Summary

This monograph provides significant new insights into the biology and biogeography of the birds that inhabit the northernmost tip of Myanmar. The area's hill jungle is largely untouched by humans and has not been visited by ornithologists since the late 1940s. Even today, this jungle can be considered a primary forest in the literal sense and a "white map" area for most biodiversity. During our recent visits to this extraordinary, species-rich area we compiled an inventory of the avifauna that includes records of more than 440 species. Although the area inventoried covers only about one percent of the land surface of Myanmar, the species reported in the inventory include endemics as well as globally threatened taxa and represent more than a third of all known bird species from the country. By evaluating in detail the subspecific relationships of the Hkakabo Razi rainforest avifauna, we conclude that the bird avifauna community of northern Myanmar is most similar to the one found in the avifauna of the temperate rainforests of northeastern India.

Bonn zoological Bulletin – Supplementum Vol. 62 (2015)
Managing Editor: Thomas Wesener

Zoologisches Forschungsmuseum Alexander Koenig –
Leibniz-Institut für Biodiversität der Tiere (ZFMK)
Adenauerallee 160, D-53113 Bonn, Germany

ISBN-13: 978-3-925382-66-6
ISSN: 0302-671X

Cover illustration:
The remoteness and inaccessibility of northern Myanmar is illustrated by one of the many rattan suspension bridges made without any metal. To reach Tahaundam at least five such rattan bridges (here about 50 m long bridge between Gawlai and Tazungdam) need to be crossed – in case these are not maintained (such as during rainy season) the rivers cannot be crossed.

Mitglied der Leibniz-Gemeinschaft
Bundesministerium für Bildung und Forschung
Ministerium für Innovation, Wissenschaft und Forschung des Landes Nordrhein-Westfalen

Bonn zoological Bulletin – Supplementum

Volume 62 (2015)

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Bonn zoological Bulletin Supplementum Vol. 62 (2015)

formerly: Bonner zoologische Monographien

Avifauna of the Southeastern Himalayan Mountains and neighboring Myanmar hill country

Swen C. Renner, John H. Rappole, Christopher M. Milensky, Myint Aung, Nay Myo Shwe & Thein Aung

An open access journal of organismal zoology, published by
Zoologisches Forschungsmuseum Alexander Koenig – Leibniz-Institut für Biodiversität der Tiere, Bonn

BONN ZOOLOGICAL BULLETIN – SUPPLEMENTUM (BzB-S),
formerly “Bonner zoologische Monographien”,

Bonn zoological Bulletin, Editor-in-Chief
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The peer-reviewed series Bonn zoological Bulletin – Supplementum, formerly “Bonner zoologische Monographien”, has existed since 1971. It is published by the Zoological Research Museum Alexander Koenig – Leibniz Institute for Animal Biodiversity (ZFMK), Bonn. Supplements on focus topics are produced in irregular succession. The BzB-S consists of original zoology papers too long for inclusion in our institute’s regular journal, Bonn zoological Bulletin. Preferred manuscript topics are: systematics, taxonomy, biogeography, anatomy, and evolutionary biology. Manuscripts should be in American English. Authors are requested to contact the managing editor prior to manuscript submittal.

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Authors of this issue:
Swen C. Renner, John H. Rappole, Christopher M. Milensky, Myint Aung, Nay Myo Shwe & Thein Aung
Published: Bonn zoological Bulletin – Supplementum Vol. 62, 75 pp.

ISBN-13: 978-3-925382-65-9
ISSN: 0302-671X

Editorial Assitant Sebastian Hüllen
Produced by Eva-Maria Levermann, Kaiserstr. 129, 53113 Bonn, Germany; emlevermann@netcologne.de.
Printed and bound by Verlag Natur & Wissenschaft, Postfach 170209, 42624 Solingen, Germany.

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Bonn zoological Bulletin – Supplementum 62: 1–75

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Avifauna of the Southeastern Himalayan Mountains and neighboring Myanmar hill country

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Abstract. The northern Myanmar hill jungle and neighboring highlands found along the southeastern slopes of the Himalayas (Hkakabo Razi region, northern Kachin State, northernmost Myanmar) is almost untouched by humans, and can be considered as primary forest in the literal sense. Until the efforts reported on in this monograph, no ornithologist had the opportunity to visit this remote area since the late 1940s. Beginning in 1997, we made several visits to this extraordinary, species-rich area, and compiled an inventory of the regional avifauna while also studying the ecology, behavior, systematics, taxonomy, biogeography, and origin of the region's birds. We report on these aspects for the 441 species found in the area and add data on species new to the area and those for which there are only a few representatives in the world's specimen collections. In addition, we provide information on taxa that are likely endemic (*Jabouilleia naungmungensis*), suggest splits or revisions of subspecies and species, and describe two new subspecies from the area, *Alcippe cinereiceps hkakaboraziensis* ssp. nov. and *Malacocincla abbotti kachinensis* ssp. nov., based on plumage and morphometric differentiation. Last but not least, we analyze the species affinities (i.e. the biogeographic origin of the species occurring in Hkakabo Razi and surrounding areas).

We found a lack of data in general for bird species in Southeast Asia, India and Tibet/China, but especially in the northern hill mountains of Kachin State around Hkakabo Razi National Park. Efforts by conservation organizations and ourselves has improved the situation, but much more work, particularly on ecology and global change effects, is warranted. We have added considerable information on the distribution, systematics, ecology, and biogeography of a number of species. Although much work remains to be done, our research provides significant new insights into the biology and biogeography of the region's birds, and in particular, on delineation of major zoogeographic regions. We conclude that Ernst Mayr was correct in essence when he stated that the eastern border between the Oriental and Southeast Asian regions is roughly equivalent to the political boundary between Myanmar (Burma) and China. However, our work provides new understanding of the reasons, and challenges some of the fundamental assumptions on which the 'zoogeographic region' concept is based. In particular, such delineations often fail to take into account the geological and ecological history of a region. By evaluating in detail the subspecific relationships of the Hkakabo Razi rainforest avifauna, we were able to determine that the avifauna most similar is found in the temperate rainforests of northeastern India. We conclude that the likely reason for this similarity is that these two avifaunas shared the same refugium during the maximum of the last glacial period (18,000 years ago), and that other south and southeast Asian rainforest species shared different refugia during this time period, and probably during previous glacial events as well.

အကျဉ်းချုပ်. ကုန်းမြင့်ဒေသများနှင့်ကပ်လျက် ဧတောင်ပေါ်တောများကို မြန်မာနိုင်ငံမြောက်ပိုင်း ဟိမဝန္တာ အရှေ့တောင်ဘက်ပိုင်းတွင် တွေ့ရပြီး (ခါကာဘိုရာဇီ ၊ ကချင်ပြည်နယ်မြောက်ပိုင်း မြန်မာပြည်မြောက်ဖျားကို) လူတို့အထိအခိုက် မရှိသလောက် ဖြစ်သော မူလသဘာဝသစ်တောကြီးများအဖြစ်တွေ့ရသည်။ ယခုစာတမ်းတွင်ဖော်ပြသည့်တိုင် ၁၉၄၀ ခုနှစ်မှစ၍ ယခုအချိန်ထိ မည်သည့် ငှက်ပညာရှင်မျှ ဧ လှ့လာခြင်းမပြုလုပ်သော ဧ ဖားလံသောဒေသတစ်ခုဖြစ်ပါသည်။ ၁၉၉၇ နှစ်ဆန်းမှစ၍ အဆိုပါဒေသရှိ မျိုးစိတ်ပေါကြွယ်ဝသော ဧ နရာများ ထပ်ဆင့်လေ့လာခြင်းများ၊ စာရင်းကောက်ယူခြင်းများ၊ ဧ ဂဟဗေဒ၊ ဓလေ့စရိုက်၊ စနစ်တကျမျိုးစိတ်ခွဲခြားဖြင်း၊ ဇီဝဘူမိထူးခြားမှုများနှင့် ဒေသငှက်မျိုးစိတ်များ၏ မူလအစ တို့ကိုလေ့လာခဲ့သည်။ ခရီးစဉ်များအတွင်း မျိုးစိတ်(၄၄၁)မျိုးကိုတွေ့ ရှိမှတ်တမ်းတင်ထားသည့်အပြင်ကမ္ဘာပေါ် ရှိ ပြတိုက်နမူနာပုံစံများထဲမှ အနည်းငယ်သာ စုဆောင်းထားသော မျိုးစိတ်များ၏အချက်အလက်များကိုလည်း ရရှိခဲ့ပါသည်။ ထို့အပြင်ဒေသရင်းမျိုးစိတ် ဖြစ်နိုင်သော (*Jabouilleia naungmungensis* နောင်မွန်စဉ့္) ဆိုင်ရာ အချက် အလက် များကိုလည်းရရှိခဲ့ပါသည်။ ထို့အပြင် မျိုးခွဲ (သို့မဟုတ်) မျိုးစိတ်ခွဲသစ်နှစ်မျိုးဖြစ်သော *Alcippe cinereiceps hkakaboraziensis* ssp. nov. နှင့် *Malacocincla abbotti kachinensis* ssp. nov. ကို အမွေး အတောင်ကွဲပြားမှုနှင့် သွင်ပြင်ကွဲပြားမှုအပေါ် အခြေခံ၍ခွဲခြားမှတ်တမ်းတင်နိုင်ခဲ့ပါသည်။ နောက်ဆုံး အနေဖြင့် မျိုးစိတ် နီးစပ်မှုအပေါ် အခြေခံသုံးသပ်ပါသည် (ဥပမာ ခါကာဘိုရာဇီ နှင့် အနီးတဝိုက် ဘူမိဇီဝမူရင်း မျိုးစိတ်များ)။ အရွေ့တောင် အာရှ၊ အိန္ဒိယနှင့် တရုတ် (တိဗက်)ဒေသ၊ အထူးသဖြင့် ကချင်ပြည်နယ်မြောက်ပိုင်း ခါကာဘိုရာဇီ အမျိုးသားဥယျာဉ်အနီး ဧ တောင်တန်းများတွင်ငှက်နှင့်ပတ်သက်သော အချက်အလက်မရှိသလောက်နည်းပါးသည်ကိုလည်း ဧ တွ့ ရှိရပါသည်။ ထိုနည်းသိမ်းရေးအဖွဲ့အစည်းများနှင့် ကျွန်ုပ်တို့ကိုယ်တိုင် ကြိုးစားအားထုတ်မှုများသည် အချက်အလက်များ တိုးတက် အထောက်အကူ ဖြစ်သော်လည်း ဂေဟဗေဒနှင့်ကမ္ဘာ့ပြောင်းလဲမှုဆိုင်ရာအကျိုးသက်ရောက်မှုများကို ခိုင်လုံစေရန် လိုအပ်လျက်ရှိပါသည်။ မျိုးစိတ်များနှင့် ပတ်သက်၍ပျံနှံတည်ရှိမှုဆိုင်ရာ အချက်အလက်များ၊ သိပ္ပံနည်းကျ ဧ ဂဟဗေဒနှင့် ဘူမိဇီဝဆိုင်ရာအချက်အလက်များ ထည့်သွင်းစဉ်းစားသင့်ကြောင်း ဧ ပါင်းစုဖော်ပြထားပါသည်။ သို့ ဧ သာ များစွာ လုပ်ဆောင်ရန်ကျန်ရှိပါသေးကြောင်း၊ ယခုသုတေသနအနေဖြင့် သိသာထင်ရှားသောဒေသတွင်းငှက်မျိုးစိတ်များ၏ ဇီဝဂေဒနှင့် ဘူမိဇီဝထူးခြားမှုများကိုသာဖော်ပြထားပြီး အတိအကျဆိုရပါမူဘူမိဇီဝ ရပ်ဝန်းနယ်နိမိတ်ကိုသာ ဧ ဖော်ညွှန်း နိုင်ပါသည်။ အနီး(တ်)မေရာဏီဖော်ပြချက်ဖြစ်သော မူလပကတိ အရှေ့နယ်နိမိတ်ဖြစ်သည့် အရှေ့တိုင်းနှင့် အရှေ့တောင်အာရှကြားသည် မြန်မာနှင့် တရုတ်နိုင်ငံတို့၏ နိုင်ငံနှယ်နိမိတ်ဒေသများဖြစ်ကြောင်းကိုလည်း ပို့မို့ မှန်ကန်စေခဲ့ပါသည်။ သို့သော် ယခုသုတေသနမှ ဘူမိဇီဝ ရပ်ဝန်းဆိုင်ရာအပေါ် အခြေခံအယူအဆနှင့် စိန်ခေါ်မှုများ၊ အကြောင်းရင်းအချက်အလက်များကို ဧ ထောက်ကူပေးသောရလာဒ်လည်း ဖြစ်ပါသည်။ အတိအကျဆိုသော် အဆိုပါ နယ်နိမိတ်သည်ဒေသ၏ဘူမိဇေဒဆိုင်ရာနှင့် ဧ ဂဟဗေဒဆိုင်ရာသိုင်းကြောင်း အထောက်အထား မကြာခဏ ရောထွေး ဂိရောဓိဖြစ်လေ့ရှိသောဒေသဖြစ်ပါသည်။ အသေးစိတ်ခြုံငုံသုံးသပ်သော် ခါကာဘိုရာဇီဒေသ မိုးသစ်တောများရှိ ငှက်မျိုး စိတ်နှင့်မျိုးစိတ်ခွဲများ၏ဆက်နွယ်မှုသည် အိန္ဒိယနိုင်ငံအရှေ့မြောက်ဘက်ရှိ သမပိုင်းသစ်တောများရှိမျိုးစိတ်များနှင့် များစွာ ဆင်တူသည်ကိုတွေ့ ရသည်။ နိဂုံးချုပ်အနေဖြင့် အဆိုပါဒေသနှစ်ခုအတွင်း ငှက်မျိုးစိတ်ပြန့် နှံ့ တည်ရှိမှုသည် ရေခဲ ခတ် (လွန်ခဲ့ သော နှစ်ပေါင်း ၁၈၀၀၀) ခန့်မှစတင်တည်ရှိခဲ့သည်အကြောင်းရင်း ဖြစ်ဟန်ရှိပြီး အခြားတောင်နှင့် အရှေ့တောင် အာရှရှိ မိုးသစ်တောငှက်မျိုးစိတ်များသည်လည်း အဆိုပါ ရေခဲ ခတ်ကာလအတွင်းတည်ရှိခဲ့ သာ မျိုးစိတ်များ ဖြစ်နိုင်ပါ သည်။

INTRODUCTION

The southeastern Himalayas and neighboring hill country constitute one of the most biologically diverse places in the world (Dumbacher et al. 2011, International Council for Bird Preservation 1992, Renner & Rappole 2011a, b, c), yet it is also one of the most isolated, remote, and poorly known (Aung 1999, Rabinowitz 2003, Renner 2011, Renner & Rappole 2011a, b, Renner et al. 2007) (Fig. 1).

In addition to extraordinarily difficult terrain, lack of information concerning flora and fauna is also the result of a long history of political instability. Although most of present-day Myanmar had been a British colony since 1886, '*The northern half* [of northern Myanmar], *the Putao District of northern Kachin State, was not administered* [i.e. by the British] *until 1911, and two vast areas, the Hukawng* [Hukaung] *Valley and The Triangle* [northernmost Myanmar north of the Irrawaddy confluence], *though entered by* [military] *expeditions for several years in an endeavor to suppress the local customs of slavery and human sacrifice, were not formally administered until 1934*' (Stanford & Ticehurst 1938a). The Japanese invaded Myanmar (11 Dec 1941), not long after publication of this statement, remaining there until the end of the Second World War. The country established its independence from Great Britain on 4 Jan 1948. However, in 1962 Myanmar chose a path of extreme isolation from the international community. Travel to the country by foreigners was limited for the next four decades, and access to areas outside Yangon to visitors remained under strict government control until 2011. Since then, the political climate in the country has improved considerably. However, despite a general relaxation of rules governing travel by foreigners throughout most of the country, access to the Putao area including Hkakabo Razi, remained under tight government control until Feb of 2015.

The first, cursory survey of flora and fauna of the region since the 1950s was performed by an expedition of Myanmar and U. S. scientists sponsored by the Myanmar Forestry Ministry and the Wildlife Conservation Society from 2 Mar to 14 Apr 1997 (Aung 1999, Khin & Aung 1999, Rabinowitz 2003, Rabinowitz et al. 1999).

The country north of the Putao Plain is a rugged expanse of peaks and valleys that becomes progressively higher and steeper as one approaches the border with Tibet, culminating in Hkakabo Razi at 5,881 m, Myanmar's highest mountain (Fig. 2). Slopes of 50° or more occur frequently. Major tributaries for some of Asia's largest rivers slice through the region, along with hundreds of lesser streams. These waterways are often cataracts or torrents during spring thaws and seasonal rains.

The near absence of roads makes travel to the area challenging. There is a single, unpaved track from Putao, running 40 km east to Ba Baw and north to Naung Mung that is passable to trucks for two to three months of the year during the dry season (Dec to Feb). Access to lands beyond the Putao Plain are gained via seasonal foot paths and, since 2013, at least partially with motorbikes. Travelers on these routes must bring all their own provisions because almost all villages are too small (five to ten families), poor, and isolated to be able to sell even the most basic supplies. In addition, the region is dissected by many rivers and streams, most of which are impassable for a large part of the year except for the many rattan suspension bridges that must be repaired and rebuilt at least annually (Fig. 3).

OBJECTIVES

The main purpose of our study was to provide basic information on the avifauna of the Hkakabo Razi region, and to address fundamental questions regarding its ornithogeography including:

1) How much of the Hkakabo Razi avifauna belongs to the Yunnan-Tibetan Himalayan fauna?
2) How much belongs to the northeastern Indian fauna?
3) How much belongs to the Thai fauna; and
4) How much, if any, is unique (i.e. endemic) to the region?

Specifically, we wished to know, how the geological and ecological history of the region might explain the observed patterns of relationships with avifaunas from other regions containing similar habitats.

In addition to these biogeographic questions, we looked at baseline information on bird occurrence, distribution, and taxonomic relationships with other regions, and investigated conservation issues regarding the location of the most biologically diverse portions of the area, their sensitivity to disturbance, and the levels of protection provided them. We added also reports and gray literature as well as any reference of interest in the bibliography, even if not cited directly in the text.

STUDY AREA

Our study area consists of lands in and around Hkakabo Razi National Park in the northernmost tip of Kachin State, Myanmar. Other political regions not visited but containing similar topography include neighboring Tibet to the north; Yunnan, China to the east; Assam and Arunachal Pradesh, India to the west; and south in Myanmar to Myitkyina (Fig. 1). At present, Hkakabo Razi is accessible from the outside world by plane (bi-weekly flights to Putao in 2014) or seasonal road from Myitkyina (Jan to Apr; closed in early 2014 due to rebel-government conflicts). Our actual field sites were situated in the Putao-Naung

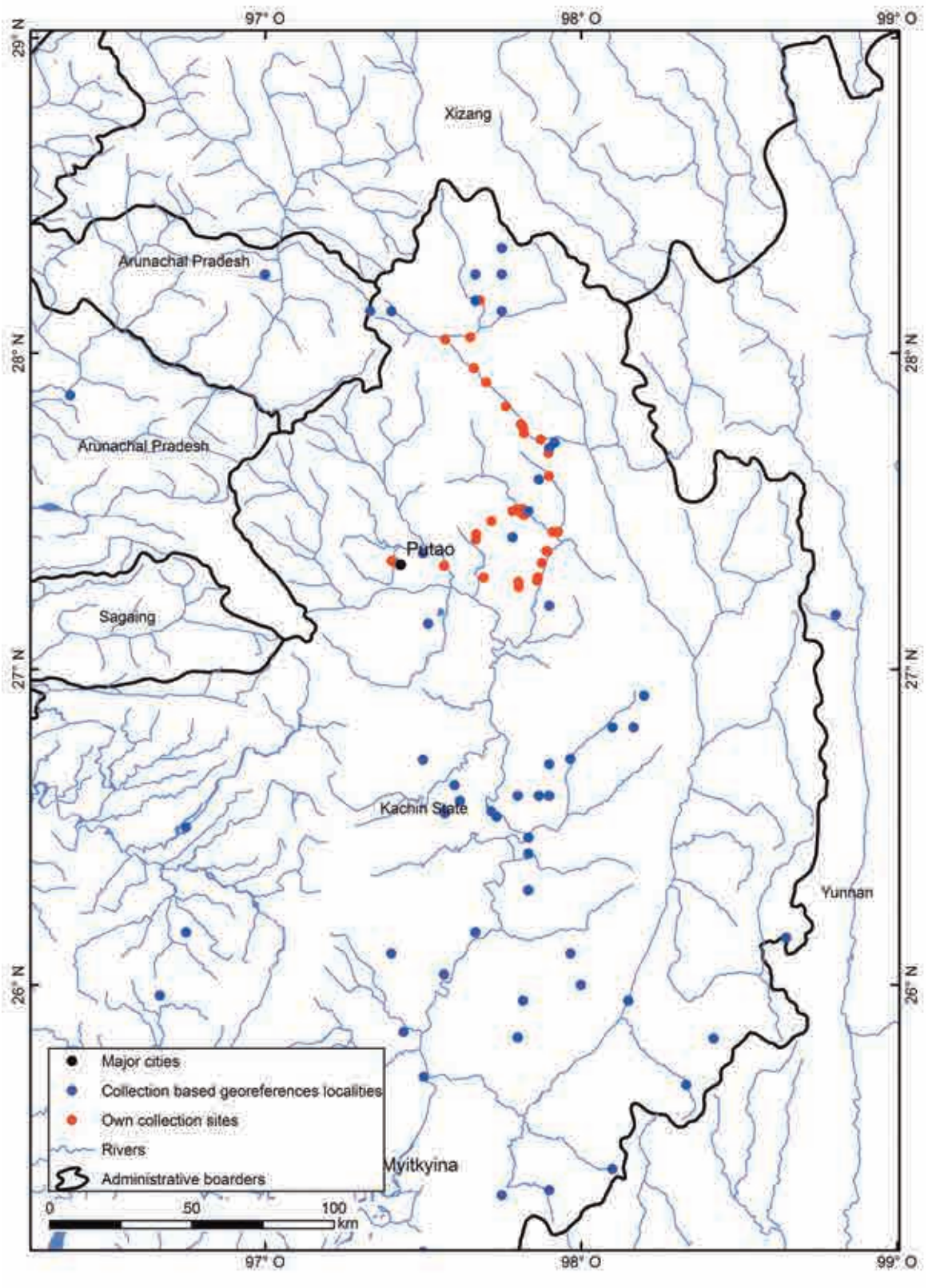

Fig. 1. Map of the Hkakabo Razi region between Putao and Mount Hkakabo Razi, the study region and focus of the monograph; the map is based on our own GPS-readings and GIS-based analyses from the 2001/2004/2005/2006 trips and collection based work.

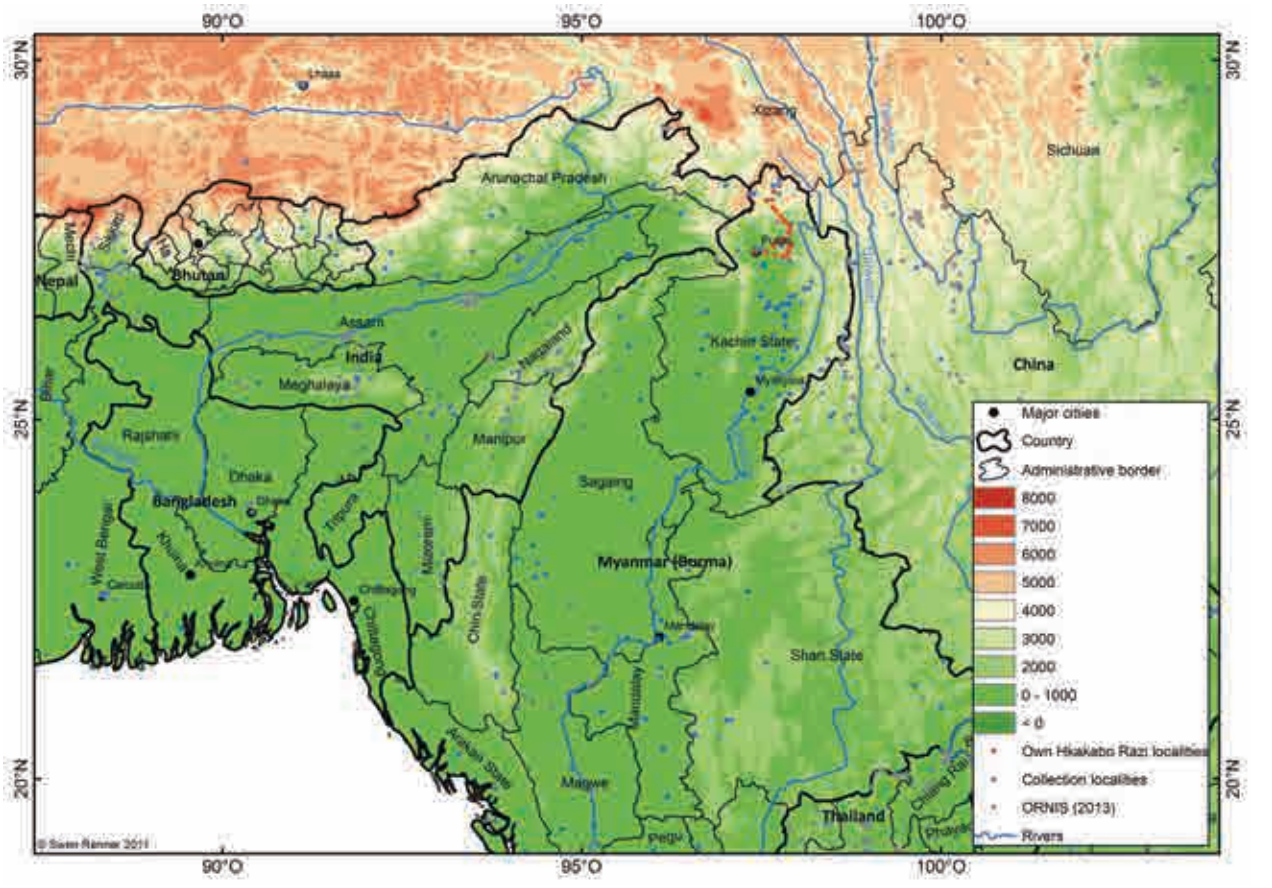

Fig. 2. Elevation and topography of the study area and the greater Himalayan and Southeast Asian regions, with major rivers and cities. Added are localities from our study (*red dots*) and collections (*blue dots*) which form the baseline for the analysis (further localities from ORNIS 2011 as *gray dots*).

Mung area, and up the Nam Tamai River valley to Tahaundam, a block extending from 26.0° to 28.5° North and 96.0° to 98.5° East. Most of the data presented are our own, but we include additional information from other sources, e.g. published information and specimen collections (we cite all sources as needed).

The dominant topographic features of the study area are the mountains, whose slopes ascend from 450 m around Putao up to 5,881 m at Mount Hkakabo Razi (the term 'razi' refers to glaciers or large snow fields; Figs 2, 4).

Locality names

Locality names provide significant challenges in Myanmar, because native Myanmar, English and German collectors transcribed the phonetic description of site names (also in at least five local idioms different from Burmese) as they understood them, which can be quite different from accepted current names. In Appendices 1 and 2, we show all spellings of the original names of which we are aware to facilitate finding the place names and give standardized transcription from Myanmar fonts (adapted and expanded from Thwin et al. 2011). A detailed discussion on the localities and an ornithological gazetteer are provided elsewhere (Thwin et al. 2011). Further names as derived from labels by Ronald Kaulback and John K. Stanford, the two most important bird collectors in the area (details below) are added in Appendix 2.

GEOLOGY

The geology of this region was formed by one of the most extraordinary geological events in the history of the planet. Roughly 200 million years before present (Mya), the Indian land mass broke away from Gondwanaland and began northward movement across the Indian Ocean at a rate of about 16 cm/year (Chatterjee et al. 2013). 55 Mya, the leading edge of the Indian plate (submerged under the Indian Ocean) began to wedge under a 2,400 km-long section of the southern Eurasian continental landmass that is present day Tibet, forcing it to rise. Northerly movement

Fig. 3. Rattan suspension bridge near Tazungdam in February 2001. [Renner February 2001]

by the Indian plate has continued to the present day; although it has slowed to 5 cm/year, resulting in elevation of the Tibetan plateau to nearly 8,850 m. This movement caused the formation of the Himalayan mountain chain along the boundary between the original Indian and Eurasian land masses (Dèzes 1999, Stampfli et al. 1998).

While uplift continues to be a significant cause of geologic change in the region, climatic factors associated with repeated advance and retreat of ice sheets have also had a major impact. It is estimated that as many as 30 'ice age' events may have occurred in the past three million years, each of which produced the advances of huge, glacial ice sheets, with accompanying gouging of the landscape. These events were followed during warming periods by the similarly dramatic effects of vast volumes of water flowing down the steep slopes, carving deep river gorges, and carrying immense amounts of alluvial deposits to surrounding lowlands. The most recent ice age is estimated to have peaked about 18,000 years before present (compare Denton et al. 2010).

Geological activity resulting from the northward movement of the Indian subcontinent, which caused the rise of the Himalayan and related ranges, takes a unique shape in Myanmar. Smythies (1953) describes the formation as a '?' in Myanmar (in our opinion these ranges surrounds almost all of northern Myanmar in an inverted U-shape). There are three larger mountain ranges in Myanmar: (1) the border mountains between northeastern India and

Fig. 4. Putao plains with rice paddies and snow covered mountains of Hponkan Razi Mountain Ridge in background. [Renner Dec 2013].

Myanmar (Chin Hills and Naga Hills) towards the northwest, stretching south into the Arrakan mountains. (2) The Gaolingonshan or Nu Shan (Dumbacher et al. 2011), which is the extension southwards of the Himalayan mountains along the Yunnan/Kachin State border – these mountains further extend southwards through the Shan plateau and ultimately terminate in the Fan Si Pan area of northern Vietnam. (3) The mountain ranges south of the Shan Plateau forming the Toak and other plateaus along the border between Thailand and Myanmar.

Our study region is located in the northern part of these mountain ranges within Myanmar, along the extreme eastern boundary between the Indian and Eurasian plates (Fig. 2), an area of spectacular hills, steep mountains, north-south valleys formed by some of the continent's greatest rivers and their tributaries (Irrawaddy, Than Lwin, Mekong, Yangtze; Fig. 1). Aung Win (1999) summarizes specific geological formations for the Myanmar portions of the region as follows: '*The northern part of Kachin State includes the largest tectonic unit in Myanmar. This region underlain by consolidated, partially low-grade metamorphic, Paleozoic and Mesozoic sediments and its substratum consisting of Precambrian crystalline rocks. Cretaceous sediments occur chiefly in the western part of this tectonic region, while Late Tertiary and Quaternary sequences surround its western marginal area and form the filling of inter-montane basins*.'

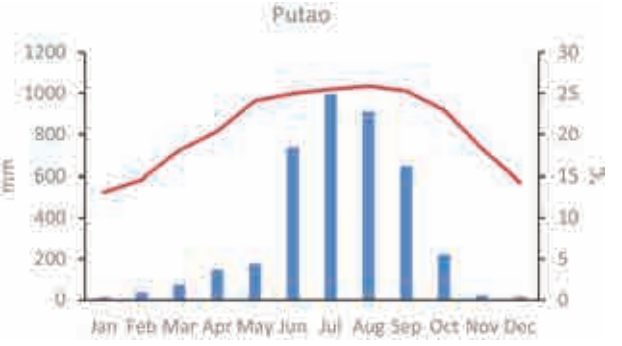

Fig. 5. Monthly mean precipitation and temperature at Putao Airport (450 m) (adopted from Müller 1996).

Fig. 6. Putao Plains with typical structure of rice paddies, huts and bush groups. [Renner February 2001].

CLIMATE

In addition to the remarkable geologic features associated with the movement of the Indian tectonic plate towards Eurasia, this event had a profound effect on regional climate and weather patterns. For instance, it has been hypothesized that the elevation of the Tibetan land mass forced by the northward movement of the Indian plate was a major causative element for ice ages that have occurred during the past 2.5 Mya (Kuhle 1998). According to this theory, the continental uplift disrupted planetary circulation and, perhaps, reduced atmospheric carbon dioxide through silicate weathering of the Himalayas (Filippelli 1997). Currently, the Earth is in a warm, inter-glacial period that began roughly 5,000 years before present after a long period of gradual warming commencing during the middle of the last ice age about 16,000 years before present (Barry 1983).

The present climate of the southeastern Himalayas and neighboring northern Myanmar results from a combination of the south Asian Monsoon, temperate continental westerlies, and orographic effects. The nearest regularly-monitored weather station is located at Putao airport (457 m), but data from this station are not archived, and are largely unavailable for long-term analysis. Temperature data collected from this station clearly demonstrate the continental, temperate influence on the region's climate, with high temperatures occurring during temperate summer (Jun to Sep) and lows during temperate winter (Dec to Feb; Fig. 5). In contrast, the rainfall pattern reflects the strong effects of the south Asian monsoon, with a pronounced rainy season occurring during the months of Jun to Sep, as occurs elsewhere over much of Southeast Asia. However, the climate data from the Putao station likely are not typical for the rest of the southeastern Himalayas (Müller et al. 1996), since Putao is located at the south-

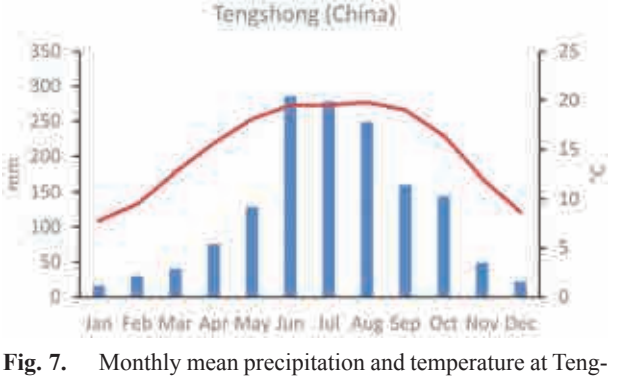

Fig. 7. Monthly mean precipitation and temperature at Tengshong, Yunnan, China (1,655 m), the next available dataset of climate for us (adopted from Müller 1996).

Fig. 8. Natural forest (background and other side of river) and slash-and-burn agriculture is a steady phenomenon but increases in the lower altitudes of Hkakabo Razi (particularly in the proposed 'Southern Extension'). [Renner Feb 2001].

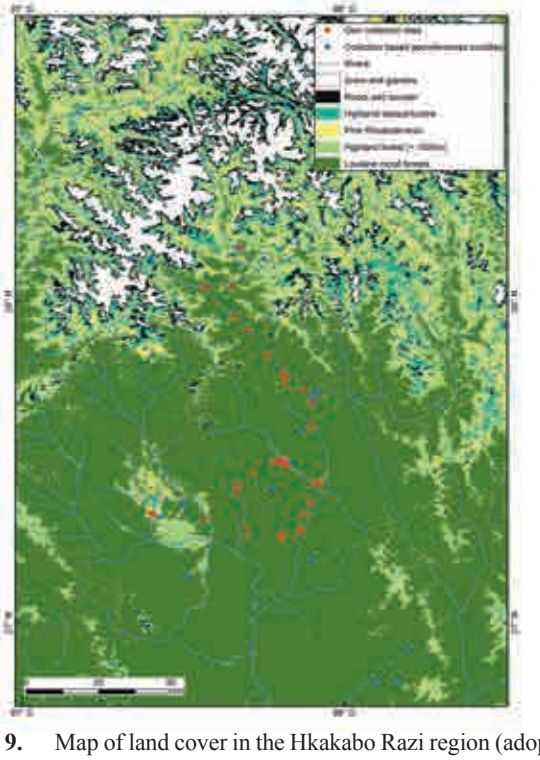

Fig. 9. Map of land cover in the Hkakabo Razi region (adopted and changed from Renner et al. 2007). Shown are all natural land cover types (Putao and Naung Mung Plains are therefore not developed areas in this case)

ern extremity of the area, in a broad, flat, and relatively low plain, much of which has been cleared of natural vegetation for agriculture (Figs 6, 8). The majority of the study area has higher elevations, and for these a Himalayan station like the one in Tengshong (Yunnan) is more likely to represent the climatic conditions of at least the highlands or our area (Müller et al. 1996). However, precipitation in Tengshong is generally far below that of the Hkakabo Razi region (Fig. 7). Thus, although there are no good datasets available, the weather of our study area is likely cooler and wetter than that of the Putao Plain (Fig. 5). Also, orographic effects become much more pronounced at higher elevations, with the most obvious evidence being the presence of year-round glaciers and snow fields at elevations >5,000 m (Fig. 9).

HABITATS

As indicated by the biogeographic analysis, habitats of the Southeast Himalayas can be separated into two major divisions based largely on elevation, along with slope, aspect, and, to some degree, latitude, namely: a 'Humid tropical/subtropical' division (<1,800 m), and a 'Continental temperate' division (>1,800 m).

(1) Humid tropical/subtropical habitats <1,800 m

Moist evergreen lowland forest

This habitat is lowland (<500 m), tropical and subtropical rainforest dominated by diverse assemblages of broadleaved evergreen trees, bamboo (*Arundinaria* sp.), lianas, dense herbaceous understory, and epiphytes (Fig. 10). The remarkable aspect of this rainforest is that it is essentially a tropical rainforest, not much different from forests found 3,000 km to the south (Myo Khin and Sein Aung 1999). These forests are a mix of tropical rainforests with small nested-in subtropical, broadleaf, and evergreen forest areas, 400 m to 1,000 m (Table 1 in Rappole et al. 2011b), merging at >500 m into hill forest. Most of the Hkakabo Razi area is located >500 m.

Fig. 10. Moist Evergreen Lowland Forest in Northern Myanmar. [Renner February 2001].

Fig. 11. Moist Evergreen Hill Forest in Northern Myanmar. [Renner February 2001].

Moist evergreen hill forest

The principal habitat type of the 'Humid tropical' division, as described by Myo Khin and Sein Aung (1999) is 'Moist evergreen hill forest' or, colloquially, 'hill jungle.' Found from about 500 m to 1,800 m in the region, this habitat type is similar in some respects in both structure and composition to 'cloud forest' (Figs 11, 12, 13), a form of mid-elevation, rainforest characterized by evergreen and semi-deciduous broadleaf trees, tree ferns, epiphytes, and woody lianas (Fig. 8). Unlike American cloud forest, several different species of bamboo compose here a dominant understory and mid-story presence. These forests also are remarkable for the number of tropical elements that persist to relatively high latitude and elevation. Hill Forests in the study area are temperate, semi-deciduous, broadleaf rainforest dominated by oak (*Quercus* sp.), laurel, and chestnut (*Castanea* sp.), 1,000 to 2,000 m (Table 1 in Rappole et al. 2011b).

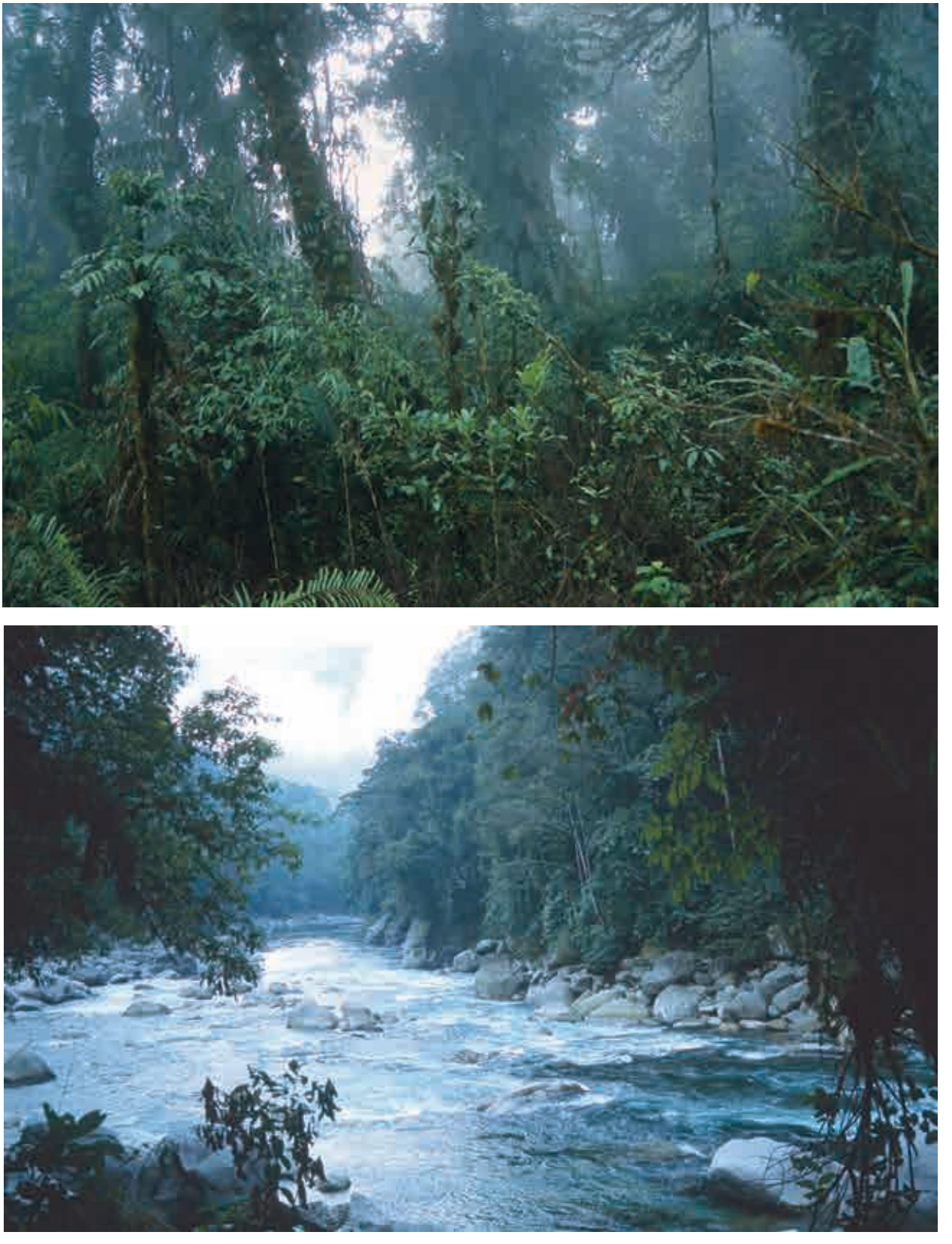

Fig. 12. Cloud forest close to Naung Mung. [Renner: a: Feb 2004, b: Feb 2001].

Fig. 13. 'Untouched' forests close to Tazungdam, with naturally occurring degradation through steep slopes (left on image). [Renner Jan 2014].

Second growth hill forest and riparian forests

Hill jungle seral stages are found near human settlements, along borders of agricultural fields, and along the banks of streams and rivers (Fig. 13). In addition to numerous specialized and widespread 'invasive' species, the second growth forest has increasing numbers of primary forest seedlings and saplings as it ages. Early stages can be nearly impenetrable thickets of shrubs and vines, at higher elevations these have been replaced by fern/shrub vegetation (Figs 14, 15, 16).

Developed areas and settlements

Developed areas include settlements, mostly very small with fewer than ten huts. In association with all settlements, there are paths, overgrown rice paddies (Figs 4, 6) and other agricultural fields (Rappole et al. 2011b, Renner et al. 2007). No settlements occur >1,500 m to our knowledge.

Rivers, streams, and associated wetlands

In addition to the principal rivers that cut through the region, e.g. Mali Hka River and Nam Tamai River, there are hundreds of feeder streams of varying sizes, providing a vast array of aquatic and/or emergent habitats, including sandy and muddy banks, shallow, rocky outcrops, pools, and ponds; marshes, swamps, flooded areas and cataracts (Figs 11, 12b, 13). All of these habitats are ephemeral due to the drastic changes that occur in water depth over the course of an annual cycle.

Fig. 14. Second growth Hill Forest in Northern Myanmar. [Renner February 2001].

Fig. 15. Second growth and development of fields near Tahaundam during early rainy season of March 2001. [Renner February 2001].

Agricultural
Rice (*Oryza sativa*), New World corn (*Zea mays*), and wheat (*Triticum aestivum*) are the principal crops for local farmers, with most farming restricted to <2,000 m (Figs 4, 14). Upland rice farming predominates in the lowland areas (<1,000 m); wheat and corn are grown at higher elevations (starting at about 900 m).

Lwin
Lwin is natural savanna and grassland, most of which is found on the open flatlands surrounding the town of Putao (Rappole et al. 2011b, Renner et al. 2007).

(2) Continental temperate habitats >1,800 m

Upper mixed evergreen and deciduous forest
At higher elevations from 1,800 m up to about 2,400 m, the forest becomes progressively more temperate or even alpine in nature, with increasing numbers of tree species typical of temperate deciduous forest (Fig. 16), e.g. oak (*Quercus* sp.), chestnut (*Castanea* sp.), maple (*Acer* sp.), alder (*Alnus* sp.), cherry (*Prunus* sp.), and birch (*Betula* sp.).

Fig. 16. Same as in Fig. 14 (right hand side on image is the same slope but taken from other side) in Jan 2014. The slope is covered by shrubs within a decade. In the background fern areas are visible without successful fire management schemes. [Renner Jan 2014].

Mixed deciduous and coniferous forest
There is no sharp division between this forest type and the preceding forest type. These mixed forests (Fig. 17) are the famous *Rhododendron* forests of the Himalayan highlands found from about 2,400 m to 3,000 m (Fig. 18). Five tree and shrub species of *Rhododendron* are found in these forests (mainly *R. tephropeplum*, *R. martirianum*, *R. megacalyx*, *R. madennii*, and *R. triflorum*) along with oak, bamboo, rowan (*Sorbus* sp.), crab apple (*Pyrus* sp.), blueberry (*Vaccinium* sp.) and other temperate shrubs, depending on slope and aspect (Khin & Aung 1999). Conifers become more frequent at the higher elevations, although pine (*Pinus* sp.) can be found as low as 1,500 m, we made single records even at 1,200 m (own observations).

Coniferous forest
Coniferous forest ('Alpine Spruce-Fir Forest' in Table 1 of Rappole et al. 2011b) is found from about 3,000 to 3,700 m depending on slope and aspect (Fig. 19). It is composed of Hemlocks (*Tsuga* sp.), firs (*Abies* sp.) and spruces (*Picea* sp.) with holly (*Ilex* sp.), dwarf-*Rhododendron*, and other hardy alpine plants in the understory along with carpets of moss, orchids, blackberry (*Rubus* sp.), blueberry, and lilies (*Clintonia* sp.) (Khin & Aung 1999).

Fig. 17. Upper mixed evergreen and deciduous forest. [Renner February 2001].

Fig. 18. *Pinus-Rhododendron* forest near Tahaundam (only pines visible on photo), Alung Dung Valley, Northern Myanmar. [Renner February 2001].

Fig. 19. Pines and forest near Tahaundam, Alung Dung Valley, Northern Myanmar. [Renner February 2001].

Alpine scrub and tundra

Low (<1 m), dense growths of dwarf rhododendron (*Rhododendron* sp.) and other scrub species found above the tree line at elevations from 3,300 m (down to as low as 2,700 m under some conditions) to 4,600 m (Fig. 20).

Snow fields

Snowfields cover much of the region >3,000 m for over half the year (Fig. 21). In winter, these snow fields, along with bare rock and scree, cover as much as 5 % of the total land area of the southern Himalayan region (Khin & Aung 1999).

Highland seral stages

Slopes along major river valleys of the Namai Hka and Nam Tamai River, as well as tributaries from the Adung valley, have been cleared of primary forest, evidently for firewood (Fig. 14). These slopes are covered with dense, low growths of bamboo, fern, and other shrub species (Figs 23a, b).

Fig. 20. Alpine scrub and tundra in Northern Myanmar. [Renner February 2001].

Fig. 21. Snow fields over Tahaundam, Alung Dung Valley, Northern Myanmar. [Renner February 2001].

Fig. 22. Cleared slopes in Alung Dung Valley, Northern Myanmar. [Renner February 2001].

Fig. 23. Pine tree with pine-rhododendron covered northeastern slope of Tahaundam: Slope north of Tahaundam in Feb 2001 which burned down the years before and was at the time of the photo covered by fern regrowth. [Renner Feb 2001].

HISTORY OF ORNITHOLOGICAL STUDIES

Botanists Francis Kingdon-Ward and George Forrest were the first field biologists to enter the southeastern Himalayas and make extensive collections, mostly during the period between 1904 and 1931, although Forrest focused mainly on areas east of the region in the Chinese province of Yunnan. Their principal aim was the discovery of new plants for British horticulturalists, but both collected birds in addition to plants, and Kingdon-Ward in particular was a keen observer of animal as well as plant life. His writings provide a great deal of ecological information in a vivid prose style (Kingdon-Ward 1921, 1923, 1937, 1939, 1941, 1945, 1948, 1956, 1960, Kingdon-Ward & Smith 1934, Kingdon-Ward et al. 1932). Kingdon-Ward traveled throughout eastern Tibet and northern Myanmar for several decades in the first half of the 20th century, generally alone or with a few indigenous porters or guides (and sometimes, his wife), often under appallingly difficult circumstances. Most of his bird work was done in collaboration with J. K. Stanford during the famous Vernay-Cutting expedition under the auspices of the American Museum of Natural History (AMNH) just prior to the outbreak of the Second World War (Stanford 1935, 1939, 1946, Stanford & Mayr 1940, 1941a, b, c, Stanford & Ticehurst 1935a, b, 1938a, b, c, d, 1939, Ticehurst 1938, 1939).

Stanford summarizes faunal inventory work done in northern Myanmar prior to the Vernay-Cutting expedition as follows: '*In January 1935 I was fortunate enough to accompany Mr. Arthur Vernay and Mr. S. F. Hopwood for the first few days of their expedition, which started from Nanyaseik in the Myitkyina district and proceeded northwestwards to the Chindwin. I then suggested to Mr. Vernay the possibility of his making a subsequent trip to the eastern part of the present Laukkaung (once Htawgaw) subdivision; the ornithology of these great mountains, which lie east of longitude 98° E and north and south of latitude 26° N, and which form the Nmai-Salween* [now: Namai-Salween or May Hka-Than Lwin] *watershed, was at the time known only more or less by inference from the collections and the scanty notes left by the late George Forrest, most of whose time had been spent in Yunnan. The country, first administered by Burma in 1911, was not unknown, thanks to the journeys of Pottinger, Barnard, Clerk, Kingdon-Ward, Farrer, and Cox, and various political tours by officers of the frontier service and military police. A few mammals, and still fewer birds, had been collected by Col. F. C. Lewis, the late Capt. E. Maxwell West, Captain Kingdon-Ward, and others at high altitudes in the Imaw Bum-Hpimaw neighbourhood; and I had also made a small collection between Htawgaw and Hpimaw, mainly in the spring of 1933, and received other birds from the area, which suggested that it had great possibilities of interest*' (Stanford & Mayr 1940, Liwn & Thwin 2003).

Ronald Kaulback made a bird-collecting expedition along the Nam Tamai River from Pangnamdim to Karon in 1938 to 1939, the results of which are mentioned briefly by (Ticehurst 1939). Kaulback himself also wrote up his travel but he was less precise in natural history findings as Kingdon-Ward (Kaulback 1937, 1938a, b). Bertram Smythies spent several months collecting birds in the Putao area in 1944 to 1945 and again in 1948 (Smythies 1940, 1953). Stanford collected over 5,000 specimens in all of Myanmar, but just 29 from our study area from several trips while 'securing' the Myitkyina-Putao, and Putao-Pangnamdim roads in 1931 to 1933, 1935, and 1936. Most of Stanford's specimens are from the Myitkyina-Kambaiti region further south (details below).

The largest historical collection with over 100 specimens (and an additional 200 or so from just south of our study area, what Smythies calls *The Triangle*), were left at the British Museum of Natural History (BMNH) by Lord Cranbrook (33 specimens from 1931) and Ronald Kaulback (96 specimens from 1931, and 1938 to 1939). Both studied intensively in our study area, and collected everything they could snare or shoot (as stated on label).

According to records from the Smithsonian National Museum of Natural History (NMNH) in Washington, D. C., several collectors made their way into northern Myanmar, although not to our specific area. Garthwaite and Smith collected extensively along the Myitkyina-Putao road in 1934. R. B. Payne visited Myanmar in Apr 1955, but he did not go further north than Myitkyina. A. W. Chennell accomplished several trips to the Naga Hills in Nagaland, the more southern border area between India and Northwest Myanmar, in 1876.

Kyaw Nyunt Liwn and Khin Ma Ma Thwin published 'Birds of Myanmar' in 2003, two versions of which are available, one in Myanmar and another in English. While this work is a very good start to promote birding and ornithology in-country, not all species are depicted, and data from the far north are few.

Smythies' famous 'Bird of Burma' (1953) is still the most thorough and comprehensive summary of information on the birds of Myanmar. While the 1st edition (1940) treats only some portions of Myanmar such as specifically the Yangon area and Tenasserim (Tanintharyi), the 2nd edition (1953) covers the entire country, and includes significant information from the far northern part. The book is based largely on the work of Stanford, Kaulback, Smith, Lord Cranbrook (in company with Kingdon-Ward), Forrest and Garthwaite. Smythies summarizes ornithological work in northernmost Myanmar as follows: '*Very little was known about the birds of this area until the 'thirties; then in 1931 Kingdon Ward and Cranbrook spent nearly a year in the Adung valley* […], *but the collection of 152 bird skins,* […] *added at least thirty mountain species to the Burma list.* […] *Stanford was posted to the charge of the Myitkyina district and from November 1932 to June 1936*

[…] *he collected 1,769 skins of 472 species* […]. *Stanford* […] *returned to the district in 1938–39 with the Vernay-Cutting expedition, which collected 1,505 specimens of 296 species in the Laukkaung subdivision and along the N'Mai* [Namai] *Hka valley to Laukkaung* […]. *In the same year, 1938-39, Kaulback spent some time in the Tamai valley, based in Pangnamdim* […], *and also in the Triangle; a collection of 260 specimens was sent home, and reported on briefly by Ticehurst (1939), but no field notes accompanied the collection. In* […] *1948 I spent three months in the Laukkaung subdivision, mostly in the area covered by the Vernay-Cutting expedition, and made a small collection which is now in the British Museum* […].'

METHODS

Information on the avifauna was gathered by personnel of the Hkakabo Razi National Park, under the supervision of Thein Aung (Aung 1998, 2002, Aung & Oo 1999). We also include audio/visual observations made by Thein Aung and his assistants and colleagues over a seven-year period during his tenure as Chief Warden of Hkakabo Razi National Park (Aung 1998, 2002, Aung & Oo 1999) starting in 1997. These data, in combination with information in major collections, were used to compile a complete list of the known avifauna for the region ('Species accounts'; Appendix 4 lists all of the bird species found in the region that we know of). We include all historic information that we could find in the literature (i.e. anything prior to our own field work, mainly from Kaulback, Stanford, Smythies, and Cranbrook), and specimen records from various collections.

Field work 2001 to 2006

We undertook our first major expedition into the southeastern Himalayan region of Myanmar (Fig. 1) in Feb and Mar of 2001 (two foreign scientists [Rappole & Renner], three Myanmar Forest Service wildlife biologists [Nay Myo Shwe, Kyi Aung, Kyaw Lin], four guides/translators, one trail boss [Tay Za], one cook, and 60 porters). This effort was the second major biological exploration undertaken in the area in recent times: the first was conducted from 2 Mar to 14 Apr 1997 (Khin & Aung 1999, Rabinowitz 2003) although little in the way of ornithological information was gathered on that journey. During our expedition, we gathered information on the bird community, based on observations and mist-net captures (12 m x 2.6 m, mesh 36 mm), and on the principal habitats using remote sensing, global positioning systems (GPS), geographic information systems (GIS), and ground-truthing (i.e. collecting habitat descriptions at specific GPS points along the route) resulting in a map of habitats for the region (Renner et al. 2007; redrawn and modified in Fig. 9). Each day during the trip began with two biologists setting out at 0700 h for the next way stop, usually located 8 to 16 km (three to six hour walk) from the previous one. At each stop, ten to 15 mist nets were set in primary habitats where possible. The other portion of the field team (four biologists) remained at the previous day's stop to check the mist nets for new captures, take the nets down, and then follow the other members of the team on to the next day's way stop, usually departing the previous stop by 1000 h. All team members worked at checking nets regularly and preparing specimens when not actually in-transit between sites. The nets were set no later than by 1300 h each day and taken down at 1000 h the following day for a total of 3,045 net-hours. Following this protocol, we set 15 mist nets at 19 localities and ten mist nets at 15 localities over the 30 days and 330 km (round trip) traversed by our party. Each bird species captured was photographed. Specimens of each regional plumage variation for all species were prepared as museum study skins. A tissue sample for each bird collected was also saved in DMSO preservative, and is stored at the Smithsonian Institution. In addition to collection data, ornithological observations were noted by all members of the biological team throughout the trip.

A second ornithological expedition was conducted in the region during Feb 2004 (Fig. 1). This trip involved two foreign scientists (Rappole and Renner), Myanmar Forest Service wildlife biologists (Nay Myo Shwe, Kyi Aung, A Jo, Tu Myint U, and Myint Kyaw), a trail boss (Aung Khin), a cook, two cook's assistants, and 15 porters. During this second trip, we spent most of our time mist-netting in the vicinity of the township capital of Naung Mung, and at the wayfarer's lodge at Nam Ti. We had a total of 25 mist nets, all 12 m x 2.6 m, and of different mesh sizes (26 mm, 30 mm, and 61 mm). Nets were set at five localities around the town of Naung Mung and at two localities near Nam Ti (Fig. 1). On most days, nets were opened at 0630 h and closed at 1630 h (first net). We left nets open all night (24 h) on one occasion at Naung Mung and on one occasion at Nam Ti. Each bird captured was collected as a museum specimen until we had a sample of at least five specimens representing each species captured. Thereafter, individuals of species with samples of more than five specimens were released except for those species for which we had questions concerning their identification or some other aspect of their biology. Specimens were saved as study skins, whole bodies preserved in formalin, skeletons, and/or tissue samples (Woog et al. 2010). A photo was taken of every species captured.

The third trip was conducted by Renner and Myint Aung in Sep 2005 during the rainy season. We encountered considerable difficulty on this trip, and Renner was severely injured (dislocated elbow). Hence just 52 specimens were prepared as museum specimens. Although this trip yielded comparatively few data, the specimens prepared are important since 80 % of these are first records for the region

of breeding or juvenile plumages previously unknown to science (Renner & Rappole 2011c). In addition, data from this trip provided the basis for description of a new taxon in *Tesia* (Renner et al. 2008) and revitalization of a second, *Cyornis magnirostris* (Renner et al. 2009).

Our most recent trips to the Putao-Naung Mung area included for review here were in Mar 2006 (Rappole, Renner, and Milensky) and Jul 2006 (Pamela C. Rasmussen). Specimens collected on these trips are stored currently in the Hlawga Park bird collection (Yangon). Methods used during the 2006 trips were similar to those used in previous trips. During the Mar 2006 trip, Rappole, Renner, and Milensky visited Maza, Naung Mung, and U Ring Ga. The principal objective of this trip was to obtain natural history information on *Jabouilleia naungmungensis* (Rappole et al. 2005, Rappole et al. 2008). The effort amounted to 22 netting days in three localities and 102 specimens. Rasmussen collected significant data on breeding populations during the Jul 2006 visit to Putao, Nam Ti, Naung Mung, and Maza. She collected a total of 108 specimens. Unfortunately, many of the specimens from the 2006 trips were destroyed by water leakage at the site where they were stored in Yangon in Apr 2008 due to Cyclone 'Nargis,' and are 90 % lost for science.

In this monograph, we summarize all available information on the ornithogeography of the Southeast Himalayas and sub-Himalayan area of northern Myanmar, supplementing data collected first-hand in the field during our trips from 2001 to 2006, using methods described above, with published literature, and data from specimens.

Data from museum collections

The central focus of our study was to determine the ornithological history of the Hkakabo Razi region. The principal method used for this purpose was to obtain specimens of as many of the avian species of the region as we could in order to compare them with the avifaunas of other regions by visiting major museum collections and examining the plumage and morphological characteristics to see which populations were most similar to those from Hkakabo Razi. The main regions with which we compared our birds were as follows: 1) elsewhere in the Himalayan highlands; 2) neighboring Yunnan and other portions of southwestern China; 3) temperate rainforest areas in the sub-Himalayan portions of Assam and Arunachal Pradesh in northeastern India; 4) Thailand and other portions of Southeast Asia; 5) neighboring portions of Myanmar to the south and west.

The chief collections consulted were the Smithsonian's National Museum of Natural History in Washington, D. C., the American Museum of Natural History in New York, (where most of the Vernay-Cutting expedition specimens are located as well as much of George Forrest's Yunnan collection), the British Museum of Natural History bird collection in Tring (where most of Stanford's earlier Myitkyina collections are located), and the Natural History Museum of Berlin (MfN). Nearly all of the museum work was performed by Renner. The museums visited include (alphabetical order by acronym):

AMNH – American Museum of Natural History, NY
ANSP – Academy of Natural Scieneces, Philadelphia
BMNH – British Museum of Natural History, Bird Collection, Tring
CAS – California Academy of Sciences, S Franscisco
MfN – Natural History Museum (*Museum für Naturkunde*), Berlin
NMN – Naturalis Natural History Museum, Leiden
NMNH – Smithsonian's National Museum of Natural History, Washington, D. C.
NMW – Natural History Collections (*Naturhistorisches Museum Wien*), Vienna
NRM – Natural History Museum, Stockholm
SMNS – State Museum of Natural History Stuttgart
ZMUC – Zoological University Museum Copenhagen

Identification and morphometrics

When doubt about specimen identification arose, we measured several morphometrics of the specimens, and compared the morphometrics with those from museum collections. If sufficient sample sizes were available, we proceeded with a statistical procedure (details below) to test on significant differences between the specimens from northern Myanmar and other populations. If differences were significant and plumage coloration supported these differences, we discussed whether the specimens should be placed in a new or different taxon.

To analyze morphometric variation between pools of specimens, bill length (BL), width (BW), and height (BH) were taken from the specimens. Bill length here is defined as the length between tip and proximal end of the nares (anterior culmen length; compare Eck et al. 2011). The height and width was measured at the nares (*operculum*) – however variation is large in bill width and height due to preparation procedures, and the drying of specimens forces the mandible and maxilla to change position. The wing (W) was measured from the tip to carpal joint, and was not flattened. The inner (Ti) and outermost (To) rectrix was measured from the tip to the base where the rectrix met the skin. The tarsi (T) were measured from the notch at the back of the intertarsal joint to the bend of the toe at the metatarsal joint. All measurements were taken with a digital caliper, and are given to the nearest of 0.5 mm. We measured normally the left side of each specimen, unless damaged (d), missing (miss), feathers in molt (m), or imperfectly closed bill (a, for agape).

To analyze morphometric variation, specimens from neighboring localities were pooled. Pools were not permitted to include samples from across major ecological barriers like wide rivers or large mountain ridges, which

have been shown to limit genetic exchange (*cf.* Mayr 1999) To compare the pools, an ANOVA was performed ($p \leq 0.05$) including the above-listed morphometric parameters. Visible differences between the Hkakabo Razi specimen pools from all other specimen pools were considered to be sufficient to describe a new subspecies when morphometrics suggested differences derived from genetic exchange suppression.

Land cover and land use mapping

Construction of the habitat map (Fig. 9) involved analysis of Landsat Thematic Mapper satellite scenes, dating from 1991 to 1996, each approximately 180 km on a side with pixel size of 30 m. These maps were obtained from the USGS EROS Data Center. Habitat classification procedures included: (1) georectification and georeferencing of all scenes; (2) scenes merged (mosaiced) to form a single image; (3) performance of an unsupervised classification using reflectance bands 1 through 6 (Isodata module, ERDAS Imagine 8.7) to assign all pixels into 60 spectral clusters; and (4) assignment of land cover values to each of the 60 spectral clusters. Land cover was characterized as forest, open, water, and bare (cloud cover, snow cover). Extent of each habitat was calculated following geographic information system procedures using ArcGIS 9.

RESULTS

A total of 441 bird species have been recorded for the region based on our investigations and that of previous workers for which we present species accounts (see below). A total of 152 species was observed during the 2001 trip for which specimens of 75 species (178 specimens) were obtained. During the second expedition into the region in Feb of 2004, a total of 202 species was observed and/or collected and photographed, and specimens of 56 species were obtained. In Sep 2005, another two-week field trip yielded 52 specimens of 27 species. In Mar 2006, we captured 51 species and documented 102 individuals with specimens. In Jun/Jul 2006, we captured an additional 60 species and documented 138 species audio visually (Rasmussen et al. 2011).

We also observed a total of 220 bird species during all our trips combined. The latter number is based on audio/visual observations in the region including the Putao Plain (mainly Thein Aung, Myint Aung, and Nay Myo Shwe), hence slightly extending our area of major interest. In addition, a land use map was made based on GPS readings taken in conjunction with descriptions of habitat for each site where position readings were taken (Fig. 1).

SPECIES ACCOUNTS

A basic summary of information on all species recorded for the region is provided in Appendix 4, including record type (specimen or observation) and habitat. For those species on which we were able to gather additional information, those data are provided in the accounts given below. The accounts are based on all available sources of information on birds of the area, as detailed above. The principal sources of data (Appendix 3 details the specimens that have been prepared) derive from specimens and observations collected during our trips into the southeastern Himalayan region in 2001, 2004, 2005, and 2006. We also include published literature on the region. The section treats all species we recorded, and describes regional differences and several new subspecies after review of 133 of our specimens (93 skins in 2001, 40 in 2004) exported and >8,000 examined specimens (museums and acronyms listed above).

Note: specifically for AMNH, BMNH and NMNH collections many more specimens are available than were entered in the database or mentioned herein by the time this publication went to press. Our main focus is on specimens collected in the Putao-Hkakabo Razi area (roughly anything northwards between 27° North in Kachin State, i.e. just south of Putao, towards the border with Yunnan, Tibet, and Arunachal Pradesh; Fig. 1). We estimate our coverage of ornithological collections to cover 99 % of the specimens collected in this particular area, and no other collections are known to us. Further large collections are available from Yunnan (Chinese institutions, BMNH, and Kansas University among others) and the Sundaic region to the south, which we hope to include in future analyses.

Documentation

All accounts (sight, song and capture records) are listed with locality of capture, special habitat, and further relevant attributes. For birds supported by specimen documentation, we include information on sex, date and exact locality code where appropriate, and additional ecological and natural history data as available.

Abundance

Indicated abundance of the species in the Hkakabo Razi region is estimated from captures and sight records. We use three abundance categories as defined below. Our abundance classification system differs from many others in that we do not include finer divisions of rarity such as 'scarce' or 'vagrant' because we did not consider available data sufficient. Indeed, the term 'rare' may simply reflect seasonal variation or a lack of data because of scarce observations only.

The meanings of the abundance categories used are as follows:
COMMON – Ubiquitous in specified habitat; high probability of finding several individuals (>5) in a day.
UNCOMMON – Present in specified habitat; high probability of finding a few individuals (<5) in a day.
RARE – Scarce in specified habitat, with only a few records per trip; low probability of finding the bird.

In addition to observational data for assessment of abundance, we include mist net data. We are aware that such data are difficult to quantify (Poulsen 1994, Remsen 1994, Remsen & Good 1996), however, they provide a much more accurate estimate of abundance for quiet, skulking species (probably half of forest-related birds during the non-breeding period) (Rappole et al. 1998). Therefore, we incorporate mist net data in our abundance estimates.

Several species which were observed prior to 1940 (according to Smythies (1953) and specimens found in collections) could not be documented during our work. We record these simply as 'present'. In addition we add several species which have been documented from neighboring areas (specifically Kambaiti and sites north of Myitkyina) but have not yet been recorded from Hkakabo Razi. We consider their presence there to be likely and therefore mention these records explicitly.

The residency status (resident, breeding, migrant, on passage and so on) for each of the 441 species is added in Appendix 4, and was adopted largely from Rappole et al. (2011b), except where new information is available, which we include in the Abundance section of the species.

Movement

Our field studies were done mostly in February and March, the coolest, driest periods of the year, and the time when roads and paths are most passable. We did have a field trip to Naung Mung in Jul (P. C. Rasmussen) and one in Sep (Renner), and, of course Thein Aung, as Chief Warden of the park, and his assistants visited Putao and Hkakabo Razi National Park during all seasons of the year for more than a decade (1997 to 2007). Nevertheless, data on movements for many species in the region are few or lacking. Actually, this situation is true for nearly all of Myanmar, and, indeed, for most of Southeast Asia. However, Rappole et al. (2011a) performed a five-year study (1996 to 2001) of bird movements in Myanmar's Central Dry Zone. In addition to data gathered during their study, this paper summarized as much information on movement for the species occurring at their study site (Chatthin Wildlife Sanctuary, 23.71° North, and 95.51° East) as they could find in the literature. Thus, in the 'Movement' section of the Species Accounts, we present the limited data on movements gathered during our years of study in the region, along with a summary judgment of movement status based on information from the literature, including the Chatthin Wildlife Sanctuary study. For this purpose, we use the following movement types:

1. Resident – Populations of these birds appear to be largely sedentary, although local changes in numbers may occur as a result of production of offspring, stochastic factors, or seasonal changes in social organization, e.g. mixed-species flock formation during non-breeding periods (King and Rappole 2001a, b, 2002).
2. Asian Palaearctic Migrant – Members of this group breed (May to Aug) in boreal and temperate regions of the Asian Palearctic and winter (Nov to Mar) in the Asian subtropics and tropics. They occur in the Hkakabo Razi region as transients (Sep to Oct, Mar to Apr) and/or winter residents (Nov to Mar).
3. Asian South Temperate/Himalayan or Altitudinal Migrant – Members of this group breed in South Asian mountains, including neighboring Myanmar or Tibetan peaks, and/or east Asian temperate regions and occur in the Hkakabo Razi lowlands (<1,000 m) as transients (Sep to Oct, Mar to Apr) and/or winter residents.
4. Subtropical Migrant – Members of this group breed during the dry season and early rainy season (Feb to Aug) in the subtropical lowlands (<1,000 m) of the Hkakabo Razi region and then become largely or entirely absent during the remainder of the year. Evidence from the literature (disappearance from a northern region coinciding with appearance in a southern region) suggests long-distance migration to the tropics.
5. Local/Regional Migrant – The species that fit this category are similar to those of the previous category (Subtropical Migrant) in that they breed during the dry season and early rainy season (Feb to Aug) of the Hkakabo Razi region and then become largely or entirely absent during the remainder of the year. The difference between members of this group and the previous group is that there is no evidence from the literature regarding where they might go during the non-breeding period.

It should be noted that, with the possible exception of the Asian Palaearctic Migrant category, the movement type assigned each species in our accounts should be considered hypothetical until sufficient data on movement have been accumulated to either confirm or change status.

Comments

This section includes observations regarding ecology, natural history, or taxonomy (e.g. sub-specific identification for those species for which sufficient examples and comparative material are available), or analysis of evident affinities. As appropriate, we mention taxonomic recommendations and observations on regional distribution patterns. All taxonomic notes and statements are based on morphometrics and plumage coloration.

A complete listing of all species encountered in the region is provided in Appendix 4. Only species for which

additional information is available are treated in our species accounts. The taxonomy and systematics follows largely Dickinson et al. (2003); however, there are exceptions where we follow other published sources (justified and specified in such cases) or in, two cases, describe new taxa.

PHASIANIDAE

Arborophila rufogularis **Rufus-throated Partridge.** Documentation: One individual (sex unknown) snared by local hunter at Nam Ti in 2004 (NT/04-1); second individual, a male, captured by local hunter on the west bank of the Nam Tisang River (14 Mar 2006). Abundance: Common (as reported to us by local hunters). Movement: Altitudinal migrant?

Arborophila atrogularis **White-cheeked Partridge.** Documentation: One individual was brought by a local hunter on 7 Feb 2004. He reported that he had captured the individual (snare) approximately 8 km west of Naung Mung. BMNH 1939.12.8.62 male adult, Ningma, Kaulback (15 Jan 1939); BMNH 1940.1.1.7 male adult, Paira Ga, Kaulback (3 Apr 1939); BMNH 1937.1.7.890 female adult, Sumprabum, Stanford (22 Jan 1933). Abundance: Uncommon as reported by hunters. Comments: The specimen captured in 2004 (# 04-058, stored in Hlawga Park, Yangon) is similar to *A. atrogularis*, but a black vertical bar divides the cheek into two white parts, instead of a dorsal white and ventral cinnamon part (Fig. 24). The three specimens in the NMNH show a more whitish to grayish rather than a cinnamon crown. The abdomen in the three museum specimens was white, fading into gray towards the sides. The back is darker with more prominent vertical black bars. In contrast, the Kachin bird has wings with larger black bars. Juveniles have a white teardrop-shaped pattern on underparts and coarser black spotting on the crown. The color variation may indicate subspecific differentiation, but more material will be required to make that assessment.

Bambusicola fytchii **Mountain Bamboo Partridge.** Documentation: BMNH 1941.12.1.780 female adult, Hkrang Hka, Stanford (Mar 1933). Abundance: Rare. Movement: Altitudinal migrant?

Tragopan blythii **Blyth's Tragopan.** Documentation: BMNH 1939.12.8.64 male adult, Anke, Kaulback (6 Apr 1939). Abundance: Rare. Movement: Altitudinal migrant.

Lophophorus impejanus **Himalayan Monal.** Documentation: Captured by villager in the mountains northwest of Tahaundam (Feb 2001). Abundance: Locally common. Comments: First record for Myanmar, most likely only within the extreme north of the Hkakabo Razi National Park at high elevations (>3,000 m) near Tahaundam and environs. Most of the more recent specimens in collections are caged birds or otherwise not from their natural range in the Himalayas (AMNH, BMNH).

Fig. 24. *Arborophila atrogularis* White-cheeked Partridge sample illustrating the differing coloration of the head (sides and superciliar stripe darker than usual). [Renner Feb 2004].

Lophophorus sclateri **Sclater's Monal.** Documentation: Captured female at Tahaundam (shot by local hunter, gonads destroyed; Feb 2001). Abundance: Locally uncommon to rare at higher elevations (>3,000 m) of the region. Hunters reported decreasing success when trapping for this species. Comments: All previous records of the species from Myanmar date prior to 1969. Our record shows that the species still exists in the high elevations of northern Myanmar.

Gallus gallus **Red Junglefowl.** Documentation: No specimen records. Domesticated form (*G. g. domesticus*) found in all villages in the region. Abundance: Unknown. If found in the wild, *G. gallus* will likely be limited in distribution to the lowlands and foothills south of Naung Mung and Putao. Comments: This bird was not recorded in Feb and Mar of 2001 and 2004 except for the domesticated form, but we observed the species frequently in the remote 'jungle hills' of the Naung Mung area during our

Sep 2005 trip (might have been the domesticated form). This discrepancy in observation could indicate local seasonal movement or changes in behavior associated with breeding.

***Lophura leucomelanos* Kalij Pheasant.** Documentation: Local hunters provided one specimen in 2001 and another individual in 2004. BMNH 1939.12.8.74 [male] adult, Naung Mung, 762 m at 27.5° North 97.83° East (no locality name provided on label besides coordinates), collected by Kaulback (9 Dec 1938); BMNH 1939.12.8.75 [female] adult, Htingnan, Kaulback (5 Jan 1939); BMNH 1939.12.8.73 [male] adult, Htingnan, Kaulback (5 Jan 1939); BMNH 1939.12.8.76 [female] adult, Htingnan, Kaulback (9 Jan 1939); BMNH 1941.12.1.764 [female] adult, Sumprabum, Stanford (21 Dec 1932); BMNH 1941.12.1.791 [female] adult, Hpunchankha, Stanford (23 Jan 1933). Abundance: A shy species found in small groups. Hunters reported that the species is rare but nevertheless they had the chance to capture *L. leucomelanos* several times. The number of historic records may indicate a reduced abundance as compared with the present. Comments: *L. l. williamsi* occurs in north and west Myanmar; this subspecies is distinct from the other subspecies (Rasmussen & Anderton 2005). In East Myanmar, hybridization with *L. nycthemerus* has been reported (Smythies 1953, Stanford & Ticehurst 1938b). According to Smythies (1953), this species is easy to hunt by skilled hunters. In Myanmar, it is widespread but becoming scarce – Hkakabo Razi might be the last stronghold for the country, but numbers are also declining here as reported by local hunters. Formerly widespread throughout mountainous regions in Southeast Asia.

***Polyplectron bicalcaratum* Gray Peacock-Pheasant.** Documentation: BMNH 1938.12.8.69 female adult, Lunghkang Ga, Kaulback (13 Jan 1939); BMNH 1939.12.8.72 female adult, Sumprabum, Kaulback (17 Jan 1939); BMNH 1939.12.8.70 female adult, Ratnamhti, Kaulback (11 Dec 1938); BMNH 1939.12.8.66 female adult, Gam Majaw, Kaulback (17 Mar 1939); BMNH 1938.12.8.68 male adult, Lunghkang Ga, Kaulback (13 Jan 1939); BMNH 1938.12.8.67 male adult, Htingnan, Kaulback (1 Feb 1939); BMNH 1939.12.8.71 male adult, Sumprabum, Kaulback (17 Jan 1939); BMNH 1941.12.1.891 [male] adult, Hkamko, Stanford (no date). Abundance: Common.

ANATIDAE

***Asarcornis scutulata* White-winged Duck.** Documentation: Seen along Nam Tamai River around Nagwa (2001) and at the Nam Tamai River around U Ring Ga (2006). Abundance: Uncommon.

***Dendrocygna javanica* Lesser Whistling Duck.** Documentation: Observed in wetlands at lower elevations, specifically Naung Mung (Jul 2006). Abundance: Uncommon. Smythies (1953) reported heavy hunting of this species in in the Myitkyina area with resulting population declines. Nevertheless this is a widespread species in Myanmar. Movement: Local/regional migrant. Comments: All specimens from Thailand, northern Myanmar, or Nicobar Islands in the collections we visited showed no geographic variation in plumage characteristics. Occurs regularly in the Putao plains in habitats of shallow, still waters.

***Tadorna ferruginea* Ruddy Shelduck.** Documentation: Observed along Namai Hka River in 2001. Abundance: Asian Palaearctic Migrant – common winter visitor along rivers in the Hkakabo Razi area.

***Anas poecilorhyncha* Indian Spot-billed Duck.** Documentation: Observations on rivers north of Pangnamdim; between Gawai and Tazungdam (21 Feb 2001). Abundance: Uncommon at lower elevations (<1,000 m). Comments: *A. p. zonorhyncha* occurs in northern Myanmar from Myitkyina north.

***Mergus merganser* Common Merganser.** Documentation: Several sight records of male and female foraging near the suspension bridge of Naung Mung along the Nam Tisang River on 5 Feb 2004 and three individuals on 6 Feb 2004. Also sighted at Kasaung Hka River on 13 Feb 2004. Abundance: Asian Palaearctic Migrant – common winter visitor in northern Myanmar.

CICONIIDAE

***Ephippiorhynchus asiaticus* Black-necked Stork.** Documentation: Observed at Nam Tisang River (9 Feb 2001). Abundance: Rare. Comments: Two subspecies, one in Asia (*asiaticus*) and one in Australia (*australis*). In Myanmar formerly a widespread species but current status is unclear (BirdLife International 2003, Robson 2000). It is probable that this forest species is a common breeding bird in the vast forests of northern Myanmar. The Hkakabo Razi area is considered as a northern frontier of the species, but it has been recorded also east and west from there in the past.

PHALACROCORACIDAE

***Phalacrocorax niger* Little Cormorant.** Documentation: Sight records at Kasaung Hka River on 13 Feb 2003. Abundance: Common along rivers, mainly <1,500 m. Comments: At least in the northern parts of Kachin State,

P. niger is still common along the rivers and lakes in winter. A formerly widespread species in Southeast Asia.

***Phalacrocorax carbo* Great Cormorant.** Documentation: Observed several times along all major streams (Mali Hka River, Nam Tisang River, Nam Tamai River) usually flying along the rivers in small groups of up to nine individuals (4 Mar 2004). One individual seen on the river at Naung Mung (Nam Tisang River) on 10 Feb 2004. One individual at net site Kasaung Hka River on 13 Feb 2004 and on 11 Feb 2001 near the suspension bridge of Naung Mung. Additional records from between Nagwa and Wangsewan (19 Feb 2001), near Gawlai (20 Feb 2001), near Karaung (23 Feb 2001), Tahaundam near the river (25 Feb 2001), near Gawai (1 Mar 2001), and between Naung Mung and Maza (10 Mar 2001). Abundance: Common; almost daily observations when working along the larger rivers. Comments: A broadly-distributed species occurring across much of Southeast Asia where larger areas of water bodies are, but locally very unevenly distributed. The subspecies *P. c. sinensis* occurs in Myanmar. All observations involved small flocks of a few individuals. Previously, *P. carbo* was reported from Myanmar only in the south and Tenasserim (Liwn & Thwin 2003). Robson (2000) reported that *P. carbo* no longer occurs in Myanmar; however our data suggest that at least in the north of Myanmar, the species is still common.

ACCIPITRIDAE

***Elanus caeruleus* Black-shouldered Kite.** Documentation: Near Alung-dung Ku (9 Feb 2001). Abundance: Uncommon.

***Spilornis cheela* Crested Serpent Eagle.** Documentation: Recorded between Putao and Alung-dung Ku (9 Feb 2001). Abundance: Uncommon. Comments: *S. cheela* was observed several times in the low elevation parts of the Hkakabo Razi region above dense forests and slopes.

***Accipiter badius* Shikra.** Documentation: Observed at lower elevations near Naung Mung. Abundance: Rare.

***Accipiter virgatus* Besra.** Documentation: One captured in Gawlai. Also observed between Shinshanku and Gawlai (7 Mar 2001). One female captured on west bank of Nam Tisang River, near Naung Mung (8 Mar 2006). Abundance: Uncommon.

***Buteo buteo* Common Buzzard.** Documentation: One near Karaung (23 Feb 2001). Abundance: Uncommon (in winter). Movement: Asian Palaearctic Migrant wintering in higher parts of the Hkakabo Razi region.

GRUIDAE

***Grus antigone* Sarus Crane.** Documentation: Observed (Milensky) and photographed in two groups of birds totaling 65 individuals flying over on 12 Mar 2006 at U Ring Ga. Abundance: Rare. Comments: This species has been rarely reported form Myanmar. The first, and for a long time, the only record for the country was reported by Rippon (1896) with no collection details other than 'Kalaw' (locality not unambiguously geo-referenced; Bezuijen et al. 2010). The status of *G. anitgone* is unclear in Myanmar, but we confirm with our sighting that the species occurs in northern Myanmar, perhaps breeding in the Putao-Naung Mung area.

CHARADRIIDAE

***Vanellus indicus* Red-wattled Lapwing.** Documentation: Two observations at Kasaung Hka River (14 Feb 2004) near Naung Mung rice paddies. Abundance: Rare. Movement: Local/Regional Migrant – non-breeding population moves seasonally.

COLOMBIDAE

***Streptopelia orientalis* Oriental Turtle Dove.** Documentation: Ten individuals observed near a rice paddy sitting in a bush, 3.2 km south of Nagwa (4 Mar 2001). Abundance: Common. Comments: The subspecies *S. o. orientalists* is found in Yunnan and northern Myanmar. In India, Rasmussen & Anderton (2005) divide the species into two forms: a northwestern form (*meena*), which is migratory and a northeastern form (*agricola*), which is resident, but with local movements.

***Streptopelia decaocto* Collared Dove.** Documentation: Observed near rice paddies at several sites along travel routes. Abundance: Common. Comments: Smythies (1953) believed that *S. decaocto* was restricted to the dry zone of the central plains in Myanmar, not occurring in northern Kachin State. A cline in plumage coloration may occur with larger and darker individuals in northwestern India, and to smaller paler individuals in Myanmar (Rasmussen & Anderton 2005).

***Streptopelia tranquebarica* Red-collared Dove.** Documentation: One sight record from Naung Mung near rice paddies on 11 Feb 2004. Abundance: Uncommon. Comments: The subspecies *S. t. humilis*, which is paler than the nominate form, has been recorded in Myitkyina.

***Streptopelia chinensis* Spotted Dove.** Documentation: One individual was observed along the path from Naung

Mung to Maza, approximately 2 km west of Naung Mung (10 Mar 2001). Abundance: Uncommon.

***Macropygia unchall* Barred Cuckoo-Dove.** Documentation: A small flock was observed between Shinshanku and Gawlai (7 Mar 2001). Abundance: Common. Comments: Sexual dimorphism is clearly developed. Juveniles resemble the adult female in coloration.

***Chalcophaps indica* Emerald Dove.** Documentation: One immature individual was captured in Nam Ti at site NT/04-2 (equals NT/01-1). BMNH 1939.12.8.5 male adult, Lunghkang Ga, Kaulback (13 Jan 1939). Abundance: Common. Comments: At least three subspecies are clearly differentiated by plumage: *C. i. indica* and *C. i. augusta* have differing chin and head colorations.

***Treron apicauda* Pin-tailed Green Pigeon.** Documentation: Tail feather found near Nam Ti (7 Sep 2005). Abundance: Rare. Movement: Seasonal movement in Myanmar.

***Treron sphenura* Wedge-tailed Green Pigeon.** Documentation: Observed near Maza. Abundance: Uncommon. Comments: Three subspecies recognized with the nominate occurring in Hkakabo Razi and Yunnan. The only *Treron* species recorded from Yunnan according to Smythies (1953), but *T. apicauda*(*ta*) and *T. phoenicoptera* have been recorded in Yunnan since.

***Ducula badia* Mountain Imperial Pigeon.** Documentation: BMNH 1939.12.8.302 Htingnan, Kaulback (8 Jan 1939); BMNH 1932.12.10.80 male adult, Hpunchan, Cranbrook (11 Dec 1931); BMNH 1939.12.8.1 male adult, Gam Majaw, Kaulback (17 Mar 1939). Abundance: Uncommon.

CUCULIDAE

***Surniculus lugubris* Asian Drongo-Cuckoo.** Documentation: One adult, in Naung Mung (Jul 2006). Abundance: Uncommon. Movement: Subtropical Migrant. We found none from Jan to Mar or during Sep, but our Jul record indicates that the species breeds in the area while leaving to winter elsewhere. Comments: Likely two species on the Indian subcontinent (Rasmussen & Anderton 2005). Our specimens are from *S. lugubris*, but the range is not resolved for *S. lugubris sensu lato*. A species of northeast India.

STRIGIDAE

***Otus bakkamoena* Collared Scops Owl.** Documentation: One capture at NT/04-2. Several calling individuals were heard in Naung Mung at dusk. BMNH 1940.1.1.3 adult, Anke, Kaulback (27 Mar 1939). Abundance: Common. Movement: Asian South Temperate/Himalayan or Altitudinal Migrant. Northern populations breed in the Himalayas and winter south in the lowlands of Myanmar (and likely other areas in Southeast Asia). Comments: Robson (2000, 2008) states that there are many subspecies and that the pattern is complex, indicating that he is not satisfied with the described taxa. The main problems are the slight and almost invisible distinctions between subspecies and the occurrence of color morphs complicating the effort to enlighten the species' systematics and biogeography. According to Holt et al. (1999), *O. bakkamoena* does not occur in northern Myanmar. Most northern records for the species are from Southwest Bengal, and most eastern records are from the western border of Nepal in the Himalayas. Unfortunately, we could not export our specimens, but the individuals were identified as *O. bakkamoena* to the best of our ability in the absence of comparative material given the discrepancies and variations in plumage described in Robson (2000) and Rasmussen & Anderton (2005).

***Otus scops* Oriental Scops Owl.** Documentation: Two captured in 2001 at Nam Ti in second growth near forest. One male captured near the U Ring Ga rest house (19 Mar 2006). Abundance: Common. Comments: Fourteen subspecies have been described for both taxa *sunia* and *scops* (each seven). The taxonomy is still under discussion (compare Dickinson et al. 2003, Holt et al. 1999) (Inskipp, Dickinson pers. com. 2011). Labels made by S. D. Ripley from northern India indicate that there are several different color morphs. Two specimens captured by Ripley, both at the same locality in early Jan 1985, had different overall coloration: e.g. USNM 234234 was labeled with the remark 'rufous phase' and USNM 234234 was labeled with 'dark gray phase'. A revision of *Otus* with all taxa included is still to be done. As in many other plumage-cryptic species, the biological species concept seems to fail here in the meaning that it cannot deliver the answers whether or not a given taxon is a species, subspecies or superspecies and how to easily identify in the field. Rasmussen & Anderton (2005) recognize four subspecies and divide the nominate form into western and eastern Himalayan parts. The ranges of the two taxa *modestus* and *malayensis* overlap in northern Myanmar/Yunnan. Smythies (1953) was not sure about the presence of the species north of Myitkyina. Otherwise it is reported as common in the more wooded parts of Myanmar, especially in Shan State.

***Glaucidium brodiei* Collared Owlet.** Documentation: Captured at Naung Mung (NM/01-1, NM/04-1, also at same site in 2006). BMNH 1937.1.7.753 female adult, Nawngkhai, Stanford (5 Jan 1933); BMNH

1941.5.30.1566 adult, Ticehurst (Mar 1933); BMNH 1937.1.7.755 adult, Kawapang, Stanford (16 Dec 1932). Abundance: Uncommon. Comments: Two specimens of *G. brodiei* (2004-014, 2004-054) were captured in 2004. Each specimen showed distinctive plumage coloration. 2004-014 is overall gray with a light brownish tinge in plumage. 2004-054 is overall completely reddish-brown to light rufous. Apart from the different plumage patterns the specimens are comparable in measurements. The overall brownish to reddish specimen represents a lighter colored morph, while the brighter and grayer morph is frequently present in the collections (NMNH holdings: 21 specimens). Out of the collection, four specimens had also a slightly brownish plumage pattern mostly around the abdomen. Nevertheless, the specimens showed less than 40 % of the total plumage in brown. Holt et al. (1999) mention that there are different morphs: rufous, chestnut and gray-brown morphs. An entirely gray form has not previously been mentioned. Sometimes *G. brodiei* is believed to be part of a super-species with *G. passerinum*, *G. perlatum*, *G. gnoma* and *G. californicum*. DNA analysis clearly separate at least the first and the latter species (Holt et al. 1999).

***Glaucidium cuculoides* Asian Barred Owlet.** Documentation: Captured in Lonnat 5 Mar 2001. Abundance: Rare. Comments: Eight subspecies, sometimes ten (Peters 1931). Two subspecies are clearly recognizable by coloration. *G. c. deignani* (more gray) and *G. c. brügleri* (more rufus to brown). *G. c. whiteley* in northern Myanmar shows almost no difference from the other subspecies but resembles more the rufus/brown '*brügleri*.' The subspecies could also be considered as morphs as reported frequently before from other *Glaucidium* species (Holt et al. 1999). Holt et al. (1999) state that *rufescens* ranges in northern Myanmar, however, coloration of our specimen does not allow subspecies determination.

CAPRIMULGIDAE

***Eurostopodus macrotis* Great Eared Nightjar.** Documentation: One individual was recorded at dusk in Naung Mung (near 'TV Station'; 9 Mar 2001). Abundance: Most likely a common bird in the region (we did not do standardized netting/observations during the night, so abundance cannot be determined well for this species). Comments: *E. m. cervipennis* is the representative subspecies in northern Myanmar/Yunnan.

APODIDAE

***Aerodramus brevirostris* Himalayan Swiftlet.** Documentation: Observed along route from Tazungdam to Gawai over Namai Hka River, 1 Mar 2001; seen in Naung Mung area (Jul 2006). Abundance: Uncommon. Movement: Himalayan Altitudinal Migrant. Observed on passage in the Hkakabo Razi region. Comments: Several subspecies are described (Robson 2000, Smythies 1953), but revision is needed. The status of *brevirostris* in northern Myanmar is claimed to be uncertain (compare Robson 2000, 2008), but we recorded the species during the late winter in the northernmost valleys of the Hkakabo Razi region quite regularly in small flocks, indicating presence in the area. Likely, *A. brevirostris* is a resident in the Putao-Naung Mung area (more data needed).

***Hirundapus giganteus* Brown-backed Needletail.** Documentation: BMNH 1937.1.7.809a adult, Sumprabum, Stanford (1935); seen in Naung Mung area (Jul 2006). Abundance: Uncommon.

***Cypsiurus balasiensis* Asian Palm-Swift.** Documentation: Six individuals were observed entering nest sites in the guard shack at the Nam Ti rest house (6 Mar 2001). The species was NOT observed at any site during the Sep 2005 trip. BMNH 1939.12.8.35 female adult, Chatihka, Kaulback (18 Apr 1939); two captured in Nam Ti (Jul 2006); seen and heard in Naung Mung area (Jul 2006). Abundance: Common. Movement: Local/Regional Migrant? The lack of observations for this common species during Sep, may indicate at least local movement. Comments: *C. balasiensis* is common around the villages in the valleys and often uses the huts of local residents as nest sites. The nest is attached either to thatched roofs or under the floor (the houses are generally built on stilts at least 1 m above the ground, normally 2 to 3 m).

TROGONIDAE

***Harpactes erythrocephalus* Red-headed Trogon.** Documentation: Shot by a porter (sling-shot) during the stay at Nam Ti near the guest house in 2001. Also captured in NT/04-1. Feather remains were found near Naung Mung (approximately 1.5 km southwest of the center) on 9 Feb 2004 and many sightings during all trips from Nam Ti towards Naung Mung and towards Pangnamdim. Three captured in Naung Mung (Sep 2005); one subadult in Naung Mung (Jul 2006). Abundance: Locally common in forests in the southern parts of the region. Comments: *T. e. helenae* ranges in northern Myanmar/Northeast Assam. *T. erythrocephalus* inhabits the southern slopes of the Himalayas and is an Indian sub-continental element.

***Harpactes wardi* Ward's Trogon.** Documentation: In subtropical forests around Naung Mung and Nam Ti. Abundance: Rare. Comments: The assumption by Robson (2000), that the species is extinct in Myanmar ('no recent

records') is henceforth incorrect. We documented *wardi* in the low to medium altitudes (foothills) several times during our 2001 to 2006 surveys. Specimens are rare in collections, e.g. the NMNH has just one in its holdings.

CORACIDAE

***Eurystomus orientalis* Dollarbird.** Documentation: BMNH 1937.1.7.830 male adult, Suphka, Stanford (16 Mar 1934); BMNH 1938.12.8.23 male adult, Nam Tamai River Valley at 27.70° North 97.90° East, Kaulback (18 Aug 1938); BMNH 1938.12.8.25 female adult, Nam Tamai River Valley at 27.70° North 97.90° East, Kaulback (9 Aug 1938); BMNH 1938.12.8.24 female adult, Nam Tamai River Valley at 27.70° North 97.90° East, Kaulback (1 Sep 1938). Abundance: Uncommon.

ALCEDINAE

***Alcedo meninting* Blue-eared Kingfisher.** Documentation: Sight records at a side branch of the Nam Tisang River (5 Feb 2004, 6 Feb 2004, 9 Mar 2001); one immature in Putao (Jun 2006). Abundance: Uncommon along the rivers and streams at lower elevations. Comments: Smythies (1953) contradicts himself and states that this species only reaches southern Myanmar (Pegu Yomas); elsewhere, he states that the species is widespread and uncommon to locally common in Myanmar. In our study area, *meninting* was common along the smaller and faster flowing streams.

***Alcedo atthis* Common Kingfisher.** Documentation: Netted at Nam Tisang River near Naung Mung on 12 Feb 2004. BMNH 1937.1.7.31 male adult, N'ding, Stanford (17 Feb 1936); BMNH 1937.1.7.876 male adult, Hpunchan, Stanford (22 Jan 1933); seen/heard on several occasions in the Naung Mung area (Jul 2006). Abundance: Rare along the rivers along the rivers at lower elevations. Comments: The taxon *bengalensis* appears in northern Myanmar south to Mandalay and in Arunachal Pradesh. Altitudinal records have been made up to 1,830 m (Robson 2000) but the general breeding altitude is far below and probably not exceeding 1,000 m. Records >1,000 m are generally in regions where the species is not expected to breed (NMNH data).

***Alcedo hercules* Blyth's Kingfisher.** Documentation: One netted on 13 Feb 2004 at Nam Tisang River, approximately 1 km west of Naung Mung. One sight record in the same vicinity on 10 Feb 2004. One male netted at U Ring Ga rest house (19 Mar 2006). Abundance: Common along rivers. Comments: The collection holdings of the NMNH, BMNH, and ANSP had too few specimens to draw any conclusions on differences of the specimens collected in Hkakabo Razi. The Hkakabo Razi area will be an important refuge for the species due to the large areas of remaining habitat (unpolluted larger rivers accompanied by evergreen forests – however gold mining in the lower parts close to Putao started in 2008). Holdings at the AMNH and BMNH indicate no noticeable geographic variation within the species in the Himalayan area.

***Megacryle lugubris* Crested Kingfisher.** Documentation: Two individuals were recorded 1 km west of Naung Mung at the Kasaung Hka River (12 Feb 2004) as well as single individuals on 11 Feb 2004 and 13 Feb 2001; BMNH 1939.12.8.26 male adult, Sumprabum, Kaulback (22 May 1939); BMNH 1937.1.7.880 male adult, Nawngkhai, Stanford (5 Jan 1933); BMNH 1937.1.7.881 adult, Putao, Stanford (Oct 1933); one adult captured in Putao (Jul 2006). Abundance: Common. Comments: 27 specimens in the NMNH show only minor plumage differences. We show for the first time that *M. lugubris* is common in the Hkakabo Razi area; *M. lugubris* had not previously been observed in northern Myanmar. It is common elsewhere in the Himalayas near rocky streams (Rasmussen & Anderton 2005).

MEROPIDAE

***Nyctyornis athertoni* Blue-bearded Bee-eater.** Documentation: Sight record (5 Feb 2001) Southwest of Naung Mung; BMNH 1939.12.8.29 female adult, Htingnan, Kaulback (30 Jan 1939); BMNH 1937.1.7.706 adult, Putao, Stanford (Jan 1935); several seen and heard in Naung Mung area (Jul 2006). Abundance: Locally common. Comments: *N. a. athertoni* occurs in northern India, Myanmar and Thailand, and shows no visible geographical variation. *N. athertoni* typically does not reach elevations >1,500 m, and most times is to be found far below in the foothills of the region and throughout its range.

UPOPIDAE

***Upupa epops* Common Hoopoe.** Documentation: 10 Mar 2001 near Naung Mung, approximately 2 km along the track to Maza. Abundance: Locally common. Comments: *U. epops* was observed foraging during 2001 and 2004 expeditions in open areas near Naung Mung. *U. epops* was not observed during summer (2005), but was observed around the fields of Htang-Ga in Jul 2006, indicating year-round residency.

BUCEROTIDAE

***Buceros bicornis* Great Hornbill.** Documentation: Observed between Shinshanku and Gawlai (7 Mar 2001); and Naung Mung (Jul 2006). Abundance: Rare, mainly <1,200 m. Comments: The species of hornbills found by us in the region are easy to distinguish and have been observed several times at different localities at lower elevations (<1,200 m) in the Hkakabo Razi region. All hornbills are uncommon to common in the region, and still find large areas of suitable habitat (comparatively few hunters, high canopy with many trees suitable to provide natural tree cavities, many fruiting and masting trees).

***Aceros nipalensis* Rufus-necked Hornbill.** Documentation: BMNH 1941.12.1.827 adult, Hpunchankha, Stanford (May 1933), several sight records especially between Naung Mung and Mali Hka River. Specifically, two individuals along the path were observed foraging and calling on 15 and 16 Feb 2004. Also, a pair was observed along the path between Shinshanku and Gawlai (7 Mar 2001). Abundance: Locally common. Comments: A considerable population is resident in the primary forests between Naung Mung and Putao. Northern Myanmar and Yunnan may be the final strongholds for *A. nipalensis* populations.

***Rhyticeros undulatus* Wreathed Hornbill.** Documentation: Between Alung-dung Ku and Ba Baw several records (9 Feb 2001; 10 Feb 2001). This species was observed in a big flock of about 50 individuals in Hpongkan Razi in Sep 2004 (by Thein Aung); BMNH 1939.12.8.309 adult, Lunghkang Ga, Kaulback (13 Jan 1939); BMNH 1941.12.1.831 male adult, Laawnga, Stanford (28 Oct 1932); BMNH 1941.12.1.832 female adult, Laawnga, Stanford (27 Dec 1932). Abundance: Uncommon in hills. Comments: Peters (1931) recognized two subspecies (*ticehursti* in northern Myanmar and Thailand and the nominate form in northern Thailand); however, the species is considered monotypic by others (e.g. Robson 2000). The NMNH holdings reveal no differences in color nor morphometrics.

RHAMPHASTIDAE

***Megalaima virens* Great Barbet.** Documentation: Captured once in Naung Mung (Sep 2005). Recorded at the rest house of Maza in 2004, calling steadily on an exposed branch approximately 100 m in the Southwest of the rest house (15 Feb 2004); BMNH 1939.12.8.40 female adult, Lunghkang Ga, no collector indicated (13 Jan 1939). Abundance: Common. Movement: Seasonal movements are likely. Comments: Juveniles are not illustrated in plates or just said to be 'similar to adults' (Robson 2000) or 'duller' (Rasmussen & Anderton 2005). Contrary to these statements, we found juveniles to be quite different in plumage coloration from adults. Juveniles are darker overall than adults, especially around the throat, which is almost black and lacks any shining or iridescent parts as seen in adults.

***Megalaima lineata* Lineated Barbet.** Documentation: Sight records Nam Ti area. Comments: BMNH has many specimens from Myitkyina and southwards, but we found none in collections from the Putao-Hkakabo Razi Area. Based on our sight records, we extend the range northwards to the hill forests of Kachin State including those forests near Putao (east of Putao).

***Megalaima franklinii* Golden-throated Barbet.** Documentation: Recorded near Mali Hka River between Nam Ti and Putao; one individual calling in the morning sitting in the top of a 10 m tree; BMNH 1939.12.8.42 female adult, Htingnan, Kaulback (30 Jan 1939). Abundance: Common.

***Megalaima asiatica* Blue-throated Barbet.** Documentation: One captured at Naung Mung (Sep 2005). Observed at Nam Ti rest house (11 Mar 2001; 17 Feb 2004). One male captured west bank of Nam Tisang River (10 Mar 2006). Abundance: Uncommon at lower elevations (<1,500 m).

***Megalaima haemocephala* Coppersmith Barbet.** Documentation: Not documented. Comments: We did not record the species, but assume that it might occur because potential habitats are available. *M. haemocephala* has been observed in places just south and east of our study area (BMNH; Rasmussen & Anderton 2005).

PICIDAE

***Jynx torquilla* Northern Wryneck.** Documentation: Observed in mixed-species flock in riparian second growth along the Namai Hka River south of Tazutu on 28 Feb 2001 (Rappole). Abundance: Rare. Movement: Asian Palaearctic Migrant – Occurs as a transient or possible winter resident in the Hkakabo Razi region.

***Picumnus innominatus* Speckled Piculet.** Documentation: One immature Nam Ti (Jul 2006). Abundance: Rare.

***Sasia ochracea* White-browed Piculet.** Documentation: Captured in Tazutu, Tazungdam, Naung Mung, Lonnat, NM/01-1, NM/04-3; Sep 2005 in Naung Mung. One male, one female captured west bank of Nam Tisang River (11 Mar 2006); BMNH 1937.1.7.528 [male] adult, Tutuga, Stanford (13 Jan 1933); BMNH 1937.1.7.527 [male] adult,

Tutuga, Stanford (21 Jan 1933); BMNH 1937.1.7.529 [male] adult, Tutuga, Stanford (13 Jan 1933); three adults from Putao and Naung Mung; one immature from Nam Ti (Jul 2006). Abundance: Common at lower elevations (<1,000 m) and rare above. Comments: Overall the distinction between *S. ochracea* and *S. abnormis* is not clear and several plumage features are rather gradually then distinctive between both species; some plumage features, believed to be distinctive for the two sexes appear nevertheless in both species and sexes (genetic screening might solve this problem). Field guides are in common agreement that the female of both species has a rufus front while the male has a yellow front (King et al. 1995, Robson 2000, Smythies 1953). While 80 % of the 46 specimens of both species from the NMNH collection follow the sex-dimorphism scheme, there are also 20 % of specimens in both species that show a contrary crown coloration as would have been assumed according to the specimen's location and label, i.e. 20 % of females (as labeld) have a yellow front instead of rufus.

The Hkakabo Razi specimens are in general darker on the belly and abdomen (compared to the subspecies known from Myanmar) and may represent a new subspecies or a population related to the next closest based on coloration (Sumatra) subspecies (*hasbrouki*). Three subspecies are recognized: the nominate, *reichenowi* (occurs in Thailand and has slightly brighter rufus parts on belly and abdomen), and *hasbrouki* (Sumatra) in which the male has a darker crown and chin then the nominate.

***Dendrocopos darjellensis* Darjeeling Woodpecker.** Documentation: BMNH 1940.1.1.5 [female] adult, Anke, Kaulback (25 Mar 1939). Abundance: Rare.

***Celeus brachyurus* Rufus Woodpecker.** Documentation: BMNH 1939.12.8.56 adult, Ratnamhti, Kaulback (11 Dec 1938). Abundance: Rare to uncommon.

***Picus chlorolophus* Lesser Yellow-naped Woodpecker.** Documentation: One immature Naung Mung (Jul 2006). Abundance: Rare.

***Picus flavinucha* Greater Yellow-naped Woodpecker.** Documentation: BMNH1939.12.8.53 male adult, Htingnan, Kaulback (4 Feb 1939); seen in Naung Mung in Jul 2006. Abundance: Uncommon.

***Picus canus* Gray-headed Woodpecker.** Documentation: One captured in Gawlai. Also observed between Shinshanku and Gawlai (7 Mar 2001); BMNH 1937.1.7.861 male adult, Simahtu, Stanford (25 Mar 1934); BMNH 1937.1.7.857 female adult, Tutuga, Stanford (16 Jan 1933). Abundance: Uncommon.

***Gecinulus grantia* Bamboo Woodpecker.** Documentation: BMNH 1939.12.8.52 [male] adult, Naung Mung, Kaulback (10 Dec 1938). Abundance: Uncommon.

***Blythipicus pyrrhotis* Bay Woodpecker.** Documentation: One individual captured at Shinshanku; one record between Gawai and Wangsewan (2 Mar 2001); one male captured west bank of Nam Tisang River (14 Mar 2006); BMNH 1940.1.1.4 male adult, Mahkawng Ga, Kaulback (1 Apr 1939); BMNH1937.1.7.743 [female] adult, Putao, Stanford (Jan 1935); two adult Naung Mung (Jul 2006). Abundance: Locally common. Comments: The mandible of the Gawai individual was deformed (curved to the left) with a broken tip (already broken when captured).

EURYLAIMIDAE

***Psarisomus dalhousiae* Long-tailed Broadbill.** Documentation: BMNH 1939.12.8.92 female adult, Lunghkang Ga, Kaulback (10 Mar 1939); BMNH 1939.12.8.91 male adult, Lunghkang Ga, Kaulback (10 Mar 1939); BMNH 1937.1.7.485 male adult, Putao, Stanford (6 Jan 1933). Abundance: Locally common (Fig. 25).

***Serilophus lunatus* Silver-breasted Broadbill.** Documentation: Two released on 9 Feb 2004, five on 12 Feb 2004, eight on 8 Sep 2005 and three on 11 Sep 2005 in Naung Mung; one released at NT/04-2 (18 Feb 2004); one male captured near U Ring Ga rest house (17 Mar 2006); BMNH 1937.1.7.492 male adult Kalihtu, Stanford (21 Mar 1934); BMNH 1937.1.7.490 female adult, Tutuga, Stanford (28 Dec 1932). Abundance: Common. Comments: A comparison of specimens from the NMNH and the Hkakabo Razi area show no differences in the plumage characteristics of the specimens. However, frontal coloration in older specimens (from museums) appears duller instead of dark gray. This effect is most likely a result of temporal bleaching because the specimens from the 2001 survey showed the same fading pattern on the front, while the 2004 survey's specimens showed no fading as of 2005.

In total, there are six subspecies and the nominate form recognized (while Sibley & Monroe 1990 list ten). Based on plumage coloration, two of the subspecies, *lunatus* and *rubopygius*, are valid and might even warrant consideration as separate species. All other forms show no obvious differences in plumage characteristics. The nominate form is rufus to cinnamon colored on ventral parts, while the form *rubopygius* is dark gray instead. *S. rubopygius* has also a consistent dark gray fore crown, while *lunatus* has a lighter part near the beak and a black superciliar stripe. In addition to geographic variation, we found a marked sex-dimorphism (not yet reported by others) in the taxon *rubopygius* from Assam, India and the northern half of

Fig. 25. *Psarisomus dalhousiae* Long-tailed Broadbill. [Renner Dec 2013].

Myanmar (NMNH, ANSP): males generally do not exhibit a silvery shiny breast band like females of the form *lunatus*. Our exported specimens currently stored at the NMNH collection resemble more the Indian subspecies (*rubopygius*) and are overall darker. The birds often occur in small flocks of up to five individuals.

CAMPEPHAGIDAE

***Pericrocotus divaricatus* Ashy Minivet.** Documentation: Captured at Gawlai. Movement: Asian Palaearctic migrant. Abundance: Uncommon.

***Pericrocotus ethologus* Long-tailed Minivet.** Documentation: One individual was shot by a small boy (sling shot) in the center of Naung Mung Township ('TV Station'). Three males and two females were recorded near the guest house (located at the Military Base of Putao) of the National Park in Putao on 9 Mar 2001. Abundance: Common.

***Pericrocotus flammeus* Scarlet Minivet.** Documentation: One record between Tazungdam and Gawai (1 Mar 2001); between Lonnat and Pangnamdim (5 Mar 2001); several individuals near Naung Mung (9 Mar 2001); BMNH 1939.12.8.109 male adult, Hkrang Hka, Kaulback (12 Apr 1939); BMNH 1939.12.8.108 male adult, Ratnamhti, Kaulback (11 Dec 1938). Abundance: Common. Movement: Reported as resident across most of its range by both Robson (2008) and Rasmussen & Anderton (2005) with maybe some altitudinal migration from highlands (breeding) to lower valleys (winter) in the Himalayas. Comments: Smythies (1953) states that the form *speciosus* is probably the taxon occurring in northwestern Myanmar. While the two historic specimens at the BMNH are both labeled and sorted as *P. ethologus*, Renner is convinced these are *flammeus*. (Unfortunately the specimens' tails are missing, hence ultimate determination from plumage remains unresolved).

***Hemipus picatus* Bar-winged Flycatcher-shrike.** Documentation: Sight records between Tazutu and Karaung (23 Feb 2001) and between Tazungdam and Gawai (1 Mar 2001); one individual recorded near Gawlai (approximately 1 km northwards; 7 Mar 2001); BMNH 1941.12.1.434 male adult, Tutuga, Stanford (19 Jan 1933). Abundance: Common.

LANIIDAE

***Lanius cristatus* Brown Shrike.** Documentation: Observed within young secondary forest heavily used by cattle in Gawlai (8 Mar 2001). Abundance: Uncommon. Movement: Asian Palearctic migrant – transient and possible winter visitor in open habitats at lower elevations in the region (<1,000 m).

***Lanius schach* Long-tailed Shrike.** Documentation: Several sight records between Putao and Mali Hka River along the road on the Putao plains. Most times observed when sitting on power lines parallel to the road near the airfield of Putao, with a single individual every 300 to 400 m, both in 2001 and 2004. Also sight records in the Naung Mung Township in rice paddies and open areas: 6 Feb 2004 near the 'TV Station'. One individual was observed at a rice paddy 3.2 km south of Nagwa (4 Mar 2001). Also recorded in the vicinity of Naung Mung (approximately 2 km along the way to Maza; 10 Mar 2001). Two adults and one immature near the Police Station (the former Fort Hertz) in Putao (12 to 16 Sep 2005); BMNH 1941.12.1.412 female adult, Tutuga, Stanford (20 Jan 1933); BMNH 1941.12.1.414 one male adult, Putao, Stanford (17 Jan 1933); BMNH 1939.12.8.239 one male adult, Anke, Kaulback (28 Mar 193); BMNH 1941.12.1.418 one adult, Lunghkang Ga, Stanford (Mar 1934); BMNH 1941.12.1.413 one male adult, Sumprabum, Stanford (20 Dec 193). Abundance: Common. Comments: Smythies (1953) states that *L. schach* does not breed in Myanmar except for the Putao plains. The five historic specimens along with at least 20 specimens stored at the BMNH from Myanmar, India, and Bhutan have been identified as *L. schach* and as 'gray' on nape, indicating that the specimens belong to the *L. s. erythronotus* group (last five records in 'documentation').

***Lanius tephronotus* Gray-backed Shrike.** Documentation: One individual was observed 3.2 km south of Nagwa (4 Mar 2001). One individual near the Police Station (the headquarters building of the former Fort Hertz) in Putao (12 Sep 2005). Abundance: Uncommon in plains and open country. Movement: Asian Palaearctic, subtropical, and altitudinal migrant; winter visitor to open habitats throughout much of Myanmar; breeds at higher elevations (>1,000 m) in parts of northern and eastern Myanmar as well as the Tibetan plateau and the Likiang range in Yunnan.

ORIOLIDAE

***Oriolus xanthornus* Dark-throated Oriole.** Documentation: Observed in second growth forest bordering river near Ba Baw on 10 Feb 2001. Also along the path to Naung Mung coming from Ba Baw 11 Feb 2001. Abundance: Uncommon.

***Oriolus traillii* Maroon Oriole.** Documentation: One sight record between Wangsewan and Nagwa (3 Mar 2001); near Naung Mung (9 Mar 2001); BMNH 1937.1.7.669 male adult, Punlumbum, Stanford (19 Mar 1934); BMNH 1937.1.7.668 adult, Putao, Stanford (Jan 1935). Abundance: Uncommon.

DICRURIDAE

***Dicrurus leucophaeus* Ashy Drongo.** Documentation: One sight record near Naung Mung (9 Mar 2001). Abundance: Uncommon.

***Dicrurus aeneus* Bronzed Drongo.** Documentation: Captured in Maza. One sight record on 5 Feb 2004 southwest of Naung Mung, another on 11 Feb 2004. One sight record also west of Naung Mung at Kasaung Hka River near rice paddy (12 Feb 2004). One near Ba Baw (10 Feb 2001). Observed at Nam Ti rest house (11 Mar 2001) and on way between Nam Ti and Kankiu when proceeding to Putao; BMNH 1939.12.8.285 female, Lunghkang Ga, Kaulback (26 Jan 1939); BMNH 1939.12.8.286 male, Lunghkang Ga, Kaulback (26 Jan 1939); BMNH 1937.1.7.516 female, Laawnga, Stanford (10 Jan 1933). Abundance: Common. Comments: The three subspecies *malayensis*, *braunianus*, and the nominate form stored at NMNH are hardly if at all distinguishable by color patterns. Nevertheless, subspecies might be separable by the length of the outermost rectrix. Analyses of adult individuals from 12 pools from Southeast Asia yielded some significant differences of tail length between all pools (pools are individuals of close geographic localities, which are assumed to have no geographical border to suppress gene flow; Appendix 5). Pools # 12 and 9 are significantly different from pools # 1, 2, 3, and 8. In other words, males from Taiwan and Thailand have significantly longer tails then Bornean birds and males from East Sumatra. Numbers are too small for all other pools or there are no significant differences (Appendix 5). Rasmussen & Anderton (2005) state that *hopwoodi* individuals from the eastern Himalayas and Northeast India are slightly paler and less glossy overall.

***Dicrurus remifer* Lesser Racket-tailed Drongo.** Documentation: Captured at NM/04-1. Sighted near Tasaku (13 Feb 2001). Abundance: Uncommon.

***Dicrurus hottentottus* Hair-crested Drongo.** Documentation: Naung Mung (Jul 2006). Abundance: Uncommon. Movement: Local movements.

***Dicrurus paradiseus* Greater Racket-tailed Drongo.** Documentation: Observed between Lonnat and Pangnamdim (5 Mar 2001); BMNH 1939.12.8.289 male adult, Ratnamhti, Kaulback (11 Dec 1938); BMNH 1939.12.8.288 female adult, Htingnan, Kaulback (27 Jan 1939); BMNH 1939.12.8.287 female adult, Htingnan, Kaulback (27 Jan 1939). Abundance: Common.

RHIPIDURIDAE

***Rhipidura hypoxantha* Yellow-bellied Fantail.** Documentation: One observation near Nam Tisang River (9 Mar 2001); BMNH 1937.1.7.109, Punlumbum, Stanford (19 Mar 1934); BMNH 1937.1.7.108 male, Sumprabum, Stanford (24 Dec 1932); BMNH 1937.1.7.106 male, Tutuga, Stanford (13 Jan 1933). Abundance: Common. Movement: Altitudinal Migrant – in summer >2,400 m; in winter <1,000 m.

***Rhipidura albicollis* White-throated Fantail.** Documentation: Captured in Nagwa. 2004: NM/04-1, NM/04-2, NM/04-5. One released at Tazutu (27 Feb 2001). One female captured on bank of Nam Tisang River south of Naung Mung (8 Mar 2006). One male captured west bank of Nam Tisang River (11 Mar 2006). Abundance: Common, especially at lower elevations (<1,000 m?). Comments: Subspecies *cenerescens* lacks darker black chest band and is gray instead. *R. a. stanleyi* is darker around the chest and *celsa* are paler overall. Females of the nominate subspecies are more brownish on abdomen and belly. The coloration of the chest band below the white throat patch, abdomen and belly can be used to separate subspecies.

***Terpsiphone paradisi* Asian Paradise Flycatcher.** Documentation: Three captures in forests of Naung Mung in Sep 2005. Abundance: Uncommon during rainy season in the southern part of the Hkakabo Razi region. Movement: Local/regional migrant?

CORVIDAE

***Urocissa flavirostris* Yellow-billed Blue Magpie.** Documentation: Captured in Tahaundam; BMNH 1939.12.8.292 male adult, Htingnan, Kaulback (27 Jan 1939). Abundance: Common. Movements: Local/regional migrant? Not observed during winter in the area, but is present during breeding.

***Cissa chinensis* Common Green Magpie.** Documentation: Captured 2004 at site NT/04-2 (Fig. 26); one female captured at U Ring Ga rest house (17 Mar 2006); BMNH 1939.12.8.295 female, Lunghkaung Ga, Kaulback (13 Jan 1939); BMNH 1937.1.7.911, Putao, Stanford (Jan 1935); BMNH 1939.12.8.293 male, Htingnan, Kaulback (27 Jan 1939); BMNH 1937.1.7.912 female, Tutuga, Stanford (19 Jan 1933). Abundance: Common.

***Cissa hypoleuca* Indochinese Green Magpie.** Documentation: Captured Gawai and Gawlai. Abundance: Uncommon.

Fig. 26. *Cissa chinensis* Common Green Magpie. [Renner Mar 2001].

***Dendrocitta formosae* Gray Treepie.** Documentation: One individual of undetermined sex captured along the west bank of Nam Tisang River (11 Mar 2006). One male captured west bank of Nam Tisang River (13 Mar 2006). One individual of undetermined sex captured at the U Ring Ga rest house (17 Mar 2006). Abundance: Common.

***Dendrocitta frontalis* Collared Treepie.** Documentation: Captured at Naung Mung (12 Feb 2001) and one released at Naung Mung (9 Mar 2001); observed in the vicinities of Naung Mung (approximately 2 km along the way to Maza; 10 Mar 2001); one male captured west bank of Nam Tisang River (9 Mar 2006); one female captured at U Ring Ga rest house (18 Mar 2006); BMNH 1937.1.7.928 male, Naunghkai, Stanford (6 Jan 1933); BMNH 1937.1.7.930 male, Tutuga, Stanford (12 Jan 1933); BMNH 1937.1.7.931 male, Maitongkha, Stanford (18 Dec 1932); BMNH 1940.1.1.11 female, Htingnan, Kaulback (10 Mar 1939); BMNH 1940.1.1.12 female, Htingnan, Kaulback (10 Mar 1939); BMNH 1939.12.8.291 female, Htingnan, Kaulback (10 Jan 1939); BMNH 1937.1.7.926, Putao, Stanford (Jan 1935); BMNH 1937.1.7.927, Naunghkai, Stanford (1 Jan 1933). Abundance: Common. Comments: Smythies (1953) found this species only in the northern parts of Myanmar and he suggests presence in the lower

hills of Kachin State, especially in the Mali Hka River valley and in the Sadon-Sima hills; he disregards the occurrence in the Namai Hka River valley. Our records confirm those findings so far. Probably, the high elevation habitats separating the two valleys (Nam Tisang River Mountains) constitute a geographical barrier for this species eastwards. For plants, orchids, trees and bamboo, we observed a similar pattern (Thein Aung), namely that each mountain chain, ranging from north to the south, has a different plant community. Some species are restricted to one particular mountain range or valley and are not found in the next towards the east or west.

***Corvus macrorhynchos* Large-billed Crow.** Documentation: Four individuals recorded at rice paddies (11 Feb 2004, 12 Mar 2004) near NM/01-1 at the river Kasaung Hka, west of Naung Mung; BMNH 1939.12.8.89 male adult, Sumprabum, Kaulback (20 Feb 1939). Abundance: Common.

PARIDAE

***Parus monticolus* Green-backed Tit.** Documentation: Captured in Tahaundam 25 Feb 2001, also in Nagwa (3 Mar 2001). Sighted between Tazutu and Karaung (23 Feb 2001); one observation also between Shinshanku and Gawlai (7 Mar 2001); BMNH 1937.1.7.297 (labeled as *P. m. yunnanensis*), Hkamko, Stanford (31 Dec 1933). Abundance: Common in northern part of the Hkakabo Razi region. Comments: Specimens of *P. monticolus* are more blackish (Fig. 27) and show a brighter yellow on the breast in northern Myanmar, as compared with specimens from Vietnam (Da Lat). The latter specimens belong to the subspecies *legendrei* and appear somewhat less colorful (yellow is less pronounced).

Fig. 27. *Parus monticolus* Green-backed Tit. [Renner Dec 2013].

***Parus spilnotus* Yellow-cheeked Tit.** Documentation: Observed in a mixed-species flock in riparian second growth along the Namai Hka River south of Tazutu on 28 Feb 2001. Abundance: Uncommon. Comments: Male *P. spilnotus* from the Himalayan region are above more greenish mottled as compared with specimens from Da Lat and Fan Si Pan (Vietnam). The Fan Si Pan and Da Lat individuals are more grayish mottled.

***Melanochlora sultanea* Sultan Tit.** Documentation: Few records for the path between Naung Mung and Putao in forest apart from settlements in 2001 and 2004; recorded between Pangnamdim and Lonnat (17 Feb 2001); three individuals observed between Shinshanku and Gawlai (7 Mar 2001); BMNH 1937.1.7.514 male adult, Tutuga, Stanford (12 Jan 1933). Abundance: Common at lower elevations (<1,000 m) south of Gawai (where in bamboo thickets and banana groves). Movement: The absence of Sep records may indicate local movements or changes in behavior during breeding (i.e. non-participation in mixed-species flocks).

HIRUNDINIDAE

***Riparia paludicola* Plain Martin.** Documentation: Sighted at Kasaung Hka River on 13 Feb 2004. Near Naung Mung several individuals (10 Mar 2001). Abundance: Uncommon.

***Hirundo rustica* Barn Swallow.** Documentation: Near Alung-dung Ku (9 Feb 2001). Abundance: Uncommon. Movement: Asian Palaearctic migrant; occurs as a transient and winter visitor.

***Cecropis daurica* Red-rumped Swallow.** Documentation: Observed along Namai Hka River (Feb 2001). Abundance: Common (seasonal). Movement: Asian Palaearctic and subtropical migrant – occurs as a transient and winter visitor (Martens & Eck 1995).

***Cecropis striolata* Striated Swallow.** Documentation: BMNH 1939.12.8.99 male adult, Htingnan, Kaulback (11 Mar 1939). Abundance: Rare. Movement: Subtropical migrant? – Was observed during breeding time in the area, but was not observed in Sep or Jun/Jul.

ALAUDIDAE

***Mirafa assamica* Rufus-winged Bushlark.** Documentation: Observed at rice paddies, several sites along route (Rappole). Abundance: Locally common.

CISTICOLIDAE

Prinia hodgsonii **Gray-breasted Prinia.** Documentation: BMNH 1937.1.7.348, Sumprabum, Stanford (25 Dec 1932); BMNH 1937.1.7.349 female, Tutuga, Stanford (13 Jan 1933). Abundance: Locally uncommon.

Orthotomus cucullatus **Mountain Tailorbird.** Documentation: Captured at Tazungdam in mixed evergreen forest on 28 Feb 2001; Pangnamdim in streamside vegetation on 5 Mar 2001. One observation near Gawlai (8 Mar 2001). Abundance: Common. Comments: A widespread species with several subspecies, especially on islands (Indonesia). The nominate subspecies from Thailand and Java as well as our specimen, 2004-110, show no differences in plumage coloration. The individuals from northern Myanmar are at the northernmost range limit of the species.

Orthotomus sutorius **Common Tailorbird.** Documentation: One captured near Putao Military Base on 9 Feb 2001. Abundance: Uncommon, most likely more abundant in southern parts of Kachin State. Comments: This species has its northern limits in Kachin State, and does not occur commonly (own observations). The northernmost distribution occurs <1,500 m elevation along the southern slopes of the Himalayas.

PYCNONOTIDAE

Pycnonotus striatus **Striated Bulbul.** Documentation: Observed in forests south of Lonnat (17 Feb 2001). Abundance: Rare.

Pycnonotus jocosus **Red-whiskered Bulbul.** Documentation: Captured by a local hunter in 10 Feb 2004 approximately 1 km west of Naung Mung; one within the limits of the town Naung Mung Feb 2004; NM/04-3, also in Naung Mung in Sep 2005; two were shot by a boy (sling shot) near the town center of Naung Mung Township in Feb 2004; several sight records have been made within the Naung Mung plains in rice paddies and bushy vegetation (e.g., 9 Mar 2001; 10 Feb 2004; 10 Mar 2001); two individuals were observed at Nam Ti Rest house (11 Mar 2001); Putao town near the Park Wardens office (11 Sep 2005); BMNH 1939.12.8.132 adult, Kankiu, Kaulback (12 Dec 1938); BMNH 1939.12.8.133 female adult, Htingnan, Kaulback (30 Jan 1939); BMNH 1939.12.8.131 adult, Kankiu, Kaulback (12 Dec 1938); BMNH 1939.12.8.134 adult, Htingnan, Kaulback (30 Jan 1939). Abundance: Common in foothills southwest of Pangnamdim and the Nam Tamai River. Comments: Most times observed along forest edges (own observations) or in isolated trees in open areas.

Pycnonotus cafer **Red-vented Bulbul.** Documentation: One individual was observed near the site NM/01-1 near Naung Mung (9 Mar 2001); BMNH 1939.12.8.126 female adult, Kalihtu, Kaulback (21 Apr 1939); BMNH 1939.12.8.128 male adult, Htingnan, Kaulback (13 Mar 1939); BMNH 1939.12.8.129 male adult, Htingnan, Kaulback (30 Jan 1939); BMNH 1941.1.7.167 female adult, Sumprabum, Stanford (25 Dec 1932); BMNH 1939.12.8.127 male adult, Htingnan, Kaulback (8 Jan 1939). Abundance: Common.

Alophoixus flaveolus **White-throated Bulbul.** Documentation: Captured in Naung Mung. In 2004: NM/04-2, NM/04-3, NM/04-5, NM/04-2, NT/04-2; 2005: nine times in Naung Mung; Sep 2005: four captured and five released on 8 Sep and seven released on 10 Sep 2005; also shot by porter; one released on 9 Feb 2004 and 10 Feb 2004 in Naung Mung; one observation between Shinshanku and Gawlai (7 Mar 2001); one male captured west bank of Nam Tisang River (11 Mar 2006); one male captured west bank of Nam Tisang River (14 Mar 2006); BMNH 1941.12.1.67 female adult, Sumprabum, Stanford (16 Mar 1934). Abundance: Common. Comments: Slight color differences between *A. f. burmanicus* and *A. f. flaveolus* but no geographic pattern: Three specimens from Arunachal Pradesh (USNM 584482, 522789, 585807, and 585809) and our three exported specimen (2004-144, -168, -033) have more olive in flanks and belly compared to all other specimens, the latter with rather yellowish belly and flanks and almost no olive green colors. Robson (2000) questions whether or not the subspecies characters are valid. Based on our findings, we suggest that there are no subspecies for *A. flaveolus*.

Hypsipetes mcclellandii **Mountain Bulbul.** Documentation: Two captures in Nam Ti (Sep 2005); BMNH 1939.12.8.119 female adult, Htingnan, Kaulback (4 Feb 1939). Abundance: Uncommon during rainy season. Movement: Presence in Naung Mung during Sep and absence in Feb indicates local movements.

Hemixos flavala **Ashy Bulbul.** Documentation: Two individuals captured in Naung Mung (Sep 2005); BMNH 1941.12.1.82 male adult, Sumprabum, Stanford (22 Dec 1932); BMNH 1941.12.1.86 male adult, Kawapang, Stanford (16 Dec 1932); BMNH1941.12.1.84 male adult, Tutuga, Stanford (19 Jan 1933); BMNH 1941.12.1.85 female adult, Tutuga, Stanford (16 Jan 1933). Abundance: Uncommon during rainy season. Movement: Not documented, but presence in Naung Mung during Sep and absence in Feb indicates local movements.

Hypsipetes leucocephalos **Black Bulbul.** Documentation: Observed several times while crossing the Putao plains, both on 9 Feb 2001 and 3 Feb 2004. Also, near Nam Ti

rest house (11 Mar 2001, 11 Feb 2001). Abundance: Common in river plains and lower-elevation forests (<1,000 m?).

SYLVIIDAE

***Tesia olivea* Slaty-bellied Tesia.** Documentation: Two individuals captured 2004 at NM/04-2. Two at NM/04-3. One male captured west bank of Nam Tisang River (9 Mar 2006). Abundance: Common in foothills. Comments: Specimens collected in northeastern Myanmar and Arunachal Pradesh show differences to the specimens from Thailand and represent the subspecies *chiangmaiensis* (Fig. 28; Renner et al. 2008). *T. olivea* is a species hardly present in collections. The abundance of *T. olivea* in northeastern Myanmar might be exceptionally high and reflect a stronghold of the population.

Fig. 28. *Tesia olivea chiangmaiensis* Slaty-bellied Tesia with shiny head pattern distinguishing Southeast Asian subspecies from Himalayan form. [Renner Feb 2004].

***Phylloscopus fuscatus* Dusky Warbler.** Documentation: BMNH 1941.12.175 female, Tutuga, Stanford (14 Jan 1933). Abundance: Uncommon. Movement: Asian Palaearctic migrant. Winter visitor to our region, north and northeast India and parts of continental Southeast Asia.

***Phylloscopus proregulus* Palla's Leaf-warbler.** Documentation: One captured in Naung Mung town by local hunter (12 Feb 2004). Abundance: Uncommon. Movement: Asian Palaearctic and Himalayan migrant. Winter visitor. Comments: Hkakabo Razi specimen resembles the subspecies *forresti* from Southwest China (Yunnan) and Chin States. The specimen is the first record for northern Myanmar, but was expected due to the records from southwest China. *P. proregulus* is probably only a winter visitor to the Hkakabo Razi region and/or crosses the region during migration to other places (own observations).

***Phylloscopus cantator* Yellow-vented Warbler.** Documentation: One male captured on west bank of Nam Tisang River near Naung Mung (8 Mar 2006); one undetermined sex captured west bank of Nam Tisang River (12 Mar 2006); one female south bank of river south of the U Ring Ga rest house (20 Mar 2006). Movement. Subtropical/altitudinal migrant in parts of its range in Myanmar. Abundance: Common.

***Seicercus affinis* White-spectacled Warbler.** Documentation: One captured in Naung Mung and one sight record at NM/04-3 on 10 Feb 2004. One male captured at U Ring Ga rest house (17 Mar 2006). Abundance: Common. Movement: Subtropical/altitudinal migrant. Probably a winter visitor in the region; species is said to winter in southwest China (Yunnan) while breeding in southeast China.

***Seicercus burkii* Golden-spectacled Warbler.** Documentation: One male from Naung Mung (14 Mar 2006). Abundance: Locally rare.

***Seicercus tephrocephalus* Gray-crowned Warbler.** Documentation: Captured 2004: NM/04-2, NM/04-3. Several released (10 Feb 2004). Abundance: Common.

***Seicercus whistleri* Whistler's Warbler.** Documentation: One male captured in Nam Ti (19 Feb 2004). Abundance: Rare.

***Seicercus poliogenys* Gray-cheeked Warbler.** Documentation: Captured in Naung Mung, Nagwa, Wangsewan, and Tazutu. 2004: NM/04-2, NM/04-5. Four individuals released on 28 Feb 2001 in Tazungdam. Observed in a small flock with *Alcippe cinereia* between Wangsewan and Nagwa (3 Mar 2001). Joined in a flock with *Stachyris chrysaea* all together eight individuals (4 Mar 2001). One observation between Shinshanku and Gawlai (7 Mar 2001). Another small flock together with *Alcippe cinereia* was observed between Gawlai and Tazutu (8 Mar 2001). One female captured west bank of Nam Tisang River (9 Mar 2006). Two females captured at U Ring Ga rest house (18 Mar 2006). Abundance: Common. Comments: Our specimens resemble in plumage the specimens from Arunachal Pradesh, while the southern specimens in collections (Annam, Vietnam) display a lighter crown and are distinctive. Two captured individuals (2004-155, 2004-156) from the Hkakabo Razi region resemble in overall plumage *S. poliogenys*. However, the chins of the two specimens are colored slightly more whitish instead of light gray. The specimen might be a representative of a new subspecies, but differences are small and the variation within the group is large. Examination of additional material from the region and other parts of northern Kachin state will be necessary to make a valid assessment.

Abroscopus albogularis **Rufus-faced Warbler.** Documentation: Captured 2001 in Naung Mung, 2004: NM/04-3, NT/04-2 (one released on 9Feb 2004). One female captured on westbank of Nam Tisang River (near Naung Mung) on 9 Mar 2006. One male captured west bank of Nam Tisang River (13 Mar 2006). One male captured at U Ring Ga rest house (18 Mar 2006); BMNH 1937.1.7.355 female, Supkaya, Stanford (15 Mar 1934); BMNH 1937.1.7.3530 female, Punlumbum, Stanford (18 Mar 1934); BMNH 1937.1.7.352 male adult, Tutuga, Stanford (19 Jan 1933); BMNH 1937.1.7.354 adult, Tutuga, Stanford (13 Jan 1933); BMNH 1937.1.7.351 female adult, Tutuga, Stanford (14 Jan 1933); BMNH 1937.1.7.356 adult, Tutuga, Stanford (16 Jan 1933). Abundance: Common.

Abroscopus schisticeps **Black-faced Warbler.** Documentation: Observed in a mixed-species flock in riparian second growth along the Namai Hka River south of Tazutu (28 Feb 2001). Abundance: Rare.

TIMALIDAE

Pellorneum albiventre **Spot-throated Babbler.** Documentation: Captured at NM/04-3 on 9 and 10 Feb 2004. Abundance: Uncommon. Comments: One male (2004-118/USNM 633216) was identified by P. C. Rasmussen (pers. com.) preliminarily as *P. a. ignotum*, the subspecies occurring in the eastern Himalayas. However we noted that there are some striking differences between our specimen and museum specimens of *P. a. ignotum*.

Pellorneum ruficeps **Puff-throated Babbler.** Documentation: Captured in Nam Ti in old second growth (20 m tall trees) near natural evergreen forest (NT/04-2). Abundance: Uncommon.

Pellorneum tickelli **Buff-breasted Babbler.** Documentation: Captured at NM/04-5 on 12 Feb 2004 and 13 Feb 2004; captured also once Sep 2005 (2005-045); one male, one female captured west bank of Nam Tisang River 9 Mar 2006; BMNH 1939.12.8.169 male, Lunghkang Ga, Kaulback (26 Jan 1939). Abundance: Common.

Malacocincla abboti **Abbott's Babbler.** Documentation: Captured 2004 at NM/04-3 (2004-105). Abundance: Uncommon. Comments: The single captured individual (2004-105) differs from *M. abbotti* by cinnamon tips on primaries and secondaries. King et al. (1975) illustrates this color pattern but did not draw any conclusion form the pattern. All specimens from the NMNH collection showed no cinnamon tips on wings – all wings are plain sepia colored. The specimens from the Hkakabo Razi region therefore might represent a new subspecies.

Malacocincla abbotti kachinensis ssp. nov.

We describe the features of the possible new subspecies here, but will provide a more complete account when more data are available .
Diagnosis: Subspecies *kachinensis* has brighter colored tail tips than nominate subspecies. Otherwise rather non-descript rufus brown bird with light gray ('dirty white'); ocular stripe dark grayish.
Holotype: Specimen 2004-105, stored at the Myanmar Museum of Natural History in Hlawga Park, Yangon. Paratype: No paratype available.

Pomatorhinus ochraceiceps **Red-billed Scimitar-Babbler.** Documentation: One male captured at U Ring Ga rest house (18 Mar 2006). Abundance: Uncommon.
Pomatorhinus ferruginosus **Coral-billed Scimitar-Babbler.** Documentation: Captured at Naung Mung. NM/04-1, NM/04-3, NT/04-2, one male Maza (6 Mar 2006); BMNH 1939.12.8.140 female, Htingnan, Kaulback (8 Jan 1939). Abundance: Common. Comments: The subspecies from Thailand (*albogularis*) has a brighter, more whitish belly and abdomen. The subspecies from northeast India (Arunachal Pradesh, taxon: *namdaphus*) resembles the ones we captured in the Hkakabo Razi region.

Jabouilleia naungmungensis **Naung Mung Scimitar-Babbler.** Documentation: Three female individuals captured at Naung Mung; two at NM01-1 (6 Feb 2004), one at NM04-3 (8 Feb 2004), one male at NM04-2 (13 Mar 2006). Remains of one individual were found in a net at U Ring Ga (south bank of river south of the U Ring Ga rest house), after the netted individual was probably preyed on by a medium-sized predator (20 Mar 2006). Abundance: Locally uncommon. Comments: The closely-related species *J. danjoui* is known as an endemic with two small range patches in southern and northern Vietnam (Robson 2000). *J. danjoui* is according to King et al. (1975) and King et al. (1995) a rare species, and collection holdings (we confirm, since we found worldwide 15 specimens in collections) indicate a low abundance and/or secretive behavior. All *danjoui* specimen found in the collections were assigned to Vietnam. Recently, *J. naungmungensis* was visually observed in extreme western Yunnan, China (24.76° North, 97.56° East; J. Hornskov, pers. comm. 2009). This observation represents a range extension of 300 km to the south-southeast, increasing the possibility that the species might be found eastward in valleys of the Gaolingonshan (Rappole et al. 2008, Rappole et al. 2005).

The discovered form in Naung Mung were found to represent a morphologically distinct population of the genus separated by approximately 1,000 km from its closest known relative, *J. danjoui*. This taxon was therefore recognized as a separate species by the American Ornithol-

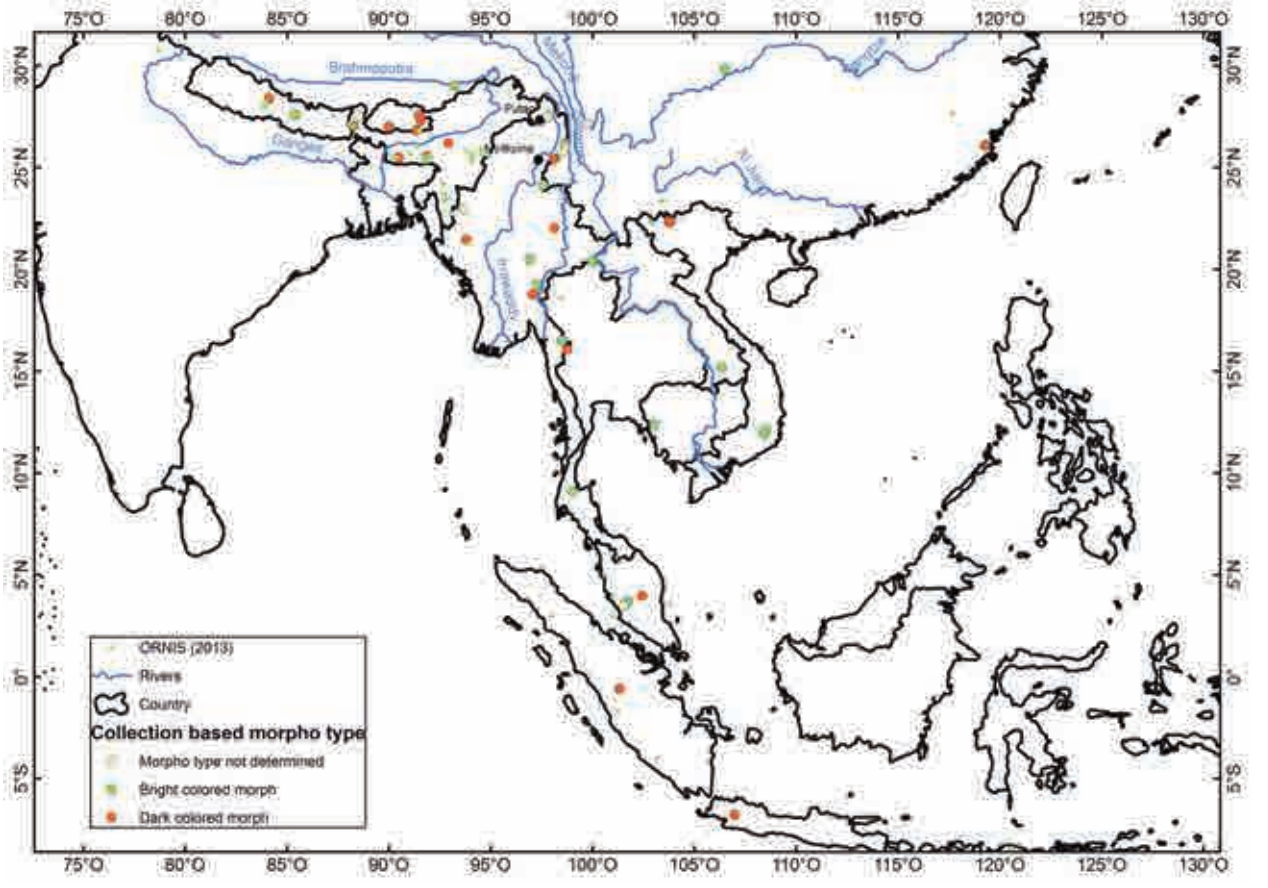

Fig. 29. Distribution of specimen records (sight records not included) from *Pnoepyga pussila* morphs in Southeast Asia. Data supplemented from ORNIS (2011).

ogists' Union (Rappole et al. 2008, Rappole et al. 2005). However, Collar (2011), in his treatment of the taxon, concluded that the split represented a western form of *J. danjoui*, which is incloncuisve based on the large gap in distribution and the marked plumage differences.

***Rimator malacoptilus* Long-billed Wren-Babbler.** Documentation: Two captured at Shinshanku (16 Feb 2001). Abundance: Uncommon.

***Napothera brevicaudata* Streaked Wren-Babbler.** Documentation: Captured at NM/01-1 (skeleton), NT/04-2; one male Maza (7 Mar 2006). Abundance: Uncommon. Comments: The regions' individuals belong to the subspecies *striata*, which is found in northeastern India and Myanmar. These birds are quite distinct from other subspecies, and probably warrant recognition as a separate species (compare Rasmussen & Anderton 2005: 433).

***Napothera epilepidota* Eye-browed Wren-Babbler.** Documentation: Captured in Maza. NM/04-1, NM/04-5, NT/04-2. One male captured west bank of Nam Tisang River (11 Mar 2006). One female captured west bank of Nam Tisang River (14 Mar 2006). One undetermined sex captured at U Ring Ga rest house (17 Mar 2006). One male captured south bank of the river south of U Ring Ga rest house (19 Mar 2006). Abundance: Common at lower elevations (<1,000 m?). Comments: All our collected specimens resemble the subspecies *guttaticollis*, which occurs in Assam and Arunachal Pradesh. The subspecies from Thailand (*bakeri*, not always recognized, but present and clearly distinctive based on specimens in the NMNH) show remarkable differences from the specimens from northern Myanmar: the throat of *bakeri* is less dark marked with black drops on the feathers, the throat's basic color is more cinnamon than white, as in *guttaticollis*.

***Pnoepyga pusilla* Pygmy Wren-Babbler.** Documentation: Captured in Tazungdam. Abundance: Locally uncommon. Comments: Two morphs are distinctive: a 'light' morph has white drops on feathers on chin, belly, and abdomen; the 'dark' morph exhibits rufus drops instead of white drops. Both morphs occur in northern Kachin State (Fig. 29). In addition, according to labels, both morphs are not sex-related, i.e. *P. pusilla* has no sex-dimorphism.

***Spelaeornis reptatus* Gray-bellied Wren-Babbler.** Documentation: Sight records. Abundance: Rare. Comments: Rasmussen & Anderton (2005) note marked morphological differences in *oatsi*, *chocolatinus*, and *reptatus*. All three should be treated as separate species which we follow here at least for *reptatus* and *oatsi*. Typically, *reptatus* is considered a subspecies of *chocolatinus*, but taxonomy of '*chocolatinus*' needs further investigation. English and scientific names seem to be confounded in some cases, compare discussion by Dickinson et al. (2003).

***Sphenocichla humei* Wedge-billed Wren-Babbler.** Documentation: Two individuals captured in evergreen forest in Maza. Four specimens identified as juveniles from Sep 2005 from Naung Mung (note: tentatively identified as *S. roberti* in the field but later corrected to *S. humei*). Abundance: Uncommon. Comments: The Sikkim specimen from the NMNH holdings (USNM 335180) is darker and exhibits less white (almost no white except for the brighter colored rachis) on chin, breast, and chest. We were unable to export our specimens from Myanmar so no comparisons with specimens from other collections were possible. As stated by BirdLife International (2001) and Rasmussen & Anderton (2005), the two subspecies of *humei* (*humei* and *roberti*) are morphologically distinct, and should be treated as two separate species, an approach we follow here.

***Sphenocichla roberti* Chevron-breasted Wren-Babbler.** Documentation: BMNH 1939.12.8.214 female immature (?), Nam Tamai River Valley at 27.2° North 97.9° East, Kaulback (23 Aug 1938); BMNH 1939.12.8.213, Matsatap, Kaulback (10 Dec 1938). Abundance: Rare.

***Stachyris rufifrons* Rufus-fronted Babbler.** Documentation: Recorded at Tahaundam (25 Feb 2001). Abundance: Uncommon.

***Stachyris ruficeps* Rufus-capped Babbler.** Documentation: Captured at Naung Mung (11 Feb 2001) and Lonnat (17 Feb 2001); Tahaundam. Abundance: Common. Movement: Altitudinal migrant. Moves down to 450 m in winter in northern Myanmar.

***Stachyris chrysaea* Golden Babbler.** Documentation: Captured in Naung Mung (2001, 2004, Sep 2005) at NM/04-5. One released in Tazungdam on 28 Feb 2001; joined in a flock with *Seicercus poliogenys* all together eight individuals (4 Mar 2001); BMNH 1934.12.8.179 female, Htingnan, Kaulback (4 Feb 1939). Abundance: Common. Comments: All captured individuals from northern Myanmar resemble specimens from Arunachal Pradesh (*S. c. chrysaea*), while we identified remarkable differences from specimens from northern Thailand (*S. c. assimilis*). The nominate form and also those from the Hkakabo Razi region exhibit a more orange-reddish, i.e. fiery, small breast band nested within the almost bright yellow ventral parts. *S. c. assimilis* is generally less yellow. *S. c. binghami* (Lushia Hills, Chin State) exhibit darker ear coverts (compare Rasmussen & Anderton 2005).

***Stachyris nigriceps* Gray-throated Babbler.** Documentation: Captured in Naung Mung, Lonnat, Tazutu, NM/01-1, NM/04-1, and NM/04-5. One released at NT/04-2 (18 Feb 2004). One released at Tazutu (27 Feb 2001) and three at Tazungdam (28 Feb 2001). One individual observed between Shinshanku and Gawlai (7 Mar 2001). One female captured west bank of Nam Tisang River (12 Mar 2006); BMNH 1941.12.1.578 (*coltarti*) male, Sumprabum, Stanford (24 Dec 1932); BMNH 1941.12.1.576 (*coltarti*) male adult, Tingpai, Stanford (17 Dec 1932). Abundance: Common. Comments: Based on examination of 148 specimens from 13 subspecies of *S. nigriceps*, current taxonomy does not reflect geographic variation. Rather current taxonomy appears to include a number of errors that obscure understanding of geographic variation in populations. We suggest the following subspecific groupings based merley on plumage: (a) Himalayan Mountains and western Yunnan; (b) northern Kachin State; (c) Tenasserim (Tanintharyi) and Thai-Malay Peninsula; and (d) northern Laos and Vietnam. By plumage coloration, the groups (c) and (d) are very close compared to differences with groups (a), (b).

***Stachyris striolata* Spot-necked Babbler.** Documentation: Captured in Naung Mung. Abundance: Uncommon.

***Stachyris oglei* Snowy-throated Babbler.** Documentation: Two males captured west bank of Nam Tisang River (10 Mar 2006), one captured west bank of Nam Tisang River (11 Mar 2006). Abundance: Uncommon.

***Babax* [*lanceolatus*] *woodi* Mount Victoria Babax.** Documentation: Not observed, but likely since it has been documented by at least one specimen from NRM located from Kambaiti (NRM 571037, labeled as *Babax l. lanceolatus* male adult, Kambaiti, Malaise, 29 Apr 1934) indicating a range extension towards our study region (compare map on plate 128.1 in Rasmussen & Anderton 2005). Comments: Taxonomy not yet resolved, but Rasmussen & Anderton (2005) suggest to split *B. lanceolatus* and 'upgrade' *woodi* to species level for mainly the Myanmar population, an approach we follow here.

***Garrulax leucolophus* White-crested Laughingthrush.** Documentation: Captured 2004 at NM/04-3, NM/04-5 and in Naung Mung in Sep 2005. Flock was located between Gawai and Wangsewan (2 Mar 2001). A small flock of approximately five individuals was observed near Gawlai (about 1 km north; 7 Mar 2001 and 8 Mar 2001). One captured west bank of Nam Tisang River 9 Mar 2006. One

female captured at U Ring Ga rest house (17 Mar 2006). Abundance: Common. Comments: The specimen from Hkakabo Razi (female 2004-120) resembles in coloration the subspecies *patkaicus* (India) and not *diardi* (Thailand).

Garrulax monileger **Lesser Necklaced Laughingthrush.** Documentation: One male, one female captured at U Ring Ga rest house (19 Mar2006); BMNH 1937.12.8.147 male, Htingnan, Kaulback (12 Jan 1939); BMNH 1937.1.7.571, Putao, Stanford (Jan 1935); BMNH 1939.12.8.148 female, Htingnan, Kaulback (12 Jan 1939). Abundance: Fairly common.

Garrulax pectoralis **Greater Necklaced Laughingthrush.** Documentation: Observed between Gawlai and Tazutu (8 Mar 2001) and at Naung Mung (9 Mar 2001); BMNH 1937.1.7.569 male, Tutuga, Stanford (13 Jan 1933); BMNH 1941.12.1.136 male, Sumprabum, Stanford (18 Dec 1933). Abundance: Common.

Garrulax delesserti **Rufus-vented Laughingthrush.** Documentation: Two males, one female, and one of undetermined sex captured at U Ring Ga rest house (17 Mar2006); BMNH 1937.1.7.573, Putao, Stanford (Jan 1935); BMNH 1937.1.7.574, Putao, Stanford (Jan 1935); BMNH 1937.1.7.572, Hkamko, Stanford (31 Dec 1932); BMNH 1939.12.8.151 male, Htingnan, Kaulback (11 Mar 1939); BMNH 1939.12.8.152 male, Htingnan, Kaulback (12 Mar 1939). Abundance: Common. Comments: Originally and erroneously identified as '*Garrulax delesserti* (*gularis*)'.

Garrulax striatus **Striated Laughingthrush.** Documentation: Captured in Nagwa, Tahaundam. Sight record between Pangnamdim and Lonnat (17 Feb 2001) and between Gawai and Wangsewan (2 Mar 2001); BMNH 1940.1.1.9 female, Anke, Kaulback (25 Mar 1939). Abundance: Common. Comments: The chief diagnostic characters for subspecies in this species are 1) the presence or absence of a black superciliar stripe and 2) the coloration of the folded crest. *G. s. sikkimensis* from Nepal, west-northwest India, and Bhutan has no black superciliar stripe, but subspecies from Arunachal Pradesh and northeast Myanmar, including the specimens from Hkakabo Razi, do. The subspecies from Arunachal Pradesh (*cranbrooki*, including *austeni* and *brahmaputra*) resemble the specimens from northern Kachin State.

Garrulax nuchalis **Chestnut-backed Laughingthrush.** Documentation: Two captured at Gawlai on 7 Mar 2001 in second growth that was used heavily by cattle; one female captured at U Ring Ga rest house (20 Mar 2006); BMNH 197.1.7.542 female, Putao, Stanford (Dec 1934); BMNH 1939.12.8.160 male, Htisyenyang, Kaulback (21 Mar 1939); BMNH 1939.12.8.162 female, Htingnan, Kaulback (27 Jan 1939); BMNH 1939.12.8.163 female, Htingnan, Kaulback (27 Jan 1939); BMNH 1939.12.8.159 male, Ninga (= Ninja?), Kaulback (2 Jan 1939); BMNH 1939.12.8.161, Htisyenyang, Kaulback (21 Mar 1939). Abundance: Uncommon. Comments: Specimens collected in Arunachal Pradesh and the two from Hkakabo Razi are similar in color patterns. Specimens from Thailand, which belong to subspecies *chinensis* or *propinquus*, are darker colored on and around the chest.

Garrulax rufogularis **Rufus-chinned Laughingthrush.** Documentation: Captured at Naung Mung in Sep 2005. Two males and one female captured at U Ring Ga rest house (16 to 17 Mar 2006). Abundance: Uncommon.

Garrulax ruficollis **Rufus-necked Laughingthrush.** Documentation: BMNH 1931.1.7.550 female, Tutuga, Stanford (12 Jun 1933); BMNH 1937.1.7.548, Kalihtu, Stanford (22 Mar 1934); BMNH 1937.1.7.549, Hkamko, Stanford (31 Dec 1932); BMNH 1937.1.7.551, Putao, Stanford (Jan 1935); BMNH 1948.80.1569, Hkamko, Stanford (31 Dec 1932). Abundance: Previously common, today might be rare (no records 2001 to 2006).

Garrulax merulinus **Spot-breasted Laughingthrush.** Documentation: One juvenile in Nam Ti (Jul 2006). Abundance: Rare.

Garrulax squamatus **Blue-winged Laughingthrush.** Documentation: Captured at Maza guest house (one male, one female; 6 Mar 2006); BMNH 1939.12.8.138 male, Htingnan, Kaulback (27 Jan 1939). Abundance: Uncommon.

Garrulax subunicolor **Scaly Laughingthrush.** Documentation: Captured in Tahaundam near the river (26 Feb 2001). Abundance: Uncommon.

Garrulax affinis **Black-faced Laughingthrush.** Documentation: Captured in Tahaundam. Abundance: Uncommon. Comments: Yunnan individuals have a darker, almost black crown, while the Indian specimens lack this pattern. The specimen captured in Hkakabo Razi is similar to the Yunnan birds.

Garrulax erythrocephalus **Chestnut-crowned Laughingthrush.** Documentation: Captured in Tazutu (four individuals). Abundance: Uncommon. Movement: Altitudinal migrant. Breeds >1,200, mainly 1,800 m to 3,400 m; winters at lower elevations, perhaps to 300 m, although Martens & Eck (1995) question whether or not they descend this far. Our records indicate that they descend at least to 600 m. Comments: The subspecies *nigrimentum*, occurring in Bhutan, Assam, and Arunachal Pradesh is lighter-colored on the belly compared to the other subspecies. However, the geographic nature of this pattern is

not clear. Our two specimens resemble most the individuals from Bhutan in coloration. Females are generally less olive-green on the belly compared to male subspecies.

Liocichla phoenicea **Red-faced Liocichla.** Documentation: Captured in Lonnat (Mar 2001), Pangnamdim (5 Mar 2001), and Naung Mung (Sep 2005). Abundance: Uncommon. Comments: Individuals from Thailand and southern Myanmar are brighter colored then all others. The subspecies *ripponi* from Assam (sometimes *bakeri* is considered as conspecific, but compare Dickinson et al. 2003) is darker. Our specimens are closest in coloration to those from Assam.

Leiothrix argentauris **Silver-eared Mesia.** Documentation: Captures at Naung Mung, Tasaku in 2004: NT/04-2 (the latter seven individuals; five released); eight captured and six were released in Tazutu (8 Mar 2001); BMNH 1941.12.1.663 male adult, Sumprabum, Stanford (20 Dec 1932); BMNH 1939.12.8.203 adult, Mantum, Kaulback (26 Aug 1939); BMNH 1939.12.8.204 male adult, Htingnan, Kaulback (30 Jan 1939). Abundance: Common. Comments: The Putao specimens resemble in plumage characteristics those of northern Thailand's Chiang Mai province. In addition, the specimens from northern Myanmar have a slightly more fiery-red breast coloration than specimens from Assam. Rasmussen & Anderton (2005) ask for confirmation of the taxon *aureigularis* (southern Assam), but our specimens and their more fiery-red coloration in congruence with those of Assam support the taxon *aureigularis*, i.e. *aureigularis* should be considered as a subspecies for eastern Assam and Kachin State.

Leiothrix lutea **Red-billed Leiothrix.** Documentation: One male captured at U Ring Ga rest house (16 Mar 2006); one female captured at U Ring Ga rest house (17 Mar 2006). Abundance: Uncommon.

Pteruthius melanotis **Black-eared Shrike-Babbler.** Documentation: Observed in mixed-species flock in second growth forest bordering river near Ba Baw (10 Feb 2001). Abundance: Rare.

Minla cyanouroptera **Blue-winged Minla.** Documentation: BMNH 1939.12.8.200 female adult, Htingnan, Kaulback (4 Feb 1939). Abundance: Uncommon.

Minla strigula **Chestnut-tailed Minla.** Documentation: Not observed, but likely present, since it has been documented by four specimens from Kambaiti collected by Malaise in 1934, 70 km south of our area of interest. NRM (no collection numbers available): *M. s. yunnanensis* female adult, Kambaiti, Malaise (9 May 1934); *M. s. yunnanensis* female adult, Kambaiti, Malaise (23 Apr 1934); *M. s. yunnanensis*, Kambaiti, Malaise (3 May 1934). Comments: Malaise (or rather Stanford and collegues) collected four specimens in Kambaiti of which three specimens exhibit a grayish back with a clear distinction in coloration towards the head.

Minla ignotincta **Red-tailed Minla.** Documentation: Male captured in Naung Mung (10 Mar 2004); BMNH 1939.12.8.207 male adult, Htingnan, Kaulback (no date) and in the Kambaiti area (NRM) *M. ignotincta*, Kambaiti, Malaise (May 1934). Abundance: Rare. Comments: The specimen series at the NMNH shows small variation in the intensity of yellow on ventral plumage. The Hkakabo Razi specimen is bright yellow, while one specimen from the Chin States (USNM 609280) has less yellow on ventral parts and three specimens from Yunnan exhibit no yellow at all. In addition, specimens in the NRM collection of the species indicate that the specimens from India are less colorful (about same age of specimens), but that the specimen from Kambaiti resemble exactly those of Fan Si Pan (northern Vietnam). Our specimen is different with a peal of yellow color, nested geographically inbetween faded East (Yunnan) to West (Assam) colorations.

Alcippe cinerea **Yellow-throated Fulvetta.** Documentation: Captured in Tazutu in evergreen forest, 28 released at Tazungdam (28 Feb 2001). Observed in a small flock with *Seicercus poliogenys* between Wangsewan and Nagwa (3 Mar 2001). Five individuals released at Lonnat (5 Mar 2001). One flock of ten individuals was captured and released near Pangnamdim (5 Mar 2001) in bamboo thicket near the ground (all captured in net shelves close to ground). Another flock of five individuals was observed between Pangnamdim and Shinshanku (6 Mar 2001). Abundance: Common. Comments: All specimens from 2001 lost somewhat of their yellow color compared to the 2004 skins. Nevertheless, the time of three years is not sufficient to entirely bleach out. Therefore, it is hard to tell whether or not there are any plumage similarities with Assam or Thailand populations.

Alcippe castaneceps **Rufus-winged Fulvetta.** Documentation: Captured in Tahaundam, Maza. In 2004 at NT/04-1; one male captured west bank of Nam Tisang River (10 Mar 2006); one female captured west bank of Nam Tisang River (14 Mar 2006). Abundance: Common. Comments: The Hkakabo Razi birds show no differentiation from the Arunachal Pradesh birds. However, the throat coloration of the Hkakabo Razi specimens has a tinge of yellow while the flanks exhibit larger amounts of cinnamon as compared to the specimens from Thailand (*A. c. exul*: Doi Pu Kha). *A. c. castaneceps* from Doi Sutep in northern Thailand have even less yellow tinges on throat and yellow disappears completely in specimens from the south and east of Thailand (measurements added in Appendix 5).

***Alcippe vinipectus* White-browed Fulvetta.** Documentation: Captured on slope north of Tahaundam village (25 Feb 2001). Abundance: Uncommon. Comments: The captured individual resembles *A. v. perstriata* from Arunachal Pradesh. The differences of our specimen from the nominate form are obvious (Nepal): *vinipectus* is overall lighter colored. The two subspecies *ripponi* (western Myanmar) and *austeni* (northwest Myanmar: Mount Saramati) are distinguishable by the white supercilium: in *ripponi* the supercilium at the base of the bill is also whitish, *austeni*'s supercilium starts above the eye. There is no evidence to separate *ripponi* and *perstriata* by plumage characteristics. Specimen 2001-083 has a complete white supercilium and therefore belongs to the Indian-Himalayan subspecies group. In addition, we had the chance to compare specimens of the species from the Gaolingonshan (collected by M. Flannery and J. P. Dumbacher on the Yunnan-Kachin State border) stored at CAS: the six specimens from Gaolingonshan exhibit duller crown in male then female (GLGS00266 male). However, the pattern does not represent a geographic variation: overall all specimens examined show some degree of variation of crowns' dullness (measurements added in Appendix 5).

***Alcippe cinereiceps* Streak-throated Fulvetta.** Documentation: One male, one female, one undetermined captured in Tahaundam (northern slope) (24/25 Feb 2001). Abundance: Uncommon. Comments: Plumage colorations of the specimens from the Hkakabo Razi region do not fit well to any subspecies. The Hkakabo Razi specimens are closest in coloration to birds from Chin State (*manipurensis*), but the abdomen is not as dark cinnamon colored. The abdomen of the Hkakabo Razi birds is similar to the abdomen of *ludlowi* (Arunachal Pradesh). Nevertheless, the plumage coloration of the throat in *ludlowi* is darker and has more contrasting colors than the birds of northern Myanmar. The latter specimens share characters from both subspecies, and is most likely a new intermediate from.

A. ludlowi is considered as a distinct species in most cases (e.g. Kazmierczak and Perlo 2000, MacKinnon et al. 2000, Rasmussen & Anderton 2005). Considering the rather distinct plumage characters as compared with *cinereiceps* and *vinipectus*, species level seems adequate. Nevertheless, a new taxon sharing characteristics of both *ludlowi* (sometimes *ludlowi* is considered conspecific with *vinipectus*) and *vinipectus* assumes subspecies recognition of our specimen of the region. The complete and clear (however in detail only visible) distinctions of the plumage characteristics indicate that the three specimens captured in 2001 belong to a new subspecies of *A. cinereiceps*. The examined specimens from BMNH, NMNH, Hlawga Park, NMW, and ANSP (n = 56; Table 1) and literature review gave no evidence for an already described subspecies for the region describing the specified features. We propose the name

Alcippe cinereiceps hkakaboraziensis ssp. nov.

However, genetic and acoustic support would strengthen our case considerably.

Diagnosis: A taxon sharing characteristics of both *ludlowi* and *vinipectus*, but slightly darker above and darker cinnamon on vent giving clear distinction either as taxon on a cline or as distinct species (unresolved with current data available).

Holotype: One male collected at Tahaundam (24 Feb 2001; USNM 631843; field number 2001-089) has a light cinnamon abdomen, a gray throat and breast. The latter has frequent white to grayish drops. Measurements do not deviate largely from other *A. cinereiceps* (Table 1).

Paratype: Two further specimens were collected but remained after accurate comparison with the holotype specimen at the Myanmar Natural History Collection in Hlawga Park, Yangon: 2001-098 and 2001-100. All three specimens resemble each other. No sex-dimorphism was determined. Two further specimens are stored at CAS (CAS 95630, CAS 95631) and we choose the first as paratype (CAS 95630). Direct comparison between our holotype and paratype revealed no differences in plumage characteristics or morphometrics.

Distribution: Himalayan slopes in northern Kachin State (extreme northern Myanmar) and adjacent areas in western Yunnan (Southwest China).

Etymology: The species is named after the highest mountain of Myanmar, Hkakabo Razi, located approximately 20 km northeast of the holotype's capture site. The collection locality is located within the Hkakabo Razi National Park.

***Alcippe rufogularis* Rufus-throated Fulvetta.** Documentation: Captured in Naung Mung (2001, 2004, Sep 2005), Gawlai, NM/04-1, NM/04-2, NM/04-3, NT/04-2; several released (10 Feb 2004); five captured at NT/04-2 (19 Feb 2004) but two of them released; two male, one female captured west bank of Nam Tisang River (12 Mar 2006); BMNH 1941.12.1.560, Tutuga, Stanford (28 Dec 1932); BMNH 1941.12.1.555 male, Tutuga, Stanford (28 Dec 1932). Abundance: Common. Comments: *A. r. collaris* (subspecies from northern Myanmar) from the NMNH show no differences in plumage from the specimens from Hkakabo Razi National Park and surroundings. The 20 specimens captured in 2001/2004 are members of the ssp.

A. rufogularis from Kachin State and in collections show some marked differences from plates 93.9a and b (Robson 2000) and plate 47 (King et al. 1975): When contrasted with illustrations, the crown is less brown; the lateral crown stripes broader black (twice as broad); the supercilium 'dirty white' to gray; the lower throat has less rufus stripes; the moustachial stripe gray; breast gray; belly and flanks olive-green instead of gray to rufus; upper parts olive-green instead of rufus.

Table 1. Measurements of *Alcippe ludlowi*, *A. cinereiceps*, and *A. fessa* in South and Southeast Asia. Measurement details given in the methods section. Holotype and paratypes gray shaded. d: damaged, m: feathers in molt, or a imperfectly closed bill (a, for agape).

Collection	Coll. n°	Species	Taxon	Sex	Location	BM	BL	BW	BH	W	Ti	To	Tarsus
MfN	37.96	*ludlowi*	n/a	Female	Taktoo, Northeast Sakden, Bhutan	n/a	7.40	4.40	3.70	55.10	48.60	40.80	26.70
BMNH	1935.4.5.882	*ludlowi*	n/a	Male	Taktoo, near Sakden, Eastern Bhutan	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BMNH	1914.5.13.820	*cinereiceps*	n/a	n/a	Ichang, upper Yangtze valley, China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NMW	83409	*cinereiceps*	n/a	Male	Kuatun, China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Hlawga	123	*cinereiceps*	n/a	Female	Kennedey Peak, Didin Township, Myanmar	10	6.5	3.7	3.46	51.3	45.6	40.75	21.43
Hlawga	121	*cinereiceps*	n/a	Male	Kennedey Peak, Didin Township, Myanmar	11	6.82	4.18	3.88	54.66	49.36	43.47	23.59
BMNH	2010.16.59	*cinereiceps*	n/a	Female	Jed Lwe, Kachin State, Myanmar	7.5	7.33	3.98	3.3	50.13	48.5	39	22.94
BMNH	2010.16.60	*cinereiceps*	n/a	Male	Jed Lwe, Kachin State, Myanmar	9	7.12	3.98	3.7	54.04	54.05	40.76	23.01
BMNH	2010.15.12	*cinereiceps*	n/a	Female	Myanmar	8.5	7.61	3.36	a	53	49	43.84	20.71
BMNH	2010.15.13	*cinereiceps*	n/a	Female	Myanmar	7.5	6.63	3.31	3.97	48.31	48.47	42.47	21.24
MfN	25.724	*cinereiceps*	n/a	Male	Washan, Szechwan, China	n/a	6.70	2.60	3.40	60.70	d	45.50	25.60
MfN	25.738	*cinereiceps*	n/a	Female	Washan, Szechwan, China	n/a	6.70	2.60	3.60	54.40	49.50	38.60	d
MfN	24.331	*cinereiceps*	n/a	n/a	Kwanshrun, China	n/a	8.50	3.50	3.70	57.00	56.10	44.30	25.60
MfN	25.726	*cinereiceps*	n/a	Male	Tschungwin, China	n/a	7.70	2.90	3.60	56.70	51.30	41.50	21.90
MfN	25.729	*cinereiceps*	n/a	Male	Washan, Szechwan, China	n/a	7.00	3.40	3.80	54.80	51.60	49.30	17.70
MfN	25.73	*cinereiceps*	n/a	Male	Kwanhuan, China	n/a	8.80	3.20	3.60	58.80	57.70	46.70	26.80
MfN	25.727	*cinereiceps*	n/a	Male	Washan, Szechwan, China	n/a	6.80	3.00	3.30	57.90	56.40	45.90	25.80
CAS	CAS95631 (GLGS2192)	*cinereiceps*	n/a	Female	Gaolingonshan (Yaojiaping Panda Conservation Station, Yunnan), China	8.7	6.80	3.80	3.80	46.30	46.70	37.90	23.20
NRM	n/a	*cinereiceps*	n/a	Female	Fan Si Pan, Vietnam	n/a	7.10	4.47	a	49.11	49.08	40.91	22.00
NRM	n/a	*cinereiceps*	n/a	Male	Fan Si Pan, Vietnam	n/a	6.74	a	a	55.17	50.39	47.62	22.51
BMNH	1914.5.13.817	*cinereiceps*	*cinereiceps*	Male	Kweitum Sai, China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NRM	n/a	*cinereiceps*	*formosana*	Female	Taiheisan, Taihoku, Taiwan	n/a	6.75	3.16	3.77	50.06	48.54	d	21.61
BMNH	1913.1.29.30	*cinereiceps*	*formosanis*	Female	Mt. Arizan, Taiwan	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
USNM	631843 (HK-089)	*cinereiceps*	*hkakaboraziensis*	Male	Tahaundam, Myanmar	9	8.40	3.80	3.30	52.40	22.40	48.50	50.70
HK	098	*cinereiceps*	*hkakaboraziensis*	n/a	Tahaundam, Myanmar	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
HK	100	*cinereiceps*	*hkakaboraziensis*	Male	Tahaundam, Myanmar	n/a	7.10	2.80	2.90	52.00	39.60	48.60	23.30
CAS	CAS95630 (GLGS2101)	*cinereiceps*	*hkakaboraziensis*	Male	Gaolingonshan (5 km from Pianma on road to Liuku, Yunnan), China	8.9	2.50	4.30	3.40	52.30	51.00	41.90	22.80
BMNH	1948.34.39	*cinereiceps*	*manipurensis*	Male	Chimli Pass road, Myanmar	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BMNH	1921.7.15.267	*cinereiceps*	*manipurensis*	Male	Tengyueh District, China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BMNH	1922.12.7.211	*cinereiceps*	*manipurensis*	Female	Salwin valley, Latitude 25.33 North, China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BMNH	1933.11.13.789	*cinereiceps*	*manipurensis*	Male	Peh Tu P'u, Yungping, China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BMNH	1948.34.38	*cinereiceps*	*manipurensis*	Female	Htawgaw, Myanmar	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BMNH	1895.7.14.1934	*cinereiceps*	*manipurensis*	n/a	Owenkulno Peak, Manipur hills, India	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
USNM	609282	*cinereiceps*	*manipurensis*	n/a	Laiva Dam, Falam Township, Myanmar	10	7.04	3.41	3.35	53.43	50.43	38	20.13
USNM	609293	*cinereiceps*	*manipurensis*	Male	Kennedy Peak, Tidim Township, Myanmar	9.5	6.68	4.35	3.65	49.71	49.76	38.83	19.64
BMNH	1889.3.25.25	*fessa*	n/a	Male	Kansu [Kan-Su], Si Gu [Si-gu], China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ANSP	ANSP184547	*fessa*	n/a	Male	89 km north of Sung Pam, Szechwan, China	13	7.40	d	d	60.90	62.70	56.60	23.20
ANSP	ANSP184546	*fessa*	n/a	n/a	89 km north of Sung Pam, Szechwan, China	11	6.90	3.00	3.80	60.40	58.80	46.10	22.70
ANSP	ANSP182078	*fessa*	n/a	Male	89 km north of Sung Pam, Szechwan, China	12	7.00	4.40	3.70	58.70	59.10	45.90	22.30
ANSP	ANSP (no #)	*fessa*	n/a	n/a	89 km north of Sung Pam,	12	7.80	3.40	3.90	61.00	63.20	57.50	22.60

***Alcippe poioicephala* Brown-cheeked Fulvetta.** Documentation: Observed in mixed-species flock in riparian second growth along the Namai Hka, south of Tazutu (28 Feb 2001). Abundance: Rare.

***Alcippe morrisonia* Gray-cheeked Fulvetta.** Documentation: Frequently captured and observed in small flocks with about 10 individuals. Captured near Ba Baw, Naung Mung, Lonnat, and Shinshanku. NM/01-1, NM/04-1, NM/04-3, NM/04-5, NT/04-2. Five released on 12 Feb 2004. Eleven captured but 10 of those released at NT/04-2 (18 Feb 2004). Three released on 19 Feb 2004 at NT/04-2. Five released at Lonnat (5 Mar 2001). A small number was observed between Shinshanku and Gawlai (7 Mar 2001) in a mixed-species flock that included two other species (*Seicercus poliogenys*, *Alcippe cinerea*). Two were captured and released near Maza (11 Mar 2001). Two males and one individual of undetermined sex observed near Naung Mung (on east bank of Nam Tisang River south of Naung Mung). One male captured west bank of Nam Tisang River 9 Mar 2006. One male captured west bank of Nam Tisang River (14 Mar 2006); captured 2004: NM/04-2, NM/04-3, NM/04-5; three captured in Naung Mung (Sep 2005) and eight released in Naung Mung on 9 Sep 2005; 11 released (9 Feb 2004). Abundance: Common. Comments: *Alcippe morrisonia* and *A. nipalensis* are not conspecific in the region, at least we only observed *A. morrisonia* during our visits (see *A. nipalensis*).

All individuals of *A. morrisonia* that we captured in the Hkakabo Razi area are distinctive from the collection material (215 examined). The birds from northern Myanmar resemble in general *A. morrisonia*, but have some noteworthy plumage features: (i) the front is olive-green instead of gray, (ii) the eye ring towards the bill or front is slightly whiter, (iii) underside (belly) is brighter yellowish, almost whitish-buff, and (iv) eye is gray-brown. The tiny differences indicate subspecies *yunnanensis*, a subspecies distributed mainly in northern Myanmar, Yunnan and Sichuan (measurements added in Appendix 5).

In one of our specimens, initially identified as *A. nipalensis* (2004-046) we observed that the olive-green crown disappeared after approximately four days. The temporal disappearance of the pattern might have two reasons: Either it is a fast bleaching color with the olive front just disappearing from the feathers or it is adventitious resulting from pollen-dusting during foraging. Similar pattern have been found to occur for example in Tennessee Warblers (*Setophaga peregrine*) when foraging on the tropical forest vine *Combretum fruticosum* in Central America (Morton 1980).

***Alcippe nipalensis* Nepal Fulvetta.** Documentation: BMNH 1939.12.8.121 *Alcippe nipalensis* female adult, Htingnan, Kaulback (30 Jan 1939). Abundance: Rare? Comments: Initially several individuals of ours were identified as *A. nipalensis*, but careful comparison indicates all are *A. morrisonia*. However, as the specimen collected by Kaulback cited above indicates (and indeed Kaulback's specimen stored at the BMNH collection in Tring is *A. nipalensis*), *A. nipalensis* was found in the Hkakabo Razi region. We have no data on its current status but assume it is currently not present.

***Heterophasia annectans* Rufus-backed Sibia.** Documentation: One juvenile capture in Nam Ti (Jul 2006); observed several in Nam Ti during breeding. Abundance: Uncommon.

***Heterophasia pulchella* Beautiful Sibia.** Documentation: BMNH 1931.12.8.185 male, Htingnan, Kaulback (13 Mar 1939). Abundance: Uncommon. Movement: Not documented, but local movements likely (not observed during Feb to Mar but during summer).

***Heterophasia picaoides* Long-tailed Sibia.** Documentation: Captured in Naung Mung, Tahaundam, Tazutu; one observation at Nam Ti rest house (11 Mar 2001); BMNH 1941.5.39.105, Kadak Bum, no collector cited (Jan 1933); BMNH 1941.5.30.106, Hukaung Valley at 26.17° North 96.75° East, no collector indicated (Feb 1933). Abundance: Common, more so in the higher elevations. Comments: Two specimens from our trip captured at Tahaundam identified as *H. picaoides* lack the white wing bar (compare Rasmussen & Anderton 2005, Robson 2000) but are otherwise not distinguishable from other specimens, also our prepared specimens seem to be much shorter, particularly with shorter tail feathers than those specimens found in other collections.

***Yuhina castaniceps* Striated Yuhina.** Documentation: One undetermined sex, one female captured west bank of Nam Tisang River (10 Mar 2006). Abundance: Uncommon.

***Yuhina bakeri* White-naped Yuhina.** Documentation: Captured in Maza (evergreen forest). Abundance: Uncommon.

***Yuhina flavicollis* Whiskered Yuhina.** Documentation: Observed at Shinshanku 15 Feb 2001, and Tahaundam at 25 Feb 2001 (2,500 m; northern slope of Tahaundam); BMNH 1939.12.8.193 male adult, Htingnan, Kaulback (4 Feb 1939); BMNH 1939.12.8.194 male adult, Htingnan, Kaulback (4 Feb 1939). Abundance: Common at higher elevations.

***Yuhina gularis* Stripe-throated Yuhina.** Documentation: Observed in temperate rainforest north of Gawlai (7 Mar 2001). Abundance: Rare. Movement: During 'summer' mainly 2,400 m to 3,700 m (Inskipp and Inskipp 1985),

in winter down to 1,600 m (Robson 2000) or as far as 1,000 m (own observations).

***Yuhina nigrimenta* Black-chinned Yuhina.** Documentation: Captured on way between Pangnamdim and Shinshanku. In 2004 at Nam Ti (NT/04-1); also observations between Shinshanku and Gawlai (7 Mar 2001); six individuals were observed at the Nam Ti rest house (11 Mar 2001); one individual was shot by porter near Pangnamdim (16 Feb 2001); BMNH 1939.12.8.197 female adult, Htingnan, Kaulback (4 Feb 1939); BMNH 1939.12.8.198 male adult, Htingnan, Kaulback (27 Jan 1939); BMNH 1941.12.1.391 male adult, Maitongkha, Stanford (18 Dec 1932); BMNH 1941.12.1.392 adult, Hkamko, Stanford (31 Dec 1932). Abundance: Common north of Pangnamdim, uncommon during breeding south of Pangnamdim. Comments: Specimen 2001-047 resembles in plumage coloration the specimens of India, i.e. the nominate taxon. The subspecies *pallida* from northern Vietnam is slightly brighter colored on breast.

***Erpornis zantholeuca* White-bellied Yuhina.** Documentation: Captured 2004: NM/04-2, NM/04-3, and NT/04-1. One male captured west bank of Nam Tisang River (11 Mar 2006). One male, one female captured west bank of Nam Tisang River (12 Mar 2006). Abundance: Common. Comments: Specimen 2004-075 resembles those of *canescens* in Thailand, and *sordida* in Vietnam. *E. z. interposita*, occurring in central Thailand, exhibit darker crown.

***Paradoxornis nipalensis* Black-throated Parrotbill.** Documentation: Captured at Pangnamdim (16 Feb 2001). Abundance: Uncommon. Comments: All captured and exported individuals of the Hkakabo Razi region resemble in coloration those of the subspecies *poliotus* of Arunachal Pradesh. The Bhutan subspecies *erocotius* is less colorful.

***Paradoxornis atrosuperciliaris* Lesser Rufus-headed Parrotbill.** Documentation: Captured at Naung Mung. Abundance: Uncommon. Comments: The Hkakabo Razi specimens resemble in coloration those from Arunachal Pradesh/Assam rather than the Thailand specimens.

***Paradoxornis ruficeps* Greater Rufus-headed Parrotbill.** Documentation: Three individuals at NT/04-2. One male, one female captured at U Ring Ga rest house (18 Mar 2006). Abundance: Uncommon.

***Paradoxornis gularis* Gray-headed Parrotbill.** Documentation: BMNH 1939.12.8.209 adult, Htingnan, Kaulback (4 Feb 1939); BMNH 1941.12.1.146 male adult, Tutuga, Stanford (12 Jan 1933). Abundance: Locally common.

ZOSTEROPIDAE

***Zosterops palpebrosus* Oriental White-eye.** Documentation: Observed near Naung Mung (9 Mar 2001) and Nam Ti rest house (11 Mar 2001). Abundance: Uncommon. Comments: Wide range with marked variation. Specimens from Hkakabo Razi resemble the nominate subspecies, which occurs mainly in India.

SITTIDAE

***Sitta cinnamoventris* Chestnut-bellied Nuthatch.** Documentation: BMNH 1931.1.7.277 [male] adult, Tutuga, Stanford (12 Jan 1933). Abundance: Rare. Comments: Taxonomy follows Rasmussen & Anderton (2005).

***Sitta himalayensis* White-tailed Nuthatch.** Documentation: Observed in mixed-species flock in riparian second growth along the Namai Hka River south of Tazutu on 28 Feb 2001. Abundance: Rare.

***Sitta frontalis* Velvet-fronted Nuthatch.** Documentation: BMNH 1937.1.7.283 female adult, Tutuga, Stanford (13 Jan 1933); BMNH 1937.1.7.284 male adult, Supkaya, Stanford (15 Mar 1934). Abundance: Uncommon. Comments: Red bill color fades in collections and is rather yellowish in historic specimens (>100 years).

***Sitta formosa* Beautiful Nuthatch.** Documentation: Two captures in Maza within evergreen forests; a third captive was released (10 Mar 2001); BMNH 1939.12.8.244 male, Htingnan, Kaulback (30 Jan 1939). Abundance: Common. Comments: USNM 631883 (field number: 2001-169), one out of the two specimens collected in Maza, was exported to the NMNH where it was compared with the single specimen in the collection (USNM 390283), a female collected in the Mishmi Hills (Northeast Assam). All three specimens revealed no differences in plumage coloration.

STURNIDAE

***Acridotheres javanicus* White-vented Myna.** Documentation: Observed in open fields of Putao Plain (9 Feb 2001, 15Sep 2005, and 3Mar 2006). Abundance: Locally common.

***Acridotheres tristis* Common Myna.** Documentation: BMNH 1939.12.8.278 male adult, Htingnan, Kaulback (10 Mar 1939); BMNH 1939.12.8.279 female adult, Htingnan, Kaulback (30 Jan 1939); BMNH 1939.12.8.280 female adult, Htingnan, Kaulback (30 Jan 1939); BMNH 1937.1.7.666 adult, Putao, Stanford (5 Jan 1933). Abundance: Locally common.

***Sturnus contra* Asian Pied Starling.** Documentation: Sight record at Nam Ti (18 Feb 2004), and between Putao and Alung-dung Ku (9 Feb 2001). Abundance: Uncommon at lower elevations (<1,000 m).

***Sturnus malabaricus* Chestnut-tailed Starling.** Documentation: Observed in 10 m high tree nearby the Nam Ti rest house (11 Mar 2001). Abundance: Uncommon.

TURDIDAE

***Myophonus caeruleus* Blue Whistling-Thrush.** Documentation: Captured in Wangsewan in second growth. Abundance: Uncommon.

***Zoothera citrina* Orange-headed Thrush.** Documentation: Captured in Naung Mung (Sep 2005). Abundance: Uncommon. Movement: Local movements in the foothills indicated by absence in Feb but presence in Sep.

***Zoothera dixoni* Long-tailed Thrush.** Documentation: Captured in Gawai 2 Mar 2001. Abundance: Rare. Comments: The eight NMNH specimens from Yunnan, Szechwan, Nepal and southern Tibet show no color variation. But direct comparison of the Hkakabo Razi specimen 2001-120 with the series of eight specimens from the NMNH reveal slight differences in the plumage pattern, because 2001-120 is brighter colored on throat compared to the other mentioned specimens. The observed differences are emphasized in so far that the second specimen captured in Gawai (2001-121) resembles exactly the exported specimen (pairwise observations in the field). Two specimens with the same plumage coloration from Hkakabo Razi, which is distinctive from all other specimens, might indicate geographic variation and a distinct subspecies, however, more data is needed.

***Turdus albocinctus* White-collared Blackbird.** Documentation: BMNH 1937.1.7.447 female, Hukaung Valley near N'ding, Stanford (11 Feb 1936). Abundance: Rare.

***Brachypteryx hyperythra* Rusty-bellied Shortwing.** Documentation: Two females were captured 2004 at Naung Mung site NM/04-3. Abundance: Rare. Comments: Only 19 localities worldwide are known for this species (BirdLife International 2001). Our specimens represent the only confirmed records of the bird from Myanmar, although the species was reported from 'near Putao' in 1998 (BirdLife International 2001).

***Brachypteryx leucophrys* Lesser Shortwing.** Documentation: One capture in wet second growth with scattered trees and bamboo thickets in Lonnat (2001-138), one in Pangnamdim in 2001 (2001-129). Abundance: Uncommon. Comments: Five subspecies are recognized: comparisons of specimens representing the various subspecies with our specimens revealed some differences in plumage coloration. Our specimens (closest to *nipalensis* in coloration) showed minor differences in plumage characteristics to other members of *nipalensis*, and *wrayi* as well as *carolinae* (NMNH, BMNH): the ventral plumage parts are variable in degree of whitish for all subspecies; ventral parts show slightly more cinnamon in *carolinae* compared with our Myanmar specimens. *B. l. wrayi* is as buffy as *nipalensis*, while *carolinae* is more grayish overall.

Specimens from the BMNH showed a previously unrecognized sexual dimorphism for some populations; in *wrayi* females are darkish brown with white but small eye brow, male dark gray with almost invisible or hidden white eye brow. In *nipalensis* the white eye brow is most times invisible for both sexes.

MUSCICAPIDAE

***Luscinia pectoralis* White-tailed Rubythroat.** Documentation: One sight record of female at Kasaung Hka River, 1 km west of Naung Mung on 11 and 12 Feb 2004. Abundance: Uncommon.

***Luscinia cyanurus* Orange-flanked Bush-Robin.** Documentation: Captured in Lonnat (5 Mar 2001) and Gawlai (8 Mar 2001). Abundance: Uncommon.

***Copsychus saularis* Oriental Magpie-Robin.** Documentation: Observed near Naung Mung, approximately 1 km west at site NM/01-1 (9 Mar 2001). Abundance: Rare.

***Phoenicurus auroreus* Daurian Redstart.** Documentation: Captured in Nagwa in wet second growth (3 m to 7 m). Abundance: Uncommon.

***Rhyacornis fuliginosus* Plumbeous Water Redstart.** Documentation: Several sight records alongside Nam Tamai River; Nam Tamai River bridge near Pangnamdim male (18 Feb 2001); captured in Pangnamdim on 6 Mar 2001. One sight record near Naung Mung (Kasaung Hka) on 10 and 12 Feb 2001. Recorded at Pangnamdim (16 Feb 2001) and on way from there to Lonnat (17 Feb 2001; 5 Mar 2001). On way between Lonnat and Nagwa (18 Feb 2001), between Tazutu and Karaung (23 Feb 2001), Karaung and Tahaundam (24 Feb 2001). Observed along the Nam Tamai River between Wangsewan and Nagwa (3 Mar 2001). One nest site (breeding not confirmed) was observed in a tree trunk (diameter of trunk was about 30 cm) hanging over the Nam Tamai River in 4 m height. Also observed at Nam Tisang River near Naung Mung (9 Mar 2001). Abundance: Common. Comments: We observed several breeding sites on the river banks of larger rivers.

Table 2. Matrix representing the sex of *Ficedula strophiata*, determined by plumage characteristics and adapted from the labels. Included are only specimens with safe determination of the sex by the collector from NMNH and ANSP holdings. All information based on clearly label sex by gonads, otherwise indicated (*).

	Identification based on plumage characteristics														
Labeled as	Male					Female					Immature or undetermined				
	Thailand	Vietnam	China	India/Nepal	Myanmar	Thailand	Vietnam	China	India/Nepal	Myanmar	Thailand	Vietnam	China	India/Nepal	
Male	15	7	1	11*	4	5	–	–	–	–	–	2	–	–	
Female	5	–	–	1	–	10	4	–	3	2	3	–	–	–	
Immature	–	–	–	–	–	–	3	–	–	–	–	–	–	–	
Undetermined	2	–	1	–	–	–	–	–	1	–	–	–	–	1	

***Chaimarrornis leucocephalus* White-capped Water-Redstart.** Documentation: One individual was singing and sitting on stranded driftwood along a dry river bed near Gawlai (approximately 2.5 km north of Gawlai) on 7 Mar 2001; BMNH 1931.1.7.928 male adult, Hpunchankha, Stanford (23 Jan 1933). Abundance: Uncommon near streams and rivers. Comments: Reported as common in 1940 in the Alung Dung Valley (Smythies 1953), but may have decreased in numbers since then, since we hardly observed the species.

***Myiomela leucura* White-tailed Robin.** Documentation: One captured on 10 Feb 2001 in Ba Baw Village in second growth riparian forest; BMNH male adult, Htingnan, Kaulback (11 Mar 1939). Abundance: Uncommon. Comments: Easily overlooked and might be more abundant than assumed (own observations).

***Enicurus scouleri* Little Forktail.** Documentation: Captured in Lonnat. Sighted at Pangnamdim (16 Feb 2001) and on way to Lonnat (5 Mar 2001) and between Lonnat and Nagwa (6 Mar 2001). Abundance: Common near smaller rivers and streams.

***Enicurus immaculatus* Black-backed Forktail.** Documentation: Observed at Kasaung Hka River, a side branch of the Nam Tisang River (11 Feb 2004; 9 Mar 2001). Abundance: Uncommon along smaller rivers.

***Enicurus schistaceus* Slaty-backed Forktail.** Documentation: Captured on streamside (side branch of Nam Tamai River) in Pangnamdim. Sight records between Naung Mung and Maza on 15 Feb 2004. Abundance: Uncommon near streams and rivers.

***Enicurus leschenaulti* White-crowned Forktail.** Documentation: Sighted at Kasaung Hka River (side branch near NM/01-1) on 12 Feb 2001. Also near Gawlai (14 Feb 2001). One male captured at U Ring Ga rest house (18 Mar 2006). Abundance: Common near smaller rivers and larger streams.

***Enicurus maculatus* Spotted Forktail.** Documentation: Captured in Nam Ti (17 Feb 2001). Abundance: Uncommon near rivers.

***Saxicola torquatus* Eurasian Stone Chat.** Documentation: Near Alung-dung Ku (9 Feb 2001). Abundance: Rare.

***Saxicola ferreus* Gray Bush Chat.** Documentation: Observed in open fields of Putao Plain (9 Feb 2001). Abundance: Uncommon.

***Ficedula strophiata* Rufus-gorgeted Flycatcher.** Documentation: Captured in Pangnamdim, Wangsewan, Nagwa, Tasaku, NM/01-1, NM/04-1; one male captured west bank of Nam Tisang River (9 Mar 2006); BMNH 1939.12.8.102 male adult, Htingnan, Kaulback (4 Feb 1939). Abundance: Common. Comments: Measurements of the specimen from the BMNH revealed significant differences from pooled *F. strophiata* (measurements listed in Appendix 5), supporting recognition of subspecies of this common and widespread species. While inner and outermost rectrix did not differ significantly between pools, the pooled individuals from Thailand (pool 5 in Appendix 5) had significantly ($p \leq 0.05$) differing bill length and tarsus.

Based on the morphometric differences, the recognized subspecies in this species should be revised. All Thailand birds should be considered as one clearly distinguishable subspecies while those birds found in the rest of the species' range should be considered as the nominate form. Robson (2000) states that *F. s. fuscogularis* has warmer upper parts and occurs in southern Vietnam. While we cannot necessarily confirm these particular color findings with the available data in the NMNH, we can confirm morpho-

Table 3. Measurements of female *Ficedula tricolor* from the Hkakabo Razi region and the NMNH collection. Measurements are explained in detail in the 'Methods' section.

#	Locality	Age	BM	BL	BW	BH	W	Ti	To	T
2004-123	Naung Mung	adult	8.00	8.1	4.1	2.6	57.3	40.8	37.6	19.9
519874	Gasa, Bhutan	adult	n/a	7.3	3.8	2.6	57.7	52.1	43.6	19.2
535577	Doi Pha Ham Pol, Thailand	adult	n/a	8.7	3.8	2.6	54.8	47.4	44.0	18.4
519873	Gasa, Bhutan	immature	8.0	-	-	-	-	-	-	-
535582	Doi Inthanon, Chiang Mai, Thailand	adult	n/a	7.1	3.8	2.6	55.4	47.3	42.7	18.4

metric differences between this subspecies and all others. Rasmussen & Anderton (2005) note that 'individuals,' probably referring to *fuscogularis*, are much darker overall in southern Assam hills then in the western Himalayan form '*euphonia*'.

We found that sexual dimorphism differed between different subspecies. All field guides state that males have a dark cinnamon to rufus throat patch, sometimes lacking, and plumbeous to dark gray overall plumage. Females have a whitish or absent throat patch and are grayer browner overall. Our two specimens from Hkakabo Razi were females, based on examination of the gonads. However, their plumage lacked the typcial throat patch. Similarly, three male specimens from Thailand and one from Assam, lacked the rufus throat patch completely.

Examination of additional specimens of the species from NMNH and ANSP indicated that the southern population (Vietnam) does indeed exhibit sexual dimorphism to some degree. Specimens from China, India, and Nepal were sexed all as male accoding to plumage (Table 2), but indeed were female by gonads (as staded on the labels). This pattern is unfortunately not supported with a powerful statistical analysis (n is very low). Nevertheless, the two recognized subspecies might be used in a slightly unconventional way: The taxon *F. s. strophiata* has distinctive males and females, while *F. s. fuscogularis* have similar males and females in plumage appearance.

Ficedula monileger **White-gorgeted Flycatcher.** Documentation: Captured in Naung Mung, Pangnamdim, Nagwa, Wangsewan, Tazungdam, NM/01-1, NM/04-1, NM/04-3, and NT/04-1. Three were released at Pangnamdim (6 Mar 2001). One out of two captures was released at Tazutu (9 Mar 2001). One captured and released in Maza (10 Mar 2001). Three captured in Naung Mung (Sep 2005), one in Maza (6 Mar 2006). Abundance: Common. Comments: *F. m. leucops* and *F. m. gularis* are recognized as two subspecies, the latter from southwest Myanmar is not distinctive in plumage from the nominate form nor *leucops*.

We found two plumage forms (morphs): (i) a form with a darker colored belly which is cinnamon with an olive hue and (ii) a gray belly form. Both forms have no clear geographic differences in distribution. While the dark morph has two specimens from India and ten from Thailand, the gray form is represented by two specimens from India and Thailand. In addition, the forms represent no sex-dimorphism because both sexes are intermingled in all groups and all localities (own observations; all data NMNH).

Rasmussen & Anderton (2005) state that *F. monileger* has two regional races, which are shown with disjunct populations and plumage colorations therein. While *leucops* (Southeast Asia) is grayer, the nominate is tawnier. Three out of four specimens from the Hkakabo Razi region belong to the dark morph (i.e. the nominate) and one to the lighter morph (i.e., *leucops*). We suggest both morphs represent two distinct taxa; because of the sympatric occurrence, we conclude on a preliminary basis based on plumage characters that both morphs should be treated as species. Further data, molecular and acoustic analysis are warranted.

Ficedula hyperythra **Snowy-browed Flycatcher.** Documentation: Captured 2004 in Naung Mung (NM/04-4, NM/04-5). Also at Nam Ti (NT/04-2). One male captured at U Ring Ga rest house (16 Mar 2006). Two females captured at U Ring Ga rest house (17 and 18 Mar 2006). Abundance: Common.

Ficedula tricolor **Slaty-blue Flycatcher.** Documentation: Captured at Naung Mung (10 Mar 2001). Abundance: Common. Comments: We identified two captured males (2004-123, -164) as members of this species by plumage colors, but both have shorter tails than all other members of the species in collections in the NMNH, a feature not typical for flycatchers. Both specimens showed no sign of molt. The plumages of both specimens indicate female but the analyses of the gonads resulted two males. The skulls of both where almost completely ossified, indicating mature male. Female specimens from Hkakabo Razi region exported to the NMNH, have a slightly larger bill but shorter wing and shorter rectrix (Table 3).

***Ficedula sapphira* Sapphire Flycatcher.** Documentation: One male captured in Nam Ti (13 Sep 2006). Abundance: Uncommon.

***Cyornis hainanus* Hainan Blue-Flycatcher.** Documentation: One female (2001-001) captured in Putao near Military Base. Abundance: Rare. Comments: Our record is a range extension within Myanmar form the Shan States west and northwards. The observed habitat in the Hkakabo Razi region indicates that this species might be common.

***Cyornis unicolor* Pale Blue-Flycatcher.** Documentation: Two adults and one juvenile captured in Naung Mung, one adult captured in Nam Ti (Jul 2006). Abundance: Uncommon.

***Cyornis magnirostris* Large Blue-Flycatcher.** Documentation: 2005-046 male in Naung Mung Sep 2005. Abundance: Common (most likely breeding). Comments: The blue-flycatchers of Southeast Asia comprise a speciose assemblage of taxa that are very similar despite having brilliantly plumaged males. Rasmussen & Anderton (2005) considered *magnirostris* to be a full species primarily on the basis of its distinctive morphology. The highly migratory habit of *magnirostris* contrasts strikingly with the resident status of *whitei* and we revived species status for *magnirostris* (Renner et al. 2009).

***Cyornis banyumas* Hill Blue-Flycatcher.** Documentation: BMNH 1939.12.8.106 *Cyornis banyumas* [*sic!*] male adult, Htingnan, Kaulback (10 Mar 1939). Abundance: Rare.

***Cyornis rubeculoides* Blue-throated Flycatcher.** Documentation: 2005-029 [male] and 2005-043 female captured in Sep 2005 in Naung Mung. One male captured at U Ring Ga rest house (19 Mar 2006). Abundance: Uncommon. Comments: First record for northern Kachin State. The Mar and Sep dates of our records suggests that the bird may breed in the area.

***Niltava sundara* Rufus-bellied Niltava.** Documentation: Captures at southern parts of the region at Ba Baw, Gawlai, and the center of the Hkakabo Razi NP at Nagwa, Wangsewan, and Gawai. NM/04-1, NM/04-3. One male released in Tazungdam on 28 Feb 2001. One male was released in Tazutu (8 Mar 2001). One male captured at U Ring Ga rest house (18 Mar 2006). Abundance: Common. Comments: One specimen captured in Yunnan (NMNH) exhibits a darker colored breast and brighter wings. However, the color variation in all specimens from Northeast India to China is minor and rather clinal.

***Niltava grandis* Large Niltava.** Documentation: Captured in Gawlai, Shinshanku, Nagwa, Wangsewan, Lonnat, NM/04-1, NM/04-2, NM/04-3, NM/04-5, NT/04-2; On 12 Feb 2004 we captured one female of the subspecies *decorata* at NM/04-5; two females were released on 10 Feb 2004 at NM/04-2 and NM/04-3; one male released at NT/04-2 (17 Feb 2004); female, male released 18 Feb 2004 NT/04-2; female on 19 Feb 2004 (NT/04-2) released; male on 19 Feb 2004 (NT/04-1) released; two (male, female) released on 16 Feb 2001 at Pangnamdim; one capture was released in Maza (10 Mar 2001); one male captured in Naung Mung (Sep 2005); one male Maza (6 Mar 2006); BMNH 1939.12.8.103 male adult, Htingnan, Kaulback (9 Jan 1939); BMNH 1940.1.1.8 female adult, Htingnan, Kaulback (11 Mar 1939). Abundance: Common. Comments: While males do not exhibit any visible variation in plumage coloration, females of *N. g. decorata* and *N. g. decipiens* are distinctive in plumage characteristics (shining blue nape and crown). The extent of blue in females varies between almost invisible to a strong blue hue almost as shiny as the blue in male crown and nape, but the extent seems due to individual variation without geographic pattern.

***Niltava macgrigoriae* Small Niltava.** Documentation: Captured in Naung Mung (primary evergreen forest) in 2004: NM/04-2, NM/04-3, NM/04-4, NM/04-5, and NT/04-2. Abundance: Common. Comments: Males from Hkakabo Razi show a slightly brighter shining effect of the upper tail coverts compared to all other examined specimens in the NMNH collection. In addition, the eastern Himalayan subspecies (*signata*) and the western Himalayan nominate form differ from each other and from our specimens: *N. m. signata* exhibits a more whitish belly and less intensive yellow on underparts. One female specimen (2001-057) captured in Pangnamdim looks very similar to the female of *N. macgrigoriae* but is much darker – browner to rufus rather than cinnamon like the NMNH specimens.

***Culicicapa ceylonensis* Gray-headed Canary-Flycatcher.** Documentation: Captured in Gawlai, NM/04-1, NM/04-4, NM/04-5, also in Naung Mung (Sep 2005); BMNH 1937.1.7.104 male, Tutuga, Stanford (13 Jan 1933). Abundance: Common.

CINCLIDAE

***Cinclus pallasii* Brown Dipper.** Documentation: Captured along a tributary of the Nam Tamai River (Nam Tamai River) near Pangnamdim. Sighted at the net site near the Kasaung Hka River on 12 Feb 2004, also on way between Lonnat and Nagwa (18 Feb 2001) and between Tazutu and Karaung (23 Feb 2001). One individual was observed at

a nameless side branch of the Nam Tamai River between Wangsewan and Nagwa (3 Mar 2001). One individual at a side branch of the Nam Tamai River 9.6 km south of Nagwa (4 Mar 2001); the name of this second side branch was given as 'Darweng'. Abundance: Common. Comments: Males of all subspecies between Sichuan and Northeast Assam exhibit no visible differences from our exported specimens. Females show slight differences between Sichuan and Northeast Assam specimen, stored at the NMNH collection: the China birds have darker brownish wings and tails (dark sepia instead of brown). The female 2001-140 captured at Pangnamdim resembles more the Chinese birds than the Northeast Assam specimens in coloration. The darker form resembles *dorjei*, the subspecies from the southern Himalayan Mountains and hills. The female specimens from the Hkakabo Razi region are in-between the more western and eastern subspecies, all three subspecies form a cline from east to west, females are duller in the west and darker in the east.

CHLOROPSEIDAE

***Chloropsis hardwickii* Orange-bellied Leafbird.** Documentation: Sight record at Nam Ti rest house (11 Mar 2001) and 10 Feb 2001 in Ba Baw. One female captured west bank of Nam Tisang River (9 Mar 2006). Abundance: Common.

DICAEIDAE

***Dicaeum ignipectum* Buff-bellied Flowerpecker.** Documentation: Observed in tree along river north of Tazutu (23 Feb 2001); BMNH 1941.12.1.470 male adult, Tutuga, Stanford (13 Jan 1933). Abundance: Rare.

NECTARINIIDAE

***Aethopyga gouldiae* Mrs. Gould's Sunbird.** Documentation: BMNH 1932.12.10.70 male adult, Adung Valley at 28.17° North 97.67° East, Kingdon-Ward (27 Mar 1931). Comments: The historic single specimen collected by Kingdon-Ward has a black throat with almost no iridescent parts contrasting the throat coloration with all specimens of the same species collected elsewhere (BMNH collection).

***Aethopyga nipalensis* Green-tailed Sunbird.** Documentation: Captured at Tahaundam. Abundance: Uncommon. Comments: Thailand subspecies and specimen are generally more red and fiery on breast (*angkanensis*) than Indian subspecies (*koelzi*) and the specimens from Hkakabo Razi (Fig. 30). Subspecies *australis* has more green instead of red on breast and occurs also in Thailand.

Fig. 30. *Aethopyga nipalensis* Green-tailed Sunbird close to Tesuthu. [Renner Dec 2013].

***Aethopyga saturata* Black-throated Sunbird.** Documentation: Two individuals were captured at Nagwa in wet second growth (3 to 7 m); Tasaku, Maza, NM/01-1, NM/04-5, NT/04-1; one capture in Naung Mung (Sep 2005); two individuals (male, female) were observed between Pangnamdim and Shinshanku (6 Mar 2001); one observed male at Nam Ti rest house (11 Mar 2001); one male captured south bank of river south of the U Ring Ga rest house (20 Mar 2006); BMNH 1941.12.1.451 male adult, Tutuga, Stanford (17 Jan 1933). Abundance: Common. Comments: Male 2001-123 is clearly classified as belonging to the subspecies *assamiensis* (Northeast India), and is distinguishable from Thailand's subspecies by having a lighter-colored breast.

***Aethopyga siparaja* Crimson Sunbird.** Documentation: Captured in Naung Mung 8 Feb 2004 at NM/04-3. Abundance: Uncommon.

***Arachnothera longirostra* Little Spiderhunter.** Documentation: One female captured west bank of Nam Tisang River (10 Mar 2006); BMNH 1941.12.1.489 male adult, Tutuga, Stanford (19 Jan 1933); BMNH 1941.12.1.490 [female] adult, Putao, Stanford (19 Dec 1932). Abundance: Uncommon.

Arachnothera magna **Streaked Spiderhunter.** Documentation: Captured in Naung Mung. In 2004: NM/04-5; one out of the two captures at Naung Mung (9 Mar 2001) was released; in Sep 2005 one capture in Naung Mung and two in Nam Ti; three captures at Maza but two were released (10 Mar 2001); observed also at Nam Ti rest house (11 Mar 2001); one sight record at NM/04-2 on 6 Feb 2001; another record between Wangsewan and Nagwa (3 Mar 2001); observed also between Shinshanku and Gawlai (7 Mar 2001); one male captured at U Ring Ga rest house (20 Mar 2006); BMNH 1939.12.8.261 male, Htingnan, Kaulback (27 Jan 1939); BMNH 1939.12.8.256 male, Htingnan, Kaulback (12 Jan 1939); BMNH 1939.12.8.260 male, Htingnan, Kaulback (30 Jan 1939); BMNH 1939.12.8.257 female, Htingnan, Kaulback (30 Jan 1939); BMNH 1939.12.8.259 male, Htingnan, Kaulback (30 Jan 1939); BMNH 1939.12.8.258 female, Htingnan, Kaulback (12 Jan 1939); BMNH 1941.12.1.492 male, Tutuga, Stanford (13 Jan 1933); BMNH 1941.12.1.491 male, Tutuga, Stanford (20 Jan 1933). Abundance: Locally common. Movement: Not documented.

PASSERIDAE

Passer domesticus **House Sparrow.** Documentation: Few sight records in Tahaundam (Feb 2001). Frequently observed at the National Park Warden's House in Putao in Sep 2005. Abundance: Locally common. Comments: Locally common in Myanmar but outnumbered by *P. montanus* (Smythies 1953). The numbers at the Park Warden's house in Putao indicate a relation of one to ten of *P. domesticus* to *P. rutilans*.

Passer rutilans **Russet Sparrow.** Documentation: Frequent observations at the market place in Putao (2001, 2004, 2005) and at the Park Warden's house in Putao (2004, 2005). Regional populations are about 25 and 15 individuals in both places in Sep 2005; BMNH 1941.12.1.236, Gam Majaw, Stanford (9 Apr 1933); BMNH 1941.12.1.239 female, Kalihtu, Stanford (21 Mar 1934); BMNH 1941.12.1.237 male, Kalihtu, Stanford (22 Mar 1934); BMNH 1941.12.1.240 female, Kalihtu, Stanford (21 Mar 1934); BMNH 1941.12.1.238 female, Kalihtu, Stanford (21 Mar 1934). Abundance: Locally common. Movement: In northern Myanmar not reported in winter but as breeding bird (own observations). Comments: Common species in Putao at all locations with large areas of bare soil like the market place or near the airport. Not observed anywhere else on track. Flocks with *P. domesticus* but outnumbers *domesticus* by tenfold.

Passer montanus **Eurasian Tree Sparrow.** Documentation: Shot by small boys in Naung Mung Township near the center ('TV Station') in 2004; BMNH 1939.12.8.275 male, Htingnan, Kaulback (12 Mar 1939); BMNH 1941.12.1.198 female, Tutuga, Stanford (21 Jan 1933); BMNH 1941.12.1.199 male, Gam Majaw, Stanford (14 Apr 1933). Abundance: Locally common. Comments: Martens and Eck (1995) found that in a given village always only one species of *Passer* occurs (i.e. one out of *montanus*, *rutilans* or *domesticus*). We found, that at least *P. domesticus* and *P. rutilans* can occur at the same localities.

ESTRILIDAE

Lonchura striata **White-rumped Munia.** Documentation: Sight record of 20 individuals 1 km west of Naung Mung center (11 Feb 2004); BMNH 1941.12.1.291 adult, Tutuga, Stanford (17 Jan 1933). Abundance: Common. Comments: Two subspecies range to the Hkakabo Razi region: *swinhoe* in western Yunnan and *subsquamicollis* in Southeast China (Tso-hsin Cheng 1987). A flock of 20 individuals was observed in a rice paddy near Kasaung Hka. The individuals were feeding in the rice paddy and flowing to a nearby bush when disturbed. The observation was made for several consecutive days in Feb 2004 (Renner). Rasmussen & Anderton (2005) suggest splitting populations in India (two species) along the Ganges with possibly secondary contact zone in Hkakabo Razi.

PRUNELLIDAE

Prunella immaculata **Maroon-backed Accentor.** Documentation: Captured in Tahaundam (Nam Tamai River), Tazungdam. Observed 3.2 km south of Nagwa (two individuals; 4 Mar 2001). We captured one male (2001-102) at Tahaundam (1,800 m) on 25 Feb 2001, one female (2001-119) on 1 Mar 2001 in Gawai (1,200 m) and observed two individuals near a rice paddy between Wangsewan and Nagwa (1,000 m) on 3 Mar 2001. Abundance: Locally common. Movement: *P. immaculata* is most likely a winter visitor to the region migrating to northern Myanmar (from Eurasia) during Oct to Mar. Comments: *P. immaculata* has not been recorded for Southeast Asia, but was postulated to occur in northern Myanmar (Robson 2000) and is known to breed in northern Yunnan (Smythies 1953). With our record we confirm occurrence of the species in northern Myanmar.

MOTACILLIDAE

Motacilla alba **White Wagtail.** Documentation: Several sight records in the central area of Naung Mung ('Golf Court' near Naung Mung market) in 2004. One record in the village Karaung (23 Feb 2001). Two individuals be-

tween Gawai and Wangsewan (2 Mar 2001) and at the school of Nagwa (3 Mar 2001). Nam Se Bum (4 Sep 2005). Putao (bridge and Park Warden's house; 12 Sep 2005). Abundance: Locally common. Comments: The subspecies *baicalensis* from the Baikal Lake region winters in the Hkakabo Razi region. Other subspecies occur also in the region (Smythies 1953), but are rare.

***Anthus roseatus* Rosy Pipit.** Documentation: BMNH 1941.12.1.348 [male] adult, Punlumbum, Stanford (19 Mar 1934); BMNH 1941.12.1.336 non-breeding, Hkamko, Stanford (31 Dec 1932); BMNH 1941.12.1.341 non-breeding, Sumprabum, Stanford (23 Dec 1932); BMNH 1941.12.1.344 male non-breeding, Sumprabum, Stanford (25 Dec 1932). Comments: All three *Anthus* species found in the region are historic records only.

***Anthus richardi* Richard's Pipit.** Documentation: BMNH 1941.12.1.361 male adult, Putao, Stanford (Jan 1935). Comments: All three *Anthus* species found in the region are historic records only.

***Anthus hodgsoni* Olive-backed Pipit.** Documentation: BMNH 1941.12.1.358 (determined as *A. h. yunnanensis*) female adult, Tutuga, Stanford (15 Jan 1933). Comments: All three *Anthus* species found in the region are historic records only.

FRINGILIDAE

***Leucosticte nemoricola* Plain Mountain-Finch.** Documentation: Not documented but at Hpare pass (four individuals) at 25.83° North 98.42° East (Smythies 1953). Comments: Hpare pass is the border region between Yunnan and Kachin State (located about 8 km on Kachin State side).

***Carpodacus erythrinus* Common Rosefinch.** Documentation: BMNH 1939.12.8.276 female, Htingnan, Kaulback (4 Feb 1939).

***Pyrrhula nipalensis* Brown Bullfinch.** Documentation: BMNH 1932.12.10.60 male, Adung Valley at 28.17° North 97.67° East, Cranbrook (18 Apr 1931).

***Pyrrhula erythaca* Gray-headed Bullfinch.** Documentation: Sight record at Tahaundam (2,800 m at northern slope) 25 Feb 2001; BMNH 1932.12.10.59 male subadult, Adung Valley at 28.33° North 97.75° East, Cranbrook (5 Jul 1931).

***Pyrrhoplectes epauletta* Golden-naped Finch.** Documentation: Sight record at Nam Ti rest house (11 Mar 2001); additional record about 5 km south of our area of interest at Htawgaw (BMNH 1948.34.76.37 at 25.99° North 98.68° East by Smythies).

***Mycerobas carnipes* White-winged Grosbeak.** Documentation: BMNH 1932.12.10.58 female, Adung Valley at 28.33° North 97.75° East, Cranbrook (14 Aug 1931).

***Mycerobas melanozanthus* Spot-winged Grosbeak.** Documentation: BMNH 1939.12.8 female, Mahtum, Kaulback (15 Aug 1939); BMNH 1941.12.1.229 male adult, N'Daw Hka, Stanford (28 Mar 1934); BMNH 1941.12.1.230 male adult, N'Daw Hka, Stanford (28 Mar 1934).

***Mycerobas affinis* Collared Grosbeak.** Documentation: BMNH 1932.12.10.57 female non-breeding, Adung Valley at 28.33° North 97.75° East, Cranbrook (28 Jun 1931).

Not identified specimens

Fourteen specimens have not yet been identified to species because specimens have not yet been exported and consequently not compared with specimens from international collections.

DISCUSSION

Biogeographic affinities

Watts (1984) provided a general taxonomy for the biogeography of the world, describing six major units: Nearctic; Neotropical; Ethiopian (African); Australian; Palearctic; and Oriental (Fig. 31). The Hkakabo Razi region of the southeastern Himalayas straddles two of these major divisions: the Palearctic and the Oriental. It is clear from Fig. 31 that a critical determinant of the boundary between units, at least in the northern Hemisphere, is latitude, with the Ethiopian/Palearctic boundary following the Tropic of Cancer (23.5° North) quite closely. Where the boundaries depart from this latitude, mountain ranges seem to be the principal shaping factor, although in different ways in different regions. In the New World, the Sierra Madre mountain chains, which run more-or-less north-to-south, appear to extend the Nearctic southward several hundred kilometers, whereas the Himalayan chain, which runs east-to-west, seems to move the Oriental region several hundred kilometers to the north. Frequency of frost-free days is a key factor in boundary location between Holarctic and Tropical realms, which, in turn, is likely to depend both on elevation and on the ways in which mountain ranges shape climate patterns (e.g. weather system movement). Indeed, the summary provided by Ernst Mayr, based largely on observations and collections made by Major J. K. Stanford during the Vernay-Cutting expedition of 1935

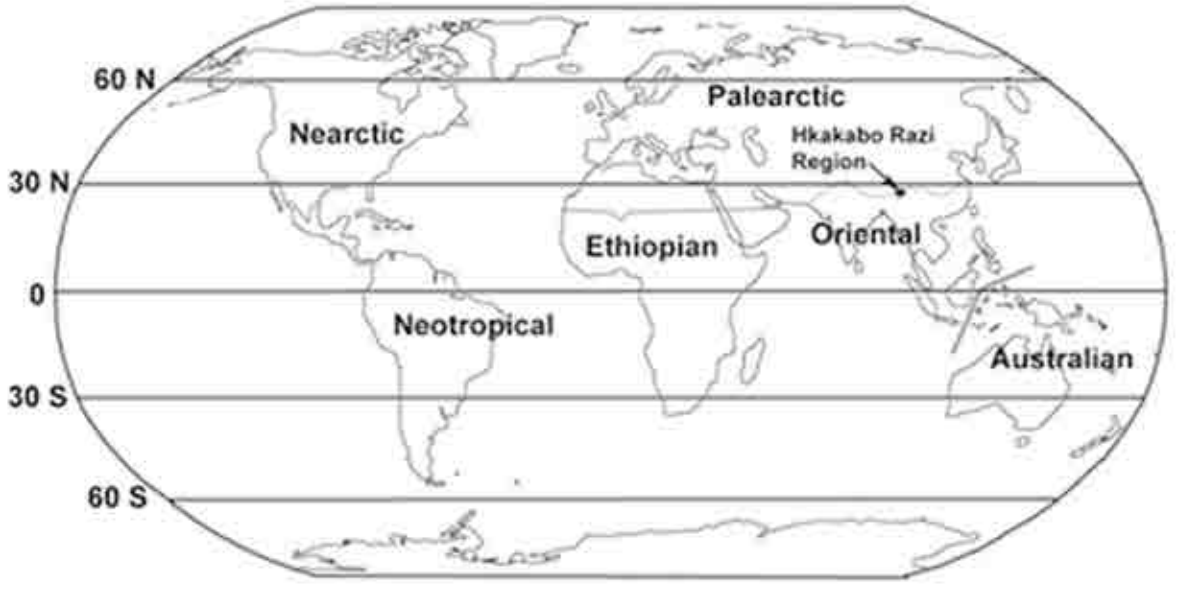

Fig. 31. Major biogeographical divisions of the World (after Watts 1984). Black dot shows the location of our study area, the Hkakabo Razi region of the southeastern Himalayas and neighboring foothills of Myanmar.

Table 4. Taxonomic affinity of Hkakabo Razi subspecies. Species listed are also found in any other of the marked geographic regions (x), further explanations see text. SE = Central Myanmar south and east to Laos and Thailand; HIM = Himalayan Mountains (>1,000 m); YUN= Yunnan with parts of Szechwan and southeastern Tibet; HIL = Foothills of the Himalayas in Nepal, Bhutan and Northeast India (the latter especially Assam, Arunachal Pradesh, and Sikkim); * = depending on taxonomy; C = Cambodia; V = Vietnam.

Species	SE	HIM	YUN	HIL	Elevation (m)	Habitat over entire range	Habitat in Hkakabo Razi
Sasia ochracea	X	X	X	X	335 to 1,800	Humid forest, undergrowth, bamboo	Rainforest, Hill Forest
Serilophus lunatus	X	X	?	X	305 to 2,200	Woodland, bamboo	Rainforest, Hill Forest
Coracina melaschistos	X	X	X	X			Rainforest
Pericrocotus ethologus	–	X	X	X	900 to 3,650	Wide range of habitats / open structure of light forest preferred	Hill Forest
Pericrocotus flammeus	X	X	X	X	299 to 2,134	Forest hills	Rainforest, Hill Forest
Lanius cristatus	X	X	X	X	0 to 2,400, mostly <500	Open woodland, thorn scrub, savanna, and farmlands	Lwin, Agriculture, Second growth, Developed Areas
Oriolus traillii	X	X	?	X	457 to 4,000	Forests Hills and mountains	Rainforest, Hill Forest, Second growth
Parus ater	–	X	X	X	2,896 to 3,658		Highland Forest, Alpine Forest
Parus spilonotus	–	X	X	X	900 to 2,377	Broad-leafed forest, scrub, towns;	Hill Forest
Hirundo rustica	X	X	X	X	30 to 914	Open country, farmlands, and towns, typically close to water and/or larger settlements and towns	Wetlands, Aerial
Delichon dasypus	–	X	X	X	152 to 3,505		Aerial
Orthotomus cucullatus	–	X	–	X	0 to 2,500	Woodland, pine forest, grass, bamboo jungle, Second growth	Hill Forest, Second growth
Orthotomus sutorius	X	X	X	?	330 to 1,500	Gardens, thickets, bamboo, Second growth, cultivations	Second growth
Orthotomus atrogularis	X	X	–	X	0 to 1,067	Second growth	Second growth
Pycnonotus jocosus	X	X	X	X	0 to 1,524	Forest edge, Second growth, towns	Lwin, Agriculture, Second growth, Developed Areas
Pycnonotus cafer	–	X	X	X	0 to 2,100	Scrub, woodland, Second growth, towns and close to or in Second growth, human created habitats (cultivations)	Lwin, Agriculture, Developed Areas
Alophoixus flaveolus	–	X	–	X	600 to 1,500	Broad-leafed evergreen forest and scrubs	Rainforest, Second growth
Hypsipetes mclellandi	X	X	X	X	800 to 2,743	Evergreen forest, woodland, Second growth	Hill Forest, Second growth
Hemixos flavala	–	–	X	X	300 to 1,800	Evergreen forest, Second growth	Hill Forest, Second growth

Species	SE	HIM	YUN	HIL	Elevation (m)	Habitat over entire range	Habitat in Hkakabo Razi
Tesia olivea	X	X	X	X	0 to 2,000	Dense humid forest undergrowth	Rainforest, Hill Forest, Second growth
Seicercus poliogenys	–	X	X	X	600 to 3,100	Broad-leafed evergreen forest and Second growth	Rainforest, Hill Forest
Pomatorhinus ferruginosus	–	X	–	X	900 to 1,676	Broad-leafed evergreen forest, bamboo	Rainforest
Jabouilleia naungmungensis	–	–	X	X	600 to 1,000	Evergreen forest and foothills	Rainforest
Rimator malacoptilus	–	X	X	X	1,000 to 2,700	Second growth, scrubs, and broad-leafed evergreen forests	Rainforest
Napothera brevicaudata	X	X	–	X	121 to 2,100	Broad-leafed evergreen forest, often near damp gullies, stony outcrops, near limestone or in forest with limestone	Rainforest
Napothera epilepidota	X	X	–	X	121 to 2,100	Undergrowth in evergreen forest mountains	Rainforest
Pnoepyga pusilla	–	X	–	X	500 to 2,804	Dense undergrowth in evergreen forest	Rainforest
Stachyris chrysaea	X	X	–	X	300 to 3,000	Broad-leafed evergreen forest undergrowth, edge, dense bushes, and bamboo	Rainforest
Garrulax leucolophus	X	X	X	X	600 to 1,600, up to 2,200	Undergrowth, thickets in evergreen forest, and less in Second growth	Rainforest, Second growth
Garrulax striatus	–	X	–	X	600 to 2,750	Dense broad-leaved evergreen forest and *Rhododendron* scrub	Rainforest
Garrulax nuchalis	–	X	–	X	229 to 1,200	Grassland and forests Dense Second growth, undergrowth in evergreen forest	Rainforest, Second growth
Garrulax affinis	–	X	X	X	1,800 to 4,600	Mixed broad-leafed to coniferous forest undergrowth, *Rhododendron* mixed with mainly Abies, woodland, thickets, bamboo	Hill Forest
Garrulax erythrocephalus	X	X	–	X	1,200 to 3,350	Broad-leaved evergreen forest, scrubs, bamboo	Hill Forest
Liocichla phoenicea	–	X	–	X	1,220 to 2,500	Evergreen forest undergrowth, scrub, grass	Hill Forest
Leiothrix argentauris	X	X	–	X	457 to 2,200	Evergreen forest, forest edges, Second growth, and scrubs	Rainforest, Hill Forest, Second growth
Actinodura egertoni	–	X	X	X	975 to 2,134		Rainforest, Hill Forest
Actinodura waldeni	–	X	X	X	1,676 to 2,800		Hill Forest, Second growth
Minla cyanouroptera	C	X	X	X	610 to 2,600	Broad-leafed evergreen forest, Second growth	Rainforest, Hill Forest
Minla ignotincta	–	X	–	X	1,100 to 3,400	Broad-leafed evergreen, deciduous, and coniferous forests' undergrowth	Rainforest, Hill Forest
Alcippe vinipectus	–	X	X	X	1,800 to 3,300	Prickly oak forest, conifers, and scrubs	Hill Forest
Alcippe cinereiceps	–	X	X	X	1,500 to 2,800	Thickets in mixed, coniferous forests, bamboo	Hill Forest
Alcippe rufogularis	–	X	–	X	Up to 1,000	Undergrowth in evergreen forest, bamboo, and Second growth	Rainforest
Yuhina flavicollis	X	X	X	X	200 to 3 to 000	Evergreen forest and Second growth	Hill Forest, Second growth
Yuhina gularis	–	X	X	X	1,200 to 3,658	Dense and close evergreen forest, bamboo, cloud forests	Hill Forest, Second growth
Yuhina nigrimenta	V	X	X	X	304 to 3,200	Evergreen forest, Second growth, scrubs, and farmland	Rainforest, Hill Forest, Second growth
Erpornis zantholeuca	X	X	–	X	350 to 3,050	Evergreen forest, Second growth	Rainforest, Second growth
Paradoxornis nipalensis	–	X	X	X	1,200 to 3,300	Forest undergrowth, bamboo, thickets, grass	Rainforest, Hill Forest, Second growth
Paradoxornis atrosuperciliaris	–	X	–	X*	215 to 2,100	Bamboo, long grass, scrubs, and reed beds	Second growth
Sitta formosa	–	X	–	X	457 to 2,400	Deep wet evergreen forest	Rainforest, Hill Forest
Brachypteryx hyperythra	–	X	–	X	1,800 to 3,000	Broadleaf evergreen forest	Rainforest
Brachypteryx leucophrys	–	X	X	X	900 to 3,650	Dense forest undergrowth	Rainforest, Hill Forest
Ficedula hyperythra	–	X	–	X	500 to 3,000	Broad-leafed evergreen forest undergrowth	Rainforest
Cyornis magnirostris	–	X	–	X		Forest undergrowth, thickets, bamboo	Rainforest, Hill Forest, Second growth
Niltava sundara	X	X	X	X	1,200 to 2,700	Evergreen forest undergrowth, Second growth, and brush	Rainforest
Niltava grandis	X	X	–	X	152 to 2,700	Dense evergreen forest, open woodland	Rainforest
Culicicapa ceylonensis	X	X	X	X	152 to 3,048	Tall mature forests, woodland, forest edges, rarely in or close to Second growth	Rainforest
Cinclus pallasii	X	X	X	X	0 to 4,572	Rapid rocky streams	Wetlands
Chloropsis hardwickii	–	X	X	X	0 to 2,591	Open forest, scrub	Rainforest, Hill Forest
Aethopyga nipalensis	X	X	–	X	600 to 3,700	Wide range of forest types, scrubs; open forests, clearings, forest edge preferred, but also in any habitat with flowering plants	Rainforest
Aethopyga saturata	X	X	X	X	300 to 1,850	Broad-leafed evergreen forests and forest edge	Second growth
Arachnothera magna	X	X	–	X	900 to 1,800	Forest	Rainforest, old Second growth
Passer montanus	X	X	X	X	5 to 2,500	Open woodland, plains, farms, towns, and human habitations	Developed Areas
Prunella immaculata	–	–	X	X	2,900 / 4,600	Conifer forest, Rhododendron forests and forest edges	Hill Forest

(Stanford and Mayr 1940, 1941a, b, c), appears to furnish a much more pertinent starting point for our analysis.

Using Stanford's data, along with other historical materials, Mayr came to the following conclusions regarding the ornithogeography of this region: '*Our knowledge of the birds of Upper Burma* [Myanmar from the latitude of Myitkyina (25° North) north to the Tibetan border] *is still too incomplete to justify an exhaustive zoogeographical analysis. However, some of the principles of distribution in this area are already quite evident. The most important is that two distinct faunas meet at about 3000–5000 ft.* [914–1,524 m] *on the western slope of the mountains which comprise the Irrawaddy-Salween watershed. Below this line there is the fauna of the lowlands of northern Burma and Assam, and above is the fauna of the highlands of Szechwan, Yunnan, and the Himalayas*' (Stanford & Mayr 1940). Note that Mayr's reference to 'Assam' essentially includes all of northeastern India, east of the modern Indian state of West Bengal; an area which now includes the Indian states of Assam, Manipur, Nagaland, Arunachal Pradesh, Tripura, Mizoram, and the country of Bangladesh.

Mayr goes on to describe the 'Upper Burma-Assam' (lowland resident) fauna as follows: '*The eastern border of this fauna coincides almost exactly with the Burma-Yunnan frontier. This is, of course, merely an accident caused by the fact that the birds that belong to this fauna have their upper limit of distribution generally at about 3000 ft.* [914 m] *(1000–5000 ft.)* [305–1,524 m], *and most of Yunnan, at least of northern Yunnan, is above this altitude. This is illustrated very nicely on the recently published map of the Myitkyina district*' (Stanford & Mayr 1940). Smythies' ornithogeographic classification (1953: xxiv) follows Mayr (Mayr in Stanford & Mayr 1940), at least in part, recognizing a distinct boundary between avifaunas that occur in extreme northern Myanmar between the lowland (<1,000 m) 'Assam-Burma element' of the Oriental Region as distinct from the 'Sino-Himalaya element' (>1,000 m).

We identified 63 species in our samples from the Hkakabo Razi region in which specimens could be identified to subspecies based on plumage similarities of specimens in collections from other regions. We present these findings in Table 4, which can be summarized as follows:

1) Species in which subspecies from Hkakabo Razi are most similar to birds from the Himalayas (>1,000 m) = 60;
2) Species in which subspecies from Hkakabo Razi are most similar to birds from Yunnan with parts of Szechwan and southeastern Tibet = 37;
3) Species in which subspecies from Hkakabo Razi are most similar to birds from Central Myanmar south and east to Laos and Thailand = 30;
4) Species in which subspecies from Hkakabo Razi are most similar to birds from the foothills of the Himalayas (<1,000 m) in Nepal, Bhutan and Northeast India (the latter especially Assam, Arunachal Pradesh, and Sikkim) = 62.

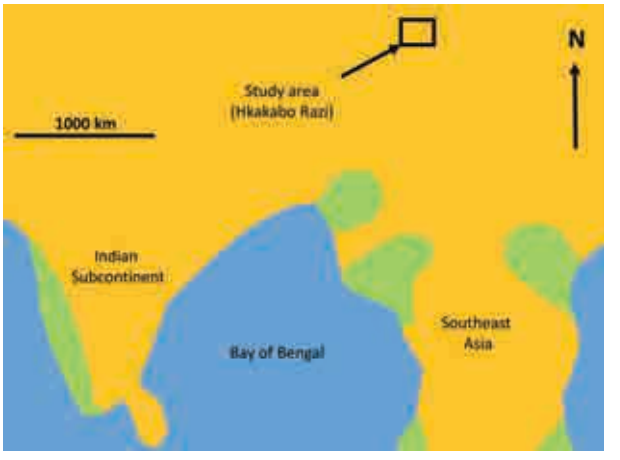

Fig. 32. Hypothesized location of nearest temperate rain forest refugia (*green*) to our Hkakabo Razi study area 25,000 to 15,000 ybp based on data in Abegg and Thierry (2002).

Thus, our work in the region confirms the broad outlines of Mayr's hypothesis (Stanford & Mayr 1940). In general the birds found >1,000 m, mostly in the northern or far eastern portions of our area, represent species that are found throughout the Himalayas (compare Table 4).

The 'Assam-Burma element' (found mostly <1,000 m) is, as both Mayr (Stanford & Mayr 1940) and Smythies (1953) attest, quite distinct. However, the biogeographic affinities of this assemblage are more complex, and appear dependent upon the habitats they occupy. For instance, in our analysis of subspecific relationships based on plumage similarities, we found that of 63 species with identifiable subspecies from other areas in the Oriental Region, 62 appeared to be members of subspecies found in extreme northwestern Myanmar and neighboring regions of the modern Indian states of Arunachal Pradesh and Assam (Fig. 2). These birds were mostly members of communities found in the wet temperate evergreen forest characteristic of the southeastern sub-Himalayas. For instance, several of the birds of the lowland rainforest community (<1,000 m) bordering the Namai Hka River and tributaries (Figs 11, 12b) show strong subspecific affinity to birds of the northeast Indian temperate rainforest region (based on comparison with specimens collected by Beeler and Ripley), despite an intervening break in temperate rainforest habitat extending for nearly 300 km (Fig. 2).

During the Pleistocene glacial maximum (25,000 to 15,000 years before present), neither the temperate rain forest habitat nor any of the species currently found there were present in the region. The areas >1,000 m were ei-

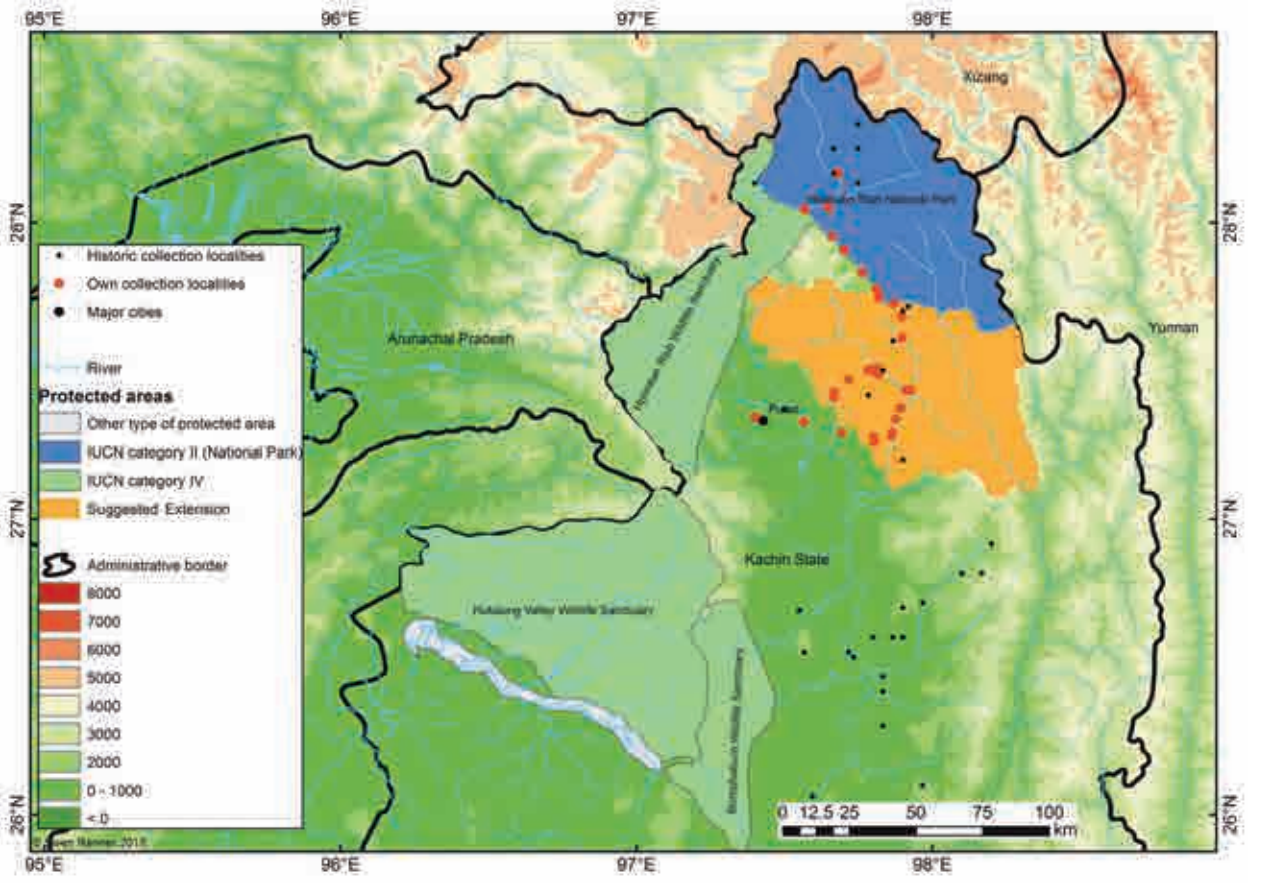

Fig. 33. Protected area system and proposed "Southern Extension" for the Hkakabo Razi National Park.

ther covered by a permanent ice cap (Finlayson 2011) or alpine desert (Ray & Adams 2001) while those <1,000 m were covered in semi-arid temperate woodland or scrub and savanna (Ray & Adams 2001). The nearest refugium for temperate rain forest (and likely associated avifaunal communities) was probably at least 1,000 km to the south (Abegg & Thierry 2002) (Fig. 32).

Based on the results of our intensive evaluation of the relationships between the populations of the Hkakabo Razi region with those from similar habitats in other regions, as indicated by plumage similarities, we conclude that the temperate rainforest birds of northeastern India and the Hkakabo Razi region of Myanmar are derived from the same refugium. Populations of the 62 rainforest species from Hkakabo Razi rainforest that show subspecific differentiation are most similar to populations from northeastern India because up until a few thousand years ago they were likely part of the same population. There are other populations of these species found in other rainforests elsewhere in south and southeast Asia, whose populations appear to be different, often quite different from their congeners or conspecifics of northeast India/Hkakabo Razi because the refugia from which they were derived were separate from those from which the northeast India/Hkakabo Razi resided during glacial maxima.

CONSERVATION

Biologists have long suspected that the southeastern Himalayan and sub-Himalayan region of northern Myanmar, referred to herein as 'Hkakabo Razi,' was among the most biologically diverse in the world (Rabinowitz 2003, *cf.* discussion in Renner et al. 2007). However, until quite recently this supposition remained largely untested. Travel into the area was not allowed by the Myanmar government from 1962 until the mid-1990s due to political instability. However, by 1996, treaties between the central government in Yangon and the insurgent groups in northern Myanmar made it possible to obtain government permission to access the region although the logistical challenges remained daunting. Subsequent expeditions by researchers from the Myanmar Ministry of Environmental Protection and Forestry, Yangon University, California Academy of Sciences, the Wildlife Conservation Society, and ourselves, as documented in this monograph, have

confirmed that both the biological and cultural diversity (four different ethnic groups with different customs, histories, and languages including the nearly extinct Taron), are indeed unique on a global scale.

Through the heroic efforts of Myanmar conservationists, such as U Uga and U Aung Than from the Nature and Wildlife Conservation Division of the Forestry Department, the government established Hkakabo Razi national park, a huge area (3,800 km^2) protecting much of the Himalayan region of the northeastern part of the country (Fig. 33).

Unfortunately, for reasons that are not altogether clear, the majority of the subtropical rainforest in the region, which we shall refer to as the 'Naung Mung Sector', "Southern Extension", was left outside the park boundaries and is completely unprotected (Fig. 33) (Rappole et al. 2011b). The Naung Mung Sector contains most of the biological elements that make Hkakabo Razi unique: an extraordinarily high level of biodiversity coupled with a remarkable degree of endemism, as exemplified by the new species of leaf deer discovered there in 1998, the new species of scimitar-babbler found by us in 2004, several new (sub-)species (compare species accounts and e.g. Renner et al. 2008) and a number of new species reptiles and amphibians discovered during expeditions led by the late Joe Slovinski of the California Academy of Sciences.

Acknowledgments. We thank the late U Uga, former Director of the Nature and Wildlife Conservation Devision, for inviting Rappole for an expedition into the newly-formed Hkakabo Razi National Park, and for his subsequent efforts to make the expedition possible. Without his support, none of the work done by our group in the region would have occurred.

The success of this work included many helpers, comments and discussion as well as the numerous unnamed helpers in the field and as background work at scientific institutes. We like to thank the following persons for support in the field: U Kyaw Lin, U Tu Myint U, U A Jo, U Myint Kyaw, and in total 76 helpers on all the trips. We thank U Aung Khin and Daw Thandar Kyi, who organized much of the expeditions in 2004, 2005, and 2006 for us, and U Tay Za (SST), who managed the 2001 trip and supported the organization of the trip.

We thank the Nature and Wildlife Conservation Division of the Forestry Department, and especially former Director U Khin Maung Zaw, for permission to conduct the study (Myanmar Collection and Export Permit # SI/4697/2004). U Tin Tun was working on the permits in 2005 and 2006. We thank U Soe Win Hlain, U Khin Maung Zaw, U Win Tun, U Sann Lwin, and U Aye Myint Maung. U Nyi Nyi Kyaw (current Director General of Forest Department) and U Win Naing Thaw (current Director of NWCD) considerably support our work in Myanmar, permits and we are in deep dept for the great cooperation.

J. Martens, the late J. Haffer, T. Price, F. Woog, M. Päckert, J. C. Eames, P. J. J. Bates, J. Pilgrim, J. Tizzard, W. C. Duckworth, P. D. Round, N. J. Collar, A. Pearson, and F. Steinheimer for support of our work and for intensive and (partly contradictory) discussions. P. C. Rasmussen gave valuable comments at particularly stages of the work in the field and on aspects of the monograph.

The museum staff at various museums around the world were helpful when visiting collections and discussed interesting parts of the manuscript: G. Graves, S. Olson, and J. Dean, M. Adams and R. Prys-Jones, T. Töpfer, R. van den Elzen, N. Rice and L. Joseph, P. Sweet and F. Vuillemieur, S. Frahnert, C. Cicero, M. Flannery and J. P. Dumbacher, P. J. J. Bates, A. Gamauf, J. Fjeldså, H. van Grown and R. Dekker, U. Johansson, and F. Woog.

The Smithsonian Institution, Office of the Undersecretary for Science, provided support for the expedition through the Abbott Fund. Additional support came from the Alexander Wetmore Fund, Bird Division, U. S. National Museum of Natural History, Smithsonian Institution, for which we thank curators G. Graves and S. Olson. Other parts of this work have been funded through six SYNTEHSYS grants (visits to BMNH, NMN, NMW, ZMUC, NRM, and Museo de la Historia Natural de Madrid: ES-TAF-2501; AT-TAF-2481; GB-TAF-108, SE-TAF-1312; NL-TAF-4369, AT-TAF-7), under the European Community's 7th Framework Program (www.synthesys.info). The National Geographic Society's Global Exploration Fund supported us for the 2001 trip.

Last but not least, we are indebted to the early collectors of birds in Kachin State who set the baseline for the ornithological work and gave us further insight into the avifauna of this extraordinary region.

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APPENDICES

Appendix 1. Hkakabo Razi Region Gazetteer and locality names as used.

Locality names and sites are a complex topic in Myanmar, because native Myanmar, English and German collectors –among others– transcribed the audio description of site names (in our study area also in at least five local idioms different from Burmese) as they understood them, which can be quite different from accepted current names. In addition, spelling varies considerably from collector to collector, and in the worst cases localities cannot be reconstructed from labels. Fortunately, for most localities in Kachin we can establish coordinates fairly well due to well documented coordinates on labels (R. Kaulback and Lord Cranbrook), or a hand sketch map of J. K. Stanford, which is reproduced on plate 1 in Ticehurst (1938), or own data.

We show all spellings of the original names as we found and deciphered from labels to facilitate finding the places and give standardized transcription from Myanmar fonts, which we adapted and amended from Thwin et al. (2011). A detailed discussion on the localities and an ornithological gazetteer is given in Thwin et al. (2011). We added further names as derived from labels by R. Kaulback and J. K. Stanford. Some localities are provided by the map on Plate 1 in Ticehurst (1938). However, these localities are not always precise, because localities often do not match those provided on labels or with the original hand sketch by Stanford, which is archived in the Ornithology Library of the BMNH in Tring, UK. We found the following localities as not unique or with reduced precision for a lack of information:

1. 'Tutuga' (sometimes spelling on label was deciphered as 'Tuzuta', 'Tuluza', 'Intuga', 'Tutuila', 'Tutuya') was at least four times labeled as '160th mile Myitkyina-Putao road' and once 'about 145th mile Myitkyina-Putao Road'. Following the road with most of the curves and adding miles for elevation, 257 km (≈ 160 miles) north of Myitkyina along the road (the concurrent is very similar to ancient versions as indicated by locals) is just south of today's Putao center; but Ticehurst (1938: plate 1) labels Tutuga at about 26.71° North and 97.50° East; since the hand sketch of Stanford indicates the same we assume this is about the locality for all 38 specimens we have from this location.

2. 'Hpunchan' or 'Hpunchankha' supposedly is located at '150th mile [≈ 241 km] Myitkyina-Putao road' which we located as just south of Machanbaw (~ 17 km east-southeast of Putao). Manchanbaw is anywhere close to the locality with the same name as indicated by Ticehurst (1938); nevertheless we assume Ticehurst (1938) is correct since the hand sketch of Stanford indicates about the same.

3. 'Chimli' (close to Pawahku in Kachin State; Ticehurst 1938) is a frequently labeled locality by Stanford. The site is actually located as a town in Yunnan on the Salween/Nu Jiang at about 26.16° North and 98.83° East. Here we use Pawahku as proxy for Chimli because Stanford supposedly was not collecting in Yunnan, but Kachin State to our knowledge.

4. Malaise was collecting (with Stanford or at least obtained specimens from Stanford) in Kambaiti in 1934, of which about 150 specimens are estimated to be stored in the NRM. All specimens collected by Malaise or Stubbs are labeled also with 'JK Stanford.' Likely, Stanford prepared or organized preparation while the party was collecting and parts of the collection is stored at the NRM or specimens were presented by Stanford to the NRM. If Malaise collected in person or just added his name after inclusion in the collection remains a mystery.

Locality names as used and amended by own, new information from Khin Ma Ma Thwin et al. (2011).

Locality name (English)	Synonyms (English)	Locality name (Myanmar)
Adung Valley	n/a	-
Alan Ga Village, Machanbaw Township	n/a	အလန်ဂါး
Alung-dung Ku	Alungdungku, Alungdung Ku: 27.28 North 97.69 East 446 m (Renner et al. 2007); Alung-dung Ku is not georeferenced according to Khin Ma Ma Twin et al. (2011) but is located between Machanbaw and U-Ring Ga (Renner et al. 2007)	-
Alungdung Valley (northernmost valley of Myanmar)	Along Dong, Alung Dung	-
Ayeyarwady River	Irrawaddy (spelling varies considerably and includes also Ayyeyarwaddy)	ဧရာဝတီမြစ်
Ba Baw	Ba-wa, Bawa, Bat-wa, Babwa, Babaw	ဘဘော့
Gawai, Naung Mung Township	Ga-we, Gawa, Ga Waing	ဂဝိုင်
Gawlai, Naung Mung Township	Kole, Gawle, Gawla, Gaw Lei, Gawlei, Gow La	ဂေါ်လဲး ဂေါ်လတ်
Hkakabo Razi	Hkakaborazi, Khakaborazi, Ahtang Bum	ခါကာဘိုရာဇီး အထင်းဘွမ်
Hponkan Razi	Phonkan Razi, Hponkanrazi, Hpon Kan Razi	ဖုန်ကန်ရာဇီ

Locality name (English)	Synonyms (English)	Locality name (Myanmar)
Htang Ga, Machanbaw Township	Htang-Ka, Htang Kha, Htanga	ဓာတန်းဂ၊ ထန်ဂ
Laukkaung	Lawkkaung, Lauhkaung	လောက်ခေါင်
Lonmat, Naung Mung Township	Lonet, Lannet, Lonnut, Lon Nat	လုံမတ်
Machanbaw, Machanbaw Township	Ma Chan Baw, Machambaw	မချမ်းဘော
Mali Hka (river)	Malihka, Malikha, Maleekha	မလီမြစ်
May Hka (river)	Mayhka, May-Hka, Maykha, May Kha, Mai Kha, N'Mai Hka, Mai Hka	မဲခမြစ်
Maza, West of Naung Mung	Ma Za, Masaa, Masa, Masâ, Ma Sa	မဇ
Myitkyina	n/a	မြစ်ကြီးနား
Myitkyina Airport	n/a	မြစ်ကြီးနား လေဆိပ်
Nam Lang River, Northwest Putao District	Nan Lam River	နမ်းလန်မြစ်
Nam Tamai Valley	n/a	နမ်းတမိုင်ချိုင့်ဝှမ်း
Nam Ti Rest House	Namti (Note: there is another Nam Ti in Kachin State, close to Myitkyina)	နမ်းတီဘိုတ်
Naung Mung	Naung Mong, Naung Mon, Naungmong, Nong Mong, Nogmung, Non Mung, Naun Mung, Nonmong	နောင်မွန်း နောင်မွန်း
Northern Kachin State	Putao area including N 'The Triangle', approximately all North of 25.60 North in Kachin State	ကချင်ပြည်နယ်မြောက်ပိုင်း
Northeast Myanmar	NE Mynamar (formerly 'Northeast Burma'), defined here as Smythies (1953), i. e. Kachin North of 25.00 N	-
Ngawa, Naung Mung Township	Nagwa, Nawa, Na-wa, No Wah	ငဝါ
Pangnamdim, Naung Mung Township	Pannandin, Pangnamdam, Pagnamdim	ပန်နမ်းဒင်
Putao	Puta-O, Puta-o, former Fort Hertz	ပုတာအို
Putao Airport	n/a	ပုတာအို လေဆိပ်
Ratbaw, Naung Mung Township	Rat Baw, Rapbow, Ratbod, Ra Baw	ရပ်ဘော
Shinshanghku (as on old maps)	Shinshanku, Shinshan Ku, Shenshin Ku, Shinshan Gu, Shinsaku, Shinsanku, Shingshanku	ရှင်ဆာကူး ရှင်ဂူန်း
Tahawndam, Naung Mung Township	Tahundam, Tahaundam, Tehaundam	တဟွန်းဒမ်း တဝေါင်းဒမ်း
Tanai (river)	n/a	တနိုင်းမြစ်
Taping (river)	Tapeng river, Daping river	တာပိန်မြစ်း တပိန်မြစ်
Tarigan	Triangle; refers to 'The Triangle' in Smythies' map (1953)	တြိဂံ
Tasaku Rest House, Naung Mung Township	Tasahku	တဆာခူးဘိုတ်း တဆာကူးဘိုတ်
Tashuhtu, Naung Mung Township	Tasuhtu, Tezutu, Tashutu, Tasaku, Tesuku, Tesaku	တဆူထူး တဇူထူး
Tazungdam, Naung Mung Township	Dazonden, Tazondam, Tzungdane, Tazundam, Tezungdam	တဇွန်းဒမ်း
Thala Wang Valley	Tala Wang Valley	သာလာဝမ်ချိုင့်ဝှမ်း
U Ring Ga, Naung Mung Township	U-Ring-Ga, U-Rein Ga, Uringa	အုရင်းဂါ
Wangsi Wang, Naung Mung Township	Wansiwang, Wang-se-wan, Wangsewang, Wansewan, Wangsiwang,Wang She Wong	ဝမ်စီးဝမ်
Yangon	Rangoon, Rangun (the former capital of Myanmar)	ရန်ကုန်

Appendix 2. Locality names.

Locality names added from specimens with coordinates provided on label by collector, stored in BMNH and NMNH from the study area covering 26.00° and 28.50° North as well as 96.00° to 98.50° East. Label indicates that the coordinate was derived from a bird label in any collection.

Locality name	Precision of locality and/or synonymies	Source	Elevation	North	East	Year	Collector
'Cloud forest'	No name given	Renner et al. (2007)	641	27.28	97.86	2001	Rappole, Renner
'river'	No name given	Renner et al. (2007)	994	27.78	97.81	2001	Rappole, Renner
Adung valley	n/a	Label	n/a	28.13	97.40	n/a	Kingdon-Ward
Adung valley	n/a	Label	n/a	28.16	97.66	n/a	Cranbrook, Kaulback
Adung valley	n/a	Label	n/a	28.25	97.00	n/a	Kingdon-Ward
Adung valley	n/a	Label		28.17	97.67	n/a	Cranbrook
Adung valley	n/a	Label	n/a	28.25	97.66	n/a	Cranbrook, Kaulback
Adung valley	n/a	Label	n/a	28.25	97.75	n/a	Cranbrook, Kaulback
Adung valley	n/a	Label	n/a	28.33	97.75	n/a	Cranbrook, Kaulback
Adung valley	n/a	Label	n/a	28.16	97.66	n/a	Cranbrook
Adung valley	n/a	Label	n/a	28.33	97.75	n/a	Kaulback, Kingdon-Ward
Adung valley	n/a	Label	n/a	28.16	97.66	n/a	Cranbrook, Kingdon-Ward
Alungdung Ku	n/a	Renner et al. (2007)	446	27.29	97.69	2001	Rappole, Renner
Anke	(Akke, An Ke, Ahke)	Label	n/a	26.91	98.20	1939	Kaulback
Bat Baw Ford	Nam Tsing River	Renner et al. (2007)	516	27.43	97.93	2001	Rappole, Renner
Bawa	Village	Renner et al. (2007)	508	27.37	97.89	2001	Rappole, Renner
Bawa	n/a	Renner et al. (2007)	n/a	27.37	97.89	2004	Rappole, Renner
Brahma Kund	n/a	Label	n/a	27.86	96.38	n/a	Godwin-Austen
Chatihka	n/a	Label	n/a	n/a	n/a	1939	Kaulback
Chipwi	n/a	Label	n/a	27.70	97.90	n/a	Stanford
Fort Hertz	(Putao)	Google Earth (2011)	n/a	27.32	97.42	n/a	Stanford
Gam Majaw	(Gam Măjaw)	Label	n/a	26.71	97.96	n/a	Kaulback
Gawai	n/a	Renner et al. (2007)	1,162	27.95	97.66	2001	Rappole, Renner
Gawla	n/a	Renner et al. (2007)	643	27.61	97.90	2001	Rappole, Renner
Hkamho	Hkamko	Ticehurst (1938)	n/a	27.14	97.51	1933	Stanford
Hkrang	n/a	Label	n/a	n/a	n/a	n/a	Stanford
Hpare pass	n/a	Label	n/a	25.83	98.42	n/a	Stanford
Hpunginkha	(Hpunchankha, Hpunchapkha, Hpuncha [NOTE: The names have been spelled very similar and it remains unclear, whether these are one or several localities])	Ticehurst (1938)	n/a	26.69	97.55	n/a	Stanford
Hpunginkha	(Hpunghka)	Ticehurst (1938)	n/a	26.69	97.55	n/a	Stanford
Hta Kha	River	Renner et al. (2007)	595	27.28	97.80	2001	Rappole, Renner
Htang-Ga	n/a	Renner et al. (2007)	700	27.26	97.80	2004, 2006	Rappole, Renner
Htawgaw	n/a	Label	n/a	76.37	25.99	1948	Stanford, Smythies
Htingnam	(Htingnan)	Label	n/a	26.60	97.86	n/a	Kaulback
Htisyenyang	n/a	Label	n/a	26.81	98.10	1939	Kaulback
Hukawng Valley, near N'Ding	n/a	Ticehurst (1938)	n/a	26.16	96.75	n/a	Stanford
Kadak Bum	(Hu Kong [Hukwang Valley]) [NOTE: 'Naga Hills' was added, which are the mountains along the border between India and Myanmar]	Label	n/a	26.50	96.75	n/a	No collector on label
Kajiklu	(Kalihtu)	Ticehurst (1938)	n/a	26.30	97.83	1934	Stanford
Kankiu	n/a	Label	n/a	27.36	97.50	n/a	Kaulback
Karaung	Not localized.	Renner et al. (2007)	~1,000	28.00	97.00	2001	Rappole, Renner
Kasung Hka	See Naung Mung (Kausaung Hka)		Label	n/a	n/a	n/a	2004
Kawapang	n/a	Label	n/a	n/a	n/a	1932	Stanford
Laawnga	n/a	n/a	n/a	n/a	n/a	n/a	
Laukkaung	n/a	Label	n/a	n/a	n/a	n/a	Stanford
Lonnat	(Net site)	Renner et al. (2007)	978	27.75	97.82	2001	Rappole, Renner
Lonnat	(Accommodation)	Renner et al. (2007)	976	27.77	97.82	2001	Rappole, Renner
Lunghkang ga	Lunghkaung Ga	Label	n/a	26.60	97.80	1939	Kaulback
Mahkawng Ga	n/a	Label	n/a	n/a	n/a	1939	Kaulback
Maitongkha	n/a	Label	n/a	n/a	n/a	1932	Stanford
Mantum	n/a	Label	n/a	n/a	n/a	n/a	Kaulback (26 Aug 1939);
Masá	(Masa, Maza)	Renner et al. (2007)	968	27.47	97.72	2001	Rappole, Renner

Locality name	Precision of locality and/or synonymies	Source	Elevation	North	East	Year	Collector
Matsatap	n/a	Label	n/a	27.50	97.83	1939	Kaulback
Mekh Rame	n/a	Label	n/a	n/a	n/a	n/a	n/a
Mishmi Hills	n/a	Rasmussen & Anderton (2005)	n/a	28.25	96.00	n/a	Godwin-Austen
N'Daw Hka		Label	n/a	n/a	n/a	1934	Stanford
N'ding	n/a	Label	n/a	n/a	n/a	1936	Stanford
Nagwa	n/a	Renner et al. (2007)	1,069	27.83	97.76	2001	Rappole, Renner
Nam Tamai	n/a	Label	n/a	27.70	97.90	n/a	Kaulback, Kingdon-Ward
Nam Tamai Valley	n/a	Label	n/a	27.71	97.91	n/a	Kaulback
Nam Tamai Valley	n/a	Label	n/a	27.70	97.90	n/a	Kaulback
Nam Tamai Valley	n/a	Label	n/a	27.71	97.91	n/a	Kaulback
Nam Ti	Nam Ti 1	Renner et al. (2007)	1,314	27.43	97.67	2004	Rappole, Renner
Nam Ti	Nam Ti 2	Renner et al. (2007)	900	27.41	97.67	2001, 2004	Rappole, Renner
Nam Tisang	River, approximately 1 km west of Naung Mung	n/a	n/a	n/a	n/a	2004	Rappole, Renner
Naung Mung	n/a	Label	n/a	27.50	97.83	n/a	Kaulback
Naung Mung	NM01; net site from 2001	Renner et al. (2007)	570	27.50	97.80	2001	Rappole, Renner
Naung Mung	TV-Station	Renner et al. (2007)	548	27.51	97.81	2004	Rappole, Renner
Naung Mung	NM01; net site from 2001	Renner et al. (2007)	570	27.50	97.80	2004	Rappole, Renner
Naung Mung	NM04-1; net site from 2004	Renner et al. (2007)	650	27.50	97.79	2004	Rappole, Renner
Naung Mung	NM04-2	Renner et al. (2007)	n/a	27.50	97.78	2004	Rappole, Renner
Naung Mung	NM04-3	Renner et al. (2007)	600	27.49	97.82	2004	Rappole, Renner
Naung Mung	NM04-2 top	Renner et al. (2007)	n/a	27.49	97.82	2004	Rappole, Renner
Naung Mung	NM04-2 rice paddy	Renner et al. (2007)	n/a	27.49	97.82	2004	Rappole, Renner
Naung Mung	NM04-2 ~middle	Renner et al. (2007)	n/a	27.49	97.82	2004	Rappole, Renner
Naung Mung	'001'	Renner et al. (2007)	750	27.49	97.82	2004	Rappole, Renner
Naung Mung	'002'	Renner et al. (2007)	n/a	27.49	97.82	2004	Rappole, Renner
Naung Mung	Kasung Hka	Renner et al. (2007)	500	27.50	97.80	2004	Rappole, Renner
Naunghkai	n/a	Ticehurst (1938)	n/a	27.16	97.56	1939	Stanford
Ninga	(Ningma)	Label	n/a	26.53	97.73	1939	Kaulback
on way	2nd breakdown of truck	Renner et al. (2007)	n/a	27.34	97.88	2004	Rappole, Renner
Paira Ga	n/a	Label	n/a	n/a	n/a	1939	Kaulback
Pangnamdim	Me Hka	Renner et al. (2007)	1,024	27.73	97.87	2001	Rappole, Renner
Puato	Rest house	Renner et al. (2007)	466	27.33	97.57	2001	Rappole, Renner
Punlumbum	n/a	Label	n/a	n/a	n/a	1934	Stanford
Putaga	n/a	Google Earth (2011)	n/a	27.32	97.42	n/a	Stanford
Putao	Fort Hertz, Ft. Hertz (also Ft. Heartz by others which is wrong)	Google Earth (2011)	n/a	27.32	97.42	n/a	Stanford
Putao	Mali Hka Bridge	Renner et al. (2007)	421	27.34	97.41	2001	Rappole, Renner
Putao	Market place	Renner et al. (2007)	452	27.34	97.40	2001	Rappole, Renner
Putao	National Park Warden House	Renner et al. (2007)	~450	n/a	n/a	2004	Rappole, Renner
Rat-baw	Ferry	Renner et al. (2007)	516	27.43	97.91	2001	Rappole, Renner
Rat-baw	Ferry	Renner et al. (2007)	516	27.43	97.91	2004	Rappole, Renner
Ratnamhti	n/a	Label	n/a	27.41	97.78	1938	Kaulback
Seinghku valley	n/a	Label	n/a	28.13	97.33	n/a	Kingdon-Ward
Shinshan Ku	n/a	Renner et al. (2007)	1,138	27.68	97.90	2001	Rappole, Renner
Simahtu	n/a	Label	n/a	n/a	n/a	1934	Stanford
Sumprabum	n/a	Google Earth (2011)	n/a	26.54	97.56	n/a	Stanford
Suphka	(Sup Hka, Supkaya)	Label	n/a	n/a	n/a	1934	Stanford
Taga Hka, Hukong	n/a	Ticehurst (1938)	n/a	26.16	96.75	n/a	No collector given on label
Tahaundam	Village	Renner et al. (2007)	1,809	28.17	97.68	2001	Rappole, Renner
Tahaundam	Pine-Rhododendron	Renner et al. (2007)	2,800	28.17	97.68	2001	Rappole, Renner
Tahaundam	River	Renner et al. (2007)	1,800	28.00	97.00	2001	Rappole, Renner
Tahaundam	Near bridge	Renner et al. (2007)	1,800	28.00	97.00	2001	Rappole, Renner
Tala Wang	n/a	Label	n/a	28.13	97.75	n/a	Kaulback
Tasaku	n/a	Renner et al. (2007)	1,141	27.00	97.00	2001	Rappole, Renner
Tazungdam	n/a	Renner et al. (2007)	1,317	28.04	97.57	2001	Rappole, Renner
Tezutu	n/a	Renner et al. (2007)	1,372	28.05	97.65	2001	Rappole, Renner
Tingpai	n/a	Label	n/a	n/a	n/a	1932	Stanford
Tutuga	n/a	Ticehurst (1938)	n/a	26.71	97.50	n/a	Stanford
U Ring Ga	First night 2004	Renner et al. (2007)	637	27.29	97.86	2004	Rappole, Renner
Wangsewan	n/a	Renner et al. (2007)	1,088	27.91	97.70	2001	Rappole, Renner

Appendix 3. Specimen list.

List of all specimens and samples made by authors with relevance for the trip. § Species not yet safely determined (compare 'Species accounts'). $ likely miss identified (compare 'Species accounts'). (D = Day; M = Month; Y = Year)

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2001-1	9	Feb	2001	*Cyornis hainanus*	Putao Military Base	female	8.5	Second growth forest	Skin	4*2	Yes
2001-2	9	Feb	2001	*Orthotomus sutorius*	Putao Military Base	n/a	7.9	Second growth forest	Skin	n/a	Yes
2001-3	10	Feb	2001	*Cinclidium leucurum*	Babwa	n/a	26.5	Second growth forest	Skin	n/a	Yes
2001-4	10	Feb	2001	*Niltava sundara*	Babwa	n/a	22.0	Second growth forest	Skin	n/a	Yes
2001-5	10	Feb	2001	*Alcippe morrisonia*	Babwa	female	13.5	Second growth forest	Skin	3*1	Yes
2001-6	11	Feb	2001	*Stachyris chrysaea*	Naung Mung	female	8.0	Temperate rainforest	Skin	6*4	Yes
2001-7	11	Feb	2001	*Ficedula monileger*	Naung Mung	n/a	9.5	Temperate rainforest	Skin	n/a	Yes
2001-8	12	Feb	2001	*Ficedula monileger*	Naung Mung	n/a	30.0	Temperate rainforest	Skin	n/a	Yes
2001-9	12	Feb	2001	*Paradoxornis atrosuperciliarus*	Naung Mung	female	17.0	Temperate rainforest	Skin	3*2	Yes
2001-10	12	Feb	2001	*Serilophus lunatus*	Naung Mung	male	32.0	Temperate rainforest	Skin	4*2	Yes
2001-11	12	Feb	2001	*Pomatorhinus ferruginosus*	Naung Mung	female	44.0	Temperate rainforest	Skin	n/a	Yes
2001-12	12	Feb	2001	*Ficedula monileger*	Naung Mung	female	9.5	Temperate rainforest	Skin	5*3	Yes
2001-13	12	Feb	2001	*Dendrocitta frontalis*	Naung Mung	n/a	89.0	Temperate rainforest	Skin	n/a	Yes
2001-14	12	Feb	2001	*Dendrocitta frontalis*	Naung Mung	n/a	84.0	Temperate rainforest	Skin	n/a	Yes
2001-15	12	Feb	2001	*Heterophasia picaoides*	Naung Mung	n/a	47.0	Temperate rainforest	Skin	n/a	Yes
2001-16	12	Feb	2001	*Heterophasia picaoides*	Naung Mung	male	44.0	Temperate rainforest	Skin	5*3	Yes
2001-17	12	Feb	2001	*Pomatorhinus ferruginosus*	Naung Mung	male	45.0	Temperate rainforest	Skin	2*	Yes
2001-18	12	Feb	2001	*Leiothrix argentaurus*	Naung Mung	male	24.5	Temperate rainforest	Skin	n/a	Yes
2001-19	12	Feb	2001	*Arachnothera magna*	Naung Mung	female	31.0	Temperate rainforest	Skin	1*2	Yes
2001-20	12	Feb	2001	*Alophoixus flaveolus*	Naung Mung	male	49.0	Temperate rainforest	Skin	n/a	Yes
2001-21	12	Feb	2001	*Napothera brevicaudata*	Naung Mung	female	17.3	Temperate rainforest	Skin	10*10	Yes
2001-22	12	Feb	2001	*Sasia ochracea*	Naung Mung	n/a	9.0	Temperate rainforest	Skin	n/a	Yes
2001-23	12	Feb	2001	*Sasia ochracea*	Naung Mung	female	10.0	Temperate rainforest	Skin	6*5	Yes
2001-24	12	Feb	2001	*Stachyris nigriceps*	Naung Mung	male	15.5	Temperate rainforest	Skin	n/a	Yes
2001-25	12	Feb	2001	*Stachyris nigriceps*	Naung Mung	n/a	13.5	Temperate rainforest	Skin	n/a	Yes
2001-26	12	Feb	2001	*Alcippe rufogularis*	Naung Mung	male	14.0	Temperate rainforest	Skin	1*	Yes
2001-27	12	Feb	2001	*Alcippe rufogularis*	Naung Mung	female	14.0	Temperate rainforest	Skin	6*3	Yes
2001-28	12	Feb	2001	*Stachyris nigriceps*	Naung Mung	n/a	15.0	Temperate rainforest	Skin	n/a	Yes
2001-29	12	Feb	2001	*Seicercus poliogenys*	Naung Mung	male	6.0	Temperate rainforest	Skin	<1	Yes
2001-30	12	Feb	2001	*Seicercus poliogenys*	Naung Mung	male	7.0	Temperate rainforest	Skin	1*	Yes
2001-31	12	Feb	2001	*Stachyris striolata*	Naung Mung	female	33.0	Temperate rainforest	Skin	n/a	Yes
2001-32	12	Feb	2001	*Stachyris striolata*	Naung Mung	male	33.0	Temperate rainforest	Skin	2*1	Yes
2001-33	12	Feb	2001	*Alophoixus flaveolus*	Naung Mung	male	48.0	Temperate rainforest	Skin	2*	Yes
2001-34	12	Feb	2001	*Abroscopus albogularis*	Naung Mung	n/a	n/a	Temperate rainforest	Skin	n/a	Yes
2001-35	12	Feb	2001	*Abroscopus albogularis*	Naung Mung	female	4.5	Temperate rainforest	Skin	3*2	Yes
2001-36	12	Feb	2001	*Alcippe morrisonia*	Naung Mung	female	14.0	Temperate rainforest	Skin	4*3	Yes
2001-37	14	Feb	2001	*Pericrocotus divaricatus* (*roseus*)	Gawlai	female	14.5	evergreen forest	Skin	1*	Yes
2001-38	14	Feb	2001	*Alcippe rufogularis*	Gawlai	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-39	15	Feb	2001	*Niltava grandis*	Gawlai	female	35.0	primary evergreen forest	Skin	6*3	Yes
2001-40	15	Feb	2001	*Niltava sundara*	Gawlai	male	20.0	primary evergreen forest	Skin	1*	Yes
2001-41	15	Feb	2001	*Culicicapa ceylonensis*	Gawlai	male	7.2	primary evergreen forest	Skin	1*	Yes
2001-42	16	Feb	2001	*Paradoxornis nipalensis*	Pangnamdim	male	6.0	Second growth forest	Skin	n/a	Yes
2001-43	16	Feb	2001	*Paradoxornis nipalensis*	Pangnamdim	female	6.0	Second growth forest	Skin	n/a	Yes
2001-44	16	Feb	2001	*Niltava grandis*	Shinshanku	male	25.0	primary evergreen forest	Skin	n/a	Yes
2001-45	16	Feb	2001	*Rimator malacoptilus*	Shinshanku	male	16.0	primary evergreen forest	Skin	1*	Yes
2001-46	16	Feb	2001	*Rimator malacoptilus*	Shinshanku	female	16.5	primary evergreen forest	Skin	6*3	Yes
2001-47	16	Feb	2001	*Yuhina nigrimenta*	Shinshanku	male	7.0	primary evergreen forest	Skin	<1	Yes
2001-48	16	Feb	2001	*Ficedula monileger*	Pangnamdim	male	n/a	Second growth forest	Skin	<1	Yes
2001-49	17	Feb	2001	*Alcippe morrisonia*	Pangnamdim	male	n/a	riparian-bamboo thicket	Skin	n/a	Yes
2001-50	17	Feb	2001	*Stachyris nigriceps*	Pangnamdim	female	n/a	riparian-bamboo thicket	Skin	n/a	Yes
2001-51	17	Feb	2001	*Stachyris nigriceps*	Pangnamdim	n/a	n/a	riparian-bamboo thicket	Skin	n/a	Yes
2001-52	17	Feb	2001	*Alcippe morrisonia*	Pangnamdim	n/a	n/a	riparian-bamboo thicket	Skin	n/a	Yes
2001-53	17	Feb	2001	*Ficedula strophiata*	Pangnamdim	female	10.4	Second growth forest	Skin	n/a	Yes
2001-54	17	Feb	2001	*Alcippe cinerea*	Pangnamdim	male	n/a	riparian-bamboo thicket	Skin	1.5*	Yes
2001-55	17	Feb	2001	*Alcippe cinerea*	Pangnamdim	female	n/a	riparian-bamboo thicket	Skin	5*5	Yes
2001-56	17	Feb	2001	*Stachyris ruficeps*	Pangnamdim	male	n/a	riparian-bamboo thicket	Skin	n/a	Yes
2001-57	18	Feb	2001	*Niltava* sp. §	Pangnamdim	female	22.5	Second growth forest	Skin	1.1*	Yes
2001-58	18	Feb	2001	*Enicurus scouleri*	Lonnat	n/a	n/a	riparian-bamboo thicket	Skin	n/a	Yes
2001-59	18	Feb	2001	*Alcippe cinerea*	Lonnat	female	8.0	riparian-bamboo thicket	Skin	1*	Yes
2001-60	18	Feb	2001	*Alcippe cinerea*	Lonnat	female	7.5	riparian-bamboo thicket	Skin	3*2	Yes
2001-61	18	Feb	2001	*Alcippe cinerea*	Lonnat	female	8.5	riparian-bamboo thicket	Skin	1*1	Yes
2001-62	18	Feb	2001	*Garrulax striatus*	Nagwa	n/a	n/a	Second growth forest	Skin	n/a	Yes

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2001-63	18	Feb	2001	*Rhipidura albicollis*	Nagwa	n/a	n/a	Second growth forest	Skin	n/a	Yes
2001-64	18	Feb	2001	*Sasia ochracea*	Lonnat	n/a	n/a	riparian-bamboo thicket	Skin	n/a	Yes
2001-65	19	Feb	2001	*Ficedula strophiata*	Wangsewan	n/a	13.5	Disturbed temp. forest	Skin	n/a	Yes
2001-66	19	Feb	2001	*Ficedula monileger*	Nagwa	n/a	10.5	Second growth forest	Skin	n/a	Yes
2001-67	19	Feb	2001	*Ficedula strophiata*	Wangsewan	n/a	n/a	Disturbed temperate forest	Skin	n/a	Yes
2001-68	19	Feb	2001	*Niltava grandis*	Nagwa	female	35.0	Second growth forest	Skin	10*4	Yes
2001-69	19	Feb	2001	*Rhipidura albicollis*	Nagwa	n/a	11.0	Second growth forest	Skin	n/a	Yes
2001-70	19	Feb	2001	*Niltava sundara*	Nagwa	n/a	23.5	Second growth forest	Skin	n/a	Yes
2001-71	19	Feb	2001	*Seicercus poliogenys*	Nagwa	n/a	n/a	Second growth forest	Skin	n/a	Yes
2001-72	20	Feb	2001	*Ficedula monileger*	Wangsewan	male	10.5	Disturbed temperate forest	Skin	1*	Yes
2001-73	20	Feb	2001	*Niltava grandis*	Wangsewan	n/a	33.0	Disturbed temperate forest	Skin	n/a	Yes
2001-74	20	Feb	2001	*Niltava sundara*	Wangsewan	n/a	19.0	Disturbed temperate forest	Skin	n/a	Yes
2001-75	20	Feb	2001	*Ficedula strophiata*	Wangsewan	male	11.0	Disturbed temperate forest	Skin	<1	Yes
2001-76	20	Feb	2001	*Ficedula monileger*	Wangsewan	n/a	8.5	Disturbed temperate forest	Skin	n/a	Yes
2001-77	20	Feb	2001	*Niltava sundara*	Gowai	n/a	n/a	Second growth forest	Skin	n/a	Yes
2001-78	20	Feb	2001	*Seicercus poliogenys*	Gowai	male	n/a	Second growth forest	Skin	1*	Yes
2001-79	20	Feb	2001	*Seicercus poliogenys*	Gowai	male	6.5	Second growth forest	Skin	1*	Yes
2001-80	21	Feb	2001	*Cissa hypoleuca*	Gowai	female	n/a	Second growth forest	Skin	n/a	Yes
2001-81	22	Feb	2001	*Pnoepyga pusilla*	Gowai	male	13.5	primary evergreen forest	Skin	4*3	Yes
2001-82	22	Feb	2001	*Ficedula monileger*	Tazundam	female	11.5	primary evergreen forest	Skin	8*4	Yes
2001-83	23	Feb	2001	*Sasia ochracea*	Tazundam	female	9.5	primary evergreen forest	Skin	1*	Yes
2001-84	23	Feb	2001	*Seicercus poliogenys*	Tazutu	male	6.0	primary evergreen forest	Skin	1*1	Yes
2001-85	24	Feb	2001	*Stachyris ruficeps*	Tahaundam	n/a	9.0	n/a	Skin	n/a	Yes
2001-86	24	Feb	2001	*Stachyris ruficeps*	Tahaundam	n/a	7.6	n/a	Skin	n/a	Yes
2001-87	24	Feb	2001	*Stachyris ruficeps*	Tahaundam	n/a	7.5	n/a	Skin	n/a	Yes
2001-88	24	Feb	2001	*Alcippe castaneceps*	Tahaundam	female	7.5	n/a	Skin	3*5	Yes
2001-89	24	Feb	2001	*Alcippe cinereiceps*	Tahaundam	female	9.0	n/a	Skin	1*2	Yes
2001-90	25	Feb	2001	*Urocissa flavirostris* northern slope	Tahaundam,	n/a	135.0	Rhododendron pine forest (primary; 2,800 m)	Skin	n/a	Yes
2001-91	25	Feb	2001	*Heterophasia picaoides*	Tahaundam, northern slope	n/a	n/a	Rhododendron pine forest (primary; 2,800 m)	Skin	n/a	Yes
2001-92	25	Feb	2001	*Heterophasia picaoides*	Tahaundam, northern slope	male	42.9	Rhododendron pine forest (primary; 2,800 m)	Skin	n/a	Yes
2001-93	25	Feb	2001	*Aethopyga nipalensis*	Tahaundam, northern slope	male	n/a	Rhododendron pine forest (primary; 2,800 m)	Skin	n/a	Yes
2001-94	25	Feb	2001	*Parus monticollis*	Tahaundam	male	n/a	n/a	Skin	1*	Yes
2001-95	25	Feb	2001	*Parus monticollis*	Tahaundam	n/a	n/a	n/a	Skin	n/a	Yes
2001-96	25	Feb	2001	*Garrulax striatus*	Tahaundam, northern slope	n/a	n/a	Rhododendron pine forest (primary; 2,800 m)	Skin	n/a	Yes
2001-97	25	Feb	2001	*Garrulax affinis*	Tahaundam, northern slope	male	125.0	Rhododendron pine forest (primary; 2,800 m)	Skin	3*1	Yes
2001-98	25	Feb	2001	*Alcippe cinereiceps*	Tahaundam, northern slope	n/a	9.5	Rhododendron pine forest (primary; 2,800 m)	Skin	n/a	Yes
2001-99	25	Feb	2001	*Alcippe vinipectus*	Tahaundam, northern slope	male	n/a	Rhododendron pine forest (primary; 2,800 m)	Skin	n/a	Yes
2001-100	25	Feb	2001	*Alcippe cinereiceps*	Tahaundam, northern slope	male	n/a	Rhododendron pine forest (primary; 2,800 m)	Skin	1*2	Yes
2001-101	25	Feb	2001	*Garrulax subunicolor*	Tahaundam, near bridge	male	63.0	Second growth forest	Skin	2*	Yes
2001-102	25	Feb	2001	*Prunella immaculata*	Tahaundam, near bridge	n/a	17.0	Second growth forest	Skin	n/a	Yes
2001-103	26	Feb	2001	*Lophophorus impejanus*	Tahaundam	female	n/a	n/a	Skin	n/a	Yes
2001-104	26	Feb	2001	*Lophophorus sclateri*	Tahaundam	female	n/a	n/a	Skin	n/a	Yes
2001-105	27	Feb	2001	*Alcippe cinerea*	Tazutu	n/a	9.5	primary evergreen forest	Skin	n/a	Yes
2001-106	27	Feb	2001	*Alcippe cinerea*	Tazutu	female	9.0	primary evergreen forest	Skin	2*5	Yes
2001-107	27	Feb	2001	*Stachyris nigriceps*	Tazutu	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-108	27	Feb	2001	*Stachyris nigriceps*	Tazutu	male	15.5	primary evergreen forest	Skin	2*	Yes
2001-109	27	Feb	2001	*Alcippe cinerea*	Tazutu	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-110	28	Feb	2001	*Stachyris chrysaea*	Tazundam	n/a	7.0	Mixed evergreen forest	Skin	n/a	Yes
2001-111	28	Feb	2001	*Orthotomus cuculatus*	Tazundam	male	5.5	Mixed evergreen forest	Skin	1*	Yes
2001-112	28	Feb	2001	*Sasia ochracea*	Tazundam	n/a	10.0	Mixed evergreen forest	Skin	n/a	Yes
2001-113	28	Feb	2001	*Garrulax erythrocephalus*	Tazutu	n/a	74.0	primary evergreen forest	Skin	n/a	Yes
2001-114	28	Feb	2001	*Garrulax erythrocephalus*	Tazutu	female	71.0	primary evergreen forest	Skin	7*3	Yes
2001-115	28	Feb	2001	*Garrulax erythrocephalus*	Tazutu	n/a	75.5	primary evergreen forest	Skin	n/a	Yes
2001-116	28	Feb	2001	*Garrulax erythrocephalus*	Tazutu	male	75.0	primary evergreen forest	Skin	2*	Yes
2001-117	28	Feb	2001	*Heterophasia picaoides*	Tazutu	male	41.0	primary evergreen forest	Skin	2*	Yes
2001-118	1	Mar	2001	*Lophura leucomelanus*	Gawlai	n/a	n/a	n/a	Skin	n/a	Yes
2001-119	1	Mar	2001	*Prunella immaculata*	Tazutu	female	n/a	Second growth forest	Skin	n/a	Yes
2001-120	2	Mar	2001	*Zoothera dixoni*	Gawai	n/a	n/a	Disturbed temp. forest	Skin	n/a	Yes

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2001-121	2	Mar	2001	*Zoothera dixoni*	Gawai	n/a	n/a	Disturbed temp. forest	Skin	n/a	Yes
2001-122	3	Mar	2001	*Myophonus caeruleus*	Wangsewan	n/a	n/a	Secondary vegetation with bamboo near stream side with some primary forest	Skin	n/a	Yes
2001-123	3	Mar	2001	*Aethopyga saturata*	Nagwa	male	6.4	Wet Second growth (3–7 m)	Skin	3*	Yes
2001-124	3	Mar	2001	*Phoenicurus auroreus*	Nagwa	n/a	n/a	Wet Second growth (3–7 m)	Skin	n/a	Yes
2001-125	3	Mar	2001	*Parus monticollis*	Nagwa	n/a	n/a	Wet Second growth (3–7 m)	Skin	n/a	Yes
2001-126	4	Mar	2001	*Rhipidura albicollis*	Nagwa	n/a	n/a	Wet Second growth (3–7 m)	Skin	n/a	Yes
2001-127	4	Mar	2001	*Aethopyga saturata*	Nagwa	n/a	n/a	Wet Second growth (3–7 m)	Skin	n/a	Yes
2001-128	4	Mar	2001	*Ficedula strophiata*	Nagwa	n/a	n/a	Wet Second growth (3–7 m)	Skin	n/a	Yes
2001-129	5	Mar	2001	*Brachypteryx leucophrys*	Lonnat	male	12.0	Wet Second growth (3–7 m)	Skin	n/a	Yes
2001-130	5	Mar	2001	*Alcippe morrisonia*	Lonnat	male	13.5	Bamboo thickets	Skin	n/a	Yes
2001-131	5	Mar	2001	*Alcippe morrisonia*	Lonnat	n/a	12.0	Bamboo thickets	Skin	n/a	Yes
2001-132	5	Mar	2001	*Niltava grandis*	Lonnat	n/a	n/a	Bamboo thickets	Skin	n/a	Yes
2001-133	5	Mar	2001	*Liocichla phoenicea*	Lonnat	n/a	n/a	Bamboo thickets	Skin	n/a	Yes
2001-134	5	Mar	2001	*Tarsiger cyannurus*	Lonnat	n/a	n/a	Bamboo thickets	Skin	n/a	Yes
2001-135	5	Mar	2001	*Glaucidium cuculoides*	Lonnat	n/a	n/a	Bamboo thickets	Skin	n/a	Yes
2001-136	5	Mar	2001	*Enicurus schistaceus*	Pangnamdim	n/a	n/a	Stream and streamside vegetation	Skin	n/a	Yes
2001-137	5	Mar	2001	*Orthotomus cuculatus*	Pangnamdim	n/a	n/a	Stream and streamside vegetation	Skin	n/a	Yes
2001-138	6	Mar	2001	*Brachypteryx leucophrys*	Pangnamdim	male	12.5	Stream and streamside vegetation	Skin	3*	Yes
2001-139	6	Mar	2001	*Rhyacornis fuliginosus*	Pangnamdim	n/a	n/a	Stream and streamside vegetation	Skin	n/a	Yes
2001-140	6	Mar	2001	*Cinclus pallasii*	Pangnamdim	female	n/a	Stream and streamside vegetation	Skin	1*5	Yes
2001-141	6	Mar	2001	*Ficedula monileger*	Pangnamdim	male	10.0	Stream and streamside vegetation	Skin	2*	Yes
2001-142	6	Mar	2001	*Blythipicus pyrrhotis*	Shinshanku	male	n/a	primary evergreen forest	Skin	5*9	Yes
2001-143	7	Mar	2001	*Alcippe morrisonia*	Shinshanku	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-144	7	Mar	2001	*Alcippe morrisonia*	Shinshanku	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-145	7	Mar	2001	*Alcippe morrisonia*	Shinshanku	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-146	7	Mar	2001	*Tarsiger cyannurus*	Gawlai	n/a	n/a	Second growth forest, used by cattle	Skin	n/a	Yes
2001-147	7	Mar	2001	*Cissa hypoleuca*	Gawlai	n/a	132.0	Second growth forest, used by cattle	Skin	n/a	Yes
2001-148	7	Mar	2001	*Garrulax nuchalis*	Gawlai	n/a	78.0	Second growth forest, used by cattle	Skin	n/a	Yes
2001-149	7	Mar	2001	*Garrulax nuchalis*	Gawlai	n/a	77.0	Second growth forest, used by cattle	Skin	n/a	Yes
2001-150	7	Mar	2001	*Accipiter virgatus*	Gawlai	n/a	194.0	Second growth forest, used by cattle	Skin	n/a	Yes
2001-151	7	Mar	2001	*Niltava sundara*	Gawlai	female	20.5	Second growth forest, used by cattle	Skin	3*6	Yes
2001-152	7	Mar	2001	*Picus canus*	Gawlai	n/a	156.0	Second growth forest, used by cattle	Skin	n/a	Yes
2001-153	8	Mar	2001	*Stachyris chrysaea*	Tesaku	male	7.5	Mixed evergreen forest and Second growth	Skin	5*4	Yes
2001-154	8	Mar	2001	*Leiothrix argentaurus*	Tesaku	n/a	n/a	Mixed evergreen forest and Second growth	Skin	n/a	Yes
2001-155	8	Mar	2001	*Leiothrix argentaurus*	Tesaku	male	23.0	Mixed evergreen forest and Second growth	Skin	4*3	Yes
2001-156	8	Mar	2001	*Aethopyga saturata*	Tesaku	n/a	n/a	Mixed evergreen forest and Second growth	Skin	n/a	Yes
2001-157	9	Mar	2001	*Ficedula strophiata*	Tasaku	n/a	n/a	Mixed evergreen forest and Second growth	Skin	n/a	Yes
2001-158	9	Mar	2001	*Arachnothera magna*	Naung Mung	n/a	29.9	Paddy field	Skin	n/a	Yes
2001-159	9	Mar	2001	*Aethopyga siparaja*	Naung Mung	female	6.0	primary evergreen forest	Skin	4*2	Yes
2001-160	10	Mar	2001	*Aethopyga saturata*	Masa	female	5.9	primary evergreen forest	Skin	7*4	Yes
2001-161	10	Mar	2001	*Alcippe castaneceps*	Masa	female	12.5	primary evergreen forest	Skin	9*6	Yes
2001-162	10	Mar	2001	*Napothera epilepidota*	Naung Mung	male	15.2	primary evergreen forest	Skin	3*	Yes
2001-163	10	Mar	2001	*Minla ignotincta*	Naung Mung	male	12.5	primary evergreen forest	Skin	2*	Yes
2001-164	10	Mar	2001	*Ficedula tricolor*	Naung Mung	male	9.0	Paddy field	Skin	1*	Yes
2001-165	10	Mar	2001	*Niltava macgrigoriae*	Naung Mung	male	10.8	primary evergreen forest	Skin	2*	Yes
2001-166	10	Mar	2001	*Alcippe rufogularis*	Naung Mung	n/a	13.5	primary evergreen forest	Skin	n/a	Yes
2001-167	10	Mar	2001	*Alcippe rufogularis*	Naung Mung	female	12.5	primary evergreen forest	Skin	6*6	Yes
2001-168	10	Mar	2001	*Alophoixus flaveolus*	Naung Mung	female	47.0	primary evergreen forest	Skin	3*	Yes
2001-169	10	Mar	2001	*Sitta formosa*	Masa	female	n/a	primary evergreen forest	Skin	16*8	Yes

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2001-170	10	Mar	2001	*Sitta formosa*	Masa	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-171	10	Mar	2001	*Yuhina bakeri*	Masa	female	21.0	primary evergreen forest	Skin	11*6	Yes
2001-172	10	Mar	2001	*Dicrurus aeneus*	Masa	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-173	11	Mar	2001	*Sphenocichla humei*	Masa	female	n/a	primary evergreen forest	Skin	8*4	Yes
2001-174	11	Mar	2001	*Sphenocichla humei*	Masa	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-175	11	Mar	2001	*Niltava sundara*	Masa	n/a	n/a	primary evergreen forest	Skin	n/a	Yes
2001-176	11	Mar	2001	*Pellorneum ruficeps*	Nam Ti	n/a	28.0	Old Second growth (20 m)	Skin	n/a	Yes
2001-177	12	Mar	2001	*Otus sunia*	Nam Ti	n/a	n/a	Old Second growth (20 m)	Skin	n/a	Yes
2001-178	12	Mar	2001	*Otus sunia*	Nam Ti	n/a	n/a	Old Second growth (20 m)	Skin	n/a	Yes
2004-1	5	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-2	5	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-3	5	Feb	2004	*Alcippe rufogularis*	Naung Mung	male	n/a	n/a	Alcohol	n/a	No
2004-4	5	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-5	5	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-6	5	Feb	2004	*Ficedula monileger*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-7	5	Feb	2004	*Ficedula strophiata*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-8	5	Feb	2004	*Napothera brevicaudata*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-9	5	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	n/a	n/a	No
2004-10	5	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-11	5	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-12	5	Feb	2004	*Ficedula monileger*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-13	5	Feb	2004	*Rhipidura albicollis*	Naung Mung	female	n/a	n/a	Alcohol	n/a	No
2004-14	5	Feb	2004	*Glaucidium brodiei*	Naung Mung	n/a	n/a	n/a	Skin	n/a	No
2004-15	5	Feb	2004	*Niltava grandis*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-16	5	Feb	2004	*Culicicapa ceylonensis*	Naung Mung	male	n/a	n/a	Alcohol	n/a	No
2004-17	5	Feb	2004	*Sasia ochracea*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-18	5	Feb	2004	*Ficedula monileger*	Naung Mung	female	n/a	n/a	Alcohol	n/a	No
2004-19	5	Feb	2004	*Aethopyga saturata*	Naung Mung	female	n/a	n/a	Skeleton	n/a	No
2004-20	6	Feb	2004	*Niltava grandis*	Naung Mung	male	n/a	n/a	Skin, partial skeleton	n/a	No
2004-21	6	Feb	2004	*Stachyris nigriceps*	Naung Mung	male	n/a	n/a	Skin, partial skeleton	n/a	No
2004-22	6	Feb	2004	*Ficedula strophiata*	Naung Mung	female	n/a	n/a	Skin, partial skeleton	n/a	No
2004-23	6	Feb	2004	*Alcippe morrisonia*	Naung Mung	female	11.5	n/a	Skin, partial skeleton	n/a	No
2004-24	6	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-25	6	Feb	2004	*Alcippe morrisonia*	Naung Mung	male	n/a	n/a	Skin, partial skeleton	n/a	No
2004-26	6	Feb	2004	*Dicrurus remifer*	Naung Mung	male	37.5	n/a	Skin, partial skeleton	n/a	No
2004-27	6	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	12.0	n/a	Alcohol	n/a	No
2004-28	6	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	12.5	n/a	Skeleton	n/a	No
2004-29	6	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	11.0	n/a	Alcohol	n/a	No
2004-030a	6	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	12.0	n/a	Skin, partial skeleton	n/a	No
2004-030b	6	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-31	6	Feb	2004	*Stachyris nigriceps*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-32	6	Feb	2004	*Stachyris nigriceps*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-33	6	Feb	2004	*Stachyris nigriceps*	Naung Mung	n/a	15.5	n/a	Skin	n/a	No
2004-34	6	Feb	2004	*Stachyris nigriceps*	Naung Mung	n/a	10.5	n/a	Skin, partial skeleton	n/a	No
2004-35	6	Feb	2004	*Napothera epilepidota*	Naung Mung	male	15.3	n/a	Skin, partial skeleton	1*	No
2004-36	6	Feb	2004	*Ficedula strophiata*	Naung Mung	female	10.3	n/a	Skin, partial skeleton	3*2	No
2004-37	6	Feb	2004	*Culicicapa ceylonensis*	Naung Mung	n/a	7.5	n/a	Alcohol	n/a	No
2004-38	6	Feb	2004	*Culicicapa ceylonensis*	Naung Mung	n/a	7.5	n/a	Skin	n/a	No
2004-39	6	Feb	2004	*Niltava sundara*	Naung Mung	male	21.3	n/a	Alcohol	n/a	No
2004-40	6	Feb	2004	*Niltava grandis*	Naung Mung	male	n/a	n/a	Skin, partial skeleton	n/a	No
2004-41	6	Feb	2004	*Pomatorhinus ferruginosus*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-42	6	Feb	2004	*Pomatorhinus ferruginosus*	Naung Mung	n/a	49.0	n/a	Alcohol	n/a	No
2004-43	6	Feb	2004	*Pomatorhinus ferruginosus*	Naung Mung	female	43.5	n/a	Skin	6*8	No
2004-44	6	Feb	2004	*Jabouilleia naunmungensis*	Naung Mung	n/a	35.0	n/a	Skin, partial skeleton	n/a	No
2004-45	6	Feb	2004	*Jabouilleia naunmungensis*	Naung Mung	female	36.0	n/a	Skin, partial Alcohol	8*10	No

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2004-46	7	Feb	2004	*Alcippe morrisonia*	Naung Mung	female	n/a	n/a	Skin	n/a	No
2004-47	7	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	n/a	n/a	Skin, partial skeleton	n/a	No
2004-48	7	Feb	2004	*Pycnonotus jocosus*	Naung Mung	female	n/a	n/a	Skin	n/a	No
2004-49	7	Feb	2004	*Alophoixus flaveolus*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-50	7	Feb	2004	*Alophoixus flaveolus*	Naung Mung	n/a	n/a	n/a	Skin, partial skeleton	n/a	No
2004-51	7	Feb	2004	*Seicercus poliogenys*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-52	7	Feb	2004	*Rhipidura albicollis*	Naung Mung	n/a	11.5	n/a	Skin, partial skeleton	n/a	No
2004-53	7	Feb	2004	*Yuhina zantholeuca*	Naung Mung	n/a	9.3	n/a	Alcohol	n/a	No
2004-54	7	Feb	2004	*Glaucidium brodiei*	Naung Mung	n/a	n/a	n/a	Skin	n/a	No
2004-55	7	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-56	7	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-57	7	Feb	2004	*Seicercus tephrocephalus*	Naung Mung	n/a	n/a	n/a	Skin, partial skeleton	n/a	No
2004-58	7	Feb	2004	*Arborophila atrogularis*	Naung Mung	n/a	n/a	n/a	Skin	n/a	No
2004-59	8	Feb	2004	*Niltava grandis*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-60	8	Feb	2004	*Pycnonotus jocosus*	Naung Mung	n/a	51.0	n/a	Alcohol	n/a	No
2004-61	8	Feb	2004	*Alophoixus flaveolus*	Naung Mung	male	n/a	n/a	Skeleton	n/a	No
2004-62	8	Feb	2004	*Niltava macgrigoriae*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-63	8	Feb	2004	*Niltava macgrigoriae*	Naung Mung	female	n/a	n/a	Alcohol	n/a	No
2004-64	8	Feb	2004	*Serilophus lunatus*	Naung Mung	female	n/a	n/a	Skin	n/a	No
2004-65	8	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-66	8	Feb	2004	*Seicercus poliogenys*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-67	8	Feb	2004	*Alcippe morrisonia*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-68	8	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-69	8	Feb	2004	*Tesia olivea*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-70	8	Feb	2004	*Tesia olivea*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-71	8	Feb	2004	*Jabouilleia naunmungensis*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	4*6	No
2004-72	8	Feb	2004	*Brachypteryx hyperthyra*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	10*5	No
2004-73	8	Feb	2004	*Brachypteryx hyperthyra*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-74	8	Feb	2004	*Garrulax leucolophus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-75	8	Feb	2004	*Yuhina zantholeuca*	Naung Mung	male	11.8	n/a	Skin, partial Alcohol	1*	No
2004-76	8	Feb	2004	*Yuhina zantholeuca*	Naung Mung	n/a	10.3	n/a	Skeleton	n/a	No
2004-77	8	Feb	2004	*Yuhina zantholeuca*	Naung Mung	n/a	11.3	n/a	Alcohol	n/a	No
2004-78	8	Feb	2004	*Niltava sundara*	Naung Mung	male	19.3	n/a	Skin, partial Alcohol	n/a	No
2004-79	8	Feb	2004	*Tesia olivea*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-80	8	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	12.3	n/a	Alcohol	n/a	No
2004-81	8	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	12.5	n/a	Alcohol	n/a	No
2004-82	8	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	12.5	n/a	Alcohol	n/a	No
2004-83	8	Feb	2004	*Alcippe morrisonia*	Naung Mung	male	11.3	n/a	Skin, partial Alcohol	n/a	No
2004-84	8	Feb	2004	*Abroscopus albogularis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-85	8	Feb	2004	*Abroscopus albogularis*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-86	8	Feb	2004	*Abroscopus albogularis*	Naung Mung	female	4.5	n/a	Skin, partial Alcohol	3*2	No
2004-87	8	Feb	2004	*Aethopyga siparaja*	Naung Mung	n/a	5.3	n/a	Alcohol	n/a	No
2004-88	8	Feb	2004	*Sasia ochracea*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-89	8	Feb	2004	*Serilophus lunatus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-90	8	Feb	2004	*Serilophus lunatus*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-91	8	Feb	2004	*Serilophus lunatus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2004-92	8	Feb	2004	*Serilophus lunatus*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-93	8	Feb	2004	*Serilophus lunatus*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-94	8	Feb	2004	*Seicercus tephrocephalus*	Naung Mung	n/a	6.5	n/a	Skin, partial Alcohol	n/a	No
2004-95	9	Feb	2004	*Pomatorhinus ferruginosus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-96	9	Feb	2004	*Alophoixus flaveolus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-97	9	Feb	2004	*Niltava macgrigoriae*	Naung Mung	male	10.5	n/a	Alcohol	n/a	No
2004-98	9	Feb	2004	*Abroscopus albogularis*	Naung Mung	female	4.5	n/a	Alcohol	n/a	No
2004-99	9	Feb	2004	*Seicercus affinis*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-100	9	Feb	2004	*Alcippe rufogularis*	Naung Mung	n/a	14.0	n/a	Alcohol	n/a	No
2004-101	9	Feb	2004	*Ficedula monileger*	Naung Mung	n/a	10.3	n/a	Skeleton	n/a	No
2004-102	9	Feb	2004	*Niltava sundara*	Naung Mung	male	n/a	n/a	Alcohol	n/a	No
2004-103	9	Feb	2004	*Stachyris nigriceps*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-104	9	Feb	2004	*Niltava sundara*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-105	9	Feb	2004	*Malacocincla abbotti*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-106	9	Feb	2004	*Abroscopus albogularis*	Naung Mung	n/a	5.0	n/a	Alcohol	n/a	No
2004-107	9	Feb	2004	*Pycnonotus jocosus*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-108	10	Feb	2004	*Passer montanus*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-109	10	Feb	2004	*Tesia olivea*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-110	10	Feb	2004	*Alcippe morrisonia*	Naung Mung	male	12.8	n/a	Alcohol	1*	No
2004-111	10	Feb	2004	*Seicercus tephrocephalus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-112	10	Feb	2004	*Alophoixus flaveolus*	Naung Mung	n/a	n/a	n/a	Skin	n/a	No
2004-113	10	Feb	2004	*Niltava grandis*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-114	10	Feb	2004	*Niltava grandis*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-115	10	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-116	10	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-117	10	Feb	2004	*Pycnonotus jocosus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-118	10	Feb	2004	*Brachypteryx* sp. §	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	1*	No
2004-119	11	Feb	2004	*Garrulax leucolophus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-120	11	Feb	2004	*Garrulax leucolophus*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-121	11	Feb	2004	*Niltava macgrigoriae*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	<1	No
2004-122	11	Feb	2004	*Culicicapa ceylonensis*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-123	11	Feb	2004	*Ficedula hyperthyra*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-124	11	Feb	2004	*Stachyris nigriceps*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-125	11	Feb	2004	*Stachyris nigriceps*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-126	11	Feb	2004	*Alcippe morrisonia*	Naung Mung	female	n/a	n/a	Alcohol	6*4	No
2004-127	11	Feb	2004	*Alcippe morrisonia*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	8*4	No
2004-128	12	Feb	2004	*Pericrocotus ethologus*	Naung Mung	male	n/a	n/a	Alcohol	n/a	No
2004-129	12	Feb	2004	*Alcedo athis*	Nam Tisang river	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-130	12	Feb	2004	*Arachnothera magna*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-131	12	Feb	2004	*Pellorneum tickelli*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-132	12	Feb	2004	*Niltava macgrigoriae*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-133	12	Feb	2004	*Niltava macgrigoriae*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-134	12	Feb	2004	*Phylloscopus proregulus*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-135	12	Feb	2004	*Alcippe morrisonia*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	n/a	No

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2004-136	12	Feb	2004	*Ficedula hyperthyra*	Naung Mung	male	n/a	n/a	Skin, partial Alcol	<1	No
2004-137	12	Feb	2004	*Niltava grandis*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-138	12	Feb	2004	*Alcippe morrisonia*	Naung Mung	male	n/a	n/a	Alcohol	n/a	No
2004-139	12	Feb	2004	*Aethopyga saturata*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-140	12	Feb	2004	*Alcippe morrisonia*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-141	12	Feb	2004	*Rhipidura albicollis*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-142	12	Feb	2004	*Niltava grandis*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-143	12	Feb	2004	*Alophoixus flaveolus*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-144	12	Feb	2004	*Alophoixus flaveolus*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-145	12	Feb	2004	*Napothera brevicaudata*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-146	12	Feb	2004	*Napothera brevicaudata*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	4*	No
2004-147	13	Feb	2004	*Alcedo hecules*	Nam Tisang river	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-152	13	Feb	2004	*Niltava grandis*	Naung Mung	female	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-153	13	Feb	2004	*Culicicapa ceylonensis*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-154	13	Feb	2004	*Aethopyga saturata*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-155	13	Feb	2004	*Seicercus poliogenys*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-156	13	Feb	2004	*Seicercus poliogenys*	Naung Mung	n/a	n/a	n/a	Alcohol	n/a	No
2004-157	13	Feb	2004	*Niltava grandis*	Naung Mung	male	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-158	13	Feb	2004	*Stachyris chrysaea*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-159	13	Feb	2004	*Napothera epilepidota*	Naung Mung	n/a	n/a	n/a	Skeleton	n/a	No
2004-160	13	Feb	2004	*Napothera epilepidota*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-161	13	Feb	2004	*Pellorneum tickelli*	Naung Mung	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-162	14	Feb	2004	*Pycnonotus jocosus*	Naung Mung	n/a	n/a	n/a	Skin	n/a	No
2004-163	16	Feb	2004	*Ficedula monileger*	Nam Ti	n/a	n/a	n/a	Skeleton	n/a	No
2004-164	16	Feb	2004	*Paradoxornis ruficeps*	Nam Ti	n/a	n/a	n/a	Skeleton	n/a	No
2004-165	16	Feb	2004	*Paradoxornis ruficeps*	Nam Ti	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-166	16	Feb	2004	*Paradoxornis ruficeps*	Nam Ti	female	n/a	n/a	Skin, partial Alcohol	5*7	No
2004-167	16	Feb	2004	*Pomatorhinus ferruginosus*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-169	17	Feb	2004	*Otus bakkamoena*	Nam Ti	male	n/a	n/a	Skin, partial skeleton	n/a	No
2004-170	17	Feb	2004	*Enicurus maculatus*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-171	17	Feb	2004	*Harpactes erythrocephalus*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-172	17	Feb	2004	*Chalcoholophaps indica*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-173	17	Feb	2004	*Alophoixus flaveolus*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-174	17	Feb	2004	*Harpactes erythrocephalus*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-175	17	Feb	2004	*Niltava grandis*	Nam Ti	female	n/a	n/a	Skeleton	n/a	No
2004-176	17	Feb	2004	*Chalcoholophaps indica*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-177	17	Feb	2004	*Ficedula hyperthyra*	Nam Ti	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-178	17	Feb	2004	*Abroscopus albogularis*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-179	18	Feb	2004	*Leiothrix argentaurus*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-180	18	Feb	2004	*Leiothrix argentaurus*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-181	18	Feb	2004	*Niltava macgrigoriae*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-182	18	Feb	2004	*Cissa chinensis*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-183	18	Feb	2004	*Aethopyga saturata*	Nam Ti	male	n/a	n/a	Skeleton	n/a	No
2004-184	18	Feb	2004	*Napothera brevicaudata*	Nam Ti	n/a	n/a	n/a	Skin, partial skeleton	n/a	No
2004-185	18	Feb	2004	*Yuhina zantholeuca*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-186	18	Feb	2004	*Yuhina zantholeuca*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-187	18	Feb	2004	*Alophoixus flaveolus*	Nam Ti	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-188	18	Feb	2004	*Yuhina nigrimenta*	Nam Ti	female	n/a	n/a	Skin, partial Alcohol	n/a	No
189	18	Feb	2004	*Yuhina nigrimenta*	Nam Ti	n/a	n/a	n/a	Skin	n/a	2004-No

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2004-190	18	Feb	2004	*Alcippe castaneceps*	Nam Ti	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-191	18	Feb	2004	*Alcippe castaneceps*	Nam Ti	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-192	18	Feb	2004	*Alcippe castaneceps*	Nam Ti	female	n/a	n/a	Skin, partial Alcohol	3*2	No
2004-193	18	Feb	2004	*Alcippe morrisonia*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-194	18	Feb	2004	*Alophoixus flaveolus*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-195	18	Feb	2004	*Lophura leucomelanus*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-196	18	Feb	2004	*Ficedula hyperthyra*	Nam Ti	n/a	n/a	n/a	Skin, partial Alcohol	n/a	No
2004-198	19	Feb	2004	*Arborophila rufogularis*	Nam Ti	n/a	n/a	n/a	Skin	n/a	No
2004-199	19	Feb	2004	*Seicercus whistleri*	Nam Ti	male	n/a	n/a	Skin, partial Alcohol	<1	No
2004-200	19	Feb	2004	*Pellorneum ruficeps*	Nam Ti	female	n/a	n/a	Skin	n/a	No
2004-201	19	Feb	2004	*Pellorneum ruficeps*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-202	19	Feb	2004	*Napothera epilepidota*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-203	19	Feb	2004	*Alcippe rufogularis*	Nam Ti	male	n/a	n/a	Skeleton	n/a	No
2004-204	19	Feb	2004	*Alcippe rufogularis*	Nam Ti	female	n/a	n/a	Skeleton	n/a	No
2004-205	19	Feb	2004	*Alcippe rufogularis*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2004-206	19	Feb	2004	*Niltava grandis*	Nam Ti	female	n/a	n/a	Alcohol	n/a	No
2004-207	19	Feb	2004	*Napothera brevicaudata*	Nam Ti	n/a	n/a	n/a	Alcohol	n/a	No
2005-1	7	Sep	2005	*Zoothera citrina*	Naung Mung	male	60.0	Temperate rainforest	Skin	n/a	No
2005-2	7	Sep	2005	*Alophoixus flaveolus*	Naung Mung	female	48.0	Temperate rainforest	Skin	n/a	No
2005-3	7	Sep	2005	*Alophoixus flaveolus*	Naung Mung	female	40.0	Temperate rainforest	Skin	n/a	No
2005-4	7	Sep	2005	*Myiomela leucura*	Naung Mung	female	20.0	Temperate rainforest	Skin	n/a	No
2005-5	7	Sep	2005	*Niltava macgregoriae*	Naung Mung	female	9.8	Temperate rainforest	Skin	n/a	No
2005-6	8	Sep	2005	*Brachypteryx* sp. §	Naung Mung	female	18.0	Temperate rainforest	Skin	n/a	No
2005-7	8	Sep	2005	*Alophoixus flaveolus*	Naung Mung	male	50.0	Temperate rainforest	Skin	n/a	No
2005-8	8	Sep	2005	*Terpsiphone paradisi*	Naung Mung	female	10.7	Temperate rainforest	Skin	n/a	No
2005-9	8	Sep	2005	*Aethopyga saturata*	Naung Mung	male	5.7	Temperate rainforest	Skin	n/a	No
2005-10	8	Sep	2005	*Harpactes erythrocephalus*	Naung Mung	female	94.0	Temperate rainforest	Skin	n/a	No
2005-11	8	Sep	2005	*Serilophus lunatus*	Naung Mung	female	32.0	Temperate rainforest	Skin	n/a	No
2005-12	8	Sep	2005	*Sasia ochracea*	Naung Mung	male	9.2	Temperate rainforest	Skin	n/a	No
2005-13	8	Sep	2005	*Ficedula monileger*	Naung Mung	male	n/a	Temperate rainforest	Skin	n/a	No
2005-14	8	Sep	2005	*Serilophus lunatus*	Naung Mung	male	32.0	Temperate rainforest	Skin	n/a	No
2005-15	8	Sep	2005	*Serilophus lunatus*	Naung Mung	indet	n/a	Temperate rainforest	n/a	n/a	No
2005-16	8	Sep	2005	*Liocichla phoenicea*	Naung Mung	male	44.0	Temperate rainforest	Skin	n/a	No
2005-17	8	Sep	2005	*Culicicapa ceylonensis*	Naung Mung	male	7.0	Temperate rainforest	Skin	n/a	No
2005-18	8	Sep	2005	*Hemixos flavala*	Naung Mung	male	29.0	Temperate rainforest	Skin	n/a	No
2005-19	9	Sep	2005	*Alcippe morrisonia*	Naung Mung	female	15.0	Temperate rainforest	Skin	n/a	No
2005-20	9	Sep	2005	*Megalaima asiatica*	Naung Mung	female	71.0	Temperate rainforest	Skin	n/a	No
2005-21	9	Sep	2005	*Alcippe morrisonia*	Naung Mung	male	15.0	Temperate rainforest	Skin	n/a	No
2005-22	9	Sep	2005	*Alophoixus flaveolus*	Naung Mung	indet	n/a	Temperate rainforest	Alcohol	n/a	No
2005-23	9	Sep	2005	*Alcippe morrisonia*	Naung Mung	indet	n/a	Temperate rainforest	Alcohol	n/a	No
2005-24	9	Sep	2005	*Myiomela leucura*	Naung Mung	female	23.0	Temperate rainforest	Skin	n/a	No
2005-25	9	Sep	2005	*Arachnothera magna*	Naung Mung	female	25.0	Temperate rainforest	Skin	n/a	No
2005-26	9	Sep	2005	*Myiomela leucura*	Naung Mung	male	26.0	Temperate rainforest	Skin	n/a	No
2005-27	9	Sep	2005	*Garrulax rufogularis*	Naung Mung	female	55.0	Temperate rainforest	Skin	n/a	No
2005-28	9	Sep	2005	*Turdus boulboul* $	Naung Mung	female	120.0	Temperate rainforest	Skin	n/a	No
2005-29	9	Sep	2005	*Niltava rubicoloides*	Naung Mung	female	11.0	Temperate rainforest	Skin	n/a	No
2005-30	9	Sep	2005	*Hemixos flavala*	Naung Mung	male	27.0	Temperate rainforest	Skin	n/a	No
2005-31	9	Sep	2005	*Ficedula monileger*	Naung Mung	male	9.0	Temperate rainforest	Skin	n/a	No
2005-32	9	Sep	2005	*Myiomela leucura*	Naung Mung	female	18.0	Temperate rainforest	Skin	n/a	No
2005-33	10	Sep	2005	*Terpsiphone paradisi*	Naung Mung	male	17.0	Temperate rainforest	Skin	n/a	No
2005-34	10	Sep	2005	*Ficedula monileger*	Naung Mung	male	11.0	Temperate rainforest	Skin	n/a	No
2005-35	10	Sep	2005	*Harpactes erythrocephalus*	Naung Mung	female	95.0	Temperate rainforest	Skin	n/a	No
2005-36	10	Sep	2005	*Harpactes erythrocephalus*	Naung Mung	female	92.0	Temperate rainforest	Skin	n/a	No
2005-37	10	Sep	2005	*Arbroscopus albogularis*	Naung Mung	indet	5.0	Temperate rainforest	Skin	n/a	No
2005-38	10	Sep	2005	*Terpsiphone paradisi*	Naung Mung	female	19.0	Temperate rainforest	Skin, partial Alcohol	n/a	No
2005-39	10	Sep	2005	*Alcippe rufogularis*	Naung Mung	indet	19.0	Temperate rainforest	Skin	n/a	No
2005-40	10	Sep	2005	*Zoothera citrina*	Naung Mung	female	57.0	Temperate rainforest	Skin, partial Alcohol	n/a	No
2005-41	11	Sep	2005	*Stachyris chrysaea*	Naung Mung	indet	7.8	Temperate rainforest	Skin	n/a	No
2005-42	11	Sep	2005	*Garrulax leucolophus*	Naung Mung	female	110.0	Temperate rainforest	Skin	n/a	No
2005-43	11	Sep	2005	*Niltava rubicoloides*	Naung Mung	male	14.0	Temperate rainforest	Skin	n/a	No
2005-44	11	Sep	2005	*Pycnonotus jocosus*	Naung Mung	female	31.0	Temperate rainforest	Skin	n/a	No
2005-45	11	Sep	2005	*Brachypteryx* sp. §	Naung Mung	n/a	23.0	Temperate rainforest	Skin	n/a	No

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2005-46	13	Sep	2005	*Ficedula sapphira*	Nam Ti	male	18.0	Second. vegetation (old)	Skin	n/a	No
2005-47	13	Sep	2005	*Arachnothera magna*	Nam Ti	female	n/a	Second. vegetation (old)	Skin	n/a	No
2005-48	13	Sep	2005	*Megalaima virens*	Nam Ti	female	190.0	Second. vegetation (old)	Skin	n/a	No
2005-49	13	Sep	2005	*Arachnothera magna*	Nam Ti	indet	27.0	Second. vegetation (old)	Skin	n/a	No
2005-50	13	Sep	2005	*Hypsipetes mcclelandi*	Nam Ti	female	38.0	Second. vegetation (old)	Skin	n/a	No
2005-51	13	Sep	2005	*Niltava grandis*	Nam Ti	male	36.0	Second. vegetation (old)	Skin	n/a	No
2005-52	13	Sep	2005	*Hypsipetes mcclelandi*	Nam Ti	indet	36.0	Second. vegetation (old)	Alcohol	n/a	No
2006-3265	5	Mar	2006	*Ficedula* sp. §	Nam Ti	female	7.9	Secondary vegetation (old)	Skin,	5*2.5	Yes
2006-3266	5	Mar	2006	*Pellorneum brachypteryx*	Nam Ti	male	20.7	Secondary vegetation (old)	Skin, partial skeleton	6*3.4	Yes
2006-3267	6	Mar	2006	*Garrulax squamatus*	Masa	female	79.0	primary evergreen forest	Skeleton	10*3	Yes
2006-3268	6	Mar	2006	*Garrulax squamatus*	Masa	male	79.9	primary evergreen forest	Skin, partial skeleton	3*1.5	Yes
2006-3269	6	Mar	2006	*Ficedula monileger*	Masa	male	11.2	primary evergreen forest	Skeleton	6.5*4	Yes
2006-3270	6	Mar	2006	*Niltava grandis*	Masa	male	38.3	primary evergreen forest	Skeleton	2.5*1.5	Yes
2006-3271	6	Mar	2006	*Pomatorhinus ferruginosus*	Masa	male	51.0	primary evergreen forest	Skeleton	8*4	Yes
2006-3272	7	Mar	2006	*Napothera brevicaudata*	West bank, Nam Tisang River, near Naung Mung	male	18.0	evergreen forest	Skeleton	4.5*3	Yes
2006-3273	8	Mar	2006	*Alcippe morrisonia*	West bank, Nam Tisang River, near Naung Mung	male	12.1	evergreen forest	Skin	3*2	Yes
2006-3274	8	Mar	2006	*Alcippe morrisonia*	West bank, Nam Tisang River, near Naung Mung	male	13.1	evergreen forest	Skeleton	2.5*1.5	Yes
2006-3275	8	Mar	2006	*Alcippe morrisonia*	West bank, Nam Tisang River, near Naung Mung	indet	12.3	evergreen forest	Alcohol	n/a	Yes
2006-3276	8	Mar	2006	*Rhipidura albicollis*	West bank, Nam Tisang River, near Naung Mung	female	10.7	evergreen forest	Skin, partial skeleton	4*2.5	Yes
2006-3277	8	Mar	2006	*Accipiter virgatus*	West bank, Nam Tisang River, near Naung Mung	male	98.3	evergreen forest	Skeleton, partial skeleton	3*1.5	Yes
2006-3278	8	Mar	2006	*Phylloscopus cantator*	West bank, Nam Tisang River, near Naung Mung	male	6.0	evergreen forest	Skeleton, partial skin	3.5*2.5	Yes
2006-3279	9	Mar	2006	*Abroscopus albogularis*	West bank, Nam Tisang River, near Naung Mung	female	4.5	evergreen forest	Skin	4*2.5	Yes
2006-3280	9	Mar	2006	*Seicercus* sp. §	West bank, Nam Tisang River, near Naung Mung	female	7.5	evergreen forest	Skin	4*1.5	Yes
2006-3281	9	Mar	2006	*Tesia olivea*	West bank, Nam Tisang River, near Naung Mung	male	8.4	evergreen forest	Skeleton, partial skin	1.5*1	Yes
2006-3282	9	Mar	2006	*Ficedula strophiata*	West bank, Nam Tisang River, near Naung Mung	male	12.5	evergreen forest	Skin, partial skeleton	1*1	Yes
2006-3283	9	Mar	2006	*Seicercus* sp. §	West bank, Nam Tisang River, near Naung Mung	female	7.1	evergreen forest	Skin	3.5*1.5	Yes
2006-3284	9	Mar	2006	*Alcippe morrisonia*	West bank, Nam Tisang River, near Naung Mung	male	11.5	evergreen forest	Skeleton	5*4	Yes
2006-3285	9	Mar	2006	*Garrulax leucolophus*	West bank, Nam Tisang River, near Naung Mung	indet	104.1	evergreen forest	Alcohol	n/a	Yes
2006-3286	9	Mar	2006	*Dendrocitta frontalis*	West bank, Nam Tisang River, near Naung Mung	male	86.0	evergreen forest	Skeleton, partial skin	3*1	Yes
2006-3287	9	Mar	2006	*Pellorneum tickelli*	West bank, Nam Tisang River, near Naung Mung	male	19.1	evergreen forest	Skin	4.5*2.5	Yes
2006-3288	9	Mar	2006	*Pellorneum tickelli*	West bank, Nam Tisang River, near Naung Mung	female	18.4	evergreen forest	Skeleton	7*4.5	Yes

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2006-3289	9	Mar	2006	*Seicercus poliogenys*	West bank, Nam Tisang River, near Naung Mung	female	7.0	evergreen forest	Skeleton	2*1.5	Yes
2006-3290	9	Mar	2006	*Chloropsis hardwickii*	West bank, Nam Tisang River, near Naung Mung	female	34.3	evergreen forest	Skeleton	2*3	Yes
2006-3291	10	Mar	2006	*Stachyris oglei*	West bank, Nam Tisang River, near Naung Mung	male	32.6	evergreen forest	Skin, partial skeleton	3.5*2	Yes
2006-3292	10	Mar	2006	*Stachyris oglei*	West bank, Nam Tisang River, near Naung Mung	male	30.8	evergreen forest	Skeleton	4*2.5	Yes
2006-3293	10	Mar	2006	*Yuhina castaneiceps*	West bank, Nam Tisang River, near Naung Mung	indet	11.3	evergreen forest	Alcohol	n/a	Yes
2006-3294	10	Mar	2006	*Yuhina castaneiceps*	West bank, Nam Tisang River, near Naung Mung	female	11.3	evergreen forest	Skin	2*3	Yes
2006-3295	10	Mar	2006	*Pellorneum* sp. §	West bank, Nam Tisang River, near Naung Mung	female	19.3	evergreen forest	Skin partial skeleton	7*5	Yes
2006-3296	10	Mar	2006	*Arachnothera longirostris*	West bank, Nam Tisang River, near Naung Mung	female	10.3	evergreen forest	Skin	4.5*2.5	Yes
2006-3297	10	Mar	2006	*Megalaima asiatica*	West bank, Nam Tisang River, near Naung Mung	male	79.0	evergreen forest	Skeleton	6*4	Yes
2006-3298	10	Mar	2006	*Alicppe castaneceps*	West bank, Nam Tisang River, near Naung Mung	male	11.8	evergreen forest	Skin	2.5*1.5	Yes
2006-3299	11	Mar	2006	*Dendrocitta frontalis*	West bank, Nam Tisang River, near Naung Mung	indet	95.1	evergreen forest	Alcohol	n/a	Yes
2006-3300	11	Mar	2006	*Stachyris oglei*	West bank, Nam Tisang River, near Naung Mung	indet	31.9	evergreen forest	Alcohol	n/a	Yes
2006-3301	11	Mar	2006	*Sasia ochracea*	West bank, Nam Tisang River, near Naung Mung	female	9.4	evergreen forest	Skeleton	4*4	Yes
2006-3302	11	Mar	2006	*Pellronem* sp. §	West bank, Nam Tisang River, near Naung Mung	male	21.4	evergreen forest	Skeleton, partial skin	5*3	Yes
2006-3303	11	Mar	2006	*Napothera epilepidota*	West bank, Nam Tisang River, near Naung Mung	male	16.9	evergreen forest	Skin	3*1.5	Yes
2006-3304	11	Mar	2006	*Yhina zantholeuca*	West bank, Nam Tisang River, near Naung Mung	male	10.8	evergreen forest	Skeleton	8*5	Yes
2006-3305	11	Mar	2006	*Sasia ochracea*	West bank, Nam Tisang River, near Naung Mung	male	9.9	evergreen forest	Skin	2.5*1	Yes
2006-3306	11	Mar	2006	*Rhipidura albicollis*	West bank, Nam Tisang River, near Naung Mung	male	12.3	evergreen forest	Skeleton	2.5*1	Yes
2006-3307	11	Mar	2006	*Criniger flaveolus*	West bank, Nam Tisang River, near Naung Mung	male	46.2	evergreen forest	Skeleton	6*4	Yes
2006-3308	12	Mar	2006	*Phylloscopus cantator*	West bank, Nam Tisang River, near Naung Mung	indet	6.4	evergreen forest	Alcohol	n/a	Yes
2006-3309	12	Mar	2006	*Alcippe rufogularis*	West bank, Nam Tisang River, near Naung Mung	male	15.6	evergreen forest	Skeleton	5*5	Yes
2006-3310	12	Mar	2006	*Alcippe rufogularis*	West bank, Nam Tisang River, near Naung Mung	male	15.9	evergreen forest	Skeleton	4*3.5	Yes
2006-3311	12	Mar	2006	*Alcippe rufogularis*	West bank, Nam Tisang River, near Naung Mung	female	16.1	evergreen forest	Skin	Laying	Yes

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2006-3312	12	Mar	2006	*Stachyris nigriceps*	West bank, Nam Tisang River, near Naung Mung	female	15.5	evergreen forest	Skin	6*4	Yes
2006-3313	12	Mar	2006	*Yuhina zantholeuca*	West bank, Nam Tisang River, near Naung Mung	female	10.7	evergreen forest	Skin	6*2	Yes
2006-3314	12	Mar	2006	*Yuhina zantholeuca*	West bank, Nam Tisang River, near Naung Mung	male	12.4	evergreen forest	Skin, partial skeleton	9*6	Yes
2006-3315	13	Mar	2006	*Pellroneum* sp. §	West bank, Nam Tisang River, near Naung Mung	male	21.3	evergreen forest	Skin, partial skeleton	6*4.5	Yes
2006-3316	13	Mar	2006	*Dendrocitta frontalis*	West bank, Nam Tisang River, near Naung Mung	male	92.9	evergreen forest	Skin, partial skeleton	5.5*2	Yes
2006-3317	13	Mar	2006	*Abroscopus albogularis*	West bank, Nam Tisang River, near Naung Mung	male	4.6	evergreen forest	Skeleton	5*4	Yes
2006-3318	13	Mar	2006	*Jabouilleia naunmungensis*	West bank, Nam Tisang River, near Naung Mung	male	46.2	evergreen forest	Skin, partial skeleton	5*3.5	Yes
2006-3319	14	Mar	2006	*Alcippe rufogularis*	West bank, Nam Tisang River, near Naung Mung	male	13.2	evergreen forest	Skeleton	6*5	Yes
2006-3320	14	Mar	2006	*Alicppe morrisonia*	West bank, Nam Tisang River, near Naung Mung	male	11.2	evergreen forest	Skin	4*2.5	Yes
2006-3321	14	Mar	2006	*Criniger flaveolus*	West bank, Nam Tisang River, near Naung Mung	male	46.4	evergreen forest	Skin	6*2.5	Yes
2006-3322	14	Mar	2006	*Blythipicus pyrrhotis*	West bank, Nam Tisang River, near Naung Mung	male	168.1	evergreen forest	Skeleton	5.5*4	Yes
2006-3323	14	Mar	2006	*Napothera epilepidota*	West bank, Nam Tisang River, near Naung Mung	female	18.1	evergreen forest	Skin, partial skeleton	9*7	Yes
2006-3324	14	Mar	2006	*Yuhina castaneiceps*	West bank, Nam Tisang River, near Naung Mung	female	11.8	evergreen forest	Skeleton	4*2	Yes
2006-3325	14	Mar	2006	*Seicercus burkii*	West bank, Nam Tisang River, near Naung Mung	female	n/a	evergreen forest	Skeleton	2.5*1.5	Yes
2006-3326	16	Mar	2006	*Ficedula hyperthyra*	U Ring Ga guest house	male	8.7	evergreen forest	Skin	2*1	Yes
2006-3327	16	Mar	2006	*Leiothrix lutea*	U Ring Ga guest house	male	24.0	evergreen forest	Skin	1.5*1	Yes
2006-3328	16	Mar	2006	*Garrulax rufogularis*	U Ring Ga guest house	male	58.4	evergreen forest	Skeleton, partial skin	2.5*1	Yes
2006-3329	17	Mar	2006	*Pellorneum* sp. §	U Ring Ga guest house	male	19.1	evergreen forest	Skin, partial skeleton	6*5	Yes
2006-3330	17	Mar	2006	*Pellorneum* sp. §	U Ring Ga guest house	female	21.0	evergreen forest	Skeleton	10*8	Yes
2006-3331	17	Mar	2006	*Leiothrix lutea*	U Ring Ga guest house	female	19.9	evergreen forest	Skeleton	4*2	Yes
2006-3332	17	Mar	2006	*Garrulax gularis*	U Ring Ga guest house	male	88.9	evergreen forest	Skin, partial skeleton	9*4.5	Yes
2006-3333	17	Mar	2006	*Garrulax gularis*	U Ring Ga guest house	male	80.7	evergreen forest	Skeleton	6.5*2.5	Yes
2006-3334	17	Mar	2006	*Garrulax gularis*	U Ring Ga guest house	indet	80.2	evergreen forest	Alcohol	n/a	Yes
2006-3335	17	Mar	2006	*Garrulax leucolophus*	U Ring Ga guest house	female	100.4	evergreen forest	Skeleton	8*4	Yes
2006-3336	17	Mar	2006	*Serilophus lunatus*	U Ring Ga guest house	male	28.3	evergreen forest	Skeleton	4.5*2	Yes
2006-3337	17	Mar	2006	*Dendrocitta frontalis*	U Ring Ga guest house	indet	92.2	evergreen forest	Alcohol	n/a	Yes
2006-3338	17	Mar	2006	*Seicercus affinis*	U Ring Ga guest house	male	8.3	evergreen forest	Skeleton, partial skin	2.5*1.5	Yes
2006-3339	17	Mar	2006	*Garrulax gularis*	U Ring Ga guest house	female	n/a	evergreen forest	Skin, partial skeleton	10*6	Yes
2006-3340	17	Mar	2006	*Ficedula hyperthyra*	U Ring Ga guest house	female	8.0	evergreen forest	Skin	4*3	Yes
2006-3341	17	Mar	2006	*Cyornis* sp. §	U Ring Ga guest house	female	12.9	evergreen forest	Skin, partial skeleton	4*3	Yes
2006-3342	17	Mar	2006	*Cissa chinensis*	U Ring Ga guest house	female	125.3	evergreen forest	Skeleton	15*11	Yes
2006-3343	17	Mar	2006	*Garrulax rufogularis*	U Ring Ga guest house	male	58.0	evergreen forest	Alcohol	n/a	Yes
2006-3344	17	Mar	2006	*Napothera epilepidota*	U Ring Ga guest house	indet	15.5	evergreen forest	Alcohol	n/a	Yes
2006-3345	18	Mar	2006	*Enicurus leuschenaulti*	U Ring Ga guest house	male	45.5	evergreen forest	Skin, partial skeleton	5*3	Yes

Field-No.	D	M	Y	Species	Location	Sex	Body mass	Habitat	Type	Gonads	Tissue
2006-3346	18	Mar	2006	*Ficedula hyperthyra*	U Ring Ga guest house	female	7.9	evergreen forest	Skin	6*3.5	Yes
2006-3347	18	Mar	2006	*Abroscopus albogularis*	U Ring Ga guest house	male	4.3	evergreen forest	Skin	6*4	Yes
2006-3348	18	Mar	2006	*Niltava sundara*	U Ring Ga guest house	male	20.3	evergreen forest	Skeleton	2*1	Yes
2006-3349	18	Mar	2006	*Pomatorhinus ochraceiceps*	U Ring Ga guest house	male	37.4	evergreen forest	Skeleton, partial skin	3.5*6	Yes
2006-3350	18	Mar	2006	*Paradoxornis ruficeps*	U Ring Ga guest house	male	36.4	evergreen forest	Skeleton	3*2	Yes
2006-3351	18	Mar	2006	*Paradoxornis ruficeps*	U Ring Ga guest house	female	31.2	evergreen forest	Skin, partial skeleton	6*3	Yes
2006-3352	18	Mar	2006	*Dendrocitta frontalis*	U Ring Ga guest house	female	76.6	evergreen forest	Skin, partial skeleton	12*5	Yes
2006-3353	18	Mar	2006	*Seicercus poliogenys*	U Ring Ga guest house	female	6.3	evergreen forest	Skin	3.5*2	Yes
2006-3354	18	Mar	2006	*Garrulax rufogularis*	U Ring Ga guest house	male	56.3	evergreen forest	Skeleton	5*2	Yes
2006-3355	18	Mar	2006	*Garrulax rufogularis*	U Ring Ga guest house	female	52.7	evergreen forest	Skin, partial skeleton	9*4	Yes
2006-3356	18	Mar	2006	*Seicercus poliogenys*	U Ring Ga guest house	female	6.9	evergreen forest	Skeleton	5*2	Yes
2006-3357	19	Mar	2006	*Garrulax monileger*	U Ring Ga guest house	male	93.5	evergreen forest	Skeleton	6*3	Yes
2006-3358	19	Mar	2006	*Garrulax monileger*	U Ring Ga guest house	female	83.4	evergreen forest	Skeleton, partial skin	10*7	Yes
2006-3359	19	Mar	2006	*Otus sunia*	U Ring Ga guest house	male	75.8	evergreen forest	Skeleton, partial skin	5*3.5	Yes
2006-3360	19	Mar	2006	*Niltava rubicoloides*	U Ring Ga guest house	male	11.7	evergreen forest	Skin, partial skeleton	2.5*2	Yes
2006-3361	19	Mar	2006	*Napothera epilepidota*	U Ring Ga guest house	male	16.2	evergreen forest	Skeleton	6*4	Yes
2006-3362	19	Mar	2006	*Alcedo hercules*	U Ring Ga guest house	male	63.8	evergreen forest	Skeleton	8.5*4.5	Yes
2006-3363	20	Mar	2006	*Arachnothera magna*	U Ring Ga guest house	male	30.1	evergreen forest	Skeleton	4.5*4	Yes
2006-3364	20	Mar	2006	*Garrulax nuchalis*	U Ring Ga guest house	female	74.3	evergreen forest	Skeleton, partial skin	9*5	Yes
2006-3365	20	Mar	2006	*Aethopyga saturata*	U Ring Ga guest house	male	6.3	evergreen forest	Skeleton	5.5*4	Yes
2006-3366	20	Mar	2006	*Phylloscopus cantator*	U Ring Ga guest house	female	6.3	evergreen forest	Skin, partial skeleton	6*4	Yes
2006-3367	20	Mar	2006	*Jabouilleia naunmungensis*	U Ring Ga guest house	indet	n/a	evergreen forest	Remains of toe	n/a	No

Appendix 4. Species list.

Species list of all species observed in the Hkakabo Razi area (2001 to 2006). Note: We kept the original field determination even if in the main text we changed taxonomy in several cases. We also kept dissipative records in this particular list.

Appendix 4. Online supporting information only
http://zoologicalbulletin.de/BzB_Volumes/BzM_60/BzM_Renner_et_al_Appendix_4.pdf

Appendix 5. Morphometric measurements of selected species.

Appendix 5. Online supporting information only
http://zoologicalbulletin.de/BzB_Volumes/BzM_60/BzM_Renner_et_al_Appendix_5.pdf

