

# XUE, Jia-Yu

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## Areas of Research

Plant phylogenetics, genome evolution, plant-pathogen interaction, medicinal plants.

## Contact Information

**Office location:** Bioinformatics center  
(Lab room Not determined) (Mailing Address: Not determined)

**Office phone:** Not determined

**Lab location:** Not determined

**Lab phone:** Not determined

**Email address:** [xuejy@njau.edu.cn](mailto:xuejy@njau.edu.cn)

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## Research Interests

**Plant phylogenetics, genome evolution, plant-pathogen interaction, medicinal plants.**

Our recently established research group (Plant Evolutionary Genomics) wants to become a center of excellence in the field of gene prediction, genome assembly and annotation, and in the field of comparative and evolutionary genomics.

### 1. Phylogenetics

My general interest is the molecular evolution of land plants, particularly focusing on two questions: 1, the transition of plants from aquatic to terrestrial environment 2, the origin and early diversification of angiosperms. For now, I am mainly working on the second question, which was referred to by Charles Darwin as “an abominable mystery”, and it remains unsolved. As a number of studies on angiosperm phylogeny gave incongruent results, I am trying to explain the discrepancy between results and develop a new bioinformatic approach to analyze massive genomic data, and afterwards, based on reliable data and methods, I am going to reconstruct a solid phylogenetic framework to reveal the relationships of early-diverging angiosperm lineages.

### 2. Divergence of plant lineages

My second goal is to utilize genomic data to identify lineage-specific molecular characteristics of different clades (gymnosperms vs. angiosperms and within major

angiosperm lineages), figuring out specific molecular elements for particular lineages and the corresponding morphological traits. Ideally, additional experiments would be needed to testify the correlation between molecular data and phenotypic traits and finally to clarify the molecular basis behind important evolutionary processes.

### **3. Evolution of plant resistance genes**

My third interest goes around the plant-pathogen interactions, focusing on the evolution of the plant disease resistance (R) genes in different plant lineages and the molecular mechanisms between the susceptible and resistant lines. R gene includes several different gene families and subfamilies. Although the signaling pathways of R genes have been largely unknown, there are clues suggesting that different R genes go through different signaling pathway. My intention is to utilize genomic data and the correlation of genes on the same pathways to identify potential resistance pathway genes, and upcoming experiments will testify our hypothesis.

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## **Education Background**

**Bachelor:** Nanjing University, 2005

**Doctor:** Nanjing University & University of Michigan, Ann Arbor, 2010

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## **Work experience**

Postdoc/Assistant Professor, Nanjing University, 2010-2014

Assistant/Associate Professor, Institute of Botany, Jiangsu Province and Chinese Academy of Sciences, 2014-2020

Associate Professor, Nanjing Agriculture University, 2020-

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## **Honors and Awards**

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### **Part-time Academic Jobs:**

2014.7-now Botanical Society of Jiangsu secretary

2019.6-now Frontiers in Genetics Guest Associate Editor

2019.6-now Frontiers in Ecology & Evolution Guest Associate Editor

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## **Selected Publication** (\*corresponding author, #co-first author)

1. **Xue JY**, Takken FL, Nepal MP, Maekawa T, Shao ZQ\*. Evolution and Functional

- Mechanisms of Plant Disease Resistance. *Frontiers in Genetics*. doi: 10.3389/fgene.2020.593240.
2. Zhang J#, Fu XX#, Li RQ#, Zhao X#, Liu Y#, Li MH#, Zwaenepoel A#, Ma H, Goffinet B, Guan YL, **Xue JY**, Liao YY, Wang QF, Wang QH, Wang JY, Zhang GQ, Wang ZW, Jia Y, Wang MZ, Dong SS, Yang JF, Jiao YN, Guo YL, Kong HZ, Lu AM, Zhang SZ\*, Van de Peer Y\*, Liu ZJ\*, Chen ZD\*. The hornwort genome and early land plant evolution. *Nature Plants*. 6(2):107-118.
  3. **Xue JY**, Zhao T, Liu Y, Zhang YX, Zhang GQ, Chen HF, Zhou GC\*, Zhang SZ\*, Shao ZQ\*. 2019. Genome-Wide Analysis of NBS-LRR Genes of Four Orchids Revealed Extremely Low Numbers of Disease Resistance Genes. *Frontiers in Genetics*. doi: 10.3389/fgene.2019.01286
  4. Shao ZQ#, **Xue JY**#, Wang Q, Wang B, Chen JQ\*. 2019. Revisiting the Origin of Plant NBS-LRR Genes. *Trends in Plant Science*. 24(1):9-12.
  5. Dong S, **Xue JY**, Zhang S, Zhang L, Wu H, Chen Z, Goffinet B, Liu Y\*. 2018. Complete mitochondrial genome sequence of *Anthoceros angustus*: conservative evolution of the mitogenomes in hornworts. *The Bryologist*. 121(1):014–022.
  6. Qian LH#, Zhou GC#, Sun XQ, Lei Z, Zhang YM, **Xue JY**\*, Hang YY\*. 2017. Distinct Patterns of Gene Gain and Loss: Diverse Evolutionary Modes of NBS-Encoding Genes in Three Solanaceae Crop Species. *G3:Genes|Genomes|Genetics*. 7(5):1577-1585.
  7. Zhang YM, **Xue JY**, Liu LW, Sun X, Zhou GC, Chen M, Shao ZQ, Hang YY. 2017. Divergence and Conservative Evolution of XTNX Genes in Land Plants. *Frontiers in Plant Science*. 8:1844.
  8. Li D, Lei Z, **Xue JY**, Zhou G, Hang Y\*, Sun X\*. 2017. Regulation of FATTY ACID ELONGATION1 expression and production in *Brassica oleracea* and *Capsella rubella*. *Planta*. 246(4):763-778.
  9. Shao ZQ#, **Xue JY**#, Wu P, Zhang YM, Wu Y, Hang YY, Wang B\*, Chen JQ\*. 2016. Large-Scale Analyses of Angiosperm Nucleotide-Binding Site-Leucine-Rich Repeat Genes Reveal Three Anciently Diverged Classes with Distinct Evolutionary Patterns. *Plant Physiology*. 170(4): 2095-2109.
  10. Guo HS#, Zhang YM#, Sun XQ, Li MM, Hang YY\*, **Xue JY**\*. 2016. Evolution of the KCS gene family in plants: the history of gene duplication sub/neofunctionalization and redundancy. *Molecular Genetics and Genomics*. 291(2):739-52.
  11. Sun XQ, Li DH, **Xue JY**, Yang SH, Zhang YM, Li MM, Hang YY\*. 2016. Insertion DNA Accelerates Meiotic Interchromosomal Recombination in *Arabidopsis thaliana*. *Molecular Biology and Evolution*. 33(8):2044-53.
  12. Zhang YM#, Shao ZQ#, Wang Q, Hang YY, **Xue JY**, Wang B\*, Chen JQ\*. 2016. Uncovering the dynamic evolution of nucleotide-binding site-leucine-rich repeat (NBS-LRR) genes in Brassicaceae. *Journal of Integrative Plant Biology*. 58(2):165-77. 2016.
  13. Peng FW, Wu TT, Ren ZW, **Xue JY**, Shi L\*. 2015. Hybrids from 4-anilinoquinazoline and hydroxamic acid as dual inhibitors of vascular endothelial growth factor receptor-2 and histone deacetylase. *Bioorganic &*

- Medicinal Chemistry Letters*. 25(22):5137-41.
14. Wu P, Shao ZQ, Wu XZ, Wang Q, Wang B, Chen JQ, Hang YY, **Xue JY\***. 2014. Loss/retention and evolution of NBS-encoding genes upon whole genome triplication of *Brassica rapa*. *Gene*. 540: 5461.
  15. Shao ZQ<sup>#</sup>, Zhang YM<sup>#</sup>, Hang YY, **Xue JY**, Zhou GC, Wu P, Wu XY, Wu XZ, Wang Q, Wang B\*, Chen JQ\*. 2014. Long-Term Evolution of Nucleotide-Binding Site-Leucine-Rich Repeat (NBS-LRR) Genes: Understandings Gained From and Beyond the Legume Family. *Plant Physiology*. 166(1):217-234.
  16. Shi L, Wu TT, Wang Z, **Xue JY**, Xu YG\*. 2014. Discovery of quinazolin-4-amines bearing benzimidazole fragments as dual inhibitors of c-Met and VEGFR-2. *Bioorganic & Medicinal Chemistry*. 22(17):4735-44.
  17. Shi L, Wu TT, Wang Z, **Xue JY**, Xu YG. 2014. Discovery of N-(2-phenyl-1H-benzo[d]imidazol-5-yl)quinolin-4-amine derivatives as novel VEGFR-2 kinase inhibitors. *European Journal of Medicinal Chemistry*. 84:698-707.
  18. Amborella Genome Project. 2013. The *Amborella* Genome and the Evolution of Flowering Plants. *Science* 342 (6165): p. 1241089
  19. Cheng K<sup>#</sup>, **Xue JY**<sup>#</sup>, Zhu HL\*. 2013. Design, synthesis and antibacterial activity studies of thiazole derivatives as potent eCKAS III inhibitors. *Bioorganic & Medicinal Chemistry Letters* 23(14):4235-4238.
  20. Huang XF<sup>#</sup>, **Xue JY**<sup>#</sup>, Jiang AQ, Zhu HL\*. 2013. Capsaicin and its analogues: structure-activity relationship study. *Current Medicinal Chemistry* 20(21):2661-72.
  21. **Xue JY**, Wang Y, Wu P, Wang Q, Yang LT, Pan XH, Wang B\*, Chen JQ\*. 2012. A primary survey on bryophyte species reveals two novel classes of nucleotide-binding site (NBS) genes. *PLoS One* 7(5): e36700.
  22. Liu Y, Wang B, Cui P, Li L, **Xue JY**, Yu J, Qiu YL\*. 2012. The Mitochondrial Genome of the Lycophyte *Huperzia squarrosa*: The Most Archaic Form in Vascular Plants. *PLoS One*. 7(4):e35168.
  23. Liu Y, **Xue JY**, Wang B, Li L, Qiu YL\*. 2011. The Mitochondrial Genomes of the Early Land Plants *Treubia lacunose* and *Anomodon rugelii*: Dynamic and Conservative Evolution. *PLoS One* 610:e25836.
  24. **Xue JY**<sup>#</sup>, Liu Y<sup>#</sup>, Li L, Wang B, Qiu YL\*. 2010. The complete mitochondrial genome sequence of the hornwort *Phaeoceros laevis*: Retention of many pseudogenes and conservative evolution of mitochondrial genomes in hornworts. *Current Genetics* 56:53-61.
  25. Wang B, Li HY, **Xue JY**, Liu Y, Ané JM, Qiu YL\*. 2010. Presence of three mycorrhizal genes in the common ancestor of land plants suggests a key role of mycorrhizas in the colonization of land by plants. *New phytologist* 186:514-525.
  26. Qiu YL, Li L, Wang B, **Xue JY**, Hendry TA, Li RQ, Brown JW, Liu Y, Hudson GT, Chen ZD. 2010. Angiosperm phylogeny inferred from sequences of four mitochondrial genes. *Journal of Systematics and Evolution* 48 (6): 391-425.
  27. Wang B<sup>#</sup>, **Xue JY**<sup>#</sup>, Li L, Liu Y, Qiu YL\*. 2009. The complete mitochondrial genome sequence of the liverwort *Pleurozia purpurea* reveals extremely

- conservative mitochondrial genome evolution in liverworts. *Current Genetics* 55:601-609.
28. Liu XH, Lv PC, **Xue JY**, Song BA, Zhu HL\*. 2009. Novel 2,4,5-trisubstituted oxazole derivatives: Synthesis and antiproliferative activity. *European Journal of Medicinal Chemistry* 44: 3930-3935.
  29. Li HQ, **Xue JY**, Shi L, Gui SY, Zhu HL\*. 2008. Synthesis, crystal structure and antimicrobial activity of deoxybenzoin derivatives from genistein. *European Journal of Medicinal Chemistry* 43: 662-667.
  30. **Xue JY**, Xiao ZP, Shi L, Li HQ, Zhu HL\*. 2007. Synthesis and structure-activity relationship analysis of enamines as potential antibacterial agents. *Australian Journal of Chemistry* 60: 957-962.
  31. Xiao ZP, **Xue JY**, Tan SH, Zhu HL\*. 2007. Synthesis, structure, and structure-activity relationship analysis of enamines as potential antibacterials. *Bioorganic & Medicinal Chemistry* 15: 4212-4219.

#### **Book Chapters:**

1. 1. Liu Y, Wang B, Li L, Qiu YL, **Xue JY**. Conservative and dynamic evolution of mitochondrial genomes in early land plants. In: Bock R, Knoop V, eds. *Genomics of Chloroplasts and Mitochondria*. Netherlands: Springer. p. 159-174. 2012.