

The Relationships of Four Species of New Zealand Passerine Birds

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Received 20 April 1986, accepted 2 July 1986

The long isolation of New Zealand from other large land masses has produced many endemic organisms, and has permitted the survival of some that have become extinct elsewhere. Among the endemics are four species of small passerines which, for many years, have been assigned to the genera *Finschia*, *Mohoua* and *Bowdleria*.

The Brown Creeper *Finschia novaeseelandiae*, and the two species of *Mohoua*, the Whitehead *M. albicilla* and the Yellowhead *M. ochrocephala*, are forest-dwellers. The Fernbird *Bowdleria punctata* lives in reed and sedge swamps and fernlands.

Taxonomic history of *Mohoua* and *Finschia*

Mohoua and *Finschia* have been placed in various families, including the Paridae, Timaliidae, Sylviidae, Muscicapidae, Campephagidae and Pachycephalidae. Gray (1845) placed the Yellowhead, Whitehead and Brown Creeper together in the genus *Certhiparus* of Lafresnaye (type species = *Frinilla albicilla* Lesson). Sundevall (1872, transl. Nicholson 1889, p. 56) included them under *Clitonyx* (of Reichenbach, a synonym of *Mohoua*) in his 'Fam. 13. Crateropodinae [sic]', a group that included 'Thrush-like birds often of small size ...' mostly from Africa (e.g., *Chuetops*, *Cossypha*, *Parisoma*) but also '*Drymoedus*' (= *Drymodes*) of Australia. This heterogeneous cluster was a unit in his 'Cohort 1. CICHLOMORPHAE', which included the thrushes, Australian warblers (*Acanthiza*, *Malurus*), babblers, wrens, mockingbirds and various other genera.

Buller (1882) assigned the Yellowhead and Whitehead to *Orthonyx* and placed them in the 'CERTHIADAE [sic]. Creepers' with the New Zealand wrens, *Xenicus* and *Acanthisitta* (= *Acanthisittidae*). The Brown Creeper was placed in the 'LUSCINIDAE. Warblers' as *Certhiparus novae-zealandiae*. Buller (p. 21) noted that the Brown Creeper 'like the members of the allied group, *Orthonyx*, ... is a gregarious species, associating together in small flocks, and hunting diligently for its insect food among the branches and dense foliage of the forest undergrowth.'

Forbes (1882) examined the syrinx, carotid arteries and other characters of *Orthonyx spinicauda* (= *temminckii*), the Southern Logrunner of Australia, and of '*Orthonyx ochrocephala*' (= *Mohoua ochrocephala*). He concluded that the 'examination of ... these two birds has convinced me that the two forms are not really congeneric ...'. Forbes described the differences and noted that 'it seems that *Clitonyx* of Reichenbach will be the correct generic term for the New-Zealand birds, as Lesson's name *Mohoua*, though of prior application, is not only barbarous but, what is more important, liable to be confounded with *Mohoa* [sic], also a genus of Passeres from the Pacific Subregion [= *Moho*]. ... it is impossible for me to point out clearly any definite position either for *Orthonyx* or *Clitonyx*, though both forms might, I apprehend, be safely placed in Mr. Sharpe's somewhat vaguely-defined "Timaliidae".'

Gadow (1883, p. 75) included *Mohoua* and *Finschia* in the Paridae as the only members of *Certhiparus*, with '*novae zealandiae*' between '*albicillus*' and '*ochrocephalus*'.

Sharpe (1903, p. 1) placed the two species of *Mohoua* in *Clitonyx*, as the first genus in the Crateropodinae of the Timaliidae, but *Finschia* was left in the Paridae as *Certhiparus novae-seelandiae* (p. 342).

Mathews (1930, p. 554) listed the three species at the end of the Campephagidae as *Mohoua ochrocephala*, *Certhiparus albicilla* and *Finschia novaeseelandiae*, followed by the Orthonychidae containing the logrunners.

Mayr & Amadon (1951) assigned *Finschia* and *Mohoua* to the Malurinae of the Muscicapidae and Fleming (1953) followed them.

Oliver (1955) placed the Whitehead, Yellowhead, Brown Creeper and Fernbird in the Sylviidae as the only members of the family in New Zealand.

Falla *et al.* (1967, 1979) placed *Finschia* and *Mohoua* in the Malurinae of the Sylviidae. Kinsky (1970) followed Mayr & Amadon (1951) and Fleming (1953) by assigning

Finschia and *Mohoua* to the Malurinae of the Muscicapidae. Keast (1976, p. 519) assigned *Mohoua* and *Finschia* to the Mohouinae of the Sylviidae as 'an endemic New Zealand group of "old Australian" origin.' He noted (p. 521) that 'amongst the higher categories [the bills] of the Mohouinae are slightly, but consistently, distinct.'

Later, Keast (1977) decided that *Finschia* and *Mohoua* are actually 'members of an old Australian pachycephaline-warbler-flycatcher lineage.' He based this conclusion primarily on the morphology of the maxilla, shape of the nostril, colour pattern and nest shape.

Wolters (1975-1982, p. 399-400) placed *Mohoua* and *Finschia* in the Mohouinae of the Pachycephalidae, apparently following Keast (1977). Fleming (1982) also accepted a close relationship between *Mohoua* and *Finschia*.

Taxonomic history of the Fernbird

The taxonomic history of the Fernbird has been more stable than those of *Mohoua* and *Finschia*. Gray (1869, p. 206) placed the Fernbird in the family Luscinidae as *Megalurus punctatus*, subgenus *Sphenoeacus*. Several subsequent authors have listed the Fernbird under one of these generic names.

Buller (1882) included the Fernbird '*Sphenoeacus punctatus*' in the 'LUSCINIDAE. Warblers' with the Brown Creeper '*Certhiparus*', and the genera *Gerygone*, *Petroeca* [sic] (= *Petroica*), and '*Anthus novae-zealandiae*', the New Zealand Pipit.

Sharpe (1883, p. 97) assigned *Sphenoeacus punctatus* to the Timaliidae. In 1903, Sharpe (p. 28) recognised the genus *Bowdleria* for the Fernbird, which had been dedicated to him by Rothschild (1896, p. 539). Sharpe retained *Bowdleria punctata* in the Timaliidae.

Mathews (1930, p. 571) recognised the family Bowdleridae in which he placed *Bowdleria*, *Malia*, *Vitia*, *Ifrita*, *Crateroscelis*, *Lamprolia* and several other genera of uncertain affinities.

Oliver (1955 p. 463) placed *Bowdleria* in the Sylviidae and noted that 'The New Zealand fernbirds were said by Sharpe to be aberrant warblers, but they differ from the true Sylviidae in the short wings and longer first primary. They are possibly related to the grassbird (*Megalurus*) of Australia.'

Falla *et al.* (1967, 1979) placed the Fernbird in the Sylviinae of the Sylviidae, but Kinsky (1970) assigned it to the Sylviinae of the Muscicapidae.

Wolters (1975-1982, p. 370) synonymised *Bowdleria*

with *Megalurus*, and placed *Megalurus punctatus* in the Sylviidae. Fleming (1982) accepted Oliver's (1955) suggestion that the Fernbird is related to *Megalurus*.

Results and discussion

We have used the technique of DNA-DNA hybridisation to compare the single-copy DNAs of *Mohoua albicilla* and *Finschia punctata* with one another, and with those of a large number of species representing all groups of Australian passerines and representatives of Eurasian families. Sibley & Ahlquist (1983, 1985) describe the technique, the tentative dating calibration in absolute time, and the construction of a classification from the phylogeny inferred from DNA-DNA hybridisation comparisons.

Our data show that *Mohoua* and *Finschia* are close relatives (Fig. 1). The average of 10 comparisons (five in each direction) is delta $T_{50}H$ 1.75, indicating a divergence time of c. 7.9 million years ago (mya).

Our data also show that Keast (1977) was correct when he identified the pachycephalines as the closest relatives of

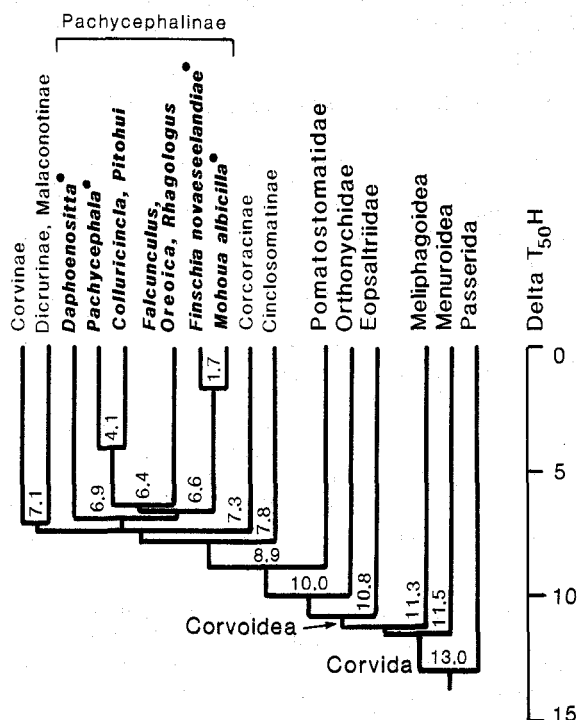


FIGURE 1. Phylogeny of some groups of Australasian passerines. Numbers on divergence needs, e.g. 11.3, are average Delta $T_{50}H$ values. The single-copy DNAs of the taxa followed by black dots, e.g. *Mohoua albicilla*, were used as radio-labelled 'tracers' in this study.

Mohoua and *Finschia*. The average delta value for six DNA-DNA hybrids between the tracer DNA of *M. albicilla*, and the driver DNAs of six species of pachycephalines, is delta $T_{50}H$ 6.5 ± 0.1 standard error (s.e.), ± 0.3 standard deviation (s.d.). For six comparisons between the tracer DNA of *Finschia* and six species of pachycephalines, the average delta $T_{50}H$ is 6.6 ± 0.1 s.e., ± 0.3 s.d. The pachycephaline genera used in these comparisons were *Oreoica*, *Falcunculus*, *Rhagologus*, *Colluricincla*, and *Pachycephala*. The divergence between the Pachycephalini and the Mohouini was c. 29-30 mya.

After the Pachycephalini, the Dicrurini (including *Monarcha*, *Arses*, *Rhipidura*, *Philentoma*, *Metabolus*) are the next nearest relatives of *Mohoua* and *Finschia*. Six comparisons were made between the tracer DNA of *M. albicilla* and six species of the genera listed above; average delta $T_{50}H$ 7.1 ± 0.03 s.e., ± 0.08 s.d. For six comparisons between the tracer DNA of *Finschia* and six species of dicrurines the values are 7.3 ± 0.07 s.e., ± 0.16 s.d. The pachycephaline-dicrurine branch probably occurred c. 32-34 mya.

We now know that the pachycephalines are members of an old endemic Australo-Papuan cluster that is not closely related to the sylviids or muscicapids (Sibley & Ahlquist 1985).

The close relationship between *Mohoua* and *Finschia* meets the criteria we have used for congeneric species, namely, up to delta $T_{50}H$ 2.2. We therefore propose that the two genera be merged in *Mohoua*, which has priority.

The delta values between *Mohoua* and the other members of the Pachycephalinae, 6.6, 6.7, meet the criteria we have used for the tribal level. We therefore assign *Mohoua* to the tribe Mohouini, subfamily Pachycephalinae, family Corvidae.

The single-copy tracer DNA of the Fernbird was hybridised with the driver DNAs of a wide array of passerines, including representatives of the six superfamilies we have recognised from previous DNA-DNA comparisons (Sibley & Ahlquist 1985). The average delta $T_{50}H$ for two comparisons between the Fernbird and the Little Grassbird *Megalurus gramineus* is 1.1 (Fig. 2), a congeneric relationship. We therefore recommend that *Bowdleria* be synonymised with *Megalurus*. The Fernbird *Megalurus punctatus* is delta $T_{50}H$ 1.9 from the Spinifexbird *Eremiornis carteri*, 2.9 from the Brown Songlark *Cinchoramphus cruralis*, and 3.0 from the Rufous Songlark *C. mathewsi*, of Australia. These genera are members of the subfamily Megalurinae of the Sylviidae. The average delta $T_{50}H$ between the Fernbird tracer DNA and the driver DNAs of two species of *Sylvia* is 8.35; for two species of *Phylloscopus* it is 8.9. See Sibley & Ahlquist (1985, p. 4-5) for the classification and phylogeny of the Sylvioidea.

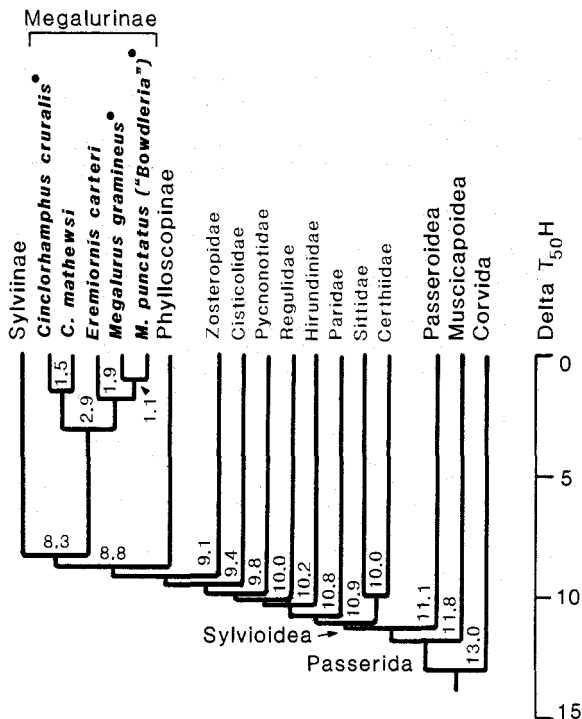


FIGURE 2. Phylogeny of some groups of Australasian passerines to show the relationships of the Fernbird *Megalurus punctatus*. See Figure 1 for explanation of symbols and numbers.

Acknowledgements

We thank L. Wallace for assistance in the laboratory and F.C. Sibley for assistance in the field. J.A. Bartle of the National Museum of New Zealand extended hospitality and assistance with the work in New Zealand. We especially appreciate the help and congenial companionship of the late Colin Roderick, and his wife Fay, during field work in New Zealand in 1983. We thank the New Zealand Wildlife Service for permission to conduct the field work.

The field work in New Zealand was supported by the National Geographic Society (Grant No. 2583-82). The laboratory work was supported by Yale University and the U.S. National Science Foundation (BSR-79-26746).

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The Lesser Melampitta is a Bird of Paradise

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Received 20 April 1986, accepted 2 July 1986

The Lesser Melampitta *Melampitta lugubris* is a small (c. 17-18 cm), long-legged oscine passerine bird that lives in dense undergrowth on the floor of the mountain forests of New Guinea. The adults are entirely black and their short, erect forecrown feathers are iridescent and plushlike, as in some birds of paradise. The immatures have rusty-brown underparts.

The Lesser Melampitta was placed in the genus *Cora-copitta* of the Pittidae by Sclater (1888, p. 449) who noted that 'Until anatomical investigations have been made, it must remain doubtful whether this type should be referred to the Pittidae or to the Timaliidae.' Sclater noted the 'short erect frontal plumes' but did not link this species to the

birds of paradise. Sharpe (1901, p. 185) also included the Lesser Melampitta in the Pittidae, with a footnote: 'Count Salvadori tells me that, in his opinion, this genus [*Melampitta*] belongs rather to the Timaliidae than to the Pittidae.' The oscine relationships of *Melampitta lugubris* were established by Mayr (1931) from a study of the syrinx. He concluded that *Melampitta* is a timaliid, possibly related to *Crateroscelis* and *Amalocichla*. Mayr noted differences and similarities between *Melampitta lugubris* and the Greater Melampitta *M. gigantea*, and concluded that the two species are related. Mayr (1941, p. 108) placed *lugubris* and *gigantea* in the Timaliinae of the Muscicapidae, and noted that *gigantea*, 'In spite of its lengthened tail . . . is clearly congeneric with *lugubris*.' Rand & Gilliard (1968,