Summary

Understanding the processes that generate and maintain biodiversity in tropical Asia remains a central goal of evolutionary biology and biogeography. This thesis investigates the evolutionary history, biogeographic origins, and diversification patterns of Indian representatives of the skink genus *Sphenomorphus*, using an integrative framework combining multilocus phylogenetics, divergence dating, historical biogeography, phylogeography, and ecological niche modelling.

Phylogenetic and biogeographic analyses demonstrate that the contemporary distribution of *Sphenomorphus* in India is best explained by multiple independent dispersal events from Southeast Asia rather than Gondwanan vicariance. In particular, the peninsular Indian endemic *Sphenomorphus dussumieri* is recovered as sister to Sundaic lineages, with divergence dating and ancestral range reconstructions supporting a transoceanic dispersal from the Sunda Shelf into peninsular India during the early Miocene. These findings challenge long-standing assumptions regarding the biogeographic isolation of peninsular Indian reptile faunas and highlight the importance of overseas dispersal in shaping South Asian biodiversity.

Detailed taxonomic and phylogeographic analyses of *Sphenomorphus maculatus* reveal that this nominal species represents a complex of multiple deeply divergent lineages across Northeast India and adjoining regions of tropical Asia. The designation of a neotype from Guwahati stabilises the nomenclature of *S. maculatus* sensu stricto, while molecular and morphological evidence indicates extensive cryptic diversity within the complex. Major phylogeographic breaks correspond broadly with river basins and mountain systems, although evidence of secondary contact and genetic admixture suggests a dynamic history of isolation and reconnection, likely driven by Pleistocene climatic fluctuations.

A comparative phylogeographic analysis of *S. maculatus* and the elevationally restricted *Sphenomorphus indicus* reveals strikingly different responses to the same landscape features. While the lowland *S. maculatus* exhibits relatively shallow genetic structure and signatures of admixture, *S. indicus* shows

deeper lineage divergence and stronger spatial structuring, consistent with isolation across montane “sky islands”. Ecological niche modelling further supports these findings by demonstrating significant differences in realised climatic niches between the two species, indicating that elevational preference plays a key role in mediating diversification processes.

Overall, this thesis demonstrates that Indian *Sphenomorphus* diversity is shaped by a combination of long-distance dispersal, complex landscape evolution, and species-specific ecological traits. These results underscore the importance of integrating phylogenetics, biogeography, and ecology to understand tropical diversification and provide a robust framework for future taxonomic revision and genomic investigation of Asian skinks.