BIRDS OF THE VICTOR EMANUEL AND HINDENBURG MOUNTAINS, NEW GUINEA

RESULTS OF THE AMERICAN MUSEUM OF NATURAL HISTORY EXPEDITION TO NEW GUINEA IN 1954

E. THOMAS GILLIARD AND MARY LECROY

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INTRODUCTION

THE PRESENT REPORT is based on a collection of 666 specimens of birds obtained by the senior author and his wife, Margaret Tifft Gilliard, during the period from March 19 to May 25, 1954, in the Victor Emanuel and Hindenburg Mountains. The expedition was a continuation of the exploration of New Guinea in which the American Museum has been engaged for nearly three decades.

The Victor Emanuel and the Hindenburg Mountains are situated in the Telefomin region of central New Guinea at the headwaters of the Fly, Sepik, and Strickland rivers. Politically speaking, the Victor Emanuel Mountains are in the Territory of New Guinea, and the Hindenburg Mountains are in Papua. The geographical region they occupy is at the center of one of the least-known areas of New Guinea.

HISTORY

The mountains of the Telefomin region were first sighted by the Italian explorer Count L. M. D'Albertis in 1876 while cruising on the upper Fly River. He named the loftiest range the Victor Emanuel Mountains for his King. The first white men to reach these mountains were two Australian field officers in the employ of the Papuan Government, Charles H. Karius and Ivan F. Champion, who crossed New Guinea via the mountains of the Telefomin region in 1926–1928. Champion stated in his report on this venture, entitled "Across New Guinea from the Fly to the Sepik" (1932, p. 207): "Throughout the whole journey this Telefomin Plateau at an altitude of 4877 feet was the only place we saw where an airplane could land, and it is ideal, though after the heavy rains it would no doubt be a morass. Airplanes could bring stores to a base camp from which to explore the fertile valley of the surrounding country."

Champion's reference to exploration with the support of aircraft was prophetic. However, the first such attempt, namely, that of the 1936–1937 Archbold Expedition of the American Museum of Natural History (as originally planned; see Rand and Brass, 1940, p. 341) had to be abruptly curtailed when the expedition aircraft was lost just after the advance party reached its first mountain camp (see fig. 1). The expedition party had planned to penetrate the mountains of the Telefomin region on foot on the old Karius-Champion trail, while being supported by food dropped by aircraft. Only two birds were collected; George H. H. Tate prepared specimens of *Manucodia ater* and *Diphyllodes magnificus* shortly before abandoning the Mt. Mabion camp (Rand, 1942a, pp. 349–350). So far as we can determine, these specimens were the first and only scientific specimens of birds collected in the mountains of the Telefomin region prior to our expedition.

However, over the years collectors had made many attempts to survey the avifauna of these mountains. The first attempt from the north was that of Karl Hunstein, a famous bird-of-paradise collector who discovered many species of birds. In 1887 Hunstein voyaged up the Sepik River in the "Samoa." He reached a range of mountains lying more than 200 miles up the river that now bears his name, but succeeded in collecting only a few birds which were sent to the Berlin Museum. The next attempt was the German Empress Augusta [or Sepik] River Expedition of 1912–1913. On that venture the ornithologist, Burgers, obtained extensive collections of birds in the Hunstein Mountains, the Lordberg, Regenberg, Meander Mountains, and on the Schrader Mountains—all of which are isolated or outlying mountains in the watershed of the Sepik River. Apparently Burgers' collecting locality closest to the Telefomin region was the Hunstein Mountains, about 100 miles northeast of the Victor Emanuel Mountains.

In the southern watershed, the explorations of the aforementioned L. M. D'Albertis, the first ornitholigist to explore the Fly River (1875–1877), took him up the Fly and Palmer rivers, approximately to the present location of Thompson's Junction (Austen, 1925). D'Albertis' extensive collections of natural history specimens included no mountain birds, although he must have come within a few score of miles of the southern foothills of the Hindenburg and Dap ranges.

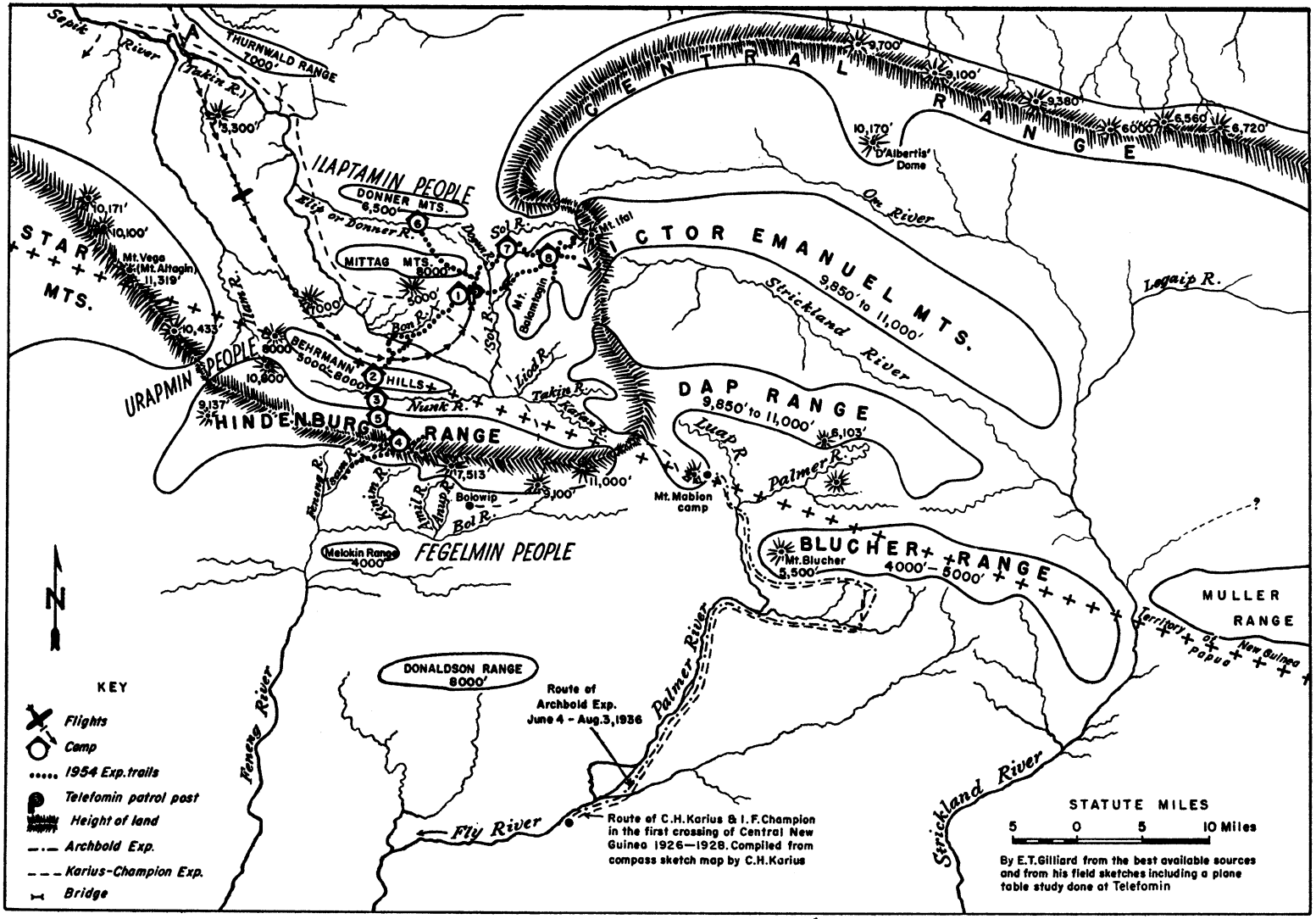

FIG. 1. Map of the Telefomin region of central New Guinea, showing flights and camps. 1. Base Camp at Telefomin airfield. 2. Camp 2, 6000 feet. 3. Camp 3, 5300 feet. 4. Camp 4, 7200 feet. 5. Camp 5, 5850 feet. 6. Camp 6, 3500± feet. 7. Camp 7, 6200 feet. 8. Camp 8, 7300 feet.

To the east of the Telefomin region the nearest point along the main ranges at which the mountain avifauna had been sampled was about 180–220 miles distant at Mt. Hagen, Mt. Wilhelm, Mt. Kubor, and Mt. Giluwe (the last two mountains are narrowly cut off from the main ranges). Surveys conducted by N. B. Blood in 1945 for the Australian Museum, by Fred Shaw-Mayer in 1950 to 1953 for the British Museum, by E. T. Gilliard in 1950 and 1952 for the American Museum of Natural History, and by Nils Gyldenstolpe in 1953 for the State Museum of Natural History in Stockholm had made known the avifauna of the region—a region that was almost inaccessible prior to 1945. During the surveys made by the senior author, 23 new forms of birds, including two new species, were discovered (Mayr and Gilliard, 1954, p. 318).

To the west the nearest locality that had been surveyed for bird life was Mt. Goliath (about 100 miles distant). A. S. Meek visited this mountain in January and February, 1911. His collection went to Lord Rothschild's Tring Museum, and thence to the American Museum in 1935. As Mt. Goliath is an isolated peak south of the main east-west cordillera, the nearest point west of the Telefomin region at which the avifauna of the main ranges had been surveyed was the Snow Mountains in the vicinity of Mt. Wilhelmina, some 220 miles distant. The third New Guinea Archbold Expedition of the American Museum of Natural History, which studied this area thoroughly in 1938 and 1939, discovered 40 new forms of birds, including four new species (Rand, 1942b, p. 425).

From this historical sketch it is clear that the vast mountainous area lying between the Snow Mountains of Netherlands New Guinea and the Hagen Mountains of eastern New Guinea remained biologically untouched until our expedition in 1954. However, between the time of the discovery of the "Telefomin Plateau" in 1928 by Karius and Champion and our visit in 1954, many pioneers visited the area, most of them secretly. The first to land an aircraft there was the American mining engineer, Ward Williams, in 1936. His ship landed on an airstrip prepared by three New Guinea gold prospectors who had reached the area on foot. In 1937 the Taylor and Black expedition came on foot from Mt. Hagen but, so far as we know, no minerals were found, and the area was soon forgotten. Then, during World War II, seven United States Air Force gliders filled with men and earth-moving equipment, were towed over the Victor Emanuel Mountains and landed on the site of the old Ward Williams airstrip. Thus about the year 1943 a substantial airfield was constructed at an altitude of 4800 feet for emergency use by lost allied fliers gathering in New Guinea for the invasion of the Philippines. With the next phase of the war the field became obsolete, and it was abandoned.

In 1950 the senior author learned of the existence of this airfield high on the side of the biologically unexplored mountains of the Telefomin region. He also learned that in 1949, after six years of abandonment, the New Guinea Government had established a Patrol Post at the Telefomin field. The post was supplied entirely by "Norsemen"—single-engined bush aircraft imported from Canada and flown by Australian pilots. The aircraft flew in from Wewak about once a month with food and mail for the two patrol officers in charge. This post and the controlled area immediately around it formed a "hub" in an uncontrolled area of some 80,000 square miles of forest and mountain, much of it uninhabited or at best thinly populated with natives of little known temperament. Of this region, forming the heart of New Guinea, Ernst Mayr wrote in a personal communication of 1953: "No doubt the Victor Emanuel Mountains are the center of the least known area in New Guinea and perhaps the entire Old World."

The senior author immediately began negotiations to take advantage of the unique collecting opportunities offered by this landing strip, but it was late 1952 before arrangements could be made. Financial support was obtained from the American Museum of Natural History, the Frank M. Chapman Memorial Fund, the National Geographic Society, and the C. R. Vose Exploration Fund of the Explorers Club. Diplomatic sanction for the expedition was granted by the Territory of Papua and New Guinea Government in July, 1953. Final approval had to come from the officers in charge of the station at Telefomin, and this, of course, hinged on

native relations. These officers were Patrol Officer Gerald Leo Szarka and Cadet Patrol Officer Geoffrey Brodrill Harris. These men and a Baptist missionary, Norman Draper, who lived half a mile from the post, were the only white men in this large area. With them was a team of highly trained native constables. The natives they administered seemed friendly and cooperative, and our bird collecting venture was approved. Harris began keeping lists of birds and mammals pending our arrival.

Unfortunately we were never to meet these officers. Shortly after our arrival in New Guinea, but before we reached Telefomin, both were killed, together with two native constables, in nearly simultaneous ambushes which took place about 10 miles apart the morning of November 6, 1953, in outposts of the Telefomin region. By good luck Draper had changed his plans and was not ambushed. It was he who radioed for help, issued arms, and saved the post.

For months thereafter we despaired of being permitted to carry out our mission in the mountains of the Telefomin region. However, on March 19, 1954 the Commissioner of the Sepik District, Mr. S. Elliott-Smith, informed the expedition that it could proceed as planned. The team of patrol officers and native constables which had been airlifted into the region in November, he said, had restored order to the area.

The expedition party consisted of the senior author, his wife, Margaret, and five trained native assistants from the village of Kanganaman on the middle Sepik River. One of the assistants was an ex-native constable named Rambur, who served as the general native boss of our Kanganaman team, as well as of the natives who were later hired in the Telefomin region. At Telefomin a young man named Innisip (a native of the Telefomin area), who had worked with the native constables and learned pidgin, was employed as expedition interpreter.

ACKNOWLEDGMENTS

We wish to express our gratitude to the Reverend Norman Draper and to Mr. Laurie Nolan for valuable information concerning local customs and collecting areas in the Telefomin region. Mr. Robin Gray, manager of Gibbes Sepik Airways at Wewak, helped us immeasurably by looking after our shipments of food, gear, and mail while we were in the mountains. We are deeply indebted to him. At Telefomin we were treated most graciously and received much important help from Assistant District Officer Frank Jones, from Patrol Officer Alex Zweck, and from Medical Officer Bernie Gobel. We are very grateful to Mr. L. J. Dwyer, Director of the Commonwealth Bureau of Meteorology, for supplying weather records from the Telefomin region.

We are particularly grateful to the District Commissioner, Mr. Sydney Elliott-Smith, for his warm friendship and understanding. Without his deep interest, which led him to make a personal inspection of the Telefomin region immediately prior to his granting permission for us to visit the region, we should never have been able to carry out our mission.

To His Honor the Administrator of Papua and the Territory of New Guinea, Mr. Donald M. Cleland, and to Mrs. Cleland, we extend our most grateful thanks for their warm interest and help in this project.

The senior author wishes to thank Mrs. Mary LeCroy for her splendid assistance in the preparation of this report. Mrs. LeCroy came to the Department of Ornithology as a student working under the Undergraduate Research Program, Special Projects in Science Education, of the National Science Foundation.

We wish to thank Mr. Leonard J. Brass for providing valuable botanical identifications and other information, Dr. Dean Amadon for reading the manuscript of this paper and for offering many constructive suggestions, Miss Sarita Van Vleck for much-appreciated laboratory assistance, Mr. Walter Holmquist for drawing the maps and charts, and Miss Constance D. Sherman for her invaluable help in preparing the manuscript for the printer. Finally the senior author wishes to thank Margaret Gilliard for her magnificent assistance in the field.

THE EXPEDITION

ITINERARY

NOVEMBER 1, 1953, TO JUNE 23, 1954, IN NEW GUINEA (PORT MORESBY, LAE, MADANG, SEPIK RIVER, WEWAK, TELEFOMIN REGION, WEWAK, GOROKA REGION, AND LAE)

March 19–May 25	Telefomin, Victor Emanuel Mountains	Camp 1 4800 feet
March 28–March 29	Miptagin, Behrmann Hills, Hindenburg Mountains	Camp 2 6300 feet
March 29–March 30	Momsakten, Hindenburg Mountains	Camp 3 5300 feet
March 30–April 8	Ilkivip, Hindenburg Mountains (collecting occurred up to 8000 feet)	Camp 4 7200 feet
April 8–April 13	Unchemchi, Hindenburg Mountains	Camp 5 5850 feet
[April 20–April 22]	Eliptamin Valley via two crossings of Mittag Mountains by Sepik shoot boys of expedition. (Eliptamin Valley localities given by boys: Talatafit; Takatemdikin; Uftemtakin)	Camp 1 4800 feet Camp 6 [3500 feet?]
May 3–May 4	Lumbered clearing, Victor Emanuel Mountains	Camp 7 6200 feet
May 4–May 12	Southwest slopes of Mt. Ifal, Victor Emanuel Mountains	Camp 8 7300 feet
May 10	Highest point of Mt. Ifal climbed by expedition Highest peak of the Victor Emanuel Range, Mt. Ifal's summit rocks, was still an estimated 800–1000 feet above this altitude at a distance of less than a mile and on an azimuth of 150 degrees	8200 feet
May 12–May 25	Telefomin	Camp 1 4800 feet

ROUTES AND COLLECTING LOCALITIES

CAMP 1

Telefomin; northwest flank of Victor Emanuel Mountains, altitude about 4800 feet.

This camp, which served as our base, was situated about half a mile west (?) of and in the same grass field as the Telefomin airstrip. It was in a small, abandoned mission house close to the edge of the forest. Some 340 man-hours of hunting were conducted from this base. Of this time an estimated 150 man-hours were devoted to the grasslands and forest edge, and the remainder to various kinds of forest and along the edges of heavily wooded streams. Hunting was conducted chiefly between the altitudes of 4500 and 5500 feet, but some was done as low as about 4000 feet near the borders of the Takin [Sepik] River. Hunting took place in native gardens, along the edges of the grass-covered airport, in marshy grasslands of the flatlands fringing the Telefomin station, in freshly cleared garden areas in the forest, along the exposed bottoms of streams flowing in well-lighted corridors of the forest, in the 80-foot crown of the old second-growth forest which abounds in this area, in the heavily over-grown forest vegetation of abandoned gardens of different ages, and in original mountain forest, even including the canopy of the 150-foot tall bulolo pines, a few of which still grow within a mile of the Telefomin station.

Flowing through the forests north of the Telefomin station is the Sol River. At the Balammalook trail crossing (near the confluence of the Balam River and the Sol River) the senior author, in his field notes, described the Sol as " . . . a rushing milky to muddy river about 30 feet wide, very rocky, subject to flooding, and floored with much black sand." The flow at the crossing point (altitude 4610 feet) was generally south-southwest through a forest-fringed gorge about 250 feet deep. From this point the trail to Telefomin station passed through tall, wet, flattish-floored woodlands with an average crown height of 90 to 100 feet. The last mile or so of the trail led through tall second-growth forest in which individual trees reached 2 feet in diameter and appeared to be quite old. Had we not seen the very large original trees on Mt. Balamtagin, we might have been misled into thinking that the forests in the Telefomin vicinity were original, whereas they are chiefly old secondary forests.

We were assisted in our collecting in this area by Telefomin natives who brought in a small number of trapped birds, chiefly rails, as well as small forest birds which they shot with four-pronged arrows. Under normal conditions native labor should be farily good at this camp, but at the time of our visit the people were not very cooperative because of the recent disturbance. In normal times taro, the chief article of native food, and pigs should be available to assist in the maintenance of small collecting parties working in and near this camp. In our case, however, virtually all food had to be air freighted from the coast, also owing to the recent unrest.

Camp 2

Miptagin; north flank of a small range called the Behrmann Hills, chiefly important as a sketching station for the study of terrain features.

Here the panorama shown in plate 1 was made at about 7:30 A.M. on March 29. Just below this camp the slopes were burned annually and thus remained denuded of forest. Camp 2 was at the lower edge of a broad strip of mountain rain forest containing much moss and very high trees. This kind of forest crowned the Behrmann Hills in an area called Miptagin, where we crossed the range to the Nunk River on a native trail. The height of land on this trail I recorded as 6420 feet.

Few scientific specimens were collected around this camp because the expedition remained there such a short time, but a bower of *Amblyornis macgregoriae* was found near it, and two birds were trapped in this structure. This was the only bower of a bowerbird which came to the attention of the senior author during this expedition, and unfortunately it was not inspected by him. The birds of this mountain crest therefore remain unsurveyed, and it would seem well worth while for future collectors to study the area.

Camp 3

Momsakten; south bank of the Nunk River; altitude about 5300 feet; northern foothills of the Hindenburg Mountains.

This camp was on the top of a rounded, heavily forested ridge. The Nunk River lay some 300 feet below and about a mile to the north. We crossed the Nunk River near a forest clearing containing three houses (all were boarded shut). The river, when we crossed it, was 6 feet wide and about a foot deep.

After we had erected our tents at Momsakten, about 20 natives appeared from the woods bearing a large watermelon, much taro, some pit pit, and edible tree leaves. We were surprised by the number and friendliness of the natives who suddenly came from the forest that seemed to extend unbroken in every direction.

Again very little collecting was conducted, for this was a travel camp, but our only record of *Climacteris placens* and our only adult male *Lophorina superba* came from here. The latter was shot from its display limb almost directly over the camp site.

Camp 4

Ilkivip; north watershed of Hindenburg Mountains, 7200 feet.

This camp was in irregularly floored, mossy forest with an average height of 60–80 feet. During the 10 days that we worked from this base, about 250 man-hours of hunting were done between the altitudes of 6500 and 8000 feet, all of it in the forest and most of it at or above 7000 feet.

The camp was reached in four and a quarter hours of climbing from Camp 3. For the most part the trail followed a rounded ridge in the forest, but in about five places the ridge became fairly sharp, and the underlying sandstone protruded in irregular, sharp formations (see pl. 6, fig. 2) which made walking difficult for the carriers. Several of these areas were open and covered with brackens and grasses, and near one we found an old dwelling shelter with much carbon on its sloping rock ceiling. This was a very old native track called Bamtaman Ilap, which had apparently been used only once before by a white man, Laurie Nolan, about a year previously. It was said to lead to Bolowip, a village at the headwaters of the Fly River, which Karius and Champion visited during their 1926–1928 expedition. No streams were found, but the ridge trail in some places passed through little saddles floored with yellow clay containing small pools of water.

Above 7000 feet the forest became very wet and mossy. It dripped day and night, as the mist of the cloud belt penetrated it and condensed on the cool vegetation. The underlying rock was chiefly a thick veneer of old limestone, with jagged crevices and extensive clusters of sharp, spike-like rocks. Sizable areas lay exposed, but generally the rocks were covered with moss, roots, and other vegetation varying in thickness from inches to more than a foot. Some of the trees growing on this surface were very large, well over 100 feet tall. All were heavily moss covered. There were many tree ferns and pandanus plants.

Natives from the watersheds of both the Fly and Sepik rivers hunt these high forests for game and especially for oily pandanus seeds. The latter they apparently plant in these cold environs. Water was a serious problem at this camp, for there are no streams on these mountains. A large United States Army Lister bag was suspended between two tarpaulins, and with this arrangement enough rain water was obtained to take care of our party of 10 people. Some food (melons, one pig, some taro, some pandanus nuts) was brought to this camp by natives living in the drainage of the Fly River on the Isam River. These natives (the Fegelman people) were friendly. They even brought their wives and children to see Margaret Gilliard, their first white woman (see pl. 9, fig. 2). Therefore we were surprised to learn later from the officers at Telefomin that the Fegelmans have a bad reputation for stealthy murder.

Camp 5

Unchemchi; northern watershed of the Hindenburg Mountains, 5850 feet.

This camp was in a large, grassy clearing on a knoll in what had probably once been a native garden in tall, original forest. It commanded a magnificent view of the Victor Emanuel Range, including the plateau and Mt. Ifal (see pl. 1). A feature of this camp was a huge, chimney-like cave extending hundreds of feet straight down into the limestone (see below). Six days of collecting were conducted at this location. Our primary objective was to find a long-tailed bird which the natives said lived near here. This bird, the "blakblak," we thought might prove to be a second species of *Astrapia*. It turned out to be *Epimachus fastosus*.

The forests surrounding the Unchemchi clearing averaged about 80 feet in height, but contained many trees that were 110 feet tall. The forest floor was quite steep, and therefore we cut contour trails for hunting. Japanese mist nets were installed at the edge of the limestone chimney—a feature that was frightening to behold. In his journal for April 9 the senior author wrote: "I went south from camp a quarter of a mile then curved around to the east, then north, descending all the while until I had practically returned to our camp site. Now, however, I was 250 feet below the dome of grass and fern on which the tents are pitched, and about 500 feet east of it. My native guide gingerly picked his way to the edge of a cliff, looked over, then slinked back. I did likewise, and, after a moment of peering down into a massive chimney clad in ferns and moss, I pulled back somewhat shaken. I had been unable to see the bottom. A stone hurled into the hole fell for seconds before a clatter was heard as it bounced from shelf to shelf. Immediately a deep-throated querulous din emerged from far below. It sounded as though hundreds of animals had been disturbed. Perhaps they were flying foxes. One large laboring maroon and gray pigeon (*Reinwardtoena reinwardtsi*) soon came spiralling up out of the hole which I estimated to be about 400 feet wide. Behind the pigeon came many swiftlets (*Collocalia*)."

On my sketch map of the region I named this terrain feature Marsalai Pit. The native name for an evil spirit is "marsalai." However, the native name for this pit is "Untem Loon."

From this spot I described the Victor Emanuel plateau as "... a high-walled table land, nearly flat on top but tilted slightly upward at the western end." As seen from Unchemchi, this table land extended from 56 to 59 degrees across the northeastern horizon.

Camp 6

Eliptamin Valley; north watershed of Mittag Mountains, 3500± feet.

This was the only expedition camp that was not occupied by the Gilliards. Three expedition shoot boys crossed the Mittag

Range from Telefomin on April 20, probably going to a height of 6000–6500 feet, then descending to the high tropical regions of the Eliptamin Valley, where a temporary patrol post was being maintained. Because of native unrest, they had to return to Telefomin on April 22 after briefly hunting in the Eliptamin Valley. The hunters reported that this valley was fairly heavily populated with natives and that the Eliptamin Valley-Telefomin Valley trail across the Mittag Mountains was heavily forested and very wet. In this forest the shoot boys collected the only example of *Loboparadisea sericea* obtained by the expedition, as well as several examples of *Astrapia splendidissima*.

Accompanying the latter was this note in pidgin which sheds light on our methods of communication: " . . . mifelo I sutim trifelo fisin long disfelo mauden kortu tesin nem disfelo mauden Deikimdiken." (We shot these three birds on the mountain close to Telefomin Station. The name of this mountain is Deikimdiken [Mittag Mountains].)"

Camp 7

Lumbered clearing; west slopes of Victor Emanuel Mountains, 6200 feet.

This was a stop-over camp on the west trail to Mt. Ifal, which is known locally as the Ifalbil Ilap. To reach this camp from Telefomin, we walked through forest for some four and a half hours, passing over the Dogun River at an altitude of 4950 feet about two hours after leaving the patrol post, and the Sol River an hour later at an altitude of 5100 feet. After leaving the Sol, we ascended the west slopes of the Victor Emanuel Mountains by way of a long series of heavily forested, rounded ridges in which were many gardens in all stages of development. The gardens, which were being freshly prepared in tall, original forest, were very difficult to traverse because of nearly impassable barriers formed by the tangle of huge fallen limbs.

Camp 8

Mt. Ifal; southwest slopes of the Victor Emanuel Mountains, 7300 feet.

This camp was placed on the side of a very steep, heavily forested slope leading directly up to the summit of the cliffs of Mt. Ifal. Some 500 feet below Camp 8 we found a native shed roofed with pandanus leaves. At that elevation oily pandanus trees were abundant, apparently as a result of plantings by natives of the Telefomin region. Bird collecting was conducted from Camp 8 for nine days. A total of some 200 man-hours was devoted to hunting in the original mountain forests of the western slopes of Mt. Ifal between the altitudes of about 6500 feet to 8200 feet.

The forest at 6800 feet was very tall and thickly canopied at 7300 feet. It became much more heavily moss covered, and at elevations above 7600 feet the moss was very thick with some arboreal clumps of mosses and epiphytes as big as small tents (see pl. 11, fig. 1) and with every surface from rock floor to tree branchlets sheathed in moss.

Just above this camp, at an azimuth of about 102 degrees and at a distance of some 2 air miles, rose the highest point of the Victor Emanuel Mountains, Mt. Ifal (see pl. 10, fig. 2). This peak is estimated on standard maps to be 11,000 or more feet in height. We tried twice to reach its summit during day-long climbs, but on both occasions we were blocked by deep limestone gorges. The nearest approach to the summit was made May 10 when a hunting party of natives and the senior author climbed towards the summit for five and one-half hours before being blocked by a narrow limestone gorge which apparently forms part of the headwaters of the Sol River (i.e., the Sepik River). A cairn was built at an altitude of 8200 feet. This small monument stands on a ridge in moss forest about half a mile from the actual summit. The summit was at an azimuth of 159 degrees from our cairn. It did not appear to be 11,000 feet high.

It is a misnomer to say we climbed towards Mt. Ifal because we burrowed through dripping vegetation, sliding, crawling, and tightrope walking on vines, stone edges, and narrow trunks. Every surface we touched was as wet as a freshly dipped sponge. White, black, yellow, and gray lichens covered large areas of the moss like bandages or even small rugs, and small orchids were very numerous. All trees, vines, and rocks were swathed with this covering and bound together with a mesh of rootlets that was resilient and usually fairly strong. As one walks on sharp ridges on

such a matting or clambers up steep inclines, toe holds are easily obtained by driving the foot into the mesh to fashion a stirrup of rootlets. Indeed after a time the tiring traveler is apt to begin counting too heavily on this boggy mat for support, which can be very dangerous, because beneath the matting are fissures and caves sometimes many feet deep.

Some hunting took place as low as 6500 feet. In the lower belt we found a few trees that rose to 125 feet, and one measured 14 feet in circumference 5 feet from its base. Here, too, were palms with very tall pyramidal roots, many tree ferns, and much thin bamboo, also huge wild taro plants with leaves longer than my shotgun.

No natives were seen in the forests of Mt. Ifal, although their plantings and one house were observed. Probably collectors who work these forests at a later date, when there is no native unrest, will be able to obtain the all-important cooperation of the native population. At the time of our visit we had difficult problems with the natives, who did not want to carry our loads into this area.

We returned to Telefomin by a slightly different route which took us along the top of Mt. Balamtagin. In these forests we were pleased to discover a spectacular grassy knoll at an altitude of 6100 feet. From there we could see the whole Telefomin Valley, with the Hindenburg Mountains to the south and the Star Mountains to the west. Many photographs and a sketch map were made from this unusual spot (see pls. 2 and 3).

Using a 300-mm. lens, the senior author photographed a valley in the Star Mountains that appeared to be less than one-quarter of the size of Telefomin Valley (see pl. 2, fig. 2). This valley was floored with alternate patches of forest and grass. The latter extended upward to about 6000+ feet, denoting that a sizable number of natives had lived in it for a long time. This valley forms the headwaters of the Iram River which drains into the Takin near the Takin Gorge at the entrance of the Telefomin Valley. From this point the valley looked attractive, luxuriant, and reasonably accessible from the Telefomin airfield. People called the Urapmins are said to live in this valley which, at the time of our visit, was still unexplored.

If these people should prove friendly and willing to serve as porters, this area might be the logical place from which to survey the virgin highlands of the Star Mountains.

METHODS AND PROCEDURES

All the birds made into study skins were sexed by the senior author (by dissection), and life-sized drawings were made of the gonads. Hunting usually began about 6 to 6:30 A.M. The first hunter to get three or four good birds would return to camp and give his specimens to Margaret Gilliard. She labeled each specimen, using India ink, being meticulous to record date, locality, altitude, native name, a very complete description of all perishable colors (bill, feet, tongue, naked parts of face, wattles, iris, and other such parts), a complete molt analysis (to which a special printed section of the label pertained), weight in grams, and the measurements in "life" of the total length, wing, tail, and tarsus. An important advantage in making measurements of this kind is that no label can ever be misplaced.

Margaret dealt with local natives, purchasing food and specimens, trading, and nursing; she also managed the camp, so the senior author was free to explore, collect, and record his notes.

Photography and similar work were done chiefly in the hours near midday. With the use of strobe it was customary, however, to make portraits of birds whenever the opportunity presented itself. As on our earlier trips these portraits were made from hand-held specimens brought in by native children or by the hunters. Some were made under wild conditions, but not many. See, for example, the unusual record of the Six-wired Bird of Paradise (*Parotia carolae*), which was photographed on its dance bower deep in the forest several days after having been captured on the same perches by a native hunter. All the photographs in this report were made by E. Thomas and Margaret Gilliard.

NATIVE ASSISTANTS

The Sepik hunters who accompanied the expedition, Rambur, Mava, Kronchungo, Aukus, and Pono, joined the expedition party at their home village of Kanganaman, 190 miles from the mouth of the Sepik. Pono was

injured by a crocodile near Wewak and had to be left there. All were trained to use the expedition rifle and shotguns and to prepare scientific specimens. Part of their job was protecting the expedition while the party was in the Telefomin region. Rambur, an ex-police constable, was exceptionally capable and trustworthy. Mava became an excellent taxidermist.

Sepik men have difficulties in the mountains because they suffer from the cold and have chronic malaria. However, by being provided with raincoats, sweaters, four blankets each, good tenting, and adequate malarial medicine, our Sepiks carried out their assigned tasks very well.

An important adjunct to our collecting was the interviewing of all local natives who had the reputation of being good naturalists. One specimen of each species of bird that we collected (or two if the species was highly sexually dimorphic) was kept available for use when the local sages were interrogated. These men were taken aside and shown the specimens one at a time. In this way much local information concerning the species was obtained and could be rechecked with ease. The key question, of course, was the native name. A few of the old men knew the names of most of the large and more unusual birds in our collection. Femsep, the chief of the Telefomin people, knew the names of virtually every specimen we managed to collect, and of a few we failed to see or collect. For many he provided elaborate descriptions of their courtship, using his arms, fingers, and body to demonstrate the actions of such species as *Pteridophora alberti*. We showed Femsep colored paintings of birds of paradise and bowerbirds and, to our surprise, he knew nearly all of them, including the Greater Bird of Paradise (*Paradisea apoda*) which, he said, occurs only on the southern (Fly River) watershed of the central mountains. He knew species such as *Cicinnurus regius* from the tropical forest far below Telefomin as well as birds from cold regions near the summits of the mountains. Only the small birds of regions above or below the mid-mountain zone puzzled him. Because of his record, we are inclined to believe that a bird of paradise resembling *Macgregoria* lives at the top of the Victor Emanuel Mountains; Femsep reported that a black bird with yellow on its head occurred in the alpine forest, above Telefomin. He called it the "kondimkait" and said it was the "kind" of bird we should have in our collection. We are sure it is not an *Archboldia*, because we showed a color painting of *A. sanfordi* to Femsep.

The Telefomin natives are well acquainted with the flora and fauna of the high mountains, because they hunt in these regions for edible pandanus palms, many of which they plant themselves. Hunting parties from the southern and northern watersheds sometimes meet at 7000 and 8000 feet in the mossy forest of the Hindenburg Mountains and there contest the ownership of the pandanus trees. Battles may ensue, and during a fairly recent fight Fegelman people from the Upper Isam River are said to have killed many Telefomin natives.

RESULTS OF EXPEDITION

A total of 588 scientific bird skins were prepared (see Annotated List); 78 birds were preserved in spirits. The latter are listed below:

Birds Preserved in Spirits

Egretta intermedia plumifera (Gould)[1]
Excalfactoria chinensis subspecies (?)
Rallus pectoralis captus Mayr and Gilliard
Capella megala (Swinhoe)
Ptilinopus superbus superbus (Temminck)
Macropygia amboinensis kerstingi Reichenow
Reinwardtoena reinwartsi griseotincta Hartert
Charmosyna papou goliathina Rothschild and Hartert
Neopsittacus pullicauda alpinus Ogilvie-Grant
Caprimulgus macrurus yorki Mathews[1]
Collocalia hirundinacea hirundinacea Stresemann
Clytoceyx rex septentrionalis Paludan
Edolisoma montanum minus Rothschild and Hartert
Coracina caeruleogrisea strenua (Schlegel)
Sericornis nouhuysi stresemanni Mayr
Sericornis papuensis bürgersi Stresemann
Acanthiza murina (De Vis)
Peltops montanus Stresemann
Rhipidura atra atra Salvadori
Rhipidura hyperthyra mülleri Meyer
Rhipidura albolimbata albolimbata Salvadori
Rhipidura rufiventris gularis Müller
Monarcha axillaris fallax Ramsay

[1] Not represented by study skins.

Tregellasia leucops nigriceps (Neumann)
Pachycephala soror klossi Ogilvie-Grant
Artamus maximus Meyer
Chaetorhynchus papuensis Meyer
Paradigalla brevicauda Rothschild and Hartert
Astrapia splendidissima elliott-smithi Gilliard
Parotia carolae clelandiae Gilliard
Paradisea minor finschi Meyer
Amblyornis macgregoriae macgregoriae De Vis
Timeliopsis fulvigula montana (?) Mayr[1]
Myzomela rosenbergii rosenbergii Schlegel
Oreornis subfrenatus melanolaema (Reichenow)
Ptiloprora perstriata lorentzi (van Ort)
Melanocharis versteri meeki Rothschild and Hartert
Zosterops minor minor Meyer

DISPOSITION OF SPECIMENS

All specimens of birds are in the American Museum of Natural History except as follows: one example of each species of bird collected has been deposited with the Department of Agriculture, Stock, and Fisheries, Port Moresby, Papua, in accordance with the terms of the general and special permits issued to the expedition by the Department of Customs of Papua and of the Territory of New Guinea. These specimens are to be placed in a natural history museum which is to be erected at Port Moresby, Papua.

Although our main efforts were devoted to ornithology, small collections of mammals, amphibians, reptiles, and invertebrates were preserved and were assigned to the appropriate departments in the American Museum, except for the Lepidoptera which were turned over to L. J. Sanford for study.

[1] Not represented by study skins.

NEW GUINEA: FACTORS SHAPING ITS BIOTIC ENVIRONMENT

NEW GUINEA, with a complement of 566 species of land and fresh-water birds (Keast, 1961),[1] and more than 1500 subspecies (Mayr, 1953), is the richer of the two avifaunal blocks that form the Australo-Papuan Region. The other, Australia, has 531 species. Yet New Guinea has only one-tenth of the land area of Australia.

PHYSIOGRAPHY

In size New Guinea is 1500 miles long, about 400 miles in greatest width, and about 200 to 250 miles in average width. It is the second largest island, after Greenland. In topography, its chief feature is a massive cordillera running roughly west-northwest and south-southeast and containing the highest peaks in the Australo-Papuan area. This cordillera, which ranges up to more than 16,500 feet in Netherlands New Guinea, to more than 15,000 feet in central New Guinea, and to slightly more than 13,000 feet in eastern New Guinea, is one of the great mountain systems in the world. Irregular and jagged in profile, with only a few passes crossing it as low as 5500 feet, this intensely rugged range forms a complete divide between the north and the south drainages of the island.

In many places the cordillera consists of a complex system of ranges with high-floored, intermontane valleys. As a result, the cordillera varies from 50 miles to 150 miles in width. Beyond these extremes in many places on the main body of the island, outlying ranges and peaks rise island-like from the tropical lowlands. Often such mountains are completely encircled by sediments and river gravels of Pleistocene and recent age. At the eastern and western ends of the island the cordillera dips into the sea, breaking into a mosaic of islands, some of which are very high. To the north and south of the main body of the island broad alluvial plains occur. A major feature of structural origin is a lowland gulch or trough formed by the Markham, Ramu, Sepik, Idenburg, and Rauffer rivers. This trough is often referred to as the Central Depression. Lying north of and parallel to the main ranges, it forms a zoogeographical barrier between the mountains of the north coast and those of the main island.

[1] Keast (1961) gives 566 species for New Guinea and adjacent islands as compared with 531 for Australia, or 906 for the entire Australo-Papuan Region. These figures he compares with 750 species for all of North America (north of Mexico), 1100 for the Palearctic Region, 2500 for South America, and 1750 for Africa.

ZOOGEOGRAPHICAL BACKGROUND

New Guinea lies in equatorial seas, ½ to 11 degrees south of the Equator. It is separated from Australia by Torres Strait, a shallow, island-studded barrier 95 miles in width. Geological evidence indicates that this strait has been broken repeatedly by eustatic changes which transformed it into a land bridge. The faunal interchanges that occurred across these bridges and across the narrow water gaps are believed to be largely responsible for the remarkable similarity that exists between the fauna of Australia and that of New Guinea, and it is believed that the bulk of the avian stock of New Guinea arrived by way of Australia.

The only other land area with which New Guinea has come into close contact is that of the Moluccas, but it has been cut off from them by broad water barriers since Mesozoic times. During the Mesozoic, however, there was a close connection between New Guinea and the Moluccas, as well as a rather free faunal interchange between Asia and Australo-Papua. Today, zoogeographically speaking, the Moluccas constitute the western extremity of the New Guinea region because, among other reasons, they contain an impoverished New Guinea bird fauna which includes two species of birds of paradise.

Very little avifaunal enrichment occurred in New Guinea as a result of contacts with the islands of Melanesia and Polynesia. Mayr (1953, p. 14), in discussing the avifauna of the Papuan region, together with that of the more remote islands of Polynesia, states that the " . . . heartland of this biota . . . is New Guinea." He adds: "Even those genera which reached the height of development in the Polynesian area are originally of Papuan or Australian descent."

GEOLOGICAL HISTORY

The mountains of the Telefomin region, the Victor Emanuel and the Hindenburg

Mountains, form central segments in the aforementioned 1500-mile mountain wall. This dividing wall or "central horst" runs the length of New Guinea and comprises, with Sumatra, Java, and Timor, " . . . a prolongation of the Malayan-Burmese arc through the Malay Peninsula. . . . This arc-like wall of mountains is composed in the main of rock masses which have faulted as a result of earth movements that took place relatively recently, whereas, by contrast in Australia, . . . the last crustal deformation comparable with that of New Guinea died out in Carboniferous times about 250 million years ago. . . . [The horst consists of] extremely old (Precambrian) schists and gneisses which rank among the oldest existing rocks in the world" (Hodge-Smith, 1943).

Hodge-Smith notes also that the mountains forming the New Guinea horst took the form of a chain of islands during the Tertiary period which closed about two million years ago.

The mountain wall formed by the Victor Emanuel and Hindenburg Mountains is a formidable one; in the region of Telefomin it is steep but generally not precipitous, and some of the lowest passes are as low as 6000 feet between peaks that reach to about 10,000–12,000 feet. But within view of Telefomin to the east and west, along the main ranges, one can see several huge precipices which are more than 2000 feet in height (pl. 2, fig. 1). These precipitous slopes, however, do not rival the land forms described for Netherlands New Guinea. Hodge-Smith writes (1943) that south of Mt. Leonard Darwin " . . . is the greatest precipice in the world with an estimated height of 10,500 feet." He adds: "It is considered that this stupendous earth feature, comparable with the walls of lunar craters, is due to the snapping of the rocks accompanied by the differential movement on either side of the crack so formed."

PLEISTOCENE CLIMATE AND ITS BIOLOGICAL EFFECTS

The changes of climate that occurred in New Guinea during the Pleistocene and post-Pleistocene periods were major factors in the distribution and evolution of its mountain avifauna. The following short reconstruction of part of these periods is based largely on glaciation studies made in New Guinea (Reiner, 1960; Dozy, 1938) and on analyses of Pleistocene glaciations and their chronology in other parts of the world (Heusser, 1960; Zeuner, 1959; Darlington, 1957; Flint, 1957).

During the Pleistocene epoch, which began with the appearance of the first ice sheets about one million years ago (Darlington, 1957, p. 581), four major glaciations occurred in the Northern Hemisphere. According to carbon-14 dating (Libby, 1956), the last of the continental ice sheets began to withdraw a mere 10,000 years ago. These glaciations and their interglacials are generally believed to have occurred more or less contemporaneously in both hemispheres. Evidence for this comes from a number of sources, including pollen studies done in the Southern Hemisphere (Auer, 1946) which reveal that in Patagonia the post-glacial climatic sequence was closely similar to that of northern Europe. Further evidence is found in the recent work of Heusser (1960, p. 577) in Chile, who writes, however: "Any conclusion that in-phase hemispheric environmental relationships existed during the late-Pleistocene would be premature, though in their major aspects, and in some minor ones, the changes at Laguna de San Rafael would seem to favor such a conclusion."

In the light of this knowledge it seems safe to assume that three or four major glaciations occurred in the mountains of New Guinea during the Pleistocene epoch. It also becomes possible to reconstruct a fairly accurate picture of the climatic events that have occurred in New Guinea since the end of the last peak of glaciation 10,000 years ago. At that time, when in the Northern Hemisphere the ice shields had reached their maximum size and outlet glaciers in the Southern Hemisphere had reached sea level in Tasmania, the New Guinea glaciers are known to have extended downward to 10,900 feet on Mt. Wilhelm (Reiner, 1960, p. 499) and to 6000 feet on the Carstenz Massif (Dozy, 1938), and, compared with the situation at the present time, the snow line was some 3100 feet lower on Mt. Carstenz and between 3400 and 4000 feet lower on Mt. Wilhelm.

The changes in temperature which, since that period, caused such rapid upward shifts in the ice and snow lines also enabled a rapid

upward displacement of the life zones to encompass the "new" mountain habitat as it became habitable. This upward shifting of the life zones must have brought about the geographical isolation of many animal populations and must have been a powerful stimulus to speciation—a stimulus that has occurred at least three times during the Pleistocene and, together with the rugged topography of New Guinea, may be largely responsible for the unusual avifaunal enrichment of New Guinea over Australia.

From these general biographical considerations we turn now to a reconstruction of the historical climate of the biotope in which we collected in 1954, the Victor Emanuel and Hindenburg Mountains.

Ten or eleven thousand years ago the cordillera of which these ranges are a central part was probably quite similar in conformation to the cordillera as it stands today. However, it was probably heavily capped with snow, and the high intermontane valleys at the headwaters of the Sepik River, the Fly River, and the Strickland River were probably within the range of ice tongues that extended downward from the ice caps. Expressed in another way, probably all the terrain above 5000 feet surveyed by our expedition consisted of stunted alpine moss forest, bushes, and alpine grassland, with the slopes above about 9000 feet being nearly or completely devoid of vegetation and covered permanently with ice at and above 10,000 feet.

At that time of maximum cold and rain, the specialized forest formations (those ancestral to the present-day mossy forests, beech forests, mid-mountain forests, and tropical rain forests) were probably compressed into a lowland belt some 6000 feet in vertical width which had its upper edge in the Telefomin region, whereas today tree line is about 11,000 feet and grass line is about 13,000 feet above sea level.

When the biological significance of this hypothetical compression of forest habitat is considered, it is interesting to remember that at this period of maximum downward compression, the oceans, because of the building up of ice sheets on land, were also at their lowest level. They were some 300 feet below their present level. This condition, together with the unusually heavy rains postulated for the glacial ages, must have fostered the expansion of ocean basin rain forests and the development of forest "transmission" belts in which faunal interchanges could readily take place.

The similarity of a large segment of the avifauna of tropical south New Guinea to that of northern Australia (Rand and Brass, 1940, p. 376; Keast, 1961) strongly supports these hypotheses. For example, *Chlamydera cervineiventris*, *Phonygammus keraudrenii*, and *Craspedophora magnifica* among the Paradiseidae seem to be examples of recent drift across a New Guinea-Australia land bridge. The first species is represented by the same race on both land areas; the others, by thinly differentiated races.

Examples of older drifts, dating almost certainly from earlier glacial cycles, are found among the highly specialized Australo-Papuan birds. A good example is the *Prionodura-Amblyornis* group. The young and the females of all species in this group strongly resemble one another, yet the adult males of *Prionodura* (cool mountain rain forests of North Australia) differ very much in pattern and color from the males of *Amblyornis* (cool mid-mountain forest of New Guinea). Yet these differently dressed males are the only birds known that build the intricate maypole type of bower. Therefore, on the basis of morphology and ethology it is highly probable that these very different birds are isolates of a stock that was split as a result of the removal of a forest bridge between Australia and New Guinea.

Similar zoogeographical conclusions have been derived from studies of mammals. Tate (1952, p. 576), in his discussion of the dispersal southward to Queensland of New Guinea rain-forest mammals, wrote: "The successive passages of the tree kangaroos to the Cooktown-Townsville rain forests and of the phalangers to, but not beyond, the Iron Range-Rocky Scrub forests favor the view that more than one invasion took place and that differing routes may have been followed. The changes in environment may have been fairly extensive, for the alterations in ocean levels generally held by geologists to have taken place synchronously with the Pleistocene glaciations, coupled with the cooler world temperature of that time, may have had important repercussions on local cilmates."

THE TELEFOMIN REGION

GEOGRAPHY

As BRIEFLY EXPLAINED in the Introduction, the "Telefomin region" is a term of convenience used to identify a portion of the territory that is controlled by or is under the jurisdiction of the Telefomin Patrol Post. This area extends into both the Mandated Territory and Papua. It ranges in altitude from about 3000 feet to about 11,000 feet. Included in it are parts of the southern and western drainages of the Victor Emanuel Mountains, the southern watershed of the Mittag Mountains, parts of the Behrmann Hills, and portions of the northern drainage of the Hindenburg Mountains.

These terrain features form major segments in the complex system of ranges which nearly surround the little upland valley known as Telefomin Valley. Located at 4800 feet in the north central portion of this tiny intermontane basin is the Telefomin Patrol Post with its small, grass-covered airstrip. All contact with the outside world is by aircraft or radio.

The Telefomin area is entirely in the northern watershed. All flow is by way of the Takin [=Sepik] River to the north coast. The main tributaries of the Takin River in the Telefomin region are the Sol River, which drains portions of the Mittag and Victor Emanuel Mountains, and the Nunk River, which drains portions of the Behrmann Hills and Hindenburg Mountains.

CLIMATE

The following résumé of the climate of the Telefomin region is based primarily on meteorological data which were kindly supplied to us by Mr. L. J. Dwyer, Director of the Bureau of Meteorology, Melbourne, Australia.

RAINFALL

The annual rainfall as measured at the Telefomin Patrol Post during the years between 1955 and 1959 inclusive was, respectively, 112.79 inches, 105.13 inches, 142.22 inches, 143.37 inches, and 127.16 inches. The average annual rainfall over a period of eight years is 130.64 inches.

The seasonal pattern in the annual distribution of rainfall is as follows: Rain may fall almost every day throughout the year, but in November and December the rainfall is under 10 inches, while in the other months the rainfall is between 10 and 12 inches, with September the wettest month (12.50 inches).

Thus the differences between the wet and dry seasons are much less pronounced than in the tropical zones of New Guinea. Even the driest month at Telefomin, December, had an average rainfall of 7.83 inches. Much of the precipitation in the wettest months of the "wet" season falls in short, violent storms. In late April, 1954, the vegetation of the valleys was sufficiently dry to permit the burning of the grassland slopes of the Behrmann Hills, but the grass did not carry the fire for extensive distances.

During late March and April and the first half of May, 1954, the mid-mountain and the moss forests were dripping wet and luxuriant under almost daily deluges of rain and thick rafts of clouds. The following description, taken from the field journal of the senior author under date of May 11, 1954, gives a picture of the average weather of these forests during the first half of May, 1954 ". . . at this season the Victor Emanuels above 7000 feet are apt to be cloaked in heavy fog until about 9:00 A.M., then usually there is a period of an hour to three hours of intermittent sun and cloud shadow, then during the early afternoon, until about 3–4 P.M. heavy white clouds obscure the sky. At this hour rain usually begins to fall and continues with many interruptions until about 8–9 P.M. The nights are apt to be clear with the stars shining. Such nights are cold, and five blankets are welcome at 7500 feet. If there is a night fog, three blankets are sufficient."

CLOUD COVER

The period of greatest cloud cover is from January through April. However, clouds are prevalent throughout the year, as the following record of mean monthly cloud amounts will indicate. The figures represent "eights of the total visible sky": January, 6.3; February, 6.5; March, 6.4; April, 6.2; May, 5.4; June, 5.9; July, 5.6; August, 6.1; September,

6.1; October, 5.7; November, 5.8; December, 5.9.

From the practical point of view, this Telefomin Patrol Post is so solidly and so constantly covered with a low ceiling of clouds that the surrounding mountains are invisible, sometimes for a week at a time, and there have been periods when it has been impossible to reach the Telefomin airfield by aircraft for periods of more than two weeks.

Temperature and Humidity

The mean average daily temperature variation at Telefomin is 16.9° F. at 4800 feet. The temperature presumably fluctuates between about 50° and 80° F., as it does in the Wahgi region at similar altitudes. No frosts have been registered at the Telefomin Patrol Post, but at 6800 feet an extreme minimum temperature of 41° F. was obtained.

During December, the month of greatest average dryness, the mean humidity was 83 per cent at 9 A.M. and 65 per cent at 3 P.M.

VEGETATIONAL FORMATIONS, WITH NOTES ON CHARACTERISTIC BIRDS

We are indebted to Mr. Leonard J. Brass for his assistance in the identification, from photographs, of some of the following vegetational formations. We follow his classification of these formations (see Archbold, Rand, and Brass, 1942, p. 281).

Rain Forest

As one approaches the Telefomin region by air, the lowlands of the northern watershed appear to be generally densely covered with tall rain forest. This formation extends in all directions as far as the eye can see, and it climbs solidly upward on the mountains to merge with the mid-mountain forests. Only the steepest cliffs and the river edges are not forested. In the Telefomin Valley the rain forest probably occurs in the lower parts of the deepest gorges, and these interlace with the mid-mountain forest.

A few miles northwest of the Telefomin airstrip, *Cacuata galerita*, a species that is typical of the rain forest and its edges, was seen flying over the rain forests where they pushed upward into the mouth of the Telefomin Valley. This cockatoo, however, was never encountered in the valley itself, for, together with something over 100 species of tropical rain-forest birds, its altitudinal range is closely correlated with that of the rain-forest formation. This reservoir of species was tapped but once by us when native hunters attached to the expedition made a short sortie into the Elip Valley just northwest of Telefomin. They descended to about 3000–3500 feet and there obtained our only records of the following purely tropical species: *Ducula zoeae*, *Trichoglossus haematodus*, *Alisterus chloropterus*, *Cacomantis variolosus*, *Chalcites meyerii*, *Edolisoma morio*, and *Pachycephala simplex*.

Having just completed a detailed ornithological survey of the tropical-zone birds occurring in the forests, grasslands, and swamps of the middle Sepik River near sea level (Kanganaman Village region), we found the transition between that fluid, generally little-differentiated avifauna and the birds of the forests and grasslands of the Telefomin region (from 5000 feet upward) very striking. In fact, with the exception of four species (*Egretta intermedia*, *Paradisaea minor*, *Rhipidura leucophrys*, and *Oriolus szalayi*), the avifauna was totally different from that which we had studied in the Kanganaman region.

Tropical birds that have the upper limits of their vertical ranges at 4000–5000 feet in the Telefomin region are *Egretta intermedia*, *Accipiter fasciatus*, *Caprimulgus macrurus*, *Coracina caeruleogrisea*, *Crateroscelis murina*, *Malurus alboscapulatus*, *Gerygone chloronota*, *Gerygone palpebrosa*, *Rhipidura hyperythra*, *Rhipidura rufiventris*, *Rhipidura leucophrys*, *Monarcha axillaris*, *Monarcha frater*, *Microeca flavigaster*, *Pachycephala rufiventris*, *Myiolestes megarhynchus*, *Pitohui dichrous*, *Oriolus szalayi*, *Diphyllodes magnificus*, *Paradisaea minor*, *Toxorhamphus iliolophus*, *Toxorhamphus poliopterus*, *Melilestes megarhynchus*, *Xanthotis polygramma*, *Meliphaga analoga*, and *Pycnopygius cinereus*.

The sharp avifaunal break which occurs at about 4500–5000 feet in the altitudinal zonation of New Guinea birds has been noted before (see Archbold and Rand, 1935, p. 542; Stresemann, 1923, pp. 11–15). But, as Rand notes, it has never been satisfactorily ex-

plained why at a given altitude major differences should suddenly occur in an avifauna, whereas elsewhere, both above and below the "line," the differences are apt to be gradual.

Earlier, in discussing the history of climatic changes during the Pleistocene epoch, we suggested that at times of maximum glaciation the fauna and flora were largely compressed into a lowland belt with a vertical height of about 5000 feet. The apparent general division of New Guinea birds into two primary groups (see Stresemann, 1923, pp. 11–15), (a) forms of the lowlands and lower mountain slopes and (b) forms of the upper mountain zone, may be correlated in part with this phenomenon. Another possibility is that the basic dichotomy between the two groups is founded on intrinsic differences in variability. The much greater uniformity over long periods of time of the tropical rain-forest environment over the mountain environment may have slowed the process of speciation (somewhat as in marine animals versus land animals) in some organisms living within the tropical rain forest.

If, for example, birds of the tropical rain forests have the tendency to diverge less rapidly than birds of the less stable mid- and upper mountain environments, perhaps we should look to the static species of the tropical rain forests for examples of relict surviving species, and perhaps we should consider that tropical rain-forest avifaunas, despite their diversification, have a potential for supporting primitive elements superior to that of even the "sanctuary-like" mountain avifaunas.

Mid-mountain Forest

In the Telefomin region this forest is believed to extend from about 3500 feet up to about 7000 feet, where it intergrades with the lower edge of the mossy forest. At the lower elevations, that is, below about 5000 feet, it has two canopies, the lower one covering thickly clustered trees averaging about 80 feet in height, and an upper one consisting of sparsely placed hoop pines (*Araucaria cunninghamii*) and bulolo pines (*A. klinkii*) which reach heights of up to 150 feet. Handsome trees of these species are curiously uncommon in the mid-mountain forest, although examples grow along the edges of the main Telefomin clearing (see pl. 4, fig. 2).

At elevations below 4000 feet along the edge of the Takin River, where the mid-mountain forest interlaces with the rain forest, *Casuarina papuana* abounds. Higher, near the villages, are plantings of *Casuarina olgidon*, a species that Brass informs us is endemic to the mid-mountain valleys of east and west New Guinea and that has only recently been named. This fast-growing, straight-splitting species of casuarina is abundant in the Wahgi Valley, where thousands of groves have been planted for use as firewood and building material by the natives.

The lower tier of the mid-mountain forest near the main clearings of the Telefomin plateau is rather dense and appears to be chiefly old second growth, with many areas of recently disturbed forest and many recently felled patches which are devoted to farming (see pl. 3, fig. 2). Taro is the chief article of foodstuff grown in such gardens. This forest formation is full of vines, scrambling shrubs, and prickly shafted tree ferns (*Cyathea*), and along the edges we found pink rhododendrons in flower in May. The floor itself is well shaded and thickly covered with a mesh of strong roots, which resemble crazy steps on the older, steeper forest trails. On steep limestone slopes patches of forest often appear blighted (see pl. 9, fig. 1), probably owing to water starvation resulting from the limestone formations. At the upper edge of the mid-mountain forest the forest floor becomes very damp, and patches of stinging nettles are frequent. About here the belt of beech forest begins. The lower limits of this forest seem to be about the lower edge of the prevailing cloud zone. It is at this level that one begins to find plantings of the oily pandanus which the Telefomin natives plant throughout the cloud forest and harvest annually. At about 6000 feet we found mid-mountain forest which Brass identified as of the *Castanopsis* and oaks type, with some beeches beginning to appear on exposed ridges (see pl. 1). In such exposed areas moss began to predominate, and at about 7000 feet the moss became heavy everywhere, and tree ferns (*Cyathea fugax;* pl. 11, fig. 2), pandanus plantings, and bamboos of various kinds were numerous. This was a forest with many tall

trees and a rather open, "Spanish moss" adorned canopy; it also contained some very tall stilt palms, a good many spiny rattan climbing palms growing in shaded areas (*Calamus*), as well as many small orchids. At about 8000 feet near the upper edge of the mid-mountain forest, this vegetational formation had changed so much that we found forests of rough-barked trees which Brass identified as nearly pure stands of stunted beech forest (see pl. 11, fig. 1). Large masses of vegetation hanging from big limbs of the middle tier of the forest characterized this formation. The masses were chiefly rust-colored, with strong overtones of yellow and splashes of green and gray. In figure 1 of plate 11 also the size of many of these composite epiphyte masses is indicated by the tent-sized cluster above the boy's head. Brass, who examined a color reproduction of this illustration, sent the following information: "The rust colored epiphytes are leafy liverworts (hepatics). These moss-like plants are mixed with mosses (yellow) to form the big mass of bryophytes above the boy's head. The small ferns with the undivided leaves, growing in the bryophyte mass are *Grammites* species of the Polypodiaceae, good indicators of a wet, misty climate and cool temperatures." Also included are unidentified species of orchids. A thick, moss-like covering seemed to blanket everything at this elevation.

On both the Victor Emanuel and the Hindenburg Mountains this vegetational formation seemed to occur at lower elevations than on Mt. Hagen or on Mt. Wilhelm.

Mossy Forest: This forest, which the senior author has sampled in other parts of New Guinea (Mt. Hagen and Mt. Wilhelm), occurs at the upper edge of the beech forest. On Mt. Ifal the trees become stunted and scraggly, with a heavy covering of shaggy moss. Looking upward to the summit of Mt. Ifal from the highest point reached by the expedition (see pl. 10, fig. 2), the senior author noted that the exposed rock of the summit of the Victor Emanuel Mountains was chiefly visible as limestone cliff faces. These were surrounded with stunted trees. The actual summit was wooded. Brass, upon examining a photograph of the summit (pl. 10, fig. 10), wrote: "The uneven sky-line leading towards the cliffs and summit from the right is almost certainly a beech forest skyline. The actual summit forest has a stunted and compacted appearance and could be beech or mossy forest."

It was in the mossy forest that *Macgregoria* and other birds of the highest mountain forests were to be looked for. Unfortunately we were unable to reach this niche.

Mid-mountain Forest Birds

A	Higher belt of the mid-mountain forest; the mossy beech forest (7000–8200 feet)
B	Lower belt of the mid-mountain forest (4500–6500+feet)
C	Mid-mountain forest edge (4500–6000 feet)
A, B	*Rallicula rubra telefolminensis*
B	*Rallicula forbesi steini*
C	*Ptilinopus superbus*
A, B, C	*Ptilinopus rivoli bellus*
A, B	*Gymnophaps albertisii albertisii*
C	*Macropygia amboinensis kerstingi*
C	*Reinwardtoena reinwardtsi griseotincta*
B	*Psitteuteles goldiei*
A, B	*Charmosyna papou goliathina*
A, B	*Charmosyna pulchella bella*
A, B	*Oreopsittacus arfaki grandis*
B	*Neopsittacus musschenbroekii major*
A, B	*Neopsittacus pullicauda alpinus*
A, B	*Micropsitta bruijnii bruijnii*
B	*Psittacella brehmii pallida*
B	*Psittacella modesta subcollaris*
C	*Cacomantis pyrrophanus excitus*
B	*Aegotheles archboldi*
B, C	*Aegotheles insignis insignis*
B, C	*Collocalia esculenta esculenta*
B, C	*Collocalia hirundinacea hirundinacea*
C	*Clytoceyx rex septentrionalis*
B	*Edolisoma montanum minus*
A, B	*Coracina longicauda grisea*
A, B	*Crateroscelis robusta sanfordi*
A, B	*Ifrita kowaldi kowaldi*
B	*Sericornis perspicillatus*
B	*Sericornis nouhuysi stresemanni*
A,B	*Sericornis papuensis bürgersi*
B	*Sericornis arfakianus olivaceus*
A, B	*Acanthiza murina*
A	*Gerygone cinerea*
B, C	*Phylloscopus trivirgatus giulianettii*
B, C	*Peltops montanus*
B	*Rhipidura atra atra*
B	*Rhipidura albolimbata albolimbata*
A, B	*Rhipidura albolimbata lorentzi*
B	*Machaerirhynchus nigripectus saturatus*
B	*Microeca griseoceps poliocephala*
B, C	*Microeca papuana*
B	*Tragellasia leucops nigriceps*

B	*Poecilodryas albonotata griseiventris*
A, B	*Peneothello sigillatus* subspecies?
B	*Peneothello cyanus atricapilla*
B	*Heteromyias albispecularis centralis*
B	*Pachycephalopsis poliosoma albigularis*
B	*Pachycare flavogrisea subaurantia*
B	*Pachycephala soror klossi*
A, B	*Pachycephala schlegelii obscurior*
A	*Pachycephala lorentzi*
A, B	*Pachycephala modesta telefolminensis*
B	*Pachycephala rufinucha niveifrons*
B	*Pachycephala tenebrosa tenebrosa*
B	*Pitohui nigrescens bürgersi*
B	*Chaetorhynchus papuensis*
B	*Paradigalla brevicauda*
B, C	*Epimachus fastosus stresemanni*
A, B	*Epimachus meyeri albicans*
A, B	*Astrapia splendidissima elliott-smithi*
B	*Parotia carolae clelandiae*
B, C	*Lophorina superba feminina*
B	*Diphyllodes magnificus chrysopterus*
A, B	*Pteridophora alberti alberti*
B	*Loria loriae loriae*
B	*Loboparadisea sericea (?sericea)*
B	*Amblyornis macgregoriae macgregoriae*
B	*Climacteris placens steini*
B	*Timeliopsis fulvigula (?montana)*
B	*Myzomela cruentata cruentata*
B, C	*Myzomela rosenbergii rosenbergii*
B	*Melipotes fumigatus goliathi*
B	*Melidectes belfordi belfordi*
B	*Melidectes rufocrissalis rufocrissalis*
C	*Melidectes torquatus mixtus*
B	*Oreornis subfrenatus melanolaema*
B, C	*Meliphaga montana sepik*
B	*Ptiloprora plumbea granti*
A, B	*Ptiloprora perstriata lorentzi*
B, C	*Dicaeum pectorale rubrocoronatum*
B, C	*Melanocharis versteri meeki*
B	*Rhamphocharis crassirostris (?crassirostris)*
A, B	*Oreocharis arfaki bloodi*
A, B	*Paramythia montium montium*
B, C	*Zosterops fuscicapilla fuscicapilla*
C	*Zosterops minor minor*
B	*Oreostruthus fuliginosus* subspecies?

Alpine Grasslands

We did not discover alpine grasslands on any of the summits in the Telefomin region. It is significant, however, that Rand and Brass (1940, p. 375), during the course of an aerial reconnaissance, observed: "Small patches of grassland on top of Mt. Faim [10,560 feet], less than one square mile in total area [which] should probably be considered as alpine."

It is also interesting to note from the chart of aerial reconnaissances (see map in Rand and Brass, 1940) that flight numbers 2 and 6 carried the observers (including Brass) of the Archbold 1936–1937 expedition very close to the positions where we later placed our mountain camps on both the Hindenburg and Victor Emanuel Mountain ranges. These flights were presumably close enough to have enabled the sighting of grasslands, yet only the aforementioned bit of alpine grassland on Mt. Faim was found. This information, together with our own land traverses, suggests strongly that alpine grassland is virtually absent today on the Victor Emanuel and Hindenburg ranges. This is highly significant, because these mountains almost undoubtedly supported very large areas of alpine grassland during the Pleistocene epoch and particularly during much of the time since the last peak of glaciation some 10,000 years ago. Another virtual certainty is that many species of alpine grassland birds have become extinct or extirpated along with the grasslands, or they have become ecologically modified for life in the alpine forest (see *Oreostruthus* for an example).

Mid-mountain Grasslands

The mid-mountain grassland of the Telefomin region appears to be restricted to the floors and easily burned slopes of the valleys that form catchments near the headwaters of the Sepik (Takin) River. A large proportion of this grassland is probably man-induced. However, if we can judge from what we know of rates of evolution, the presence of a species of bird in the bushy grasslands of the Telefomin region that shows an increase in size over populations of the nearby lowlands (see *Rhipidura leucophrys melaleuca*) strongly suggests that some of the bushy grasslands, at least, were in existence before man arrived.

We found lobes of this vegetational formation as low as the Takin Gorge (3000 feet) and as high as 6000 feet on the Behrmann Hills. In general, this grassland niche is composed of what Brass calls mid-mountain short grass communities, with kangaroo-grass (*Themeda triandra*) probably being the dominant grass.

At the general elevation of Telefomin airfield (4800 feet) the grasslands are fairly level

and thinly interspersed with bushes (see pl. 4, figs. 1 and 2), and the forest walls are high and sharply defined. The grass north of the airfield, that is, on the southern slopes of the Victor Emanuel and Mittag Mountains, is apparently limited to elevations below 5200 feet. These grass fields are fairly level but have a gentle downward slope to the southward as the terrain dips towards the Takin River. Many shallow, heavily forested gullies occur in the Telefomin "plain," and these bands of forest break up the grass fields into small and medium-sized clearings, the largest of which is probably less than 2 miles wide. As one nears the Takin River these forested gullies become deeper, and in the main gorge of the Takin River the valley suddenly becomes very much deeper and very sharply incised in the Telefomin plain. In places this steep, canyon-like wall is denuded of forest; elsewhere it is densely forested with disturbed and original forest (see pl. 7, fig. 1). At the immediate top of the gorge, to the south, the plain is virtually stripped of forest (see pl. 8, fig. 1), and from here to the tops of the rounded ridges of the Behrmann Hills, at about 6000 feet, one encounters sizable steep-faced fields of grassland on the rounded northern slopes of the Behrmann Hills (see pl. 8, fig. 2). These are due to deforestation by man. At the upper edges of these burnings and in forest clearings on water-starved floored ridges (pl. 6, fig. 2) one finds fern-like brackens (*Pteridium aquilinum*) predominating.

Throughout the flatter parts of the Telefomin plain the grass fields are chiefly a series of isolated fields cut in the forest (see pl. 2, fig. 2). In several of these are native villages, some of them clusters of houses erected on the flat grasslands well away from any trace of forest (see pl. 3, fig. 1); others, such as Trifolip (see pl. 5, fig. 1), are set on narrow ridges between forested gullies.

In the vicinity of the former type of village there is very little except grasslands to attract bird life other than the refuse of man and his retinue of dogs and pigs. In the latter type of village, native gardens climb upward from the adjacent valleys to the village edge, and trees are present in the immediate vicinity, some of them protected "totem" pines of great beauty (see pl. 5, fig. 1).

Mr. Brass had kindly identified some of the kinds of plantings found at the borders of the village of Trifolip (pl. 5, fig. 1), and these are incorporated in the following description: Growing abundantly about the village, and particularly around the fences of the house tamboran, is the tall, somewhat palm-like, slender tree with terminal mops of leaves which is a "so-called" dracaena (*Cordyline terminalis*), the leaves of which are used throughout the highlands by the men for covering their rear. Also commonly seen are tall-plumed sugar canes, including the wild varieties (*Saccharum*) and a semidomesticated pandanus (*Pandanus ? conoideus*) which is widely planted for its edible, soft, long-cylindrical fruitheads, also bananas and casuarinas. The tall trees with tiered branches are the valuable hoop pines (*Araucaria cunninghamia*).

MID-MOUNTAIN GRASSLAND BIRDS

A	Bushy grassland (4000–5000 feet)
B	Native gardens (4500–5000 feet)
C	Pure grassland (4000–4800 feet)
D	With patches of swampy ground (4500–5000 feet)
A, C	*Excalfactoria chinensis* subspecies?
A, C	*Rallus pectoralis captus*
A, D	*Capella megala*
A, C	*Pluvialis dominica fulva*
A	*Cacomantis castaneiventris weiskei*
A	*Saxicola caprata (?wahgiensis)*
A	*Malurus alboscapulatus* subspecies?
A	*Megalurus timoriensis alpinus*
A, B, C	*Rhipidura leucophrys melaleuca*
A, B	*Lanius schach stresemanni*
A, B, C	*Artamus maximus* (also over mid-mountain woodlands)

ZOOGEOGRAPHICAL ANALYSIS OF BIRDS OF THE TELEFOMIN REGION

FOR THE PURPOSE of these studies the bird populations of the Hindenburg and Victor Emanuel Mountains have been treated as a single unit. Virtually no differentiation was found between the birds of these two closely situated mountain masses which in reality are adjacent high spots on a continuous mountain range.

The only possible exception to this treatment pertains to *Melanocharis versteri meeki*, in which two females from the Victor Emanuel Mountains appear somewhat paler than comparative material from the Hindenburg Mountains and therefore may be closer to the eastern race *maculiceps*, but even in this instance confirmation must await the collection of males.

The species, some with endemic forms, that probably have reached the Telefomin region from eastern New Guinea are:

Accipiter fasciatus polycryptus
Pachycephala modesta telefolminensis
Lanius schach stresemanni

The species that probably has reached the Telefomin region from the northern highlands of New Guinea is:

Melidectes rufocrissalis rufocrissalis

The species, some with endemic forms, that probably have reached the Telefomin region from western New Guinea are:

Rallicula rubra telefolminensis
Aegotheles archboldi
Pachycephala tenebrosa tenebrosa
Paradigalla brevicauda
Epimachus fastosus stresemanni
Astrapia splendidissima elliott-smithi
Parotia carolae clelandiae
Pteridophora alberti alberti
Zosterops fuscicapilla fuscicapilla

The species with tropical northern New Guinea affinities are:

Saxicola caprata wahgiensis
Paradisaea minor finschi

There are no species with tropical southern New Guinea affinities.

The following species have their eastern or western limits in the Telefomin region:

EASTERN LIMITS

Rallicula rubra telefolminensis[1,2]
Aegotheles archboldi[2]
Astrapia splendidissima elliott-smithi[1,2]
Zosterops fuscicapilla fuscicapilla[1]

WESTERN LIMITS

Pachycephala modesta telefolminensis
Lanius schach stresemanni

During the period of our residence in the Telefomin region (March 19 to May 25) only three migrants, all from the north, were encountered:

Capella megala (March 26–April 17)
Pluvialis dominica fulva (March)
Muscicapa griseisticta (April 27)

From these studies it seems evident that the primary relationship of the avifauna of the Telefomin region is with that of the mountains of western New Guinea. Nine species can be traced to that region, whereas only one forest bird has been derived from the east. On the other hand, two of the three eastern derivatives are chiefly species of the grasslands, and no grassland birds were found in the Telefomin region that bore primarily western affinities. This evidence suggests that, while the primary relationship of the forest avifauna is with the west, that of the relatively recently (?) cleared grasslands is with the east.

In similar biogeographical studies by Mayr and Gilliard (1954, p. 329) on the birds of the Mt. Hagen area some 200 miles to the east of Telefomin, it was found that the primary relationship was clearly with eastern New Guinea. For this reason we feel that a minor but significant zoogeographical barrier remains to be discovered between the Telefomin and Hagen regions. Probably this barrier can be pinpointed by a study of *Astrapia* in the field. The eastern limits of the range of *A. splendidissima* and the western limits of

[1] Extension of species range to Papua from Netherlands New Guinea.
[2] Extension of species range to Mandated Territory from Netherlands New Guinea.

A. mayeri will probably be found on each side of the postulated gap.

Gilliard (1959), in a study of the *Melidectes* problem, and Mayr and Gilliard (1952, pp. 333–334) postulated that much greater geographical isolation existed in earlier times between the main ranges of New Guinea and the mountains lying north of the Markham-Ramu-Sepik-Idenburg-Rauffaer gulch. Populations of birds that became isolated on each side of the gulch are believed to have frequently diverged to the level of good species, and some of these probably have successfully recrossed the gulch. However, we were able to unmask only one such species in the Telefomin region: *Melidectes rufocrissalis*.

The effectiveness of altitudinal barriers, such as the mountain barrier between the forests (and grasslands) of the Telefomin region (where we did our collecting on the northern watershed), and similar regions on the southern watershed, is demonstrated by the fact that we were unable to find a single species in the northern watershed that bore its closest affinities to a bird of the southern watershed.

THE NATURE OF VARIATION IN THE BREEDING LAND BIRDS OF THE TELEFOMIN REGION

THE MONOTYPIC SPECIES are as follows: *Harpyopsis novaeguinea, Ducula zoeae, Psitteuteles goldiei, Chalcites meyerii, Aegotheles archboldi, Acanthiza murina, Gerygone cinerea, Peltops montanus, Microeca papuana, Pachycephala lorentzi, Artamus maximus, Oriolus szalayi,* and *Chaetorhynchus papuensis.*

The widespread polytypic species that do not exhibit geographical variation in the New Guinea region except occasionally under conditions of extreme isolation on satellite islands are as follows: *Ptilinopus superbus superbus, Ptilinopus rivoli bellus, Gymnophaps albertisii albertisii, Reinwardtoena reinwardtsi griseotincta, Micropsitta bruijnii bruijnii, Cacatua galerita triton, Cacomantis pyrrophanus excitus, Caprimulgus macrurus yorki, Edolisoma morio incertum, Crateroscelis murina murina, Gerygone chloronota cinereiceps, Rhipidura rufiventris gularis, Rhipidura leucophrys melaleuca, Lanius schach stresemanni, Myzomela cruentata cruentata, Myzomela rosenbergii rosenbergii,* and *Zosterops fuscicapilla fuscicapilla.*

The widespread polytypic species that exhibit geographical variation on one or more of the peninsulas (Vogelkop, Huon, or southeastern New Guinea) or in the highlands lying north of the Markham-Ramu-Sepik-Idenburg-Rauffaer gulch, or on both, but that are represented by a single subspecies south of this gulch (on the "main body" of New Guinea) are as follows:

Rallicula forbesi steini, Pseudeos fuscata incondita, Charmosyna papou goliathina, Charmosyna pulchella bella, Coracina longicauda grisea, Sericornis perspicillatus, Rhipidura atra atra, Rhipidura hyperythra mülleri, Monarcha axillaris fallax, Machaerirhynchus nigripectus saturatus, Poecilodryas albonotata griseiventris, Pachycephala soror klossi, Pachycephala rufinucha niveifrons, Melipotes fumigatus goliathi, Melidectes rufocrissalis rufocrissalis, Ptiloprora plumbea granti, and *Ptiloprora perstriata lorentzi.*

The widespread polytpic species that exhibit geographical variation on the main body of New Guinea south of the Markham-Ramu-Sepik-Idenburg-Rauffaer gulch are as follows: *Accipiter fasciatus polycryptus, Rallus pectoralis captus, Rallicula rubra telefolminensis, Macropygia amboinensis kerstingi, Oreopsittacus arfaki grandis, Neopsittacus musschenbroekii major, Neopsittacus pullicauda alpinus, Alisterus chloropterus callopterus, Psittacella brehmii pallida, Psittacella modesta subcollaris, Cacomantis variolosus* subspecies?, *Aegotheles insignis insignis, Collocalia esculenta esculenta, Collocalia hirundinacea hirundinacea, Edolisoma montanum minus, Coracina caeruleogrisea strenua, Crateroscelis robusta sanfordi, Ifrita kowaldi kowaldi, Megalurus timoriensis alpinus, Sericornis nouhuysi stresemanni, Sericornis papuensis bürgersi, Gerygone palpebrosa wahnesi, Phylloscopus trivirgatus giulianettii, Microeca flavigaster laeta, Microeca griseoceps poliocephala, Tregellasia leucops nigriceps, Heteromyias albispecularis centralis, Pachycephala schlegelii obscurior, Pachycephala rufiventris dorsalis, Pachycephala tenebrosa tenebrosa, Pitohui nigrescens bürgersi, Macgregoria pulchra, Lophorina superba feminina, Diphyllodes magnificus chrysopterus, Cicinnurus regius similis, Paradisaea minor finschi, Loria loriae loriae, Amblyornis macgregoriae macgregoriae, Climacteris placens steini, Toxorhamphus iliolophus iliolophus, Melilestes megarhynchus stresemanni, Melidectes belfordi belfordi, Melidectes torquatus mixtus, Oreornis subfrenatus melanolaema, Meliphaga montana sepik, Pycnopygius cinereus marmoratus, Dicaeum pectorale rubrocoronatum, Oreocharis arfaki bloodi,* and *Zosterops minor minor.*

The species from the Telefomin region that exhibit slight geographic variation (beginning speciation) but in which the differences are not sufficient for subspecific separation are *Trichoglossus haematodus intermedius, Pachycephalopsis poliosoma albigularis, Pachycare flavogrisea subaurantia, Myiolestes megarhynchus maeandrinus, Epimachus fastosus stresemanni, Epimachus meyeri albicans, Diphyllodes magnificus* subspecies?, *Pteridophora alberti alberti,* and *Paramythia montium montium.*

The species from Telefomin that exhibit slight geographical variation but of a degree permitting taxonomic separation are *Pachy-*

cephala modesta telefolminensis, *Astrapia splendidissima elliott-smithi*, *Parotia carolae clelandiae*, and *Meliphaga analoga* subspecies.

The species from Telefomin that were too poorly sampled to permit the drawing of final conclusions but that exhibit evidence suggesting that they have reached the level of good subspecies are *Excalfactoria chinensis* subspecies?, *Clytoceyx rex* (*?septentrionalis*), *Saxicola caprata* (*?wahgiensis*), *Malurus alboscapulatus* subspecies?, *Peneothello sigillatus* subspecies?, *Loboparadisaea sericea* (*?sericea*), and *Oreostruthus fuliginosus* subspecies?.

The species so poorly sampled that racial identification cannot be made with the material at hand are *Timeliopsis fulvigula* (*?montana*), *Toxorhamphus poliopterus* subspecies?, *Xanthotis polygramma* (*?septentrionalis*), *Melanocharis versteri meeki*, and *Rhamphocaris crassirostris* (*?crassirostris*).

The species with populations in the Telefomin region that are partially intermediate and usually clinal in their variations between thinly differentiated races[1] are *Cacomantis castaneiventris weiskei*, *Sericornis arfakianus olivaceus*, *Rhipidura albolimbata albolimbata*, *Rhipidura albolimbata lorentzi*, and *Peneothello cyanus atricapilla*.

TRENDS OF SPECIATION

Among our Telefomin birds we found (a) four species with populations that are intermediate between very thinly differentiated races inhabiting the main body of New Guinea; (b) nine species with populations that exhibit slight geographical variation (beginning speciation); and (c) four species with representative populations that exhibit slight geographical variation of a character which requires taxonomic recognition. On the other hand, we found no sharply differentiated races and no localized species.

Evolutionary Rates

In the case of the four populations that have diverged sufficiently to require taxonomic recognition, two (*Astrapia splendidissima* and *Pachycephala modesta*) are high-mountain mossy and beech-forest birds, and one (*Parotia carolae*) is a very locally distributed, highly plastic species of the mid-mountain forests.

The maximum age of two high-mountain forest races may very well be between 4000 and 9000 years. This estimate is based on the reconstruction of the vegetational formations and the historical climate of the Victor Emanuel and Hindenburg Mountains (presented earlier in this report), in which it is postulated that the ecological islands, the forest-covered ranges surveyed by our 1954 expedition, did not become habitable for forest birds until some time after the last period of maximum glaciation about 10,000 years ago.

Altitudinal Speciation

The following examples from the Telefomin region represent three major phases of altitudinal speciation: (a) clinal increase in size with increase in altitude; (b) closely related, allopatric species which seem to be still in ecological competition; and (c) closely related sympatric species.

Excellent examples of clinal increase in size with increase in altitude are found in *Melipotes fumigatus*, *Rhipidura leucophrys*, and *R. albolimbata* (also see Rand, 1936). The altitudinal population increments of a species such as *Melipotes fumigatus* seem to be continuously exchanging genes (just as in the laterally situated populations of a "ring species"), and, similarly, the clinal extremes often appear to be well-differentiated "good" races. But, unlike the "ring species" of tropical New Guinea, the clinal extremes of altitudinal species are inhabitants of ecologically very different habitats. Experience with New Guinea birds teaches that such altitudinally variable birds should be especially carefully studied, because not infrequently the "extremes" turn out to be allopatric species rather than altitudinal subspecies. As a case in point, the clinal extremes of altitudinal populations belonging to groups of the genus *Ptiloprora* (Mayr and Gilliard, 1954, p. 369) were found to represent two closely related species (*P. perstriata* and *P. guisei*) rather than a single group of altitudinally differentiated populations as formerly believed.

It would seem therefore that, while clinal increase in size with increase in altitude can

[1] See the Annotated List for our reasons for using trinomials.

and often does operate as a first step in the origin of mountain species, this step probably is secondarily supported by geographical or ecological isolation for effective isolating mechanisms to develop.

Examples of speciation that presumably followed this pattern are *Ptiloprora perstriata* and *P. guisei*, as mentioned above, *Peltops blainvillei* and *P. montanus*, and perhaps *Epimachus fastosus* and *E. meyeri*, although the last seems to fit better as a case of initial geographical speciation followed by overlapping.

In any case, each species of these species pairs appears to be completely reproductively isolated, but otherwise the pairs still appear to be so similar that they remain in ecological competition, and therefore they do not invade each other's range, or, at most, they are but slightly overlapping allopatric species.

In connection with the effects of Pleistocene glaciations on some northern North American birds, one school of thought (see Rand, 1948) contends that paired isolates of this sort (i.e., very similar in morphology but with mutually exclusive ranges) are not true species but "semi-species" which have come into secondary contact as a result of the lifting of temporary geographic barriers (the ice). However, such semi-species usually involve a history of hybridization under natural conditions and as such may be either "species in the making" or "species merging," whereas in the three pairs of New Guinea isolates cited here hybrids are unknown, and there can be little doubt that all have reached the level of good biological species.

At hand also from the Telefomin region are excellent samples of the third level of speciation, that of fully completed recent speciation between populations which are still very similar both in their morphology and their habits. These are found chiefly in the genera *Pachycephala*, *Rhipidura*, *Sericornis*, and *Melidectes*.

Peculiar Ranges

An unexplained phenomenon pertains to three species of birds found on the north watershed of the Telefomin region (and on other mountains of New Guinea) which also have representative (taxonomically distinct) populations near sea level far to the south in New Guinea. These are *Coracina caeruleogrisea*, *Microeca griseoceps*, and *Tregellasia leucops*. These isolated southern populations are situated in the tropics near the mouth of the Fly and the Oriomo rivers at just about the southernmost point of the New Guinea mainland. No representative populations of these species occur in the broad reaches of the Fly River drainage so far as known.

In our reconstruction of the historical climate of New Guinea, we postulated that at times of glacial maxima the mountain fauna and flora were probably compressed into a relatively narrow vertical belt, and that, at such times, owing to the building of the ice caps and the consequent lowering of sea level, there was much shifting of animal populations via broad belts of vegetation in areas that are now covered by the sea.

It is our belief that the ranges of the above-named species are correlated with the phenomena of Pleistocene temperature change. It seems likely that these species were inhabitants of the then cooler lowland forests during the last peak of glaciation, that the species were then represented by single populations, and that, with the warming of the highlands and melting of the mountain ice caps, these populations split into a coastal one, which favored the coolness of the sea, and a mountain one, which sought coolness by living higher and higher in the mountain forests.

Checkerboard Variation

Unusually perplexing examples of checkerboard variation without correlation to geography, altitude, or ecology are *Sericornis arfakianus*, *Pitohui dichrous*, and *Clytoceyx rex*. The last-named species may eventually turn out to be geographical in nature, but the first two examples, with their often well-marked populations, represent a little understood phenomenon. (For details, see the Annotated List.)

Hybridization

Our most exhaustive study of speciation in a Telefomin species pertained to the *Melidectes* group (see Gilliard, 1959). This study had its beginnings in 1950 and 1952 in the Wahgi region, when the senior author noticed the extraordinary range of variation exhibited by many populations of *Melidectes* and there-

fore made large collections, which were subsequently analyzed by Mayr, with Gilliard assisting. These variable populations were identified as hybrid swarms between two groups of honeyeaters which, morphologically speaking, had diverged to the level of good species, but which were still not reproductively isolated. Later studies revealed that these swarms occurred only in areas drastically disturbed by man. Several such swarms had become stabilized, and one of these was sharply differentiated from both of the parent groups. At Telefomin the two parent groups were found living side by side in undisturbed areas without hybridizing. The questions posed by these discoveries were primarily (1) the biological status of the two groups: were they species or subspecies?; (2) the connection between habitat disturbance and species barriers; and (3) the question of taxonomic discrimination of populations of hybrid ancestry that have become sufficiently stabilized to be taxonomically distinguished from each of the parent groups. These questions were resolved as follows by Gilliard (1959, p. 24): The two groups were treated as good species despite their interfertility under conditions of ecological disturbance (nine striking morphological characters served to separate the two groups). In the light of the evidence presented by these birds (and that of earlier researchers on other species, notably Meise, 1936; Miller, 1941; Yamashina, 1948; Chapin, 1948), it was suggested that the stabilization of hybrids be considered as a rare natural mechanism of speciation.

ANNOTATED LIST OF BIRDS OF THE VICTOR EMANUEL AND HINDENBURG MOUNTAINS (TELEFOMIN REGION)

VERNACULAR ENGLISH NAMES are given for all species; many of these were coined by us. The native names by which the species are known in the Telefomin region are given after a semicolon.

All measurements are in millimeters, and all weights are in grams. Brackets, when used to enclose a scientific name, indicate that the species in question was not collected. Brackets, when used to enclose technical data, indicate that these data were added in the laboratory.

The term "molt" as used in this report refers to a double process: the loss as well as the replacement of feathers. The condition of the molt of all specimens collected by the expedition was examined in the field while the specimens were still pliable, and the data were then recorded on the field label. The molt analyses were graded into "traces," "medium," and "heavy," and the three main areas of investigation were the body, the wings, and the tail. Because the molt periods of birds are known to be closely synchronized with the reproductive cycle in many parts of the world but not necessarily in the equatorial region (where the environmental factors responsible for the timing of the molt are far less likely to be geared to increases and decreases in the duration of day length), the condition of the molt is given in this Annotated List with the condition of the gonads.

ARDEIDAE

HERONS AND BITTERNS

Egretta intermedia plumifera (Gould)

PLUMED LESSER EGRET

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One sex?, 4800 feet, May 18.

REMARKS: Our only record is of a specimen preserved in alcohol which was shot at the edge of the Telefomin airstrip in marshy grassland. It was probably a rare straggler from the lowlands.

ACCIPITRIDAE

HARRIERS, HAWKS, AND EAGLES

Accipiter fasciatus polycryptus Rothschild and Hartert

AUSTRALIAN GOSHAWK; NARAIN

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One male, 4800 feet, April 27.

MEASUREMENTS AND WEIGHT: Wing, 230; tail, 176.5. Weight, 215.

CONDITION IN LIFE: Perishable colors: Iris bright yellow; bill gray, with black ridge and tip; feet dull yellow; skin on eyebrow grayish olive; eye ring yellow, with narrow black rim next to iris; cere, gape, and fleshy part of mandible yellowish olive. Molt: Traces on head and body.

REMARKS: Compared with males of *polycryptus* and *dogwa*, this male closely resembles that of *polycryptus*. The male of *dogwa* is much lighter brown.

[**Harpyopsis novaeguinea** Salvadori]

NEW GUINEA EAGLE

REMARKS: Observed May 7 flying over the forests of the Victor Emanuel Range at an altitude of about 6000 feet.

PHASIANIDAE

QUAILS AND PHEASANTS

Excalfactoria chinensis subspecies?

CHINESE QUAIL; CAGOSON

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, five females, 4800 feet, March 20 to April 30.

MEASUREMENTS AND WEIGHTS: Wing: Males, 64, 67; females, 65, 67, 67.5, 67.5, 68. Weights: Males, 34.5, 36.5; females, 25, 28.5, 33, 33.5.

CONDITION IN LIFE: Perishable colors: Males, iris carmine to dark red; females, iris reddish brown to golden brown. Bill dark gray or black, with lighter tip and cutting edge; feet dull yellow to yellow-orange; cere, two dark brown and one black (female). Molt: None (one); traces on back and chest (one

male with greatly enlarged testes); heavy on head and body, none on wings and tail (one, male with testes enlarged); medium general except wings (one female with ovary enlarged); medium general (two, one female with moderately enlarged ovary, one with a greatly enlarged ovary).

TAXONOMIC ANALYSIS: When males are compared, nearest to *papuensis* but differing from both *papuensis* and *novaeguineae* by having the upper parts generally darker, more sooty colored, less brownish, and by having the feather streaking narrower and more grayish, less contrasted with brownish buff.

If additional males confirm the differences noted above, the Telefomin population should be taxonomically separated. Females of the two races appear to be indistinguishable. A reëxamination of the Mt. Hagen material confirms earlier conclusions (Mayr and Gilliard, 1954, p. 335) that the Wahgi region population is very close to typical *novaeguineae* (i.e., the back is more brownish and has more prominent striping). The discovery of *novaeguineae* at Mt. Hagen would seem to bracket the Telefomin series geographically. It must be remembered, however, that the Wahgi Valley is in the southern drainage, whereas Telefomin is in the northern drainage.

REMARKS: This bird is not uncommon in the grasslands and edges of native gardens in the Telefomin region. Telefomin men say it nests at all seasons. A downy chick weighing 4.5 grams and about one day old was brought in April 24. It is sooty black above, with indistinct chestnut brown streaking on the lower back. On the forehead and throat it is nearly clear yellowish buff, and below it is generally grayish sooty washed with pale buff. It has the iris light brownish gray, the bill fleshy tan, and the feet olive-tan in color.

RALLIDAE

RAILS AND COOTS

Rallus pectoralis captus Mayr and Gilliard

SLATE-BREASTED RAIL; UWAL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Six males, six females, two sex?, 4800 feet, March 26 to April 25.

MEASUREMENTS AND WEIGHTS: The measurements of the wing and of the exposed culmen, respectively, of *Rallus pectoralis* follow:

alberti, southeast New Guinea
Males: 93, 94 (type); 29, 30
Females: 93, 93.5, 94, 94, 97; 27, 28
captus, Wahgi region
Males: 95, 96, 101, 101, 102; 32, 33, 33.5, 34.5
Females: 97, 100, 101; 29, 31, 34, 34
captus, Telefomin region
Males: 99, 101, 102.5, 105; 31.5, 32.5, 34, 35
Females: 97.5, 98; 31, 31, 32, 32, 32
connectens, Wisselmeren region[1]
18 males: 98–104; 34–41
16 females: 96–108; 32–37
mayri, Vogelkop
Males: 105, 105, 109; 38, 39, 39
Females: 98, 101; 35, 35

Weights: Males, 65, 85, 92; females, 71, 77, 77, 90; juvenile males, 53, 75; juvenile female, 78.

CONDITION IN LIFE: Perishable colors: Males: Iris golden brown; outer half of bill rose-gray, basal half grayish rose to purplish rose; feet gray, tannish gray, pinkish gray. Females: Iris more "rusty brown," otherwise like male. Juvenile males: Iris blackish brown; bill grayish brown with blackish tip; feet pinkish gray, darkest gray. Juvenile female: Iris brownish gray; bill dark rose-gray; feet smoky rose-gray. Molt: None (four, two males with the testes slightly enlarged); traces on head and back (one); medium body molt (three, one with the testes enlarged to 7 mm.); medium general (three, one with the ovary much enlarged); one female is in a completely flightless condition owing to having all of its primaries and secondaries encased simultaneously in wax sheaths.

REMARKS: One juvenile male (weight, 53 grams) several weeks old was collected on March 27. Above it is dull smoky black except for the crown which is somewhat more silky black. Below it is sooty black, with large whitish areas on the throat and abdomen. Its remiges are still encased in wax, except for the tips which are just beginning to appear. The sides of its face and ear coverts are gray and much of its crown, throat, chest, and particularly rump plumage is tipped with fine, sooty-colored down feathers.

Another juvenile male (weight, 75 grams)

[1] Measurements from Junge (1953, p. 10).

which we collected differs from it by having the crown, nape, and upper back sooty black and the face and under parts dark gray without a greenish tinge. This specimen has the lower chest and central abdomen whitish and the flanks and abdomen dark gray, not vividly barred with black and white as in the adult.

This species was abundant in the grasslands of Telefomin. All our specimens were brought to us by native trappers.

Rallicula rubra telefolminensis Gilliard

CHESTNUT RAIL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, 7200 feet, May 11. Hindenburg Mountains: Ilkivip: One subadult male, 7300 feet, April 7.

MEASUREMENTS AND WEIGHTS: Wing, 93, 94. Weights, 71, 76.

CONDITION IN LIFE: Perishable colors: Iris brown; bill (adult male) black, with gray at base; (subadult male) dark reddish brown with light gray tip and base of mandible; feet (adult male) shiny black or (subadult male) dark wine brown. Molt: Medium general, heavy on tail (adult male); medium general except none on wings (subadult male).

REMARKS: This species is apparently very uncommon. Both specimens were brought in by native trappers. The discovery of the Chestnut Rail in the Victor Emanuel and Hindenburg Mountains extends the known range of the species from Netherlands New Guinea to Papua and the Mandated Territory.

Rallicula forbesi steini Rothschild

FORBES'S CHESTNUT RAIL; QUAIL

SPECIMENS COLLECTED: Unchemchi: One male, one female, one subadult female, 5850 feet, April 11.

MEASUREMENTS AND WEIGHTS: Wing: Male, 111; female, 107; subadult female, 108. The tail of the subadult female measures 67 mm. Weights: Male, 88; female, 87; subadult female, 81.

CONDITION IN LIFE: Perishable colors: Male: Iris golden brown; bill dark brown; feet brownish black. Female: Iris chestnut brown; bill blackish brown; feet black. The subadult female had a black bill, with a gray spot on the tip. Molt: Heavy general except on wings (two adults, both with enlarged gonads).

REMARKS: The Unchemchi birds compare fairly well with those from the Mt. Hagen vicinity; the only difference seems to be that the former tend to be somewhat darker, more maroon, less chestnut, on the shoulders, and this maroon grades more gradually into the black of the back instead of showing a sharp line of contrast. However, several of the Mt. Hagen birds show this tendency, as does one female from the Rawlinson Mountains. As the Unchemchi birds are most similar to the Mt. Hagen birds, they are being placed in the subspecies *steini*, following Mayr and Gilliard (1954, p. 335). They are not uncommon in the mid-mountain forest.

CHARADRIIDAE

PLOVERS

[Pluvialis dominica fulva (Gmelin)]

PACIFIC GOLDEN PLOVER

REMARKS: A small flock was observed in March at the Telefomin airfield by Frank Jones.

SCOLOPACIDAE

SANDPIPERS, CURLEWS, AND SNIPES

Capella megala (Swinhoe)

SWINHOE'S SNIPE (CHINESE SNIPE); NAL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, one female, one sex?, March 26 to April 17.

MEASUREMENTS AND WEIGHTS: Wing: Males, 144, 145; female, 144. Weights: Male, 207; female, 224.

CONDITION IN LIFE: Perishable colors: Iris dark brown to blackish brown; basal part of bill grayish tan to pinkish tan, outer part dark brown to black; feet light gray to light yellowish gray. Molt: Traces on body and heavy on tail (one); medium body molt (one).

REMARKS: This migrant from Asia was not found in the Wahgi Valley by the senior author. He collected there between the dates of April 17 and August 6, 1950 and 1952. However, Gyldenstolpe (1955a, p. 39) found it there in late September. Rand (1942a, p. 298) found the bird in the Fly River region in late September and mid-January. He also found some examples in the Wilhelmina region (1942b, p. 439) in late September, October, and December. Junge (1953, p. 23) found it in the Wissel Lake region in mid-

November and early October. It therefore appears that this winter resident is present in New Guinea from about late September to about mid-April.

At Telefomin we found this species fairly common on the floor of bushy wet savannas near the airport.

COLUMBIDAE

PIGEONS AND DOVES

Ptilinopus superbus superbus (Temminck)

SUPERB FRUIT PIGEON; SONGANE; BEREE

SPECIMENS COLLECTED: Hindenburg Mountains: Nongtamin: One male, 4000± feet, April 13. Eliptamin Valley: Talatafit: One male, approximately 3000 feet, April 21.

MEASUREMENTS AND WEIGHT: Wing, 124.5, 129.5. Weight, 116.

CONDITION IN LIFE: Perishable colors: Iris lemon yellow; bill in basal half blackish, outer half gray with a bone tip; cere and eye ring blackish; feet dull purplish and dull rose. Molt: Traces on head, chest, and under wing coverts (one with testes much enlarged).

REMARKS: This species is uncommon in the mid-mountain forest edge and is probably not found much above 4500 feet.

Ptilinopus rivoli bellus Sclater

RED-FRONTED MOUNTAIN FRUIT PIGEON; OOWA

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, one female, 7600 feet, May 6–7. Hindenburg Mountains: Unchemchi: One male, one female, 5850 feet, April 10 to 11.

MEASUREMENTS AND WEIGHTS: Wing: Males, 143, 144; females, 139, 140. Tail: Males, 84, 85; females, 84. Weights: Males, 143, 161; females, 162, 164.

CONDITION IN LIFE: Perishable colors: Iris red-orange, pupil ringed by a narrow line of buff in the males; bill bright yellow shading to olive at the tip, one female with the bill all yellow-olive; naked skin in front of eye whitish yellow through lemon yellow to light yellow-green; eye ring dark gray to black; feet dull purplish rose. Molt: None (three, one with the testes much enlarged); traces on body (one, with the ovary slightly enlarged).

REMARKS: This species is not uncommon in the lower edge of the mossy beech forest and in the mid-mountain forest at about 5500 feet.

Ducula zoeae (Lesson)

ZOE FRUIT PIGEON; AVIM

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One female, 4000± feet, April 30.

MEASUREMENTS: Wing, 231; tail, ?130.

CONDITION IN LIFE: Perishable colors: Iris white, with a ragged outer rim of black; bill dark gray; legs strawberry red; feet mulberry; skin around eye dark coral, becoming black on the eye ring. No trace of molt. Ovaries much enlarged (up to 12 mm. in diameter).

REMARKS: This altitude appears to be the highest at which this essentially tropical-zone species has been taken (see Rand, 1942a, p. 304; 1942b, p. 443; and Mayr, 1941, p. 45). It was collected in a valley just east of the Telefomin Patrol Post by Frank Jones.

Gymnophaps albertisii albertisii Salvadori

D'ALBERTIS' MOUNTAIN PIGEON; YOK

SPECIMENS COLLECTED: Hindenburg Mountains: Ilkivip: One male, two females, 7300 feet, March 30–31.

MEASUREMENTS AND WEIGHTS: Wing: Male, 206; females, 202, 206. Weights: Male, 265; females, 225, approximately 275.

CONDITION IN LIFE: Perishable colors: Male: Iris blood red, with an amber inner ring; bill wine gray, with bone tip, basal half of mandible gray; cere blood red; naked face geranium red; feet pinkish red. Females: Iris red-orange (one), orange rimmed with red (one); bill light gray at base, shading through rose to bone on the tip; cere and skin on face bright geranium red; feet bright rose pink to dull fuschia. Molt: Male: Medium general except none on tail (testes large); females: traces on body (one with the ovary much enlarged); medium general except none on wings and tail (one with the ovary enlarged).

REMARKS: Small flocks of from three to eight birds are common in the middle and upper portion of the tall mid-mountain forest and in the mossy beech forest. Flocks were seen daily in the Hindenburg Mountains.

Macropygia amboinensis kerstingi Reichenow

AMBOINA CUCKOO-DOVE; UGOOM

SPECIMENS COLLECTED: Victor Emanuel

Mountains: Telefomin: Four males, one male nestling, 4800 feet, March 24 to April 29.

WEIGHTS: 125, 126, 128, 132, 67.

CONDITION IN LIFE: Perishable colors: Iris from pale blue to pale gray, rimmed by rose or pink. Bill black (two, one with gray on fleshy part), blackish brown (one), brownish gray, lighter towards base of mandible (one). Skin on face gray to blue-gray. Cere black (two). Eye ring maroon, with thin black ring next to iris (one), black (one). Feet bright rose to orange-rose. Molt: Three with traces (wings and tail, one; tail, one; stomach, one); one with medium general. Gonads enlarged in all.

The measurements of the wing in males of *Macropygia amboinensis* follow:

balim
Balim Valley: 175, 176, 177, 180, 181, 182
kerstingi
Mt. Goliath: 160, 160, 168, 172
Telefomin: 164.5, 165, 167, 171
cinereiceps
Wahgi region: 167, 171, 176
Southeastern New Guinea: 168, 170, 171, 172, 174

TAXONOMIC ANALYSIS: Our specimens were compared with *cinereiceps* (Fergusson Island, Goodenough Island, southeastern New Guinea), *kerstingi* (Sattleberg, Sevia, Hollandia) and with topotypical *balim*. They differ from *balim* by having darker under parts and a distinctly shorter wing (see measurements), but one of the Telefomin examples has the abdomen nearly as light as in *balim*.

Cinereiceps and *kerstingi* are difficult to distinguish and probably are not worth separating, because in each there is considerable individual variation in coloration. Viewed in series, however, *kerstingi* has the dorsal coloration averaging darker (but there is considerable overlap).

Our Telefomin sample has the slightly darker average coloration of *kerstingi*, although, below, there is a tendency in the direction of the pale coloration of *balim*. The Telefomin series from the northern watershed of central New Guinea is geographically closest to *kerstingi;* therefore, on the basis of slightly darker coloration and for geographical reasons, we tentatively assign our series to *kerstingi*.

REMARKS: This species was fairly common in the mid-mountain forest edge, in riverine forests, and in scattered trees bordering streams. It was not observed above 5000 feet.

A nestling, about ready to leave the nest, was brought in by a native on March 24. It had the iris dark brown, the bill grayish brown, with a white tip, and the feet brown.

Reinwardtoena reinwardtsi griseotincta Hartert

REINWARDT'S PIGEON; MASAN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One female, 4800 feet, March 24. Hindenburg Mountains: Unchemchi: One male, 5850 feet, April 10.

MEASUREMENTS: Wing: Male, 235; female, 233. Tail: Male, 303; female, 285.5.

CONDITION IN LIFE: Perishable colors: Male: Iris narrow line of white ringed by rose-red; bill brown, one with inner half dull rose; feet bright rose to purplish rose; naked skin on face and cere deep purplish rose to wine-red. Female same as male except with iris yellowish white; one with cere brownish rose. No sign of molt. Testes slightly enlarged.

REMARKS: This species was fairly common in the Telefomin region where it was observed flying over the forest and forest edge. In the Hindenburg Mountains one was seen to fly upward in tight spirals from the depths of a giant sink hole hundreds of feet deep (see p. 13).

Natives report that Reinwardt's Pigeon builds its nest on stone ledges, in river gorges, and in caves in March and April. A squab several weeks old was purchased from a native in late April.

PSITTACIDAE

LORIES, PARROTS, AND COCKATOOS

Pseudeos fuscata incondita (Meyer)

DUSKY LORY; DIL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male, one sex?, 4000±feet, April 27–28.

MEASUREMENTS AND WEIGHT: Male: Wing, 160; tail, 88.5. Weight: Male: 158.

CONDITION IN LIFE: Perishable colors: Male: Iris crimson, with a thin inner ring of black and a faint ring of gray next to pupil;

bill mainly orange; cere and skin near eye black; naked skin under mandible orange; feet brownish black. Molt: Traces on wings and tail, one with traces on rump also. Gonads not enlarged.

REMARKS: This tropical species is apparently very uncommon at this altitude.

Trichoglossus haematodus intermedius Rothschild and Hartert

COCONUT LORY; TAIL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male, 4800 feet, April 26; Deikimdikin: one female, 4000–4500 feet.

MEASUREMENTS AND WEIGHT: Wing: Male, 135; female, 140. Weight: Male, 107.

CONDITION IN LIFE: Perishable colors: Iris (male) bright rose, with narrow black inner ring and a hairline ring of gray next to pupil; bill red-orange to orange, fading to yellow at tip; feet light blue-gray (male), olive-gray (female); cere and skin on face blackish. Molt: Traces on body and head (one male); medium general (one female with ovary enlarged).

TAXONOMIC ANALYSIS: According to Cain (1955, p. 434) *intermedius* is not so wide-ranging as Mayr (1941) believed. Cain states, "It occurs in the Astrolabe Bay area, the lower Sepik valley, and the Maeanderberg (upper Sepik). The exact boundary between *berauensis* and *intermedius* cannot be determined for lack of material from the Aitape district, but it is probably near the Torricelli Mountains." He gives Hollandia as the easternmost boundary of the range of *berauensis*. Because our birds are from the fringe area, they were carefully compared with both *berauensis* and *intermedius*. They compared well with *intermedius* from Nondugl and Madang. When compared with topotypical *berauensis* from the Vogelkop, they showed more restricted blue on the head and more extensive green; the nape was more brownish black than black. However, when compared with *berauensis* from the Idenberg River, they showed little difference. One bird from the Idenberg had even more green than our birds. A cline of decreasing blue and increasing green extends from the Vogelkop on the west to Nondugl and Madang on the east. Our birds fit better with the named population representing the eastern end of this cline.

REMARKS: This tropical species appears to be very uncommon to rare above 4500 feet.

Psitteuteles goldiei (Sharpe)

GOLDIE'S LORIKEET

SPECIMENS COLLECTED: Hindenburg Mountains: Ilkivip: Two males, 7300 feet, April 4.

MEASUREMENTS AND WEIGHTS: Wing, 107, 107. Weights, 57, 65.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill black; cere and skin on face light gray; feet light blue-gray. Molt: Two with heavy molt on the tail and two with traces of body molt.

REMARKS: This species is apparently quite uncommon in the crown of the mid-mountain forest.

Charmosyna papou goliathina Rothschild and Hartert

POLYMORPHIC LORIKEET; TSOO

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Five males, four females, 7200 to 7600 feet, May 7–10. Hindenburg Mountains: Ilkivip: One male, 6500 feet, March 30.

MEASUREMENTS AND WEIGHTS: Wing: Males, 137, 140, 142, 143, 144, 146; females, 128, 135, 138. Tail: Males, 216, 240.5, 248, 258, 270, 300.5; females, 228, 233, 247.5. Weights: Males, 74, 82, 86, 91, 95, 95; females, 77, 77, 77, 84.

CONDITION IN LIFE: Perishable colors: Iris scarlet (three: two in red phase, one in black phase), yellowish (one in red phase); bill red or red-orange, with orange at base of mandible (four, two with a black tip); feet pale red-orange; cere dull orange; eye ring black. Molt: Traces general (three); medium general (one).

TAXONOMIC ANALYSIS: Five of these birds are in the red phase, and five are melanistic. Of the five red birds, three are males with a bright red rump patch, one is an immature female with yellow rump feathers heavily tipped with red, and one is an adult female with a bright yellow rump patch. Of the five black birds, three are males with a bright red rump patch and two are females with a green rump patch.

When the red-phase birds were compared

with a series of red birds from the Weyland Mountains and with a single red bird from Mt. Hagen, no differences were noted. From *C. p. stellae* the Weyland-Victor Emanuel-Mt. Hagen series differs by having the elongated central rectrices generally pale greenish, not strongly washed with reddish.

REMARKS: This bird is fairly common in flocks in the mid-mountain forests above 6500 feet.

Charmosyna pulchella bella (De Vis)

FAIRY LORIKEET; TITIN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Two males, one female, 7500–7600 feet, May 7–8. Hindenburg Mountains: Unchemchi: One female, 5550 feet, April 10.

MEASUREMENTS AND WEIGHTS: Wing: Male, 92; female, 90. Weights: Males, 30.4, 33.5; females, 31, 37.

CONDITION IN LIFE: Perishable colors: Iris orange to red-orange; bill mainly orange or red-orange with a black tip; feet orange to red-orange; cere dull orange to dull red-orange; eye ring black. Molt: Traces to medium on body, wings or tail, or both (four, one with testes partially enlarged).

REMARKS: Compared with *rothschildi* of the mountains north of the Telefomin region, our birds lack the green chest coloration and have a less extensive, more sharply defined black crown spot. In these characters they agree with *bella*, the race that occurs in the mountains both east and west of the mountains of the Telefomin region. This bird is uncommon in the crown of the high mid-mountain forest.

Oreopsittacus arfaki grandis Ogilvie-Grant

BLUE-CHEEKED ALPINE LORIKEET; ILILLEE

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Four males, 7500 feet, May 8. Hindenburg Mountains: Ilkivip: One male, two females, 7300 feet, March 30 to April 3.

MEASUREMENTS AND WEIGHTS: Wing: Males, 81.5, 82, 82, 83; females, 80, 81.5. Tail: Males, 78, 81, 82.5. Weights: Males, 17.8, 18, 18.2, 19, 19.3; females, 18, 19.5.

TAXONOMIC ANALYSIS: These birds lack the characteristic reddish abdominal spot of *major*. They extend the range of *grandis* westward from Mt. Hagen and Mt. Giluwer (Sims, 1956, p. 402).

CONDITION IN LIFE: Perishable colors: Iris dark brown to blackish brown; bill dark gray or black to dark brown, two lighter at base; cere and eye ring gray to black; feet gray to yellowish gray. Molt: Traces (two); medium general (three); medium on tail (one); heavy on tail, traces on back (one).

REMARKS: This species is common in the crown of the mossy beech forest.

Neopsittacus musschenbroekii major Neumann

MUSSCHENBROEK'S LORIKEET; KOOKOOLEE

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One female, 4800? feet, April 30; Mt. Ifal: Four males, two females, 7200–7500 feet, May 8–10; Deikimdikin: one sex?, 7000 ± feet, April 22. Hindenburg Mountains: Ilkivip: Two males, one female, 7300 feet, April 4; Mepigin, upper Sepik: One male, 6700 feet, March 29.

MEASUREMENTS AND WEIGHTS: Wing: Males, 115.5, 116, 118, 123; females, 111, 112, 116, 116. Weights: Males, 42.8, 48, 51, 51, 51, 55, 56; females, 42, 43.5, 52, 54.

CONDITION IN LIFE: Perishable colors: Iris crimson, red-orange (one ringed with yellow), orange (one ringed with yellow) to yellow; bill yellow, two tipped with gray; feet blue-gray through gray to yellowish gray; cere yellow; eye ring black; skin around eye sooty gray. Molt: Males: Traces on body, medium on wings, heavy on tail (one); traces on head, body, and wing, heavy on tail (one); medium on head and body (one); medium general (four, two with testes slightly enlarged). Females: Traces on neck and tail (one); traces on head and body, none on wings and tail (one); traces on stomach and wings, medium on tail (one, ovary very slightly enlarged); medium general (one).

TAXONOMIC ANALYSIS: Two races of *musschenbroeki* are now recognized from New Guinea, exclusive of the Vogelkop: *medius* (type locality, Weyland Mountains) and *major* (type locality, Schraderberg). Birds from the Weyland, Snow, Victor Emanuel, Hindenburg, Hagen, Kubor, and Bismarck Mountains and the mountains of eastern New Guinea have been compared with the Telefomin series. There seems to be quite a bit of variation which is not correlated with

geography. One character that seems to be valid, however, is cheek coloration, the western birds being rather more greenish, less yellowish. On this basis the Telefomin birds agree best with *major*.

REMARKS: Flocks of this bird are common in the top of the original mid-mountain forest.

Neopsittacus pullicauda alpinus Ogilvie-Grant

ALPINE LORIKEET

SPECIMENS COLLECTED: Victor Emanuel Mountains: Deikimdikin: One male, 7000± feet, April 22; Mt. Ifal: two males, two females, 7200 feet, May 10–11. Hindenburg Mountains: Ilkivip: One male, one female, 7300 feet, April 4–5.

MEASUREMENTS AND WEIGHTS: Wing: Males, 99, 105, 106, 108; females, 99, 101, 106. Weights: Males, 29.5, 33.5, 34, 35.5; females, 28, 32, 33.5.

CONDITION IN LIFE: Perishable colors: Iris reddish orange to orange (dull yellow to brown in subadults); bill reddish orange shading to yellow near the tip and with the tip blackish (subadult dull yellow-ocher, fading to light yellow near tip); feet brownish gray to yellowish gray and gray; cere dull yellow; eye ring black. Molt: Traces of body molt (four); medium general body molt (two); tail in molt (two). Testes slightly enlarged in all; ovary enlarged in one (April 4).

REMARKS: Telefomin region birds compare well with *alpinus* from the Snow and Weyland Mountains in having the chest more orange, less crimson, and the side of the head more greenish, less yellowish, than in *pullicauda*. They constitute an eastward extension of the range of *alpinus* from Netherlands New Guinea to both Papua and the Mandated Territory of New Guinea.

This species was fairly common in flocks in the crown of the mossy beech forest zone of the mid-mountain forest.

Micropsitta bruijnii bruijnii (Salvadori)

BRUIJN'S PYGMY PARROT; OWINNIMMIM

SPECIMEN COLLECTED: Hindenburg Mountains: Ilkivip: One female, 7300 feet, April 5.

MEASUREMENTS AND WEIGHT: Wing, 67.5; tail, 28; bill from cere, 7; tarsus, 9. Weight, 16.

CONDITION IN LIFE: Perishable colors: Iris brown; bill light gray, with white outline along cutting edge and ridge of maxilla; feet lavender-gray; skin on face dark blue-gray. Molt: Traces on tail. Ovary slightly enlarged.

TAXONOMIC ANALYSIS: Comparing females from eastern, central, and western New Guinea, we find an east-west cline in the coloration of the bright spotting at the tips of the black rectrices which grades from reddish yellow to lemon yellow.

REMARKS: Native informants told Gilliard that Bruijn's Pygmy Parrot nested in holes in dead forest trees. He doubted their statements, believing instead that this species nested in termite nests as does *M. pusio*. However, we now note that Rand (1942b, p. 450) found a male excavating a cavity in a dead tree stump and that he collected two young from a similar nest near Bernhard Camp (approximately 5500 feet).

Other information obtained from native informants is that *M. bruijnii* bores into termite nests for its food and that it feeds on termites by "following their roads." This may or may not be true in view of Rand's observation concerning their apparent eating of jelly-like fungus (*ibid.*, p. 450). For other notes concerning the little-known habits of this superspecies, see Bergman's observations of *M. keiensis* (*in* Gyldenstolpe, 1955b, pp. 242–243).

Micropsitta bruijnii is apparently thinly distributed and very local at higher elevations in the mid-mountain forest. Gilliard obtained only one other example during many months of hunting in the Kubor, Hagen, Bismarck, Owen Stanley, and Victor Emanuel Mountains. We note also that Shaw-Mayer (see Sims, 1956) and Gyldenstolpe (1955a) failed to collect this species. Rand, however, obtained four in southeastern New Guinea (Mayr and Rand, 1937, p. 57) and an extraordinary series of 24 in the Snow Mountains (Rand, 1942b, p. 449), although J. P. K. van Eechoud (see Junge, 1953) did not find it in the Wissel Lake area.

[Cacatua galerita triton Temminck]

SULPHUR-CRESTED COCKATOO

REMARKS: Several were observed flying over the tropical rain forests at the mouth of

the Telefomin Valley at an estimated altitude of 3000 feet.

Alisterus chloropterus callopterus
(D'Albertis and Salvadori)

GREEN-WINGED KING PARROT; NISIM

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, 4500± feet, April 28–30.

WEIGHTS: 147, 154.

CONDITION IN LIFE: Perishable colors: Iris bright orange to yellow-orange; basal half of maxilla red to red-orange; remainder of bill black to brownish black, with a trace of dull yellow or orange at the base; feet brownish black to black; skin around eye dark gray to black; cere brownish yellow in one. Molt: Medium general (two, one with enlarged testes).

REMARKS: Males from the upper Fly River (*callopterus*), from the Wahgi region, and from the Snow Mountains (*wilhelminae*) were compared with these Telefomin birds. All agreed well together and seem racially inseparable, a fact that supports the suggestion of Mayr (1937, p. 10), Rand (1942a, p. 312), and Gyldenstolpe (1955a, p. 56) that *wilhelminae* may prove to be a synonym of *callopterus*.

This tropical species is very uncommon in the Telefomin Valley. These specimens were probably collected in the Takin River gorge below 4500 feet.

Psittacella brehmii pallida Meyer

BREHM'S PARROT; UNNANGEN

SPECIMEN COLLECTED: Hindenburg Mountains: Unchemchi: One male, 6000± feet, April 11.

MEASUREMENTS AND WEIGHT: Wing, 119; tail, 87; bill from cere, 19; tarsus, 20. Weight: 90.

CONDITION IN LIFE: Perishable colors: Iris dark brown rimmed with burnt sienna; bill bluish gray on the inner half and pale greenish yellow on the outer half; cere dull olive-gray; feet light greenish gray. Molt: Traces on back only.

REMARKS: This specimen is within the color variability shown by a series of *pallida* from southeastern New Guinea and the Kubor Mountains. It differs from *intermixta* from the Weylands and Mt. Goliath in its smaller size and its distinctly less yellowish coloration. See Mayr and Gilliard (1954, p. 340) for measurements.

This bird is apparently very uncommon; it is found in the middle and top of the tall mid-mountain forest.

Psittacella modesta subcollaris Rand

MODEST PARROT; DONONGEN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One female? (native skin). Hindenburg Mountains: Ilkivip: One male, 7300 feet, April 6; Unchemchi: one female, 5850 feet, April 9.

MEASUREMENTS: Wing: Male, 97; female, 93; female?, 94.5. Tail: Male, 62.5; female, 56; female?, 57.5.

CONDITION IN LIFE: Perishable colors: Iris red-orange; bill whitish gray to pale pearly gray; cere and skin on face gray (female); feet light gray to light blue-gray. Molt: None (male, testes small); medium on head and body, none on wings and tail (female, ovary slightly enlarged).

TAXONOMIC ANALYSIS: Comparative material of *P. modesta:* One male of *modesta;* four males (including the type) of *subcollaris;* and two males of *collaris*. Comparative material of *P. madaraszi:* Two males (including the type) of *major;* the type of *hallstromi* (a male); the type of *huonensis* (a male); and eight males of *madaraszi*.

REMARKS: From a study of the above material it seems doubtful that two species are represented. However, Rand (1941, p. 8) recommends that they be treated as two species because they appear to be sympatric in the Snow Mountains.

Our male from the Hindenburg Mountains is quite similar to that of *subcollaris*. From that of *collaris* it differs by having the green upper parts generally darker, and the brown chest darker, more olive brown, less amber. From that of *hallstromi* it differs very much by having the head much lighter in color, with bold yellow markings on the nape, not sooty olive with traces of yellow. Below it also differs very much by having the chest brownish, not generally greenish.

This species is fairly common at upper elevations of the mid-mountain forest.

CUCULIDAE

Cuckoos

Cacomantis variolisus subspecies?

Brush Cuckoo; Deeonook

Specimen Collected: Victor Emanuel Mountains: Telefomin: One subadult female, 4800 feet, March 26.

Measurements and Weight: Wing, 112.5; tail, 101. Weight, 36.5.

Condition in Life: Perishable colors: Iris dark brown; bill dark brown, except basal half of mandible medium brown; feet dull yellow; gape and inside of mouth red-orange. Molt: Medium general, except none on wings. Two enlarged, orange ova present.

Remarks: Because of its immaturity we cannot determine the racial identity of this specimen.

This tropical-zone species is very uncommon at the elevation of Telefomin.

Cacomantis pyrrophanus excitus Rothschild and Hartert

Fan-tailed Cuckoo

Specimen Collected: Victor Emanuel Mountains: Telefomin: One female, 4800 feet, April 19.

Measurements and Weight: Wing, 140; tail, 134. Weight, 47.5.

Condition in Life: Perishable colors: Iris brown; bill black, yellowish at base of mandible; feet yellow, washed with black; eye ring yellow; gape orange. Molt: Traces on chest, tail coverts, and back.

Remarks: This specimen is immature, as indicated by the heavily barred under parts, brownish tan tail barring and generally brownish rather than sooty gray dorsal coloration.

This species was apparently uncommon in the areas surveyed by our party.

Cacomantis castaneiventris weiskei Reichenow

Chestnut-bellied Cuckoo; Diyoyap

Specimens Collected: Victor Emanuel Mountains: Telefomin: Two males, one immature male, 4800 feet, March 20 to April 30.

Measurements and Weights: Males: Wing, 112, 118. Weights, 25, 31.2 (immature male), 36.

Condition in Life: Perishable colors: Iris brown (one), chestnut brown (one), gray (one[1]); bill black (two[1]), dark brown with light brown streak under mandible (one); feet whitish flesh (one[1]), light yellow (one), dull yellowish tan (one); gape dull yellow (one[1]), pale red-orange (one), reddish orange (one); eye ring bright yellow (two), narrowly black (one[1]). Molt: Traces on back, chest, and tail, none on wings (one); traces on head and throat (one); medium general (one).

Taxonomic Analysis: We cannot find any firm differences in color between the adults of *arfakianus* and those of *weiskei*, although *weiskei* shows a tendency towards darker brown ventral coloration. Rand has pointed out (Mayr and Rand, 1937, p. 63) that slight differences in size seem to constitute the only characters of diagnostic value, and we concur in this. He notes that three Arfak males had wing lengths of 110, 110, 113, whereas three males from southeastern New Guinea measured 112, 114, 115. Our males measure 112 and 118 and therefore appear to fit best with the larger *weiskei*.

Our immature male is inseparable from an immature male of *weiskei* in the American Museum collection. It is almost entirely dull buffy below, with the feather bases dark gray. In contrast an immature male of *arfakianus* is more whitish below. These differences may be due to geographical variation (see Hartert, 1930, p. 100).

Remarks: This species is common but elusive in bushy savanna, forest edge, and forest below 6000 feet. One stomach contained two 1-inch long gray caterpillars.

Chalcites meyerii (Salvadori)

Meyer's Shining Cuckoo

Specimens Collected: Mittag Mountains: Eliptamin Valley: Takatemdikin: One male, one female.

Measurements: Wing, 90.5, 91; tail, 64, 64.

Condition in Life: Perishable colors: Bill black; feet dark brown. Molt: Traces on under parts (two, one with testes slightly enlarged).

Remarks: These birds were probably collected below 4000 feet. This tropical-zone cuckoo is probably not in the Telefomin Valley.

[1] Immature male.

AEGOTHELIDAE

OWLET FROG-MOUTHS

Aegotheles insignis insignis Salvadori

REDDISH OWLET NIGHTJAR; MAGAK

SPECIMEN COLLECTED: Hindenburg Mountains: Momsakten: One female, 6000± feet, March 29.

MEASUREMENTS AND WEIGHT: Wing, 162; tail, 126. Weight, 74.

CONDITION IN LIFE: Perishable colors: Maxilla light brown, with dark brown cutting edges; mandible whitish; feet whitish flesh. Molt: Heavy on body only. Ovary small.

REMARKS: We follow Rand (1942b, p. 456) in synonymizing *pulcher* with *insignis*. *Tatei* of the upper Fly is very different from *insignis*.

Our bird from the northern watershed of the Hindenburg Mountains has large areas of dark brown and large areas of cinnamon brown in the plumage of the head and back. These patches match the two color phases commonly found in this species. As the dark plumage is partly encased in wax sheathing and is replacing the cinnamon plumage, it would appear that the so-called color phases are ontogenetic in character.

This species is fairly common but elusive in the middle tier of open mid-mountain forest. Natives report that it feeds on large insects. At about 6000 feet in the Hindenburg Mountains an adult was observed in its nest or sleeping cavity in tall hill forest. The cavity was about 15 feet up, with a roundish entrance about 3½ to 4 inches in diameter. The bird resembled a Screech Owl in the red phase as it peered with wide-open eyes (at about 3:30 P.M.) at a noisy group of men standing below.

Other examples of the species observed in daylight by the senior author were found in the Kubor and in the Wahgi Divide forests, both at altitudes of about 6000±feet. The former was a bird that had been trapped. It kept its eyes closed in bright light, but occasionally it turned its head squarely towards a noise and opened its eyes for a few seconds. The Wahgi Divide bird was observed near noon in riverine forest bordering grasslands. It was perched about 12 feet up in a clump of slender trees. This bird sat upright with its eyes shut tightly. It so resembled a cluster of dead leaves caught among limbs that Gilliard could not distinguish it for some time, although the native guide made every effort to point it out. This specimen, which was collected on May 11, 1950, had the feathering of its breast and tail heavily worn, apparently from nest abrasion.

Aegotheles archboldi Rand

ARCHBOLD'S OWLET NIGHTJAR; NUGUMKATIP

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One female, 4800 feet, May 1.

WEIGHT: 35.

CONDITION IN LIFE: Perishable colors: Iris brown; maxilla dark brown; mandible bone, with a dark tip; feet pinkish flesh. Molt: Medium general, including wings and tail. Gonads not enlarged.

REMARKS: Our specimen, which is in the gray phase, is indistinguishable from a series from the Lake Habbema region. The range of *archboldi* is therefore extended eastward in the northern watershed to the Victor Emanuel Mountains.

Junge (1953, p. 38) reported the interesting fact that *A. albertisii salvadorii* and *A. archboldi* are sympatric in the Wissel Lake area and therefore must be considered distinct species.

CAPRIMULGIDAE

GOATSUCKERS

Caprimulgus macrurus yorki Matthews

LONG-TAILED NIGHTJAR

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One sex?, 4800 feet, April 23.

REMARKS: This species is represented in the collection by one specimen, in alcohol, shot near Telefomin.

APODIDAE

SWIFTS

Collocalia esculenta esculenta (Linnaeus)

GLOSSY SWIFTLET; FULFALIM

SPECIMENS COLLECTED: Victor Emanuel Mountains: Owalbil: One sex?, 3900 feet, March 28. Hindenburg Mountains: Unchemchi: Two males, 5850 feet, April 10–11.

MEASUREMENTS AND WEIGHTS: Males: Wing, 106, 109.5; tail, 45.5, 45. Weights, 6, 7.

CONDITION IN LIFE: Perishable colors: Iris

blackish brown, bill black, feet grayish rose. Molt: Traces on head and body (one); medium on head and body (one); medium on wings, tail, and tail coverts (one). No sign of gonadal enlargement.

REMARKS: In its dimensions (wing, 106–109.5) this small sample fits with the nominate form of the low and mid-mountains rather than with the large-winged *erwini* (wing, 115–120) of the high mountains of Netherlands New Guinea. (See Rand, 1942b, p. 458.)

This species is not uncommon in small to medium-sized flocks in forest clearings and above the crown of the mid-mountain and mossy beech forest, but is apparently much less common in the Telefomin region than in the Wahgi region at similar altitudes.

Collocalia hirundinacea hirundinacea Stresemann

MOUNTAIN SWIFTLET; FULFALMIN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Six males, four females, one male?, one female?, 4800 feet, March 19 to April 28. Hindenburg Mountains: Unchemchi: One female, 5850 feet, April 9.

MEASUREMENTS AND WEIGHTS: Male: Wing, 115, 116, 117, 117.5, 121, 123.5; tail, 50, 51, 51, 51, 51, 51.5. Female: Wing, 114, 114, 115, 116, 117, 118; tail, 46, 47, 49, 49.5, 50, 50.5. Weights: Males, 9, 9.8, 9.8, 10; females, 9.1, 9.3, 9.5, 9.5, 9.8, 10.

CONDITION IN LIFE: Perishable colors: Iris generally dark brown (two blackish brown); bill black except one dark brown; feet vinaceous gray (two vinaceous black). Molt: None (two), traces on body (two), traces on wings and throat (one), medium general except for tail (seven, two males with enlarged testes, one female with slightly enlarged ovary; one male had one testis blackish and one white, not enlarged).

REMARKS: This is one of the most common birds of the mid-mountain bushy grasslands, native gardens, and pure grassalnds. It was abundant in the vicinity of the Telefomin Patrol Post.

ALCEDINIDAE

KINGFISHERS

Clytoceyx rex septentrionalis Paludan

SHOVEL-BILLED KINGFISHER; TOOWOIM

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, 4800 feet, March 25 to April 18.

WEIGHTS: 238, 245.

CONDITION IN LIFE: Perishable colors: Iris dark brown; maxilla brown; mandible bone white, with brown cutting edges; feet pale bluish gray. Molt: Medium general (one); traces on chin, wings, and under wing coverts (one). The testes of both specimens were moderately enlarged (3.5 to 4 mm.).

TAXONOMIC ANALYSIS: The Telefomin males were compared with an extensive series: six from extreme southeastern New Guinea; six from just west of Port Moresby, including Mt. Tafa and Mt. Cameron; two from the middle Fly River; two from Mt. Goliath; one from the Vogelkop; two from the upper Idenburg River; one from the Jimmi River; one from Mawan, Adelbert Mountains; three from Astrolabe Bay near Konstatinhafen; and one from near Finschhafen.

Little difference in size between the sexes and little evidence of geographic variation in size were found except for the surprising Mt. Goliath population (*C. r. imperator*) which is distinctly larger in all dimensions.

Our Telefomin examples are much darker above than a series of almost topotypical *rex*. They have the head much deeper brown, the neck collar more rufous, less tan, and the back brownish black rather than brown. Below, they have the abdomen nearly solid rufous, not with a light area on the abdomen.

The specimens from Mt. Tafa are intermediate between the dark Telefomin and the light Milne Bay populations. They are closer to the former in the coloration of the upper parts and closer to the latter in the coloration of the abdomen. The dorsal color variation seems not to be clinal but "checkerboard" in nature, and this difference in hue has nothing to do with foxing, because a recently collected specimen from the Jimmi River is as brown as any of the old specimens. To the north and west of Telefomin the populations generally become pale brown on the back, and the old "Arfak make" skin is as pale as nominate *rex*.

For the time being, we provisionally call our birds *septentrionalis*, because the type locality of that race is in the Sepik River region.

REMARKS: Mayr (1941, p. 89) does not

TABLE 1

MEASUREMENTS OF *Clytoceyx rex*

	Wing	Tail	Culmen from Base	Breadth of Bill at Gape
Southeast New Guinea				
Males	157–165.5	121–124	46–54	33.5–35
Females	159–163	116–121	49–53	35–35.5
Mt. Tafa				
Males	162–170	122–131	50–50	33.5–36
Females	168	129	52	36.5
Mt. Cameron				
Males	154.5	113	48	33.5
Females	165	119	53	36
Fly River				
Males	162	122.5	52	32
Females	162	116	51, 41	35
Vogelkop, females[a]	168, 171	119.5, 120	50.5	37.5, 35
Idenburg River, female	161–162	111–118	53–53	36–38
Telefomin, male	160–161	120–122.5	47–48	36–36
Jimmi River, female	171	122.5	50	36
Mawan, male	168	121	52	35
Astrolabe Bay				
Males	158–163.5	117.5–120	48–50	34–35
Females	158	117.5	50	34
Huon Peninsula, male	168	113	46	35
Mt. Goliath				
Males	178	138	57.5	40
Females	178.5	130	58	42

[a] Measurements of the second specimen are from Gyldenstolpe (1955b, p. 259).

include the Vogelkop in the range of this species. However, there is one old specimen in the American Museum Sanford collection from "Handels Bay" near Manokwari, and in 1949 Sten Bergman obtained an example near Anggi Giri near Manokwari (see Gyldenstolpe, 1955b, p. 259).

Both of the Telefomin specimens were shot by natives in the original mid-mountain forest at about 4800 feet. One bird was said to have flown up from the ground just before being shot. Stout black insect legs were found in the stomach of this specimen.

CAMPEPHAGIDAE

CUCKOO-SHRIKES

Edolisoma morio incertum (A. B. Meyer)

MOLUCCAN CUCKOO-SHRIKE; TINAN

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One male, 4800 feet, March 26.

MEASUREMENTS AND WEIGHT: Wing, 113; tail, 88. Weight, 50.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill black; feet black. Molt: Heavy on tail and back, medium on wings and chest. Testes not enlarged.

REMARKS: This tropical-zone species is apparently very uncommon above 5000 feet.

Edolisoma montanum minus Rothschild and Hartert

MOUNTAIN GRAYBIRD; SAGOL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Three males, five females, 4800 feet, March 22 to April 26; Mt. Ifal: Two males, 7300 feet, May 4. Hindenburg Mountains: Ilkivip: One male, one sex?, 7300 feet, April 6; Unchemchi: One female, 5850 feet, April 9.

Weights: Males, 55, 63, 65, 66, 70 [75?]; females, 50.5, 58, 59, 60, 62, 67.

CONDITION IN LIFE: Perishable colors: Iris

dark brown to blackish; bill black (one with dark gray bill, lighter towards base of mandible); feet dark gray, black, brownish black. Molt: Males: Medium general (six, testes not enlarged); females: traces on back (one), medium general (five, one with the ovary enlarged).

REMARKS: The Telefomin series fits with the small race *minus* of eastern New Guinea (see below).

The measurements of the wing in *Edolisoma montanum* follow:

montanum
Arfak Mountains: Males, 135–140, 140; females, 132, 135
Netherlands New Guinea[1]: Males, 134, 135, 136, 136, 137, 141; females, 127, 128, 128, 130, 137
minus
Telefomin region: Males, 128, 132, 133, 134, 134.5; females, 126, 127, 129, 131
Southeastern New Guinea[2]: Males, 126, 135 (130.5); females, 124, 127

This species is common in the upper tier of the mid-mountain forest. One stomach contained small seeds and pale green fruit.

Coracina caeruleogrisea strenua (Schlegel)

BLUE-GRAY CUCKOO-SHRIKE; ILAYOK

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two females, one male, 4800 feet, March 22 to April 28. Hindenburg Mountains: Unchemchi: One male, 5850 feet, April 8.

WEIGHTS: Male, 148; females, 116, 117.

MEASUREMENTS: The measurements of the series from the Telefomin region are: Unchemchi, Hindenburg Mountains, male adult: wing, 179; bill from nostrils, 27.5, width of bill at nostrils, 16.5. Telefomin, Victor Emanuel Mountains, two female adults: wing, 155, 166; bill from nostrils, 25, 25; width of bill at nostrils, 16, 17.

CONDITION IN LIFE: Perishable colors: Iris dark brown to blackish brown; bill black; feet black; gape flesh (one). Molt: None (one); medium on body, none on wings and tail (two, one a male with testes moderately enlarged).

REMARKS: Compared with series from southeastern New Guinea (*adamsoni*) and from western New Guinea (*strenua*), our Telefomin region birds have the under wing coverts and axillaries averaging paler, more buffy brown, less ochraceous brown, as in *strenua*.

An immature male collected at Telefomin is largely blue, with prominent patches of white on the body and head, especially on the sides of the head, the eye ring, the lores, the throat, the sides of chest, the flanks, and the crissum. It also has some of the blue feathers on the back narrowly tipped with white. This specimen, which appears as large as a full-grown bird (wing, 166; weight, 127), has the wings and tail edged narrowly with white. It had gray feet, a fleshy white gape, and blackish brown irides.

This species was not uncommon in the upper portion of the mid-mountain forest. One stomach examined contained fruit pits and insect remains.

Coracina longicauda grisea Junge

LONG-TAILED CUCKOO-SHRIKE; TANAN

SPECIMENS COLLECTED: Hindenburg Mountains; Ilkivip: Two males, 7300 feet, April 3–6.

WEIGHTS: 92, 101.

CONDITION IN LIFE: Perishable colors: Iris dark brown to blackish; bill black; feet black. Molt: Medium general (two).

TAXONOMIC ANALYSIS: We find *grisea* of Netherlands New Guinea to be indistinguishable in coloration from *longicauda* of eastern New Guinea, including series from the southeastern peninsula. The wing and tail measurements (see below), however, provide characters by which the populations of southeastern New Guinea can be separated. Measurements of samples from the Bismarck, Kubor, and Hagen Mountains show that these mountains are inhabited by *grisea* rather than by *longicauda*, as reported by Mayr and Gilliard (1954, p. 344).

The measurements of the wing and of the tail, respectively, of males of *Coracina longicauda* follow:

Netherlands New Guinea[3]: 165, 169; 146, 147
Snow Mountains: 163, 165, 167, 168, 170, 171.5, 172, 172.5, 173, 173.5, 174, 174, 174, 174.5, 175; 148, 150, 151.5, 153, 153, 153.5, 153.5, 154.5, 157, 157.5, 158, 158.5, 160.5

[1] Measurements from Rand (1942b, p. 463).
[2] Measurements from Mayr and Rand (1937, p. 94).
[3] Measurements from Junge (1953, p. 41).

Hindenburg Mountains: 172, 173.5; 146, 154
Mt. Hagen area: 169, 172, 172, 176; 153, 154, 155.5, 156
Weiga, Waghi region[1]: 174; 159
Sevia: 177
Southeastern New Guinea: 175.5, 176, 177, 178, 180, 180.5, 182.5, 183, 183, 183, 183, 188; 160, 163, 165, 166, 166, 167.5, 168, 174, 177.5, 180

REMARKS: This species is apparently uncommon. We did not observe it below 7000 feet. The specimens were shot in the upper portions of moss-festooned trees of the beech forest formation.

TURDINAE

THRUSHES

Saxicola caprata (?wahgiensis) Mayr and Gilliard

BLACK CHAT-ROBIN; UNTANUNG

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Three males, two females, 4800 feet, March 27 to May 2.

WEIGHTS: Males, 25, 26.5, 27.5; females, 23.5, 24.3.

The measurements of the series from Telefomin are: Adult males: wing, 79, 81, 82; tail, 60, 60, 65. Adult females: wing, 77, 77; tail, 59.5, 59.5.

CONDITION IN LIFE: Perishable colors: Males: Iris blackish brown; bill black, one lighter towards gape; feet black. Females: Iris dark brown; bill dark brown to brownish black; feet brownish black to black. Molt: None (two, one a male with the testes much enlarged); traces on body (one male with the testes much enlarged); traces on tail and tail coverts (two, one a female with enlarged ovary).

TAXONOMIC ANALYSIS: Compared with *aethiops*, the Telefomin birds are larger, with a somewhat heavier bill, and the females are generally lighter in color. Compared with *belensis*, the Telefomin females are generally lighter. Compared with *wahgiensis*, the Telefomin birds are similar, except that the tail averages longer than that in a series from the Nondugl region. A specimen from Mt. Hagen (Tomba region, 8000 feet), collected by the senior author in 1950, has the tail 5 mm. longer than the longest in a series of eight males collected by Gyldenstolpe (1955a, p. 79) near Nondugl, 60 miles to the east of Tomba. One of our Telefomin males has the tail equally long, but the others have it as short as the longest in the Gyldenstolpe series.

Probably the Telefomin population represents an unnamed, long-tailed race nearest to *wahgiensis*, but additional material is needed to resolve this question.

REMARKS: This species was common in the bushy grasslands and bushy stream edges near the Telefomin Patrol Post. A nest containing three large young was found April 17 on the ground in the side of an elevated mound of grass.

[1] Measurements from Gyldenstolpe (1955a, p. 77).

TIMALIINAE

BABBLERS

Crateroscelis murina murina (Sclater)

RED-BREASTED WREN-BABBLER

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male, one juvenile male, 4800 feet, March 26 to April 30.

MEASUREMENTS AND WEIGHTS: Adult male: Wing, 64; tail, 39.5; bill from base, 17; tarsus, 25.5. Weights, 16, 14 (juvenile).

CONDITION IN LIFE: Perishable colors: Iris scarlet, maxilla black, mandible pinkish white, feet pale greenish mauve. The juvenile specimen had the iris brown, bill dark brown, with dull yellow at base of mandible, feet dull gray-rose, gape yellow-orange. Molt: Traces.

REMARKS: The specimens were shot on the floor of the mid-mountain forest near the edge of the Telefomin clearing. This tropical species is apparently quite uncommon at the altitude of Telefomin.

Crateroscelis robusta sanfordi Hartert

ALPINE WREN-BABBLER

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One female, 7600 feet, May 6. Hindenburg Mountains: Ilkivip: Two males, one female, 7300–7700 feet, March 31 to April 2.

MEASUREMENTS AND WEIGHTS: Wing: Males, 62, 68; females, 60, 64.5. Weights: Males, 18, 19.5; females, 17, 20.

CONDITION IN LIFE: Perishable colors: Iris yellow to golden yellow rimmed with rose (males), brown to light grayish brown (females); bill dark brown, with a bone-colored

tip; feet grayish to grayish brown; gape dull yellow. Molt: None (two); body molt only (one, traces; one, heavy). Gonads not enlarged.

REMARKS: This small series falls within the range of variability of *sanfordi*. It differs markedly from a series of nearly topotypical *robusta* in having the ventral aspect much richer in color, and the back more brownish, less olive.

The specimens were shot in the substage of the mossy beech forest.

Ifrita kowaldi kowaldi (De Vis)

KOWALD'S TREE-BABBLER; NAMTIL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Two males, one female, 7600±feet, May 6–8. Hindenburg Mountains: Ilkivip: Two females, one female?, 7300 feet, April 1–4.

MEASUREMENTS AND WEIGHTS: Wing: Males, 84, 86; females, 82, 82, 84. Weights: Males, 28.8, 31.8; females, 29.2, 30, 30.

CONDITION IN LIFE: Perishable colors: Iris dark brown; maxilla dark brown, with tan cutting edges; mandible bone-colored washed with brown on sides and tip; feet grayish olive; gape orange to tan; inside of mouth orange. Molt: None (two); body molt (two, traces; one medium). No gonadal development.

REMARKS: This species is similar to a series from southeastern New Guinea in having the back more olive, less brown, than in *brunnea* from western New Guinea.

It is common in the high mid-mountain and mossy beech forests. One specimen was shot 10 feet up in deeply shaded moss forest.

MALURINAE

WREN WARBLERS

Malurus alboscapulatus subspecies?

BLACK-AND-WHITE FAIRY-WREN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One subadult male, one nestling, 4500± feet, April 15–25.

MEASUREMENTS AND WEIGHTS: Male: wing, 51.5; tail, 48. Weights, 10.5, 8.5 (nestling).

REMARKS: Without females it is impossible to determine the race to which this population belongs. The measurements of the male fall within the range given for both *balim* (Rand, 1942b, p. 470) and *mafulu* (Gyldenstolpe, 1955a, p. 87).

The nestling was obtained from a native. It is sooty black, with a buff gape (in life), a vinaceous bill, and mauve-gray feet.

SYLVIINAE

WARBLERS

Megalurus timoriensis alpinus Mayr and Rand

STRIATED GRASS-WARBLER; SURAVEE OR SELAVEET

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Four males, three females, 4800–5300 feet, March 22 to April 24.

WEIGHTS: Males, 36, 37, 38.2, 40; females, 29.5, 32.3, 33.5.

CONDITION IN LIFE: Perishable colors: Iris golden brown to reddish brown (males); brown to grayish brown (females); maxilla dark brown, with light gray cutting edges; mandible light gray washed with brown on outer half; feet light brown to rose-brown. Molt: None (one, male with enlarged testes); traces (one); medium general except none on tail (two); heavy general (three males with testes enlarged).

TAXONOMIC ANALYSIS: This Telefomin sample agrees fairly well with *alpinus*, whereas it differs from *montanus* by being paler above, more tan, and less dark brown, also by having the flanks and crissum paler in coloration. From *wahgiensis*, which it resembles in coloration, it differs by having the wing distinctly longer (see below). Rand (1942b, p. 472) found that the population on Mt. Wilhelmina could not be separated taxonomically from topotypical *alpinus* from southeastern New Guinea. He thus extended the range far to the west, bracketing the Telefomin region.

The measurements of the wing of males in *Megalurus timoriensis* follow:

alpinus
Mt. Wilhelmina[1]: 74, 76, 78, 78, 79
Telefomin region: 74.5, 75, 76, 76.5
Southeastern New Guinea[2]: 70, 70.5, 73, 74, 74, 76

[1] Measurements from Rand (1942b, p. 472).
[2] Measurements from Mayr and Rand (1937, p. 117).

wahgiensis
Nondugl[1]: 66, 66, 66, 67, 68, 68, 68, 69, 71

REMARKS: This was a fairly common species of the grasslands with scattered bushes bordering the Telefomin airstrip. Once flushed it was difficult to put up again. Consequently it was a hard species to collect. One stomach autopsied was nearly full of insects, including a green grasshopper and a small caterpillar.

Sericornis perspicillatus Salvadori

RUFOUS WREN-WARBLER; BRUNNANA

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One female?, 4800 feet, April 29. Mt. Ifal: One sex?, 7600 feet, May 7. Hindenburg Mountains: Unchemchi: One male, 5850 feet, April 10.

MEASUREMENTS AND WEIGHT: Male: Wing, 55; tail, 42. Weight, 9.5.

CONDITION IN LIFE: Perishable colors: Male: Iris light brown; bill dark brown, becoming lighter on basal half of mandible; feet palest flesh; "legs" splotched with brown. Molt: Traces on chest, back, and tail on the male, which has the testes much enlarged (white).

REMARKS: The specimens were found in the lower tier of thick mid-mountain forest.

Sericornis nouhuysi stresemanni Mayr

NOUHUYS' WREN-WARBLER; NOTNOT

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two subadult males, two females, 4800 feet, April 18–27; Mt. Ifal: One female, 7600 feet, May 6. Hindenburg Mountains: Unchemchi: One male, one female, 5850 feet, April 11; Ilkivip: One male, 7300 feet, April 2.

MEASUREMENTS AND WEIGHTS: Males: Wing, 65, 65; tail, 46, 48; females: wing, 58, 58.5, 60, 62; tail, 40, 41, 43, 43.5. Weights: Males, 14, 15; females, 12.5, 14.2, 15, 16.2.

CONDITION IN LIFE: Perishable colors: Males: Iris (one) blood red; bill dark brown to blackish becoming gray towards base; feet rosy tan to mauve-brown. Females: Iris variable: two dark red, one golden brown, one scarlet; bill dark brown; feet variable: two brown, one rose-brown, one pale pinkish tan. Molt: None (five, including one with testes greatly enlarged and one with an almost ripe orange-yellow ovum); traces on body.

REMARKS: The specimens are similar to a series of *stresemanni* from the Wahgi region mountains and distinctly more olivaceous, less brownish, below than a series of nearly topotypical *nouhuysi* from the Snow Mountains.

The species is common in the mid-mountain forest and is encountered chiefly on or near the ground in dark, bushy situations.

Sericornis papuensis bürgersi Stresemann

MEEK'S WREN-WARBLER

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, 7600 feet, May 6. Hindenburg Mountains: Ilkivip: One male, one immature male, 7300 feet, April 2–4.

MEASUREMENTS AND WEIGHTS: Wing: Males, 59, 61; immature male, 56. Weights: Males, 11, 11; immature male, 9.5.

CONDITION IN LIFE: Perishable colors: Males: Iris golden brown, light brown; bill dark brown (one whitish at base); feet tan. Immature male: Iris light gray-brown; bill dark brown, with bone at tip; feet pale tannish yellow; gape yellow. Molt: Traces on back only (two with enlarged testes); medium on head, chest, and tail (immature male).

REMARKS: The males differ from those in a series of *papuensis* from southeastern New Guinea in having the under parts more brownish and the head more brown, less greenish, and from *meeki* in having the head and face distinctly more brown, less greenish. They are indistinguishable from a series of *bürgersi* from the Bele and Idenburg rivers. The juvenile also agrees best with this race, being quite greenish on the abdomen.

The specimens were found in the lower portions of the mossy beech forest.

Sericornis arfakianus olivaceus (Salvadori)

SALVADORI'S WREN-WARBLER; BREEPNAMAM

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Ten males, three females, one sex?, March 20 to April 30.

MEASUREMENTS AND WEIGHTS: Wing: Males, 50, 50, 51, 52, 52, 52, 54, 54, 54, 55; females, 49, 49, 50. Weights: Males, 8.2, 8.5, 8.5, 8.5, 8.7, 8.9, 9, 9.2, 9.3, 9.5; females, 7.5, 8, 9.1.

[1] Measurements from Gyldenstolpe (1955a, p. 90).

CONDITION IN LIFE: Perishable colors: The perishable colors in this population proved to be subject to an unusual degree of individual variation. Iris: Males: Brown (four), light brown (one), grayish brown (three), reddish brown (one); females: brown (two), light brown (one). Bill: Males: Dark brown (five), blackish (one), dark grayish brown, with light base and tip (one), dark brown, with base of mandible tan (one), dark brown, with light streaks under mandible (one); females: dark brown (two), grayish brown, with light tip (one). Feet: Males: Light gray to grayish brown, light rose-brown (one); females: light gray brown to light mottled brown. Molt: Traces on head and tail (one), traces on back only (one), traces on wings (one), medium general (three), medium general, heavy on tail (one), medium general, except none on tail (one, testes enlarged), heavy general (one). Four with no trace of molt (one with testes slightly enlarged).

TAXONOMIC ANALYSIS: The populations of *Sericornis arfakianus* are currently divided into two races: *olivacea* (generally more greenish above) of eastern and central New Guinea, and *arfakianus* (generally more grayish above) of western New Guinea and the Vogelkop. However, the dorsal color variation is irregular, with morphologically similar populations often occurring in checkerboard fashion (without correlation to geography). These differences seem too slight to warrant subspecific designations.

Our series from Telefomin is closer to the more greenish complex of populations which occur chiefly in eastern New Guinea (although one population from the Weyland Mountains is the greenest of all), and therefore we assign them to *olivaceus*.

REMARKS: This species is fairly common but thinly distributed in the substage of the mid-mountain forest. No specimens were taken above 5300 feet. One specimen had the stomach three-quarters full of small insects and one small caterpillar.

Acanthiza murina (De Vis)

THORNBILL WARBLER; BLUNANA OR BRUNNANA

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, 7600 feet, May 7. Hindenburg Mountains: Ilkivip: Two females, 7300 feet, April 5.

MEASUREMENTS AND WEIGHTS: Wing: Male, 58.5; females, 57.5, 58. Weights: Male, 9; females, 7.8, 8.4.

CONDITION IN LIFE: Perishable colors: Iris pale buff; bill dark brown, with basal half of mandible white; feet dark brown to grayish brown, two females with yellow pads. Molt: Traces on neck and back (male with enlarged testes); medium body molt (one); heavy body molt (one).

REMARKS: These birds are inseparable from adult specimens from southeastern New Guinea, Mt. Kubor, Mt. Hagen, and the Wilhelm region. Subadult specimens from Mt. Wilhelm and Mt. Hagen appear much darker, having the upper parts more sooty olive, less brownish olive, and the lower parts more heavily tinged with brown.

The specimens were found only in the highest belt of the mid-mountain forest, the mossy forest.

Gerygone cinerea Salvadori

GRAY TREE-WARBLER

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One female, one sex?, 7600 feet, May 6–7.

MEASUREMENTS AND WEIGHTS: Female: Wing, 53; tail, 32.5. Weight, 7.3.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill dark gray; feet gray. Molt: Medium on head and body (two); no gonadal development.

REMARKS: Our only records are from the upper tier of the mossy beech forest.

Gerygone chloronota cinereiceps (Sharpe)

GREEN-BACKED WARBLER

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One female, 4800 feet, April 27.

MEASUREMENTS AND WEIGHT: Wing, 49; tail, 31; tarsus, 15. Weight, 6.3.

CONDITION IN LIFE: Perishable colors: Iris scarlet; bill blackish brown; feet dark gray. Molt: Medium on body and head. Ovaries not enlarged.

TAXONOMIC ANALYSIS: Our specimens are nearly similar to two examples from the northern watershed of the Snow Mountains (Rand, 1942b, p. 475), but with the crown and mask slightly paler, more grayish, and more like examples from south New Guinea

collected by the Archbold Expedition (Mayr and Rand, 1937, p. 127). Rand (1942b, p. 475), in comparing small series from north and south New Guinea, called attention to the darker head and back of the northern birds, but he concluded that the differences were trifling. In reëxamining Rand's material, together with the new specimen from Telefomin, we find that the northern watershed birds differ as Rand noted and that, in addition, the northern birds have the sides of the chest, the flanks, and the abdomen darker, more olive, less lemon-yellow; but these differences are slight, and therefore we follow Rand in merely calling attention to them.

REMARKS: The Green-backed Warbler is widely but thinly distributed in the tropical forests of New Guinea. In the mountain forests it is apparently very uncommon to rare.

Gerygone palpebrosa wahnesi (Meyer)

BLACK-THROATED TREE-WARBLER

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Four males, two females, 4800 feet, April 16–30.

MEASUREMENTS AND WEIGHTS: Wing: Males, 54, 55.5, 55.5, 55.5; females, 49.5, 53. Tail: Males, 37.5, 39, 39.5; females, 37, 37. Weights: Males, 7.6, 8, 8, 8.2; females, 7.2, 7.5.

CONDITION IN LIFE: Perishable colors: Iris scarlet to red-orange (males); rust to red-orange (females); bill black; feet dark gray to blackish. Molt: None (three, two with enlarged testes); traces on head and body (three, one with enlarged testes).

REMARKS: The specimens are essentially similar to a nearly topotypical series from the Madang region but with the upper parts averaging slightly darker, more olive, less yellowish green. This slight difference is probably due to postmortem changes in the older specimens.

This tropical species was common at the altitude of Telefomin, but it was not encountered at the higher collecting stations.

Phylloscopus trivirgatus giulianettii (Salvadori)

ISLAND LEAF WARBLER; MAGALBEBAL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Four males, 4800–5000 feet, March 19 to April 17. Mittag Mountains: Talatafit: One male, April 21. Hindenburg Mountains: Unchemchi: One female, 5850 feet, April 9.

MEASUREMENTS AND WEIGHTS: Males: Wing, 53, 54, 56.5, 57, 58; tail, 37.5, 38, 40, 40.5, 40.5. Weight: Males, 8, 8.1, 8.2, 9; female, 8.5.

CONDITION IN LIFE: Perishable colors: Iris dark brown; maxilla dark brown to blackish and mandible dark brown with a lighter base; feet gray to dark brown. Molt: None (one); traces on body (one); traces on tail (two, one male with enlarged testes); medium general (two).

REMARKS: This series is within the range of variation displayed by birds from southeast New Guinea and from the Bismarck Mountains. However, the Telefomin population has the upper parts averaging slightly darker olive.

The expedition found this species not uncommon in the crown of the mid-mountain forest and forest edge. The bird is usually solitary.

MUSCICAPINAE

FLYCATCHERS

Peltops montanus Stresemann

MOUNTAIN BROAD-BILLED FLYCATCHER; BEELEELING

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Three males, two females, one sex?, 4800 feet, March 19–27. Hindenburg Mountains: Ilkivip: One male, one sex?, 7300 feet, April 6.

MEASUREMENTS AND WEIGHTS: Males: Wing, 110, 114, 117, 117.5; tail, 86.5, 87, 91.5, 95. Females: Wing, 112; tail, 86, 90. Weight: Males, 34.5, 36, 37, 42; females, 32, 32.

CONDITION IN LIFE: Perishable colors: Iris crimson to dark rose-red; bill black; feet black. Molt: None (two); traces on rump (one); medium general (five). Gonads not enlarged.

TAXONOMIC ANALYSIS: This material was compared with extensive series of both *P. montanus* and *P. blainvilli* in the American Museum collections and with fresh specimens of *blainvilli* from Kanganaman, 175 miles from the mouth of the Sepik River, in an attempt to uncover additional characters that might prove useful in the study of these extremely similar species. The only clearly

diagnostic characters that we could find are those given by Stresemann (1923, p. 92) in his description of *montanus* as a distinct species. He wrote (and we translate): "Morphologically it is distinguished from *P. blainvilli* by the considerably larger extent of the white patch on the back as well as by the considerably larger size in the measurements of the wings and tail." However, in addition we note that the white patch on the side of the head in *montanus* tends to be more extensive, and at times it almost forms a collar across the lower throat, but this character is somewhat variable.

Mayr and Rand (1937, p. 170) and Rand (1942b, p. 477) report a slight increase in size with increase in altitude, which is supported by such additional information as we were able to gather. Also, the heaviest birds for which we have the recorded weight are from the highest altitude. No differences in perishable colors were found despite very critical color comparisons.

REMARKS: This species was common in the crown of the mid-mountain forest and forest edge. One specimen autopsied had the stomach three-quarters filled with insects.

Rhipidura atra atra Salvadori

BLACK FANTAIL; SUNFIMFOOT

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male, two subadult males, one female, 4800–5000 feet, March 21–25. Hindenburg Mountains: Ilkivip: One male, one female, 6900–7300 feet, March 30 to April 2. Unchemchi: One male, 5850 feet, April 9.

MEASUREMENTS AND WEIGHTS: Wing: Males, 78.5, 80, 80.5; subadult males, 70, 73; females, 72, 73. Weights: Males, 11, 13, 13.3; subadult males, 10.5, 11; females, 10.5, 11.5.

CONDITION IN LIFE: Perishable colors: Iris dark brown to blackish brown; maxilla black except light rusty brown in one subadult male; mandible pale pinkish orange, with gray or black tip except in two subadult males, one of which had an orange-tan mandible with a gray tip and one a light rusty brown mandible with vinaceous mottling. Molt: None (three); traces (three); medium on tail (one male with no gonadal development). Traces of molt on throat (one male with slightly enlarged testes).

TAXONOMIC ANALYSIS: Comparing 45 females in the American Museum collections from most of the major collecting areas of New Guinea, we find that this species is subject to considerable geographic variation. Birds of the peninsular areas, namely, southeastern New Guinea and the Vogelkop, are generally paler, more amber brown above, less dark reddish brown. Dark populations occur in the Wahgi region, the Telefomin region, the Huon Peninsula, and the Cyclops Mountains. Those of the Cyclops Mountains and the Huon Peninsula are the darkest of all. However, there is much individual variation within each population and considerable overlap, and certain of the populations from the main body of the island average as light as the lightest peninsular birds. For example, those of the Weyland Mountains are nearly as light as those of the Vogelkop. Therefore, it seems inadvisable to separate more subspecies.

REMARKS: The birds were common in the lower and middle tiers of the mid-mountain forest. Stomach contents included small brown and black insects. One stomach contained a brown insect body 20 mm. long.

Rhipidura hyperthyra mülleri Meyer

RUFOUS-BREASTED FANTAIL; LEESONG

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, one female, 4800–5300 feet, March 22–24.

MEASUREMENTS AND WEIGHTS: Wing: Males, 72, 80; female, 79. Weights: Males, 11.5, 12.5; female, 11.

CONDITION IN LIFE: Perishable colors: Iris dark brown; maxilla dark brown to black; mandible dull yellow to rose flesh, one with a dark brown tip. Molt: None (one); medium general (one male with enlarged white testes); medium on back (one).

REMARKS: Telefomin birds agree with *mülleri* in having the under parts averaging somewhat darker, more rufous, less amber, than in *castaneothorax*. The white tip on the outer web of the outer tail feathers in the Telefomin birds measures 12 mm., 12.5, and 14.5. In this character they also agree best with *mülleri*, although one male is intermediate between that of *mülleri* and that of *castaneothorax*. Mayr and Rand (1937, pp. 162–163) give 15–18 mm. as the extent of the

white tip in *castaneothorax* and 7–13 mm. as the extent in *mülleri*.

This essentially tropical species is apparently very uncommon above 5300 feet.

Rhipidura albolimbata albolimbata Salvadori

WHITE-EARED FANTAIL; UREEP

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male?, one sex?, 5300 feet, March 22. Hindenburg Mountains: Ilkivip: One male, one sex?, 5850 feet, March 30 to April 11.

MEASUREMENTS AND WEIGHTS[1]: Wing: Males collected between 7300 and 8200 feet, 79, 81, 81, 81.5, 82, 82, 84.5, 86; male from 6400 feet, 82; male and birds of unknown sex collected between 5300 and 5850 feet, 77, 78, 79; female collected at 7300 feet, 76. Weights: A male weighing 11.5 grams (7300 feet) is the heaviest. The only specimens (three) weighing 11 grams or more are from above 7000 feet. A bird of unknown sex weighing 9.5 grams (5850 feet) is the lightest.

CONDITION IN LIFE: Perishable colors: Iris: Male and female, brown, dark brown, and blackish brown; maxilla in male: black (eight), blackish on outer half and pinkish white on inner half (one); mandible in male: white with black tip (three), pinkish white with black tip (six males, two females). Feet in both sexes: wine-black (five); brownish black (three), black (three). Molt: None (seven, two with testes enlarged); traces on body (two); medium general (two); medium general, except none on tail (one, gonads slightly enlarged); medium general, except none on wings (one); heavy on wings and tail (two); heavy general (one).

TAXONOMIC ANALYSIS: Rand (1942b, p. 479) found that the geographical variation in this wide-ranging species is too slight to permit the definition of subspecies except in the case of a large dark population (*lorentzi*) living above 7000 feet in the Snow Mountains. Mayr and Gilliard (1954, p. 348) confirmed this treatment and extended the range of *lorentzi* eastward to the high slopes of the Hagen Mountains, thus bracketing the ranges from which the present specimens were collected. Our birds were taken between the altitudes of 5300 and 8200 feet. Comparing three from below 5900 feet with a series from above 7500 feet, we can see a slight darkening of flank and back color that seems to be correlated with altitude. Also in measurement there is a slight increase in wing length with altitude (see list of measurements). There is also a slight increase in weight with altitude (see summary of weights). When the largest, darkest birds in the Telefomin series are compared with a series of typical *lorentzi* from Lake Habbema, the Telefomin birds are slightly paler both above and below, and they have the wing averaging only slightly shorter. From our studies it seems that the specimens from above 6000 feet, although intermediate between the mid-mountain race *albolimbata* and the high-altitude representative, *lorentzi*, are somewhat closer to the latter.

But the clines affecting wing length and color are so gradual at these elevations that it is very difficult to define subspecies. Nevertheless, for the present we have divided the Telefomin series according to altitude, with all birds taken above 7000 feet being placed with *lorentzi*, and all below that altitude with *albolimbata*—a solution that is far from satisfactory. A similar situation is found in the ranges surrounding the Wahgi Valley (see Mayr and Gilliard, 1954, p. 347), and indeed this situation will probably be found along the flanks of ranges stretching for hundreds of miles across the heart of New Guinea. If so, in this species it will probably be necessary to discard subspecies altogether, despite the distinctness of the clinal extremes.

REMARKS: The species is fairly common in the lower and middle tier of original mid-mountain forest. See Mayr and Rand (1937, p. 162) for an excellent account of the habits.

Rhipidura albolimbata lorentzi van Oort

WHITE-EARED FANTAIL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Four males, one female, 7600–8200 feet, May 5–8. Hindenburg Mountains: Ilkivip: Five males, one male?, one sex?, 7300 feet, March 31 to April 6.

Rhipidura rufiventris gularis Müller

LARGE-BILLED FANTAIL; DESON

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, two

[1] For comparative purposes, the measurements and weights of *lorentzi* are included here.

females, 4800 feet, March 23 to April 16.

MEASUREMENTS AND WEIGHTS: Wing: Males, 88; females, 76, 80.5. Weights: Males, 14, 14.5; females, 13.5, 13.8.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill black, one lighter at base; feet black. Molt: None (one); traces (two); heavy on wings and tail only (one).

REMARKS: Noting that our Telefomin sample appeared somewhat whiter, less suffused with cinnamon buff below, than the average of many other populations, we reëxamined the geographic and individual variation of this wide-ranging species in New Guinea. Studied were populations from the Vogelkop, Weyland Mountains, Cyclops Mountains, Snow Mountains, Vulcan Island, the Huon Peninsula, southeastern New Guinea, and Goodenough Island.

Much individual variation in coloration of under parts was found, with a number of individuals from east and west New Guinea matching the Telefomin sample in whiteness of under parts, but no significant variation correlated with geography was found.

This essentially tropical species was fairly common in the middle and lower tier of the forest and the forest edge bordering the Telefomin savanna, but we did not find it elsewhere.

Rhipidura leucophrys melaleuca
(Quoy and Gaimard)

WILLIE WAGTAIL; DUNGBALO

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Three males, one female, 4800 feet, March 25.

MEASUREMENTS AND WEIGHTS: Wing: Males, 103, 104, 105; female, 99. Weights: Males, 28.5, 31.5, 33; female, 25.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill black; feet black. Molt: None (three with large testes); traces on chest (one).

REMARKS: The presence of this species in the Telefomin region seems not to be correlated with ecological changes brought about by man, as was postulated for the Wahgi region population (Mayr and Gilliard, 1954, pp. 327, 348). This seems evident from the fact that the Telefomin population of *R. leucophrys* shows a slight increase in wing length over that of tropical populations from the Sepik River. In other words, the Telefomin birds show the morphological effects (i.e., increase in size with increase in altitude) which seem to be correlated with Bergmann's Law. It seems very doubtful that such effects could have taken place in the short period of time since man arrived in the Telefomin highlands.

The measurements of the wing and of the tail, respectively, of *Rhipidura leucophrys melaleuca* follow:

Telefomin, 4800 feet
Males: 104, 104, 105; 104, 107, 108.5
Females: 99; 102
Kanganaman, 200 feet
Males: 91, 99, 99.5; 92, 96.5, 101
Females: 92

Monarcha axillaris fallax Ramsay

BLACK AND WHITE MONARCH FLYCATCHER; ALOGOWISAL; ILATRAK

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, one [male], one [female], 4800 feet, March 20 to May 1.

MEASUREMENTS AND WEIGHTS: Males: Wing, 81, 81; tail, 79.5, 80.5; bill, 12.5, 13; tarsus, 21, 21. Weights, 17, 17.5.

CONDITION IN LIFE: Perishable colors: Males: Iris dark brown; bill steel gray, with a black tip (one) and light blue-gray with a black lateral stripe on maxilla and on the cutting edges of the outer half of the maxilla (one); feet black (one) and very dark gray (one). Molt: Traces on wings (one, testes enlarged and white); traces on chest, rump, and upper wing coverts (one); medium general body and heavy tail molt (one).

REMARKS: The specimens were found in mid-mountain forest.

Monarcha frater periopthalmicus Sharpe

BLACK-CHINNED MONARCH; KATKALASON

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male, one sex?, 4800 feet, March 19–25.

MEASUREMENTS AND WEIGHT: Wing: Male, 90; tail, 70.5. Weight: Male, 22.5.

CONDITION IN LIFE: Perishable colors: Male: Iris dark brown; bill light blue-gray, with the culmen, ridge, and tip black; feet blue-gray, with yellowish pads. Molt: Heavy on wings and tail (male with testes slightly enlarged).

REMARKS: Our male from Telefomin, when compared with a series of *frater*, is somewhat darker gray on the back and chest and blacker on the wings and tail. The black crown is more extensive, and the eye ring is black, not gray. Compared with two specimens of *kunupi*, it is much darker gray, with a deeper chestnut abdomen. Compared with a series of *periopthalmicus*, the abdomen and back are generally darker gray, but some examples show nearly the same dark coloration. In short, our small sample does not agree very well with any of the three named subspecies, but it is nearest to *periopthalmicus*.

We found that this essentially tropical-zone species is rare at the altitude of Telefomin.

Machaerirhynchus nigripectus saturatus Rothschild and Hartert

BLACK-BREASTED FLATBILL; KOOKOOLUNG

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two females, 4800 feet, March 20 to April 30; Mt. Ifal: one female, 7500 feet, May 8. Hindenburg Mountains: Ilkivip: One female, one sex?, 7300 feet, April 2–15; Unchemchi: One male, one female, one female?, 5850 feet, April 9–12.

MEASUREMENTS AND WEIGHTS: Wing: Female, 61, 62, 62.5, 64, 64. Tail: Female: 61, 61.5, 65, 67. Weights: Male, 11; female, 11, 11, 12, 12, 12.5.

CONDITION IN LIFE: Perishable colors: Iris dark brown to blackish; bill black, with white tip; feet gray-brown to black. Molt: None (one); three with traces, one of which shows tail molt; medium general (one); heavy general (one). No gonadal development.

REMARKS: The clinal coloration of the back in adult females which Mayr and Gilliard reported (1954, p. 348) was verified with the above series in hand. Telefomin birds average as dark above as Mt. Hagen birds.

One specimen had the stomach one-quarter full of small black insects. This bird is fairly common in the mid-mountain forest.

Muscicapa griseisticta (Swinhoe)

GRAY-SPOTTED FLYCATCHER

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One female, 4800 feet, April 27.

MEASUREMENTS AND WEIGHT: Wing, 84; tail, 50. Weight (with body liberally coated with fat), 21.7.

CONDITION IN LIFE: Perishable colors: Iris and bill dark brown, the latter with a light base; gape yellowish; feet black. In fresh plumage with no trace of molt. Ovaries not enlarged.

REMARKS: This record is apparently the first of this Palearctic migrant from the main body of New Guinea. Our specimen was shot from a high perch at the edge of the mid-mountain forest.

Microeca flavigaster laeta Salvadori

LEMON-BREASTED ROBIN-FLYCATCHER; TEENDAGEL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Three males, one immature female, 4800 feet, March 25 to April 25.

MEASUREMENTS AND WEIGHTS: Males: Wing, 70, 72, 74; tail, 40, 45. Weights, 12.5, 12.5, 13.

CONDITION IN LIFE: Perishable colors: Iris and bill dark brown; feet blackish brown. Molt: Traces on body (one); medium on body (one); heavy on body and tail (one). Testes slightly enlarged in all.

TAXONOMIC ANALYSIS: Rand (1940b, p. 3), in his review of this species, noted that he had been unable to examine any specimens of *laeta* and that the status of this race was still in doubt.

Compared with a series of *terraereginae*, including the type, Telefomin birds (which we conclude are *laeta*) have the bill solid blackish brown (in the dried skins) as against dark brown with a pale brown to bone-colored base. This difference is confirmed by descriptions of perishable colors made in the field from freshly killed specimens (see A.M.N.H. No. 295527, collected at Port Moresby by J. T. Zimmer; A.M.N.H. No. 420345 collected at Biota Creek by A. L. Rand; and the males listed above).

Compared with a series of *tarara*, including the type, the Telefomin sample differs by having the under parts decidedly brighter, more yellow, less pale amber; the upper chest and sides of neck more yellow, less dull grayish buff; the throat washed lightly with yellow, not dull gray; and by having the

upper parts slightly paler, more yellowish olive, less brownish olive.

Heretofore only two examples of the race *laeta* were known (see Rand, 1940b, p. 4). One (the type) is from the Wandammen Mountains; the other is from Astrolabe Bay. We have not been able to examine these specimens, but both are described as having the wing short (see measurements below) as in our series from the Telefomin region.

The wing measurements of males of *Microeca flavigaster* are:

laeta
Wandammen Mountains[1]: 69
Astrolabe Bay[1]: 72
Telefomin region: 70, 72, 74
tarara
South New Guinea[1]: 74, 74, 75, 75, 75, 75, 76, 78
terraereginae
Southeastern New Guinea[1]: 75, 76, 76, 77, 78, 79, 80, 80
North Australia[1]: (10) 76–81 (average 78.9)

We conclude that *laeta* is a good race based on size and brightness of plumage. Its range is the northern watershed of New Guinea from the Wandammen Mountains to Astrolabe Bay between sea level and about 4800 feet.

REMARKS: This essentially tropical-zone bird was fairly common at the elevation of Telefomin, but it was not encountered above that locality.

Microeca griseoceps poliocephala De Vis

GRAY-HEADED ROBIN-FLYCATCHER; DROMALBAL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, three sex?, 4800 feet, March 22 to April 30.

MEASUREMENTS AND WEIGHTS: Wing: Males, 75, 80; tail, 58, 64.5. Weights, 13.2, 14.5.

CONDITION IN LIFE: Perishable colors (males): Iris dark brown; maxilla dark brown (one), black (one); mandible pale pinkish yellow (one), yellowish white (one); feet bright amber yellow; gape yellow; interior of mouth egg yellow. Molt: Traces on tail coverts (one) and general except none on wings and tail (two). Testes enlarged (one).

REMARKS: This species is fairly common in the mid-mountain forests around Telefomin.

[1] Measurements from Rand (1940b, pp. 3–4).

Microeca papuana Meyer

YELLOW-BREASTED ROBIN-FLYCATCHER; KONFAYNOOK

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, 7600 feet, May 6. Hindenburg Mountains: Unchemchi: Three males, one female, two sex?, 5550–5850 feet, April 9–12; Ilkivip: One male, one female, one sex?, one juvenile, sex?, 7300 feet, April 1 to 2.

MEASUREMENTS AND WEIGHTS: Wing: Males, 72.5, 77.5, 77.5, 78.5; females, 72.5, 72.5; juvenile, 73.5. Tail: Males, 45, 46, 48, 49; females, 44, 44. Weights: Males, 13.5, 13.5, 14, 14.2, 14.5; females, 13, 13.5; juvenile, 15.3.

CONDITION IN LIFE: Perishable colors: Iris brown to dark brown; bill dark brown to blackish, lighter towards base of mandible; feet bright orange (five), dull yellow-orange to corn yellow (three). Molt: Two with none and three in medium general molt; one molting the throat feathers (testes much enlarged); one with no trace of molt (testes moderately enlarged).

REMARKS: This bird is abundant, in loose flocks, and is usually found in the upper tier of the mid-mountain forest 40 to 70 feet up, but occasionally it is encountered within a dozen feet of the ground.

Tregallasia leucops nigriceps (Neumann)

WHITE-FACED ROBIN-FLYCATCHER; ADIMFEP

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Four males, one female, one sex?, 4800–5300 feet, March 20 to April 29.

MEASUREMENTS AND WEIGHTS: Wing: Males, 76.5, 79, 80, 81; female, 76. Tail: Males, 47, 49, 51.5, 53; female, 47.5. Weights: Males, 15, 17, 17, 18; female, 14.8.

CONDITION IN LIFE: Perishable colors: Iris brown to dark brown; bill black, with white at the base of the mandible, two with a narrow line of yellow or white to tip of mandible; feet whitish yellow through flesh yellow to amber yellow. Molt: Traces on head and wing (one male with enlarged white testes), medium on body (one).

TAXONOMIC ANALYSIS: Telefomin birds differ sharply from a series of *nigroorbitalis* from the southern slopes of the Snow Moun-

tains by having the eyes completely rimmed with white, not with the posterior half of the eye ring black. They differ from a series of *heurni* from the Lake Habbema region by having the throat washed with yellow, not white, and by having the nape and hind neck tinged with olive, not nearly solid grayish black. They appear very close to a series of nearly topotypical *melanogenys*, but differ by having the crown, nape, and hind neck averaging darker, more blackish, less tinged with olive. The Telefomin series is closest to *nigriceps*, of which a topotypical specimen is available for study. From *waghiensis* (Mayr and Gilliard, 1952b, p. 2) the Telefomin population, and all other races, differ by having the maxilla black, not largely ivory-colored.

REMARKS: This species is common in the middle and lower tiers of mid-mountain forest. One stomach contained small beetles, caterpillars, many other small black insects, and a small snail.

Poecilodryas albonotata griseiventris
(Rothschild and Hartert)

WHITE-SPOTTED ROBIN-FLYCATCHER; SUGUL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Above Telefomin: One sex?, 6200 feet, May 3. Hindenburg Mountains: Ilkivip: One female, 7300 feet, April 5.

WEIGHTS: Female, 34.5; sex?, 38.8.

CONDITION IN LIFE: Perishable colors: Iris blackish brown; bill and feet black (blackish gray in female). Molt: Heavy general (one).

TAXONOMIC ANALYSIS: When samples from the main ranges are compared, the Snow Mountain birds appear inseparable in coloration from topotypical *griseiventris* from Mt. Goliath, and these in turn agree with our specimens from the Telefomin and Wahgi regions. To the east (Huon Peninsula) and southeast (mountains of southeast New Guinea), however, the populations are whiter below, but this tendency does not show up in our samples from the Wahgi or Telefomin regions. This is of interest because Gyldenstolpe (1955a, p. 108) obtained a specimen in the Wahgi region that caused him to suspect strongly that the birds of that region represent an undescribed race " . . . that may be distinguished from *P. a. griseiventris* by smaller dimensions and somewhat different coloration." To check the dimensions, we assembled the following measurements. They reveal no conclusive differences in wing size.

The measurements of the wing in *Poecilodryas albonotata* follow:

albonotata, Arfak Mountains: Males, 112, 113
griseiventris
Lake Habbema region[1]: Males, 105, 111, 111, 112, 112; females, 105, 107, 107, 111, 115
Mt. Goliath: Males, 106, 110; females, 104, 105
Telefomin: Sex unknown, 107; female, 102
Wahgi region, Mt. Hagen: Male, 111; female, 102
Nondugl region, Wahgi Divide[2]; Males, 97, 102
Kubor Mountains: Subadult male?, 103
correcta?, Huon Peninsula: Males, 100, 107; probably male, 103; females, 96, 99, 102, 104
correcta, mountains of southeastern New Guinea: Males, 101, 102, 106, 106, 107, 107, 108, 111, 112; females, 99, 102, 103

REMARKS: This species is apparently very thinly distributed or very uncommon in the high mid-mountain forests where we found it.

Peneothello sigillatus subspecies?

BLACK ROBIN-FLYCATCHER

SPECIMEN COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One subadult male, 7200 feet, May 9.

WEIGHT: 21.

CONDITION IN LIFE: Perishable colors: Iris blackish brown; bill and feet dark brown. Molt: Traces on chest and back.

TAXONOMIC ANALYSIS: Compared with subadults of *sigillatus*, our Mt. Ifal specimen is much darker, more sooty black, above and on the flanks and abdomen, less dark cinnamon brown; also with the white tertiary patch much more extensive, not subobsolete or lacking. Compared with a subadult of *hagenensis*, it is much smaller, the white tertiary area being much more extensive, not subobsolete, and generally more blackish above and on the flanks and abdomen. Compared with one subadult of *quadrimaculatus*, it is smaller and lacks the white patch on sides of upper chest, has the rump more blackish, less flecked with brown, and the head more uniform, less streaked with reddish brown. No strictly comparable specimens of *saruwagedi* were available for comparison. However, one

[1] Measurements from Rand (1942b, p. 485).
[2] Measurements from Gyldenstolpe (1955a, p. 108).

subadult female, one adult female, and one adult male were compared and found to be nearest to our sample. Also in size the Saruwaged Mountain population seems to agree fairly well (see measurements).

Final conclusions must await additional material from the Victor Emanuel Mountains. It seems likely, however, that our bird represents an unknown race the nearest affinities of which are with the birds of the Saruwaged Mountains.

The measurements of the wing and of the tail, respectively, of *Peneothello sigillatus* follow:

sigillatus, Mt. Tafa
Subadult males: 94, 93.5, 93; 65, 66, 70
hagenensis, Mt. Hagen
Subadult male (?): 96; 69.5
Subspecies?, Mt. Ifal
Subadult male: 85; 61
saruwagedi, Sevia
Subadult female: 87; 57
quadrimaculatus, Lake Habbema
Subadult male: 99; 69

REMARKS: This species is very uncommon in the Victor Emanuel and Hindenburg Mountains. The only specimen encountered was shot by the senior author from a perch about 2 feet up in the shadowy substage of open mossy forest growing on the side of a very steep slope. In the Hagen and Bismarck Mountains this species was found to be rather common in bushes near tree line.

Peneothello cyanus artricapilla Hartert and Paludan

BLUE ROBIN-FLYCATCHER; SOOLAN KUN

SPECIMENS COLLECTED: Hindenburg Mountains: Unchemchi: Two males, two females, one juvenile, 5550–5850 feet, April 8–12.

MEASUREMENTS: Wing: Males, 90, 91.5; females, 85.5, 86. Tail: Males, 63.5, 64; females, 56.5, 59.

CONDITION IN LIFE: Perishable colors: Iris dark reddish brown to blackish brown; bill black; feet brownish black to black. Juvenile: Bill rosy brown with bone on ridge, tip, and cutting edges; feet purplish flesh; gape yellow; inside of mouth egg yellow. Molt: None (three, one with the testes greatly enlarged); traces on throat and chest (one, with the testes greatly enlarged).

REMARKS: The east-west cline (main ranges) in crown coloration from blue to blackish blue mentioned in Mayr and Gilliard (1954, p. 350) has been reëxamined with the Telefomin series in hand. Telefomin birds are intermediate between the "blue-headed" *subcyaneus* and *atricapilla* but have the crown darker than the average of the Wahgi series, thus appearing closer to *atricapilla*. The young specimen is also closer to *atricapilla*, its plumage being more brown, less orange, as in young specimens of *subcyaneus*.

This bird is apparently rather local in distribution. Our only records are from a portion of the mid-mountain forest in which we collected but briefly.

Heteromyias albispecularis centralis Rand

WHITE-STRIPED ROBIN-FLYCATCHER

SPECIMEN COLLECTED: Hindenburg Mountains: Unchemchi: One female, 5850 feet, April 10.

MEASUREMENTS AND WEIGHT: Wing, 92; tail, 57. Weight, 30.3.

CONDITION IN LIFE: Perishable colors: Iris brown; bill dark grayish brown, with bone tip; feet palest flesh. Molt: Medium general.

REMARKS: This specimen was compared with the types of *rothschildi* and *centralis*, as well as with a large series of *centralis* from the Wahgi region.

Rand diagnosed his *centralis* (1940b, p. 4) as "Closest to *rothschildi* from which it differs in the much less buffy abdomen and under tail-coverts; in the much grayer, less brownish-tinged upper back; and in the much duller olive, less brownish-tinged lower back, wings and upper tail-coverts." Our Telefomin example fits better with *centralis* in having the upper parts less strongly washed with buffy brown and the upper parts somewhat darker, more dark gray, less brown. It is not separable from a large series from the Wahgi region.

The species is apparently uncommon or local in the mid-mountain forests of the Telefomin region.

Pachycephalopsis poliosoma albigularis (Rothschild)

WHITE-THROATED SHRIKE-ROBIN; SOY-UM

SPECIMENS COLLECTED: Victor Emanuel

Mountains: Telefomin: Three males, 4800 feet, March 20.

WEIGHTS: 34.5, 39, 40.5.

CONDITION IN LIFE: Perishable colors: Iris buffy; bill black; feet gray. Molt: None (two, testes slightly enlarged); medium general on body (one with testes slightly enlarged).

TAXONOMIC ANALYSIS: Compared with series of *albigularis* (including the type), *approximans*, *balim* (including the type), *idenburgi* (including the type), *hunsteini* (one example), *hypopolia*, and *poliosoma*, our Telefomin specimens have the exposed surfaces of the tail generally much darker, more dark gray, less brownish olive, than all except *hunsteini*. *Hunsteini* differs from the Telefomin sample, however, by having much less white on the throat and by having the under parts much darker, more sooty colored, less clear dark gray.

In addition, other races differ from the Telefomin series by having the under parts washed with brown, not solid gray (*poliosoma* and *hypopolia*), by having the central abdomen whitish, not solid gray (*balim*), and by having the exposed surfaces of the wings and upper tail coverts dark reddish brown, not sooty brown (*idenburgi*).

Thus the Telefomin birds differ from all. The differences are sufficiently slight, however, in the case of *albigularis* for us merely to call attention to them, i.e., they have the tail somewhat darker, more grayish, less brownish.

The measurements of the wing and of the tail, respectively, of adult males of *Pachycephalopsis poliosoma* follow:

albigularis
Weyland Mountains (type): 102; 63
Telefomin: 105–107; 63–64
approximans, Snow Mountains: 101–103; 64–65.5
balim, Balim River (type): 110; 69
idenburgi, Idenburg River (type): 87–95; 54–56
hunsteini, Hunsteinspitze: 107; 62
poliosoma, mountains of southeastern New Guinea: 101–109; 65–69

REMARKS: This bird is fairly common in the mid-mountain forests near the Telefomin station, but it was not encountered at higher altitudes. One stomach examined contained black insects.

PACHYCEPHALINAE

WHISTLERS OR THICKHEADS

Pachycare flavogrisea subaurantia
Rothschild and Hartert

GRAY AND YELLOW WHISTLER; FUTFITAM

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Four males, one sex?, 4800 feet, March 22 to April 30.

MEASUREMENTS AND WEIGHTS: Males: Wing, 66, 67, 69.5; tail, 42, 42, 45. Weights, 18, 18.5, 19.5.

CONDITION IN LIFE: Perishable colors: Males: Iris brown to dark brown; bill black, yellowish at base of mandible; feet light brown to brown; eye ring black. Molt: Males: Traces on under parts and back (one with the testes enlarged); traces general (one); medium general (two, one with the testes somewhat enlarged).

TAXONOMIC ANALYSIS: This sample compares fairly well with a series of *subaurantia*. However, one male has the under parts brighter, more orange as in *randi* (Gilliard, 1961, p. 2).

It should be noted that Mayr (1941, p. 147) observed that specimens from the Sepik Mountains " . . . are intermediate between *subpallida* and *subaurantia* and resemble superficially typical *flavogrisea*." This observation does not apply to Telefomin birds, which are much more orange, less yellow, than specimens from the Vogelkop and Weyland Mountains.

REMARKS: This species is common in tall mid-mountain forests near the Telefomin station, but it was not encountered above 5000 feet. One stomach contained insects and one spider.

Gyldenstolpe (1955b, p. 286) wrote that, in his opinion, the dusky spot found on the ear coverts of some specimens is due to immaturity, as Salvadori thought, rather than to sexual dimorphism, as Hartert stated. There are some 95 specimens of this species in the American Museum collections. These are about evenly divided as to sex. Included are series sexed by dissection by Rand, Mayr, Stein, and the senior author. Of these the only specimens marked "female," which lack the dark ear coverts, are as follows: one collected by A. S. Anthony and one apparently col-

lected and sexed by Bruijn's native collectors. Both of these seem to be erroneously sexed. However, a specimen marked as a male by H. Hamlin (A.M.N.H. No. 330107) has dark ear coverts. Apparently Hartert was correct.

Pachycephala soror klossi Ogilvie-Grant

SCLATER'S WHISTLER; NAMEEN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male, one female, two sex?, 4800–5000 feet, March 24 to May 1. Hindenburg Mountains: Unchemchi: One male, two females, 5850 feet, April 9–12.

MEASUREMENTS AND WEIGHTS: Wing: Males, 89, 92; females, 87, 90, 91.5. Tail: Males, 65, 65; females, 63, 65, 70. Weights: Males, 25.5, 26.5; females, 23, 25, 26.5.

CONDITION IN LIFE: Perishable colors: Iris dark red to dark red-brown; bill dark brown to black, one lighter at tip; feet bluish gray through gray to brownish gray; one with legs gray washed with brown; one with gape whitish. Molt: None (one); traces of body molt (four, one with the testes greatly enlarged, two with the ovaries slightly enlarged).

REMARKS: Our birds agree with *klossi* from the Weyland and Snow Mountains. The male in adult plumage differs from that of *bartoni* from southeastern New Guinea in having a black tail not edged with green. The females differ in having a darker, more blackish brown head, darker, more olivaceous back, more blackish brown tail with less extensive green edgings, and wing feathers edged with tan rather than olive.

These birds are found in the mid-mountain forest near the Telefomin station but not above that altitude.

Pachycephala schlegelii obscurior Hartert

SCHLEGEL'S WHISTLER; NAMIN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Four males, one female, 7600–7800 feet, May 5–8. Hindenburg Mountains: Ilkivip: Two males, three females, 7300 feet, March 30 to April 5.

MEASUREMENTS AND WEIGHTS: Wing: Males, 85, 86, 87, 88.5, 89; immature male, 87; females, 87, 88, 88, 89. Weights: Males, 19, 22, 22.3, 23, 24.2, 24.2; females, 21.2, 24.5, 25, 26.

CONDITION IN LIFE: Perishable colors: Iris dark brown to mahogany; bill black, one with base of mandible whitish; feet mauve-gray through grayish brown to dark gray. An immature male had the iris rusty brown, maxilla dark brown, mandible pale tan, with dark brown near tip, feet pale gray, and gape pale yellow. Molt: Body molt only (four, one with the testes much enlarged); traces on body and tail (four); medium general molt (two).

TAXONOMIC ANALYSIS: Our birds, as are the birds from the Wahgi region (see Mayr and Gilliard, 1954, p. 351), are intermediate between the only slightly differentiated races of *obscurior* and *viridipectus*, which appear to vary only in the coloration of the chest band in the female. When our three females in fully adult plumage (one lacks the head) are compared, one is inseparable from *viridipectus* in having a darker olive chest band, whereas the others are inseparable from *obscurior* in having a somewhat more yellowish, less greenish, chest band.

Comparing a series of nearly topotypical males of *obscurior* with a similar series of *viridipectus*, we can see the slight differences noted by Rand (1941, p. 12), namely, the more intense chestnut coloration of the abdomen in *obscurior*. In this characteristic the Telefomin males lie closer to *obscurior*.

REMARKS: One female has a spot of yellowish chestnut on the abdomen, traces of yellow in the nape feathers, and somewhat more blackish wings than the adult female. The immature male still retains some of the reddish nestling plumage.

This bird is fairly common in the middle and upper tier of the mid-mountain forest.

Pachycephala lorentzi Mayr

LORENTZ' ROBIN-WHISTLER; MALBULBAL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Three males, 7300–8200 feet, May 5–8. Hindenburg Mountains: Ilkivip: Two males, 7300 feet, April 2.

MEASUREMENTS AND WEIGHTS: Wing, 84.5, 87.5, 88.5, 88.5, 89. Weights, 18, 19.5, 19.5, 19.9, 20.3.

CONDITION IN LIFE: Perishable colors: Iris brown to dark brown; bill black; feet dark gray through brownish gray to blackish wine. Molt: Traces (three); medium general (one),

heavy on head and body, traces on wings. Gonads not enlarged.

REMARKS: Rand (1941, p. 12) gives a detailed study of this difficult species. Heretofore *P. lorentzi* has been known only from the Snow Mountains (Mt. Wilhelmina, Mt. Goliath, and the Utakwa River).

Our series differs from Snow Mountain material by having the chest averaging paler gray, and the abdomen averaging paler, more lemon, less orange-yellow. These differences, however, are very slight; therefore we recommend that this monotypic species not be dismembered.

This species is fairly common in the mossy beech forest.

Pachycephala simplex jobiensis A. B. Meyer

GRAY-HEADED WHISTLER

SPECIMENS COLLECTED: Mittag Mountains: Uftemtakin (Elip River): One male, 3500–4000 feet, April 21.

MEASUREMENTS: Wing, 85; tail, 63.

CONDITION IN LIFE: Perishable colors: Bill black; feet dark brown. Molt: None.

REMARKS: Very close to topotypical *jobiensis* (Japen Island), but with the central abdomen slightly brighter yellow.

We found this essentially tropical-zone species only in the Eliptamin Valley.

Pachycephala modesta telefolminensis, new subspecies

GRAY MOUNTAIN PACHYCEPHALA; ALUI-SOL

TYPE: A.M.N.H. No. 708799; adult female?; Mt. Ifal, 7300 feet, Victor Emanuel Mountains, Mandated Territory of New Guinea; May 5, 1954; E. Thomas and Margaret Gilliard.

DIAGNOSIS: Nearest to *hypoleuca*, but mantle much darker, more dark gray, faintly suffused with dull brownish olive, not nearly solid dark canvas brown.

OTHER SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Three females, 7300–8200 feet, May 5–8. Hindenburg Mountains: Unchemchi: One male, 5850± feet, April 11; Ilkivip: one male, one female, 7300 feet, March 31 to April 5.

MEASUREMENTS AND WEIGHTS: Wing: Males, 86, 86; females, 84, 85, 88; female?, 87 (type). Tail: Males, 63, 65; female?, 66 (type). Bill from base, 15 (type). Tarsus, 22 (type). Weights: Males, 18, 19.2; females, 16.5, 18.5, 18.8, 20.1; female?, 18.2 (type).

CONDITION IN LIFE: Perishable colors: Iris brown to dark brown, one dark red-brown; bill black; feet from brownish gray to black. Molt: Traces on body (two, one with the ovary slightly enlarged); traces on body, medium on wings and tail or both (three); medium on body (two, one with the testes much enlarged); medium on wings and tail, heavy on body (one).

RANGE: Victor Emanuel and Hindenburg Mountains.

REMARKS: This species was fairly common in the higher elevations of the mid-mountain forest belt and particularly in the mossy beech forest formation. It was encountered in the upper half of the forest, where it moved about alone or in small parties.

Pachycephala rufiventris dorsalis Ogilvie-Grant

BLACK-BACKED WHISTLER

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, 4800 feet, April 16 to 25.

MEASUREMENTS AND WEIGHTS: Wing, 87, 92; tail, 62.5, 68; bill, 15.5, 16; tarsus, 21, 21.5. Weights, 27, 28.5.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill and feet black. Molt: Traces on chest, heavy on back (one); medium on head and chest (one). Testes slightly enlarged in both.

REMARKS: When males of *dorsalis* are compared, similar to a series from the Wahgi Valley and to one specimen from the Balim River. Mayr and Gilliard (1954, p. 352) give a discussion of a hybrid population between *dorsalis* and *leucogaster* in southeastern New Guinea and their reasons for considering *monarcha* and *rufiventris* to be conspecific.

This essentially tropical-zone species was uncommon in the mid-mountain forest edges bordering the Telefomin clearings.

Pachycephala rufinucha niveifrons Hartert

RED-NAPED WHISTLER; SAYNIN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, 7200 feet, May 10. Hindenburg Mountains: Unchemchi: One female, 5850 feet, April 11; Ilkivip: two females, 7300 feet, April 3 to 7.

MEASUREMENTS AND WEIGHTS: Wing:

Male, 87; females: 85, 85, 90.5. Tail: Male, 70; females, 63.5, 68, 70.5. Weights: Male, 39; females, 39, 41, 42.5.

CONDITION IN LIFE: Perishable colors: Iris palest tan (male); buff, pinkish buff, to buffy with gray veining (females); bill black; feet gray to brownish gray, one wine gray. Molt: Traces on head and body (one, with the testes slightly enlarged); traces on wings and chest, medium on tail and back (one); medium on chest and back (one); medium general (one).

REMARKS: Our Telefomin sample is inseparable from a large series from the Wahgi region which Mayr and Gilliard (1954, p. 352) decided to include with *niveifrons* despite minor population differences, i.e., the Wahgi populations, as well as the population of Telefomin, differ somewhat from a series of nearly topotypical *niveifrons* from the Weyland Mountains by having the upper parts, flanks, and abdomen averaging a darker, more olive green, less yellowish green, and the chest more immaculate white, less extensively tinged with yellow. However, certain individuals in both the Wahgi and Telefomin series are not separable from the Weyland birds; therefore it is inadvisable to separate a central highlands race.

This bird is common in the middle and upper tier of the mid-mountain forest above 5500 feet.

Pachycephala tenebrosa tenebrosa Rothschild

OBSCURE WHISTLER; TAWONENG

SPECIMEN COLLECTED: Hindenburg Mountains: Unchemchi: One male, 5850 feet, April 10.

MEASUREMENTS AND WEIGHT: Wing, 94; tail, 82. Weight, 46.

CONDITION IN LIFE: Perishable colors: Iris dark brownish red; bill black; feet gray. Molt: Traces on back.

REMARKS: Rand (1942b, p. 489) gives details of the distribution of *P. t. atra* and *tenebrosa*. Our Telefomin specimen is not separable from topotypical *tenebrosa* from Mt. Goliath.

Myiolestes megarhynchus maeandrinus (Stresemann)

RUFOUS SHRIKE-THRUSH; TAWONENG

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One male, 4800± feet, April 17.

MEASUREMENTS AND WEIGHT: Wing, 89; tail, 73. Weight, 37.8.

CONDITION IN LIFE: Perishable colors: Iris brown; maxilla brown, with paler cutting edges, a dark ridge, and tip; mandible rose-gray; feet gray; gape pale rose. Molt: Traces on head and body (testes slightly enlarged).

REMARKS: Above, our specimen is indistinguishable from two examples of topotypical *maeandrinus* and from a series from Lake Habbema, but below it is slightly more pinkish ochraceous, less brownish, approaching the ventral coloration of *tappenbecki*. However, above, our specimen is more olivaceous, less brownish, than either *tappenbecki* or *palmeri*.

This tropical-zone species was very uncommon at the elevation of the Telefomin station, and it was not seen at higher elevations.

Pitohui dichrous (Bonaparte)

BLACK AND MAROON WOOD-SHRIKE; KOAIN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male, one female, 4800 feet, April 16–18.

MEASUREMENTS AND WEIGHTS: Wing: Male, 103; female, 102. Tail: Male, 101; female, 98.5. Weights: Male, 83; female, 76.

CONDITION IN LIFE: Perishable colors: Iris rusty brown to dark brown; bill black; feet brownish black to black. Molt: Traces on throat and tail (one, with the testes slightly enlarged); traces on head, chest, and wing coverts (one).

REMARKS: Because this species is composed of isolated populations which vary in coloration in a most irregular "checkerboard" manner, it seems advisable not to use subspecific designations. Such a procedure was first suggested by Rand (1942b, p. 491) and followed by Mayr and Gilliard (1954, p. 353).

This esentially tropical species was found only in the forest edge bordering the Telefomin station.

Pitohui nigrescens bürgersi Stresemann

DUSKY WOOD-SHRIKE; FOOGONOK

SPECIMEN COLLECTED: Hindenburg Mountains: Unchemchi: One female, 5850 feet, April 12.

MEASUREMENTS AND WEIGHT: Wing, 128; tail, 104. Weight, 68.

CONDITION IN LIFE: Perishable colors: Iris

dark red-brown; bill blackish brown; feet dark gray. Molt: None (ovary slightly enlarged).

REMARKS: Mayr and Gilliard (1954, p. 354) give detailed studies of 18 females of the six recognized races of this species. Our example is of the brownish type. It compares fairly well with a specimen of *bürgersi* from Mt. Hagen. Apparently it is an uncommon species. Our only record is from the original mid-mountain forests of the Hindenburg Mountains.

LANIIDAE

SHRIKES

Lanius schach stresemanni Mertens

SCHACH'S SHRIKE: DOO RAYSOP

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two females, one sex?, 4800 feet, March 25 to April 24.

MEASUREMENTS AND WEIGHTS: Females: Wing, 97, 99.5; tail, 131; bill, 17, 18; tarsus, 31, 31. Weights, 50, 51.

CONDITION IN LIFE: Perishable colors (females): Iris very dark brown; bill and feet black, except former with gray at gape and base of mandible. Molt: Medium general molt (all); no sign of gonadal enlargement.

REMARKS: Our specimens are indistinguishable from two topotypical females from Sevia and from a series from the Wahgi Valley. These birds extend the range of the species westward from Mt. Hagen.

There are three large nestlings in the American Museum collections from the Wahgi Valley region (two, Nondugl, 5200 feet, June 23; one, Tomba, 7800 feet, July 21) which the senior author obtained in 1950. Glydenstolpe (1955a, p. 121) obtained two nestlings in the Wahgi Valley on May 9, 1951, and he collected males with large gonads in August, September, and October.

We found this species to be fairly common in the bushy grasslands surrounding the Telefomin Patrol Post.

ARTAMIDAE

WOOD SWALLOWS

Artamus maximus Meyer

GIANT WOOD SWALLOW; WEWOK

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Three males, one female, 4800 feet, March 26 to April 15.

MEASUREMENTS AND WEIGHTS: Wing: Males, 163, 165, 168; female, 167. Tail: Males, 69, 69, 72; female, 71. Weights: Males, 70, 69; female, 77.

CONDITION IN LIFE: Perishable colors: Iris blackish brown; bill pale blue-gray, with a black tip and cutting edges; feet blackish gray (one male); feet gray-blue (one male and one female). Molt: Medium general (all). Testes slightly enlarged (two); testes moderately enlarged (one).

TAXONOMIC ANALYSIS: This series was compared with the following material in order to determine if Gyldenstolpe's (1955a, p. 121) *A. m. wahgiensis* was applicable to our Telefomin birds: Arfak Mountains: three males, three females; Snow Mountains: seven males, three females; Victor Emanuel Mountains: three males, three females; Waghi Region: one male, four females; Adelbert Mountains: one male, four females; mountains of the Huon Peninsula: four males, one male?, two females; Hydrographer Mountains: three males, three females.

Comparing the sexes in freshly collected (1959) material from the Adelbert Mountains, we find a slight tendency towards sexual dimorphism in the coloration of the dark plumage. The single male is a shade blacker above than two of the three females. The third female is nearly as dark as the darkest male. When the sexes in the fairly recently collected (1954) material from the Victor Emanuel Mountains are compared, a male again is the darkest bird in the small series. It is only a shade darker than the other males. The single female is only slightly lighter than the average of the males.

In a comparison of the sexes in the older material (1950) from the Wahgi region, the lone male once again is the blackest bird in the series. It is slightly but distinctly blacker than any of the four females, which are more brownish black above.

From the above it appears that, although slight, there is a difference between the sexes in the single character given by Gyldenstolpe (1955a, p. 122) for his *wahgiensis*. He wrote "... the population in the Waghi Valley is easily distinguishable by its definitely darker, more blackish coloration above." Gyldenstolpe's *wahgiensis* is based on a series of two males and three females. He did not distinguish between the sexes. His type is an adult female.

When the entire series of males listed above is compared, old specimens average somewhat browner above than fresh material. The brownest male is a fully adult collected in 1918 (A.M.N.H. No. 664826) in the Hydrographer Mountains. It is dull sooty brownish black. But another male, also fully adult, collected at the same time at the same locality is considerably blacker. From such and other evidence there appears to be considerable individual variation both with regard to original coloration and to degree of fading (?foxing). The brownest male (Hydrographer Mountains) is only slightly browner than the average of the three topotypical males from the Arfak Mountains, all of which were collected in 1928, and one Arfak male (No. 294420) is a near match for the brown male from southeastern New Guinea.

The blackest males are the specimen from the Adelbert Mountains (1959) and the specimen from the Wahgi Region (1950), and quite black males are in the recently collected Victor Emanuel series (1954). Also, one male (A.M.N.H. No. 341824) from the Snow Mountains (1938) is almost as black as any. No really black males are in the very old material.

In a comparison of females, the brownest are from the Vogelkop (1928) and Hydrographer Mountains (1918), but individuals from the Huon Peninsula (1929) and Snow Mountains (1938) are nearly as brown. However, in the Snow Mountain series there are females that match females of the Wahgi region (1950).

From these studies it is evident that there is a correlation between dorsal coloration and sex, as well as between dorsal coloration and age. We feel that *wahgiensis* cannot be maintained on the basis of its dorsal coloration.

REMARKS: This species was not uncommon in small flocks soaring over the mid-mountain forests and savannas.

ORIOLIDAE

ORIOLES

Oriolus szalayi (Madarász)

STRIPED ORIOLE; IM NOY YOK

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, one female, 4800± feet, March 21–23.

MEASUREMENTS AND WEIGHTS: Wing: Males, 133.5, 138.5; female, 133. Weights: Males, 87; female, 85.

CONDITION IN LIFE: Perishable colors: Iris in male and female crimson; in subadult male, dark brown; bill in male and female crimson; in subadult male, black; feet gray; gape of subadult male grayish white. Molt: None (one); medium general (one, with slightly enlarged testes); medium general, including wings and tail (female with slightly enlarged ovaries).

REMARKS: This tropical species proved fairly common in the mid-mountain forest edge. Stomachs of two specimens contained hard yellow and red seeds about 3 mm. long, and in one specimen a few black insect legs were found.

DICRURIDAE

DRONGOS

Chaetorhynchus papuensis Meyer

NEW GUINEA PYGMY DRONGO

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One subadult male; one sex?, 4800 feet, April 16–24.

WEIGHTS: 35.5, 43.

CONDITION IN LIFE: Perishable colors: Iris blackish brown; bill and feet black.

REMARKS: The specimens were found in the crown of the mid-mountain forest. The species is apparently uncommon or lacking above about 5000 feet.

PARADISAEIDAE

BIRDS OF PARADISE

[Macgregoria pulchra De Vis]

MACGREGOR'S BIRD OF PARADISE; KONDIMKAIT

REMARKS: This species probably occurs in the highest forests of the Victor Emanuel Mountains near Telefomin. Femsep, the best local naturalist, described a species to the senior author which seems almost certainly to be this species. He said it was black, with yellow on the head, and that it lived in the "place cold" well above the vertical range of *Pteridophora alberti*. Femsep, upon seeing a color painting of *Archboldia papuensis sanfordi*, declared that his bird, which he called the *kondimkait*, was very different.

Paradigalla brevicauda Rothschild and Hartert

BLUE-AND-YELLOW WATTLED BIRD OF PARADISE

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, one subadult male, 7200–7500 feet, May 8–10.

WEIGHTS: 175, 173.

CONDITION IN LIFE: Perishable colors: Adult male: Iris blackish brown; bill black; feet dark gray; maxillary wattles bright lime yellow, with tints of yellowish green at base; mandibular wattles bright ultramarine blue, with yellow beneath at base; inside of mouth pale bluish aqua. Subadult male: Maxillary wattles bright lime yellow; mandibular wattles dull yellowish gray, with narrow black contour lines below. Molt: Heavy general molt (one); none (one subadult).

The measurements of the wing and of the tail, respectively, of adult males of *Paradigalla brevicauda* follow:

Weyland Mountains: 152, 154, 154, 155, 156, 159; 45, 51, 62
Mt. Goliath: 155.5, 155.5, 157, 157, 158; 51, 51, 53, 54
Mt. Ifal: 152; 63
Mt. Hagen: 154; 53

REMARKS: The young of both sexes have the tail much larger, up to 95 mm. in length, showing in their ontogeny a strong trend in the direction of the Vogelkop species (*P. carunculata*) which has the tail 170 to 180 mm. in length. The slightly increased tail length of our virtually adult male from Mt. Ifal may be ascribed to lingering immaturity. The second specimen, which has the tail 95 mm. in length, is a young bird, although it has the wattles well developed.

This species is apparently not uncommon in the crown of the original mid-mountain forest at elevations of more than 6500 feet.

Epimachus fastosus stresemanni Hartert

BLACK SABER-TAILED BIRD OF PARADISE; BLAK BLAK

SPECIMENS COLLECTED: Hindenburg Mountains: Unchemchi: Two males, one female, 5850 feet, April 10–11.

WEIGHTS: Male, 313; female, 218.

CONDITION IN LIFE: Perishable colors in male: Iris rust colored; "legs" pale blue; feet gray; naked postocular skin black; inside of mouth and bill bright egg yellow. Adult female: Iris, bill, feet, and inside of mouth as in adult male. Molt: Male: None (one with the testes much enlarged); fresh plumage with traces of molt on tail only (testes much enlarged). Female: Traces on neck and chest (ovary not enlarged).

TAXONOMIC ANALYSIS: Compared with males from the Wandammen and Weyland Mountains, the Hindenburg male is more blackish, less chocolate brown, particularly on the under parts and on the ornamental flank plumes. At first this difference appears to represent a valid racial character, but comparisons with the types of *atratus* and *stresemanni* strongly suggest that the brown coloration in museum skins is due to foxing.

In size the Hindenburg male has the wing and bill slightly larger than does the type of *atratus* (Mt. Goliath) and smaller than does the type of *stresemanni* (Schraderberg), which is not unexpected in view of the general west-east trend towards largeness (see table 2) and heavier weight. Concerning the latter, the Hindenburg male (313 grams) was much heavier than any males weighed by Mayr in the Wandammen Mountains (250, 255, 255, 275, 275 grams) and nearly the weight of a Mt. Hagen male (318 grams). (See Mayr and Gilliard, 1954, p. 355.)

Compared with Mt. Goliath females, the Hindenburg female has the light barring of the under parts distinctly whiter, less ochraceous, particularly on the under tail coverts, flanks, and abdomen. In this respect it agrees with a series of females from the Weyland Mountains which stand out clearly from the Mt. Goliath series. A single subadult male[1] in female plumage from Schraderberg has the whitish ventral coloration of the Hindenburg and Weyland Mountain birds.

In view of these considerations, it seems best to include our small Hindenburg series with *stresemanni*. The population from the Weyland Mountains ultimately may have to be recognized (see table 2). It is fairly distinct in coloration and size. However, its differences are clinal in nature, and therefore we prefer to maintain one racial designation for all the birds of the main body of New Guinea.

[1] Erroneously sexed as a female on the Tring Museum label, but the field label gives subadult male.

REMARKS: Natives of the Telefomin region say that this species nests in the middle story of the forest in pandanus trees during the months of February through April. In April we frequently heard the explosive liquid "quink" call of the male near the Unchemchi camp. A fledgling (A.M.N.H. No. 677963) about three to five weeks old was taken by A. S. Meek on Mt. Goliath on February 17, 1911.

Our only records for this species are from the tall forests of the north flank of the Hindenburg Mountains below 6500 feet. It is very possible that *E. fastosus* does not occur above 6500 feet, because of factors of ecological competition with the closely related species *E. meyeri*. A similar situation seems to hold true on Mt. Hagen where the species seem to occupy distinct zonal belts, with *E. fastosus* occurring lower down and in the tall mid-mountain forests often bordering forest clearings, and *E. meyeri* occurring higher up and in the heavily mossed beech forest, as well as in the highest belt of the tall mid-mountain forest—the *Castanopsis* and oaks belt. In other words, we suspect that *E. fastosus* and *E. meyeri* nearly or completely exclude each other altitudinally in much the manner that *Peltops blainvillii* and *P. montanus* do.

Epimachus meyeri albicans (van Oort)

GRAY SABER-TAILED BIRD OF PARADISE; QUEN-QUEN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, 7200 feet, May 10. Hindenburg Mountains: Ilkivip: One female, 7300 feet, April 2.

MEASUREMENTS AND WEIGHTS: Wing: Male, 171; female, 145. Tail: Male, 520. Bill: Male, 76.5; female, 75. Weights: Male, 189; female, 145.

CONDITION IN LIFE: Perishable colors:

TABLE 2

MEASUREMENTS OF *Epimachus fastosus*

	Wing	Bill[a]	Tail
Wondiwoi Mountains			
Males	186, 186, 186, 187, 188, 189, 194	57, 57, 57, 58, 59.5, 60	657, 662, 665, 673, 693
Females	153.5, 157, 157	57, 58, 59	—
Weyland Mountains			
Males	188, 194, 197	58, 60, 62	725
Females	165, 166, 166, 167, 168	57, 59, 59, 60.5, 61	—
			—
Wisselmeren Lake[b]			
Male	203	—	810
Females	168, 182	—	—
Mt. Goliath			
Male (type)	200	62	785
Females	168, 172, 172	60, 60, 62.5	—
Hindenburg Mountains			
Male	204	63	827
Female	175	59?	—
Schraderberg			
Male (type)	220	66[c]	825
Males[d] (a long series)	210–222	62–66.5	—
Females[d]	175–182	63.5–72	—

[a] Measured from anterior edge of nostril.
[b] Measurements from Junge (1953, p. 61).
[c] Approximate.
[d] Measurements from Stresemann (*in* Hartert, 1930, p. 34).

Male: Iris pale cobalt blue; bill black; feet dark gray; inside of mouth bright egg yellow. Female: Iris pale cerulean blue; bill black; feet dark brownish gray; inside of mouth corn yellow. Molt: Male: No trace of molt (the testes were enlarged to a length of 9 mm. and a width of 6 mm.). Female: Body, wing, and tail in medium molt (no sign of ovarian development).

TAXONOMIC ANALYSIS: Compared with that of *bloodi* and *albicans*, the female differs by having the light ventral barring averaging slightly warmer, more rust colored, less dull whitish. In coloration of throat similar to *bloodi* and differing from *albicans* by having throat with fine buffy flecking, not clear brownish black. When males are compared, the Mt. Ifal example is slightly darker than all on the lower neck and chest. It has the white flank plumes of *albicans*.

REMARKS: This species is uncommon, and far less numerous in both the Hindenburg and Victor Emanuel Mountains than at comparable elevations in the Kubor, Bismarck, and Hagen Mountains, which was a surprise to us, because on the last three ranges the species is heavily hunted for its plumes, whereas in the Telefomin region it has little if any value in the native economy.

The species is found only above 6500 feet in the highest belt of the mid-mountain forest (*Castanopsis* and oaks) and in the beech forest. It favors large central limbs and tree trunks which are usually moss covered. During May in the Victor Emanuel Mountains a male was heard on several successive days making very loud, snapping, cracking noises in one area of steep mountain forest. The calls were repeated with alarming suddenness about every half hour during the morning and again in the late afternoon. About 1 mile distant, another male was heard performing in similar fashion. Both were presumed to be in attendance at their arboreal dance limbs.

Astrapia splendidissima elliott-smithi Gilliard

SPLENDID BIRD OF PARADISE; DAN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Four adult males, two females, 7200–7300 feet, May 6–11; Deikimdikin: three subadult males, one female, one female?, 7000–7300 feet, April 20–22. Hindenburg Mountains: Ilkivip: Two adult males, one subadult male, four females, 7300 feet, April 2–7.

MEASUREMENTS AND WEIGHTS: (For measurements, see Gilliard, 1961, pp. 3, 4). Weights: Adult males: Hindenburg Mountains, 124, 132; Victor Emanuel Mountains, 136, 138, 138, 151 (type). Subadult males in female plumage: 131, 134, 135, 139. Females: Hindenburg Mountains, 123, 126, 129, 133; Victor Emanuel Mountains, 108, 120, 122, 126.

CONDITION IN LIFE: Perishable colors of the type and other adult males: Iris blackish, bill black, feet silvery blue-gray, inside of mouth pale yellow tinged with aqua. Subadult males differ by having the iris dark brown. Adult females have the iris gray-brown to dark brown; the feet blue-gray, lead; the inside of the mouth pale greenish yellow to whitish yellow. Molt: Adult males: None (two, both with the testes enlarged to 7.5 mm.); traces on tail, medium on scapulars and wings (one, the type, in which the testes were enlarged to 9 mm.); heavy general (two, both with the testes enlarged to 3–3.5 mm.); heavy general except on the head (one, a specimen with the testes enlarged to 6 mm.). Subadult males: None (three); medium on back, heavy on tail and wings (one). All the males had black testes. Females: None (three); traces (four); medium (one). No trace of ovarian enlargement was found.

REMARKS: The discovery of this new race in the Telefomin region extends the range of this species from the high mountains of Netherlands New Guinea to both the Mandated Territory of New Guinea and Papua.

The Splendid Bird of Paradise occurs in the mossy beech-forest formation of the mid-mountain forest above 6500 feet. Although not uncommon, the males proved very difficult to collect. About 250 man hours of hunting were required to bring down two adult males in the Hindenburg Mountains. During that period males were sighted fewer than 10 times, and the ratio of adult males to females seemed to be about one to five or more. In the Victor Emanuel Mountains the males seemed somewhat more common, and four were obtained in about 150 man hours of hunting.

A male (the type), shot by the senior author May 11, was observed climbing on the side of a broad, moss-covered tree trunk in thick moss forest. The tree, which was sloping, was situated on very steep terrain in tall, mist-enshrouded forest.

The stomach of this male contained coral-colored pandanus seeds about 11 mm. long belonging to a palm found frequently above 6000 feet, which reaches a height of about 40 feet. These seeds were sent to Dr. David Fairchild in Florida, who received them just before his death in July, 1954. They were planted in the Fairchild Tropical Garden at Coconut Grove, Florida.

Parotia carolae clelandiae Gilliard

QUEEN CAROLA'S SIX-WIRED BIRD OF PARADISE; DUL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, 4800–5000 feet, April 13 to May 25; one photographic study of a living male captured on its bower and sent on loan to the Honolulu Zoo where (1960) it still lives; one female, 4800 feet, March 22.

MEASUREMENTS AND WEIGHTS: (For measurements, see Gilliard, 1961, p. 6). Weights: Males, 205, 211; female, 163.

CONDITION IN LIFE: Perishable colors: Males: Iris lemon yellow, with narrow inner ring of tan; bill black; feet black, brownish black; eye ring black (one); inside of mouth: maxilla greenish yellow, mandible sooty (one), dark gray with flecks of aqua (one). Female: Iris lemon yellow; bill black; feet dark brown; gape light brown; inside of mouth lemon yellow. Molt: No trace of molt was found. Testes enlarged and black (two); ovary slightly enlarged and orange-yellow (one).

REMARKS: This bird of paradise is sparsely but widely distributed through the mid-mountain forests of the Victor Emanuel Mountains.

On March 23 the senior author made the following observations of the first of two "bowers" of this species which he saw in the Victor Emanuel and Hindenburg Mountains: "This afternoon Ininsip [a Telefomin boy] guided me to the dancing ground of the Dul. Walking northeast from Telefomin Valley (4800 feet), we departed from the grassy clearing on a gradually ascending trail. It passed through narrow clearings spotted with clumps of rhododendron, bearing huge aromatic white flowers, and small trees, then into a cavernous forest (with crown averaging 70 feet) which presented a solid wall as we approached it. Inside the trail (which had been recently cleared to a width of 20 feet) was floored with a meshwork of roots which covered the ground and in many places served as stairs.

"We ascended to 5500 feet, crossing one small stream, then at the base of a steep slope (rising to the north) we turned left off the trail into the forest. Large patches of second growth appeared here and there. Many dead trees rose like masts from the younger stands of second growth which averaged about 30 feet in height. The substage of this new forest was thickly intertwined with foliage. Visibility was at most 30–50 feet.

"While in this habitat, Ininsip's actions suddenly indicated that the Dul was in the vicinity. Parting the bushes, we saw a kind of 'telephone booth' blind built of dried palm leaves. Beyond it, hardly 6 feet from the blind, was a cleared patch of fairly level ground surmounted by a kind of 'jungle jim' of dead sticks, vines, and saplings. Several of the larger dead limbs formed nearly horizontal perches up to 2 inches in diameter and 2 to 4 feet above the cleared area. The most prominent perch (a dead limb) was 3½ feet up and 2 inches in diameter. It was over the middle of the clearing and had been stripped of its bark and moss and was buff colored and worn from use. Below, the ground was cleared of all fallen debris such as twigs, leaves, and bark. However, it was richly cloaked in moss —a kind of brownish gray growth which was so short it somewhat resembled wet burlap spread on the ground. All about were droppings containing many red and yellow seeds. In places the clearing was so splattered it reminded me of an artist's palette. The cleared area was 6–8 feet in diameter, roughly round, and was only slightly inclined downward to the west. Some 10 to 15 feet away a large dead tree rose like a stripped pole to 60 feet, but the crown was a canopy of small trees with occasional taller trees (40 feet) intermixed.

"The bird was not seen at the bower, al-

though, when we were about one-quarter mile distant from it, Ininsip heard the male several times. Later at about the same position I shot and wounded a *Melidectes torquatus*. This bird, in trying to flee, cried loudly and, as a result, several birds flew to investigate. One proved to be the male Queen Carola's Six Wire.

"With its predominantly black plumage, it looked rather like a crow. It hopped about in the middle part of the forest (12 to 20 feet up) for perhaps a minute, then flew off quietly. The wires could not be seen, nor could the iridescent chest shield. Only flashes of white at the sides confirmed Ininsip's identification.

"While at the dance area I cleared a 35-foot tunnel which led back to the flaring roots of a large pandanus tree. At a later date I will attempt to make strobe shots of the bird in the act of displaying from this position.

"The native blind described earlier had been built so that its arrow porthole was about 6 feet from the main display perch. This blind had been in position for many days judging by the wilted condition of the leaves used in its construction. From an examination of the blind it was evident that the hunter positions his bow and arrow and himself stands in the firing position within the narrow structure. Probably his four-pronged 'bird'-catching arrow protrudes three or four feet from the front of the blind.

"Upon completion of my blind I departed. To my intense disappointment, however, several days later a wounded male was brought to my camp by a stranger. It developed that it was 'our' bird. It had been stunned by a blunt arrow blow on the chest. It soon recovered but could not fly very well and within a few weeks it became quite tame. By day it lived in a bower-like structure of bushes and trees which we made for it in the center of a large clearing of grass. It remained there in the shadows guarded by native boys.

"Before leaving Telefomin we took this male back to its original bower and, with a team of boys encircling the structure, I liberated it on its bower. It immediately hopped around to investigate, tried various perches, and in a few minutes expanded its white flank plumes (these are normally concealed) and began to preen them on one of the central perches. It now switched its head and wires, examined the ground and seemed content. During this period I made stroboscopic spotlight pictures and several closeups showing the male in what I am reasonably certain is a normal attitude on its own display ground.

"After an hour at the bower it began to rain. The bird was then recaptured and later I sent it by air from Lae via Hollandia and Manila to Honolulu. There Director Paul Breeze provided a large private cage for it near cages containing *Diphyllodes magnificus*, *Paradisaea rudolphi*, *P. rubra*, *P. minor*, *Cicinnurus regius*, and one or two additional species of Paradisaeidae. In May, 1959, when I again saw this male, it was displaying on the ground under a bush. When it dies, it will be preserved in spirits and deposited in the American Museum collections.

"A series of three photographs in color of this male on its bower (made under the controlled conditions described above) were published in the National Geographic Magazine for October, 1955, page 479.

"The second bower of this species that I saw was in the Hindenburg Mountains on the north flank of the Nunk River, at an altitude of about 5600 feet. It was observed but briefly as we traveled a forest trail on the side of a gently sloping hill. This bower was in a somewhat more open area of bushes, with an open upper story of tree crowns. The birds were not seen. The bower was a 'criss cross' of vines and limbs as was bower number one. The ground below these limbs had been largely cleared of fallen forest debris."

Lophorina superba feminina Ogilvie-Grant

SUPERB BIRD OF PARADISE; TRANG

SPECIMENS COLLECTED: Victor Emanuel Mountains: Deikimdikin: One female, 6000 feet, April 22; Momsakten, upper Sepik watershed: one male, 5300 feet, March 29. Hindenburg Mountains: Unchemchi: Two males; one female nestling, 5550–5850 feet, April 9–11.

MEASUREMENTS AND WEIGHTS: Males: Wing, 134, 138 (Momsakten), 144; tail, 85, 91 (Momsakten), 91. Female: Wing, 116.5 (nestling), 122; tail, 85.5. Weights: Males, 95, 87, 79; female, 71.

CONDITION IN LIFE: Perishable colors: Males: Iris dark brown to blackish; bill black;

feet brownish black; naked skin around eye black; inside of mouth lime yellow. Female: Iris dark brownish gray; bill black; feet dark gray; inside of mouth pale greenish yellow; skin of face blackish. Molt: None (two males with testes much enlarged), one female; heavy on sides of chest shield and cape and medium on wings (one male with testes much enlarged).

REMARKS: Our Telefomin female agrees very well with the distinctively colored *feminina*. It has the light barring of the under parts strongly suffused with ochraceous buff, as in a series from the Weyland Mountains, not grayish white tinged with buff as in two examples from the Wahgi region (*pseudoparotia*?) and in a series from the Huon Peninsula (*latipennis*).

This bird is not uncommon in the edges of the high mid-mountain forest but apparently is not found above about 6000 feet. A large female nestling was obtained from a native on April 9.

Diphyllodes magnificus chrysopterus Elliot

MAGNIFICENT BIRD OF PARADISE; TIMONSEN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Four males, one subadult male, 4600± feet, April 19–27. Mittag Mountains: Eliptamin Valley?: Two males, one sex?, 3000± feet, May 12–14.

MEASUREMENTS AND WEIGHTS: Wing, 114, 115, 115, 116, 116; tail, 38.5, 39, 39, 41. Weights, 94, 100, 101, 102.

CONDITION IN LIFE: Perishable colors: Male: Iris blackish brown; bill pale cerulean blue, brighter at base, with narrow, blackish, cutting edges; feet smoky purplish blue; inside of mouth bright yellow green; naked postocular skin sky blue. Molt: No trace of molt. Testes much enlarged and blue-gray to dark gray in all.

TAXONOMIC ANALYSIS: Compared with series from the Vogelkop (*magnificus*), Weyland Mountains (*intermedius;* see Rand, 1942b, p. 497), Jobi Island, Idenburg River, Cyclops Mountains (*chrysopterus*), Strickland River head waters (subspecies?), and southeastern New Guinea (*hunsteini*), the Telefomin males are essentially similar to *chrysopterus*. There is a general west-east trend towards deeper orange, less yellow-orange, in the coloration of the secondaries and tertiaries. The race *hunsteini* is the most richly colored of all, except as noted below. The Telefomin population shows the influence of this trend in that the males, although essentially similar to those of topotypical *chrysopterus*, are somewhat deeper orange in coloration.

REMARKS: This species is reported to be common in the mid-mountain forests of the Takin gorge. One of our males was said to have been shot with an arrow as it displayed on its bower.

The Mittag Mountains specimens are native-made skins that were purchased from a native of the Eliptamin Valley within a day or two of their preparation.

Diphyllodes magnificus subspecies?

MAGNIFICENT BIRD OF PARADISE

SPECIMENS COLLECTED: Headwaters of Strickland River: Two males (native trade skins).

REMARKS: Compared with the extensive series mentioned above, these two skins differ from all by having the orange inner secondaries suffused with rose color. A specimen at hand from Mt. Mabion (750 meters), Dap Mountains, collected by the 1936 Archbold Expedition (see Introduction, p. 7) is also from the southern watershed. This specimen lacks the suffusion of red. Were it not for this Mt. Mabion specimen, I would not hesitate to recognize the Strickland population as new. As it is, I fear that the native collectors may somehow have altered the feather coloration of our Strickland River trade skins.

Cicinnurus regius similis Stresemann

KING BIRD OF PARADISE

SPECIMENS COLLECTED: Eliptamin Valley?: One native trade skin.

REMARKS: This specimen was purchased from a native, who said that it came from the Eliptamin Valley. It agrees with *similis* in having a dark orange forehead, a purplish throat and upper chest, and a narrow vertical eye spot.

Paradisaea raggiana subspecies?

RAGGIANA BIRD OF PARADISE

REMARKS: This native trade skin has deep red flank plumes. It was obtained from a Telefomin native who said it came from the

Om River near the headwaters of the Strickland River.

Paradisaea minor finschi Meyer

LESSER BIRD OF PARADISE; KIOOM

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two males, three subadult males, three females, 4800 feet, March 27 to April 30; Uftemtakin, Elip River Valley: two males, 3500–4000 feet, April 21.

WEIGHTS: Male subadults, 151, 185, 191; male adults, 183, 243; females, 146, 152.

CONDITION IN LIFE: Perishable colors: Male: Iris lime yellow; bill light grayish blue; feet blue-gray; inside of mouth pale aqua. Female like male but feet pale brownish gray and inside of mouth dull yellowish gray. Molt: Male: None (three); heavy general (one). Testes enlarged in all adults.

The measurements of adult males of *Paradisaea minor* are as follows:

Telefomin (4800 feet): Wing, 168, 180.5; tail, 113.5, 122.5, 125

Uftemtakin (3500–400 feet): Wing, 181, 184, 185, 190.5; tail, 126.5, 130, 131

Sepik River (200 feet): Wing, 173, 177, 178, 179, 185, 186; tail, 124, 124, 126, 126, 129

TAXONOMIC ANALYSIS: As indicated by the above measurements, there appears to be no significent increase in size with altitude. The series from the Telefomin region is a shade paler but taxonomically inseparable from a fresh series of nearly topotypical *finschi* from the Sepik River lowlands.

REMARKS: This tropical-zone species proved to be abundant in the mid-mountain forest edge as high as 5000 feet above sea level. Above that elevation it was never seen. A display ground was found about a mile from the Telefomin Patrol Post at an elevation of about 4700 feet. It was in the edges of a clump of much-disturbed, second-growth, mid-mountain forest growing on a rounded hill between taro garden clearings. Observations made at that display area indicated that groups of males gathered together in tight knots and displayed with one another regardless of the absence of females. Often two or more males scurried about in full display within a few feet of one another among the upper crown limbs. They elevated the plumes and lowered the head and tail in much the manner of the Great Bird of Paradise (*Paradisaea apoda*) as observed on Little Tobago Island by the senior author. Individual males did not defend an individual dancing stage as do those of *Paradisaea raggiana salvadorii* of the Wahgi Valley. In the latter species groups of males congregate in similar vegetational situations, such as those used by *P. minor* near Telefomin, but each male seemed to take up a personal perch that he defended by charging at other males. Another significant difference noted between the Telefomin population of *Paradisaea minor* and the Wahgi Valley population of *Paradisaea raggiana* is that the latter displays by audibly thumping the backs of its "wrists" together over the upper neck, whereas the former does not strike the outsides of wings together overhead but uses the wings for spasmodic "rowing" display movements at the sides of the body.

Pteridophora alberti alberti Meyer

KING OF SAXONY BIRD OF PARADISE; INEM

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Two subadult males, 7200 feet, May 6–9. Hindenburg Mountains: Ilkivip: Two males, two subadult males, seven females, 7300–7600 feet, March 31 to April 7.

MEASUREMENTS AND WEIGHTS: Adult males: Wing, 121, 124; tail, 81. Females: Wing, 107, 111, 111, 114, 118, 121; tail, 80.5, 81.5, 85, 88. Weights: Male, 80; females, 68, 69, 72, 75, 77, 78, 83.

CONDITION IN LIFE: Perishable colors: Males: Iris dark brown; feet dark lead gray; inside of mouth aqua. Females: Iris as in male; legs bluish gray to brownish gray. Molt: Adult males: Heavy general molt, with the long occipital plumes completely lacking (one); heavy general molt, with the occipital plumes about one-third grown (one, testes very large). Adult females: None (one); traces (two); medium (three); heavy (one). Subadult males: None (one, testes very large); traces (two, testes not enlarged); medium on body only (one, testes slightly enlarged). Testes black in all. Ovaries not enlarged (all females).

TAXONOMIC ANALYSIS: When females are compared, the series from the Hindenburg Mountains agrees with a series from the Snow and Weyland Mountains, although the latter averages slightly lighter. Compared with a

series from Mt. Hagen (*hallstromi*), the Hindenburg population has the under parts distinctly darker, owing to broader and blackish barring, particularly on the lower flanks and abdomen.

REMARKS: This species occurs in the middle and upper tiers of the mossy beech forest above 7000 feet in both the Victor Emanuel and the Hindenburg Mountains. The males proved elusive and thinly distributed; the females were fairly common. It is probable that the females outnumber the males by a ratio of about three to one.

The occiptal plumes of the male exhibit considerable individual variation. Completely fresh plumes have the trailing edges of the blue filaments heavily fringed with fine, black, hair-like edges. These wear with age, until, just before shedding, the blue filaments lose most of the fringing and tend to curl. When new the celluloid texture of these ornamental plumes is crisp and bright. They are robin's-egg blue on one side and glossy brownish black on the other. As the year wanes the blue filaments lose their brightness, becoming more grayish blue on one side and more dark smoky brown on the other. The range of variation in total length of these extraordinary plumes is, in males, 348–424 (399.4), whereas the total body length of these birds averages 219 mm. The number of filaments (counting the fine filaments at the tip) shows much variation, but none that is correlated with geography. They numbered from 34 to 44 (39.5). The shape of the filament is also quite diverse. Basically the filament has the outline of a half-opened bird wing, with the shaft representing the bird body. The leading edge of the wing-shaped filament is usually swept back to a considerable degree. In some, however, the leading edge is more nearly at right angles to the shaft, giving a "squarish" appearance rather than the usual streamlined shape. There is much individual variation in the general size of the filaments.

Loria loriae loriae Salvadori

LORIA'S BIRD OF PARADISE; MILOME

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, 7200 feet, May 10. Hindenburg Mountains: Ilkivip: One male; one subadult male, 7300 feet, April 6–7.

MEASUREMENTS AND WEIGHTS: Wing: Males, 97, 99 (subadult), 101. Tail: 67, 74.5 (subadult). Weights: 77, 94.

CONDITION IN LIFE: Perishable colors: Males: Iris blackish brown; bill black; feet very dark gray; inside of mouth palest yellow; wattles cream color. Molt: Medium general, with heavy patch molt on crown and throat (one); none (one). The molting male had slightly enlarged blackish testes; the male in fresh plumage had enlarged blackish testes.

REMARKS: The adult males compare well with those of *loriae* from the Weyland Mountains. Examples of *inexpectata* were not available for study, but our adult males have the secondaries pale violet and purple as in those of *loriae*, not greenish as in those of *inexpectata*. Compared with examples from Mt. Hagen (*amethystina*), our males have the iridescent secondaries much paler, more violet, as in those of *loriae*, not darker, more dull purplish, as in those of *amethystina*.

Our extensive measurements show that there is a slight tendency towards smallness in both the Weyland Mountain and southeast New Guinea populations.

Loria's Bird of Paradise proved to be quite uncommon in the forests surveyed by us. Its bell-like, ventriloquistic tolling, which was a feature of Mt. Hagen in July, was not heard in the Hindenburg or Victor Emanuel Mountains.

Loboparadisea sericea (?sericea) Rothschild

SHIELD-BILLED BIRD OF PARADISE; JUNGAM

SPECIMEN COLLECTED: Victor Emanuel Mountains: Deikimdikin: One subadult male, 6000± feet, April 22.

MEASUREMENTS AND WEIGHT: Wing, 98; tail, 61.5; bill, 17; tarsus, 34. Weight: 68.

CONDITION IN LIFE: Perishable colors: Iris brown; bill blackish, becoming dull olive at tip; feet black; skin of face dark gray. Molt: Medium general, including wings and tail. Testes black and not enlarged.

REMARKS: Compared with a small series (four females, one juvenile male) of nearly topotypical *sericea*, our Victor Emanuel specimen is slightly more greenish olive, less yellowish olive, above than in the juvenile male, and it is slightly more olive, less ochraceous, than the four females. No comparative examples of *aurora* were studied.

This species is apparently very uncommon.

Our specimen was shot by a native hunter, who reported that it was with another of the same species in the crown of high mid-mountain forest. Its stomach contained small seeds and one blue berry.

PTILONORHYNCHIDAE

BOWERBIRDS

Amblyornis macgregoriae macgregoriae De Vis

MACGREGOR'S BOWERBIRD; FAGAN

SPECIMENS COLLECTED: Hindenburg Mountains: Unchemchi: One subadult male, 6400 feet, April 11; Miptagin: two subadult males, 6700 feet, April 13.

MEASUREMENTS AND WEIGHTS: Males: Wing, 130, 131, 133; tail, 84.5, 91. Weights, 120, 130, 132.

CONDITION IN LIFE: Perishable colors: Iris brown; maxilla dark brown; mandible gray to pinkish gray, darker on cutting edges; feet dark gray. Molt: Medium general (one, gonads not enlarged); heavy general (two, one with testes slightly enlarged).

TAXONOMIC ANALYSIS: In a previous study of the geographic variation exhibited by this species (Mayr and Gilliard, 1954, p. 363), the matter of subspecific designation of populations from the Mt. Hagen, Mt. Kubor, and Wahgi Divide regions was left undefined. Gyldenstolpe (1955a, p. 145) and Sims (1956, p. 428) followed the same procedure. With new material available for study from the Mt. Hagen region, plus a small series from the Hindenburg Mountains, we decided to restudy the species, using all the material available in the American Museum, and Herzog Mountain material kindly lent to us by Mr. James Greenway of the Museum of Comparative Zoölogy.

The measurements (see table 3) confirm the validity of three races: *mayri* of western New Guinea, *macgregoriae* of southeastern New Guinea, and *germanus*, a very distinct race from the Huon Peninsula. Mayr and Gilliard (1954) failed to note the sharp break in tail length (males) between western (Weyland Mountains, Snow Mountains, and Mt. Goliath) and eastern mainland populations. This character we now use and weigh rather heavily. Taken together with crest length, it becomes clear that *mayri* differs by having a longer tail and crest than *macgregoriae*.

A careful study of males, females, and subadult males indicates that the color of the crest and of the olive brown head and body plumage is subject to much individual variation as well as to considerable post-mortem change. Old specimens from the Weyland Mountains have changed from olive-brown to coffee brown. Furthermore, when populations from the Snow Mountains (1938), from the Weylands (1930–1931) and from the Hindenburgs (1954) are compared, it is clearly evident that, in addition to foxing, geographical variation of color is present. For example, two of the three young males from the Hindenburg Mountains collected in 1954 are nearly as richly colored below and on the head as are the examples of young males and females from Mt. Goliath collected in 1911. Also the Hindenburg Mountains and Mt. Goliath series, taken together and compared with Snow Mountain birds, have the lower parts (chiefly the abdomen) deeper, more deep ochraceous, less ashy buff; above they have the head distinctly more rufous, less olive. On the other hand, topotypical *mayri* from the Weyland Mountains again is richer brown and in this character is closer to Mt. Goliath and Hindenburg Mountain birds than to the populations from mountains that are geographically intermediate between the two. A similar situation is found in eastern New Guinea exclusive of the Huon Peninsula. There is, then, a tendency towards checkerboard coloration. This is also evident in the Mt. Kubor population, which is a bit more ashy buff below than the Mt. Hagen population, and the birds of southeastern New Guinea tend to be more coffee brown. However, there is much overlap, and some of the Mt. Hagen birds match old specimens from southeastern New Guinea.

Excluding *germanus* of the Huon Peninsula, it therefore seems best to use tail length and crest length alone to differentiate races. In measurements the populations from the Hindenburg Mountains, Mt. Hagen, Mt. Kubor, the Wahgi Divide mountains, and the Herzog Mountains belong with the eastern form of the main ranges (=*macgregoriae*). All populations examined from Mt. Goliath westward belong with *mayri*.

REMARKS: To judge from native reports, the species is not uncommon above an altitude of about 6000 feet.

TABLE 3

MEASUREMENTS OF *Amblyornis macgregoriae*

	Wing	Tail	Bill	Crest from Posterior Base
Weyland Mountains				
Males	(7) 135–142 (137.4)	(7) 87–94.5 (91.6)	(7) 29–31.5 (29.9)	(7) 61.5–74 (69.7)
Males, subadult	(2) 133–137 (135)	?		
Females	130	82	28	—
Snow Mountains				
Males	(2) 138–140 (139)	96.5	(2) 27 (27)	(2) 66–76 (71)
Males, subadult	(4) 138–142 (139.7)	(4) 90.5–11 (94.5)	—	—
Females	(8) 131–140 (138.3)	(8) 86–94 (90.6)	(8) 26–29 (27.6)	—
Mt. Goliath				
Males	(2) 136–141 (138.5)	(2) 91–95 (93)	(2) 28–29 (28.5)	(2) 72.5–78.5 (75.5)
Males, subadult	133	(2) 82–88 (85)	—	—
Females	(2) 129–132 (130.5)	(2) 84–84 (84)	(2) 28–29 (28.5)	—
Hindenburg Mountains				
Males, subadult	(3) 130–133 (131.3)	(2) 84–91 (87.5)	—	—
Mt. Hagen region				
Males	(9) 134–142 (136.7)	(7) 83–88 (86)	(7) 26–28 (27.5)	(7) 58–68 (64)
Males, subadult	(4) 129–138 (135.2)	(3) 85–90 (87.3)	—	—
Females	(4) 126–134 (129.5)	(4) 78–86 (83.5)	(4) 26–28 (27.2)	—
Herzog Mountains				
Males	(3) 131–138[a] (133.7)	80–81 (80.5)	—	(2) 57–61 (59)
Males	(2) 131–132 (131.5)	85, 88 (86.5)	26.5, 27 (26.7)	(2) 54–63 (58.5)
Males, subadult	124	81	26.5	—
Females	124, 128, 135 (129.1)	81, 84, 88 (84.3)	25, 27, 28 (26.6)	—
Mountains of southeastern New Guinea				
Males	(12) 129–138 (133.9)	(12) 83–93 (86.7)	(11) 26–29 (27.9)	(11) 49–69 (59)
Males, subadult	(3) 128–135 (131.7)	(3) 87–93 (89.7)	—	—
Females	(2) 125–125 (125)	(2) 85–87 (86)	—	—
Mountains of Huon Peninsula				
Males	(3) 127–133 (130)	(3) 84–91 (88.3)	(2) 24–29 (26.6)	(3) 43–48 (45)
Males, subadult	(3) 123–129 (126)	(2) 86–89 (87.5)	—	—
Females	(3) 125–128 (126.3)	(3) 84–86 (84.7)	(2) 25–28 (26.5)	—

[a] Measurements from Sims (1956, p. 428) and Mayr (1931b, p. 648).

CERTHIIDAE

TREE CREEPERS

Climacteris placens steini Mayr

GRAY-RUMPED TREE CREEPER; ADIMDONGDONG

SPECIMENS COLLECTED: Hindenburg Mountains: Unchemchi: One subadult male, one female?, one subadult female?, 5550–5850 feet, April 10–12; Momsakten: one subadult female, 5280 feet, March 29.

MEASUREMENTS AND WEIGHTS: Wing: Male, 83.5; female?, 82, 86; female, 81. Weights: Male, 19.5; female?, 17, 17.8; female, 18.

CONDITION IN LIFE: Perishable colors: Adult female?: Iris reddish brown, bill black, with much gray on under base of mandible, feet grayish olive; subadult male and subadult female: iris brown, bill brownish black with spot of bone color on under base of mandible, feet yellowish olive, gape dull yellow, inside of mouth yellow. Molt: None

(male, testes slightly enlarged); traces on body and tail (one); traces on body (one); medium general on body (one).

REMARKS: Rand (1940a, p. 11) writes: "The gray rump, upper tail coverts and tail separate this race [*inexpectata*] from all other races of this species. This is the grayest race, *steini* of the Weyland Mountains is the next grayest, and *placens* from Arfak and *meridionalis* from southeastern New Guinea are the least grayish."

When the coloration of the rump and upper tail coverts is compared, our fully adult specimen from the Hindenburg Mountains is much less gray, more brownish, than adults of *inexpectata*, the race geographically nearest to the Telefomin region. Our adult Hindenburg specimen also differs from both *meridionalis* and *placens* by having the rump and upper tail coverts much more gray and by having the upper parts generally duller, less suffused with olive. However, in these characters the Hindenburg specimen is an almost perfect match for two examples at hand of *steini* from the Weyland Mountains.

This species is fairly common in the Hindenburg Mountains. One specimen, shot by the senior author on a rounded ridge in tall mid-mountain forest, was observed creeping on a large trunk about 15 feet above ground.

MELIPHAGIDAE

HONEYEATERS

Timeliopsis fulvigula subspecies?

MOUNTAIN STRAIGHT-BILLED HONEYEATER

SPECIMEN COLLECTED: Victor Emanuel Mountains: Mt. Balamtagin: One sex?, 6200 feet, May 12.

WEIGHT: 16.2.

CONDITION IN LIFE: Perishable colors: Bill dark brown; feet grayish brown; gape yellow. Molt: Traces on head and neck.

REMARKS: Our only record of this species is a specimen preserved in spirits. It is not possible to determine whether it belongs to the western race, *montana*, or to the eastern race, *meyeri*.

Myzomela cruentata cruentata Meyer

RED MYZOMELA; TROPROP

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One sex?, 4800 feet, March 20.

MEASUREMENT AND WEIGHT: Wing, 52. Weight, 6.

CONDITION IN LIFE: Perishable colors: Iris rusty brown; bill black; feet gray; gape yellow.

REMARKS: This bird caused much comment among our natives, because it had each "leg" encircled by a loose band which slid up and down like a bracelet. The hunters remarked in Neomelanesian "*Bilas alsam man*," which means "ornaments such as man wears." The rings appear strong. They may be composed of spider webbing into which the bird had accidentally flown.

This species inhabits the mid-mountain forest crown. The maximum altitude at which it occurs is apparently about 4800 feet.

Myzomela rosenbergii rosenbergii Schlegel

ROSENBERG'S MYZOMELA; NAMIARIVIPHAIR

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two subadult males, one female, 4800 feet, March 20; Mt. Ifal: one [male], one female, 7600 feet; May 7. Hindenburg Mountains: Ilkivip: Five males, one female, 7300–7700 feet, March 31 to April 5; Unchemchi: one [male], 5850 feet, April 9.

MEASUREMENTS AND WEIGHTS: Males: Wing: Arfak Mountains, 64, 65, 65, 65, 65, 67.5; Hindenburg Mountains, 62.5, 65, 65, 67, 67, 67.5; Victor Emanuel Mountains, 62, 63, 66; Mt. Hagen district, 65, 65, 65.5, 66; southeastern New Guinea, 61, 63. Weights: Males, 9.5, 9.8, 10, 10, 10, 10, 10.3, 10.5, 10.5; females, 9.5, 9.5, 9.5.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill black; feet black with yellow pads (four, one vinaceous black), dark gray (six), brownish gray (one), brownish black (one), gape yellow to dull yellow (four). Molt: None (three, one with testes enlarged); traces on body (two, one with testes enlarged); traces on tail (two, with testes slightly enlarged); medium on body and head only (one, with testes enlarged); medium general (three, one with testes enlarged).

REMARKS: We cannot distinguish *wahgiensis* (Gyldenstolpe 1955a, p. 155) from the Hindenburg-Victor Emanuel series which, in turn, fits very well with a series of topotypical *rosenbergii*.

The stomach contents of two specimens included small, black-bodied insects.

Rosenberg's *Myzomela* was fairly common

in the mid-mountain forest crown and in forest-edge situations.

Toxorhamphus iliolophus iliolophus (Salvadori)

GREEN LONG-BILLED SUNBIRD

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One female, 4800 feet, April 30.

MEASUREMENTS AND WEIGHT: Wing, 61.5; tail, 30.5; bill, 17.5. Weight, 9.7.

CONDITION IN LIFE: Perishable colors: Iris brown; bill black, with the basal half of the mandible gray; feet blue-gray; eye ring and gape dull yellow. Molt: General, except none on wings.

REMARKS: This specimen agrees with *iliolophus*. It is sharply distinguished from *flavus* (from just across the Telefomin Divide) by its lack of a tuft of pale yellow flank plumes.

This species of the lower mountain slopes was uncommon to rare in the mid-mountain forests.

Toxorhamphus poliopterus subspecies?

YELLOW-THROATED GREEN SUNBIRD; FRANKATE

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Two females, 4800 feet, March 20 to April 30.

MEASUREMENTS AND WEIGHTS: Wing, 59, 59.5; tail, 32, 36.5; bill, 27, 27.5. Weights: 8.5, 11.

CONDITION IN LIFE: Perishable colors: Iris light rust brown; bill black; feet dark gray. Molt: Medium general (one); heavy general (one).

REMARKS: We are unable to identify the Telefomin population as to race on the basis of this small sample.

This species of the lower mountain forests was uncommon.

Melilestes megarhynchus stresemanni (Gray)

LONG-BILLED HONEYEATER; TAA-RANG

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One female, one juvenile male, 4800 feet, May 1.

MEASUREMENTS AND WEIGHTS: Wing: Female, 94. Weights: Female, 42; juvenile, 35.

CONDITION IN LIFE: Perishable colors: Female: Iris red-orange; bill dark brown, with light cutting edges on the mandible; feet light blue-gray. Juvenile: Bill black; feet dark gray; gape and eye ring yellow; inside of mouth yellow. Molt: Medium general (female).

REMARKS: This tropical-zone species was apparently rare in the Telefomin region.

Melipotes fumigatus goliathi Rothschild and Hartert

YELLOW-FACED HONEYEATER; MOGANING

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: One male, seven females, one sex?, 7200–7600 feet, May 6–11; Ilkivip: six males, four females, 7300 feet, April 1 to 7.

WEIGHTS: Males, 54, 58, 58, 58, 61, 61, 66; females, 47.6, 48.7, 50, 50, 51, 51, 53, 56, 56, 57, 57.

CONDITION IN LIFE: Perishable colors: Males and females: Iris dark brown to red-brown; bill black (one with bone tip on mandible); feet blackish gray to blue-gray; naked skin on face bright orange-yellow, with tints of orange or red; wattles orange-yellow to red-orange. Molt: Males: None (one), traces (two, testes slightly enlarged in one, quite enlarged in one), medium (four, the male with enlarged testes). Females: Traces (four), medium general (three), medium on body (three), heavy general (one).

TAXONOMIC ANALYSIS: Compared with males of *fumigatus*, the Mt. Ifal and Ilkivip males are slightly darker below, with a more bluish gray cast; they are also darker, more blackish, above. The females of *fumigatus* show a yellowish tinge underneath that is not present in our birds. Our males compare well with topotypical males of *goliathi*. Both males and females of *goliathi* appear slightly more brownish on the back, probably owing to foxing.

As Rand has pointed out (1942b, p. 503), this species shows such a decided increase in size with increase in altitude that altitudinal races might be recognized. In the following list of wing measurements, for example, the large-winged specimens from the Snow Mountains and from Mt. Hagen are from high elevations (probably from well above 8000 feet), whereas all the other specimens are from localities below 6000 feet.

As this increase in size with increase in altitude is clinal in nature, we agree that it is impractical to dismember the species further.

The wing measurements of *Melipotes fumigatus* follow: Snow Mountains, seven males, 114–128; Mt. Goliath, five males, 108–118; Telefomin region, seven males, 106–118; Wahgi and Mt. Hagen regions, 16 males, 108–126.5; Nondugl, 12 males,[1] 107–118; southeastern New Guinea, 14 males,[2] 108–117.

REMARKS: The mouth of one female contained dark, mulberry-colored berries about 6 mm. in diameter. This species is found mostly in the crown of the mid-mountain forest above 6000 feet.

MELIDECTES

For a discussion of the ecological factors affecting these birds and a taxonomic reclassification, see Gilliard (1959). For earlier studies of the *Melidectes* problem, see Mayr and Gilliard (1952a).

The discovery in the Telefomin region of "wattle birds" and "black bills" living in the same watershed in a presumably contiguous habitat without hybridization has provided new evidence concerning the ecology of hybridization of New Guinea honeyeaters. Apparently in areas where the habitat is largely undisturbed by man, these birds behave as good species. In areas of extensive forest disturbance and forest removal, as in the Mt. Hagen area, the birds hybridize freely and form hybrid swarms.

Melidectes belfordi belfordi (De Vis)

WHITE-BROWED HONEYEATER; MOPNOKE

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Three males, four females, 7200–7500 feet, May 6–11.

MEASUREMENTS AND WEIGHTS: Wing: Males, 145, 146, 152; females, 131, 133, 133, 137. Tail: Males, 122, 124, 134; females, 115, 115, 115.5, 120. Bill: Males, 44, 45, 45.5; females, 39, 40, 41, 41. Weight: Males, 70, 74, 80; females, 55, 57, 63, 67.

CONDITION IN LIFE: Perishable colors: Iris dark red-brown to brown. Bill: Males: One dark gray, one black with gray on under side, one mainly black, with blue-gray on the outer half of the mandible; females: black. Feet: Three brownish gray, three mottled brownish gray, one light blue-gray mottled with brown. Naked skin on face and at base of bill light cerulean blue (five). Naked skin on face shading from pale aqua or aqua-yellow to pale cerulean blue (two). Inside of gape pale yellow in one. Gape wattles white. Eye ring black in four. Molt: Traces on body only (four, one of which has the testes much enlarged); traces on body and wing (one); traces on body and tail (two, one of which has the testes moderately enlarged).

REMARKS: This species is a noisy, common inhabitant of the upper tier of the original mid-mountain forest. Its rasping calls, whistles, and deeper bugled notes are features of the forest.

Melidectes rufocrissalis rufocrissalis (Reichenow)

YELLOW-BROWED HONEYEATER

SPECIMENS COLLECTED: Hindenburg Mountains: Ilkivip: Two males, one sex?, 7300 feet, March 31 to April 5.

MEASUREMENTS AND WEIGHTS: Males: Wing, 130, 137; tail, 102.5, 107.5; bill, 44, 46. Weights: Males, 74, 84.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill pale blue-gray; feet whitish, with pale blue shading (one), whitish gray (one); skin on face and cere whitish yellow-green (one) and whitish yellow (one); gape wattles palest whitish yellow to palest greenish white; throat wattles deep orange to red-orange. Molt: Traces on body (three, one with enlarged testes).

REMARKS: This species is apparently not uncommon in the edge of the mid-mountain forest. A specimen taken at Unchemchi at 5850 feet was photographed (Gilliard, 1959, fig. 4) just before it escaped. It had been trapped in a silk bat net which had been set just outside the forest at the edge of a small isolated patch of brackens and grass.

Melidectes belfordi×rufocrissalis

SPECIMEN COLLECTED: Mittag Mountains: Deikimdikin: One female, 7000± feet, April 22.

MEASUREMENTS AND WEIGHT: Wing, 120; bill, 38. Weight, 44.

[1] Measurements from Gyldenstolpe (1955a, p. 157).
[2] Measurements from Mayr and Rand (1937, p. 221).

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill black; feet dark brown, with scutal lineations pale gray; naked skin on face pale cerulean blue; gape and gape wattles white; eye ring black. Molt: Medium general except none on wings.

REMARKS: This hybrid specimen was brought in by shoot boys who had just returned across the Mittag Mountains from the Ilaptamin Valley. The area in which it was collected was not examined, and therefore no conclusions regarding the effect that habitat disturbance may have played can be drawn. It is known, however, that the Ilaptamin Valley area supports a large population of native farmers.

Melidectes torquatus mixtus Rand

ORNAMENTAL HONEYEATER; KUROSOL

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One male; one male subadult; one female; one female subadult, 4800–5300 feet, March 22 to April 30.

MEASUREMENTS AND WEIGHT: Female: Wing, 110; tail, 97. Weight, 41.5.

CONDITION IN LIFE: Perishable colors: Male: Iris blackish brown; bill light blue-gray, with pale aqua near base and with a dark gray culmen; feet blue-gray; naked skin around eye bright orange-yellow; gape wattles dull rose; naked skin on throat bright orange. Female: Iris dark brown; bill steel gray; cere grayish aqua; feet steel gray; naked skin around eye bright yellow; gape wattle rose flesh; naked skin on throat orange. Molt: None (one); traces on head and chest (one). Gonads not enlarged.

REMARKS: Our specimens are similar to *mixtus* of the Snow Mountains, not with the distinctly deeper ochraceous markings of *polyphorus* of the Wahgi region. This species is an uncommon resident of the mid-mountain forest edges up to about 6000 feet. Two young about 10 days old were brought in by natives, one on March 27 and one on April 22.

Oreornis subfrenatus melanolaema (Reichenow)

SUB-BRIDLED HONEYEATER; DULAMIN

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One subadult male, 4800+ feet, April 25; Mt. Ifal: two males, three females, 7200–7500 feet, May 8–11. Hindenburg Mountains: Ilkivip: One male, one female, 7300 feet, April 1–2; Unchemchi: one male, 5850 feet, April 12.

MEASUREMENTS AND WEIGHTS: Wing: Males, 95, 97, 99, 99.5, 102; females, 89.5, 92, 93. Tail: Males, 89, 91.5, 91.5, 94; females, 86. Weights: Males, 29, 30.5, 30.5, 32.5, 36; females, 25, 27, 27, 29.

CONDITION IN LIFE: Perishable colors: Iris generally gray to dark gray (one dark brown); bill black; feet bright yellow to amber to dull olive-yellow; gape wattles bright yellow; naked skin of face dull translucent yellow, eye ring black. Molt: Traces on body but none on wings or tail (six, two of which had the testes much enlarged); traces on body and tail (one, with testes enlarged); medium to heavy general molt (two).

REMARKS: The east-west cline from dark to light that was noted for this species (in Mayr and Gilliard 1954, p. 369) was reëxamined with this large series in hand. Although Telefomin birds are somewhat darker than the light Weyland Mountain extremes, they fit with *melanolaema* (which is based on specimens from the Sepik Mountains) and differ from nearly topotypical *salvadorii* by their generally lighter, more brownish, under parts and slightly lighter dorsal coloration.

This species is common in the mid-mountain forest.

Xanthotis polygramma (?septentrionalis) Mayr

MANY-SPOTTED HONEYEATER

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One subadult female, 4800 feet, April 29.

MEASUREMENT AND WEIGHT: Wing, 75.5. Weight, 16.3.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill black; feet gray; naked skin of face and ears dull yellow-orange, except for a line of skin extending behind the eye which is pinkish flesh; gape yellow, with narrow black edgings. Molt: Medium on throat and chest. Wings and tail fresh.

REMARKS: This specimen, when compared with series from eastern and western New Guinea, including a fresh series from the Adelbert Mountains and a specimen from Hollandia, proved to be in subadult plumage. In this plumage it differs from the adult by having the back more yellowish green, the upper wing coverts tipped with ochraceous

brown, and the under parts less boldly spotted. Because of its immaturity, we cannot make a critical identification.

This species of the lower mountain forests was rare at the elevation of Telefomin.

Meliphaga montana sepik Rand

MOUNTAIN HONEYEATER; DOLOMAY

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Three males, 4800± feet, March 25 to April 29.

MEASUREMENTS AND WEIGHTS: Wing, 83, 85, 89; tail, 68, 71. Weights: 20, 28, 31.

CONDITION IN LIFE: Perishable colors: Iris gray to dark brown; bill dark brown to black; feet light blue-gray to dark blue-gray; gape creamy to yellowish flesh. Molt: One with traces on head, body, and tail; one with traces on throat and body; one with medium body molt. Gonads not enlarged.

REMARKS: Comparisons were made with the types of *setekwa* and *sepik*. No comparative material of *gretae* was available. Earlier, however, the senior author, in comparing Gyldenstolpe's Nondugl material with the type of *sepik*, noted that it differed from *sepik* in having "a much more greenish, not brownish head and upper surface of the body" (*in* Gyldenstolpe, 1955a, p. 167). Our Telefomin series of three males appears indistinguishable from the type of *sepik* from Huntsteinspitze.

Meliphaga analoga subspecies?

MIMIC HONEYEATER; DOROMAIN

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One male, 4800 feet, March 23.

MEASUREMENTS AND WEIGHT: Wing, 86; tail, 72.5; culmen from base, 22; tarsus, 22. Weight, 26.5.

CONDITION IN LIFE: Perishable colors: Iris gray; bill black; feet gray; gape egg yellow. Molt: Traces on body only. Testes much enlarged and buff in color. Stomach contents: Small fruits.

TAXONOMIC ANALYSIS: This Telefomin example is closest to a population from the upper Fly River in size and over-all coloration. It differs, however, in having the sides of the head paler, more olive, less sooty olive; the subloral streak smaller; the feathering at the base of the maxilla (on the forehead) grayish olive-brown, not greenish olive; and the central abdomen darker, more grayish, less pale gray washed with lemon-yellow. In its dull abdomen coloration it differs from all subspecies of *analoga*.

Considering the conservative quality of the characters distinguishing species in this genus, we feel that the above-listed characters carry considerable weight. When more material becomes available, the Telefomin region population will probably require racial recognition.

REMARKS: This species is chiefly in the tropical zone. It was observed in the crown of mid-mountain and forest edge bordering the Telefomin airfield. Apparently it is very uncommon at the altitudes surveyed by our expedition.

Ptiloprora plumbea granti Mayr

LEADEN HONEYEATER; NUMTEEL

SPECIMEN COLLECTED: Hindenburg Mountains: Unchemchi: One male, 5850 feet, April 11.

MEASUREMENTS AND WEIGHT: Wing, 82; tail, 73; culmen from base, 22; tarsus, 22. Weight, 16.5.

CONDITION IN LIFE: Perishable colors: Iris mouse gray; bill black; feet light grayish blue. Molt: Medium on head and body, none on wings and tail. Gonads much enlarged.

REMARKS: Compared with a series of the race *plumbea*, one example is generally darker, more slate, less gray; with the dark streaks of the crown and back somewhat broader and darker; and with the wing longer (82 mm. as against 74, 76, and 77). These differences are almost precisely those given by Mayr (1931a) in his description of *granti*.

This bird is apparently very uncommon in the mid-mountain forest.

Ptiloprora perstriata lorentzi (van Oort)

BLACK-BACKED STRIATED HONEYEATER

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Six males, three females, two subadult females, 7200–7600 feet, May 5–11. Hindenburg Mountains: Ilkivip: five males, one male?, one subadult male, four females, one sex?, 7300 feet, March 30 to April 5.

MEASUREMENTS AND WEIGHTS: Wing: Males: (Mt. Ifal) 94.5, 98, 99, 99, 100, 100.5, 101, (Ilkivip) 98, 99, 99, 99, 100, 103; females:

(Mt. Ifal) 84, 87, 89, 89, 93. Tail: Males: (Mt. Ifal) 88.5, 89, 90, 92.5, 93, 93.5, (Ilkivip) 89, 89.5, 91, 92, 94; females: (Mt. Ifal) 79, 79, 82, 83, 84. Weights: Males: (Mt. Ifal) 23.5, 25, 25.5, 26, 27.3, 27.5, 27.8; females: (Mt. Ifal) 21, 23, 23. Males: (Ilkivip) 26, 28, 28.5, 28.5, 29, 30; females: (Ilkivip) 22, 23.5, 24, 25.5.

CONDITION IN LIFE: Perishable colors: Iris grass green; bill black; feet pale gray-blue. Molt: None (one, with the testes enlarged); traces on body (seven); traces on body and medium on tail (four); medium general on body (four, one with the testes enlarged); traces on body and wing (one); medium general on body and wing (two, one with the testes much enlarged).

TAXONOMIC ANALYSIS: Mayr and Gilliard (1954, p. 369), in their revision of the *perstriata-guisei* group, recognized two species: black-backed *perstriata* and brown-backed *guisei*. Formerly the two had been considered as one species (*guisei*) which was strongly subject to altitudinal variation (see Mayr and Rand, 1937, p. 231).

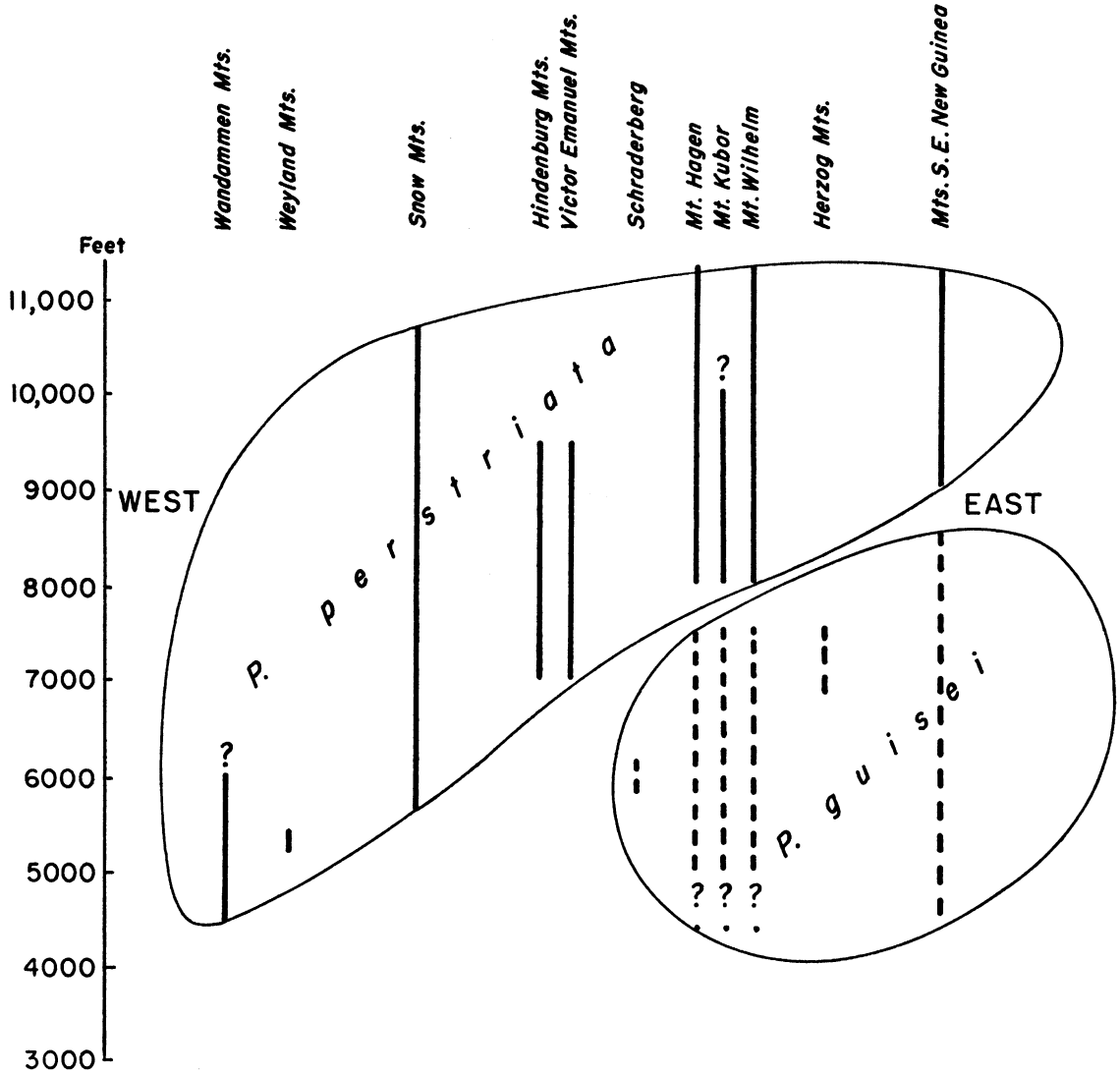

FIG. 2. Geographical variation in the vertical range of *Ptiloprora perstriata*. In the east, where it is in competition with a closely related species (*P. guisei*), it is restricted to the high mountain slopes, while in the west, where it is relieved of such competition, it descends in a clinal manner to the lower mountain slopes.

Various considerations supported the conclusion that the two populations had reached the level of good species. Chief among these was the fact that the two groups live close together, probably without overlapping on Mt. Hagen, Mt. Kubor, and in the Bismarck Mountains. In other words, on these mountains they seem to exclude each other altitudinally. The black-backed group occurs chiefly above 8000 feet, and the brown-backed group occurs chiefly below 7000 feet.

In analyzing this situation, Mayr wrote (Mayr and Gilliard, 1954, p. 369): "If [these] two closely related forms are species, one would expect them to be in competition and to affect each other's vertical range." Mayr then noted that except on mountains where the two groups co-exist, the black-backed species descends to lower levels, for example, in the Wandammen Mountains, where it descends to 4200 feet, and in the Snow Mountains where it descends to 5400 feet.

It was hoped that the two groups would be found in the mountains of the Telefomin region, so that their interactions, if any, could be studied. Unfortunately only the black-backed species was found in these mountains.

A total of 25 specimens were obtained, as follows: Victor Emanuel Mountains: seven specimens were shot at about 7200 feet; five specimens were shot at about 7600 feet. Hindenburg Mountains: Thirteen specimens were shot at about 7300 feet.

It is probable that a few of the above specimens were shot as much as 1000 feet higher than is indicated, but very probably none was taken more than 300 feet lower than is indicated. All were shot by the senior author and his expedition hunters. None was bought from local natives.

It is of interest to note the tendency of the high-altitude group to descend to lower altitudes when relieved of competition from a closely related species. The absence of *P. guisei* in the Telefomin mountains is doubtless the reason why *P. perstriata* is found about 800 feet lower, on the average, in these mountains than on Mt. Hagen, some 200 miles to the east. But, one might ask, Why such a little step downward? Apparently the tendency to exploit a new niche is retarded by gene flow through the populations inhabiting the mountain "bridge" between Mt. Hagen and the mountains of the Telefomin region. Following this "bridge" westward from Telefomin, we find that further steps downward occur in the Snow Mountains and in the Weyland Mountains. However, to judge from the gradual downward movement of the species in areas far removed from the range of *P. guisei*, it is evident that the geographical variation in the vertical range of *P. perstriata* is clinal in nature. Figure 2 supports this conclusion.

REMARKS: This species is very common in the upper half of the mid-mountain and mossy-forest formations.

Pycnopygius cinereus marmoratus (Sharpe)

GRAY HONEYEATER; NEMTIL

SPECIMEN COLLECTED: Victor Emanuel Mountains: Telefomin: One female, 4800 feet, April 30.

MEASUREMENT AND WEIGHT: Wing, 102.5. Weight, 40.

CONDITION IN LIFE: Perishable colors: Iris light gray; bill black; feet light blue-gray; naked post-ocular skin blue-gray. Molt: Medium general, except none on wings.

REMARKS: This specimen, together with one from the Wahgi region (collected in 1952) and one from the Snow Mountains (collected in 1910), was compared with a series from southeastern New Guinea (collected in 1904, 1906, and 1933).

Those of the southeast differ from the three from the central ranges by having the abdomen more heavily tinted with lemon buff, also by having the upper parts generally brighter, slightly more suffused with olive, less dark brownish. However, as the old Snow Mountain example comes near to matching the old specimen from southeastern New Guinea, it is likely that the differences noted above are in large part due to post-mortem color changes.

This bird is apparently very uncommon above about 4000 feet. Gyldenstolpe (1955a, p. 169) and Gilliard (Mayr and Gilliard, 1954, p. 370) each found but a single specimen in the Wahgi Valley.

DICAEIDAE

FLOWERPECKERS

Dicaeum pectorale rubrocoronatum Sharpe

RED-CAPPED MIDGET FLOWERPECKER; KOTE

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: One [male], three females, 4800 feet, March 20 to April 17.

MEASUREMENTS AND WEIGHTS: Wing: [Male], 53; females, 49.5, 50.5, 52. Weight: [Male], 7.8; females, 7.4, 7.5, 7.5.

CONDITION IN LIFE: Perishable colors: Iris dark brown; bill dark brown, with lower half of mandible gray; feet dark brown to black. Molt: None (one); traces on chest only (one); medium general (two).

REMARKS: The male shows the violet dorsal coloration of *rubrocoronatum*, although the blue is more suffused with dull olive. Comparisons were made with the races *centrale*, *diversum*, *setekwa*, *albo-punctatum*, and *rubrigulare*. All these races lack the bright violet-blue dorsal reflections of *rubrocoronatum*. The range of this race is thus extended westward to the headwaters of the Sepik River. For a recent review of this species, see Salomonsen (1960b, pp. 22–31).

Melanocharis versteri meeki Rothschild and Hartert

VERSTER'S SAW-BILLED FLOWERPECKER; ALOOSIAL

SPECIMENS COLLECTED: Victor Emanuel Mountains: First Garden: One female, 6000± feet, May 3; Mt. Ifal: one sex?, 7200–7600 feet, May 7–10. Hindenburg Mountains: Ilkivip: Three males, one female, 7300 feet, April 1–6; Unchemchi: one female, 5850 feet, April 9.

MEASUREMENTS AND WEIGHTS: Hindenburg Mountains: Males: wing, 59, 61, 63; tail, 73, 78; females: wing, 69; tail, 70. Weight: Males, 12.5, 12.5, 13; females, 18, 19.

CONDITION IN LIFE: Perishable colors: Males: Iris dark brown; bill black, with trace of gray at lower base; feet black. Female: Iris brown; bill black, with light gray on under side; feet brownish black. Molt: None (four, two males with testes moderately enlarged); heavy general (one, male with testes enlarged); medium general (one); traces (two).

REMARKS: Attention is directed to the fact that Stresemann (*in* Gyldenstolpe, 1955a, p. 172), upon comparing a series of Wahgi region birds with the type of *virago*, concluded that his *virago* was a synonym of *maculiceps*, the race to which he assigned the Wahgi region birds. Earlier, however, Mayr and Gilliard (1954, p. 370), although they found but slight differences between *virago* and *maculiceps*, had assigned the Wahgi region population to *virago*. Gyldenstolpe (1955a, p. 172) followed Stresemann and, upon reëxamining the Wahgi region material, we consider this to be the best solution.

The above statements bear on the identification of the two specimens from the Victor Emanuel Mountains, because they seem somewhat paler below than the Hindenburg material and nearly similar to topotypical *virago* (=*maculiceps*). On the other hand, the Hindenburg Mountain sample agrees with series from Mt. Goliath and from the Bele River (*meeki*). The final decision concerning the identification of the Victor Emanuel population must await the collection of males. For a recent review of this species, see Salomonsen (1960a, pp. 10–15).

Rhamphocharis crassirostris (?crassirostris) Salvadori

THICK-BILLED FLOWERPECKER; BISOOLEEP

SPECIMEN COLLECTED: Hindenburg Mountains: Ilkivip: One subadult, sex?, 7300 feet, April 6.

MEASUREMENT AND WEIGHT: Wing, 70.5. Weight, 18.

CONDITION IN LIFE: Perishable colors: Iris grayish brown; bill dark brown; feet dark gray; gape pale yellow.

REMARKS: Compared with a subadult male of *piperata* (Mt. Hagen) and a subadult male of *crassirostris* (Mt. Goliath), our bird agrees better with the latter, although it will be necessary to make comparisons between adult birds before a final identification can be made.

This bird is found in the mid-mountain forest.

The subadult plumage is more brownish, less greenish, above and more clear gray, less streaked, below than the plumage of the adult. For a recent review of this species, see Salomonsen (1960a, pp. 17–18).

Oreocharis arfaki bloodi Gyldenstolpe

YELLOW FLOWERPECKER; NEETNEET

SPECIMENS COLLECTED: Hindenburg Mountains: Ilkivip: One male; one female, 7300 feet, April 1–2.

MEASUREMENTS AND WEIGHTS: Wing: Male, 70; female, 70.5. Tail: Male, 44.5;

female, 44.5. Weights: Male, 17; female, 19.

CONDITION IN LIFE: Perishable colors: Male: Iris dark brown, bill black, feet mauve-tan.

REMARKS: Our specimens agree with a large series from the main body of New Guinea (from the Weyland Mountains eastward) which now are distinguished as *bloodi* (see Gyldenstolpe, 1955a, p. 174). Because of the lack of comparative material from the Arfak region, we have not been able to study the geographical variation of this species except as noted above.

This species was very uncommon in the mid-mountain forests of the Hindenburg Mountains and apparently absent from the area in which we collected in the Victor Emanuel Mountains.

Paramythia montium montium De Vis

GIANT ALPINE FLOWERPECKER: NEMINTINKON

SPECIMENS COLLECTED: Victor Emanuel Mountains: Mt. Ifal: Three males, two females, 7600–8200 feet, May 5–9. Hindenburg Mountains: Ilkivip: Five males, four females, 7300 feet, March 31 to April 5.

MEASUREMENTS AND WEIGHTS: Wing: Males, 97, 99, 102, 103.5, 104.5, 104.5, 107.5, 108; females, 95.5, 96, 97, 101.5, 102, 103. Tail: Males, 93, 95.5, 99, 100.5, 102, 102.5, 104; females, 93, 93.5, 95, 95, 102. Weights: Males, 38.5, 39.8, 40, 40.8, 42, 42, 43, 43; females, 38, 38.1, 38.5, 45, 46.3, 49.

CONDITION IN LIFE: Perishable colors: Iris dark blue-gray to blackish brown; bill black; feet black. Molt: Traces on body (three, two with the gonads moderately enlarged); general on body only (one); traces on body and flight feathers (three, two with the testes moderately enlarged); medium on body and flight feathers (three, all with the gonads moderately enlarged); heavy general molt (three).

TAXONOMIC ANALYSIS: Three races have been distinguished: *olivaceum* of west New Guinea, *montium* of eastern New Guinea to the Wahgi region, and *brevicauda* of the mountains of the Huon Peninsula.

Our series from the Victor Emanuel and the Hindenburg Mountains agree well together. They are very similar to *montium*, differing only in having the crissum and under tail coverts slightly more pallid, less golden in color. This characteristic has also been noted for the populations of the Wahgi region (see Mayr and Gilliard, 1954, p. 372).

REMARKS: This species was common in small flocks in the beech and mossy forests, where it was frequently encountered in bushy trees, in the top of the pure mossy forest, and in forest-glade edge situations, often within a few feet of the ground.

ZOSTEROPIDAE

WHITE-EYES

Zosterops fuscicapilla fuscicapilla Salvadori

BLACK-CAPPED WHITE-EYE; DARKEET

SPECIMEN COLLECTED: Hindenburg Mountains: Unchemchi: One male, 5450 feet, April 12.

MEASUREMENTS AND WEIGHT: Wing, 61; tail, 41. Weight, 11.2.

CONDITION IN LIFE: Perishable colors: Iris reddish brown; bill dark gray, with basal half of mandible light gray; feet gray. Testes slightly enlarged (no molt).

REMARKS: This specimen was shot in the upper tier of the high mid-mountain forest. The species is apparently very uncommon in the areas surveyed by this expedition.

Zosterops minor minor Meyer

YELLOW-THROATED WHITE-EYE; DARKEET

SPECIMENS COLLECTED: Victor Emanuel Mountains: Telefomin: Three males, 4800 feet, March 26 to April 29.

MEASUREMENTS AND WEIGHTS: Wing, 55.5, 56.5, 57; tail, 38, 39, 40. Weights, 10, 10.8, 10.8.

CONDITION IN LIFE: Perishable colors: Iris chestnut to rust-brown; bill black, lighter at base of mandible; feet blue-gray to gray; skin around eye dark gray. Molt: Traces on body (two, both with testes enlarged); traces on wings (one, with testes slightly enlarged).

REMARKS: These birds are inseparable from topotypical *minor* from Japen Island. All were shot in the crown of the mid-mountain forest and second-growth formations near the Telefomin airfield.

PLOCEIDAE

WEAVER FINCHES

Oreostruthus fuliginosus subspecies?

RED-AND-BROWN ALPINE FINCH; AMDRONGFEN

SPECIMENS COLLECTED: Hindenburg Mountains: Ilkivip: One [male], one subadult male, 7300 feet, April 1–7.

WEIGHTS: 20, 18.

CONDITION IN LIFE: Perishable colors: [Male]: Iris red; bill vermilion; feet pinkish tan; eye ring and gape yellow. Subadult male: Iris mouse brown; bill dark brown; feet pale yellow ocher, with shading of light brown; gape bright yellow. Molt: Medium on tail only [male]; none (subadult male). Gonads not enlarged.

The measurements of the wing and the tail, respectively, of *Oreostruthus fuliginosus* follow:

pallidus, Lake Habbema [male (type)]: 73; 47
Subspecies?, Hindenburg Mountains [male]: 66; 39; subadult male: 68; 43
hagenensis, Mt. Hagen: Male (type): 67.5; 43
fuliginosus, Mt. Albert Edward: Males: 71, 72; 48, 49
fuliginosus, Mt. Knutsford: Males: 70, 71, 71.5; 47, 47, 49

TAXONOMIC ANALYSIS: Our adult male was sexed in the laboratory on the basis of its vermilion bill color in life (see Rand, 1940a, p. 14), and the presence of some red coloration on the abdomen.

The Hindenburg Mountain specimens differ from *fuliginosus* in having the upper parts lighter, more brown, less olive-brown, and the under parts more warm brown, less sooty brown. They differ from *hagenensis* in having the upper parts darker brown, less warm brown, and by lacking the thin suffusion of blood red on the back.

Our male agrees in coloration with the type of *pallidus*, but it has the tail much smaller (see list of measurements).

When adequate comparative material becomes available, it is very possible that the Hindenburg population will prove to be a distinct subspecies.

REMARKS: In eastern New Guinea on the Wharton Range the Red-and-Brown Alpine Finch was found by Rand (MS) to be common. He found it at " . . . high altitudes, where forest gives way to alpine grasslands and where there are little grassy glades in the forest." He wrote: "The birds feed on grass seeds in the open and when alarmed seek shelter in the forest, perching inside the low dense shrubbery."

The senior author has collected this species on Mt. Hagen and in the Hindenburg Mountains. On both mountains he shot his specimens in the forest. The Mt. Hagen bird was shot in bushes about 3 feet up in the edge of a patch of ground over which the forest canopy had been partially broken by axmen felling trees along a ridge. The floor of this forest was littered with fallen trunks, and a native hunting shed stood in the area. The spot was at an altitude of about 9000 feet, about 1000 feet below the upper limit of the alpine forest where the latter gives way to the alpine grassland.

In the Hindenburg Mountains no alpine grassland was found, and none is believed to exist (see Introduction, p. 25). On this mountain *Oreostruthus* was found in the pure forest. One specimen shot by the senior author was only a couple of feet off the forest floor on the side of a steep, heavily forested gully at an altitude of 7300 feet. This forest was unbroken and heavily mossed.

From these observations it becomes clear that *Oreostruthus* (a bird that is almost certainly of grassland origin) has taken to the woodlands on both Mt. Hagen and in the Hindenburg Mountains. On Mt. Hagen it is perhaps a species of open glades in the forest; in the Hindenburg Mountains it has taken to the pure forest, but in southeastern New Guinea, according to Rand, it still favors grassy areas near tree line.

It is probably of much significance that the shift in ecological requirements from grasslands to forest should be most developed on a mountain that is no longer capped with alpine grasslands. This fact suggests that the species was able to survive by penetrating the forest as the latter replaced the alpine grasslands. We postulate (above) that grasslands covered the central mountains of New Guinea at the end of the last period of maximum glaciation some 10,000 years ago.

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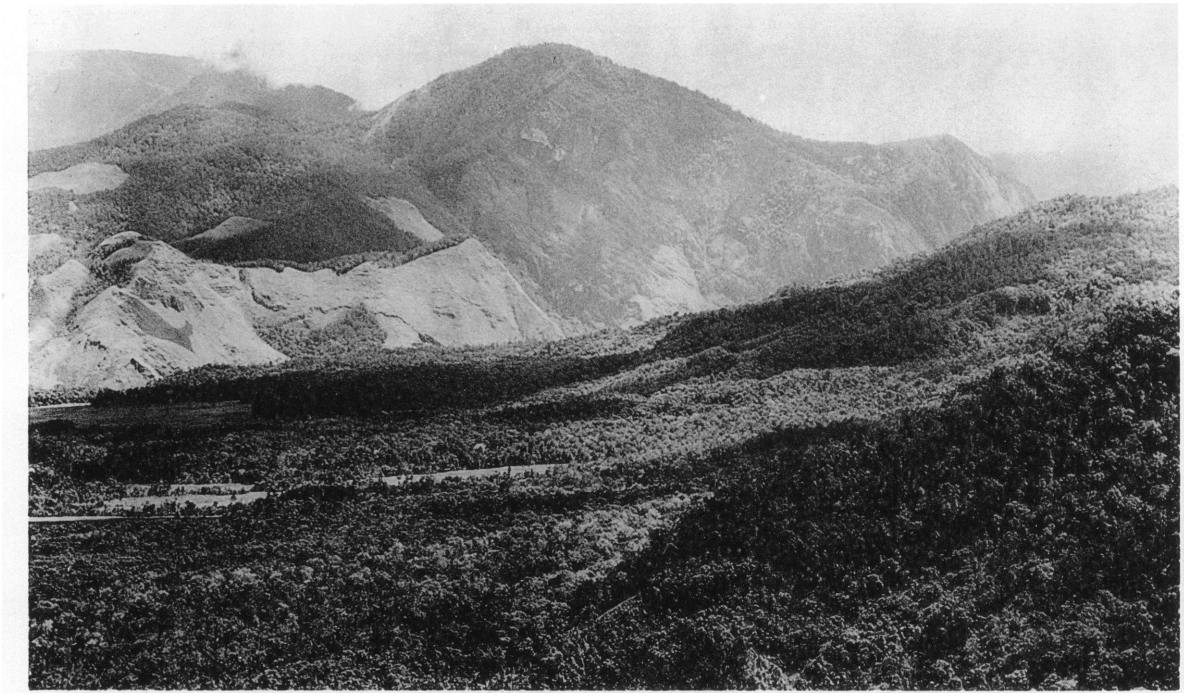
PLATES 1–17

Panoramic view from Camp 2, 6000 feet, near crest of Behrmann Hills, Papua, looking from west (top left), through north, to east (bottom right). 1. Netherlands New Guinea. 2. Sepik River gorge forming mouth of Telefomin Valley. 3. Thurnwald Mountains on horizon beyond Mittag Mountains. 4. Telefomin Patrol Post and airfield lie just below and at right of long tongue of clouds. 5, 6. Plateau of Victor Emanuel Mountains; the highest point is Mt. Ifal directly below 5. 7. D'Albertis' Dome. 8. Central Range, looking eastward beyond headwaters of Sepik River. Dense fern growth in foreground is mainly bracken (*Pteridium aquilinum*). Tall regrowth shrub with pointed, floppy leaves is *Homalanthus* sp. Primary forest (bottom) is *Castanopsis* and oaks formation



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1. Telephoto view westward of the Star Mountains (Mt. Vega, altitude 11,319 feet, rises into clouds in left background) from Victor Emanuel Mountains (6100 feet), showing Sepik (Takin) River gorge at west end of Telefomin Valley. Gorge at right forms mouth of valley

2. Telephoto view southwest across Telefomin Valley into Star Mountains, showing deforested areas of Urapmin people (background) and deforested areas of Telefomin people (foreground)

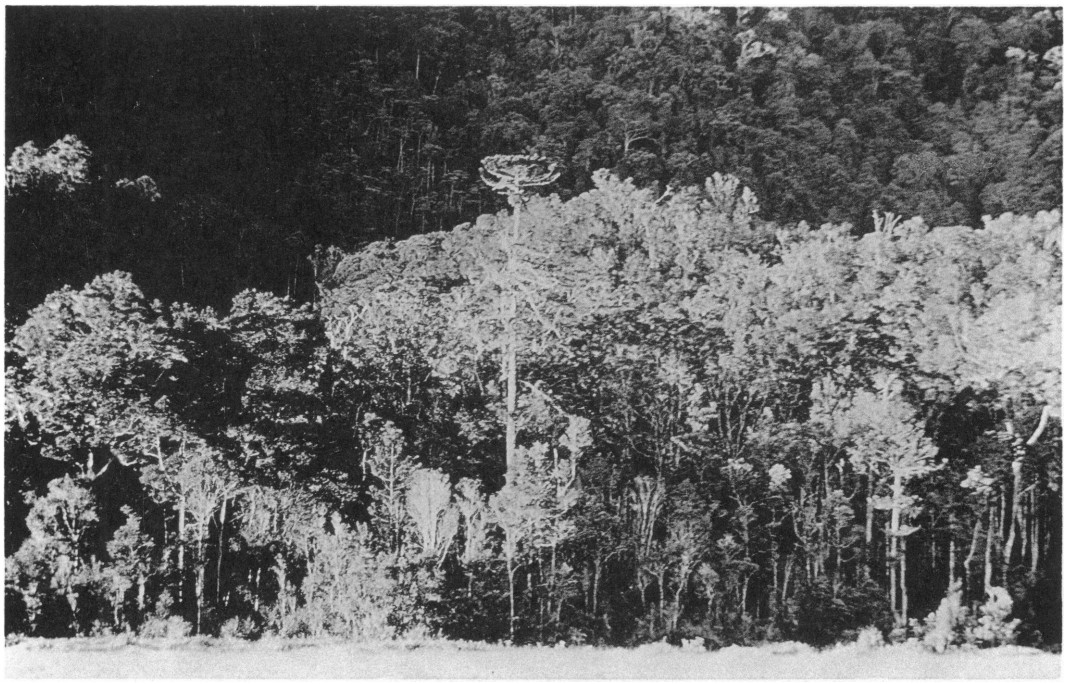
1

2

1. Telephoto view southwest from a height of 6100 feet showing Telefomin Patrol Post and airfield at 4800 feet (foreground). Two native villages are in center and left background. Sepik River gorge is at upper right background. Baptist Mission station is at right

2. A recently cut forest farm situated at approximately 5200 feet in old second-growth, mid-mountain forest, a few miles north of the Telefomin Patrol Post, on the west bank of the Sol River

1



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1. View of the mid-mountain forest formations at northeast edge of Telefomin airfield clearing (4800 feet) and on the southwestern slopes of the Victor Emanuel massif in the background. The even stands of grass are probably kangaroo-grass (*Themeda triandra*)

2. View of the mid-mountain forest formations northwest of Telefomin airfield clearing (4800 feet), with the southern slopes of the Mittag Mountains in background. The tall conifer is probably the bulolo pine (*Araucaria klinkii*)

1

2

1. Trifolip Village, Telefomin Valley, 4500 feet. The tallest tree is the hoop pine (*Araucaria cunninghamii*). The slender, mop-like tree near house tamboran (men's house) is the dracaena (*Cordyline terminalis*). Sugar cane grows in the garden at left

2. Trifolip Village (see above). Interior of men's house. Fighting shield, stone money, pig jaws, and two human skulls (in net bags) form decorations. Rattan hoops about man's waist are fire starters

1. Telefomin girl with *Paradisaea minor*. The tree is *Casuarina aligidon*
2. A young Telefomin hunter in a small forest clearing at 6000 feet in the Hindenburg Mountains

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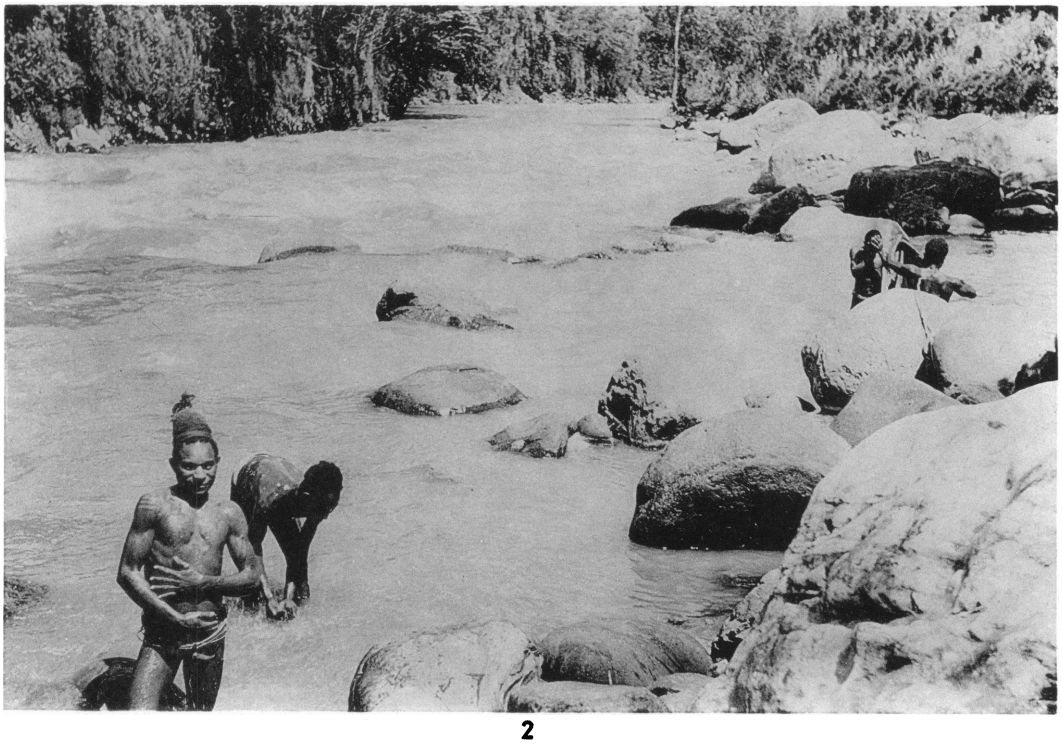

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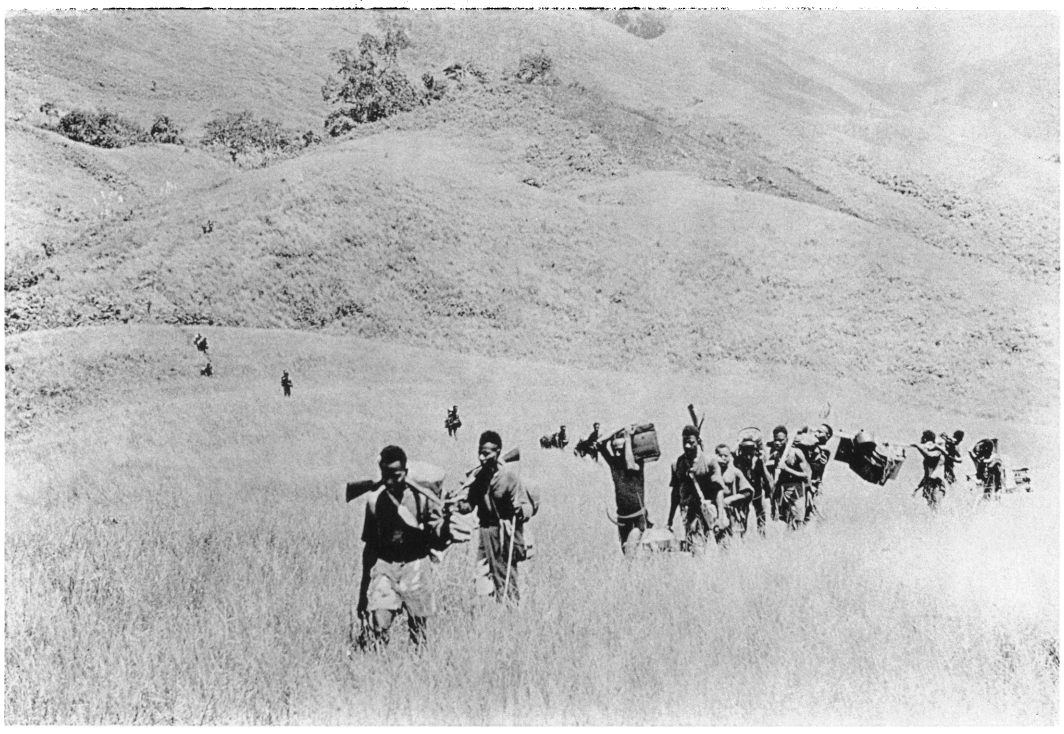
1. Sepik (Takin) River south of the Telefomin Patrol Post at an altitude of about 3800 feet. The bridge, 45-50 feet up, was a vital link in the expedition route. Vegetation formation is mid-mountain forest

2. Speik (Takin) River southwest of the Telefomin Patrol Post at an altitude of about 3500 feet. Mid-mountain grasslands (with much wild sugar cane) and disturbed mid-mountain forest border river at this point



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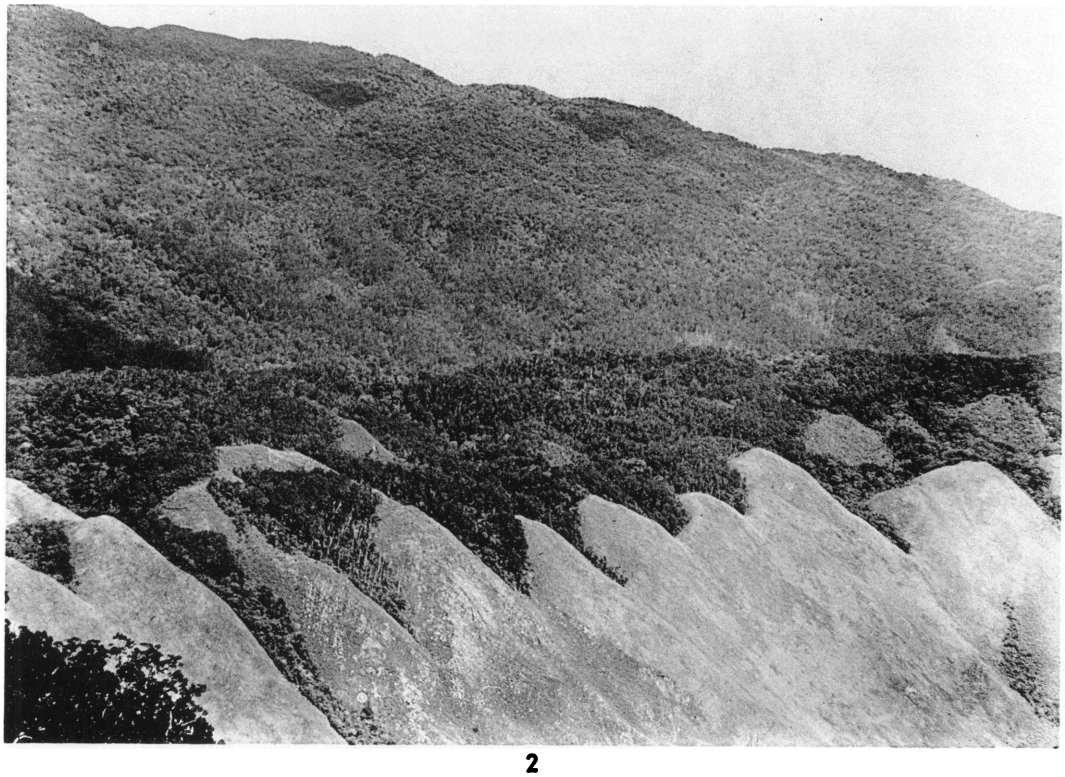

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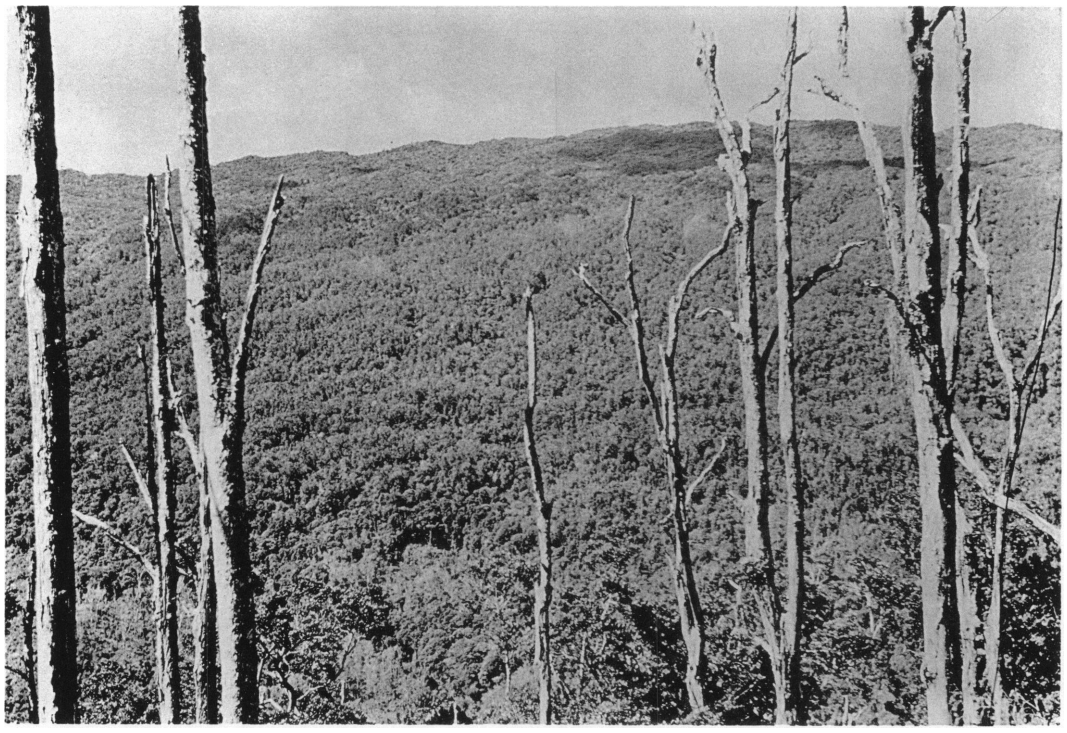
1. Mid-mountain short grassland (about 4200 feet) near the north foot of Behrmann Hills. The dominant vegetation is the bunched grass (*Themeda triandra*)

2. Air view southwest across the Behrmann Hills (foreground) and the Hindenburg Mountains (background). In the foreground is the top of the north face of Behrmann Hills. The grass fields are burned annually



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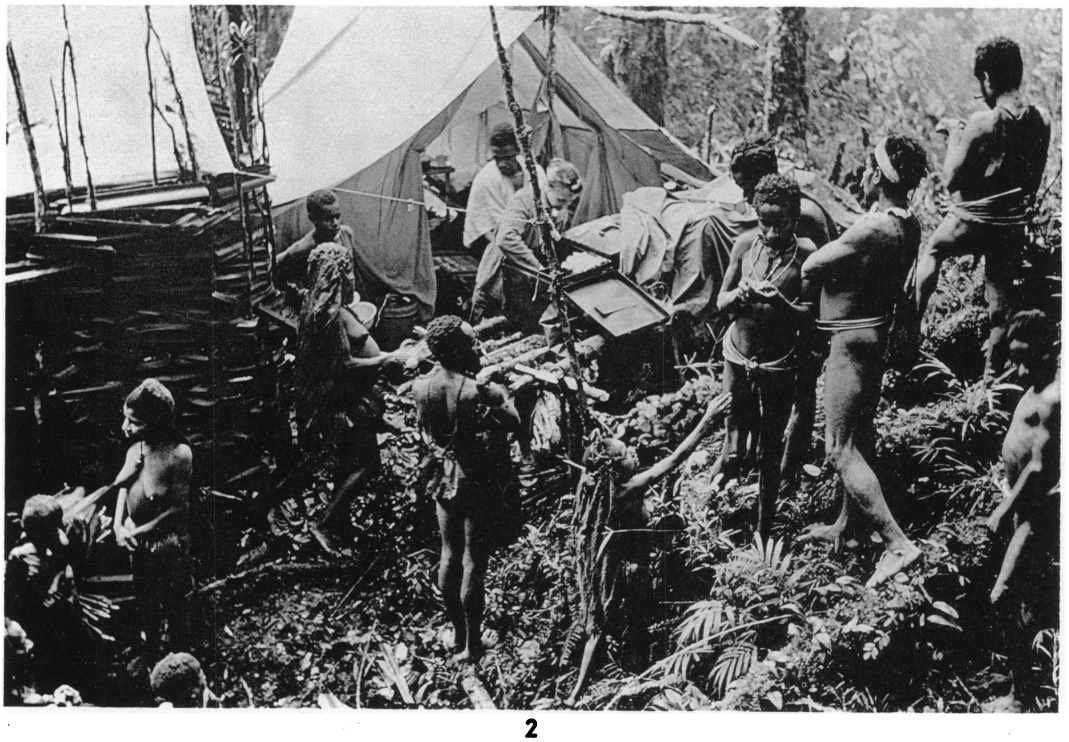

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1. View southeast (6200 feet) from the Behrmann Hills, showing the northern aspect of the Hindenburg Mountains and the Nunk River Valley in the left foreground. The trees in the foreground were killed by fire or by being ringed

2. Camp 4 (7200 feet), in the mossy beech forest of the Hindenburg Mountains. The natives are visitors from the Isam River, a tributary of the Fly River

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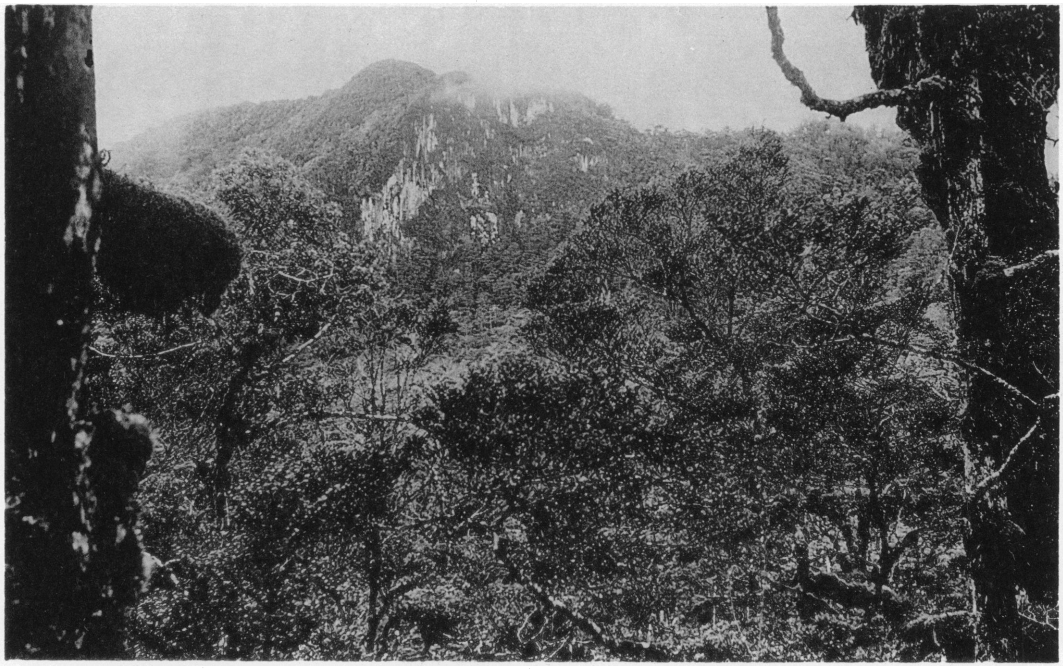

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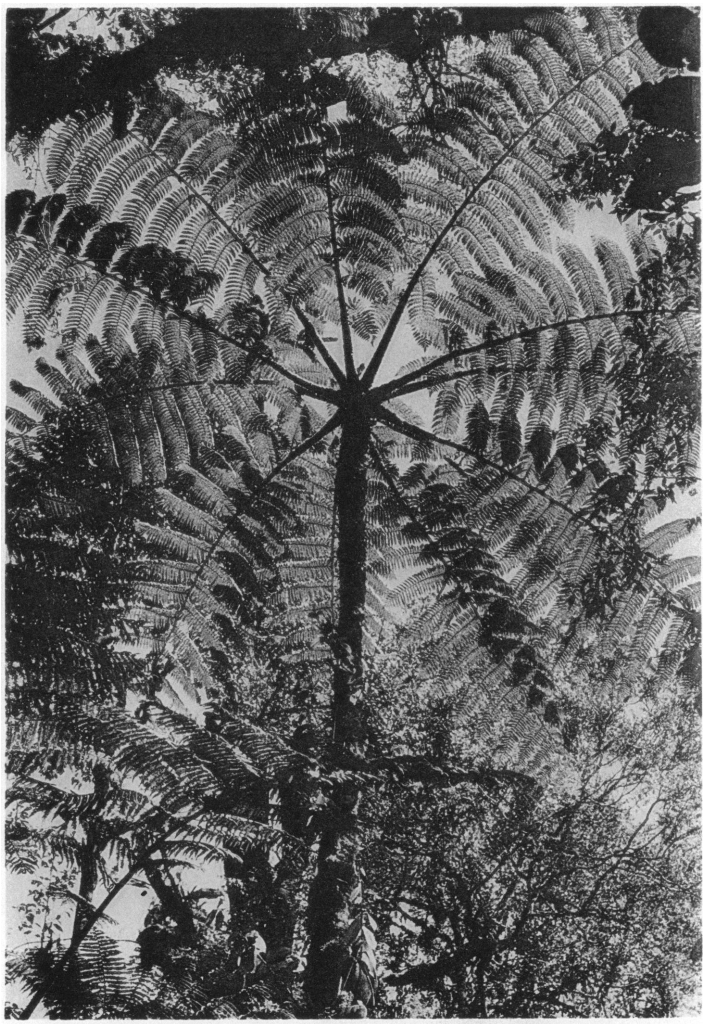
1. View northwest from Camp 8 (7300 feet) on the west slope of Mt. Ifal, Victor Emanuel Mountains, showing the spur of the Mittag Mountains at left and Thurnwald Range in the far background. The vegetational formation is heavily mossed beech forest, with much pandanus palm

2. View east from about 8000 feet, showing the rounded, well-forested summit of Mt. Ifal above the cliffs. This is the highest part of the Victor Emanuel Mountains. The forest formation is almost pure mossy beech forest



1. View of the stunted beech forest growing at 8000 feet on Mt. Ifal, showing the large arboreal masses of bryophytes, chiefly rust-colored epiphytes, intermingled with mosses and ferns

2. Tree ferns of this species (*Cyathea fugax*) were dominant features of the mid-mountain forests of the Telefomin region. This specimen was found at 8500 feet on Mt. Hagen

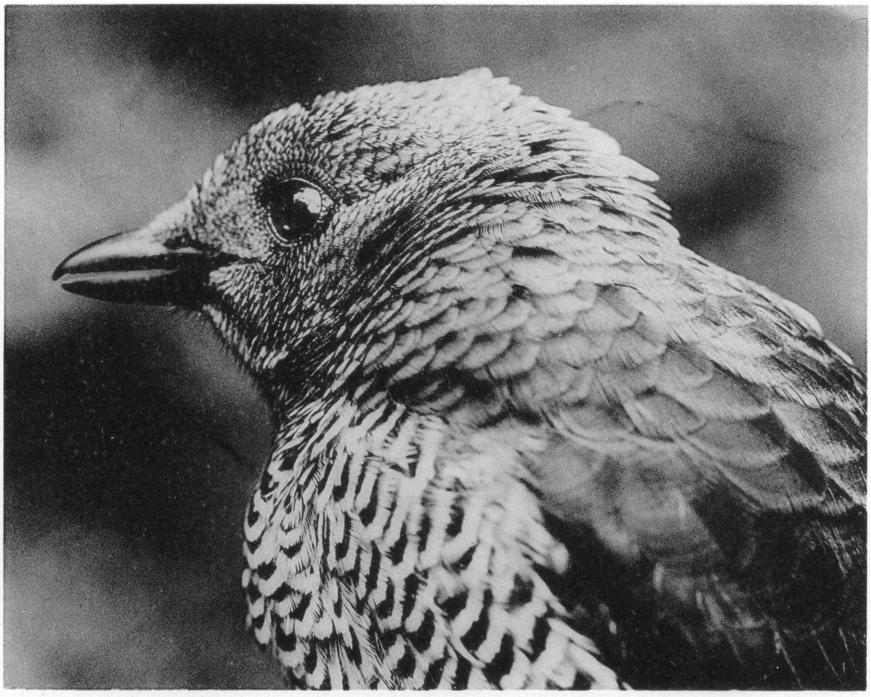
1. *Alisterus chloropterus*, an adult female photographed in semi-captivity in the Wahgi Valley at 5200 feet
2. *Astrapia splendidissima*, an adult female photographed under controlled conditions in its natural habitat in the Hindenburg Mountains at 7200 feet

1

2

Parotia carolae, an adult male on its bower in the mid-mountain forest of the Victor Emanuel Mountains. The photographs were made under controlled conditions. See Annotated List

Pteridophora alberti, an adult male displaying 80 feet up in the crown of the mossy beech forest in the Kubor Mountains, June, 1952, 7400 feet. The occipital plumes, although discernible, were faint; they are retouched slightly. The photograph was made through a 400-mm. lens from a blind constructed on the top of a 35-foot tower



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1. *Pteridophora alberti*, adult female, photographed in the Hindenburg Mountains at 7200 feet under controlled conditions
2. *Epimachus meyeri*, a nest and egg collected April 21, 1952, on Mt. Numwe, Kubor Mountains (8000 ± feet)

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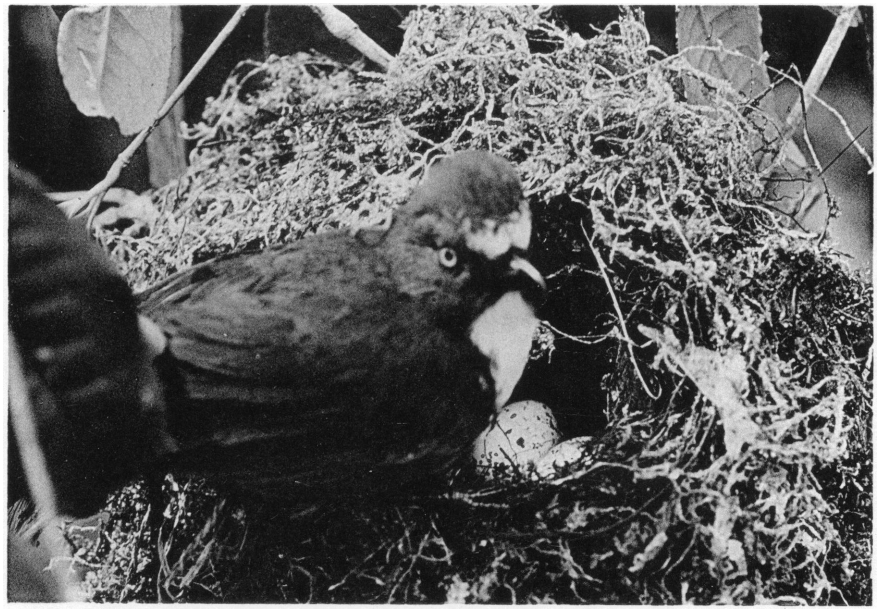

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1. *Peneothello cyanus*, brown nestling on its nest in late April, 1952, Kubor Mountains (6000 ± feet). Brought in by a native and then photographed

2. *Pachycephala rufinucha*, an adult on its nest with eggs, June, 1952, Kubor Mountains (7500 ± feet). These specimens were brought in by a native trapper. The adult is tethered to its nest

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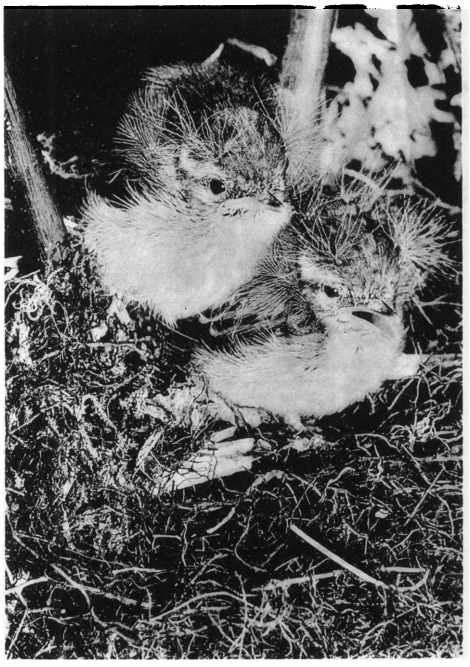

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1. *Rhipidura leucophrys*, a nest with young about to leave was found and photographed in April, 1952 (5000 feet; Kup, Kubor Mountains), 10 feet above the ground in a solitary tree growing in cane-grass swamp

2. *Phylloscopus trivirgatus*, two young brought in by natives, Kubor Mountains (5200 feet), April, 1952

3. *Phylloscopus trivirgatus*, adult, nest, and egg, Kubor Mountains (5600 feet), April 24, 1952. These specimens were bought from a native. The adult is tethered to the nest