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MELAMPITTA GIGANTEA: POSSIBLE RELATION BETWEEN FEATHER STRUCTURE AND UNDERGROUND ROOSTING HABITS

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The Greater Melampitta (*Melampitta gigantea*) is one of the least known and apparently rarest New Guinea birds. No field observations at all have been reported for it. Only six specimens are known, from four far-flung areas of New Guinea, and records of only four of these specimens have been published. The apparent rareness of this species contrasts with the relative abundance of its only congener, the Lesser Melampitta (*M. lugubris*) of the New Guinea highlands. These two species were formerly considered babblers (Timaliidae), but are now assigned to the family Orthonychidae (log-runners), along with 15 other species that formerly were also usually considered to be babblers (14 other species in New Guinea or Australia or both, and 1 species in Malaya and the Greater Sunda Islands).

Between 25 February and 3 March 1981, I found the Greater Melampitta to be common at a new locality, the Fakfak Mountains of northwestern New Guinea. I discovered its peculiar habitat preference and roost, recorded its voice, and obtained a second-hand account of its nest. The habitat preference helps explain why this species has been rarely encountered before. As background to my observations, I first review data on the six known specimens.

SPECIMENS

My observations and all specimens are from the mountains of New Guinea (Fig. 1). The stated altitudes of the specimens are between 760 and 1,070 m (originally given as 2,500 to 3,500 ft). In the Fakfak Mountains I found *M. gigantea* from 785 m up to the highest elevation that I reached (1,240 m). For two reasons I believe that 785 m approximates its lower limit in the Fakfak Mountains: I did not hear the conspicuous call there during nine days spent in otherwise similar habitat at 625–725 m; and numerous people resident at Wanggasten village (625 m) and familiar with the bird said that it was restricted to elevations higher than that of the village.

I have examined four of the six known specimens, and am indebted to Derek Goodwin for descriptions of the remaining two (specimens 3 and 7; see legend of Fig. 1 for coding of specimens by number). Table 1 compares measurements and plumage for the six specimens of *M. gigantea* and for *M. lugubris*. As noted by Rothschild and Hartert (1913), the specimens of *M. gigantea* differ considerably from each other, and it is uncertain what variation is due to sex, age, or geography. Three specimens are entirely black, while the other three have in addition variable amounts of brown. Since immature *M. lugubris* are brown in the same parts of the body, and since specimen 1 of *M. gigantea* has a few black feathers in the brown area, the brown may be characteristic of immature birds. The pattern of specimens 5 and 7 resembles that of the Black-headed Pitohui (*Pitohui dichrous*), a nuclear species of mixed-species foraging flocks in the habitat occupied by *M. gigantea*. The differences in tail length of the specimens (107 to 140 mm) may be partly due to wear, because the shortest tails are greatly worn and the longest tails are fresh. The bill is black, the iris dark brown, the legs black and stout.

It has not been previously noticed that the rachis (but not the barbs) is stiffened in both the remiges and rectrices of the Greater Melampitta. In addition, comparison of the specimens shows that these feathers are subject to marked and asymmetrical wear. The remiges and rectrices are new in specimens 2 and 3, worn in specimens 4 and 5, and very worn in specimens 1 and 7. The fresh feathers are broad, and the vane is loose-textured, especially at the margin. Even in fresh rectrices, the rachis projects several millimeters beyond the vane at the tip of the tail. With wear, the shafts of the rectrices become bare distally for 10 mm or more and break at the tip. The outer vanes of the rectrices wear off, leaving the tighter proximal portion of the barbs and causing the rectrices to become quite asymmetrical. The remiges wear especially on the inner vanes.

Two other peculiar features of the Greater Melampitta deserve mention. First, there is an exposed, conical, bony spur about 1 mm long at the bend of the wing just distal to the carpal joint. Second, all six specimens have the head covered with egg cases of feather mites.

Like other species of Orthonychidae, *M. gigantea* has a slender bill and short wings, but it is larger than most other members of the family. It resembles *M. lugubris* in its black adult plumage and in the brown-and-black-patterned, presumed immature plumage. It differs from *M. lugubris* in its much larger size (wing 125–143 vs. 75–95 mm, weight 205 vs. 39–49 g), stiffened and relatively much longer tail, stiffened wing, heavier and more hooked bill, and relatively shorter and more powerful legs. It is unclear to me whether these two species are closely related or merely superficially similar in their black plumage. *Melampitta lugubris* lives on the ground in mossy forest well above the elevation of *M. gigantea* (Stein 1936, Rand and Gilliard 1967, Beehler 1978).

FIELD OBSERVATIONS

My field observations of the Greater Melampitta were in karst terrain covered by forest and with abundant limestone sinkholes and cliffs. The sinkholes were of two kinds. Some consisted at ground level of holes typically about 1 m in diameter and at least 30 m deep, as estimated from the time to first hearing the impact sound of a stone dropped into the opening. Others consisted of long, narrow, rock trenches 1 to 2 m wide, 5 to 7 m deep, and up to hundreds of meters long. Mayr (1941) and Rand and Gilliard (1967) guessed the habitat of *M. gigantea* to be hill forest along creeks, but there were no surface streams in the Fakfak Mountains within the altitudinal range occupied by this species; rain water disappeared into the limestone.

All my records of Greater Melampittas were near sinkholes. The significance of these formations to the bird was called to my attention by Wanggasten villagers, who (like many New Guinea people) possessed detailed knowledge of local birds and gave me local-language names and accurate life history accounts of over 100 bird species familiar to them. When I first heard the song that I later identified as belonging to *M. gigantea*, my guides said that it came from an all-black bird named "suaran." They described how the suaran differed in body size, bill, eye color, tail length, tail shape, and habits from other all-black birds such as the Trumpet Bird (*Phonygammus keraudrenii*), Spangled Drongo (*Dicrurus hottentottus*), and Australian Crow (*Corvus orru*). The characteristics of the suaran that all Wanggasten villagers mentioned first were that it was black, and that it roosted and nested underground in deep sinkholes.

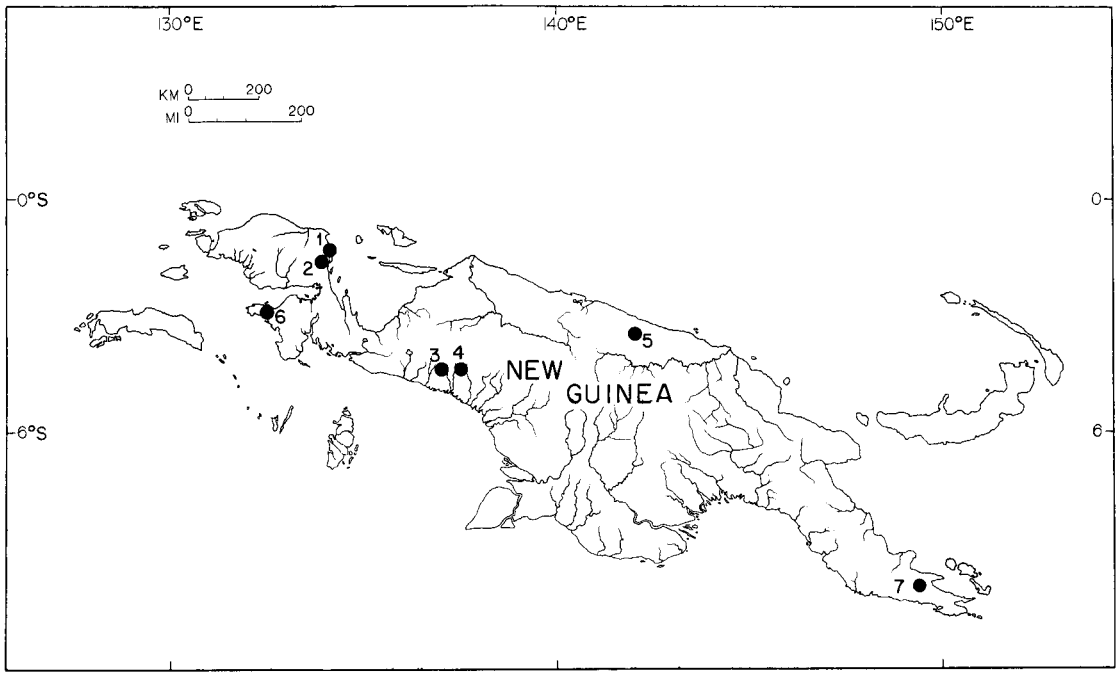

FIGURE 1. Collecting localities of the six known specimens of *Melampitta gigantea*, and my study site. (1) Mt. Moari, "3,000 ft.," Arfak Mountains; male collected January 1899 by J. M. Dumas (type, described by Rothschild 1899); in American Museum of Natural History (AMNH). (2) Siwi, unspecified altitude between 800 and 1,500 m, Arfak Mountains; male collected 15 May 1928 by E. Mayr (described by Hartert 1930); in AMNH. (3) Utakwa River, "2,500 ft.," south slope of Snow Mountains; female collected 14 December 1912 by C. B. Kloss, Wollaston Expedition (described by Ogilvie-Grant 1915); in British Museum (Natural History). (4) Setekwa River, "3,000 ft.," south slope of Snow Mountains; male collected 27 October 1910 by A. S. Meek (described by Rothschild and Hartert 1913); in AMNH. (5) Mt. Somoro, "3,500 ft.," Torricelli Mountains; female collected 24 November 1972 by A. Mirza (not previously described); in Bishop Museum (Honolulu). (6) Fakfak Mts., 785–1,240 m; my observations, 25 February–3 March 1981; no specimens collected. (7) Boneno, Mt. Mura, 50 km northwest of Mt. Simpson in the Central Dividing Range of eastern Papua; female collected 27 December 1940 (not previously described); in British Museum (Natural History).

These remarkable roosting habits were confirmed on my first sighting of this melampitta. Our high-altitude camp (1,140 m) was at the edge of a narrow, vertical-walled trench 5 m deep. At 18:15 on the first night that we occupied this camp, as light was fading and bird activity was decreasing, my Wanggasten guide and I returned to camp and began talking loudly. A large black animal scurried up the opposite-facing wall of the trench and then out of the trench along the ground into the forest. At first glance I assumed from the animal's movements that it was a rat, but I then saw that it was a Greater Melampitta. On subsequent days I found at least three individuals near our camp, and I assume that the trench behind our camp had been used as a night roost by the individual that we frightened out with our noise. An advantage of roosting in this trench, and other such holes pointed out to me by villagers as melampitta roosts, would be protection from predators, such as rats, phalangers, and dasyurid marsupials. Villagers told me that the bird also nests in these holes, and that the nest is a large suspended basket of vines.

The call, which I heard many times daily in the habitat of the Greater Melampitta, was given during the day (never at dawn, dusk, or night) from the ground or forest understory in the vicinity of a hole, while the singer remained perched stationary. It consisted of a very short, connected pair of notes, the second note at either slightly lower or slightly higher pitch than the first. The volume was loud and carrying, the quality musical and clear, and the pitch medium-high. This call was repeated monotonously and unvarying for up to several minutes at intervals of 1.3 to 4.0 s. Within a given series of calls, the interval was either constant or only slightly irregular. I heard the call both in clear weather and in the rain. Often, two birds could be heard calling simultaneously, always at least 50 m apart. I have deposited tape recordings of the call with the Cornell Laboratory of Ornithology.

In distribution and habits, the Greater Melampitta is solitary, very shy, and relatively common for a bird of its size. At our camp I heard three individuals calling simultaneously from different directions. Unlike some other New Guinea bird species, a calling *M. gigantea* never approached me when I played back a recording of its call. The bird simply continued calling until it saw me or heard me moving; the bird's response was to flee. Because of this wariness, I did not succeed in observing the bird's foraging, and can report only that it is confined to the ground and understory, perches with its body at an angle to the ground rather than horizontal, and can fly short distances.

The collecting localities of at least four of the six specimens of *M. gigantea* (specimens 1–4) are known to be in or near limestone terrain, a widespread landform in New Guinea. Because of its sharp rocks, treacherous footing, frequent obstacles of sinkholes and vertical cliffs, leech and arthropod pests, and lack of surface water, New Guinea karst is a notoriously difficult and unpleasant habitat that explorers have avoided whenever possible. The preference of *M. gigantea* for this habitat may explain why it has been thought a rare species.

TABLE 1. Measurement and plumage of the two *Melampitta* species. The six specimens of *M. gigantea* are identified by number in the legend for Figure 1. Measurements and weights of *M. lugubris* are taken from the literature.

Specimen number	Sex	Wing (mm)	Tail (mm)	Weight (g)	Plumage
M. gigantea					
1	♂	135	120	—	Largely black except: rump and upper tail-coverts rufous-brown; belly, thighs, and flanks dull brown, with scattered black feathers and scattered maroon feathers; brown of belly irregularly delineated from black of breast.
2	♂	143	140	205	Entirely black.
3	♀	133	123	—	Entirely black.
4	♂	126	115	—	Entirely black.
5	♀	128	108	—	Largely black except: lower breast and belly maroon, sharply demarcated from black of upper breast; some dark brown areas on back.
7	♀	125	107	—	Head dark blackish brown, almost black. Wing and tail similar but less dark. Upperparts dark brown with slight rufous tinge; underparts slightly lighter with much more pronounced rufous tinge. No sharp demarcations between areas of differing plumage color.
M. lugubris					
	♂	80–95	43–67	41–49	Adults entirely black. Young, brown ventrally.
	♀	75–92	44–61	39–47	

POSSIBLE RELATION BETWEEN FEATHER STRUCTURE AND HABITS

The question remains as to why the Greater Melampitta has stiffened remiges and rectrices subject to heavy wear. Two other species of Orthonychidae, the Spine-tailed Logrunner (*Orthonyx temminckii*) and Spalding's Logrunner (*O. spaldingi*), have even stiffer and spinier tails. These birds use a peculiar foraging technique of submerging themselves in copious fallen leaf litter, supporting themselves with the tail pressed on the ground, and using their legs to scatter leaves and scratch up the ground. This explanation is unlikely to apply to *Melampitta gigantea,* as that bird's habitat has very little leaf litter. I suspect that its feather structure is instead associated with its habit of roosting and nesting in deep, narrow, vertical-walled sinkholes. These sinkholes are much too deep and narrow (usually 1 m in diameter) for a short-winged bird like *M. gigantea* to exit just by flying vertically upwards. The stiffened wing and tail may serve to support the bird as it scurries up rock faces, and the feathers may become worn in this way. If this explanation proves to be correct, the Greater Melampitta is convergent on the numerous other birds that have independently evolved stiffened tails for foraging (woodpeckers, dendrocolaptids, *Certhia, Climacteris, Micropsitta*) or roosting and nesting (*Chaetura*) on vertical surfaces (Richardson 1942, Bock and Miller 1959, Winkler and Bock 1976). It remains for future studies to determine exactly how *Melampitta gigantea* uses its wings and tail to ascend sinkholes, how this use results in the asymmetrical pattern of feather abrasion, and what (if any) is the function of the bony spur at the bend of the wing.

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