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## A missing geographic link in the distribution of the genus *Echinotriton* (Caudata: Salamandridae) with description of a new species from southern China

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### Abstract

Disjunct geographic distribution of a species or a group of species is the product of long-term interaction between organisms and the environment. Filling the distributional gap by discovery of a new population or a species has significant biogeographic implications, because it suggests a much wider past distribution and provides evidence for the route of range expansion/contraction. The salamandrid genus *Echinotriton* (commonly known as spiny salamanders, spiny newts, or crocodile newts) has two species that are restricted to two widely separated areas, one in eastern Zhejiang province, China and the other in the Ryukyu Archipelago of Japan. It has been hypothesized that *Echinotriton* was once continuously distributed between the two areas through a historical land bridge that connected mainland China, Taiwan, and the archipelago. Finding fossils or relic populations along the postulated distribution are strong evidence for the hypothesis. Hundred-twenty-two years after the description of *E. andersoni* and eight-one years after that of *E. chinhaiensis*, we discover a third species of *Echinotriton* in southern China, which fills the distributional gap of the former two species. Species status of the new species is confirmed through molecular phylogenetic analysis and morphological comparison. Mitochondrial DNA indicates that the new species is sister to *E. chinhaiensis*, while nuclear DNA does not support this relationship. The new species has a very large quadrate projection, a single line of lateral warts pierced by distal rib extremities, normally developed 5th toes, and conical skin tubercles. Our discovery supports the hypothesis that there was a continuous distribution of *Echinotriton* from eastern coastal China to the Ryukyu Archipelago. We suggest that other species of this genus may also be found in Taiwan. Due to the rarity of this new species, we urge all hobbyists to refrain themselves from collecting this salamander or leaking locality information if encountered, and boycott any trading.

**Key words:** Amphibians, salamanders, endangered species, East Asia, molecular phylogenetics, statistical species delimitation

### Introduction

Phylogeneticists and taxonomists are fascinated by disjunct geographic distributions of a species or a group of species and attempt to understand the underlying mechanisms that produce the observed spatial arrangement. In some cases, the disjunction resulted from imperfect taxonomy, which may recognize distantly distributed, unrelated species as conspecific due to similar morphology (e.g., Wu *et al.* 2010a). But under other circumstances, the disjunction indeed reflects the evolutionary history of how organisms respond to intrinsic and extrinsic changes (e.g., population expansion/contraction, geological events, and climate change). Therefore, discovery of a previously unknown population or a species that connects isolated ranges has important biogeographic implications. This provides direct evidence of a once continuous distribution and informs biologists how different

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