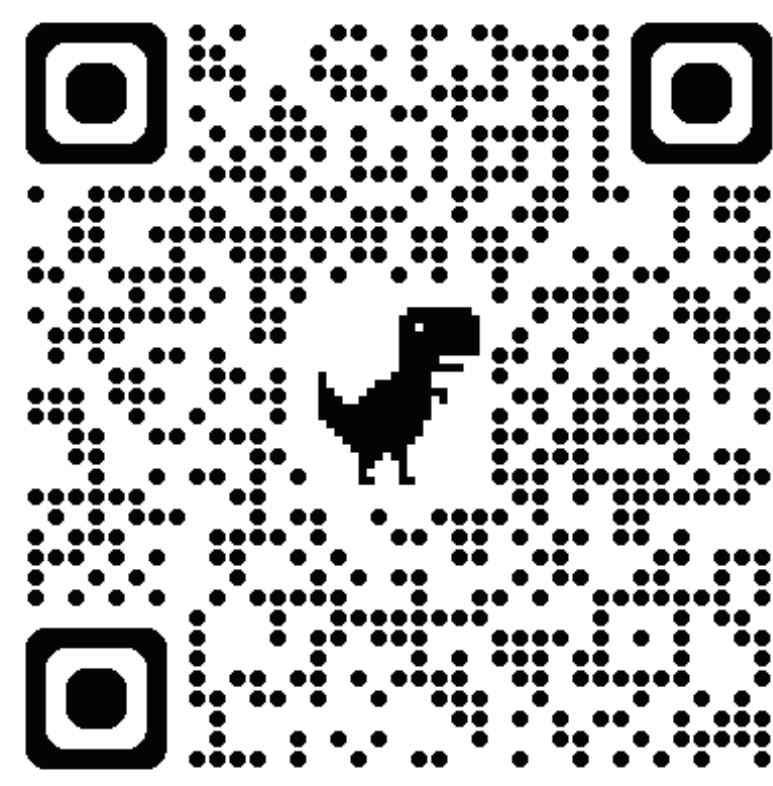


AI modelling of protein structures can distinguish between sensor and helper NLR immune receptors

check out our paper



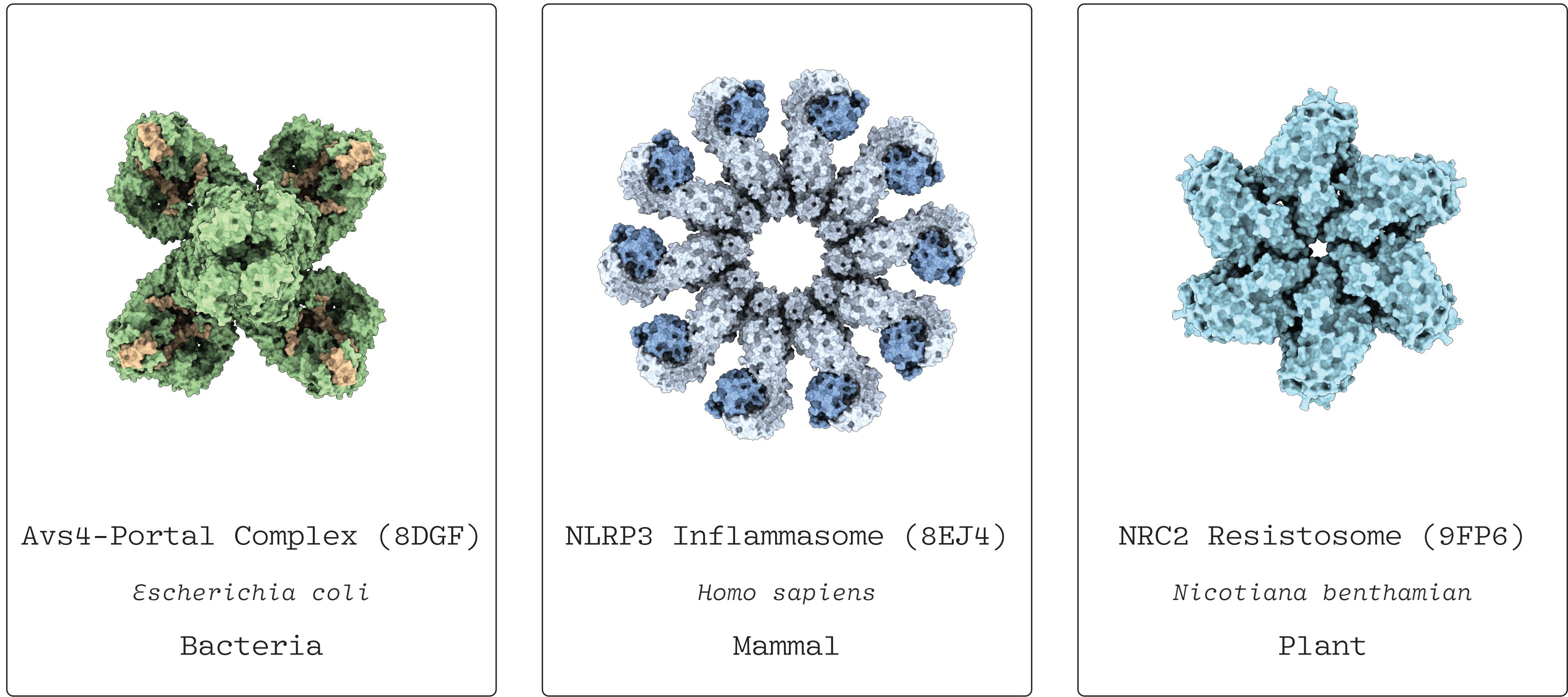
Start Here

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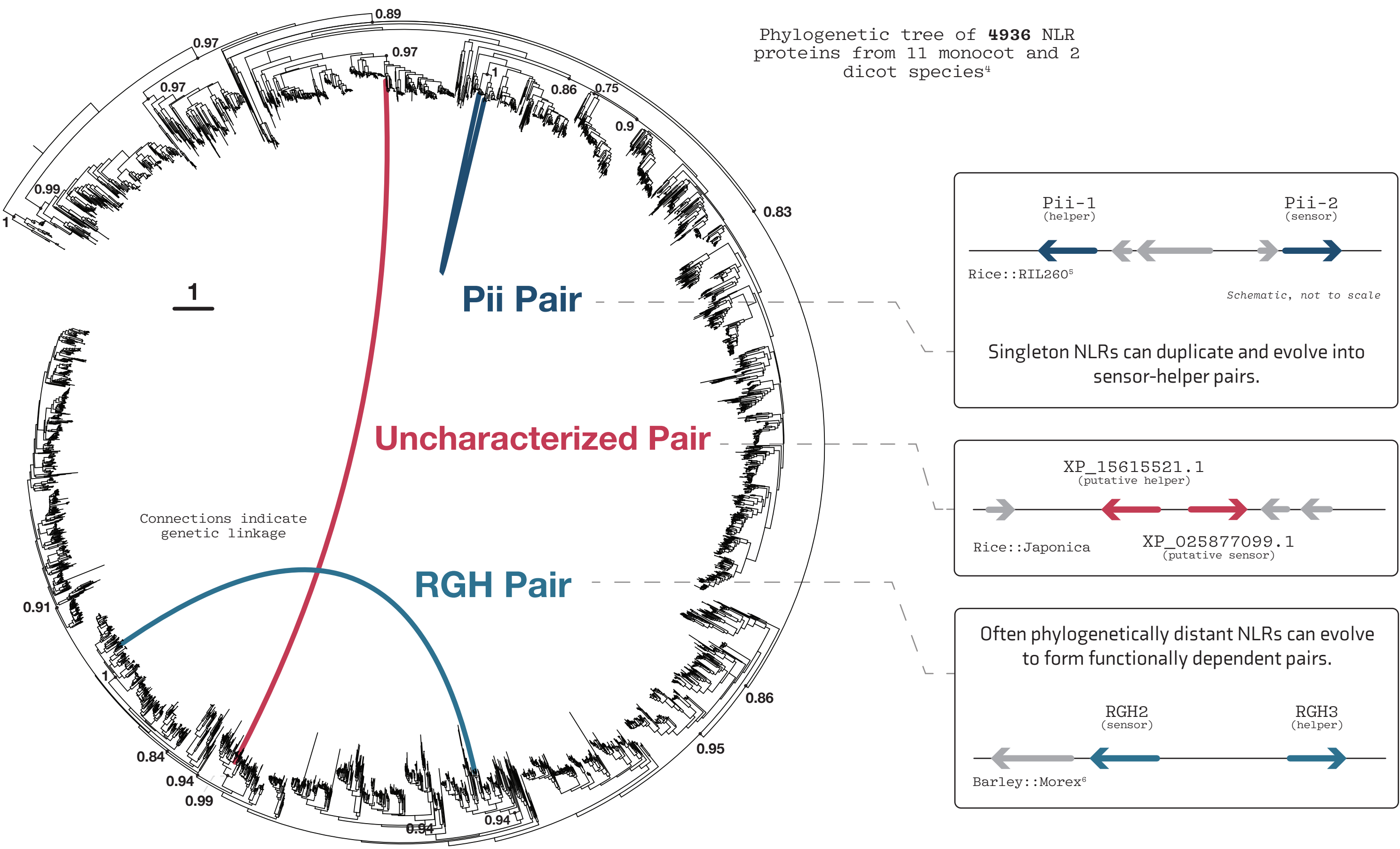
1. The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, Norwich, UK
2. Rijk Zwaan Breeding B.V., Department of Biotechnology, Fijnaart, The Netherlands
3. Department of Life Sciences, Imperial College, London, United Kingdom
4. Iwate Biotechnology Research Center, Kitakami, Iwate, Japan
5. Laboratory of Crop Evolution, Graduate School of Agriculture, Kyoto University, Kyoto, Japan

1 NLRs oligomerize upon activation

However, in plant NLR pairs and networks **sensor NLRs do not oligomerize**³

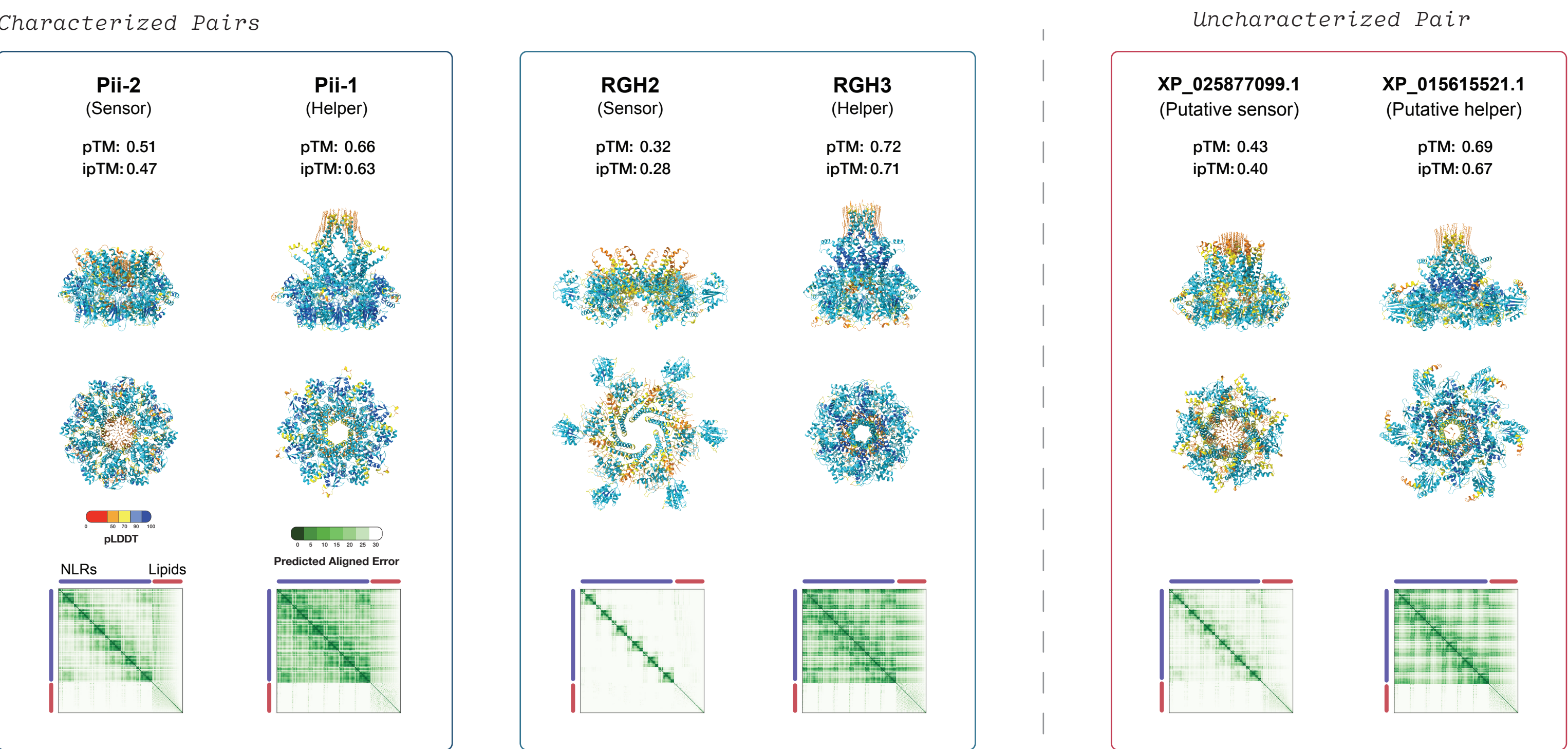


2 Functionally paired NLRs can be phylogenetically monophyletic or dispersed



Q Can we classify sensor and helper NLRs using unbiased AI structural modeling?

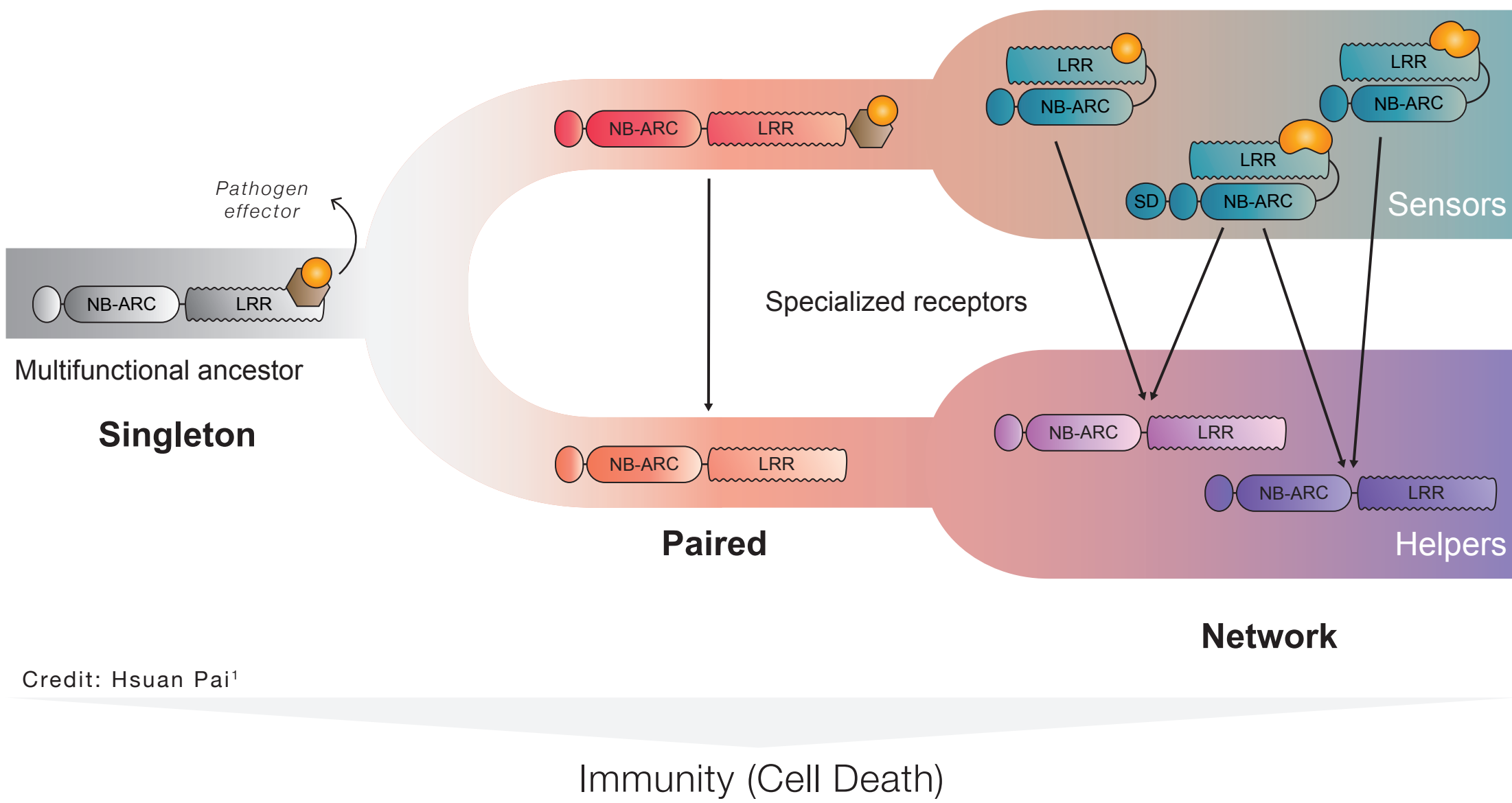
3 Helper NLRs produce higher confidence AlphaFold 3 resistosome models compared to their paired sensors⁴



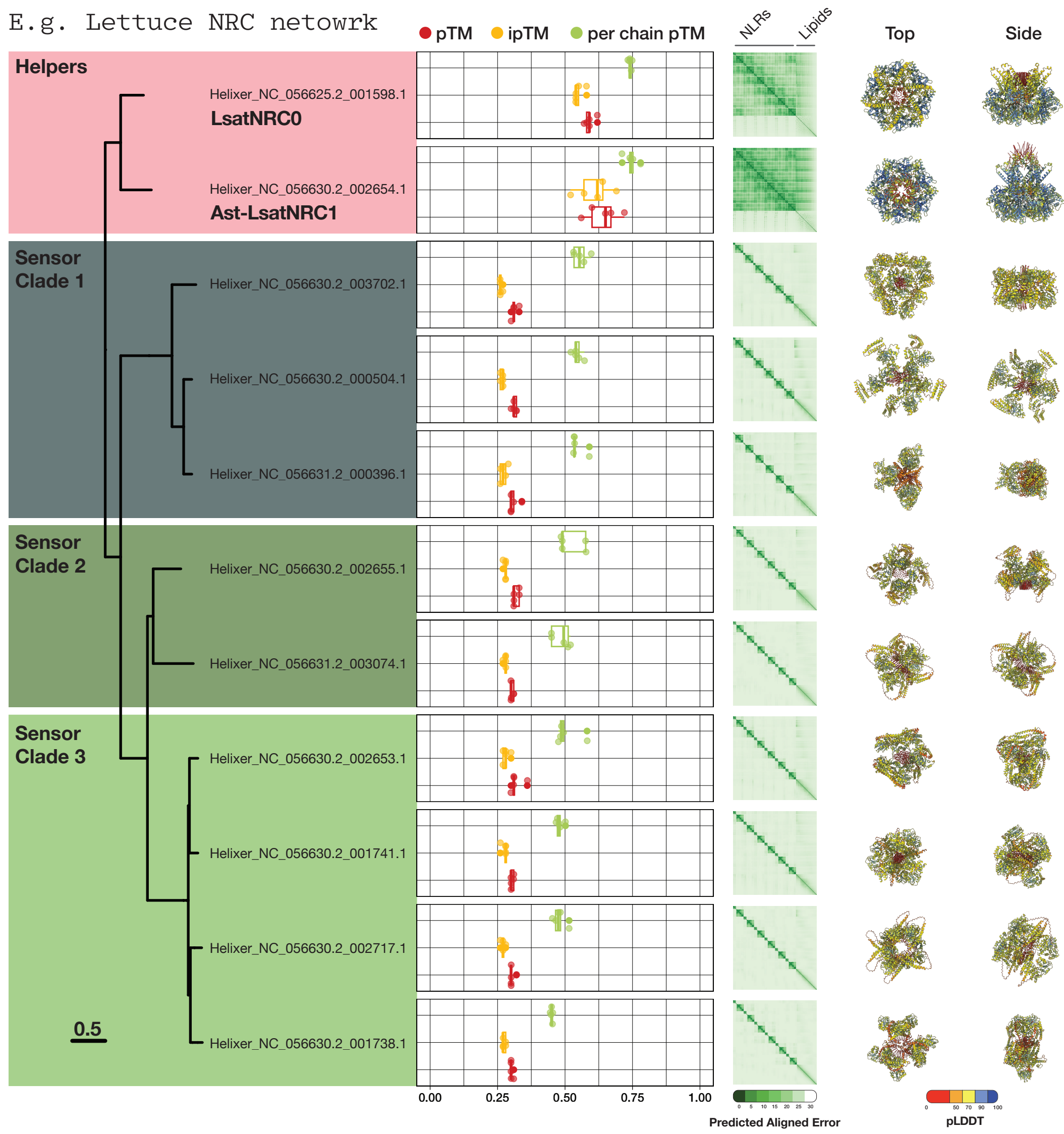
What is an NLR?

Plant nucleotide-binding domain and leucine-rich repeat (NLR) immune receptor proteins exhibit remarkable evolutionary dynamics, co-evolving in an arms race with rapidly adapting pathogens¹. They roughly comprise 1% of plant proteins².

NLRs can function in diverse configurations, including singletons, pairs, and intricate hierarchical networks, to effectively recognize and combat invading threats¹. In NLR pairs and networks sensor NLRs detect pathogen secreted effectors but require helper NLRs for immune signaling. Upon activation, singleton and helper NLRs oligomerize, insert into the plasma membrane, and act as calcium channels.¹



4 In NLR networks helpers produce higher confidence models compared to sensors⁷



Perspective

AI modeling of protein structures as a gene functional phenotyping approach?

Further reading:

1. Contreras et al., 2023, PMID: 37602936
2. Toghani et al., 2024, Zenodo
3. Contreras et al., 2023, PMID: 36579501
4. Toghani et al., 2024, bioRxiv
5. Białas et al., 2018, PMID: 29144205
6. Brabham et., 2018, bioRxiv
7. Pai et al., 2025, bioRxiv

Funding



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Our NLR datasets

