THE RELATIONSHIPS OF THE PAPUAN GENUS *PELTOPS*

The genus *Peltops* is endemic to Papua New Guinea and consists of two morphologically similar species. *P. blainvillii* occurs in the lowlands up to *ca* 450 m and *P. montanus* occurs at higher elevations, from 750 to 2700 m (Diamond 1972). Both species are *ca* 17–20 cm in length, with large bills, and plumages with contrasting patterns of black, white and red. They feed on insects, captured by "flycatching" from an open perch (Rand & Gilliard 1960). Although the two species are virtually identical in plumage colour and pattern they have distinctive voices (Diamond 1972).

In most classifications *Peltops* has been placed near the monarch flycatchers in the Muscicapidae (Sharpe 1879, 1901; Mayr 1941; Rand & Gilliard 1960). Wolters (1975–82: 404) included *Peltops* in his Pachycephalidae.

We have used the technique of DNA-DNA hybridization to compare the nuclear DNA of *Peltops montanus* with the DNAs of other species of passerine birds. The data are presented in Table 1. Our DNA-DNA hybridization methods have been described in several papers, including: Sibley & Ahlquist (1981; 1982; 1983; in press a);

TABLE I

DNA-DNA hybridization values between the radioiodine-labelled single-copy DNA of the Mountain Peltops Peltops montanus *and the DNAs of other oscine passerine birds. Under Group Index CCr = Corvinae, Cracticini; CO = Corvinae, Oriolini; C? = Corvidae?; CM = Corvidae, Monarchinae; CPar = Corvidae, Paradisaeini; CPy = Corvidae, Pachycephalini; CCin = Corvidae, Cinclosomatinae; CE = Corvoidea, Eopsaltriidae; MA = Meliphagoidea, Acanthizidae; MPt = Menuroidea, Ptilonorhynchidae. Numbers in parentheses indicate that more than one DNA-DNA hybrid was averaged.*

Common Name	Scientific Name	Delta $T_{50}H$	Group Index
Mountain Peltops	*Peltops montanus*	0.0	CCr
Grey Currawong	*Strepera versicolor*	3.4	CCr
Pied Currawong	*Strepera graculina*	3.5	CCr
Black Butcherbird	*Cracticus quoyi*	3.5	CCr
Australian Magpie	*Gymnorhina tibicen (2)*	3.7	CCr
Bornean Bristlehead	*Pityriasis gymnocephala (3)*	4.4	CCr
Black-faced Woodswallow	*Artamus cinereus*	5.1	CCr
Dusky Woodswallow	*Artamus cyanopterus*	5.2	CCr
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	5.2	CO
White-bellied Cuckoo-shrike	*Coracina papuensis*	5.2	CO
Black-and-Crimson Oriole	*Oriolus cruentus*	5.2	CO
Small Minivet	*Pericrocotus cinnamomeus*	5.2	CO
Purple-throated Cuckoo-shrike	*Campephaga quisculina*	5.3	CO
White-winged Triller	*Lalage sueurii*	5.4	CO
Green Figbird	*Sphecotheres viridis*	5.4	CO
African Graybird	*Coracina caesia*	5.5	CO
Black-naped Oriole	*Oriolus chinensis*	5.5	CO
Olive-backed Oriole	*Oriolus sagittatus*	5.8	CO
Large Woodshrike	*Tephrodornis gularis*	5.8	CO
Common Woodshrike	*Tephrodornis pondicerianus*	5.8	CO
Pied Triller	*Lalage nigra*	5.9	CO
Rosy-patched Shrike	*Malaconotus cruentus*	6.0	C?
Brown-headed Bush-Shrike	*Tchagra australis*	6.0	C?
African Drongo	*Dicrurus adsimilis*	6.1	CM
Greater Racket-tailed Drongo	*Dicrurus paradiseus*	6.1	CM
Islet Monarch	*Monarcha cinerascens*	6.1	CM
Australian Magpie-lark	*Grallina cyanoleuca*	6.3	CM
Black-faced Monarch	*Monarcha melanopsis*	6.3	CM
Shining Flycatcher	*Myiagra alecto*	6.4	CM
King of Saxony Bird of Paradise	*Pteridophora alberti*	6.4	CPar
Black-headed Gonolek	*Laniarius barbarus*	6.5	C?
Rufous Fantail	*Rhipidura rufifrons*	6.6	CM
Rufous Whistler	*Pachycephala rufiventris*	6.6	CPy
Rusty Pitohui	*Pitohui ferrugineus*	6.8	CPy
Straight-crested Helmet-Shrike	*Prionops plumata*	7.1	C?
Great Grey Shrike	*Lanius excubitor*	7.4	C?
Cinnamon Quail-thrush	*Cinclosoma cinnamomeum*	7.6	CCin
White-eyed Vireo	*Vireo griseus*	7.9	C?
Long-tailed Shrike	*Corvinella corvina*	8.4	C?
Fan-tailed Berrypecker	*Melanocharis versteri*	8.8	C?
White-faced Robin	*Tregellasia leucops*	10.5	CE
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	10.9	MA
Great Bowerbird	*Chlamydera nuchalis*	10.9	MPt

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Sibley *et al.* (1982). The delta $T_{50}H$ values are measures of the average amount of genetic difference between the lineages represented by the two species composing a DNA-DNA hybrid. It is also clear that the *same average rate* of DNA evolution occurs in all lineages of birds. Thus the delta $T_{50}H$ values are proportional to the time since the divergence of the two lineages represented by the species forming a DNA-DNA hybrid. From a preliminary calibration of delta $T_{50}H$ values against absolute time we estimate that each delta $T_{50}H$ 1.0 = 4–4.5 million years (MY) since the lineages diverged from their most recent common ancestor. The absolute time calibration is tentative and subject to correction as better datings of divergence events are obtained. However, the delta $T_{50}H$ values are valid indices to *relative* times of divergence and may, therefore, be used to reconstruct the branching pattern of a phylogeny.

The experimental error for a single DNA-DNA hybrid is up to ± 1.0 delta $T_{50}H$. To compensate for this error we use several species in each group, whenever available, or several replicates if only one species is available. We then calculate an average delta $T_{50}H$ value for each divergence node.

RESULTS AND DISCUSSION

The data in Table I indicate that the closest relatives of *Peltops montanus* are the cracticine genera *Strepera, Cracticus, Gymnorhina, Pityriasis,* and *Artamus*. The relationships of *Pityriasis* have been shown to be with the Cracticini by Ahlquist *et al.* (1984). Our Tribe Cracticini includes the Cracticidae and Artamidae of many authors.

The genealogical distances between *Peltops* and the other taxa in Table I are proportional to the delta $T_{50}H$ values. However, the relationships *among* the other taxa in Table I cannot be determined from this single set of data. The complete phylogeny of any assemblage can be reconstructed only from a matrix composed of many such data sets in each of which a different group is represented by the radio-labelled taxon. We have made such DNA comparisons for all but three of the *ca* 70 traditional "families" of living passerine birds. This study (Sibley and Ahlquist, in press a) is based on *ca* 10,000 DNA-DNA hybrids in which the DNAs of 800 species of passerines were used. More than 150 species were "labelled" and used as "tracers", in the same way that *Peltops* was used to produce the data in Table I. The DNA-based classification of the Australo-Papuan passerines has been extracted from the worldwide study and is presented in Sibley and Ahlquist (in press b).

Dr Thomas R. Howell (pers. comm.) has compared the skulls of the cracticine genera *Cracticus, Gymnorhina, Strepera,* and *Artamus* with those of many other oscines. At our suggestion, he included *Peltops* in his study and found that " The skull of *Peltops* has all the cracticine characteristics and does not resemble that of a muscicapine or monarchine flycatcher. . . .*Peltops* seems definitely to be a cracticine." In particular, Dr Howell found that the cracticines listed above and *Peltops*, share a derived condition of the zygomatic process of the squamosal which is "elongate and double, forming a two-pronged structure like the two tines of a carving fork." McEvey (1976) also discussed the occurrence of the bifurcated zygomatic process in the cracticines.

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POLYGAMY IN THE SPECKLED WARBLER *SERICORNIS SAGITTATUS*

Rowley (1976) listed the Speckled Warbler *Sericornis sagittatus* as a communal breeder on the basis of an observation by McGill (1970) who saw four Speckled Warblers feeding a fledgling Black-eared Cuckoo *Chrysococcyx osculans*. Various texts describe Speckled Warblers as occurring in pairs or small groups (e.g. McGill 1970; Frith 1976, 1979).

At Wollomombi, near Armidale, NSW, R.A. Noske and I colour-banded thirty Speckled Warblers between 1977 and 1981, and observation of these birds gave some indications of their social organization. Table I shows the size of parties of Speckled Warblers observed in mixed-species feeding flocks. In most cases only a single pair was observed. From observations and retraps each pair appeared to have a home range of about 8 ha. Of twenty-eight parties of three birds, individuals in thirteen parties were identified. Three of these parties were of one male and two females and ten were of one or more adults with known young of the year.

TABLE I

Size of parties of Speckled Warblers observed in mixed-species flocks at Wollomombi 1978–81.

No. of birds in party	1	2	3	4	5	6	7
No. of parties	18	103	28	14	24	2	1

In about half the parties of four or five birds, the individuals were identified and these parties were of a pair of adults with attendant young of the year. The three occasions where there were more than five birds each involved two separate families of adults and their young foraging together. Of three familes in which both parents and all young were colour-banded the young birds stayed with the parents until mid- or late winter. One clutch that fledged in October and another that fledged in February were seen with their parents in the following June, and another that fledged in January remained with their parents until July. This suggests that young of the year dispersed just prior to the breeding season in the following spring.

Table II suggests that annual mortality is high. There was no significant difference by χ^2 test between the survival of the twelve known fledglings and the eighteen birds presumed to be adults at time of banding. Apart from 1982, when observation was much less frequent, the annual loss is surprisingly regular considering the extreme drought of 1979–80. No grasses set seed during the two consecutive autumns of 1979–80. Although Frith (1976) describes the diet of Speckled Warblers as insects and a few seeds, stomach samples from both Wollomombi and from Eastwood State Forest nearby (H.A. Ford, pers. comm.) show that seeds are a very important part of the diet of Speckled Warblers.

On 20 September 1978 a nest with three eggs was found, attended by male BLUE/WHITE and female BLACK/BLUE. These birds, banded in late 1977, were seen foraging together in July 1978. All eggs hatched and both sexes shared equally in feeding the nestlings (n: male 29, female 32) and fledglings (n: male 17, female 15). By November, however, while female BLACK/BLUE was still accompanying the colour-banded young, male BLUE/WHITE was associating with another female, GREEN/RED. On 9 February 1979, male BLUE/WHITE and female GREEN/RED were found attending a nest with three young, located 200 m from the first nest. Once again, both sexes seemed to share equally in feeding the nestlings (n: male 7, female 9). The nestlings were colour-banded and fledged on the following day.

On 13 February 1979 both the colour-banded young and female (BLACK/BLUE) of the first nest came close to the colour-banded young and parents (BLUE/WHITE and GREEN/RED) of the second nest. Female GREEN/RED, mother of the second nest, fed MAGENTA/WHITE, a young bird of the first nest, and MAGENTA/ORANGE, one of its own young. The two family

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