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ORNITHOLOGY OF THE KELABIT HIGHLANDS OF SARAWAK, MALAYSIA

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ABSTRACT. — The Kelabit Highlands played a key role in the development of modern Bornean ornithology. The Highlands consist of a plateau at 1000–1200 m with substantial wet rice paddy and surrounding taller mountains. These physical features lead to an unusual combination of montane, lowland, and migratory birds. This avifauna was studied in the 1940s to 1950s by two ornithologists whose collaboration helped usher in the modern era of Bornean ornithology: Tom Harrisson of the Sarawak Museum and Dean Amadon of the American Museum of Natural History. We examine their collaboration and explain how these men contributed to Bertram Smythies' milestone book, *The Birds of Borneo* (1960). Although the roles of Harrisson and Smythies in Bornean ornithology are well known, the contribution of Dean Amadon is not generally appreciated, and we clarify it. In the process, we also consider modern work on the Kelabit avifauna, including our own expedition in 2011, and the current status of Kelabit birds and issues relating to their conservation and potential for further study.

KEY WORDS. — Bertram Smythies, bird, Borneo, collection, Dean Amadon, Montane forest, Tom Harrisson

INTRODUCTION

The Kelabit Highlands region of Sarawak is second only to Mt. Kinabalu in its importance to the history of Bornean ornithology. The geography of the region—a high-elevation plateau with wet rice cultivation surrounded by mountains—leads to an unusual mixture of lowland, montane, and migratory birds. But unlike Mt. Kinabalu, the historical importance of the Kelabit Highlands derives less from geography than from serendipity. The vagaries of World War II caused budding ornithologist and anthropologist Tom Harrisson to visit this remote, little known region. He began collecting specimens and life-history data of Kelabit birds as a paratroop officer near the end of the war, and he maintained a particular interest in the ornithology of the region until about 1960 (Harrisson, 1949a, 1959b, 1960). As curator of the Sarawak Museum (1947–1966), Harrisson published regularly on Kelabit birds in the *Sarawak Museum Journal*, and he encouraged forester Bertram Smythies to prepare a Bornean bird checklist (Smythies, 1957) and a handbook, *The Birds of Borneo* (Smythies, 1960), that extensively featured his Kelabit bird records. The importance of Harrisson's data to Smythies' two books is evidenced by reference to Kelabit birds in virtually every account of highland species, and many accounts of migrants and shorebirds.

But the role of the Kelabit Highlands in the development of Bornean ornithology is more interesting than simply Smythies' use of Harrisson's observations. At the end of World War II, Bornean ornithology was in flux. Although birds of coastal and riverine areas and Mt. Kinabalu in North Borneo were well known (e.g., Whitehead, 1893; Chasen & Kloss, 1930; Banks, 1937), birds of the interior were poorly understood, and taxonomic issues relative to almost all native species were in need of review. In the 15 years after the war, Harrisson pushed hard to solve many of these problems. He encouraged expeditions to unexplored inland areas, such as the Usun Apau plateau (1955) in Sarawak, and Mts. Trus Madi, Meliau, and Magdalena (1956) in Sabah (Smythies, 1957, 1960; Sheldon et al., 2001). He also enlisted the help of prominent ornithologists at museums around the world to work on specific taxonomic issues because of a lack of

comparative material at the Sarawak Museum (Harrisson, 1957). To this end, he sent large numbers of specimens to Ernst Mayr, Jean Delacour, and Dean Amadon at the American Museum of Natural History, H. G. Deignan at the Smithsonian, and S. Dillion Ripley at Yale Peabody Museum. Much of Harrisson's progress in his endeavor to improve Bornean ornithology was made possible through the generosity of the Malaysian-born Singaporean philanthropist Loke Wan Tho (1915–1964), after whom large bird collections at Yale Peabody and Sarawak museums are named.

One outcome of Harrisson's effort was to establish a collaboration with Amadon. Starting in 1952, the two men agreed to produce a major monograph on Kelabit birds based on Harrisson's ca. 1340 Kelabit specimens of 211 species. References to this study appear throughout the 1950s in Bornean bird literature, but the collaboration resulted in only two minor taxonomic studies (Amadon, 1953; Amadon & Harrisson, 1956), and the much anticipated monograph never materialised. Until now, its fate has been a mystery to most students of Bornean ornithology. This is unfortunate, because the taxonomic work done by Amadon on Harrisson's Kelabit specimens helped Smythies tremendously as he prepared his checklist and, thus, had a major impact on modern Bornean ornithology, for which Amadon got little credit. Also, Harrisson's extensive life history data on Kelabit birds, which were intended for the Harrisson-Amadon monograph, ended up in Smythies' checklist (1957) and handbook (1960), and that diversion sealed the fate of the Amadon-Harrisson collaboration.

After the Amadon-Harrisson collaboration fell apart, the birds of the Kelabit Highland's were largely ignored. In the early 1960s, Harrisson was involved in so many other projects, including Bornean anthropology, advising the government on border security, retirement planning, and some colourful personal squabbles (described by Heimann, 1999), that his focus on ornithology waned. He retired to Brunei in 1966 and ceased thereafter to work in Sarawak at all. Research on Bornean birds then shifted largely to Sabah (Smythies, 1999; Sheldon et al., 2001; Mann, 2008), and Sarawak entered a veritable ornithological dark age, with just a few highlights (e.g., Wells et al., 1979). However, since the 1990s, Kelabit ornithology has enjoyed a renaissance, including a series of scientific investigations. Sreedharan (1995) spent 214 field days in the Bario area between 28 Oct.1993 and 26 Nov.1994, during which he observed and netted birds in paddy, kerangas (sandy heath forest), and scrub around the Bario airstrip (30 days) and in the submontane ridge forest about 2 km away from Bario (184 days). In 1995, the Universiti Malaysia Sarawak (UNIMAS) conducted a general natural history expedition to Bario and environs (Ismail & Din, 1998). The expedition ornithologist, Gregory-Smith (1998), visited the Kelabit Highlands twice: 12–15 Feb.1995 and 8–19 Apr.1995. He surveyed over 100 km on foot at an average elevation of 1100 m on the Kelabit plain and up to 1400 m in the surrounding mountains. He also mistnetted for a total of 9 days at 1100 m at the Pa Umur salt lick (kerangas and secondary forest) and in submontane forest at the old water-supply dam (1250 m). In the course of his work, he identified 102 species in 29 families and netted 103 individual birds in 27 species. In 2002, Wang (2004) visited Bario (dates and length of visit unspecified) and recorded and banded birds as part of a molt study for the National University of Singapore. The Kelabit Highlands have also enjoyed a boon in ecotourism, largely consisting of treks in the mountains around the Kelabit plain. These treks attract birdwatchers who inevitably add to the Kelabit checklist (e.g., Ritai, 2004).

We conducted a joint UNIMAS-LSU expedition to the Kelabit Highlands in Jul.–Aug.2011. This project was designed to collect specimens for on-going investigations of the biogeography and evolution of birds in Borneo and Southeast Asia (e.g., Rahman et al., 2010; Lim et al., 2011; Lim & Sheldon, 2011; Moyle et al., 2011; Sheldon et al., 2012). During this trip, we recorded 114 species, and collected 184 specimens of 56 species (Appendix 1). Our experience in the Highlands spurred our interest in the history of Kelabit ornithology and, particularly, the mysterious fate of the Amadon-Harrisson collaboration. As luck would have it, we had in our possession virtually all of the Amadon-Harrisson papers, which were passed from Amadon upon his retirement to the Earl of Cranbrook and from Cranbrook to FHS in 1983. The papers consist of lists of specimens sent between the Sarawak and American museums, species accounts (in various states of completion, and with editorial notes by Harrisson and Smythies), a draft of parts of Harrisson's introduction to the monograph, a large number of index cards with Harrisson's hand-written notes, and copies of 89 letters sent between the Sarawak and American museums from Oct.1951 to Apr.1964.

In this paper, we tie together the contributions of Amadon and Harrisson and more recent investigators to Kelabit ornithology, and report on our own expedition to Bario. Our purpose is to provide a summary of current knowledge of Kelabit birds, highlight subjects relative to the region in need of further study, and publicise Amadon's contribution to Bornean ornithology.

Description of the Kelabit Highlands. — The Kelabit Highlands or Uplands are composed of a plateau at ca. 1000–1200 m—called the Plain of Bah—and the mountains that encircle it. The plateau is centered roughly at Bario (3°44'N 115°27'E) and runs north-south for about 30 km (Fig. 1). Its major rivers are the Dapur (=Lubbun on older maps), which runs near Bario and Pa Umur, and the Kelapang (or Baram), which runs through Pa Main. Both rivers drain southward, join together ca. 15 km south of Ramudu, and ultimately lead into the Baram via a series of cataracts in the southwestern corner of the highlands above Lio Matoh. The mountains surrounding the plateau to the north, west, and south form the Tama Abu or Tamabo Range, and those to the east form the Apo Duat Range. For the most part, these mountains are about 1200–1700 m in elevation, but Mt. Murud to the north of the plain reaches 2423 m and Batu Lawi to the northwest is 2027 m (Ghazally, 1998; Singh, 1998). Because of the surrounding mountains and narrow river gorge in the southwest, the Kelabit Highlands have

Table 1. Harrisson's collecting sites in the Kelabit Highlands. These sites are from the Amadon-Harrisson correspondence unless otherwise noted. Coordinates are from Mohizah et al. (2006) and Google Earth. Sites with coordinates are included in Fig. 1.

Location	Coordinates		Elevation (Harrisson)[1]	Elevation (Google Earth)	Notes
Sites on the Plain of Bah					
Bario	3°44'	115°27'	1125	1070	
Pa Trap			1075		NE of Bario on Dapur R. (Harrisson, 1959b: map C)
Pa Umor	3°44'	115°30'	925–1100	1074	
Pa Main	3°38'	115°31'	950–1150	1050	
Pa Mada	3°36'	115°32'	925	1000	
Pa Dali	3°33'	115°33'	925	1000	
Batu Patong			1075		Near Pa Dali (Harrisson, 1959a)
Pa Bangar	3°36'	115°33'	925–1100	1000	
Ramudu	3°32'	115°29'		925	Southernmost village on the Kelabit plateau (Harrisson, 1949b)
Ramudu Ulu	3°32'	115°33'		1050	
Sites Above the Plain of Bah					
Pungga Pawan			1675		In the Tama Abu range
Mt. Murud	3°54'	115°29'	2450	2423	
Batu Lawi	3°52'	115°23'	2000	2027	17 km NW of Bario (Google Earth)

[1]Harrisson's elevations have been converted from feet to meters, rounding to the nearest 25 meters.

been relatively isolated from the coast, and this isolation allowed the Kelabit people to develop a distinctive language and culture and kept ornithologists out of the region until the mid-20th Century (Harrisson, 1949a, 1959b).

The main town of the plateau is Bario in the Marudu District of the Miri (4th) Division. Until 1961, when the airstrip was opened, the trip to Bario required about 1 month: a long boat ride from Marudi to Lio Matoh (the highest navigable point on the Baram River) and then overland by foot (Harrisson, 1959b; Sanggin et al., 1998). Modern trips to the Highlands usually involve a flight from Miri to Bario, but just within the past few years a road has opened between Bario and coastal Sarawak.

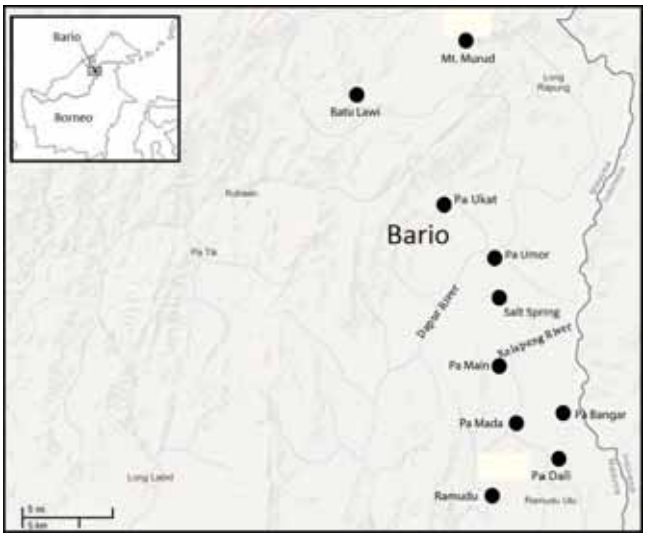

Fig. 1. Harrisson's collecting sites on the Plain of Bah in the Kelabit Highlands and our 2011 sites on the upper Dapur River (Pa Umor and Pa Ukat).

Villages in the Kelabit Highlands are generally named for the stream on which they sit, e.g., Pa Umur (P'Umur) means Umur River. Thus, a site referred to as Pa Main may actually comprise a fairly large area of river valley and adjacent slopes. The approximate locations of the villages where Harrisson collected are provided in Table 1 and Fig. 1.

The Plain of Bah consists of poorly drained clays, podzolic sands, and "climatogenic" organic soils, which largely dictate forest type and land use (Seng et al., 1998; Singh, 1998). Permanent irrigated rice paddy is established on better quality soils, and kerangas and scrub that are heavily disturbed from cattle grazing and wood-gathering dominate the rest of the plateau. Only a small amount of shifting agriculture, with associated dry-grown rice, occurs in the Highlands (Sanggin et al., 1998). Thus, the lower montane slopes of the surrounding mountains have suffered relatively little damage, although they are heavily disturbed near villages and farms by small-scale logging, wood-gathering, and grazing. Although the montane forest is in reasonably good shape now, the new road linking Bario to the coast is likely to increase logging pressure because valuable timber, such as *Agathis borneensis*, is abundant in the lower montane forest (almost 50% of forest tree biomass; Ipor et al., 1998). Our Kelabit guides informed us that a pair of local men can mill 40 boards per day in the forest, and sell each board for $11 ringgits.

The quality of much of the habitat on the Plain of Bah appears not to have changed since the days of Harrisson. In notes for his introduction, Harrisson (1959a) described the extensive

permanent, irrigated rice paddy and the pervasive effect of grazing: "Cattle (buffalo, zebu) are more numerous in the Kelabit country than anywhere else in the interior. These have grazed down large tracts around most villages into a sort of parkland, a secondary habitat which has been occupied partly by ex-lowland birds (e.g., *Copsychus*, *Rhipidura*, and *Pycnonotus* [?]) [and] partly by more dynamic montane forms (notably *Dendrocitta* and *Rhinocichla*)….the combination of irrigation and animal husbandry has cleared large plains now devoid of jungle with grassland and low trees only."

Harrisson and the Kelabit avifauna. — Harrisson's (1959a) introduction to the Amadon-Harrisson manuscript describes his ornithological experience in the Kelabit Highlands, his strategy for collecting birds, and the characteristics of the avifauna. He spent three years in total in the Kelabit area, mainly in 1945–1946, 1948–1949, and 1951–1952, with a shorter visit in 1959 (Harrisson, 1959a; Heimann, 1999). During this time, he made a general collection of birds until he felt he had a representative array of the "rather specialised and limited avifauna" of the plateau. Thereafter, he collected only new birds for the area and employed Kelabit collectors to be constantly "on the look-out for additions to this list" (Harrisson, 1959a). Harrisson was mainly headquartered at Bario, but he collected in much of the surrounding area.

Harrisson (1959a) described in detail the two most important characteristics of the Kelabit avifauna. The first is its unusual mix of montane and lowland birds on the plateau at about 1100–1200 m. Several of the common montane species that occur there are at their lowest elevational limit, while many common lowland species are unusually high (although a large portion of the lowland avifauna is missing). What makes the mixture so unusual is that the montane birds normally occur in forest, but on the Kelabit plain they intermingle with both forest and open-country lowland species. The second important characteristic highlighted by Harrisson was that Kelabit agriculture attracted copious migratory birds. Migratory species, such as the red-necked phalarope (*Phalaropus lobatus*), which are rare in most of Borneo, are abundant in the well-watered Kelabit rice paddy during fall and winter months. Harrisson (1959a) also mentioned the role of migratory species, such as the yellow wagtail (*Motacilla flava*), in setting the Kelabit rice planting and harvesting calendar. This discussion mirrors some of what he wrote in the introductory chapter to *The Birds of Borneo* (Harrisson, 1960). While describing the Kelabit avifauna, Harrisson (1959a) emphasized the importance of cool weather on the plateau, which makes the open habitat tolerable for montane and migratory birds despite its proximity to the equator.

For posterity, it is worth quoting some of Harrisson's (1959a) more poetic observations about what ornithologists and birdwatchers observe on first reaching the Kelabit Highlands. "The birds which sing the loudest on the Plain of Bah are the Yellow-crowned Bulbul [*Pycnonotus zeylanicus*] and Magpie Robin [*Copsychus saularis*], up from the lowlands. And…in rice season most of what [one] will hear and see ornithologically might as well be in northern Japan or even Europe—grasshopper warblers, shrikes, sandpipers, snipe, sparrow hawks, and herons wintering….[One] of the two barbets he can constantly hear all the year 'anvilling' is montane, the other is not….The first bird which will put [the observer] in his correct place may well be the Chestnut-capped Whistling Thrush [*Rhinocichla treacheri*], most ubiquitous of uplanders, to the stage of being a bore and nuisance….It is only when one climbs well above the irregular plain that montane birds begin to predominate numerically." Unfortunately, as we shall see, some of these observations no longer apply because of the detrimental effect of human activities on wildlife.

METHODS

We examined Amadon and Harrisson's documents to reconstruct the events in their collaboration (Table 2) and prepare a list of Harrisson's Kelabit specimens (Appendix 1). We have not cross-referenced this list with specimens currently held at the American and Sarawak museums, so there may be small discrepancies in numbers at these institutions, but internal consistency among various lists and the species accounts in Amadon's manuscript and in Smythies (1957) suggests relative accuracy. To this specimen list, we have appended additional species that Harrisson observed but did not collect. These were gleaned from the Amadon-Harrisson correspondence and from Smythies' books (Smythies, 1957, 1960). We have also added the following to the list: the records of Sreedharan (1995), Gregory-Smith (1998), and Wang (2004); birds seen or heard by Frank Rheindt (pers. comm.) during 14–19 May 2008; our own expedition records; and species from the website checklist of Ritai (2004).

Our expedition to the Kelabit Highlands took place from 12 Jul. – 2 Aug.2011. We collected birds using mistnets and made observations at two Kelabit sites (Fig. 1): 1) Gem's Lodge, Pa Umor, ca. 3 km east of Bario on the Dapur River (03.7253°N, 115.5069°E, 1060 m), during 13–18 Jul.2011; and 2) a small rice farm northwest of Pa Ukat village, ca. 5 km northeast of Bario (03.7774°N 115.4764°E, 1100 m), during 19 Jul. – 1 Aug.2011. We also visited the well-known Pa Umor salt spring (Fig. 1), but decided the site was too swampy and disturbed for our work. Gem's Lodge was located in kerangas forest that was extensively damaged by water buffalo grazing and firewood gathering. Indeed, the entire area of Pa Umor was heavily degraded—either deforested or with severely damaged forest. The nearest relatively undisturbed forest (i.e., logged but structurally complex) was at least 1–2 km to the north or east. Our second site, NW of Pa Ukat, lay along a small stream that fed into the Ukat. North of the farm, forest was continuous into the mountains; thus, we were on the northern border of the Bario plateau. The farm consisted of wet and dry paddy fields surrounded by lower montane forest (as opposed to kerangas). Immediately adjacent to the farm, the forest was heavily degraded by water buffalo grazing and wood cutting. However, upstream (north) of the farm and on higher surrounding ridges, the forest was in much better condition. It had substantial understory growth and lots of small to medium-sized trees. The largest trees

Table 2. Timeline for correspondence on the Amadon-Harrisson Kelabit Highlands manuscript. The principal correspondents were Dean Amadon (DA) and Tom Harrisson (TH). Other correspondents in the file are Ernst Mayr (EM) and Bertram Smythies (BS).

Date	Direction	Subject
17 Oct.1951	TH–EM	Harrisson sends his Kelabit collection to the American Museum after it languishes unpacked for two years at the Raffles Museum.
13 Feb.1952	EM–TH	"Dean Amadon is now sorting out your collection. It contains some very choice things. We are delighted."
17 Jun.1952	DA–TH	DA hopes to start work on the Kelabit collection soon, and complains of difficulty in reading Harrisson's hand-written specimen labels, which have copious information on diet, habitat, and behavior of Kelabit birds.
27 Jun.1952	TH–DA	"I know that the writing on the labels is shocking."
22 Dec.1952	DA–TH	Amadon sends a draft of the non-passerine portion of the manuscript. At this time, he makes clear that he prefers large birds and has little interest in passerines, and that other priorities were vying for his time (notably Mexican birds). Thus, he hopes to enlist Charles Vaurie (also at the American Museum) to undertake the passerine section.
22 Apr.1953	TH–DA	Harrisson voices disappointment with the non-passerine section because it is mainly taxonomic and does not include his life-history observations. "The primary object of the collection was to get a complete picture of the bird fauna of this locality—that is to say, the primary object was not taxonomic." He offers to come to New York and transcribe his data, including "thousands of index cards." But Harrisson gets sick and never makes it to New York, and nothing happens for more than a year.
6 Aug.1954	DA–TH	Amadon fails to enlist someone to write the passerine section, but finds a volunteer to compare and measure specimens. He suggests publishing the non-passerine and passerine sections separately.
10 Sep.1954	TH–DA	Harrisson objects to publishing the sections separately, and further states he cannot write the life-history sections without access to the specimen labels.
1 Oct.1954	DA–TH	Amadon complains about over-commitment, e.g., to the American Ornithologists' Union's and Peters' checklist.
13 Dec.1954	DA–TH	Amadon agrees to add the label data to the manuscript himself and proceeds with the passerine section.
10 Jan.1955	TH–DA	Harrisson is delighted.
ca. Mar.1955	DA–TH	Amadon sends the revised non-passerine manuscript to Harrisson.
5 Apr.1955	TH–DA	Harrisson sends an enthusiastic letter reporting on his work on the non-passerines and the introductory sections.
28 Nov.1955	DA–TH	Amadon sends part of the passerine section. This includes Harrisson's life-history notes.
4 Apr.1956	TH–DA	Harrisson acknowledges receipt of the partial passerine section and announces plans for Smythies to publish a Borneo bird checklist in the *Sarawak Museum Journal*.
8 Apr.1956	BS–DA	Smythies requests information on the taxonomy of several species, including mainly non-Kelabit taxa: e.g., *Microhierax*, *Coturnix*, *Cuculus*, *Eurystomus*, and *Corydon*.
Summer 1956	DA–TH	Amadon finishes the passerine section. He says his taxonomic review of the passerines is minimal (compared to non-passerines), and the new species accounts do not include Harrisson's field observations. Because Amadon was simultaneously returning a large portion of the Kelabit collection to Sarawak, Harrisson agrees to add the missing life-history notes. They also agree to write-up a description of the new race of *Criniger* [*Alophoixus*] *phaeocephalus*.
13 Sep.1956		A secretary at the American Museum types and sends the data from the specimen labels remaining in New York.
13 Feb.1957	TH–DA	Harrisson says he is working on the Kelabit manuscript and needs a copy of Amadon's final non-passerine section.
21 Feb.1957	DA–TH	Apparently misunderstanding, Amadon sends his only clean copy of the passerine section. (This explains why the archive in our possession does not have a complete passerine section; indeed, there is hardly any passerine information other than lists of specimens.)
3 Jun.1957	TH–DA	Harrisson sends information on Kelabit collecting sites and two birds missing from the manuscript.
19 Jun.1957	TH–DA	Harrisson sends a reprint of their description of the new bulbul (Amadon & Harrisson, 1956). He also says he is extracting label data from the returned skins for their Kelabit manuscript.
3 Dec.1957	DA–TH	Amadon acknowledges receipt of Smythies checklist (Smythies, 1957).

Table 2. Cont'd.

Date	Direction	Subject
ca. Dec.1957	TH–DA	Harrisson sends transcribed label data to Amadon.
7 Jan.1958	DA–TH	Amadon complains of over-commitment and says it would be more appropriate for Harrisson to add the label data to the manuscript.
2 Jul.1958	DA–TH	Amadon sends a partial bibliography for the Kelabit paper.
15 Jul.1958	TH–DA	"Through Bill [Smythies], I now find myself in rather an embarrassing position over the Kelabit bird paper. The pressure on him to go ahead with his bird book has meant that he has used—with my ready consent, of course—substantially all the field notes, habitat data etc. that I have on the Kelabit collections you so fully studied. Similarly, the most unusual part of my work there, on food habits, has all been extracted from my labels and incorporated into his text. Thus all this work has been effectively degutted by Bill and what I have left that is fresh is what he thing [sic] is insignificant! And here I must bow to him and agree! So I find it both thankless and probably useless, after all this time and effort…to produce an original text to go with yours."
		Harrisson then offers to write an introduction for the Amadon-Harrisson paper and suggests they publish what they have already produced.
24 Jul.1958	DA–TH	Amadon thinks this is a good plan and awaits Harrisson's introduction.
21 Jan.1959	DA–TH	Amadon urges Harrisson to write the introduction, saying "Seriously, I did put in a good deal of work on this project, and of course the longer it hangs fire the less valuable it becomes."
28 Jan.1959	TH–DA	Harrisson apologizes for the delay and tells Amadon to go ahead without his introduction.
6 Feb.1959	DA–TH	Amadon says he will wait.
10 Mar.1959	TH–DA	Harrisson sends a rough draft of the introduction, still lacking several parts. He promises to finish it by 31 March.
16 Dec.1959	TH–DA	Harrisson says he just returned from a month in the Kelabit Highlands, having made a large collection of frogmouths.
15 Jan.1960	DA–TH	Amadon says that "with my manuscript in front of you, if you think these [frogmouths] add more to the taxonomic side of it, then by all means send them along [to the American Museum]. "
17 Jun.1963	DA–TH	In reference to a visit by Max Thompson to the American Museum (Thompson, 1966), Amadon writes: "I believe there are a few things in this paper [the Kelabit manuscript] that would still be worth publishing. Since you have the only good copy, would you please send it back to me and let me have another crack at it."
1 Jul.1963	TH–DA	Harrisson sends back the manuscript and says: "you will see it is both quite a mass and quite a mess."
24 Sep.1963	DA–TH	Amadon acknowledges receipt of the manuscript and say it will be "sometime before I can get to it."

in the area had apparently been removed, although we did not see any stumps or recent large-scale damage in the area where we worked.

RESULTS AND DISCUSSION

The Amadon–Harrisson–Smythies dynamic. — Of the 89 letters between Amadon and Harrisson, many are simply acknowledgments of specimen exchanges, conversations about problematical species (e.g., *Collocalia* swiftlets and the Bornean bristlehead, *Pityriasis gymnocephala*), thank you notes, apologies for delays, discussions of how and where to publish the Kelabit monograph, etc. But intermingled among these mundane discussions are salient exchanges that explain why the Amadon–Harrisson collaboration failed and how Amadon contributed to Smythies checklist (1957) and, hence, the progress of Bornean ornithology. The important exchanges are summarised in Table 2. Ultimately, the collaboration failed because both men were busy and had other priorities. Bad luck also played a role—especially a prolonged Harrisson illness at a critical moment—and eventually delays caused the essential taxonomic and ecological elements of the project to be used by Smythies (1957, 1960). This loss rendered further work on the project largely pointless.

The basic course of the collaboration was as follows. Amadon finished the non-passerine taxonomic section of the manuscript in Dec.1952, but delayed work on the passerines because he was not particularly interested in small birds (see 22 Dec.1952 in Table 1). He also had other projects vying for his time, e.g., work on Mexican and African birds and the American Ornithologists' Union Checklist. Harrisson was also extremely busy with projects and field work. These distractions might have been endurable, except that Harrisson got very sick in 1953 (see Heimann, 1999: 289, for details). This was a pivotal time in the collaboration because Harrisson had planned a trip to New York to write the life-history sections of each species account. But Harrisson never got to New York, and it took until the summer of 1956 for Amadon to transcribe Harrisson's field data and write a basic passerine taxonomy section. By that time, Harrisson had apparently shifted his attention to Smythies, who was working on the Borneo checklist—probably with great efficiency, given his experience writing *The Birds of Burma* (Smythies, 1953). After publication of Smythies checklist (1957), the Amadon-Harrisson correspondence grew desultory because Amadon's main contributions in taxonomy were now published. The final straw was the use of all of Harrisson's Kelabit field data in Smythies (1960) handbook (see Harrisson's mea culpa on 15 Jul.1958 in Table 1). After this, Harrisson lost all momentum on the project and failed to work on the species accounts or finish his promised introduction. Amadon tried occasionally to spur him on, but to no avail.

From the unpublished manuscript and correspondence, Amadon's contributions to Bornean ornithology are clear. He examined and in some cases revised the taxonomy of the 211 Kelabit species in the Harrisson collection. In the process, he considered the subspecific classification of 40% of the 549 species in Smythies (1957) checklist. For example, he argued against recognising a distinct subspecies (*nasica*) for Bornean members of *Treron curvirostra* as proposed by Mayr (1938). In addition to Kelabit birds, Amadon compared specimens and offered his opinions on numerous non-Kelabit taxa (see 8 Apr.1956 in Table 1 for some examples). Smythies (1957) adopted Amadon's taxonomic opinions almost completely, often acknowledging them in his species accounts, but not always (e.g., not in *Treron curvirostra*). In some cases, Smythies noted disagreements between Amadon and Harrisson, e.g., over the non-Kelabit black oriole, *Oriolus hosii* (Smythies 1957: 778). Another Amadon contribution was to transcribe Harrisson's label data for the non-passerine specimens, the passerine specimens kept permanently at the American Museum, and from Harrisson's note cards, all of which notes were used in Smythies (1960). Finally, Amadon influenced the common names used for Bornean birds. In his manuscript, he adopted common names mainly from the *Birds of Malaysia* (Delacour, 1947), but he substituted some from other sources when he believed they were improvements: e.g., for *Chalcophaps indica* he used emerald dove from Baker (1922–1931) instead of green-winged ground dove from Delacour (1947). There can be no doubt that Amadon's extensive taxonomic and organisational work saved Smythies a huge amount of labour as he prepared his checklist. Smythies cannot be blamed for using Amadon's data because Harrisson gave him complete access to the unpublished manuscript, and Smythies expected Amadon and Harrisson to publish their work separately. He also acknowledged them in his introduction and usually in his species accounts. But, by modern standards of contribution, Amadon should have been an author with Smythies on the checklist and maybe even *The Birds of Borneo*. Harrisson certainly should have been an author of both.

Overview of the Kelabit avifauna. — Appendix 1 includes virtually all possible species from the Kelabit Highlands. For many species in Ritai's (2004) checklist, the sources are unknown. Some undoubtedly derive from birdwatcher reports that may cover a wide range in elevation. We restrict our comments to birds known from the Kelabit plateau itself, between 1000–1200 m. This is the area we visited and the most interesting in terms of geography and history.

Mixed avifaunas: The large area of open, high elevation flat land is hospitable to some common lowland species. At the same time, it attracts quite a few lower montane birds that, though normally found in forest on slopes, seem to do well in the flat open country, perhaps because of its cool temperature (Harrisson, 1959a). The resulting avifauna is an unusual mixture of species, especially species that occupy similar niches: e.g., *Pycnonotus atriceps* and *P. montis*, *P. goiavier* and *Hemixos cinereus*, *Pellorneum capistratum* and *Trichastoma* (*Pellorneum*) *pyrrogenys*, *and Orthotomus ruficeps* and *O. cucullatus*. On the other hand, certain expected species are noticeably absent or rare, even though they occur at 1100–1200 m elsewhere in Borneo (Sheldon et al., 2001; Sheldon et al., 2009): e.g., the lowland *Trichastoma malaccense*, and *Orthotomus sericeus*, and the montane *Rhipidura albicollis*, *Seicercus montis*, and *Pachycephala*

Appendix 1. List of birds of the Kelabit Highlands, with emphasis on Harrisson's collection.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Blue-breasted Quail	*Coturnix chinensis*	16(9)	1125								X	
Red-breasted Hill Partridge	*Arborophila hyperythra*	19(5)	900–1675	"Abound" even in scrub and kerangas	V		A		X		Occasionally calling	X*
Ferruginous Partridge	*Caloperdix oculeus*	5(3)	1100–1375	"Abound" even in scrub and kerangas								X*
Crimson-headed Partridge	*Haematortyx sanguiniceps*	3(2)	1025–1525	"Abound" even in scrub and kerangas				X	X		Calling regularly at both sites	X*
Crested Partridge	*Rollulus rouloul*	5(2)	900–1075	Only lowland partridge in the KH								X*
Crested Fireback	*Lophura ignita*	0(2)	1125	Only pheasant in the KH								X
Bulwer's Pheasant	*Lophura bulweri*											X
Great Argus	*Argusianus argus*			Not in KH			feather					X
Garganey	*Anas querquedula*	1(0)	1125	25 Nov.1949								X
Yellow Bittern	*Ixobrychus sinensis*	2(0)	1125	18 Dec.1947, 28 Jan.1948; [Sreedharan (1995) 7 Nov.1994]	N							X*
Schrenck's Bittern	*Ixobrychus eurhythmus*	2(1)	1125	9 Nov.1949, 18 Jan.1948								X*
Cinnamon Bittern	*Ixobrychus cinnamomeus*	2(1)	1125	3 Oct.1949, 20 Dec.1952; [Wang (2004) nest and eggs 19 Jul.]	N	P	N		X		Pa'Ukat rice paddy	X*
Black Bittern	*Dupetor flavicollis*			[Sreedharan (1995) early Nov.]	V							X
Striated Heron	*Butorides striata*	3(1)	1100–1125	8–28 Oct.1949								X
Grey Heron	*Ardea cinerea*		1125	No date								X
Purple Heron	*Ardea purpurea*	1(0)	1125									X
Little Egret	*Egretta garzetta*	2	1125	Harrisson and Smythies (1959); [Wang (2004) 13 Aug.]			V					X*
Intermediate Egret	*Egretta intermedia*	1(0)	1125	14 Oct.1949	N							X*
Great Egret	*Ardea alba*											X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Cattle Egret	*Bubulcus ibis*	2(0)	1000 & 1125									X*
Darter	*Anhinga melanogaster*											X
Oriental Honey Buzzard	*Pernis ptilorhynchus*	1(1)	1125	[Sreedharan (1995) 16 Aug.]	V							X
Brahminy Kite	*Haliastur indus*	3(1)	1075–1100			P,O	V	X				X
Lesser Fish Eagle	*Ichthyophaga humilis*											X
Crested Serpent Eagle	*Spilornis cheela*	3(2)	875 & 1100		V	F,O	V		X			X
Kinabalu Serpent Eagle	*Spilornis kinabaluensis*											*
Eastern Marsh Harrier	*Circus spilonotus*	3(1)	1125	24 Dec.1952, 1 Jan.1952. Amadon wrote that all harrier specimens were *C. spilonotus*; Harrisson had misidentified some as the following species.								X
Northern Harrier	*Circus cyaneus*		1125	Several "probable" sightings (Harrisson, 1955)								X
Pied Harrier	*Circus melanoleucos*		1125	Commonest harrier in the KH.								X
Japanese Sparrowhawk	*Accipiter gularis*	2(1)	975–1200	20 Nov.1949, 25 Dec.1947								X
Besra	*Accipiter virgatus*	1(2)	1000–1150			K						X
Grey-faced Buzzard	*Butastur indicus*	4(2)	1025–1150	5–26 Nov.1947 & 1949, 7 Jan.1948	V							X
Indian Black Eagle	*Ictinaetus malayensis*	1(1)	900		V	F	V					X
Rufous-bellied Hawk-Eagle	*Hieraaetus kienerii*	1(0)	900									X
Blyth's Hawk-Eagle	*Spizaetus alboniger*	2(1)	975–1675									X
Peregrine Falcon	*Falco peregrinus*											X
Slaty-breasted Rail	*Gallirallus striatus*	6(3)	1125									X
White-breasted Waterhen	*Amaurornis phoenicurus*	8(4)	1075–1125		N	P,O	N	X	X			X*

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Band-bellied Crake	*Porzana paykulli*	7(2)	1125	28 Nov.1947 to 26 Feb.1948								X
White-browed Crake	*Porzana cinerea*											X
Watercock	*Gallicrex cinerea*	1(0)	1075	No date other than year								X
Common Moorhen	*Gallinula chloropus*			[Absent in Harrisson's time.]	V	P	N	X			In Bario town	X*
Greater Painted-snipe	*Rostratula benghalensis*						V					
Pacific Golden Plover	*Pluvialis fulva*	1(0)	1125	23 Oct.1949; [Wang (2004) 8 Sep.]			V					X
Little Ringed Plover	*Charadrius dubius*	1(0)	1125	20 Dec.1952								
Oriental Plover	*Charadrius veredus*											X
Pintail Snipe	*Gallinago stenura*	1(1)	1125	7–16 Oct.1949, very common Sep.–Mar.								X
Swinhoe's Snipe	*Gallinago megala*	1(0)	1125	1 Dec.1949								X
Common Redshank	*Tringa totanus*	1(0)	1125	19 Oct.1949; [Sreedharan (1995) 17 Aug.]	V							X
Wood Sandpiper	*Tringa glareola*	5(2)	1125	2–26 Oct.1949, 1 Dec.1949; [Wang (2004) 12 Aug.]	V		V					X
Common Sandpiper	*Actitis hypoleucos*	3(1)	1125–1200	2 Oct.1949 – 16 Dec.1949	V							X
Long-toed Stint	*Calidris subminuta*	3(1)	1125	8–25 Oct.1949								X
Red-necked Phalarope	*Phalaropus lobatus*	11(3)	1125	11–25 Oct.1949, early date 2 Oct.								X
Oriental Pratincole	*Glareola maldivarum*	6(1)	1125	20 Oct.1951 to 21 Mar.1952								X
Common Tern	*Sterna hirundo*											X
White-winged Black Tern	*Chlidonias leucopterus*	1(1)	1125	29 Oct.1949								X
Emerald Dove	*Chalcophaps indica*	2(0)	1675		V	F			X		Calling constantly	X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Spotted-necked Dove	*Streptopelia chinensis*	14(5)	1075–1125		V	P,O			X			X*
Ruddy Cuckoo-Dove	*Macropygia emiliana*	6(3)	1125–1200		V	F			X			X*
Little Cuckoo Dove	*Macropygia ruficeps*	6(3)	1125–1375				V		1		Calling constantly	X
Little Green Pigeon	*Treron olax*											X
Pink-necked Green Pigeon	*Treron vernans*	5(3)	900–1125	[Sreedharan (1995) 1600–1750 m; highest Bornean elevation record]	V							X*
Thick-billed Green Pigeon	*Treron curvirostra*	8(4)	900–1200			F		X			Many in fig tree	X
Jambu Fruit Dove	*Ptilinopus jambu*	5(2)	1025–1125	Breeds Nov.–Feb.					X		One in a net	X
Mountain Imperial Pigeon	*Ducula badia*	3(1)	1025–1200					X			Many flying	X*
Chestnut-winged Cuckoo	*Clamator coromandus*	1(0)	900	22 Dec.1952; 975 m (Smythies, 1957)								X
Large Hawk-Cuckoo	*Hierococcyx sparverioides*	3(1)	1125–1675									X
Malaysian Hawk-Cuckoo	*Hierococcyx fugax fugax*	1(0)	up to 1600		V							X
Whistling Hawk-Cuckoo	*Hierococcyx nisicolor*	2(1)	1075–1200	11 Nov.								
Indian Cuckoo	*Cuculus micropterus*	1(0)	1100			F,O		X				X
Himalayan Cuckoo	*Cuculus saturatus*	2(0)		[No elevation provided]								X
Plaintive Cuckoo	*Cacomantis merulinus*	1(1)	900 & 1125									
Square-tailed Drongo-cuckoo	*Surniculus lugubris*	2(1)	975–1300									X
Black-bellied Malkoha	*Phaenicophaeus diardi*	0(1)	900									
Chestnut-bellied Malkoha	*Phaenicophaeus sumatranus*	7(3)	900–1525		V	F						X
Chestnut-breasted Malkoha	*Phaenicophaeus curvirostris*	11(4)	900–1375		V			2			Common in kerangas	X*

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Red-billed Malkoha	*Phaenicophaeus javanicus*	4(2)	1525									X
Greater Coucal	*Centropus sinensis*	1(1)	1125		V			X	X		Calling infrequently	X*
Lesser Coucal	*Centropus bengalensis*	6(2)	1125		V	O		X			Calling infrequently	X
Oriental Bay Owl	*Phodilus badius*	2(1)	900–1125									X
Collared Scops Owl	*Otus bakkamoena*	2(1)	1000–1150		A							X
Mountain Scops Owl	*Otus spilocephalus*			[Wang (2004); Nest 20 Mar., 2 chicks]								X
Buffy Fish Owl	*Ketupa ketupu*	1(0)	950									X
Barred Eagle-Owl	*Bubo sumatranus*											X
Brown Wood Owl	*Strix leptogrammica*	1(0)	1100									X
Collared Owlet	*Glaucidium brodiei*	2(0)	1150 & 1675						X		Calling infrequently	X
Boobook	*Ninox scutulata*	1(0)	1125	11 Feb.1948, migrant subspecies "burmanica" (Smythies & Harrisson, 1956)		F,O		X	X		Calling regularly at Pa'Umor, occasionally at Pa'Ukat	X
Dulit Frogmouth	*Batrachostomus harterti*	1		"Kelabit uplands" (Harrisson & Smythies, 1959)								X
Bornean Frogmouth	*Batrachostomus mixtus*	3(2)	900–1100									X*
Sunda Frogmouth	*Batrachostomus cornutus*											X
Malaysian Eared-Nightjar	*Eurostopodus temminckii*	2(1)	1200		V	F,O	A	X				X
Grey Nightjar	*Caprimulgus indicus*	8(2)	1125	Jan.–Mar.	N							X
Glossy Swiftlet	*Collocalia esculenta*		up to 1200			O	N		X			X
Swiftlet sp.	*Aerodramus sp.*							X	X			
Black-nest Swiftlet	*Aerodramus maximus*					O						X
Edible-nest Swiftlet	*Aerodramus fuciphagus*				V							X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Pacific Swift	*Apus pacificus*					O						
Brown-backed Needletail	*Hirundapus giganteus*											X
Grey-rumped Treeswift	*Hemiprocne longipennis*			Seen flying		F		X				X*
Whitehead's Trogon	*Harpactes whiteheadi*	2(1)	1275–1525	5 Oct. female in breeding condition								X
Scarlet-rumped Trogon	*Harpactes duvaucelii*							X			Calling infrequently	X
Orange-breasted Trogon	*Harpactes oreskios*	8(4)	900–1375	"Oppressively" common						1		X*
Dollarbird	*Eurystomus orientalis orientalis*	1	975									X
	Eurystomus orientalis calonyx	5	900–1100	Earliest date: 6 Nov.1949								
Chestnut-collared Kingfisher	*Actenoides concretus*	2(1)	1200–1675	4 Dec., nest and eggs					2		Attacking a babbler in a net	X
Banded Kingfisher	*Lacedo pulchella*	1(1)	1675	Semi-moss forest; other specimen not Kelabit								X
Stork-billed Kingfisher	*Pelargopsis capensis*				V	P,O	V		X		Near kampung	X*
Black-capped Kingfisher	*Halcyon pileata*	10(4)	900–1125	Earliest date: 24 Oct.1949								X
Collared Kingfisher	*Todiramphus chloris*					P						
Rufous-backed Kingfisher	*Ceyx rufidorsa*	1	1200		N				1		Old secondary forest	X
Blue-banded Kingfisher	*Alcedo euryzona*					F						X
Blue-eared Kingfisher	*Alcedo meninting*	1(0)	1075									X
Common Kingfisher	*Alcedo atthis*	2(0)	1100	Earliest date: 6 Nov.1949	V							X
Red-bearded Bee-eater	*Nyctyornis amictus*	10(4)	975–1370	[1370 m is higher than previous Bornean records]					1		Calling regularly	X*
Bushy-crested Hornbill	*Anorrhinus galeritus*	1(0)	1125		V			X	X		Calling regularly	X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Rhinoceros Hornbill	*Buceros rhinoceros*						A		X		Seen overhead a few times	X*
Helmeted Hornbill	*Buceros vigil*						A		X		Heard calling only twice	X
White-crowned Hornbill	*Aceros comatus*				V	F						X
Wreathed Hornbill	*Rhyticeros undulatus*								X		Pair flying over	X
Gold-whiskered Barbet	*Megalaima chrysopogon*					F		X	X		Calling fairly regularly at both sites	X*
Red-crowned Barbet	*Megalaima rafflesii*					K,F						X
Red-throated Barbet	*Megalaima mystacophanos*	1(0)	1000		F							X
Mountain Barbet	*Megalaima monticola*	12(5)	900–1200						1	X	Calling frequently	X*
Golden-naped Barbet	*Megalaima pulcherrima*	1(1)	1600						X		Calling infrequently	X
Blue-eared Barbet	*Megalaima australis*					F		X	X		Calling occasionally	
Yellow-crowned Barbet	*Megalaima henricii*											X
Bornean Barbet	*Megalaima eximia*	1(1)	1100 & 1125						X		Heard once	X
Brown Barbet	*Calorhamphus fuliginosus*				N							X
Rufous Piculet	*Sasia abnormis*	3(1)	975–1125				N		4			X*
Grey-capped Woodpecker	*Dendrocopus canicapillus*	1(0)	1200									X
Rufous Woodpecker	*Celeus brachyurus*	1(1)	900–5700		V		A		X		Calling infrequently	X
White-bellied Woodpecker	*Dryocopus javensis*				V							X
Banded Woodpecker	*Picus miniaceus*	1(1)	1125 & 1675									X*
Crimson-winged Woodpecker	*Picus puniceus*	5(2)	900–1675	16 Jun., female with 3 eggs	V							X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Checker-throated Woodpecker	*Picus mentalis*	8(3)	1125–1675		V				1			X*
Olive-backed Woodpecker	*Dinopium rafflesii*	1(0)	1575		K							X
Maroon Woodpecker	*Blythipicus rubiginosus*	3(1)	1025–1150		V			X	2	X		X*
Orange-backed Woodpecker	*Reinwardtipicus validus*	1(1)	1125 & 1675						1			X
Great Slaty Woodpecker	*Mulleripicus pulverulentus*	1(0)	1125									X
Green Broadbill	*Calyptomena viridis*	1(2)	900–1125	[Wang (2004), nest and 2 eggs, 15 May]			N		2	X	Calling regularly	X
Hose's Broadbill	*Calyptomena hosei*	1(1)	1025 & 1675						1			X
Whitehead's Broadbill	*Calyptomena whiteheadi*	5(2)	1025–1675									X
Black-and-red Broadbill	*Cymbirhynchus macrorhynchos*	2(1)	900									X
Long-tailed Broadbill	*Psarisomus dalhousiae*	3(1)	1575–1675									X
Banded Broadbill	*Eurylaimus javanicus*	1(0)	1125									X
Black-and-yellow Broadbill	*Eurylaimus ochromalus*	9(4)	900–1525	"Forest near moss line"; 1675 m in Smythies (1957)	A				X		Calling infrequently	X
Dusky Broadbill	*Corydon sumatranus*	3(0)	875–1200									X
Bornean Banded Pitta	*Pitta schwaneri*	2(2)	1150–1675			F						X
Giant Pitta	*Pitta caerulea*											X
Blue-banded Pitta	*Pitta arquata*	2(0)	900 & 1275									X
Fairy Pitta	*Pitta nympha*	1(0)	1000	Nov.1917								X
Blue-winged Pitta	*Pitta moluccensis*	5(1)	1000–1125	Sep.1924 – Jan.1923								X
Golden-bellied Gerygone	*Gerygone sulphurea*								X		Calling infrequently	X
Rail-babbler	*Eupetes macrocerus*	1(0)	1125									X
Rufous-winged Philentoma	*Philentoma pyrhopterum*	5(0)	1025–1525						2	X		X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Maroon-breasted Philentoma	*Philentoma velatum*	4(1)	1200–1675			F						X
White-breasted Woodswallow	*Artamus leucorhynchus*	7(2)	975–1125									X*
Sunda Cuckoo-shrike	*Coracina larvata*	5(3)	1200–1825									X
Lesser Cuckoo-shrike	*Coracina fimbriata*	2(0)	1150									
Large Woodshrike	*Tephrodornis gularis*											X
Grey-chinned Minivet	*Pericrocotus solaris*					F						
Scarlet Minivet	*Pericrocotus flammeus*	11(5)	900–1375		V			1		X		X*
Bar-winged Flycatcher-shrike	*Hemipus picatus*	8(4)	900–1825		V				X			X*
Bornean Whistler	*Pachycephala hypoxantha*	0(1)					N					X
Tiger Shrike	*Lanius tigrinus*	0(1)	900	12 Dec.1952; [Sreedharan (1995) 30 Sep.]	V N							X
Brown Shrike	*Lanius cristatus*	10(3)	900–1125	11 Oct. – 22 Nov.; [Sreedharan (1995) 9 Nov.]	V							X
Dark-throated Oriole	*Oriolus xanthonotus*								X		Heard once	
Black-and-crimson Oriole	*Oriolus cruentus*	20(4)	1000–1675									X*
Black Oriole	*Oriolus hosii*											X
Ashy Drongo	*Dicrurus leucophaeus*	11(4)	975–1525		V	F	V		X		Not many	X*
Bronzed Drongo	*Dicrurus aeneus*					F						X
Hair-crested Drongo	*Dicrurus hottentottus*	9(4)	900–1525		N	O,F	N	3	1		Abundant at both sites	X*
Greater Racket-tailed Drongo	*Dicrurus paradiseus*					F						
White-throated Fantail	*Rhipidura albicollis*	4(2)	900–1375			F						X*
Pied Fantail	*Rhipidura javanica*	3(0)	1125			P,O	V		1		Only observed once	X*
Spotted Fantail	*Rhipidura perlata*	8(2)	1000–1675		N				4	X	Never observed	X*
Black-naped Monarch	*Hypothymis azurea*	5(2)	900–1675		V				4	X		X*

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Asian Paradise Flycatcher	*Terpsiphone paradisi*	8(0)	1075–1200		V	F			2	X		X
Crested Jay	*Platylophus galericulatus*	10(2)	900–1675		V			1	1	X	Common at both sites	X*
Common Green Magpie	*Cissa chinensis*	5(2)	975–1200	12 Dec., female in laying condition; May, fledgling (Anon, 1958)	N	F,O		3	1		Unusually common at both sites	X
Short-tailed Green Magpie	*Cissa thalassina*											X
Bornean Treepie	*Dendrocitta cinerascens*	12(5)	975–1200		V	K,F,O		1	1		Occasional at both sites	X*
Slender-billed Crow	*Corvus enca*	1(1)	1125		V				X			X
Sand Martin	*Riparia riparia*											X
Barn Swallow	*Hirundo rustica*	7(2)	1125	10 Oct. – 3 Jan.		O,P	V 12 Aug.	X				X
Pacific Swallow	*Hirundo tahitica*				V	O,P		X	5	X		X*
Striated Swallow	*Cecropsis striolata*			[Sreedharan (1995) 10 Nov.1993]	V							X
Yellow-bellied Prinia	*Prinia flaviventris*	11(4)	1075–1125	11 Jan. and 14 Feb., nests with eggs (Anon, 1958)	N		N	1	X	X		X
Mountain Tailorbird	*Orthotomus cucullatus*								X			X
Red-headed Tailorbird	*Orthotomus ruficeps*	4(2)	1000–1125		N		N	3	3	X	Common at both sites	X*
Rufous-tailed Tailorbird	*Orthotomus sericeus*											X
Straw-headed Bulbul	*Pycnonotus zeylanicus*	9(3)	900–1200		V	F,O					None	X
Black-and-white Bulbul	*Pycnonotus melanoleucos*	1(0)	1125						1	X	Not observed	X
Black-headed Bulbul	*Pycnonotus atriceps*	4(1)	900–1125		V				X		Occasionally calling	X
Bornean Bulbul	*Pycnonotus montis*	9(5)	900–1525		N	F		X	4	X	Common at both sites	X*
Puff-backed Bulbul	*Pycnonotus eutilotus*											X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Yellow-vented Bulbul	*Pycnonotus goiavier*	14(4)	900–1675	One at 1675 m, rest 1125 m and below	N		N	3	1	X	Regularly recorded but not common	X*
Pale-faced Bulbul	*Pycnonotus leucops*											X
Olive-winged Bulbul	*Pycnonotus plumosus*								X			
Cream-vented Bulbul	*Pycnonotus simplex*	6(2)	900–1275		N			3	4	X	Common at both sites	X
Red-eyed Bulbul	*Pycnonotus brunneus*	1(0)	1000									X*
Spectacled Bulbul	*Pycnonotus erythrophthalmos*	1(0)	1000									X
Ochraceus Bulbul	*Criniger ochraceus*	9(4)	900–1675	Includes the type specimen for subspecies *fowleri* (Amadon & Harrisson, 1956)	N	F	N	1	6	X	Common at Pa'Ukat	X*
Grey-cheeked Bulbul	*Criniger bres*											X
Yellow-bellied Bulbul	*Criniger phaeocephalus*			Amadon & Harrison (1956)			V					X
Streaked Bulbul	*Ixos malaccensis*								X		Seen once	
Buff-vented Bulbul	*Iole olivacea*											X
Cinereous Bulbul	*Hemixos cinereus*	14(5)	900–1675			F		X	6	X	Common at both sites	X*
Hairy-backed Bulbul	*Tricholestes criniger*											X
Bornean Stubtail	*Urosphena whiteheadi*	1(1)	1125 & 1525		N							X
Sunda Bush-Warbler	*Cettia vulcania*											X
Lanceolated Warbler	*Locustella lanceolata*	1(1)	1125	23 Jan. & 12 Feb.1948								X
Rusty-rumped Warbler	*Locustella certhiola*	5(2)	1125	26 Oct. – 7 Feb.								X
Middendorf's Warbler	*Locustella ochotensis*											X
Oriental Reed Warbler	*Acrocephalus orientalis*	5(1)	1125–1200	26 Oct. – 22 Dec.; [Sreedharan (1995) 2 Nov.1993]	V							X
Arctic Warbler	*Phylloscopus borealis*	10(4)	900–1125	15 Oct. – 27 Jan.; [Sreedharan (1995) 2 Oct.]	V							X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Mountain Leaf Warbler	*Phylloscopus trivirgatus*											X
Yellow-breasted Warbler	*Seicercus montis*											X
Yellow-bellied Warbler	*Abroscopus superciliaris*	8(3)	1025–1675		V				3	X	Calling frequently at Pa'Ukat	X*
Black-capped Babbler	*Pellorneum capistratum*	2(1)	900–1400		N			6	1		Very common in kerangas	X*
Horsefield's Babbler	*Trichastoma sepiarium*											X
Temminck's Babbler	*Trichastoma pyrrogenys*	3(2)	1125–1675		N	F		1	6	X		
Ferruginous Babbler	*Trichastoma bicolor*							X			Calling occasionally in kerangas	X
Scaly-crowned Babbler	*Malacopteron cinereum*					F						X
Moustached Babbler	*Malacopteron magnirostre*											X
Chestnut-backed Scimitar Babbler	*Pomatorhinus montanus*	13(5)	975–1675	[26 Oct., Pa Main, female with 3 eggs (Anon, 1958)]	N			X	X		Heard regularly at both sites	X*
Black-throated Wren-Babbler	*Napothera atrigularis*	1(1)	1075 & 1675	"Moss forest"								X
Mountain Wren-Babbler	*Napothera crassa*											X
Eyebrowed Wren-Babbler	*Napothera epilepidota*	4(1)	1125–1675					2	X			X*
Rufous-fronted Babbler	*Stachyris rufifrons*				V							X*
Grey-throated Babbler	*Stachyris nigriceps*	4(2)	900–1675		N	F			4	X	Not especially common	X*
Grey-headed Babbler	*Stachyris poliocephala*											X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
White-necked Babbler	*Stachyris leucotis*					F						X
Chestnut-winged Babbler	*Stachyris erythroptera*								X		Heard once	X
Bold-striped Tit-Babbler	*Macronous bornensis*	6(5)	900–1125	17 Jan., Bario, male on 2 eggs (Anon, 1958)	N		V	3	1	X	Not abundant at either site	X*
Fluffy-backed Tit-Babbler	*Macronous ptilosus*											*
Sunda Laughing-thrush	*Garrulax palliatus*	4(3)	1525–1675									X*
Chestnut-hooded Laughing-thrush	*Rhinocichla treacheri*	11(5)	900–1375		N			X	2		Fairly common at both sites	X*
Bornean Bald Laughing-thrush	*Melanocichla calva*	5(2)	1600–1825									X
White-browed Shrike-babbler	*Pteruthius flaviscapis*	1(1)	1575 & 1675									X*
Brown Fulvetta	*Alcippe brunneicauda*	11(5)	900–1675		N			X	2		Calling at both sites	X*
Chestnut-crested Yuhina	*Yuhina everetti*	5(3)	1000–1525		V	F,K	N		4	X	Not especially common at Pa'Ukat	X*
Erpornis	*Erpornis zantholeuca*	3(2)	975–1675		V	F						X*
Everett's White-eye	*Zosterops everetti*					F						
Bornean Ibon	*Oculocincta squamifrons*	4(2)	1100–1675	[F. Rheindt observed several flocks on the plain in stunted forest.][9]								X*
Mountain Black-eye	*Chlorocharis emiliae*											X
Asian Fairy-bluebird	*Irena puella*	4(2)	1025–1375			F			X		Heard once	X
Velvet-fronted Nuthatch	*Sitta frontalis*	3(1)	975–1650		V	F			X		Observed once	X*
Asian Glossy Starling	*Aplonis panayensis*	1(0)	1125									
Hill Mynah	*Gracula religiosa*	1(0)	1075					X				X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Chestnut-cheeked Starling	*Sturnus philippensis*	1(0)	1125	27 Oct.1949; [Sreedharan (1995) 3 Nov.]	V							X
Bornean Whistling Thrush	*Myophonus borneensis*	1(0)	1200									X
Everett's Thrush	*Zoothera everetti*	1(0)	1650									X
Chestnut-capped Thrush	*Zoothera interpres*											X
Eyebrowed Thrush	*Turdus obscurus*	5(2)	900–1125	30 Nov. – 23 Dec.; "by November the dominant bird in the secondary jungles of the plain"								X
White-browed Shortwing	*Brachypteryx montana*											X*
Siberian Rubythroat	*Luscinia cyane*	4(2)	1000–1675	11 Oct. – 1 Jan.	N							X
Oriental Magpie-Robin	*Copsychus saularis*	13(2)	1000–1125		V	O	N	X			Very few	X*
White-rumped Shama	*Copsychus malabaricus*	1(0)	1000									X
Chestnut-naped Forktail	*Enicurus ruficapillus*											X
Bornean Forktail	*Enicurus borneensis*	15(5)	900–1675	Harrisson (1949b)	N	F			2		Netted along river	X
Wheatear	*Oenanthe oenanthe*	1(0)	1100	4 Nov.1949 (Harrisson & Medway, 1956)								X
Grey-chested Jungle Flycatcher	*Rhinomyias umbratilus*											X
Rufous-tailed Jungle Flycatcher	*Rhinomyias ruficauda*	9(4)	900–1675		N		N		4			X*
Eye-browed Jungle Flycatcher	*Rhinomyias gularis*											X
Grey-streaked Flycatcher	*Muscicapa griseisticta*											
Asian Brown Flycatcher	*Muscicapa dauurica*	2(1)	1025–1675	6 Oct. – 18 Mar.; [Sreedharan (1995) 1 Oct.]	V							X

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Dark-sided Flycatcher	*Muscicapa sibirica*	1(0)	1200	29 Oct.1949; [Sreedharan (1995) 2 Oct.]	V							X
Ferruginous Flycatcher	*Muscicapa ferruginea*											X
Narcissus Flycatcher	*Ficedula narcissina*	1(0)	1375	7 Nov.1949								X
Mugimaki Flycatcher	*Ficedula mugimaki*	4(1)	900–1125	25 Nov. – 2 Feb.								X
Snowy-browed Flycatcher	*Ficedula hyperythra*											X
Rufous-chested Flycatcher	*Ficedula dumetoria*	9(3)	1025–1675		N	F,K			5	X		X
Blue-and-White Flycatcher	*Cyanoptila cyanomelana*	21(7)	900–1425	30 Oct. – 18 Mar.								X
Verditer Flycatcher	*Eumyias thalassina*	1(0)	1075									X
Indigo Flycatcher	*Eumyias indigo*											X
Hill Blue Flycatcher	*Cyornis banyumas*	4(3)	1025–1200						3	X	Fairly common	X
Dark Blue Flycatcher	*Cyornis concretus*				V							X
Bornean Blue Flycatcher	*Cyornis superbus*											X
Grey-headed Canary-flycatcher	*Culicicapa ceylonensis*	8(3)	1000–1675		N	F			2			X
Greater Green Leafbird	*Chloropsis sonnerati*	3(0)	1000–1125									X
Lesser Green Leafbird	*Chloropsis cyanopogon*				V							X
Blue-winged Leafbird	*Chloropsis cochinchinensis*	17(4)	900–1675	Subspecies *flavocincta*	V	F			X		Not distinguished from *C. kinabaluensis*	X
Kinabalu Leafbird	*Chloropsis kinabaluensis*											*
Yellow-rumped Flowerpecker	*Prionochilus xanthopygius*	11(5)	950–1200						6	X	Abundant at Pa'Ukat	X*

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
Thick-billed Flowerpecker	*Dicaeum agile*	1(2)	900–1125	[See Sheldon (1985)]								X
Brown-backed Flowerpecker	*Dicaeum everetti*											X
Yellow-vented Flowerpecker	*Dicaeum chrysorrheum*	3(1)	1125–1675		N							X*
Orange-bellied Flowerpecker	*Dicaeum trigonostigma*	13(4)	975–1675		N		N	1	6	X	Abundant and calling at both sites	X*
Plain Flowerpecker	*Dicaeum concolor*	10(5)	900–1200		N				3	X	Common at Pa'Ukat	X*
Bornean Flowerpecker	*Dicaeum monticolum*	4(2)	1000–1125									X
Rubycheek	*Chalcoparia singalensis*	2(0)	1100		V		V					X*
Plain Sunbird	*Anthreptes simplex*								3	X		X
Brown-throated Sunbird	*Anthreptes malacensis*						V					X
Purple-throated Sunbird	*Nectarinia sperata*	2(0)	1200 & 1275		V							X*
Olive-backed Sunbird	*Nectarinia jugularis*						V					X
Eastern Crimson Sunbird	*Aethopyga siparaja*	3(0)	1100–1200		N	F		1	1	X		X
Temminck's Sunbird	*Aethopyga temminckii*	8(5)	975–1675		N	F			X			X*
Little Spiderhunter	*Arachnothera longirostra*	5(3)	900–1125		N		N	6	6	X		X*
Spectacled Spiderhunter	*Arachnothera flavigaster*	1(0)	1675		V				1	X		X
Streaky-breasted Spiderhunter	*Arachnothera affinis*	7(5)	1125–1675						6	X	Netted frequently	X
Whitehead's Spiderhunter	*Arachnothera juliae*	1(1)	1675									X
Eurasian Tree Sparrow	*Passer montanus*				V	O	N					X*
Pin-tailed Parrotfinch	*Erythrura prasina*	7(2)	1025–1250		V							X
Dusky Munia	*Lonchura fuscans* *Lonchura sp. (albino)*	7(3) 1(1)	1075–1125		V	O	N		1			X*

Appendix 1. Cont'd.

English name[1]	Scientific name[1]	Harrisson and Amadon			Sreedharan (1995)[5]	Gregory-Smith (1998)[6]	Wang (2004)[5]	LSU & UNIMAS 2011				Ritai (2004)[9]
		No. specimens[2]	Elevation[3]	Notes[4]				Pa Umor[7]	Pa Ukat[7]	Breeding[8]	Notes	
White-bellied Munia	*Lonchura leucogastra*	2(2)	1025–1125			O						X
Chestnut Munia	*Lonchura atricapilla*	16(6)	1125		N	O	N	4	1	X		X*
Yellow Wagtail	*Motacilla flava*	4(1)	1100–1125		V							X
Grey Wagtail	*Motacilla cinerea*	0(2)	1125	12 & 22 Oct.1949	V							X
White Wagtail	*Motacilla alba*		1125	Bario Aug.1956 [letter to Amadon]; [Sreedharan (1995) Nov.]	V							X
Richard's Pipit	*Anthus richardi*						V 20 Jul.					X
Red-throated Pipit	*Anthus cervinus*	7(3)	1100–1125	31 Oct. – 8 Jan.								X

[1] Classification follows Phillipps & Phillipps (2011)
[2] Specimens are divided approximately as follows: Sarawak Museum (American Museum).
[3] Elevations are from Amadon & Harrisson (unpublished manuscript) and Smythies (1957), except that we have converted feet to meters, rounding to the nearest 25 meters. Sightings (when no specimens) are Harrisson's from Smythies (1957)
[4] Harrisson's notes are from the unpublished manuscript or Smythies (1957) unless otherwise noted; KH = Kelabit Highlands
[5] V = visual record; A = auditory record; N = net record
[6] Gregory-Smith (1998) netted and observed birds in the Bario area from 12–15 Feb. and 8–20 Apr.1995; K = kerangas, F = lower montane forest, O = open areas, P = paddy
[7] "X" indicates a species' presence at the site; numbers indicated specimens collected at each site
[8] Breeding was mostly determined from gonadal condition
[9] "X" indicated records from Ritai (2004): http://www.kelabit.net/birds/birds.html; asterisks indicate birds seen or heard by Frank Rheindt (pers. comm.) during 14–19 May 2008 in the 1100–1200 m range

hypoxantha. For some forest species, a major deterrent to life on the plain is certainly that the forest has low stature because of poor soil and its understory is heavily degraded.

Fruigivores: Fruit was abundant at the time of our visit and fruit-eating birds were also abundant, most notably three species of flowerpeckers (*Prionochilus xanthopygius*, *Dicaeum trigonostigma*, and *D. concolor*) and four species of bulbuls (*Pycnonotus simplex*, *P. montis*, *Hemixos cinereus*, and *Criniger ochraceus*). The number of *D. trigonostigma* was astounding. All of these species were breeding. The pigeons *Treron curvirostra* and *Ducula badia* were common at Gem's Lodge in a fruiting fig, and *Chalcophaps indica* and *Macropygia emiliana* were calling commonly in the hills above Pa Ukat. Two species of partridge, *Haematortyx sanguiniceps* and *Arborophila hyperythra*, were also common at Pa Ukat. Numerous trees in the forest at Pa Ukat were laden with fruit that went uneaten, presumably because there was more fruit than birds could handle. Normally, this excess would have been stripped by monkeys, gibbons, and hornbills (see Conservation below).

Small insectivores: We noted a remarkable dearth of common babblers and flycatchers, especially on the plain. The only lower understory babbler that was recorded regularly at Pa Umor was *Pellorneum capistratum*, and the only one relatively common at Pa Ukat was *Trichastoma pyrrogenys*. Flycatchers were scarce at Pa Umor, and the only ones that were regular at Pa Ukat were *Ficedula dumetoria* and *Cyornis banyumas* in the better quality submontane forest. A dearth of *Rhipidura javanica* on the plain and *R. albicollis* in the lower submontane forest was especially noticeable. We attribute the small numbers of low-and mid-story species to the generally poor condition of the forest, as well as the elevation of the plain. Harrisson (1959a) encountered a similarly depauperate understory, due largely to cattle grazing, and his collection qualitatively suggests the same bird dispersion we encountered. For example, he collected only two lowland babbler species, *Pellorneum capistratum* and *Macronous bornensis*, and few flycatchers.

Large mid-story species: Perhaps the most remarkable feature of the avifauna in forested parts of the plain is the number of large, mid-story birds, especially *Phaenicophaeus sumatranus*, *Dicrurus hottentottus*, *Dendrocitta cinerascens*, *Cissa thalassina*, *Platylophus galericulatus*, and *Rhinocichla treacheri*. These were common to abundant everywhere. The insectivores were feeding on copious large insects, and the corvids and the laughing-thrush were feeding on plentiful fruit as well as insects. Although Harrisson did not remark specifically about this "large bird" phenomenon, the number of specimens he collected of such birds, especially insectivores, and his notes indicate that he encountered much the same situation as we did. For example, he collected 10 *Phaenicophaeus sumatranus* with the following stomach contents: "very large pink locust fills stomach, [~10 cm] powerful mantis, [~9 cm] brown stick insect, [~7.5 cm] leaf insect…, [~12.5 cm] pink cricket, also caterpillars." He collected 13 specimens of *Dicrurus hottentottus*, and their stomachs featured: locustids, crickets, green beetles, cicadas, longicorn beetles, and large black beetles. He collected 12 *Platylophus galericulatus*, which had eaten cochroaches, locustids, millipedes, cicadas, and stag beetles.

Conservation and ecotourism. — Hornbills, monkeys, and gibbons were rare or absent from the area. We observed four species of hornbill, but the only species that was recorded in the forest (as opposed to flying over) was bushy-crested hornbill (*Anorrhinus galeritus*), which is also the only hornbill thought to nest in the area (Harrisson, 1960). All large vertebrates were heavily hunted in the region—our guides shot a pig, barking deer, civet, and bushy-crested hornbill for food while we were there. Occasionally we heard gibbons in the forest far to the north of our Pa Ukat site, where there was continuous forest into the high mountains, but monkeys were not observed at either Pa Ukat or Pa Umor. Because the area earns substantial revenue from ecotourists, who are undoubtedly attracted by the prospect of seeing iconic animal life, such as hornbills, gibbons and monkeys, it would be wise for the locals to restrict hunting to game mammals, such as pigs and deer, and let the species of particular interest to tourists increase in numbers.

A poignant difference between the Kelabit avifauna of Harrisson's time and our own was the lack of *Pycnonotus zeylanicus* and the scarcity of *Copsychus saularis*. The bulbuls were there in the 1990s (Sreedharan, 1995; Gregory-Smith, 1998), but were gone by the early 2000s (Wang, 2004). Their extirpation is not a function of habitat change, as these birds normally occur in disturbed habitat at the edge of paddy and streams. This species is prized for its song, and its disappearance undoubtedly resulted from illegal collection for the pet trade. The same is evidently true of the magpie-robins, which are surprisingly rare, given Harrisson's description of their ubiquity in the 1940s and 1950s and their common occurrence elsewhere in Sarawak.

Future bird work. — In most areas of Borneo where lowland and montane birds meet, remarkably little information is available on the extent of their overlap, and no data have been collected on the behavioral interactions of the two communities. This is largely because the contact point of lower and upper montane forest is on slopes and in forest that is difficult to reach. Also, much of the lower montane forest in Borneo has been destroyed or extensively altered (e.g., by shifting cultivation), reducing easily accessed, well forested contact points. The situation on the Kelabit plateau is by no means natural or normal, because of extensive human disturbance and the large area of high elevation flatland. However, the surrounding sloped, lower montane forest at 1200–1500 m is relatively intact because shifting cultivation is rare. Thus, it offers an unusual opportunity for quantitative studies of lowland and montane bird species interaction.

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