

## Molecular Phylogeny of Insular Endemics of *Pittosporum* (*Pittosporaceae*) on the Ogasawara Islands

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The Ogasawara Islands are oceanic islands that harbor a unique flora with many endemic taxa. Four endemic species of *Pittosporum* inhabit the islands: *P. boninense* Koidz., *P. beecheyi* Tuyama, *P. chichijimense* Nakai ex Tuyama, and *P. parvifolium* Hayata. Each species has been considered to have rapidly diverged within the islands. To investigate this issue, we assessed the phylogenetic relationships among 55 species of *Pittosporum*, including the four Ogasawara endemics and their close relatives occurring in Japan and other countries, based on nuclear ribosomal internal transcribed spacer (ITS) sequences. The four endemics formed a robust monophyletic group, and their sister groups in East Asia consist of *P. tobira* (Thunb.) W. T. Aiton, *P. illicioides* Makino, and *P. glabratum* Lindl. ITS sequence differentiation among the four endemics was quite low. These findings suggest their recent and rapid speciation, derived from a single ancestor.

**Key words:** Endemic species, island flora, ITS, oceanic islands, Ogasawara Islands, phylogeny, *Pittosporum*, speciation.

Oceanic islands, which are topographies originating from submarine volcanic activity and/or coral reef building, are isolated from the surrounding continents by ocean. Therefore, oceanic islands tend to harbor unique flora, including insular endemics and have long been regarded as suitable arenas for examining the processes of organism evolution (e.g., Wallace 1880, Carlquist 1974, Losos and Ricklefs 2009, Takayama et al. 2018). Several previous studies have reported that endemic plant species on oceanic islands have experienced recent and rapid adaptive radiation originating from a single ancestral species on the island, resulting in low genetic differentiation among insular descendants, whereas their morphological

characteristics are clear enough to distinguish them from each other [e.g., silversword alliance in the Hawaiian Islands (Keck 1936, Carr et al. 1996), *Echium* L. in the Canary Islands (Böhle et al. 1996), *Scalesia* Arn. in the Galápagos Islands (Wiggins and Porter 1971, Blaschke and Sanders 2009), and *Robinsonia* Scop. (Skottsberg 1922) and *Dendroseris* D. Don (Sang et al. 1994) in the Juan Fernández Islands].

The Ogasawara Islands, an archipelago located in the northwest Pacific Ocean, ~1000 km south of Tokyo, Japan, consist of approximately 30 oceanic islands scattered between 26°30'–27°40'N and 142°00'–142°15'E (Fig. 1). Although the area of each island is small (the biggest island, Chichi-jima, is ca.

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#### 川喜多遥菜, 瀬戸口浩彰：小笠原諸島に固有のトベラ属 (トベラ科) 4種における分子系統解析

小笠原諸島は多くの固有種が生育する海洋島であり、シロトベラ *Pittosporum boninense* Koidz., ハハジマトベラ *P. beecheyi* Tuyama, オオミトベラ *P. chichijimense* Nakai ex Tuyama, コバトベラ *P. parvifolium* Hayata の4種のトベラ科トベラ属固有種が生育する。これら4種は小笠原諸島内において共通祖先から急速な種分化を経たと考えられてきたが、その系統関係は不明であった。本研究では、小笠原産固有4種と日本産2種、ITS領域の塩基配列情報が入手可能な外国産の種を含めた計56種

のトベラ属植物を対象にして系統解析を行った。その結果、小笠原産固有4種は単系統群であることが高い支持率で確認され、姉妹群にはトベラ *P. tobira* (Thunb.) W. T. Aiton, コヤスノキ *P. illicioides* Makino, *P. glabratum* Lindl. が該当した。また、固有4種間のITS領域における多様度は低く、4種が東アジアからの単一祖先種に由来し、諸島内で最近、急速に種分化したことが示唆された。

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