-functional adaptations and applications. *Advanced Functional Materials* 34: 2307121.
12. S. Chia, S. Wu[#], Y.-J. Lu, Y.-S. Jang[#], C.-C. Huang, **S.-F. Shen**, I.-C. Chen* and M.-N. Tuanmu*. (2024) Mechanistic understanding of how temperature and its variability shape body size composition in moth assemblages. *Functional Ecology* 38: 206-218.
13. **S.-F. Shen***, H. K. Reeve, S. T. Emlen, M. Liu[#] and D. R. Rubenstein. (2024) Group size and the resolution of insider-outsider conflict in animal societies. *Animal Behaviour* 205: 107-116.
14. S.-F. Chan[#], D. R. Rubenstein, I.-C. Chen, Y.-M. Fan, H.-Y. Tsai, Y.-W. Zheng and **S.-F. Shen***. (2023) Higher temperature variability in deforested mountain regions impacts the competitive advantage of nocturnal species. *Proceedings of the Royal Society B* 290: 20230529.
15. Y.-H. Lin[#], Y.-Y. Chen, D. R. Rubenstein, M. Liu, M. Liu and **S.-F. Shen***. (2023) Environmental quality mediates the ecological dominance of cooperatively breeding birds. *Ecology Letters* 26: 1145-1156. (cover story)
16. **Shen, S.-F.*** (2022). Animal power. *Nature Ecology & Evolution.* 6: 491 https://doi.org/10.1038/s41559-022-01732-z (Invited book review)
17. Jang,Y.-S. *[#], **S.-F. Shen**, J.-Y. Juang, C.-y. Huang, and M.-H. Lo*. (2022) Discontinuity of diurnal temperature range along elevated regions. *Geophysical Research Letter*. 49, e2021GL097551. https://doi.org/10.1029/2021GL097551 .
18. Chen, Y.-Y#., D. R. Rubenstein, and **S.-F. Shen***. 2022. Cooperation and lateral forces: Moving beyond bottom-up and top-down drivers of animal population dynamics. *Frontiers in Psychology* 13: 768773. https://doi.org/10.3389/fpsyg.2022.768773 .
19. Liu, M.[#], D. R. Rubenstein, S.-A. Cheong and **S.-F. Shen***. (2021), Antagonistic effects of long- and short-term environmental variation on species coexistence. *Proceedings of Royal Society, London Series B*, 288: 20211491
20. Liu, C. W.-J., **S.-F. Shen** , W.-C. Liu*, 2021, "On the evolution of social ties as an instrumental tool for resource competition in resource patch networks", *Humanities and Social Sciences Communications*, 8(1), 78.
21. Tsai H.-Y[#]., D.R. Rubenstein, B.-F. Chen[#], M. Liu[#], S.-F. Chan[#], D.-P. Chen[#], S.-J. Sun[#], T.-N. Yuan[#], and **S.-F. Shen***, 2020, "Antagonistic effects of intraspecific cooperation and interspecific competition on thermal performance", *eLife* 9: e57022.

22. Wang, H.-Y., **S.-F. Shen**, Y.-S. Chen, Y.-K. Kiang, and M. Heino. 2020. Life histories determine divergent population trends for fishes under climate warming. *Nature Communications* 11:4088.
23. Tibbetts, E. A., M. Liu[#], E. C. Laub, **S.-F. Shen**, (2020), "Complex signals alter recognition accuracy and conspecific acceptance thresholds", *Philosophical Transactions of The Royal Society B-Biological Sciences*. 375: 20190482.
24. Tsai, H.-Y.[#], D.R. Rubenstein, Y.-M. Fan[#], T.-N. Yuan[#], B.-F. Chen[#], Y. Tang, I.-C. Chen and **S.-F. Shen*** (2020). Locally-adapted reproductive photoperiodism determines population vulnerability to climate change in burying beetles. *Nature Communications*, **11**:1398
25. Chen B.-F.[#], M. Liu[#], D. R. Rubenstein, S.-J. Sun[#], J.-N. Liu[#], Y.-H. Lin[#] and **S.-F. Shen***. (2020), A chemically-triggered transition from conflict to cooperation in burying beetles. *Ecology Letters*, **23**: 467–475
26. Liu, M.[#] S.-J. Sun[#], D. R. Rubenstein, B.-F. Chen[#] and **S.-F Shen*.** (2020). Ecological transitions in grouping benefits explain the paradox of environmental quality and sociality. *The American Naturalist* 195: 818-832.
27. Cheng, Y.-R.[#]*, D. R. Rubenstein, and **S.-F. Shen**. (2019) Nest predation predicts infanticide in a cooperatively breeding bird. *Biology Letters,* 15: 20190314.
28. Wu, S.[#], C.-M. Chang,G.-S. Mai[#], D.R. Rubenstein, C.-M. Yang, Y.-T. Huang, H.-H. Lin, L.-C. Shih, S.-W. Chen and **S.-F. Shen***. (2019), Artificial intelligence reveals environmental constraints on colour diversity in insects. *Nature Communications,* **10**: 4554.
29. Liu, M.[#], D. R. Rubenstein, S.-A. Cheong and **S.-F. Shen***. (2019), Biological adaptation under fluctuating selection. *Proceedings of Royal Society, London Series B*. 286: 20191623.
30. Chan, S.-F.[#], W.-K. Shih[#], A.-Y. Chang[#], **S.-F. Shen*** and I.-C. Chen*, (2019), Contrasting forms of competition set elevational range limits of species, *Ecology Letters,* 22, 1668–1679
31. Lin, Y.-H.[#], S.-F. Chan[#], D.-R. Rubenstein, M. Liu[#], **S.-F. Shen***, (2019), Resolving the paradox of environmental quality and sociality: the ecological causes and consequences of cooperative breeding in two lineages of birds. *The American Naturalist* 194:207-216.***Book Chapters***

Publication before 2019

Journal Papers

32. Liu, M.[#], Rubenstein, D.R., Cheong, S.A. & **S.-F. Shen***, (2018), Multitasking and the evolution of optimal clutch size in fluctuating environments. *Ecology and Evolution*, 8, 8803-8817.
33. Chan, W.P.[#], Chen, I.C., Colwell, R.K., Liu, W.C., Huang, C.y. & **S.-F. Shen*,** (2018), Response to Qian et al. (2017): Daily and seasonal climate variations are both critical in the evolution of species' elevational range size. *Journal of Biogeography*, 45, 2832-2836.
34. Wilkins, M. R., Scordato, E. S., Semenov, G. A., Karaardic, H., Shizuka, D., Rubtsov, A., Pap, P., **Shen, S.-F.**, Safran, R. J.*, (2018), Global song divergence in barn swallows (*Hirundo rustica*): exploring the roles of genetic, geographic, and climatic distance in sympatry and allopatry, *Biological Journal of the Linnean Society*, 123, 825–849
35. Lin, C.-C.[#], L.- A. Dugatkin, H.-W. Yuan, P.-F. Lee, and **S.-F Shen***, (2017), A sequential collective action game and its applications to cooperative parental care in *Yuhina brunneiceps*, *Animal Behaviour* 129, 151–159.
36. **Shen, S.-F.***, S. T. Emlen, W. D. Koenig and D. R. Rubenstein, (2017), The ecology of cooperative breeding behavior, *Ecology Letters*, 20, 708-720.
37. Wang, H.-Y.*, Y.-S. Chen, C.-C. Hsu, and **S.-F. Shen**, (2017), Fishing-induced changes in adult length are mediated by skipped-spawning, *Ecological Applications*, 27,274-284
38. Safran, R. J., Scordato, E.S., Wilkins, M.R., Hubbard, J.K., Jenkins, B.R., Albrecht, T., Flaxman, S.M., Karaardic, H., Vortman, Y., Lotem, A., Nosil, P., Pap, P., **Shen, S.-F.**, Chan, S.-F., Parchman, T.L., Kane, N.C., 2016, "Genome-wide differentiation in closely related populations: the roles of selection and geographic isolation.", *Molecular Ecology*, 25, 3865-83.

39. Chan, W.-P. [#], I-C. Chen[#], R. K. Colwell, W.-C. Liu, C.-Y. Huang, **S.-F. Shen***, 2016, "Seasonal and daily climate variation have opposite effects on species elevational range size", *Science*, 351, 1437-1439.

40. Liu, M. [#], Q.-D. Zhong[#], Y.-R. Cheng[#], S.-H.Li, S. Fang, C.-E. Pu, H.-W. Yuan, **S.-F. Shen***, 2015 "Genetic relatedness in groups of the joint-nesting Taiwan yuhinas: Low relatedness groups with preference of accepting male kin." *PLoS One* , 10: e0127341.

41. Sun, S.-J. [#], D. R. Rubenstein, B.-F. Chen[#], S.-F. Chan[#], J.-N. Liu[#], M. Liu[#], W. Hwang, P.-S. Yang, **S.-F. Shen***, 2014, "Climate-mediated Cooperation Promotes Niche Expansion in Burying Beetles", *eLife*, 3:e02440.

42. **Shen S.-F.***, E. Akcay, D. R. Rubenstein, 2014, "Group size and social conflict in complex societies", *The American Naturalist*, 183 (2), 301-310.

43. Reeve, H. K.*†, **S.-F., Shen**†, 2013, "Unity and disunity in the search for a unified reproductive skew theory", *Animal Behaviour*, 85(6), 1137-1144. (†co-first author)

44. Chan, W.-P. [#], H.-W.Yuan, C.-Y. Huang, C.-H. Wang, S.-D. Lin, Y.-C. Lo, B.-W. Huang, K. A. Hatch, H.-J. Shiu, C.-F. You, Y.-M*. Chang and **S.-F. Shen*** , 2012, Regional scale high resolution δ18O prediction in precipitation using MODIS EVI. *PLoS One*, 7(9), e45496.

45. **Shen, S.-F.***, S. L. Vehrencamp, R. A. Johnstone, H.- C. Chen [#], S.-F. Chan [#], W.-Y. Liao [#], K.-Y. Lin [#], and H.-W. Yuan*. (2012) Unfavourable environment limits social conflict in *Yuhina brunneiceps*. *Nature Communications* 3: 885 (Featured article)

46. **Shen, S.-F.*,** H. K. Reeve, S. L. Vehrencamp. (2011) Parental care, costly young and reproductive skew: A general model of parental investment in cooperatively breeding societies. *Journal of Theoretical Biology* 284: 24-31

47. **Shen, S.-F.**, H. K. Reeve*, and W. Herrnkind 2010 The brave leader game and the timing of altruism among non-kin. *The American Naturalist 176*:242-248

48. **Shen, S.-F.**, H.- C. Chen, S. L. Vehrencamp, and H.-W. Yuan*. 2010. Group provisioning limits sharing conflict among nestlings in joint-nesting Taiwan yuhinas. *Biology Letters* 6:318-321

49. **Shen, S.-F.**, and H. K. Reeve*. 2010. Reproductive skew theory unified: The general bordered tug-of-war model. *Journal of Theoretical Biology* 263:1-12

50. Rubenstein, D.R*. and **S.-F. Shen**.2009 Reproductive conflict and the costs of social status in cooperatively breeding vertebrates. *The American Naturalist* 173:650-661

51. Cant, M. A*. and **S.-F. Shen**. 2006. Endogenous timing in competitive interactions among relatives. *Proceedings of Royal Society, London Series B.* 273:171-178

52. Reeve, H. K*. and **S.-F. Shen** . 2006. A missing model, the boarded tug-of-war of reproductive skew. *PNAS* 103: 8430–8434

53. Lee, P.-F., **S.-F. Shen**, T.-S. Ding, C.-R.Chiou and H.-W. Yuan*. 2006. Habitat selection of the cooperative breeding Taiwan Yuhina (Yuhina brunneiceps) in a fragmented forest habitat. *Zoological Studies*. 44: 479-504

54. Yuan, H.-W.*, **S.-F. Shen**, H.-Y. Hung, 2006. Sexual dimorphism, dispersal patterns, and breeding biology of Taiwan Yuhinas, a joint-nesting passerine. *The Wilson Journal of Ornithology* 118: 558-562

55. Yuan, H.-W.*, **S.-F. Shen**, K.-Y. Lin, and P.-F. Lee. 2005. Group size effects and parental investment strategies during incubation in joint-nesting Taiwan Yuhinas. *Wilson Bulletin*.117: 306-312

56. Yuan, H.-W.*, M. Liu and **S.-F. Shen**. 2004. Joint-nesting in Taiwan Yuhinas: A rare Passerine case. *The Condor* 106: 862-872.

Book Chapters

57. **Shen, S.-F.** and D. R. Rubenstein. (2025). Climate, cooperation and social evolution. *In Encyclopedia of Animal Behavior, 3rd edition*. (M. Breed, eds). NY: Academic Press.

58. **Shen, S.-F.** and H. K. Reeve. (2019). Reproductive skew. *In Encyclopedia of Animal*

Behavior, 2nd edition. (M. Breed, eds). NY: Academic Press.
59. Shen, S.-F. and D. R. Rubenstein. (2019). Environmental Uncertainty and Social Behavior. *In Encyclopedia of Animal Behavior, 2nd edition*. (M. Breed, eds). NY: Academic Press.
60. Shen, S.-F.*, H.-W. Yuan, and M. Liu[#]. 2016. Taiwan yuhinas: Unrelated joint-nesters cooperate in unfavorable environments, Pages 237-256 *in* W. D. Koenig, and J. L. Dickinson, eds. *Cooperative Breeding in Vertebrates: Studies of Ecology, Evolution, and Behavior*. Cambridge, Cambridge University Press.
61. Shen, S.-F. and H. K. Reeve. 2010. Reproductive skew. p.p 54-58. *In Encyclopedia of Animal Behavior*. (M. Breed, eds). NY: Academic Press.
62. Koenig, W. D., **S.-F. Shen**, A. H. Krakauer, and J. Haydock. 2009. Reproductive skew in avian societies. p.p 227-264. In *Reproductive Skew in Vertebrates: Proximate and Ultimate Causes* (R. Hager and C. Jones, eds). Cambridge: Cambridge University Press.