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THE BARBETS

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THE Capitonidae or family of barbets is found throughout the tropical regions known as the Ethiopian in Africa, the Indian, including the Indian, Indo-Chinese and Indo-Malayan subregions in Asia, and the Neotropical region in the New World. The family is not easily defined. In general it may be said that the Capitonidae are zygodactylous perching birds with ten tail feathers. The wings and tail are rounded. The bill is stout and strong with the culmen having a tendency to curve and with the tip pointed.

In most cases these birds present rather a squat, stubby appearance. The perching position tends to be straight up and down. Almost all the species are found in areas of high trees, either deep forest or old gardens. Some forms range high into the mountains over seven thousand feet. Others are exclusively lowland dwellers. Barbets excavate their nests after the fashion of woodpeckers, usually in rotten parts of tree trunks. However, one genus, *Caloramphus*, is said to excavate nesting holes out of termite nests, and an African form is reported to nest in holes in the ground—(*T. margaritatus*) *vide* Friedmann (1930: 463). As in woodpeckers the bill is used in excavating, and the attitudes and climbing habits in trees often closely resemble those of the Picidae, even to the use of the tail as a support.

As with most tropical birds, the nesting season tends to be variable and drawn out. Barbet's eggs are white and rounded, thin-shelled and rather glossy. The flight of these birds is fluttering, often appearing clumsy, and not long sustained. Their calls are, for the most part, characteristic harsh monosyllables uttered over and over, *i. e.* the Asiatic "coppersmith," although other species utter low whistles or soft wailing notes.

These birds are primarily fruit eaters with a secondary diet of insects, particularly during the breeding season. In captivity, barbets are great meat eaters. Most species are colonial in habit only inadvertently at times of fruiting of certain trees. However, two closely related genera—*Caloramphus* in Asia, and *Gymnobucco* in Africa—are colonial by preference.

POSITION

Sharpe (1900) placed the Capitonidae as follows: Order PICARIAE, Suborder SCANSORES, as a member of the first group of that suborder which contained the Picidae, Indicatoridae, Capitonidae and Ramphastidae. His reasons for this are primarily the anatomical ones proposed by Seebohm (1890). He separated this group from the second in the suborder, containing the Galbulidae and Bucconidae on the characters of tufted oil gland and lack of caeca in the first group, and nude oil gland and developed caeca in the second.

Stuart Baker (1927) followed Pycraft in the following arrangement: Order CORACIIFORMES, Suborder PICI with the six families as above but listed in a different sequence, with the Ramphastidae following the Galbulidae and Bucconidae, and the position of the Capitonidae and Indicatoridae reversed. The characters of the order are the arrangement of the plantar tendons of the foot and the large size and tubular shape of the gall bladder.

Wetmore (1940) proposed the following arrangement based primarily on Gadow: Order PICIFORMES, Suborder GALBULAE, Superfamily CAPITONOIDEA containing two families, Capitonidae and Indicatoridae.

It is my feeling after studying these birds, that the members of the GALBULAE hardly deserve familial rank. I should be inclined to list two families for the suborder as follows: Superfamily GALBULOIDEA; Families Galbulidae and Bucconidae; the latter to contain three subfamilies, Bucconinae, Capitoninae and Indicatorinae.

HISTORY

The barbets are an ancient family consisting of two large groups with almost no interrelationship in Asia and Africa and one small group in Tropical America. Based on the size and diversity of the group, the origin of this family should probably be looked for in Asia. One branch of relatively unspecialized barbets, having become isolated from the main group, has evolved into two principal types in Tropical America. Another branch, a relative of which is still found in Asia, has evolved into a series of types in Africa culminating in the stout-

billed forms with tooth-like serrations on the maxillary tomia. Isolated and distinctive types appear in all three continental areas.

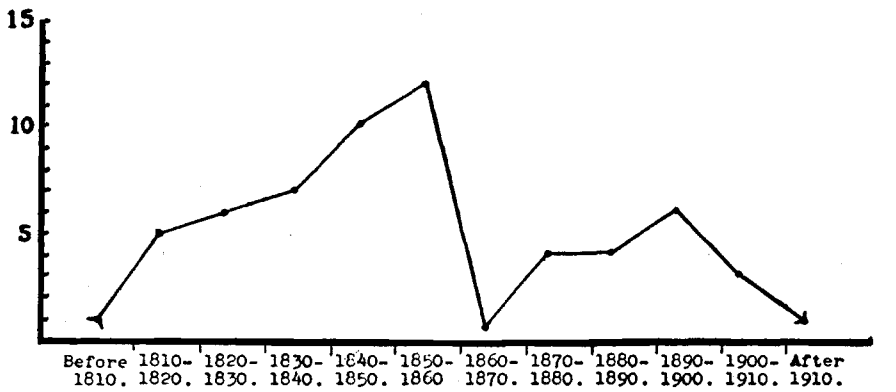
In the following pages I have adopted a linear arrangement which, though far from satisfactory, expresses what I feel to be true about the relationships of this family; namely that, except for the *Caloramphus-Gymnobucco* relationship and consequent link, each group of genera in each continent is primarily only closely related to the other genera in that continent. In this arrangement I shall differ from that of the Marshalls' 'Monograph' (1870–1871).

In the following discussion, particular thanks are due to Dr. Herbert Friedmann who read the manuscript and helped with much advice, and Dr. James Chapin whose comments on the African genera were of particular value.

THE GENERA

The early taxonomic history of the family was marred by considerable confusion over the proper generic names. *Bucco* Brisson (1760) and *Capito* Vieillot (1816) were considered by Bonaparte (1850) to represent two families rightly enough, but he completely reversed the family names. By 1855 and Gray's 'List of Genera in the British Museum,' a considerable degree of order had emerged. Charting the number of genera described for this family during the past century and a half gives an interesting result (Text-fig. 1).

Gray (1840) recognized five genera in the family although at least nineteen were then described. Bonaparte (1850) recognized eleven genera in line with the increase in names. However, Schlegel (1863) recognized only three all-inclusive genera, a procedure well in line



TEXT-FIGURE 1.—The actual numbers of genera described within each decade are represented on the chart; thus twelve was the greatest number described in the boom decade between Jan. 1, 1850, and Dec. 31, 1859.

with the conservatism represented in the appearance of new names during that decade. The Marshalls in their elaborate 'Monograph' (1870–1871) list thirteen genera in three subfamilies. By the time of the British Museum 'Catalogue' (1891) the number had risen to nineteen. Present regional lists recognize approximately twenty-two genera. Of these, seven, or over thirty per cent, are classed as monotypic.

THE SPECIES

The number of species of barbets has had a relatively simple progression from small to large to small again. Latham (1782) lists seventeen species. Bonaparte (1850) has increased this to fifty-five. The Marshalls (1870–1871) recognize seventy-seven species, while Shelley in the 'Catalogue' (1891) raises this to one-hundred and nine. Present regional lists recognize approximately eighty-three species, a decrease of about twenty-five per cent due to the institution of subspecies. About sixty-five per cent of the presently recognized species are polytypic.

Looked at from the speciation point of view, the barbet family represents a fairly cohesive entity. The distribution of colors of plumage follows a similar pattern throughout the group. Almost all species have some bright colors—green, red, blue or yellow—although at least one species in each continental area is dull and brownish. In each region there are specializations, notably of the bill. Each continent has at least one species with a grotesque and swollen bill. In the Ethiopian region the relations of this end point of development are still present. In the other regions the immediate relatives have disappeared. In the Ethiopian region also there are some species with specialized patches of bristles and areas of naked skin about the head.

REGIONAL ARRANGEMENT

In each continental region, evolution has proceeded within a distinct range of characters. That is why it seems more logical to group the inhabitants of each region together. These may be listed roughly as follows:

I. NEOTROPICAL REGION

A. *Capito* group—Brightly colored species of medium to small size with rather simple bills. Almost all are sexually dimorphic. This complex of species inhabits a rather limited range, essentially similar in all cases, on either side of the Andes from Colombia to northern Perú, and extending in some cases to the east as far as Amazonia and the Guianas. This group represents reinvasion after reinvasion of

closely allied species, indicating, when translated into taxonomic terms, few genera but many species.

B. *Semnornis* group.—Species with swollen, highly developed bills and soft, rather fluffy plumage, which lack pronounced sexual dimorphism. This group is found only in the highlands in two rather widely separated areas. Thus from the speciation point of view these species represent isolated survival forms of which the connecting links to other barbet species have disappeared.

II. INDIAN REGION

A. *Psilopogon* group.—A monotypic species with a high developed bill, soft plumage, and pronounced bristles, which nearly lacks sexual dimorphism. A montane species; the bright green color of the plumage is the only character borne in common with the other Indian barbets. As in the *Semnornis* group in the Neotropical region, this seems to be a relict form.

B. *Megalaima* group.—A uniform assemblage of species characterized by bright and gaudy plumage, predominantly green with a variety of color patches about the head and throat—black, red, blue, orange and yellow—prominent bristles and a strong stout bill. Sexual dimorphism is not pronounced. Some species are heavily streaked on the under parts. This group inhabits the Indian, Indo-Chinese and Indo-Malayan subregions. It has reached the Philippines, but has not crossed Wallace's Line. Like the *Capito* group above, the group represents reinvasions of closely allied species, which again should be represented by few genera but many species.

C. *Caloramphus* group.—A monotypic genus characterized by dull brown plumage, a sharply ridged bill, lacking prominent bristles and with reduced sexual dimorphism. A colonial species which ranges over Malaya, Sumatra and Borneo with no apparent close relatives in Asia.

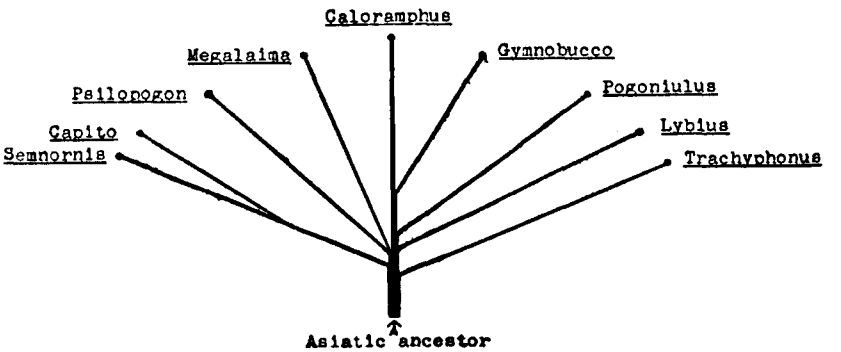
III. ETHIOPIAN REGION

A. *Gymnobucco* group.—Dull-plumaged species with reduced feathering on the head, patches of bristles about the bill, sharply ridged bills, and with reduced sexual dimorphism. Colonial in habit, these birds are found in western Africa from Liberia to west Uganda and seem to form a link between II, C. above and the following African groups.

B. *Pogoniulus* group.—Species of varied plumage and medium to small size, with feathering on the head. These species are more or less transitional between *Gymnobucco* and *Lybius*. In all of them the

culmen is ridged, particularly at the base. One species departs from the barbet rule by having a rather pointed wing. There is virtually no sexual dimorphism. These species range across central Africa from west to east.

C. *Lybius* group.—Species with bills in various stages of specialization, all having one or more 'teeth' on the edges of the upper mandible. The plumage of these species is mostly bright with red, yellow and blue-black predominating. Some species are dull-colored with large areas of white plumage. Sexual dimorphism is much reduced. There is a continual cline in the development of the bill from *melanocephalus*, possessing a relatively simple bill with very small 'teeth,' to *dubius* in which there are two pairs of 'teeth,' and both mandibles are



TEXT-FIGURE 2.—A suggested barbet family tree.

deeply sulcated. These species range across tropical Africa without close relatives in other areas.

D. *Trachyphonus* group.—Species with strong but relatively unspecialized bills, rather longer in proportion than the characteristic barbet bill. These birds have bright spotted plumage, a noticeable degree of sexual dimorphism, and long tails. The wing-tail ratio runs from 86% to 97% in *Trachyphonus*, while in *Psilopogon* or *Capito*, the other long-tailed genera of barbets, the wing-tail ratio is never over 85% or 65%, respectively. The size, proportions and color of this group as well as the suggestion of ground-nesting habits (Friedmann, 1930) incline me to the belief that *Trachyphonus* may represent a link with the Bucconidae.

THE TROPICAL AMERICAN BARBETS

In the following list I have used only two genera, *Capito* and *Semnornis*. The genus *Eubucco* was erected by Bonaparte (1850) for the

species *richardsoni*. Except that those species listed in *Eubucco* by Cory (1919) are smaller than those of *Capito*, I can find no valid distinctions between the two. Besides having rounded tails and a tendency to sexual dimorphism, both groups have similar bills and the plumage of both is often streaked on the lower parts. I think Shelley (1891: 107) was quite right in reducing *Eubucco* to synonymy.

Dicrorhynchus Carriker (1910) was proposed for the species *frantzii* because of the slight reduction in size of the bill and the plainness of the plumage as compared to *rhamphastinus*. It seems to me illogical and unnecessary to separate these two monotypic forms. The bill is highly evolved and of a unique type in both. It is far better in this case to emphasize the resemblance between the two than the difference. In spite of its somber plumage, *frantzii* has the bright metallic feathers at the nape which are found as a nuchal collar in *rhamphastinus*. In the former species they are prolonged into a crest.

Semnornis differs from *Capito* in the swollen, highly evolved bill and the lack of pronounced sexual dimorphism. Both genera have rounded tails and similar wing formulae, and in both the external nares are set within ridges, similar in form if not in degree, on either side of the culmen. In the following list of accepted subspecies those forms not examined by me are indicated by an asterisk.

I. *Capito* Vieillot

1. *aurovirens* (Cuvier)

Range: Colombia (La Morelia), eastern Ecuador, northwest Brazil and eastern Perú.

2. *maculicoronatus* Lawrence

Subspecies and range: a. *maculicoronatus*—western Panamá; b. *pirrensis*—southeast Panamá and adjacent parts of Colombia; c. *rubrilateralis*—western Colombia; d. *squamatus*[1]—extreme southwest Colombia (Ricaurté) and western Ecuador.

3. *quinticolor* Elliot

Subspecies and range: a. *hypoleucos*—Cauca-Magdalena area, north-central Colombia; b. *quinticolor** southwestern Colombia in the coastal zone.

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[1] The fact that this form has a reddish orange forehead, white spots on the secondaries, and a reduction of color and spotting on the under parts does not seem significant enough to maintain it as a separate species.

4. *niger* Müller

Subspecies and range: a. *niger*—Guianas and north bank of Amazon near Obidos, Brazil; b. *aurantiicinctus*—Venezuela; c. *intermedius*—upper Río Orinoco west of Mt. Duida; d. *punctatus*—western Colombia, Ecuador and Perú east of the Andes; e. *macintyrei**—Río Pastaza, Oriente of Ecuador; f. *auratus*—northeastern Perú; g. *orosae*—northeast Perú on the right bank of Río Marañón near Río Orosa; h. *conjunctus**—eastern Perú, Pozuzo; i. *insperatus*—Moyobamba, Perú; Río Chaparé, Bolivia; j. *bolivianus*—lower Río Beni of Bolivia; k. *nitidior*—western Brazil north side of the Solimões; l. *amazonicus*—western Brazil from Solimões to Rio Purus; m. *novaolindae*—western Brazil, left bank of Rio Purus; n. *arimae*—western Brazil, lower Rio Purus; o. *hypochondriacus*—western Brazil, upper Rio Negro; p. *dayi*—Rio Madeira, western Brazil; q. *brunneipectus*—Rio Tapajoz, north-central Brazil.

For discussions of these races see Chapman (Amer. Mus. Novit. no. 335, 1928), and Bond and de Schauensee (Proc. Acad. Nat. Sci. Phila., 95: 214, 1943). Further collecting may show that some of these races are merely color phases.

5. *versicolor* Müller

Subspecies and range: a. *richardsoni*—central and eastern Colombia and eastern Ecuador; b. *nigriceps**—Perú, junction Apiyacu and Amazon; c. *coccineus** Puerto Yessup; Junín, Perú; d. *auranticollis*—eastern Perú and western Brazil; e. *steeri*—Moyobamba, Perú; f. *glaucogularis*—central Perú in Huánuco; g. *versicolor*—southeast Perú and Bolivia.

6. *bourcieri* Lafresnaye

Subspecies and range: a. *salvini*—Costa Rica and western Panamá; b. *occidentalis*—western Andes of Colombia; c. *bourcieri*—central Colombia; d. *aequatorialis*—western and central Ecuador; e. *orientalis*—eastern Ecuador; f. *tucinkae**—southeast Perú.

II. *Semnornis* Richmond

1. *frantzii* Sclater

Range: Costa Rica and western Panamá.

2. *rhamphastinus* Jardine

Range: Colombia and Ecuador.

THE ASIATIC BARBETS

The Asiatic barbets have been carefully reviewed by Berlioz (1936). In this paper (p. 32) he gives the following key to the genera:

1. *Caloramphus:* loral bristles obsolete; bill strongly keeled at the base of the culmen; plumage dominantly brown.
2. *Psilopogon:* very well developed loral bristles, and with elongated nasal bristles, terminally red; culmen not keeled; plumage dominantly green; tail long and very tapered.
3. *Megalaima:* simple black loral bristles, a few nasal plumules; under tail coverts red; tail of medium length, slightly graduated.
4. *Chotorea:* bill notably longer than tarsus, strong and black (adults); under tail coverts green; exposed nares.
5. *Cyanops:* bill shorter than tarsus or otherwise, pale in color; size medium (wing 90 mm. or longer); second primary noticeably shorter than tenth, loral bristles not longer than culmen.
6. *Mezobucco:* size smaller (wing shorter than 90 mm.); second primary generally much longer than tenth or, otherwise, loral bristles very long, longer than culmen; feet gray or greenish.
7. *Xantholaema:* feet clear red; loral bristles short and strong, not longer than bill.

It is certainly not difficult to agree with the separation of the first two listed genera from the others. I have given their generic characters in the discussion under Regional Arrangement. Also the suppression of *Thereiceryx* Blanford (Berlioz, tom. cit.: 32) seems sensible on the basis of being too close to *Cyanops*. The only characters previously separating these genera were the brown-streaked head, neck and breast of *Thereiceryx* (*vide* Stuart Baker, 1927: 102). However, *Cyanops flavifrons* represents a transitional stage between solid color and streaking.

The question of the distinctness of the remaining five genera is very much open to doubt. As Shelley (1891: 13) expressed it for the whole of the family: "scarcely one of the genera is so well defined that it does not form a link toward some other genus." *Megalaima* Gray (1842) is a new name for *Bucco*. In his subsequent list of the genera of birds (1849) Gray, rightly enough I think, includes in *Megalaima* some twenty-nine species, all of which except *virens* have since been put in *Chotorea*, *Cyanops*, *Mezobucco* or *Xantholaema*. In their monograph, the Marshalls (1870–1871) followed approximately the same arrangement as Gray. Reading over Berlioz's key as listed above, it is diffi-

cult to see how the subsequent genera were created. In every case the characters invoked merge or are transitional.

As an example of the preceding statement, the culmen of the two species of *Megalaima* noted by Berlioz (tom. cit.: 34) seems to be somewhat more arched than in most of the other species. However, by tracing the bill of *M. virens* and superimposing on it a similar tracing of the culmen of *corvina* (a species listed under *Chotorea*) it is seen that the difference in the arc (from the base of the culmen to the tip) between the two is not more than one degree measured from the basal angle between the nares. Comparison of a series of bills of *Megalaima virens* indicates that this difference falls within the standard deviation and is not significant. Other bill characters of *M. virens* are that it is more compressed, less tumid than in two species, *chrysopogon* and *javensis*. However, there is a complete transition between these two forms when the species *zeylanicus* and *faiostrictus* are considered.

In the case of the differences enumerated above between *Megalaima* and *Chotorea*, I submit that the presence or absence of red under tail coverts is not sufficient for generic rank, nor is that of exposed nares. *M. virens* has largely exposed nares. I cannot therefore see the validity of *Chotorea*.

Cyanops and *Xantholaema*, like *Chotorea*, were created by Bonaparte (Conspectus Volucrum Zygodactylorum: 12, 1854). These names are listed on the page followed by a group of species in a manner suggesting the arrangement of subgenera. Shelley (1891: 55, 61, 88) has simply given the genotype in each case as the first-listed species after each name. The characters listed by Shelley (1891: 15) and by Berlioz for these genera are in most cases neither valid generic characters nor will they hold good in every case. The culmen of the species *mystacophanes* is not always longer than the tarsus and yet the species is placed in *Chotorea*. The species *franklinii* has a black bill which equals if not exceeds the tarsal length, and yet it is listed in *Cyanops*. It seems impossible, therefore, to accept *Cyanops*.

Mezobucco Shelley (1889) was created for the species *duvauceli* on the basis of a culmen shorter than the tarsus, a pointed, not obtuse, bill as in *Xantholaema*, and the rictal bristles which surpass the bill in length. Berlioz adds to this the wing measurement (less than 90 mm.) and the second primary. None of these characters appears to be valid. The culmen of some species listed in *Cyanops* is shorter than the tarsus, and also the wing of these birds (*i. e.*, *flavifrons*) is shorter than 90 mm. The rictal bristles of other species (*i. e.*, *mystacophanes*, *rubricapilla*) also exceed the culmen in length. Finally in *flavifrons*,

again, the second primary is not shorter than the tenth. Thus it seems impossible to maintain *Mezobucco* as a genus.

Xantholaema is characterized as having rictal bristles that do not exceed the length of the bill. Unfortunately this is not true in any of the species assigned to it. I cannot uphold the genus on the character of red feet any more than of red under tail coverts. I feel that this genus also, as with the preceding three, should be united in *Megalaima*.

Megalaima, then, can be characterized as a genus of Asiatic barbets ranging in size from large (for a barbet) to small, with stout tumid bills, the culmen of which is somewhat arched but never keeled; with green predominating in the plumage and usually with bright patches of color about the head; with rounded wings and tails; and with stout, brightly colored feet. Sexual dimorphism is not pronounced. The arrangement of the Asiatic genera follows:

III. *Psilopogon* S. Müller

1. *pyrolophus* S. Müller

Range: Mountains of Malaya and Sumatra.

IV. *Megalaima* Gray

1. *virens* (Boddaert)

Subspecies and range: a. *marshallorum*—northern and eastern India in the Himalayas; b. *magnifica*—Assam; c. *clamator*—hills of northern Burma; d. *virens*—southern Burma, Thailand, Indo-China in Tonkin, upper Laos and northern Annam and China from Yunnan to Anwhei and Kiangsi.

2. *lagrandieri* Verreaux

Subspecies and range: a. *lagrandieri*—Indo-China, Cochin China, Cambodia, southern Laos and south Annam; b. *rothschildi*—Indo-China, Tonkin south to Napé in Laos and Lung Lunh in Annam.

3. *zeylanica* (Gmelin)

Subspecies and range: a. *kangrae**—India, western Himalayas, Kangra to Garwhal; b. *caniceps*—Allahabad east to Bengal, Orissa, Hyderabad and Madras Presidency (?); c. *inornata**—western Madras Presidency and Nilgiris (?); d. *zeylanica*—southern Travancore and Ceylon; e. *hodgsoni**[1]—Assam, Burma except the northern part, Thailand, northern Malaya, Indo-China except Tonkin and north Annam; f. *lineata*—Java, Bali.

[1] I do not recognize the race *intermedia* (Baker).

4. *viridis* (Boddaert)

Range: south-central India, more commonly in the hills.

5. *faiostricta* (Temminck)

Subspecies and range: a. *faiostricta*—northeast and eastern Thailand through southern Indo-China; b. *praetermissa*—Indo-China in upper Tonkin and Laos, southern China (?) and Naochao Is., south Kwantung.

The following groups of species show close relationship to each other although in many cases their ranges overlap. Thus by definition they cannot be called superspecies. In some ways the distribution of these barbets is reminiscent of that of the Polynesian fruit pigeons of the *Ptilinopus purpuratus* group (Ripley and Birckhead, Amer. Mus. Novit., no. 1192, 1942). No color characters are constant enough even to warrant their separation into discrete species groups. For example, such characters as the occurrence of two reddish or orange spots on each side of the lower throat occur in six species belonging to three possible different species groups. I have simply arranged these species in a linear order running geographically from west to east, in each case putting what I consider closely related strains close together. I have started with those species which have rather plain, uncolored throats secondarily suffused in some cases with a yellow patch on the upper portion. From those I have gone to the species with pale bluish throats, sometimes suffused with yellow, and with red spots on either side of the lower portion.

6. *franklinii* (Blyth)

Subspecies and range: a. *franklinii*—Nepal, Sikkim, eastern Assam, the Chin hills and east to southern Yunnan and northern Annam, upper Laos and upper Tonkin, Indo-China; b. *ramsayi*—central and eastern Burma from the southern Shan States to Mt. Mouleyit in Tenasserim, northern and western Thailand; c. *trangensis*—mountains of Trang, peninsular Thailand; d. *minor*—mountains of Malaya; e. *auricularis*—highlands of southern and central Annam and central Laos, Indo-China.

7. *chrysopogon* (Temminck)

Subspecies and range: a. *chrysopogon*—southern peninsular Thailand, Malaya and Sumatra; b. *chrysopsis*—Borneo.

8. *corvina* (Temminck)

Range: west and central Java.

9. *asiatica* (Latham)

Subspecies and range: a. *asiatica*—Kashmir east through Nepal, Sikkim, eastern Bengal, Assam, northern Burma south from the Arakan to the western Shan States, southwest Yunnan and northern Thailand; b. *rubescens**[1]—Manipur and Lushai Hills, eastern Assam; c. *davisoni*—in Burma from the Pegu Yomas south to central Tenasserim, western and central Thailand, southeast Yunnan and Indo-China in Tonkin and northern Laos and Annam; d. *chersonesus*—peninsular Thailand.

10. *incognita* Hume

Subspecies and range: a. *incognita*—Amherst to Tavoy, Tenasserim; b. *euroa*—southeast Thailand and Cambodia, Annam, Laos and Tonkin in Indo-China.

11. *oorti* (S. Müller)

Subspecies and range: a. *oorti*—Malaya and Sumatra; b. *anamensis*—south Annam and lower Laos; c. *faber*—Hainan; d. *sini*—Kwangsi, China; e. *nuchalis*—Formosa.

12. *monticola* (Sharpe)

Range: mountains of Borneo.

The following species, which also have red patches on either side of the lower throat, are, in general, distinguished by more gaudy, brighter plumage. The green, particularly of the upper parts, is shiny and darker, rather grass green. The bill is black and large in proportion to the body.

13. *mystacophanes* (Temminck)

Subspecies and range: a. *mystacophanes*—Tenasserim from Tavoy south, peninsular Thailand, Malaya, Sumatra and Borneo: b. *ampala*—Tana Bala, Tana Massa Is., west Sumatra.

14. *rafflesii* (Lesson)

Subspecies and range: a. *malayensis*—peninsular Thailand, Malaya and Banks, Billiton and Mendanau Is.; b. *rafflesii*—Sumatra, Borneo.[2]

15. *javensis* (Horsfield)

Range: Java.

The following species have rather soft green plumage and orange-yellow on the crown as a patch or fringe.

[1] Not seen; possibly an erythristic form.
[2] These races vary only in size.

16. *flavifrons* (Cuvier)

Range: Ceylon.

17. *armillaris* (Temminck)

Subspecies and range: a. *henricii*—peninsular Thailand, Malaya and Sumatra; b. *brachyrhyncha*—north Borneo, lowlands; c. *pulcherrima*—Mt. Kinabalu, north Borneo; d. *armillaris*—west and central Java; e. *baliensis**—east Java and Bali.

The species following which I have not examined should possibly be considered a link between the previous forms and *australis* as noted by Berlioz (*tom. cit.:* 50).

18. *robustirostris** (Stuart Baker)

Range: northern Cachar, parts of Assam and possibly Burma.

19. *australis* (Horsfield)

Subspecies and range: a. *cyanotis*—Sikkim to Assam and Burma except Tenasserim; b. *stuarti*—Tenasserim and peninsular Thailand; c. *invisa*—northern Thailand; d. *orientalis*—southeast Thailand and Indo-China except Tonkin; e. *duvaucelii*—Malaya, Sumatra and lowlands of Borneo; f. *gigantorhina*—Nias I., west Sumatra; g. *tanamassae*—Batu Islands, W. Sumatra; h. *eximia**—mountains of Sarawak, North Borneo; i. *cyanea**—Mt. Kinabalu, north Borneo; j. *australis*—Java; k. *hebereri**—Bali.

20. *rubricapilla* (Gmelin)

Subspecies and range: a. *malabarica*—western coastal India from Goa through Travancore; b. *rubricapilla*—Ceylon.

21. *haemacephala* (P. L. S. Müller)

Subspecies and range: a. *confusa**[1]—Bombay Presidency; b. *indica*—India except range of 'a', Baluchistan, the Northwest Frontier or the south-western Punjab, Nepal and Sikkim, Ceylon, Burma, Thailand, northern Malaya, Yunnan, and Indo-China except Tonkin; c. *delica*—Sumatra; d. *rosea*[2]—Java, Bali; e. *haemacephala*—Mindanao, Leyte, Samar, Mindoro, Calamianes (?), and Luzon, Philippine Is.; f. *intermedia*[3]—Cebu, Tablas, Romblon, Masbate, Guimaras and Negros, Philippine Is.

[1] M. Delacour, who has examined some of Koelz's specimens, assures me this is a valid race, much paler than *indica*.

[2] Failing any recent substantiation of *delica* and *rosea* overlapping in the Lampong district of south Sumatra, I prefer to keep these forms as subspecies.

[3] I do not agree with M. Delacour (in litt.) that *intermedia* and *rosea* are inseparable. Eleven Philippine birds have culmen measurements of 21.5–23 mm. while seven Javan examples measure 16–18 mm. In addition, Philippine birds have more noticeable yellow bases to the feathers of the lower throat than do Javan specimens.

V. *Caloramphus* Lesson

1. *fuliginosus* (Temminck)

Subspecies and range: a. *hayi*—southern Tenasserim, peninsular Thailand, Malaya and Sumatra; b. *fuliginosus*—western Borneo; c. *tertius**—north Borneo.

THE AFRICAN BARBETS

Gymnobucco like *Caloramphus* is a gregarious bird, dull-plumaged, with a sharply ridged culmen. Both genera have short, slightly rounded tails and similar wing formulae. The species grouped under *Gymnobucco*, however, have a tendency to naked heads and short, bristly tufts of feathers over the nares or about the angles of the bill and chin.

The next group of species is combined in *Pogoniulus*. These forms, as *leucotis* for example, have a tendency to a similarly ridged culmen, but also considerable variety in plumage color and texture. Chapin (1939: 488) separates *Buccanodon* from *Pogoniulus* on the basis of the latter having a wing measurement of less than 70 mm. and the first toe being less than half as long as the fourth. It seems apparent that these characters are used to maintain a generic name for its own sake. But if the species *duchaillui* is combined in *Buccanodon* with the species *anchietae* in which the size is roughly the same but the color pattern vastly different, it would seem unnecessary to separate similarly colored species in different genera on the basis of size alone.

Smilorhis was characterized by Shelley (*tom. cit.*: 14) as having "the wing rather pointed, the primaries exceeding the secondaries by more than the length of the culmen; on the latter a well-marked crest." Unfortunately the primary-secondary-culmen comparison, as so often happens in these cases, is not valid in all cases. Also other species assigned by Shelley to different genera (*i. e.*, *Barbatula* = *Pogoniulus*) have well-marked crests on the culmen.

Viridibucco Oberholser (Proc. U. S. Nat. Mus., 28: 865, 1905) has a smaller bill, but only in proportion to its smaller size. The naked space around the eye is reduced in the same way in *leucomystax* that it is in the larger species *olivaceum*. Otherwise there are no significant differences. The character of the yellow stripe used by Chapin (*tom. cit.*: 488) is not valid in the case of the species *simplex*. Oberholser's remarks in his discussion of the validity of *Barbatula*, *Smilorhis* etc. (*tom. cit.*: 865–866) are worth reading today in that they indicate very well the transitional position of *duchaillui* between the species *anchietae* (formerly in *Stactolaema*), *leucotis* (formerly in *Smilorhis*) and

scolopaceus, *pusillus*, etc. (in *Pogoniulus*). Oberholser uses *Xylobucco* for the last but Richmond (Proc. U. S. Nat. Mus., 35: 634, 1908) shows that *Pogoniulus* should replace it.

The name *Micropogonius* Roberts for the golden-rumped tinker bird, *Pogoniulus bilineatus*, has not been used by recent authors; *i. e.* Sclater, Friedmann, Chapin.

I have combined several genera in *Lybius* on the basis of relationship. In this case it is simply a matter of taste as to whether to recognize such monotypic genera as *Pogonorhynchus* and *Erythrobucco* or not. I prefer not to recognize them as they are end products of a continuous cline of development for which there are connecting links. If the links were lacking as in the case of *Semnornis* then there would be no indication of relationship, but in this case it is present in the case of *bidentatus* which differs primarily only in degree. Comparison of the characters follows:

	Chin bristles	*Upper mandible*	*Lower mandible*	*Flank patches*
bidentatus	prominent	toothed	smooth	present
E. rolleti	tufted	toothed and lightly ridged	smooth but thickened	present
P. dubius	double tufts	toothed and ridged	thickened and sulcated	present

The plumage of these species is similar in color and pattern with only minor differences such as the color of the throat which varies from crimson to black, sometimes followed by a black breast band.

Of the genus *Tricholaema*, Chapin says (tom. cit.: 488): "chest feathers usually with long hair like tips; no red on head unless restricted to forehead and head never entirely white." All species of so-called *Tricholaema* have toothed upper mandibles as in the case of *Lybius*. In addition, *Lybius melanopterus* has hair-like tips to the chest feathers, *L. undatus* has red restricted to the forehead, and only one small group in *Lybius*, out of a number of species, has the head entirely white. Therefore, I fail to see how *Tricholaema* can be maintained.

Reichenow erected the genus *Trachylaemus* for the species *purpuratus* which has shorter crown feathers than *Trachyphonus vaillantii*, etc. The feathers of the former species are somewhat stiffened and bifurcate on the chin and throat and the upper parts are glossy black. However, I feel that these characters are not of generic value. Even the presence of bifurcate feathers in other non-passerine birds, as in some species of fruit pigeons (*Ptilinopus*), is not considered to be a generic character. The arrangement follows:

VI. *Gymnobucco* Bonaparte

1. *bonapartei* Hartlaub

Subspecies and range: a. *bonapartei*—Cameroon and Belgian Congo to lower Ituri; b. *intermedius*—eastern Congo and western Uganda; c. *cinereiceps*—Uganda from Toro to Mt. Elgon.

2. *peli* Hartlaub

Subspecies and range: a. *peli*—Gold Coast, Cameroon to lower Congo valley; b. *sladeni*—Ituri district, Congo.

3. *calvus* (Lafresnaye)

Subspecies and range: a. *calvus*—Sierra Leone, Liberia to south Nigeria; b. *major*—Cameroon to Gaboon; c. *vernayi*—northern Angola.

VII. *Pogoniulus* Lafresnaye

1. *leucotis* (Sundevall)

Subspecies and range: a. *leucotis*—Nyasaland, Zululand and Natal; b. *bocagei*—Angola; c. *leucogrammicum*—Tanganyika, Rufigi valley; d. *kilimensis*—east Africa.

2. *anchietae* (Bocage)

Subspecies and range: a. *katangae*[1]—Lualaba valley, Belgian Congo to Serenje in Northern Rhodesia; b. *anchietae*—central Angola and southern Congo; c. *rex*—Loanda, northern Angola; d. *sowerbyi*—Angoniland and Mashonaland; e. *stresemanni*—southern end of Lake Tanganyika, Kitungulu; f. *whytii*—Nyasaland east and southeast of Lake Nyasa to Northern Rhodesia.

3. *olivaceum* (Shelley)

Subspecies and range: a. *olivaceum*—Kenya and Usambara and Uluguru Mts.; b. *woodwardi*—Zululand and Nchingidi, Tanganyika.

4. *duchaillui* (Cassin)

Subspecies and range: a. *duchaillui*—Liberia, Cameroon to upper Congo. b. *gabriellae*—French Congo, Stanley Pool and Mayombe.

5. *pusillus* (Dumont)

Subspecies and range: a. *pusillus* eastern Cape Province to Zululand; b. *affinis*—southern Somaliland west to Lake Victoria Nyanza, south

[1] The occurrence of *Buccanodon sowerbyi buttoni* White (Bull. Brit. Orn. Club, 65: 18, 1945) at Ndola, Northern Rhodesia within the range of *katangae* deserves careful checking. The distribution of this species as a whole is not clear.

to Dar es Salaam; c. *uropygialis*—Eritrea and Abyssinia, parts of Somaliland.

6. *chrysoconus* (Temminck)

Subspecies and range: a. *schubotzi*—southern Sahara to Lake Chad; b. *chrysoconus*—Senegal to Gold Coast and Togoland; c. *centralis*—Uganda; d. *zedlitzi*—Egyptian Sudan; e. *xanthostictus*—central and southern Ethiopia; f. *rhodesiae*—northern Nyasaland, southeastern Belgian Congo; g. *extoni*—southern Angola, southeast Nyasaland, Bechuanaland and western Transvaal.

7. *bilineatus* (Sundevall)

Subspecies and range: a. *togoensis*—lower Nigeria, Togoland to Gold Coast, Senegal; b. *leucolaima*—central Angola north to Bozum; c. *poensis*—Fernando Po I.; d. *nyansae*—Uganda from east Congo border to southern end of Lake Tanganyika;[1] e. *bilineatus*—Natal, Zululand, eastern Transvaal, north through eastern Rhodesia and Nyasaland to southwest Tanganyika; f. *jacksoni*—Mau Plateau to Nairobi, Mt. Elgon; g. *fischeri*—Mombasa to Mikindini; h. *conciliator*—Uluguru Mts., Tanganyika; i. *alius*—Kenya highlands east of Rift valley.

8. *subsulphureus* (Fraser)

Subspecies and range: a. *chrysopygus*—Gold Coast and Liberia; b. *flavimentum*—eastern Sierra Leone to Gaboon and lower Congo; c. *subsulphureus* Fernando Po I.

9. *erythronotus* (Cuvier)

Range: Senegal to Portuguese Congo east to Ruwenzori and the Uele district.

10. *coryphaeus* (Reichenow)

Subspecies and range: a. *coryphaeus*—highlands of Cameroon; b. *hildamariae*—highlands of eastern Congo; c. *angolensis*—highlands of Angola.

11. *simplex* Fischer and Reichenow

Subspecies and range: a. *simplex*—coastal region of Tanganyika, Zanzibar; b. *leucomystax*—Kenya and Tanganyika from interior to mountains west of Lake Nyasa.

12. *scolopaceus* (Bonaparte)

Subspecies and range: a. *scolopaceus*—Sierra Leone and Liberia to Calabar; b. *stellatus*—Fernando Po I.; c. *flavisquamatus*—Cameroon

[1] Includes *mfumbiri*.

and Gaboon; d. *flavior*[1]—northern Angola; e. *aloysii*—Uganda east to Naivasha, Kenya.

VIII. *Lybius* Hermann

1. *melanocephalus* (Cretzschmar)

Subspecies and range: a. *melanocephalus*—Bogosland and Ethiopia to Addis Ababa, east to Harrar; b. *stigmatothorax*—southern Ethiopia, Lakes Rudolf and Stephanie areas south to Dodoma, Tanganyika; c. *blandi*—central and eastern Somaliland from the Goolis Mts. to Obbia; d. *flavibuccale*—Wembaerae Steppes, Tanganyika.

2. *lacrymosum* (Cabanis)

Subspecies and range: a. *lacrymosum*—northern Uganda, Kenya to northern Tanganyika; b. *radcliffei*—Uganda from Lake Albert southeast to Tororo and south to Lake Victoria Nyanza, adjacent parts of Tanganyika; c. *ruahae*—inland parts of southeast Tanganyika.

3. *leucomelas* (Boddaert)

Subspecies and range: a. *leucomelas*—Angola and Zambesi to Cape Province in the west; b. *namaqua**—Little Namaqualand; c. *centralis** —Transvaal; d. *nkatiensis**—northern Bechuanaland.

4. *diadematum* (Heuglin)

Subspecies and range: a. *diadematum*—upper White Nile and southern Ethiopia to northern Somaliland; b. *mustum**—northeast Uganda east through Kenya as far south as Mt. Kenya; c. *massaicum*—southern Kenya to northern Tanganyika; d. *frontatum**—Nyasaland to Angola.

5. *hirsutum* (Swainson)

Subspecies and range: a. *hirsutum*—Liberia and Gold Coast; b. *hybridum*—southern Nigeria; c. *chapini*—upper Uele, Belgian Congo; c. *ansorgii*—Uganda; d. *flavipunctatum*—Cameroon to lower Congo; e. *angolense**—northern Angola.

6. *undatus* (Rüppell)

Subspecies and range: a. *undatus*—Ethiopia; b. *gardullensis**—lake region of southern Shoa and Gofa of middle Omo region; c. *leucogenys*—western Ethiopia south to the Gofa country; d. *salvadorii*—Harrar Mts. eastern Ethiopia; e. *thiogaster**—northern Ethiopia and Eritrea.

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[1] New name for *angolensis* Bannerman (B. B. O. C. 53: 184, 1933) which is preoccupied by *P. c. angolensis* Boulton (Ann. Carn. Mus. 21, no. 1: 46, 1931.

7. *vieilloti* (Leach)

Subspecies and range: a. *vieilloti*—Bogosland and Egyptian Sudan; b. *rubescens*—Senegal to Cameroon, inland to northern Nigeria.

8. *guifsobalito* Hermann

Subspecies and range: a. *guifsobalito*—Bogosland, southwest Eritrea, Ethiopia (except the southeast) and the Blue Nile district of the Sudan; b. *ugandae**—northeastern Belgian Congo east through Uganda.

9. *melanopterus* (Peters)

Range: Juba River, Somaliland south to eastern Kenya and Tanganyika to Nyasaland and Mozambique.

10. *torquatus* (Dumont)

Subspecies and range: a. *torquatus*—Angola, Zambesi valley south to Cape Province; b. *congicus*—Congo valley south to Katanga and Njombe; c. *irroratus*—east Africa from Lamu to Ugogo in Tanganyika.

11. *leucocephalus* (Defilippi)

Subspecies and range: a. *leucocephalus*—upper White Nile from Lado west to Bahr el Ghazal south to Mt. Elgon and Uganda; b. *adamauae*—Shari river to Adamawa in northeastern Cameroon and northern Nigeria; c. *albicaudus*—Kenya and Tanganyika from Nairobi to Ugogo; d. *lynesi**—Iringa, Tanganyika; e. *senex*—southern Kenya from Nairobi to Kitiu; f. *leucogaster**—Angola.

12. *levaillantii* (Vieillot)

Subspecies and range: a. *levaillantii*—lower Congo and northern Angola; b. *intercedens*—Manjanga, Congo; c. *macclounii*—northern Lake Nyasa west through Northern Rhodesia to Katanga district, Congo.

13. *bidentatus* (Shaw)

Subspecies and range: a. *bidentatus*—Sierra Leone to Gold Coast; b. *aequatorialis*—French and Belgian Congo, Uganda, Ruanda and Tanganyika; c. *aethiops*—Sudan and Ethiopia except the Hawash Basin.

14. *rolleti** (Defilippi)

Range: Upper White Nile west to Shari valley, French Congo.

15. *dubius* (Gmelin)

Range: Senegal, Sierra Leone and Portugese Guiana east through inland Gold Coast to northern Nigeria.

IX. *Trachyphonus* Ranzani

1. *vaillantii* Ranzani

Subspecies and ranges: a. *suahelicus*—East Africa from the Pangani river to the Zambesi; b. *vaillantii*—southern Angola and Zambesi south to Natal and Zululand.

2. *erythrocephalus* Cabanis

Subspecies and range: a. *erythrocephalus*—northern Tanganyika and Kilimanjaro region; b. *versicolor*—western Kenya and eastern Uganda; c. *jacksoni**—central Kenya and southern Ethiopia; d. *gallarum**—east central Ethiopia; e. *shelleyi*—eastern Ethiopia, extreme western Italian Somaliland and central British Somaliland.

3. *margaritatus* (Cretzschmar)

Subspecies and range: a. *margaritatus*—Egyptian Sudan from Suakim and Khartoum south through Ethiopia, Eritrea, Bogosland, west to Lake Chad, northern Nigeria and Asben in the southern Sahara; b. *somalicus*—northern Somaliland and Gallaland.

4. *darnaudii* (Prévost and Des Murs)

Subspecies and range: a. *darnaudii*—Kordofan, upper White Nile and Shoa to the Rift valley in Kenya; b. *usambiro*—southern Kenya to the country south and southwest of Lake Victoria, Tanganyika; c. *bohmi**—southern Italian Somaliland, eastern Kenya to northeast Tanganyika; d. *emini*—Tanganyika from Ugogo south to northern Lake Nyasa.

5. *purpuratus* Verreaux

Subspecies and range: a. *purpuratus*—Cameroon to Angola east Yambuya; b. *elgonensis*—Uganda to Mt. Elgon and the Mau plateau in Kenya, and the upper Uele district; c. *goffinii*—Sierra Leone and Liberia to the Gold Coast; d. *togoensis*—Togoland and Ifon, southern Nigeria, Lagos.

CONCLUSION

The barbet family is considered to consist of a closely knit family of nine genera and sixty-six species. Within the family there are a limited number of characters such as bill form and plumage color patterns which reappear throughout in a variety of combinations. Thus with a lack of any great number of morphological characters it becomes difficult to set up more than a very few satisfactory generic categories. On the other hand, the restricted and overlapping ranges

of the members of the family coupled with the lack of variety in plumage pattern necessitates the maintenance of a large number of species. Nor can these species, many of which are obviously closely related, even be combined in larger groups such as superspecies, due to the degree of geographical overlapping which is present. The barbets thus seem to represent a condition of dispersal and speciation in which the development of physiological barriers to inbreeding has not been paralleled by an equal development of a variety of morphological characters.

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