SUPPLEMENT

TO

THE FIRST EDITION OF

A

MONOGRAPH

OF

THE RAMPHASTIDÆ,

OR

FAMILY OF TOUCANS.

BY

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INTRODUCTION.

THE earliest record respecting the existence of a species of the remarkable group of birds now so well known by their common appellation of Toucans, occurs in the 28th Chapter of Belon's third book published in 1555, where a figure of the bill of *Ramphastos Toco* is given as belonging to a bird of the new world. The beak of another species also formed part of the celebrated collection of John Tradescant, and was described in the "Museum Tradescantium," published in 1656, as that of the Araçari of Brazil. The first figure of an entire bird appeared in the "Ornithologia" of Willughby under the name of *Pica Braziliensis Toucan*, but is so imperfect that we can scarcely say what species it is meant to represent; most likely, however, it is intended for the *Ramphastos Toco*: subsequently a correct but very rude figure of another species, probably the *Ramphastos erythrorhynchus*, was published in Petiver's "Gazophylacii Naturæ"; and to these meagre materials but little appears to have been added until the appearance of the "Systema Naturæ" of the celebrated Linnæus, in the twelfth edition of which he enumerates eight species; but of these *R. picatus* cannot be identified, and the *R. Momotus* has nothing whatever to do with the present family, but is a true Motmot—genus *Momotus*: six species then were all that were known to Linnæus. Gmelin, in his edition of the "Systema Naturæ," enumerates eight others, but of these *R. pavoninus*, *torquatus*, *luteus*, *cæruleus*, and *albus* cannot be identified, and *R. erythrorhynchus* is probably identical with the *R. Tucanus* of Linnæus; his *R. Toco*, according to the characters detailed, is therefore the only addition made by him to the previous list. Illiger appears to have added *R. vitellinus*; at least Mr. Swainson quotes that name as having been given by him, but does not say where, nor have I been able to discover his description of the species. Dr. Shaw proposed the name of *R. Aldrovandi* for the *R. picatus* of Linnæus, which I have already mentioned cannot be identified. Vieillot merely Latinized the French names given by

Le Vaillant to three of the species figured in his "Oiseaux de Paradis," viz. *Ramphastos Tocard*, *R. Azaræ*, and *R. Bailloni*. Mr. Swainson made us acquainted with three additional species, *Ramphastos ambiguus*, *Pteroglossus inscriptus*, and *Pt. sulcatus*. Dr. Lichtenstein gave the names of *Pteroglossus prasinus* and *Pt. maculirostris* to two well-marked species. Dr. Latham did not add a single species to the group; unless his Blue-eared Toucan, to which he gave no specific appellation, be identical with *Aulacoramphus sulcatus*. The *Ramphastos Indicus* of Miller's "Cimelia Physica" is doubtless meant to represent a Toucan; and if the colours of the under surface were transposed it would then more nearly resemble *R. Toco* than any other.

Wagler, who gave a monograph of the group in his "Systema Avium," published in 1827, added the following species,—*Ramphastos Cuvieri* and *Pteroglossus Reinwardti*, *Langsdorffi* and *Humboldti*. Subsequently he published in Oken's "Isis" the description of a fifth new species under the name of *Pteroglossus Beauharnaisii*. His *Ramphastos Le Vaillantii* is merely the description of the faded *R. erythrorhynchus*, figured by Le Vaillant on his fourth plate; his *Ramphastos callorhynchus* is identical with the *R. carinatus* of Swainson; his *R. Forsterorum* is taken from the fifth plate of Le Vaillant, which is said to be a representation of a bird made up from *R. Ariel* and *R. Cuvieri*; his *R. erythrosoma* cannot be identified with any known bird; the characters were taken from Le Vaillant's sixth plate representing a specimen which had probably been tampered with by the bird-mounter, a much to be reprehended, though not unfrequent practice; lastly, his *Pteroglossus Poëppigi* is identical with his *Pt. Beauharnaisii*.

Both Prince Charles Lucien Bonaparte and Mr. G. R. Gray consider the *Ramphastos maximus* of Cuvier to be identical with the *R. erythrosoma* of Wagler, which, as above stated, has been founded upon a made-up specimen.

Mr. Vigors, who commenced a monograph of the family in the "Zoological Journal," but did not live to complete it, named two others, *Ramphastos Ariel* and *Pteroglossus bitorquatus*.

Mr. Fraser pointed out the characters which distinguish his *Pteroglossus flavirostris* from the true *Pt. Azaræ* for which I had mistaken it.

During my absence in Australia Mr. Waterhouse described a fine new species as *Pteroglossus nigrirostris*, the bird almost simultaneously receiving the appellation of *Pt. melanorhynchus* from the Messrs. Sturm of Nuremberg.

M. Natterer, who has furnished us with so much valuable information respecting this group, named two new species *Pteroglossus Gouldi* and *Pt. Sturmi*.

M. Boissoneau has added to the list *Pteroglossus albivitta*; and

M. d'Orbigny *Pteroglossus cæruleocinctus*.

The Messrs. Sturm, in their German translation of the first edition of this work, have published two others, *Pteroglossus atrogularis*, and *Pt. Wiedi*.

The following are the species which I have had the pleasure of making known as additional members of the family:—

Ramphastos brevicarinatus.
——— Inca.
——— citreolæmus.
——— osculans.
——— culminatus.
Pteroglossus pluricinctus.
——— pœcilosternus.
——— castanotis.
——— erythropygius.

Pteroglossus Mariæ.
Andigena laminirostris.
——— hypoglaucus.
——— cucullatus.
Selenidera Nattereri.
Aulacoramphus Derbianus.
——— castaneorhynchus.
——— hæmatopygius.
——— cæruleogularis.

The characters and figure of the *R. citreopygius* of my former edition were taken from a specimen at that time in the possession of Mr. Swainson, but which, with the remainder of his collection, is now in the Fitzwilliam Museum at Cambridge. Upon again examining it, and with greater care than upon the former occasion, I find that it is made up of the head of *Ramphastos vitellinus* and the body of *R. erythrorhynchus*; consequently that name must be expunged from the list of the species of this family.

Having thus traced the discovery of the various members of this important group from the earliest period down to the present time, I now proceed to speak of their affinities, the countries they inhabit, and the extent of their range; as well as to give all the information I have been able to obtain respecting their habits and economy, duly acknowledging the sources whence it has been derived.

In some parts of their structure the Toucans much resemble the Hornbills; like them they are distinguished by the great development of the beak, by the scantiness of the plumage of the body, and by the rich colouring of the denuded parts of the skin; both are impatient of cold, and both seem especially adapted for a tropical or subtropical climate; both are said to incubate in the holes of trees, and they are, moreover, very much alike in their general habits and actions; even to the positions they assume while roosting, when both sit with the tail turned upward over the back. In the structure of their feet,

however, they are totally different; the toes of the Toucan being placed two before and two behind, while the foot of the Hornbill is of a broad palmated form, with three large partially united toes before and a more feebly developed one behind: still, although so nearly allied, the two groups constitute two distinct families, representing each other in the respective countries they inhabit; the Hornbills dwelling in Africa, India and its islands, and the Toucans in tropical America. South America then is the true habitat of this group, and the forests bordering the mighty Amazon the centre whence they diverge on either hand. It is there that we find the greatest number of species, and there every generic form is represented. From this central stronghold they range as far south as Paraguay and Bolivia; and their progress northward is not bounded by New Grenada, several species inhabiting the Isthmus which connects Southern with Central America, and two even extending their range as far as Mexico. The forests of the Andes and the Cordilleras also afford to several species a congenial place of abode. Some frequent the humid woods of the temperate regions, while others resort to the comparatively colder districts, and dwell at an elevation of from six to ten thousand feet; those inhabiting the lofty regions are generically different from those residing in the lowlands, and are clothed in a more thick and sombre-coloured plumage; all the members of the genus *Andigena* are thus distinguished, as well as by their bills being strong, heavy and hard when compared with those of the true Toucans and Araçaris, all of which have bills of a more delicate structure, and in several species so thin and elastic on the sides as to be compressible between the fingers.

Considerable diversity of opinion exists as to the peculiar uses for which the disproportionate bills of these birds are especially adapted, and as to the nature of the food upon which they subsist; some writers stating that they are strictly frugivorous, and that they never partake of animal food; while others affirm that they are quite omnivorous: my own belief is that fruits are, strictly speaking, their natural food, but that occasionally, as is the case with the Parrots and many fruit-eating birds, animal food is necessary to their well-being, and is then freely eaten: I have had many opportunities of observing that such is the case in a state of confinement, in confirmation of which I would refer to the interesting account by Mr. Broderip given with the description of *Ramphastos erythrorhynchus*. In this semi-domesticated state they will even eat mice, caterpillars, small birds, and flesh of any kind, especially raw beef; and I have little doubt that they would also eat fish if offered to them: Humboldt states, indeed, that the Toucan loves to fish on the banks of rivers, and it was doubtless some report of this kind that induced Linnæus to give the name of *piscivorus* to a species of this family; but I apprehend that in this particular both these celebrated men have been misinformed, for, as I have before said, I have every reason to believe that in a state of nature fruit is their principal food, the larger species, such as the *Toco* and the other members of the restricted genus *Ramphastos*, feeding upon Bananas and other succulent kinds, while the *Pteroglossi* and the Toucanets mainly subsist upon the smaller fruits and berries.

Many interesting notes respecting these birds have been published by travellers who have explored South America, and I cannot perhaps do better than give them in their own words; for although uncon-

nected, they will convey a more lively idea of the habits and economy of this group of birds, than could be obtained from a condensed account derived therefrom; at the same time I must remark that on some points they are very contradictory.

The Prince Maximilian of Wied, who has kindly forwarded to me some valuable notes on the Brazilian species observed by him during his travels in that part of South America, says, "The *Ramphastidæ* are very common in all parts of the extensive forests of the Brazils, and are killed in great numbers at the cooler portion of the year for the purposes of the table. To the stranger they are of even greater interest than to the natives, from their remarkable form and from the rich and strongly contrasted style of their colouring; their black or green bodies being adorned with markings of the most brilliant hue—red, orange, blue and white; their naked orbits in some instances red, and in others green or blue; the naked parts of the body dyed with brilliant colours; the legs blue or green, the irides blue, yellow, &c.; and the large bill of a different colour in every species, and in many instances very gaily marked. The colouring of the soft parts is, however, so evanescent, that, to determine the species with accuracy, they must be depicted during life or immediately after the birds are killed. Common as these birds are in their native wilds, it is exceedingly difficult to detect their breeding places; it is certain that they deposit their eggs in the hollow limbs and holes of the colossal trees so abundant in the tropical forests, but I was never so fortunate as to discover them. The stomachs of the specimens I examined contained nothing but the remains of fruits, principally of the softer kinds, for which indeed they have such a liking that they resort in great numbers to the plantations in the vicinity of their native haunts and commit sad havoc among their favourite delicacies. I was informed that they frequently steal and eat young birds, but no instance of their so doing came under my own observation, and I never detected the remains of animal food in their stomachs: Mr. Waterton's opinion agrees with mine, that they feed solely upon fruits; but Azara, among others, states that they also feed upon animal substances. The specimens we saw in a state of domestication were very voracious and perfectly omnivorous, but they seem to be purely frugivorous in a state of nature, a fact which was indeed confirmed by the Brazilian natives whom we questioned on the subject. In their manners the *Ramphastidæ* offer some resemblance to the *Corvidæ*, and especially to the Magpies; like them they are very troublesome to the birds of prey, particularly to the Owls, which they surround and annoy by making a great noise, all the while jerking their tails upwards and downwards. The flight of these birds is easy and graceful; and they sweep with facility over the loftiest trees of their native forests; their strangely developed bills, contrary to expectation, are no encumbrance to them, for a singularity of structure (the interior being replete with a tissue of air-filled cells) renders these organs very light and even buoyant. The voice of the *Ramphastidæ* is short and unmelodious, and is somewhat different in every species. Their feathers are used by the Indians for personal decoration, especially the yellow breasts of the birds, which they affix to their heads on each side near the temple, and also to the ends of their bows. The descriptions of these birds in the older authors are very incomplete and of little value, from want of knowledge relative to the colouring of their bill and soft parts; nor have they been correctly described in

many of the works more recently published. The species observed by me during my travels in Brazil, which extended from the 13th to the 23rd degrees of south latitude, or from Bahia to Rio de Janeiro, were *Ramphastos Toco*, *R. Ariel*, *Pteroglossus Wiedi*, and *Pt. maculirostris*."

Mr. Waterton remarks, that "While the *Cotingas* attract your attention by their superior plumage, the singular form of the Toucan makes a lasting impression on your memory.

"There are three species of Toucans in Demerara, and three diminutives which may be called Toucanets. The largest of the former frequents the Mangrove-trees on the sea coast. It is never seen in the interior till you reach Machauchia, where it is found in the neighbourhood of the river Tacatoa; the other two species are very common. They feed entirely on the fruits of the forest, and though of the Pie kind, never kill the young of other birds or touch carrion.

"The larger is called *Bouradi* by the Indians (which means *nose*), the other *Scirou*. They seem partial to each other's company, and often resort to the same feeding-tree, and retire to the same shady noon-day retreat. They are very noisy in rainy weather at all hours of the day, and in fair weather at morn and eve. The sound the *Bouradi* makes is like the clear yelping of a puppy dog, and you fancy he says '*Pia-po-o-co*,' and thus the South American Spaniards call him *Piapoco*. All the Toucanets feed on the same trees on which the Toucan feeds, and every species of this family of enormous bill lays its eggs in the hollow trees. They are social but not gregarious. You may sometimes see eight or ten in company, and from this you may suppose they are gregarious, but upon a closer examination you find it is only a dinner party which breaks up and disperses towards roosting time. You will be at a loss to conjecture for what end nature has overloaded the head of this bird with such an enormous bill; it cannot be for the offensive, as it has no need to wage war with any of the tribes of animated nature, for its food is fruits and seed, and those are in superabundance throughout the whole year in the regions where the Toucan is found. It cannot be for the defensive, as the Toucan is preyed upon by no bird in South America, and were it obliged to be at war; the texture of the bill is ill-adapted to give or receive blows, as you will see by dissecting it.

"The flight of the Toucan is by jerks; in the action of flying it seems incommoded by this huge disproportionate feature, and the head seems as if bowed down to the earth by it against its will. If the extraordinary size and form of the bill expose the Toucan to ridicule, its colours make it amends. Were a specimen of each species of Toucan presented to you, you would pronounce the bill of the *Bouradi* the most rich and beautiful one. It is worthy of remark, that all these brilliant colours of the bill are to be found in the plumage of the body and the bare skin round the eye."

I now give the account published by Azara, a man of great acumen and research, who studied closely the animals of South America, and whose works will always be held valuable.

"It is my intention to classify the *Tucans*, 'so called by the Guaranis,' amongst the diurnal birds of prey, although nature seems to have united in them a character and figure altogether opposed to a cruel and sanguinary appetite. They are nearly always gregarious, since it is usual to meet them in a family party or congregated in little troops.

"They have very short wings and a misshapen beak, incapable of the operations of bending, sawing or grinding. The legs cannot be advanced alternately, but only by forced jumps. The two hind-claws are quite useless for seizure, attack or defence.

"The Toucans, contrary to all appearances, destroy a great number of birds, and on account of their large and strong beak are respected and feared by all species. They attack and drive them from their nests, and in their very presence eat their eggs and young; these they draw from the holes with the long beak, or throw down nest and all together.

"It is credibly reported that the Toucans do not even respect the eggs or young of the 'Aras' and 'Caracaras;' and if the fledglings are too large or too strong to be lifted from the nest, they dash them to the ground, as if it were their nature not only to devour but to uselessly destroy.

"The solid nest of the White Ant, that resists the action of the weather and other destructive causes, is not proof against the Toucan's attack, for he waits until the clay of which the nest is formed is moistened by the rain, and then breaks it up with his beak so as to obtain the eggs and young ants; in fact during the breeding season the Toucan feeds upon nothing else; the rest of the year is for him a long fast, so strict, that he can only get fruits with sometimes a few insects and buds of trees, nor does he continue to annoy other birds. It is my opinion that the Toucans are unable to catch adult birds; but supposing they were, their stomach would not be capable of digesting the feathers and bones, nor their bill of plucking and disjointing. But in order not to deviate in any respect from the truth, I confess that I I am not sure that the small species of Toucans do not break the nests and devour the young ones, because, being more rare than the others in Paraguay, I have not been able to verify the fact, although I do not doubt it; for having the same form and the same manner of living, they must have the same habits.

"In the first two species the bill is out of all proportion. The bird in flying presents the point of it to the wind, so that it does not offer more resistance than that of other birds in which the head and superficies are equal in extent; besides which, the conformation and specific lightness of this long beak cannot impede flight, because the highest points of the bird being the bill itself and the anterior portion of the body, they form no obstacle, the wind first taking effect upon the point of the bill: when in a state of repose, the Toucan carries its bill rather more elevated than a horizontal line that would pass through the eyes, and when closely looked at it appears like a false bill, because its base exceeds the breadth of the head, which presents the appearance of being enclosed in a case.

"In addition to these singularities, the nostrils are placed behind the aforesaid base.

"The tongue is very narrow and of an equal thickness throughout; it is entirely osseous, and resembles somewhat a feather two lines in width furnished with an osseous fringe, which is directed from

behind forwards, so that the tongue, stiff and unyielding, takes no part in the direction of the food, nor in the formation of the note, which, in the first two species, is confined to the single syllable '*rac*.'

"The mandibles are very distinctly dentated at their edges; these dentelations not corresponding at all above and below, nor are they even relatively symmetrical. The beak itself is a thin osseous sheath filled with a number of empty cellules.

"The eye is large and surrounded by a triangular naked space, puffed up and very pretty.

"The foot is very short and stout, and covered nearly to the heel with long scales, harsh to the touch. The outer toe, as well before as behind, is the longest. The claws are much flattened and curved, as in the Woodpeckers. The tail is composed of ten feathers.

"The Toucan flies at a moderate height and in a straight horizontal line, flapping its wings occasionally with some noise. The flight is quicker than the smallness of the wings would lead one to believe. It perches towards the top of the highest trees, and although unable to climb after the manner of Woodpeckers, it still progresses with speed, hopping from branch to branch. It pays great attention to all that takes place in its vicinity, advancing with fear and diffidence, like the 'Uruca' and the 'Acahes'.

"There is no perceptible difference between the two sexes, nor do I believe that the species exists towards the south beyond 28°, nor that it drinks; it rarely settles on the ground.

"The first species (*R. Toco*) is not rare; it is found near habitations and in the woods, but never in the fields.

"As regards its nidification, it builds in the holes of trees, and hatches two young ones, closely resembling the adults, which feed them until they are able to fly. I have observed that young birds reared artificially always die at the end of two or three months.

"The Toucan hops obliquely and very awkwardly, with the legs separated almost a hand's breadth.

"When it takes young birds from the nest, pieces of meat or fruit, it throws them in the air, as a juggler his balls, and by a quick movement of the beak, repeats this action until the food is in a favourable position for being swallowed, and then by another movement gulps it down its large throat.

"If the mouthful be larger than the orifice of the gullet, the Toucan abandons it without seeking to divide it.

"It is not known how the reproduction of the small species takes place, but it is probably similar to that of the others.

"Buffon has given a beautiful preface to his description of the Toucans, but he is mistaken in thinking that the name of these birds signifies 'feather' in the Brazilian language, and that they have been so called because in lieu of a tongue they have a feather of a cartilaginous (or as it seems to me osseous) substance. He is also in error in stating that the bill is both useless and an encumbrance, since it serves as an offensive weapon, and does not impede their flight nor weigh down the head. The flight of the Toucan, on the contrary, is tolerably swift, and by no means awkward or embarrassed, the beak and head being the most elevated parts. Buffon erroneously states also that Toucans perch upon the tops of trees, are easily tamed,

and breed in captivity; and lastly, that their cry is a kind of reiterated whistling, procuring for them the name of 'Oiseaux Prédicateurs' (Preaching Birds).

"The same author asserts, from the report of Hernandez, that they have a habit of boring trees, but this is impossible. The mistake must have arisen from the fact of their having been seen at holes of trees, and thence abstracting the eggs or young of the Woodpecker or Parrot.

"Their physiognomy is neither sad nor serious, as Buffon affirms. They have simply an air of restlessness and mistrust.

"Fernandez and Nieremberg affirm that these birds prey upon fish, but I do not think this, although I consider it very likely that they may sometimes feed upon frogs, toads, and such like.

"Buffon supposes that they are erratic rather than migratory birds. On this subject I can say nothing, except that the large species is stationary, and according to all appearances the others are the same."

Humboldt states that he never observed the Toucan throw its food into the air before swallowing it, and adds that, having once seized it with the point of its enormous beak, it has merely to elevate it by throwing back the head and allow it to drop down the throat.

The following extract is from Edwards' 'Voyage up the Amazon:'—

"Most noticeable of all these birds, both for size and peculiarity of form, are the Toucans. There are many varieties, appearing at different seasons; but the Red-billed (*R. erythrorhynchus*) and the Ariel (*R. Ariel*) are the largest and most abundant, seen at every season, but towards autumn particularly, in vast numbers throughout the forest.

"Their large beaks give them a very awkward appearance, more especially when flying; yet, in the trees, they use them with as much apparent ease as though they were, to our eyes, of a more convenient form. Alighted on a tree, one usually acts the part of sentinel, uttering constantly the loud cry *Tucano*, whence they derive their name. The others disperse over the branches in search of fruit.

"We had been told that these birds were in the habit of tossing up their food to a considerable distance, and catching it as it fell; but as far as we could observe, they merely threw back the head, allowing the fruit to fall down the throat. We saw, at different times, tamed Toucans, and they were never seen to toss their food, although almost invariably throwing back the head. This habit is rendered necessary by the length of the bill and the stiffness of the tongue, which prevent their eating as do other birds.

"All the time, while feeding, a hoarse chattering is kept up, and at intervals they unite with the noisy sentry, and scream a concert that may be heard a mile.

"Having appeased their appetites, they fly towards the deeper forest, and quietly doze away the noon. Often in the very early morning a few of them may be seen sitting silently upon the branches of some dead tree, apparently awaiting the coming sunlight before starting for their feeding-trees.

"The nests of the Toucans are represented in works of Natural History as being constructed in the

hollows of trees. It may be so in many cases and with some species. The only nest we ever saw, which was of the Toco Toucan, was in the fork of a large tree, over the water, upon the Amazon.

"Toucans, when tamed, are exceedingly familiar, playful birds, capable of learning as many feats as any of the Parrots, with the exception of talking.

"When turning about on their perch, they effect their object by one sudden jump. They eat anything, but are particularly fond of meat.

"When roosting they have a habit of elevating their tails over their backs. The beaks of the Red-billed Toucans are richly marked with red, yellow, and black; but preserved specimens soon lose their beauty.

"The other varieties found near Pará are the *Pteroglossus maculirostris* (Licht.), the *P. bitorquatus* (Vig.), and the *P. viridis*."

But few notes have been written on the Toucans of the Pacific side of America; I find, however, the following in the 'Zoology of the Voyage of the Sulphur,' by the late R. B. Hinds, Esq.:—

"In our examination of the west coast of America from south to north, the *Ramphastidæ* were first seen at Atacames, which is a little south of the equator; and they were subsequently often noticed at the different places touched at as far as the Gulf of Fonseca, in 13° 17′ N. Lat. This is, however, most certainly not their geographical limit, and probably not even on the coast."—Zool. of Voy. of Sulphur, p. 46.

Latham and some of the older authors mention a Preacher Toucan, but which species is intended is by no means clear. The name may possibly have arisen from the following note in the 42nd volume of the Gentleman's Magazine, p. 505:—

"The genus is confined to the hotter parts of South America; near Carthagena is found a bird called Preacher, from the custom of its perching above its companions, and with a ridiculous motion of its head, attended with its harsh note, as it were uttering a discourse."

By Linnæus and the older writers, all the members of this group known to them were comprised in the single genus *Ramphastos*. In the year 1811, however, Illiger separated the smaller and more elegantly-formed species, popularly known as *Araçaris*, into a distinct genus, to which he gave the name of *Pteroglossus*. Since that period we have acquired a much more extensive acquaintance with the subject, and we find that a still further subdivision of the family is necessary; indeed they appear to be naturally divided into five or six distinct sections or genera, each having well-marked characters not found in any of the others. The genus *Ramphastos* of Linnæus must of course be retained for the Toucans, distinguished by their large and gaily-coloured bills, and the black colouring of their plumage; in like manner Illiger's genus *Pteroglossus* is retained for the Araçaris, birds having a more elegant contour, and whose bodies are clothed in green above and yellow and red beneath. In both these sections the sexes are alike in colour.

The next section in point of affinity comprises the beautiful Amazonian group of Banded Araçaris, figured under the names of *Pteroglossus Beauharnaisii*, *Pt. Azaræ*, *Pt. flavirostris*, *Pt. Mariæ*, *Pt. bitorquatus* and *Pt. Sturmi*, and for which the generic appellation of *Beauharnaisius* has been proposed by Prince Charles Lucien Bonaparte. In this section the females very closely assimilate to the males in colour, but differ in the lighter hue of the throat.

The fourth section, for which I have proposed the generic appellation of *Selenidera*, and the trivial one of Toucanets, is exceedingly well-marked; all its members are of small size when compared with the true Araçaris, have shorter and harder bills; shorter and less graduated tails; and are, moreover, distinguished by a crescentic mark of yellow at the back of the neck; by brilliant orange and yellow ear-coverts; and by a great difference in the colouring of the sexes.

The fifth division comprises the Hill Toucans, a group inhabiting the elevated portions of the Andes. They are all well-proportioned birds, have larger and harder bills than the *Selenideræ*; a thick but lax plumage; and are not banded on the under surface like the Araçaris. For this group I have proposed the generic name of *Andigena*.

The sixth and last division, constituting my genus *Aulacorhynchus*, altered by Mr. G. R. Gray to *Aulacoramphus*, comprises ten species distinguished by a nearly uniform grass-green style of plumage, the feathers composing which are long and loose, and by the bill being in some of the species grooved along the sides. The sexes are alike in colour.

For the true Toucans then I retain Linnæus' genus

RAMPHASTOS,

WITH THE FOLLOWING CHARACTERS:—

Rostrum maximum, tenue, culmine cultrato et versus apicem incurvo; basi margine incrassato, maxillæ angulo frontali, transversim subtruncato, *tomia* inæqualiter serrata; *nares* frontales, pone maxillæ basin sitæ; *orbitæ* nudæ; *lingua* mediocris, angusta, pennacea; *alæ* subelongatæ, concavæ; remigibus primis et secundariis ad apices in spatham angustam eductis; primariis sextâ et septimâ coæqualibus, et longitudine præstantibus; *cauda* æqualis; *pedes* scansorii; digiti externi internis longiores; *acropodia* scutulata.

Bill very large, thin; culmen sharp and curved down towards the tip; thickened on the margin at the base; serrated on the edges; *nostrils* placed behind the base of the bill; *orbits* naked; *tongue* long, narrow and

feather-like; *wings* rather lengthened and concave; first and second primaries with the tips prolonged into a narrow spatulate form; the sixth and seventh primaries equal, and the longest; *feet* scansorial.

The members of this genus are more widely distributed over South and Central America than those of any other section of the family; for although it is in Brazil, and particularly in the forests clothing the delta of the Amazon, that the greater numbers exist, some of the species are found as far south as Paraguay; and one as far north as Mexico. The warmer forests, both on the eastern and western sides of the Andes, are equally tenanted by them.

The species are:—

1.	Ramphastos Toco	Pl. I.
2.	——— carinatus	Pl. II.
3.	——— brevicarinatus	Pl. III.
4.	——— Tocard	Pl. IV.
5.	——— ambiguus	Pl. V.
6.	——— erythrorhynchus	Pl. VI.
7.	——— Inca	Pl. VII.
8.	——— Cuvieri	Pl. VIII.
9.	——— citreolæmus	Pl. IX.
10.	——— osculans	Pl. X.
11.	——— culminatus	Pl. XI.
12.	——— Ariel	Pl. XII.
13.	——— vitellinus	Pl. XIII.
14.	——— dicolorus	Pl. XIV.

For the Araçaris, Illiger's genus

PTEROGLOSSUS,

WITH THE FOLLOWING CHARACTERS:—

Rostrum, amplum, tenue, cultratum, basi margine incrassato; maxillæ angulo frontali obtuso; *tomia* serrata; *nares* altiores et in maxillæ basi positæ; *lingua* mediocris, angusta, pennacea; *alæ* concavæ, breviores, secundum

staturam, quam in genere *Ramphasto* dicto; primariis quartâ, quintâ et sextâ coæqualibus et longissimis; *cauda* gradata; *pedes* scansorii; digiti externi internis longiores; *acropodia* scutulata.

Bill large, light, serrated on the edges; *nostrils* above situated in the base of the bill; *tongue* long, narrow and feather-like; *wings* shorter in proportion than in the genus *Ramphastos*; concave; fourth, fifth and sixth primaries equal, and the longest; *tail* graduated; *feet* scansorial; outer toes longer than the inner.

Although very generally dispersed over South America, the Araçaris have a less extended range than the true Toucans. I have not seen any species from the countries southward of the latitude of Rio de Janeiro, and no species have been found to the northward of Guatemala. The great countries of Venezuela, Guiana, the forests of the Amazon generally, and Northern Brazil are the portions of the Continent in which the species are found in the greatest abundance.

They are—

15. Pteroglossus Araçari . . . . . Pl. XV.
16. ——— Wiedi . . . . . Pl. XVI.
17. ——— pluricinctus . . . . . Pl. XVII.
18. ——— pœcilosternus . . . . . Pl. XVIII.
19. ——— castanotis . . . . . Pl. XIX.
20. ——— torquatus . . . . . Pl. XX.
21. ——— erythropygius . . . . . Pl. XXI.
22. ——— Humboldti . . . . . Pl. XXII.
23. ——— inscriptus . . . . . Pl. XXIII.
24. ——— viridis . . . . . Pl. XXIV.

Of these ten species seven are normal, and the remaining three somewhat aberrant; in fact the two lettered Araçaris, *P. Humboldti* and *P. inscriptus*, might with propriety be separated into a distinct genus, and the *P. viridis* made the type of another.

For the third section, or Banded Araçaris, I propose to adopt Prince Charles Lucien Bonaparte's generic title of

BEAUHARNAISIUS,

WITH THE FOLLOWING CHARACTERS :—

Aspectus generalis, sicut in genere Pteroglosso dicto, attamen rostro delicatule læviore, necnon alis brevioribus, et caudâ attenuate minore.

General structure as in *Pteroglossus*, but the bill more delicate, the wings shorter, and the tail smaller and of a lighter form.

Unlike the members of the genus *Ramphastos*, which are universally spread over South America, and the *Pteroglossi*, which are nearly so, the members of the genus *Beauharnaisius* are almost entirely confined to the districts bordering the Amazon and its tributaries; and there is scarcely any part of the banks of this river where Palm-trees abound that one or other of the species is not to be found.

They are :—

25. Beauharnaisius ulocomus . . . . . Pl. XXV.
26. ——————— bitorquatus . . . . . Pl. XXVI.
27. ——————— Sturmi . . . . . Pl. XXVII.
28. ——————— Azaræ . . . . . Pl. XXVIII.
29. ——————— flavirostris . . . . . Pl. XXIX.
30. ——————— Mariæ . . . . . Pl. XXX.

This is by far the most beautiful section of the entire family.

In the plates and descriptive letter-press they are retained under the old term *Pteroglossus*; but in future they will stand as above-named.

The fourth section comprises the species constituting my genus

SELENIDERA,

WITH THE FOLLOWING CHARACTERS:—

Rostrum brevius et amplius quam in genere *Pteroglosso*; *cauda* ratione ad magnitudinem corporis habitâ brevior; sexus inter se colore dissimilis; mare caput pectusque nigra, fœminâ has partes castaneas habente; *plumæ auriculares* flavæ; *lunula* ad cervicem posticam flava.

Bill shorter and thicker than in the genus *Pteroglossus*; *tail* shorter in proportion to the size of the body; sexes differing in colour; the male having the head and breast black, the same parts in the female being chestnut; ear-coverts and a crescent at the back of the neck yellow.

This interesting group of Toucanets again have a more restricted range than either the typical *Ramphasti* or *Pteroglossi*. No one of them has yet been found so far to the northward as the Isthmus of Panama; and few of them have been observed beyond the latitude of the Amazon in this direction. On the banks of that river, however, and those of the Rio Negro and Rio Madeira, they are very numerously dispersed; and one species, the *Selenidera maculirostris*, is found as far south as Rio de Janeiro, and I believe in Corrientes and Paraguay; still the forests bordering the Upper Amazon and its tributaries are undoubtedly the cradle of the race. They constitute a well-marked section of the family, and are distinguished by their small size, by their short bills, by the crescentic mark of yellow at the base of the neck, and by the brilliant colours which adorn their ears and flanks. The females have all these characteristic marks, but differ conspicuously in the colouring of the anterior half of their bodies, which is generally chestnut-brown instead of black.

The species are—

31.	Selenidera maculirostris	Pl. XXXI.
32.	——— Gouldi	Pl. XXXII.
33.	——— Langsdorffi	Pl. XXXIII.
34.	——— Nattereri	Pl. XXXIV.
35.	——— Reinwardti	Pl. XXXV.
36.	——— piperivora	Pl. XXXVI.

The fifth section contains the Hill Toucans, forming my genus

ANDIGENA,

WITH THE FOLLOWING CHARACTERS :—

Rostrum turgidum, magnum, attamen minus quam in genere restricto *Pteroglossus* dicto. *Alæ* et *caudæ* ut in genere *Aulacorampho* nominato. *Ptiluma* elongatum, laxum, capillaceum.

Bill stout and swollen, but not so large as in the true *Pteroglossi*; *wings* and *tail* very similar to those of *Aulacoramphus*; *general plumage* long, loose, and hair-like.

It has been found that even the higher ranges of the Andes are not untenanted by the Toucans; Professor Jameson of Quito informs me that the *A. laminirostris* even ascends the sides of Pichincha to an elevation of from six to ten thousand feet. The members of this genus extend all along the Andes and the Cordilleras, from the Caraccas to Bolivia, where Mr. Bridges found a species in the forests of Cocapata, in the department of Cochabamba; one species, however, the *A. Bailloni*, appears never to quit the lowlands of Brazil. These Hill Toucans have stout hard bills, are very thickly clothed, and have the under surface generally of a uniform and delicate colour.

The species are—

37.	Andigena laminirostris	Pl. XXXVII.
38.	——— hypoglaucus	Pl. XXXVIII.
39.	——— nigrirostris	Pl. XXXIX.
40.	——— cucullatus	Pl. XL.
41.	——— Bailloni	Pl. XLI.

The sixth and last section comprises a series of birds remarkable for some of the species having the sides of their bills deeply grooved; they form my genus

AULACORAMPHUS,

WITH THE FOLLOWING CHARACTERS :—

Rostrum, comparative breve, latum, ad culmen depressum; apud latera sulcatum; mandibulâ inferiore ad basin oblique ultra oculi lineam tendente; *alæ* breves et rotundatæ, remige quartâ longissimâ, quintâ, sextâ, et

septimâ inter se fere coæqualibus; *cauda*, paululum brevis, et minus gradata quam in genere *Pteroglosso* nominato.

Bill comparatively short, broad and flattened on the culmen; furrowed on the sides, and with the base of the under mandible extending obliquely beyond the line of the eye; *wings* short and round, the fourth quill the longest, the fifth, sixth and seventh being nearly of equal length; *tail* comparatively short, and not so decidedly graduated as in the true *Pteroglossi*.

This may be considered an Andean group, for it is among those lofty mountain ranges that nearly all the species are found. They are dispersed over all parts of the temperate regions, from Bolivia on the south to Mexico on the north. They possess characters common to each other; their plumage is nearly of a uniform green, and the sexes are precisely alike in colour.

The species are—

42.	Aulacoramphus sulcatus	Pl. XLII.
43.	——— Derbianus	Pl. XLIII.
44.	——— castaneorhynchus	Pl. XLIV.
45.	——— hæmatopygius	Pl. XLV.
46.	——— cæruleocinctus	Pl. XLVI.
47.	——— prasinus	Pl. XLVII.
48.	——— Wagleri	Pl. XLVIII.
49.	——— albivitta	Pl. XLIX.
50.	——— atrogularis	Pl. L.
51.	——— cæruleogularis	Pl. LI.

Since the above was in type, Prince Charles Lucien Bonaparte has sent me a portion of his remarks on the Birds brought by the late M. De Lattre from Nicaragua, in which I find in a note at page 84 he proposes a still further division of this family: first, Ramphomelus for the *Andigena nigrirostris*; next, Ramphoxanthus for the *Aulacoramphus prasinus*, *A. albivitta*, &c.; and Piperivorus for *Selenidera piperivora*, *Pteroglossus viridis*, *Andigena Bailloni*, *Pteroglossus inscriptus*, &c.

As regards Ramphomelus, I think any further subdivision of the Hill Toucans inadmissible: the bird upon which the Prince proposes to establish the genus has all the characters common to the other members of the section, with the exception of the black colouring of the beak, which surely must be regarded rather as a specific than as a generic distinction.

Precisely the same remark may be made with respect to his new genus Ramphoxanthus for *Aulacoramphus prasinus* and *A. albivitta*, inasmuch as they do not in my opinion offer sufficient generic differences to warrant their separation from the other birds with which I have associated them.

The birds comprising his genus Piperivorus I consider to belong to three distinct genera. The first —*piperivora*—is a true *Selenidera*—the fourth, *Bailloni*—an *Andigena*; the second and third—*viridis* and *inscriptus*—might perhaps be separated; but in that case *viridis* would stand alone in one genus and *inscriptus* with *Humboldti* in another, for which the term Grammarhynchus might be an appropriate appellation.

LIST OF PLATES.

Ramphastos Inca.

———— brevicarinatus.

———— ambiguus.

———— citreolæmus.

Pteroglossus Wiedi.

———— erythropygius.

———— pœcilosternus.

———— Azaræ.

———— flavirostris.

———— Mariæ.

———— Sturmi.

Andigena nigrirostris.

———— cucullatus.

———— laminirostris.

Selenidera Gouldi.

Aulacoramphus castaneorhynchus.

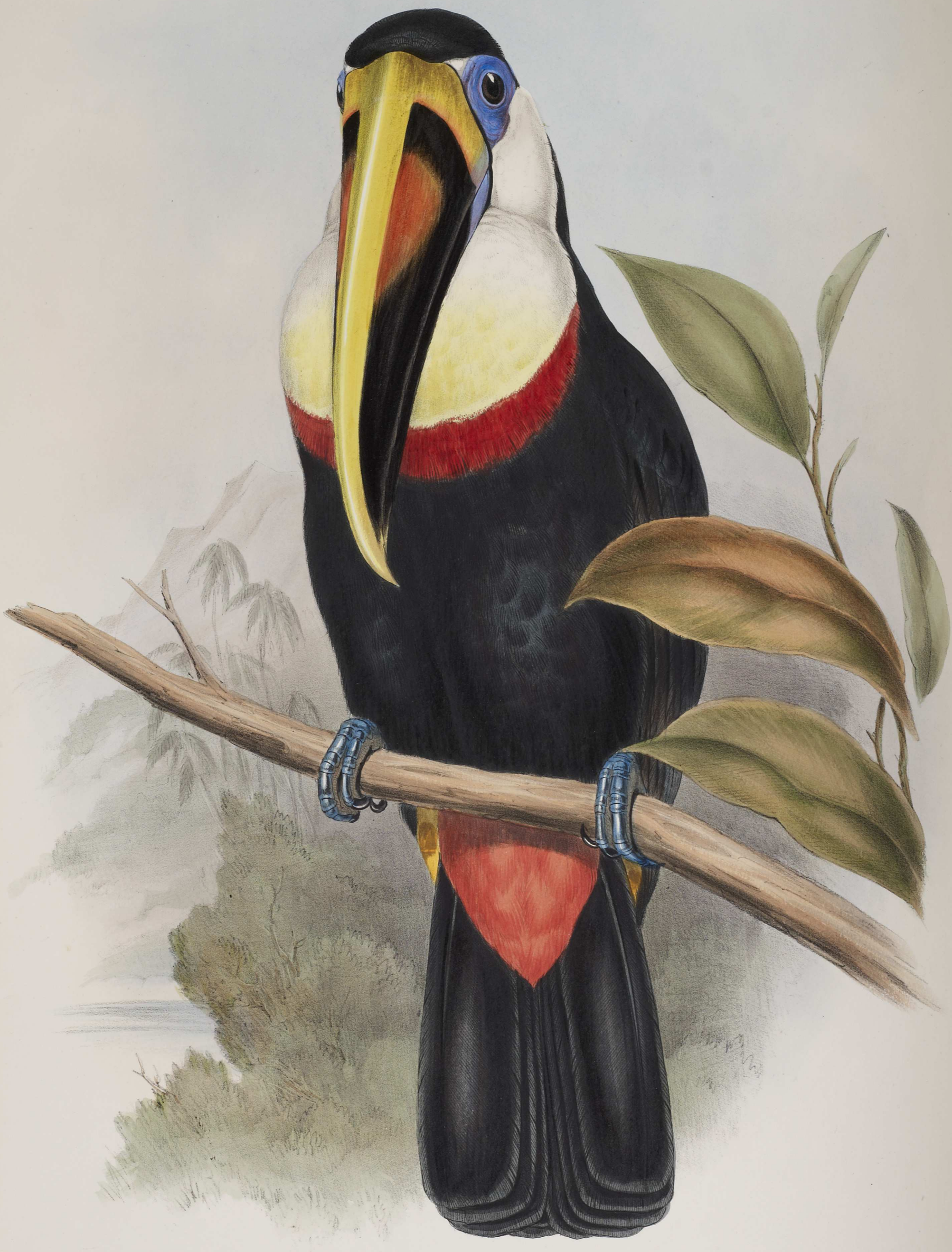
———— albivitta.

———— atrogularis.

———— cæruleicinctus.

———— cæruleogularis.

*** The proper situation of the above Plates will be found in the lists of the species of the respective genera, given in the Introduction.



RAMPHASTOS INCA, *Gould.*

Gould & Richter del.
Hullmandel & Walton Imp.

RAMPHASTOS INCA, *Gould.*

Inca Toucan.

Specific Character.

Ramph. rostro nigro, in lateribus sanguineo obnubilato; culmine mandibulæ superioris ad apicem, et latâ fasciâ basali flavis, hac posticè lineâ nigrâ, anticè lineâ coccineâ cinctâ; gulâ et pectore albis flavicinctis, hoc torque sanguineo infra succincto; tectricibus caudæ superioribus aurantiacis.

General plumage black; throat and chest white tinged with yellow, and bounded below by a band of blood-red; upper tail-coverts rich orange; under tail-coverts blood-red; bill black, with a patch of pale blood-red on the sides of the upper mandible near the base, with the culmen and point of the lower mandible yellow, and with a broad basal belt of the same colour, bounded posteriorly with a narrow line of black, and anteriorly with a narrow line of scarlet, the yellow clouded with olive-blue on the lower and the cutting edge of the upper mandible; orbits yellow, passing into yellow on their outer margins; irides brown; legs and feet bluish lead-colour.

Total length, 20 inches; *bill*, $5\frac{1}{2}$; *wing*, $9\frac{1}{4}$; *tail*, 7; *tarsi*, $2\frac{1}{4}$.

Ramphastos Inca, Gould in Proc. of Zool. Soc., Part XIV. p. 68.—Gray and Mitch. Gen. of Birds, vol. iii. App. p. 19 (App. to p. 403).—Bonap. Consp. Gen. Av., p. 92, *Ramphastos*, sp. 2.

For a knowledge of this species we are indebted to Mr. Bridges, who brought a single specimen from Bolivia. It is nearly allied to *R. erythrorhynchus*, but differs from that species in having the greater part of the mandibles black; a mark of scarlet, almost triangular in form, occupying a small space on each side of the culmen only; and in having a faint line of scarlet posterior to the black colouring, which does not occur at all in the other species: the blood-red band on the breast, too, is broader and deeper coloured, and the white of the throat is more strongly tinged with yellow. A still greater distinction is, however, observable in the colouring of the upper tail-coverts, which in *R. Inca* are of a rich fiery orange, while in *R. erythrorhynchus* they are lemon-yellow. From all appearances, it is probable that the specimen brought by Mr. Bridges is a female; and if that be the case, the male, when discovered, will prove to be one of the most rich coloured species of the genus.

Mr. Bridges's specimen was procured in the elevated and dense forests at Chimorée in the country of the Yuracaras Indians in Bolivia; beyond this, I regret to say, nothing is known respecting it.

The figure is of the natural size.

Richter, del.
& Walton, imp.



RAMPHASTOS BREVICARINATUS, *Gould*

Gould & Richter del. et lith.
Hullmandel & Walton Imp.

RAMPHASTOS BREVICARINATUS, *Gould.*

Short-billed Toucan.

Specific Character.

Ramph. rostro brevi, compresso, fasciâ, angustâ nigrâ basali circumdato, apice sanguineo; mandibulâ superiore viridi, culmine maculâque utrinque aurantio-flavis; gutture pectoreque luteis, hoc torque sanguineo infra succincto.

General plumage black with a pale wash of rufous at the back of the neck, and a gloss of green on the back, wings, abdomen and tail; upper tail-coverts white; under tail-coverts blood-red; cheeks, throat and breast yellow, bounded below with a band of scarlet; bill light green, passing into deep red on the tips of both mandibles; along each side of the upper mandible an oblong patch of reddish orange; both mandibles bounded at the base with a narrow line of black, and both marked near the tomiæ with indistinct transverse rays of black; orbits verditer-green, passing into yellow on their outer margin; feet blue, tinged with lilac on their under surface.

Total length, 14 inches; *bill*, $4\frac{1}{8}$; *wing*, 7; *tail*, 6; *tarsi*, $1\frac{5}{8}$.

From the time I commenced the study of the various members of this group of birds, I have always felt convinced that the Mexican Keel-billed Toucans constituted more than a single species; for upon examining the fine collection of the Prince Massena at Paris, while engaged on the first edition of this work, I found two fully adult specimens differing considerably in all their admeasurements, and especially in the length of the bill, which in one was fully a third longer than that of the other, while there was no marked difference in their depth; in the smaller bird the yellow of the breast was separated from the black of the under surface by a well-defined and somewhat broad band of blood-red, of which there was either a very slight or no trace in the larger one; subsequently I saw other examples in some of the continental museums, but was undecided as to the propriety of characterizing them as distinct; the British Museum, however, having been lately enriched with specimens of the short-billed species sent direct from the western side of the isthmus of Panama, all of which are alike in admeasurement, and have well-defined pectoral scarlet bands, I have considered it only right to define and give a representation of the short-billed bird, leaving it for future explorers to determine whether it be really distinct or only a local variety. Its specific characters are a short and deep bill, whence the name *brevicarinatus*, accompanied by a bright scarlet band on the chest. My attention has been lately called to a third variety or species, intermediate between the two, but from a different locality—New Grenada; the first instance that has come under my notice of a Keel-billed Toucan being found south of the Isthmus of Panama.

The collection of the Prince Massena above alluded to is now in the Museum at Philadelphia; the American ornithologists will therefore have an opportunity of investigating the subject, and of giving an opinion as to the specific value of *Ramphastos brevicarinatus*.

The figures are of the natural size.

Gould & Richter del. et lith.
Hullmandel & Walton Imp.

RAMPHASTOS AMBIGUUS, *Swains.*

Gould & Richter, del. et lith.
Hullmandel & Walton, Imp.

RAMPHASTOS AMBIGUUS, *Swains.*

Doubtful Toucan.

Specific Character.

"*Ramph. niger ; jugulo flavo ; mandibulæ superioris parte superiore flavâ, transversè maculatâ, strigâ viridi obliquè divisâ ; mandibulâ inferiore nigrâ.*"—Swainson.

General plumage black, with a tinge of rufous at the back of the neck and a greenish gloss on the wings, body and tail; throat rich yellow, bounded below by a narrow line of yellowish white, to which succeeds a broader one of blood-red; upper tail-coverts creamy white; under tail-coverts blood-red; upper mandible obliquely divided for about three-fourths of its length from the base by a strongly defined streak of black, the space below which is chocolate-black, and that above yellow, traversed by a broad streak of green; under mandible chocolate-black at the base, passing into black towards the tip; orbits blue?; legs and feet blue above, lilac beneath.

Total length, 20 inches; *bill*, $5\frac{1}{4}$; *wing*, $8\frac{3}{4}$; *tail*, $6\frac{1}{2}$; *tarsi*, $1\frac{7}{8}$.

Ramphastos ambiguus, Swains. Zool. Ill. 1st Ser., vol. iii. pl. 168.

———— *Swainsonii*, Gould, Mon. of Ramph., pl. 8, lower figure.—Ib. Sturm's Edit., pl. , lower figure.

However much I may have been perplexed by the Mexican Keel-billed Toucans, I have been ten times more so by the Columbian species known under the name of *Tocard*, to which in the former edition of this work I gave the name of *Swainsoni*, believing as I did that the *Tocard* of Le Vaillant and the *Ramphastos ambiguus* of Swainson were one and the same species; I am now, however, induced to regard them as distinct, in consequence of having recently seen in some of the continental Museums, and lately received in a collection of birds from the neighbourhood of Bogota, several examples which precisely accord with Swainson's figure of his *Ramphastos ambiguus*, and which differ from the *R. Tocard* in having smaller and straighter bills, with all the space beneath the oblique band purplish black, and with a distinct trace of the green mark along the sides of the yellow portion of the upper mandible so conspicuous in Swainson's drawing; I have determined therefore upon restoring that appellation to the bird for which Mr. Swainson doubtless intended it, and which I believe to be quite distinct from the *R. Tocard.* Some variation appears to exist in the colouring of the bare skin round the eye. Mr. Mark, Her Majesty's Consul at Bogota, tells me it is bluish green. Dr. Tschudi, who collected specimens in Peru, says it is blue, which on examination I found to be the case, so far as could be judged from the appearance of his specimen in the Museum at Neufchatel. Swainson, who states that his figure was taken from a drawing made from the bird immediately after death, also represents it blue: the diversity of hue is probably due to age, but may be attributable to some other circumstance with which we are not acquainted. In the examples from Bogota, the oblique verditer-green mark on the upper mandible, forming so conspicuous a feature in Swainson's figure, is very apparent; and this among other reasons has led me to consider the species to be a true one and to figure it as such.

It is scarcely necessary to add, that this conclusion has been arrived at since my account of the *R. Tocard* was printed; and that the insertion of Swainson's name of *R. ambiguus* among the synonyms of that species is an error.

The term "*Doubtful*," I may observe, alludes to the species, and not to the "*Toucan*" as a generic appellation.

The figures are of the natural size.

& Richter del. et lith.
andel & Walton, Imp.



RAMPHASTOS CITREOLÆMUS, *Gould.*

Gould & Richter, del. et lith.
Hullmandel & Walton, Imp.

RAMPHASTOS CITREOLÆMUS, *Gould.*

Citron-breasted Toucan.

Specific Character.

Ramph. rostro nigro, vittâ latâ basali, et culmine olivaceo viridibus, hoc colore gradatim cum flavido apud apicem mandibulæ utriusque se commiscente; gulâ albâ; pectore citreo, vittâ splendidè coccineâ cincto; tectricibus caudæ superioribus citreis.

General plumage black; throat and chest white, the latter washed with citron-yellow, which is deepest in the centre, whence it gradually fades into the white of the sides of the neck and throat; across the lower part of the breast a band of deep blood-red; upper tail-coverts sulphur-yellow; under tail-coverts deep blood-red, curving upwards at the sides and meeting at the base of the upper tail-coverts, inducing at first sight a belief that the upper tail-coverts are of two colours, blood-red and sulphur-yellow; bill black, with a broad basal and culmenal band of greenish yellow passing into pale yellow on the tips of both mandibles, and deepening into orange at the gape.

Total length, 21 inches; *bill*, $5\frac{1}{2}$; *wing*, $8\frac{1}{4}$; *tail*, $7\frac{1}{2}$; *tarsi*, $1\frac{3}{4}$.

Ramphastos citreolæmus, Gould in Proc. of Zool. Soc., Part XI. p. 147.—Gray and Mitch. Gen. of Birds, vol. ii. p. 403, *Ramphastos*, sp. 15.

———— *citreolaimus*, Bonap. Consp. Gen. Av., p. 92, *Ramphastos*, sp. 7.

An examination of the Prince of Massena's collection at Paris in 1843 afforded me an opportunity of giving a description of a species of Toucan I had never before seen. The only information I could obtain respecting this new bird, of which His Highness possessed a male and a female, was that it had been received in a collection from Santa Fé de Bogota in Columbia. In the interval that has since elapsed, the Prince's fine collection has been transported to North America, and now finds a resting-place in the extensive Museum of the Academy of Sciences at Philadelphia. Being desirous of instituting a more rigid examination of the species, and a more careful comparison of it with the allied members of the family than I was enabled to do when it first came under my notice, I applied to T. B. Wilson, Esq. of Philadelphia for another sight of it, and he has, with the utmost liberality, allowed it again to cross the Atlantic for this purpose. On re-inspecting it, I find that the conclusion I originally came to, as to its being a distinct species, is quite correct. It belongs to that section of the family, members of which are distinguished by broad culmenal marks, a feature more conspicuous in this than in any other species, the greenish yellow colour not being confined to the culmen alone, but occupying a considerable portion of the sides of the upper mandible also: the lower part of the breast is fine sulphur-yellow, passing into white on the throat and sides of the neck; the rump is fine sulphur-yellow, instead of passing into orange, as in *R. Cuvieri*, *R. culminatus*, and *R. osculans*; the bill is thick and swollen, as in the latter; but it is shorter, and on comparison will be found to present a different aspect.

The figures are of the natural size.

PTEROGLOSSUS WIEDI, *Sturm.*

Gould & Richter del. et lith.
Hullmandel & Walton, Imp.

PTEROGLOSSUS WIEDI, *Sturm.*

Prince Maximilian's Araçari.

Specific Character.

Pter. mandibulâ superiore flavido-albâ, culmine per totam longitudinem fasciâ angustâ, margine tomiorum ad basin mandibulâque inferiore nigris; rostro toto basi albocincto; femoribus viridibus.

Head, neck and throat deep black, with a very slight tinge of rufous on the ear-coverts; upper surface, wings and tail deep green; lower part of the beak and rump blood-red; upper tail-coverts green, blotched with blood-red; under surface pale greenish yellow, faintly stained with blood-red next the black of the throat and with a broad band of the same hue across the middle of the body; thighs and vent green; upper mandible creamy white, with a narrow line of black along the culmen and a conspicuous vertical mark of the same colour near the base; under mandible black; both mandibles with a raised ridge of a creamy white at the base; orbits very dark blackish grey; irides dark brown; legs greyish green.

Total length, 18 inches; *bill*, $4\frac{1}{4}$; *wing*, $5\frac{3}{4}$; *tail*, $6\frac{3}{4}$; *tarsi*, $1\frac{1}{2}$.

Pteroglossus Araçari, Prinz Max. Von Wied, Beit. zur Nat. von Bras. iv. Bd. i. Abth. p. 283.

———— *Wiedii*, Sturm's Edit. of Gould's Mon. of Ramph., pl. .

When speaking of the true *Pteroglossus Araçari*, in the first edition of this work, I remarked that I was at a loss to determine whether that bird, which is a native of Cayenne and Guiana, be identical with a somewhat similar one from the Brazils, and which, although closely resembling it in colour and size, invariably possesses characters which at once indicate its country. The variations to which I allude consist in the examples from Cayenne having the mandibles more attenuated and hooked, the teeth more defined, the black mark on the culmen much more expanded, and the black of the throat bounded by a line of fine red, which although traceable in the other is much more obscure; the thighs also are dull olive-green with strong dashes of reddish brown, so predominant in some specimens as to obscure the green entirely, while in the Brazilian birds the thighs are wholly green; besides which, I have invariably found the true Araçari to be of a larger size. Whether these differences are specific, or only to be considered as variations dependent upon difference of climate and other local circumstances, is a question not easy to determine; I am inclined, however, to believe that they constitute two distinct species. The Messrs. Sturm, after pointing out the differences above alluded to, have given to the Brazilian bird the specific appellation of *P. Wiedii*, in honour of His Highness The Prince Maximilian of Wied, a compliment most justly bestowed, since few travellers have done more to advance ornithology, or taken a greater interest in Natural History generally.

Skins of this bird are frequently found in collections from Bahia and from Rio de Janeiro. M. Natterer killed it at Mattagrossa near Borba, and also received specimens from Mattodentro, the neighbourhood of Rio de Janeiro and San Paulo. In the stomachs of those he examined were found the remains of insects and the pips of oranges.

The Prince Maximilian of Wied informs me that its voice consists of two short notes, having the sound of "*Culik! Culik!*"—that, like the *Ramphastos Ariel*, it inhabits all the great forests of the Brazils traversed by him, and that it has precisely similar habits. During the breeding season it lives in pairs; afterwards it congregates in small flocks, which fly from one tree to another in search of fruits. Their flight is performed without much motion of the wings. In the cold season they leave the forests for the plantations near the coast, become very fat, and are killed in great numbers and eaten by the inhabitants, their flesh forming excellent food. In its native wilds it may be often seen perched on the naked branches of the loftiest trees, and while perched is said to make a flirting motion of the tail similar to that of the Magpie, *Pica caudata*. Like the other species of the family, it is in the habit of assembling round and teasing the birds of prey that may visit its locality, particularly owls. The eggs are deposited in the hollows of trees, and are white and two in number.

The figures are of the natural size.



PTEROGLOSSUS ERYTHROPYGIUS, *Gould.*

Gould & Richter, del. et lith.
Hullmandel & Walton, Imp.

PTEROGLOSSUS ERYTHROPYGIUS, *Gould.*

Red-rumped Araçari.

Specific Character.

Pter. dorso inferiore, uropygio, et caudæ tectricibus splendidè sanguineis; corpore inferiore flavo, pectore superiore sanguineo tincto, inferiore vittâ coloribus nigro et sanguineo commixtis, fasciatâ.

Crown of the head, sides of the face, chin and upper part of the back shining greenish black; wings and tail dull brownish green; lower part of the back, rump and upper tail-coverts rich blood-red; under surface yellow, stained on the chest with blood-red, and crossed on the breast by a band of mingled black and blood-red; thighs chestnut; bill bordered at the base by a narrow line of dull white; the remainder of the bill yellowish horn-colour, with a broad stripe of black along the upper mandible near the cutting edge and a narrow line in the centre of the culmen; upper mandible black.

Total length, 18 inches; *bill*, 5; *wing*, $6\frac{1}{4}$; *tail*, $7\frac{1}{2}$; *tarsi*, $1\frac{1}{4}$.

Pteroglossus erythropygius, Gould in Proc. of Zool. Soc., Part XI. p. 15.—Ib. Zool. of the Voy. of H.M.S. Sulphur, Birds, p. 45. pl. 28.—Gray and Mitch. Gen. of Birds, vol. ii. p. 404, *Pteroglossus*, sp. 15.—Bonap. Consp. Gen. Av., p. 94, *Pteroglossus*, sp. 15.

The great country lying to the northward of the Isthmus of Panama has a fauna which is in a great measure peculiarly its own; it is true, that generically many of the forms are the same as those of other tropical portions of America, but the species are unquestionably different. The accompanying Plate represents one if not two species of *Pteroglossus*, and there is at least another, belonging to the same genus, which appears to be exclusively an inhabitant of Central America, by which I would be understood to mean in a wide sense—Mexico. I have said that the accompanying Plate represents either one or two species; and it will be seen that some difference occurs in the figures which were taken from two unique specimens, one in my own collection, the other in the Museum of the United Service Institution. The latter, which is represented in the foremost figure, formed part of the collection made by R. B. Hinds, Esq., Surgeon R.N., the naturalist attached to the Expedition under Captain Sir Edward Belcher, R.N., of H.M.S. Sulphur, and was obtained at Realejo, on the shores of the Pacific in Central America: the precise locality in which the specimen in my own possession was procured is not known with certainty.

Mr. Hinds's bird differs from mine in being of a much larger size, in having the under mandible of a nearly uniform straw-white, and the breast much less stained with scarlet. If hereafter it should be found that the two birds are different species, the term *sanguineus* might not be an inappropriate name for the smaller bird. Both the specimens or species in question are nearly allied to the *Pteroglossus torquatus* of Wagler (*P. regalis* of Lichtenstein, and of the former edition of this work), but the total absence of the crescentic brown collar at the nape of the neck will at all times distinguish them from that species: the markings of their bills are also very different.

The specific name of *erythropygius* was given to this bird to indicate the rich scarlet colouring of its rump, which hue is also extended over the whole of the upper tail-coverts.

The figures are of the natural size.

PTEROGLOSSUS PŒCILOSTERNUS, *Gould.*

Gould & Richter del et lith
Hullmandel & Walton Imp

PTEROGLOSSUS PÆCILOSTERNUS, *Gould.*

Double-banded Araçari.

Specific Character.

Pter. rostro et corpore superiore ut in Ptero. pluricincto; *corpore inferiore sulphureo, vittâ pectorali alterâ nigrâ, alterâ sanguineâ.*

Head, neck and chest black; upper surface, wings and tail dark olive-green; rump blood-red; under surface yellow, stained with blood-red, and crossed by two bands, one on the breast black, and the other on the abdomen blood-red stained with black; thighs chestnut, slightly fringed with sulphur-yellow; along the culmen a broad mark of black, united to a mark of the same hue, which passes down the base and occupies the lower angle of the upper mandible, the sides of which are orange, passing into pale yellow at the tip; under mandible black; both surrounded by a narrow raised band of rich orange-yellow; irides brown; orbits grey; legs and feet pale green.
Total length, 18 inches; *bill*, $4\frac{1}{4}$; *wing*, 6; *tail*, $7\frac{1}{4}$; *tarsi*, $1\frac{3}{5}$.

L'Araçari à double ceinture, Le Vaill. Ois. de Parad., tom. ii. p. 32. pl. 11.
Pteroglossus pœcilosternus, Gould in Proc. of Zool. Soc., Part XI. p. 147.—Bonap. Consp. Gen. Av., p. 94, *Pteroglossus*, sp. 14.

In the account of *Pteroglossus pluricinctus*, given in the first edition of this work, I suggested that I had never seen a specimen answering to Le Vaillant's *Araçari à double ceinture*, ventured an opinion that it was quite distinct from the *Pteroglossus Araçari*, with which Le Vaillant considered it identical, and that it was probably an accidental variety of my *P. pluricinctus*. Since that period I have received many examples from Peru, according most closely with Le Vaillant's figure and description, and I can now confidently affirm that it is not only quite distinct from *P. Araçari*, but also from *P. pluricinctus*. It is very nearly allied to the latter, but differs in having the second black band which crosses the breast of that species replaced by one of bright blood-red, and in the yellow of the under surface being less stained with red: here then we have one of Le Vaillant's hitherto doubtful species identified; and had that naturalist given the bird an appellation instead of referring it to the common species, I should have had much pleasure in adopting his name instead of proposing one myself.

The native habitat of this fine bird are the forests clothing the inner dip of the Peruvian and Columbian Andes. Strings of bills of this species, which had apparently been prepared as personal decorations by the natives, are occasionally sent from Popayan, whence I infer that the bird is very numerous in that part of the country.

It may be supposed by some that the present bird is merely a local variety of *P. pluricinctus*, and such may possibly be the case; but I must remark that all the examples from the localities above-mentioned resemble the figure here given, while those from the Upper Amazon and the Rio Negro as closely agree with *P. pluricinctus*: of course it becomes necessary in a monograph to give a figure of a bird exhibiting so marked a difference.

The figure is of the natural size.



PTEROGLOSSUS AZARÆ, *Wagl.*

Gould & Richter, del. et lith.
Hullmandel & Walton, Imp.

PTEROGLOSSUS AZARÆ.

Azara's Araçari.

Specific Character.

Pter. rostro stramineo-flavo ; mandibulæ superioris lateribus maculâ longitudinali rufâ.

Male.—Crown of the head black ; back of the neck dark chestnut-red ; upper surface very dark green ; primaries black, edged with very dark green ; rump deep blood-red ; cheeks and throat blackish chestnut, bounded below by a narrow line of deep black ; across the breast a broad crescentic mark of blood-red ; on the upper part of the abdomen a broad band of black tinged with green ; lower part of the abdomen and under tail-coverts yellow, stained with blood-red next the black band ; thighs olive ; bill delicate straw-yellow, with a broad streak of red along the sides of the upper mandible, bounded below by an interrupted narrow line of orange ; irides dark carmine-red ; orbits immediately round the eye dark greenish grey, inclining to indigo-blue, and with a patch of red at the anterior angle above, and another in the posterior angle behind the eye ; legs green.

Total length, 14¾ inches ; *bill*, 3⅝ ; *wing*, 5 ; *tail*, 5¾ ; *tarsi*, 1.

Female.—Similar in colour, but with the chestnut hue of the throat paler, and the black mark bounding it below more conspicuous than in the male.

L'Aracari Azara, Levaill. Hist. Nat. des Ois. de Parad., Supp., p. 40. t. A.

Ramphastos Azara, Vieill. 2nde Edit. du Nouv. Dict. d'Hist. Nat., tom. xxxiv. p. 283.—Ib. Ency. Méth. Orn., part iii. p. 1431.

Pteroglossus Azaræ, Vieill. Gal. des Ois., tom. ii. pl. et p. (not numbered).—Wagl. Syst. Av., *Pteroglossus*, sp. 3.—Gray and Mitch. Gen. of Birds, vol. ii. p. 403, *Pteroglossus*, sp. 6.—Bonap. Consp. Gen. Av., *Pteroglossus*, sp. 6.—Sturm's Edit. of Gould's Mon. of Ramph., pl.

It gives me great pleasure to figure this, the true *P. Azaræ* of Levaillant, from very recently killed specimens sent to this country by Mr. Wallace from the Rio Negro on the Amazon ; by means of which I am enabled to give a representation of the colouring of the soft parts as they appear in life : it will be seen that they give a very beautiful appearance to the bird, and consequently add materially to its interest. Since the publication of the first edition of this work, numerous examples have been sent to this country, principally, however, by Sir Robert Schomburgk, who collected them during his expeditions into the interior of British Guiana. Little difference in size exists between this species and *P. flavirostris* ; it is, however, the smaller of the two ; but, with the exception of the bill, the two birds are precisely alike in their colouring : it is certainly one of the most elegant species of the genus, and it is much to be regretted that nothing is known of the habits and economy of so beautiful a bird.

The figures represent the two sexes of the size of life.

PTEROGLOSSUS FLAVIROSTRIS, *Fras.*

Gould & Richter, del. et lith.
Hullmandel & Walton, Imp.

PTEROGLOSSUS FLAVIROSTRIS, *Fras.*

Yellow-billed Araçari.

Specific Character.

Pter. rostro stramineo-flavo ; tomiæ, mandibulæ superioris emarginationibus nigris ; mandibulâ inferiore aurantio tinctâ.

Male.—Crown of the head black ; back of the neck between the shoulders dark chestnut-red ; upper surface, wings and tail very dark green ; primaries black, edged with very dark green ; rump deep blood-red ; cheeks and throat blackish chestnut, bounded below by a narrow line of deep black ; across the breast a broad crescentic mark of blood-red ; on the upper part of the abdomen a broad band of black, tinged with green ; lower part of the abdomen and under tail-coverts yellow, stained with blood-red next the black band, particularly on the sides ; thighs olive ; bill delicate straw-yellow, with a narrow streak of black along the serrations of the upper mandible, and a broad streak of orange-yellow along the cutting edge of the lower mandible ; irides dark carmine-red ; orbits immediately round the eye dark greenish grey, inclining to indigo-blue, and with a patch of red in the anterior angle above, and another in the posterior angle behind the eye ; legs green.

Total length, 15½ inches ; *bill*, 3¾ ; *wing*, 5¼ ; *tail*, 6½ ; *tarsi*, 1⅛.

Female.—Similar in colour, but with the chestnut hue of the throat paler, and the black mark bounding it below more conspicuous than in the male.

Pteroglossus Azaræ, Gould's Mon. of Ramph., pl. 17.

———— *flavirostris*, Fras. in Proc. of Zool. Soc., Part VIII. p. 60.—Sturm's Edit. of Gould's Mon. of Ramph., p. .—Gray and Mitch. Gen. of Birds, vol. ii. p. 403, *Pteroglossus*, sp. 7.—Bonap. Consp. Gen. Av., p. 94, *Pteroglossus*, sp. 7.

From the time I published my first drawing of this species, now nearly twenty years ago, until very lately, I have been greatly perplexed respecting the specimen in the Museum of the Jardin des Plantes at Paris from which it was taken, inasmuch as none of the numerous examples sent to this country agreed with it, and it was only upon a more careful examination of it on a late visit, that I discovered that the specimen had been partly manufactured, the second broad scarlet band across the abdomen having been substituted for the few stains of that colour which occur in the genuine specimens :—this practice of malversating species cannot be too forcibly deprecated, tending as it does to produce inextricable confusion.

We learn from Sturm's Edition of this work, that the indefatigable Mr. John Natterer met with this species near Marabitana, on the 14th of May 1831, at which time it was moulting, and again on the 4th of June, in the woods on the banks of the River Xie, a tributary of the Upper Rio Negro ; and that Professor Pœppig also met with it on the Amazonas, in the province of Maynas in Peru ; and I have very fine specimens from New Grenada.

The *Pteroglossus flavirostris* may be at once distinguished from *P. Azaræ* by the uniform straw-yellow colouring of its upper mandible, or in other words, by being without any trace of the red streak along that portion of the bill which is so conspicuous in *P. Azaræ* ; and by its having a streak of orange along the lower mandible, which part of the bill in *P. Azaræ* is entirely free from markings of any kind ; in every other respect the two species are alike in colour.

The figures represent the two sexes of the natural size.

PTEROGLOSSUS MARLÆ, *Gould*.

Gould & Richter del. et lith.
Hullmandel & Walton Imp.

PTEROGLOSSUS MARIÆ, *Gould.*

Duchess of Leuchtenberg's Araçari.

Specific Character.

Pter. mandibulâ superiore pallidè stramineo-flavâ unicolore, maculis ad tomias nigris; inferiore ochraceo-flavo unicolore.

Crown of the head black; nape, upper part of the back and rump very deep blood-red; back, wings and tail dark olive-green; primaries black, edged with dark olive-green; cheeks and throat chocolate, bordered below by a narrow line of black, beyond which is a broad crescentic band of rich blood-red, succeeded by a still broader band of dull black; remainder of the under surface pale yellow, stained with blood-red immediately behind the black band, particularly on the sides; under surface of the wings pale yellow; thighs dark olive; upper mandible straw-yellow, with a narrow interrupted streak of black along the denticulations; under mandible uniform ochreous-yellow; at the base of both mandibles a narrow raised band of pale yellow; irides crimson; orbits deep blood-red, with a ring of cobalt-blue next the pupil; legs and feet olive-green.

Total length, 14 inches; *bill*, 3; *wing*, $4\frac{3}{8}$; *tail*, $5\frac{5}{8}$; *tarsi*, 1.

The Banded Araçaris are some of the most striking and beautiful of the forest birds inhabiting the borders of the River Amazon. They constitute a little group unequalled among the Toucans for the grace and elegance of their form, and are distinguished above all others by the rich colouring of their under surface, with the curl-crested species at their head as the largest, and the present diminutive one at the other extremity. As the name *Beauharnasius*, in honour of the late Duke of Leuchtenberg, has long been associated with this group as the specific appellation of the former, I have thought it not inappropriate to name the smaller species in honour of the widow of a prince distinguished for his love and support of science, and whose premature death all naturalists must deplore.

The native habitat of this species is the woods clothing the sides of the Lower Amazon, whence numerous specimens have been sent by Mr. Hawkswell; all of which were precisely alike, both in size and in colouring. The species to which the present bird is most nearly allied is the *P. flavirostris*, but it differs in being of a smaller size, in the uniform colouring of the upper mandible, in which there is no trace of the orange mark beneath the nostrils so observable in that species, and in the lower mandible being wholly ochraceous, instead of being straw-white with a streak of ochraceous along the side only.

The sexes appear to be precisely alike in colour, and it is only by her somewhat smaller size that the female may be distinguished from the male.



PTEROGLOSSUS STURMI. *Natt*

Gould & Richter, del et lith.
Hullmandel & Walton, Imp

PTEROGLOSSUS STURMI, *Natt.*

Sturm's Araçari.

Specific Character.

Pter. mandibulâ superiore sordidè viridi-flavâ; mandibulâ inferiore totâ nigrâ ad apicem viridi-flavâ; nuchâ, pectore, epigastrio uropygioque coccineis.

Crown of the head deep black; cheeks and throat chocolate-brown, bordered posteriorly with a crescentic mark of chestnut-black, below which is a broader crescent of yellow; nape, upper part of the back, the breast and the rump bright blood-red; back, wings and tail dark olive-green; primaries brownish black, narrowly edged with olive-green; under surface of the wings dull yellow; centre of the abdomen yellow; lower part of the abdomen and under tail-coverts dull greyish yellow; thighs olive-green; upper mandible dull greenish yellow, passing into bluish green at the base, becoming almost white on the cutting edge, and having an oblong spot of black at each denticulation; under mandible black except at the point, which is dull greenish yellow; raised band on the sides of the mandibles at the base ochreous yellow; irides dark brown; orbits dark bluish grey, bounded above by a streak of dull carmine-red; legs and feet dark greyish green.

Total length, 14½ inches; *bill*, 3⅛; *wing*, 5; *tail*, 5¾; *tarsi*, 1¼.

Pteroglossus Sturmii, Natt. in Imp. Mus. of Vienna.—Sturm's Edit. of Gould's Mon. of Ramph., pl. .

The solitary example of this fine species contained in the Imperial Museum at Vienna is the only one that has yet been sent to Europe. It was brought down by the late Mr. John Natterer, on the 22nd of January, 1830, out of a small flock flying in the primitive forests at Borba near the mouth of the Rio Madeira. It proved to be a fine male in the adult dress, and, after his return to Europe, was named by him *Pteroglossus Sturmii*, in honour of one or other of the brothers Sturm of Nuremberg, who have included a figure and description of it in their translation of the first edition of this work. As I have never seen the bird myself I have been obliged to copy their figure, and it is only fair to them to give their remarks upon its alliance, and the differences by which it is distinguished.

"This species differs from the very similar *Pteroglossus bitorquatus* in having the under mandible entirely black, instead of black with a white base; in having a dark brown iris instead of orange with a black spot on each side near its inner margin; in the orbits being dark blue grey, with a border of dull carmine-red near the feathers of the crown instead of the eye-rings being grey, and the remainder of the orbits beautifully mingled carmine and vermilion; and in the pale yellow crescentic mark on the breast, which does not exist in the male *P. bitorquatus*, and which is narrower and of a brighter yellow in the female of that species. The reasons which induced M. Natterer to regard this bird, of which it is true he had only received a single specimen, as distinct, was the circumstance of its being a fully adult bird, and that in the case of several other species, as the *Pteroglossi maculirostris*, *Gouldi*, *Nattereri*, *Langsdorffi*, *Reinwardti*, the specific distinctions reside almost exclusively in the beak."

The figure is of the size of life.



ANDIGENA NIGRIROSTRIS.

Gould & Richter, del et lith.
Hullmandel & Walton, Imp.

ANDIGENA NIGRIROSTRIS.

Black-billed Hill Toucan.

Specific Character.

And. rostro nigro; gulâ albâ; corpore inferiore pallidè cyaneo.

Crown of the head and back of the neck glossy black; back, wing-coverts and margins of the primaries sienna-brown; secondaries bluish brown; tail very dark bluish green, the four central feathers largely, and the next on each side slightly tipped with chestnut; upper tail-coverts sulphur-yellow; throat white, the white tinged with blue, proceeding across the sides of the neck, and nearly meeting at the back; breast and abdomen pale chalky blue; thighs rich chestnut; under tail-coverts blood-red; feet greenish blue, with a lilac tinge on their under surface.

Total length, 19 inches; *bill*, $4\frac{1}{4}$; *wing*, $6\frac{3}{4}$; *tail*, $7\frac{3}{4}$; *tarsi*, $1\frac{5}{8}$.

Pteroglossus nigrirostris, Waterh. in Proc. of Zool. Soc., Part VII. p. 111.—Gray and Mitch. Gen. of Birds, vol. ii. p. 404, *Pteroglossus*, sp. 18.—Bonap. Consp. Gen. Av., p. 94, *Pteroglossus*, sp. 10.

——— *melanorhynchus*, Sturm's Edit. of Gould's Mon. of Ramph., pl.

This species was first characterized by Mr. Waterhouse (from a specimen belonging to the late Earl of Derby) in 1839, four years subsequent to the completion of the first edition of this work, and during my absence in Australia; two years later Messrs. Sturm figured it in their edition of my Monograph under the name of *P. melanorhynchus*, both those gentlemen and Mr. Waterhouse having selected the black colouring of its bill, in which it differs from every known member of its family, for their specific appellation.

It is a typical example of that division of the family to which I have applied the generic term *Andigena*; it is, moreover, one of the most delicately coloured, and one of the most interesting species of the genus; from all of which, as above-mentioned, it differs in the black colouring of its bill, which is beautifully contrasted with the snowy whiteness of its throat; while the blue of its under surface is even more delicate than in *A. hypoglaucus*. It is a large and powerful bird, and the strength of its mandibles indicates that it can use them with greater force than any of its congeners.

Mr. Waterhouse has remarked that the nostrils do not extend so far forwards, that they are hidden by the feathers of the head, and that there is no longitudinal groove in front of them, as in other species of the genus.

Farther than its occurring in most of the recent collections sent from Santa Fé de Bogota, nothing is known respecting it; not even the localities it frequents in the great Andean Range. But little difference is observable in the colouring of the birds sent to Europe; on the other hand, they differ considerably in size, the smaller birds being probably females.

The figures are of the natural size.

ANDIGENA CUCULLATUS. *Gould.*

Gould & Richter, del. et lith.
Hullmandel & Walton, Imp.

ANDIGENA CUCULLATUS, *Gould.*

Hooded Hill Toucan.

Specific Character.

And. rostro flavo, nisi tertiâ parte apicali, et maculâ oblongâ utrinque ad basin mandibulæ inferioris, nigris; dorso, humeris, apicibusque tectricum alarum majorum aureo-oleagineis; uropygio autem et tectricibus caudæ superioribus viridi-flavis infectis.

Crown of the head and occiput deep glossy black; at the back of the neck a broad crescentic mark of blue-grey; back, shoulders and tips of the wing-coverts golden olive, passing into the greenish yellow of the rump and under tail-coverts; greater wing-coverts, outer webs of the primaries and secondaries dark green, their inner webs brownish black; sides of the face and throat sooty black, gradually blending with the dark bluish grey of the under surface; under tail-coverts crimson; thighs chestnut; bill yellow, clouded with green for two-thirds of its length from the base and black for the remainder of its length, the under mandible with an oblong irregularly-shaped patch of black on each side near the base; feet greenish lead-colour.

Total length, 18 inches; *bill*, 4; *wing*, 7; *tail*, 7½; *tarsi*, 2.

Pteroglossus cucullatus, Gould in Proc. of Zool. Soc., Part XIV. p. 69.—Gray and Mitch. Gen. of Birds, vol. iii. App. p. 19 (App. to p. 404).—Bonap. Consp. Gen. Av., p. 95, *Pteroglossus*, sp. 18.

This singular Toucan appears to have escaped the notice of every traveller in Bolivia, except Mr. Bridges; which is the more surprising, as the celebrated M. D'Orbigny and other French naturalists have collected extensively in that country:—I say surprising, because one can scarcely conceive how so remarkable a bird could have been unseen by them. Mr. Bridges found it in the forests of Cocapata, in the department of Cochabamba, and brought three specimens to this country, one of which is now in the British Museum, and the other two in that of the late Earl of Derby. Such, then, is all the information that is known respecting this fine Toucan; a Toucan, which differs from all its congeners in the dense and hairy character of its plumage, and in the absence of any distinct mark on the rump.

Much diversity occurs in the size of the three specimens above-mentioned, but they are precisely similar in colour: the one in the British Museum is the smallest of the three, and is doubtless a female.

The figures are of the natural size.



ANDIGENA LAMINIROSTRIS, *Gould*

Gould & Richter, del et lith
Hullmandel & Walton, Imp.

ANDIGENA LAMINIROSTRIS, *Gould.*

Laminated Hill Toucan.

Specific Character.

And. rostro ad basin coccineo; culmine et apice nigris; lateribus laminatis corneis; corpore subtus cinereo-cyaneo.

Crown of the head and back of the neck deep black; upper surface golden brown; primaries brownish black; rump pale greenish yellow; upper tail-coverts very dark green; tail dark slaty grey, four central feathers largely tipped with chestnut-red; under surface ashy blue; on either flank a large patch of rich yellow; thighs deep chestnut; under tail-coverts blood-red; culmen and apical half of both mandibles black; a broad band on the base of the upper mandible and the basal half of the lower mandible deep blood-red; on either side of the upper mandible, immediately in front of the blood-red base, is a large buff-coloured plate or lamina, continuous with the structure of the bill posteriorly, but separate and detached in front, dilated on its upper edge, thicker and projecting beyond the edge of the mandible below; feet slaty blue.

Total length, 18 inches; *bill*, $3\frac{3}{8}$; *wing*, $6\frac{3}{4}$; *tail*, $6\frac{5}{4}$; *tarsi*, $1\frac{1}{2}$.

Andigena laminirostris, Gould, in Proc. of Zool. Soc., 1850, p. 93.

For our knowledge of this fine new species we are indebted to the researches of M. Jules Bourcier, who discovered it in the forests at the base of Pichincha, in Ecuador, during his recent official sojourn in that country. At the time I described the bird in the "Proceedings of the Zoological Society," only a single specimen had been sent to Europe, which, having become the property of T. B. Wilson, Esq., of Philadelphia, was kindly lent to me by his brother, E. Wilson, Esq., for the purpose of figuring and describing. Since that time two more specimens have been sent to Paris, and now form part of my own collection.

It is certainly one of the most extraordinary of the Toucans yet discovered, inasmuch as it possesses a feature in its laminated bill not found in any other species; the particular use of this lamination, if any, is unknown to us, and we are equally ignorant as to its habits and economy. Like the *A. hypoglaucus*, and all the other members of the family, this species differs considerably in size; probably the smaller birds may be the females; if so, they have the lamination of the bill quite as strongly developed as in the male.

The figures are of the natural size.

SELENIDERA GOULDI.

Gould & Richter, del. et lith.
Hullmandel & Walton Imp.

SELENIDERA GOULDI.

Gould's Toucanet.

Specific Character.

Mas.—*Sel. mandibulâ superiore nigrâ, apicem versus lividè corneâ, apice albâ, fasciâque angustâ albâ ad basin; mandibulâ inferiore albâ fasciâ nigrâ, apiceque lividè corneo, pedibus plumbeis.*

Male.—Crown, nape, throat and chest deep shining black; ear-coverts deep orange, posterior to which is a second tuft of yellow, the two crossing obliquely; at the nape a crescent of pale yellow; back, wings and upper tail-coverts rich olive-green; primaries dark brown, externally margined with olive; tail dark olive-green, inclining to brown; six middle feathers tipped with chestnut; abdomen yellowish green; flanks orange; thighs rufous; under tail-coverts crimson; upper mandible black, bounded along the serratures and posteriorly with white, and bordered next the face with a very narrow line of greenish yellow; under mandible yellowish white, crossed near the apex with a band of black, and bordered at the base with greenish yellow; tips of both mandibles very delicate green; orbits pea-green; irides pea-green, with a circle of pale yellow next the pupil; feet green.

Total length, 13 inches; *bill*, $2\frac{1}{4}$; *wing*, 5; *tail*, 5; *tarsi*, $1\frac{1}{4}$.

Female.—Head, neck, throat and breast reddish brown, inclining to chestnut on the former; ear-coverts reddish olive; in all other points the plumage is the same as in the male; the bill is also very similar, but not so brightly coloured, and moreover has the greenish yellow mark at the base of the under mandible dilated into a triangular form.

Pteroglossus Gouldii, Natt. in Proc. of Zool. Soc., Part V. p. 44.—Sturm's Edit. of Gould's Mon. of Ramph., pl. .—Gray and Mitch. Gen. of Birds, vol. ii. p. 404, *Pteroglossus*, sp. 19.

Pteroglossus (*Selenidera*) *Gouldii*, Gould, Icon. Av., pl. .

Selenidera Gouldi, Bonap. Consp. Gen. Av., p. 95, *Selenidera*, sp. 1.

This bird was figured for the first time in my "Icones Avium," from specimens presented to the Zoological Society of London by the late M. John Natterer of Vienna, who had procured them on the banks of the River Madeira in Brazil, and who at the Meeting of the Society, held on the 11th of April, 1837, had been pleased to name the species after myself. Since that period a great number of examples have come under my notice from the banks of the River Amazon, which may be considered one of the natural localities of the bird: all these specimens correspond in every respect with M. Natterer's; none of them exhibiting a tendency to partake of the characters of *S. maculirostris*, to which the species is very nearly allied, but from which it differs in the single large patch of black on the upper mandible, in the more intense orange colouring of the sides of the body, and in a slight diversity in the colouring of the orbits and irides.

Although I have been so fortunate as to see many examples, it is a species seldom found in collections, and may be considered one of the rarest of the genus.

The Plate represents two males and a female of the natural size.



AULACORAMPHUS CASTANEORHYNCHUS. *Gould.*

Gould & Richter. del et lith
Hullmandel & Walton. Imp.

AULACORAMPHUS CASTANEORHYNCHUS, *Gould.*

Chestnut-billed Groove-bill.

Specific Character.

Aul. rostro castaneo-rubro; mandibulâ inferiore in medio, et culmine nisi ad basin nigro undulatis; vittâ basali stramineâ; uropygio coccineo; corpore subtùs viridi; pectore cæruleo tincto; caudæ rectricibus quatuor intermediis ad apicem latè castaneis.

Crown of the head and upper surface brownish green; wings dark green; rump crimson; four middle tail-feathers deep bluish green, largely tipped with chestnut-brown, the remainder green; all the under surface green, stained across the breast with light blue; bill chestnut-red, becoming paler towards the point, clouded with black on the middle of the lower mandible and along the culmen, except at the base: at the base of the bill is a band of straw-white, which increases in breadth as it proceeds downwards.

Total length, 19 inches; *bill*, $4\frac{1}{2}$; *wing*, $5\frac{3}{4}$; *tail*, $7\frac{1}{2}$; *tarsi*, $1\frac{3}{4}$.

Pteroglossus (*Aulacorhynchus*) *castaneorhynchus*, Gould in Ann. & Mag. of Nat. Hist., vol. ix. p. 238.

Of the grass-green Toucans to which the generic term of *Aulacorhynchus* has been applied, the present species is by far the largest yet discovered. The accompanying figures were drawn from specimens in my own possession, which are somewhat smaller than those in the fine collection formed by the late Earl of Derby. The *Aulacorhynchus castaneorhynchus* is nearly allied to *A. hæmatopygius*, but the diminutive size of the latter, together with the darker colouring of the apical half of its bill, indicates its specific distinctness.

The present species appears to be strictly an Andean species, all the specimens I have seen having been sent to Europe in collections from Santa Fé de Bogota. I regret to add that nothing more is known respecting it.

The figures are of the natural size.



AULACORAMPHUS ALBIVITTA.

J. Gould & Richter, del et lith.
Hullmandel & Walton Imp.

AULACORHAMPHUS ALBIVITTA.

White-banded Groove-bill.

Specific Character.

Aul. rostro nigro, ad basin fasciâ albâ circumdato; culmine toto ad apicem usque laterumque mandibulæ superioris partes, citreis in viridiscentem transeuntibus; mandibulâ inferiore ante fasciam albam maculâ sanguineâ notatâ; gulâ albidâ.

All the upper surface and wings dark tinged with brown; on the crown and the nape of the neck grass-green; primaries brownish black, margined externally at the base with dark grass-green; tail deep grass-green, passing into blue towards the extremity, and tipped with rich chestnut; throat white in some, grey or bluish white in others; under surface pale grass-green, very slightly washed with blue on the breast, and with yellow on the flanks; around the orbits and down the sides of the neck bounding the white of the grey throat a line of blue; under tail-coverts rich deep chestnut; bill black, with the exception of the culmen and upper half of the upper mandible, which are greenish yellow, passing into purer yellow at the tip and the lower angle of the under mandible which is chestnut; on the sides of both mandibles at the base a broad band of straw-white; orbits red; feet greenish lead-colour.

Male.—Total length, $13\frac{1}{4}$ inches; *bill*, $3\frac{1}{8}$; *wing*, $4\frac{3}{4}$; *tail*, $5\frac{1}{4}$; *tarsi*, $1\frac{1}{8}$.

Pteroglossus albivitta, Boiss. Rev. Zool. 1840, p. 70.—Sturm's Edit. of Gould's Mon. of Ramph. text.

———— *albivittatus*, Gray and Mitch. Gen. of Birds, vol. ii. p. 404, *Pteroglossus*, sp. 31.

———— *microrhynchus*, Sturm's Edit. of Gould's Mon. of Ramph.

Aulacoramphus albivitta, Bonap. Consp. Gen. Av., p. 96, *Aulacoramphus*, sp. 3.

This is one of the least of the family of Ramphastidæ yet discovered. It is a native of the Columbian Andes, and specimens occur in most of the collections sent from thence to this country. It differs from the *Pteroglossus prasinus* of Lichtenstein, to which it is nearly allied, in having a broad band of white down the sides of the base of the mandibles.

Considerable difference occurs in the size of the specimens, which is perhaps due to sex, the larger being the males, and the smaller the females.

The figures are of the natural size.



AULACORAMPHUS ATROGULARIS.

Gould & Richter, del. et lith.
Hullmandel & Walton, Imp.

AULACORAMPHUS ATROGULARIS.

Black-throated Groove-bill.

Specific Character.

Aul. gulâ genarumque parte anticâ anthracinis; crisso cinnamomeo; caudâ supra basin obscuro-viridi, dein in cærulescentem transeunte; rectricibus octo intermediis maculâ cinnamomeâ terminatis.

General plumage yellowish green, becoming of a somewhat lighter hue on the under surface; throat and a small patch beneath the eye deep black, margined posteriorly with blue; primaries brownish black, margined externally with green, the green occupying the base only of the external web of the outer feather, and gradually increasing in extent on each of the succeeding feathers as they approach the body; green of the tail passing into blue near the tip; under tail-coverts and the tips of the tail-feathers chestnut; upper mandible yellow, with a narrow line of black across the base, and another narrow line of black near the cutting edge, the two lines united near the gape by a triangular mark of black; raised ridge at the base of upper mandible yellow; under mandible black, except at point, which is yellow; the raised ridge at its base white; the cutting edges of both mandibles are also white; feet greenish lead-colour.

Male.—Total length, 15 inches; *bill*, $3\frac{1}{4}$; *wing*, 5; *tail*, $5\frac{1}{2}$; *tarsi*, $1\frac{1}{4}$.

Female.—Total length, 13 inches; *bill*, $2\frac{5}{8}$; *wing*, $4\frac{3}{4}$; *tail*, 5; *tarsi*, $1\frac{1}{4}$.

Pteroglossus atrogularis, Sturm's Edit. of Gould's Mon. of Ramph. p. . pl. .—Gray and Mitch. Gen. of Birds, vol. ii. p. 404, *Pteroglossus*, sp. 29.

Aulacoramphus atrigularis, Bonap. Consp. Gen. Av., p. 96, *Aulacoramphus*, sp. 7.

The woods bordering the eastern sides of the Andes in Peru and Ecuador are the localities inhabited by this fine species, which differs from all its congeners in the black colouring of its throat and in the strongly contrasted markings of its bill. It is a rare bird in the collections of Europe; but fine examples form part of the Royal Museum at Berlin, and in that of the late Earl of Derby; and were also contained in the collection of Prince Massena at Paris, now removed to Philadelphia in North America. The specimens from which my figures were taken were procured by the celebrated traveller Dr. Tschudi during his researches in Peru.

The figures are of the natural size.



AULACORAMPHUS CÆRULEICINCTUS. *D'Orb.*

Gould & Richter, del. et lith.
Hullmandel & Walton, Imp.

AULACORAMPHUS CÆRULEICINCTUS.

Blue-banded Groove-bill.

Specific Character.

Aul. rostro plumbeo, apice tomiisque pallide corneis; uropygio sanguineo; mento, gulâ, genarum parte anticâ lineolâque supra oculos albidis.

Crown of the head, back, wings and tail dark grass-green; across the upper tail-coverts a broad patch of deep blood-red; four centre tail-feathers largely tipped with chestnut-brown; stripe over the eye, sides of the face and throat white washed posteriorly with blue; ear-coverts, chest and all the under surface yellowish green, deepening into rufous on the under tail-coverts; across the lower part of the chest a band of light blue; primaries black, margined externally with green; bill dark bluish lead-colour, becoming lighter towards the tip, which, as well as the serrations of both mandibles, are whitish horn-colour; feet lead-colour.

Total length, 15½ inches; *bill*, 3¾; *wing*, 5¾; *tail*, 6½; *tarsi*, 1½.

Pteroglossus cæruleicinctus, D'Orb. Voy. dans l'Amér. Mér. Ois., tab. 66. fig. 2.—Gray and Mitch. Gen. of Birds, vol. ii. p. 404, *Pteroglossus*, sp. 30.

——— *Lichtensteinii*, Sturm's Edit. of Gould's Mon. of Ramph.

Aulacoramphus cæruleicinctus, Bonap. Consp. Gen. Av., p. 96, *Aulacoramphus*, sp. 8.

Like *Aulacoramphus atrogularis*, this well-marked species is an inhabitant of the Cinchona woods, clothing the eastern slopes of the Peruvian Andes, where it is known to the Indians by the name of *Chukimbi*.

This species was named by the Messrs. Sturm *Pteroglossus Lichtensteinii*, in honour of my old and valued friend Dr. Lichtenstein, the Director of the Royal Museum in Berlin, and it would have given me very great pleasure to have retained this justly complimentary appellation for so fine a bird; but as I find that it had been previously called *cæruleicinctus* by M. D'Orbigny, the law of priority obliges me to give this name the preference.

The *Aulacoramphus cæruleicinctus* is rendered remarkable by the blue-grey colouring of its bill, by its white throat, and by the cærulean blue band crossing the chest. It is a very rare species, but specimens are contained in the Royal Museum at Berlin, in the Collection at the Jardin des Plantes at Paris, and in my own.

The figures are of the natural size.

AULACORHAMPHUS CÆRULEOGULARIS, *Gould*

Gould & Richter del et lith.
Hullmandel & Walton, Imp.

AULACORAMPHUS CÆRULEOGULARIS, *Gould.*

Blue-throated Groove-bill.

Specific Character.

Aul. gulâ cæruleâ.

Upper surface dark green, with an olive tint on the head and nape, and of a brighter green on the rump and upper tail-coverts; primaries blackish brown, margined externally at the base with dark green; tail deep green, passing into blue towards the extremity, and tipped with rich chestnut; throat and fore part of the cheeks cærulean blue; under surface green, washed with yellow on the flanks and abdomen; under tail-coverts rich chestnut; bill black, with the exception of the upper part of the sides of the upper mandible and the apical portion of the culmen, which are greenish yellow, passing into purer yellow at the tip; on the sides of both mandibles at the base a broad band, which on the upper one is yellow, and on the lower white; orbits red; legs and feet greenish lead-colour.

Total length, $12\frac{1}{4}$ inches; *bill*, $2\frac{7}{8}$; *wing*, $4\frac{1}{2}$; *tail*, $4\frac{3}{4}$; *tarsi*, $1\frac{1}{4}$.

Aulacoramphus cæruleogularis, Gould in Proc. of Zool. Soc., February 22, 1853.

The new species of Groove-Bill figured on the accompanying Plate was killed by Berthold Seemann, Esq., Naturalist to H.M.S. Herald, together with other ornithological rarities, in Veragua. It is very nearly allied to *A. albivitta*; but may be at once distinguished from that species by its rich blue throat, by the band at the base of the bill being much broader and yellow on the upper mandible, instead of white, and by the under surface being washed with yellow, while in the other it is pure green. I regard the discovery of this new species with the greatest interest, as an important addition to the present group, especially as it arrived at an opportune moment for including it in the present Monograph.

The figures are of the natural size.

OBSERVATIONS

ON

THE ANATOMY OF THE TOUCAN.

THE organs of digestion in the Toucan present a general simplicity of structure, which accords with its geographical position and power of assimilating both animal and vegetable food, so abundantly provided by Nature in a tropical climate. The amplitude of the œsophagus and general width of the intestinal canal correspond to the magnitude of the beak. There is no lateral dilatation or crop, nor is the gizzard so encroached upon by its muscular parietes as to render such a reservoir for the alimentary substances necessary. The intestinal canal is equally devoid of lateral pouches, or *cæca*: the gastric glands are of a simple form, and are disposed, for the extent of an inch, around the termination of the œsophagus. The communication of the gizzard with the *proventriculus* is free, and readily permits regurgitation to take place. This act has been observed in two living species of Toucan (*Ramphastos Erythrorhynchus* and *Ramph. Ariel*, Vigors); and as the substances so regurgitated were, after undergoing a second mastication, again swallowed, it may be compared to the rumination of herbivorous quadrupeds.

The intestinal canal does not exceed the length of the body, including the bill. The general structure of the digestive apparatus of the Hornbill agrees with that of the Toucan.

The liver of the Toucan is composed of two lobes, of unequal size, joined by a small band, the margins of the lobes being more rounded than usual. There is no gall-bladder, and in this deficiency the Toucan manifests an affinity to the *Picidæ* and *Psittacidæ*, among the *Scansores*; while the Hornbill, on the contrary, resembles the *Corvidæ* in the large development of its biliary receptacle. A small hepatic duct enters the duodenum near its commencement; and a second duct, about two lines in diameter, passes to a more distant part of the intestine, where it terminates close to the insertion of the two pancreatic ducts.

The kidneys are composed of three lobes, of which the middle one is the smallest; their length is $1\frac{1}{2}$ inch; their surface is convoluted, though in a less marked degree than in reptiles. Between the anterior extremities of these glands, in a female specimen of *Ramphastos Ariel*, was situated the ovary, of a triangular shape, and apparently healthy in structure. The *ova* were like minute granules, and disposed in a convoluted manner. The supra-renal glands were imbedded in the posterior part of the ovary. The oviduct was as large as a crow-quill; it commenced by the usual fimbriated and wide aperture, was slightly tortuous at the commencement, and then continued straight to the *cloaca*.

Among the varied forms of tongue which birds present, that of the Toucan is one of the most remarkable. Its length from the aperture of the *glottis*, in a full-grown *Ramphastos Toco*, was six inches. The posterior ridge, or backward-projecting process, was broad and finely notched; it was situated about 4 lines from the *glottis*. Anterior to this process the tongue is soft and minutely papillose for the extent of 4 lines, and here, most probably, the sense of taste resides: the rest of the organ consists of a transparent horny *lamina*,

flattened horizontally and supported by the anterior process of the *os hyoides*, which forms a ridge along the middle of its inferior surface. At about four inches from the extremity of the horny *lamina* the margins become obliquely notched, and these notches, becoming deeper and closer together towards the extremity, occasion the bristled appearance on each side of the tongue. These bristles, Mr. Vigors observes, were generally applied to the morsels of food whilst held between the mandibles previously to being swallowed.

The *cornua* of the *os hyoides* are $1\frac{1}{2}$ inch in length. The *trachea* is narrow, and simple in its structure, the rings somewhat flattened and decreasing in diameter towards the inferior extremity, from which a single pair of muscles pass off to the *sternum*. The length of the lower fourth of the tube, and the state of tension in the *bronchia*, are regulated by a pair of small muscles, which, arising from the sides of the tracheal cartilages, are inserted into the bone of divarication at the extremity of the *trachea*: and that this part of the tube is subjected to variations in length is indicated by the tortuous character of the recurrent nerves attached to the sides of the *trachea* at this part. The lungs are small in proportion to the size of the bird, but of the usual form and structure. The abdominal air-cells are of small size. The heart is of a more oblong form than in general; its *apex*, as it were, truncate; its length 1 inch.

The pectoral muscles, as in the *Psittacidæ*, are but feebly developed, and the keel of the *sternum* is of moderate size, not projecting more than half an inch from the plane of the bone. The *sternum* has four notches at its posterior margin. The clavicles, or lateral halves of the *furcula*, are here, as in the *Psittacidæ* and *Struthionidæ*, separate; they are 1 inch in length, slender, pointed at their lower ends, and joined to each other and to the *sternum* by ligament only.

The peculiar motions of the tail called for a particular examination of that part. It is difficult to state the precise number of the caudal *vertebræ* in consequence of the terminal ones being anchylosed, requiring for this purpose the examination of a young specimen at a period before the *anchylosis* takes place. In the skeleton of a Black-billed Toucan which I have examined, it would appear that three *vertebræ* are thus anchylosed, making the entire number of coccygeal *vertebræ* nine. The Woodpecker has also nine caudal *vertebræ*, and this seems to be the greatest number found in birds. The first six of these *vertebræ* in the Toucan are articulated by ball-and-socket joints, the ball and the socket being most distinct in the last two joints. That between the sixth and the anchylosed *vertebræ* is provided with a capsule and synovial fluid; the others have a yielding ligamentous mode of connexion. The spinous processes of these *vertebræ*, both superior and inferior, are of moderate size, but smallest in the sixth, where the greatest degree of motion takes place. The transverse processes, on the contrary, are large and broad, so as almost wholly to prevent lateral motion. The first of the anchylosed *vertebræ* is broad and flat and of a rounded form, supporting the two coccygeal glands: the last of these processes is compressed laterally, and of the ordinary ploughshare form. The caudal *vertebræ* can be inflected dorsad till their superior spines are brought into contact with the *sacrum*; in the opposite direction they can scarcely be bent beyond a straight line: and it is to this structure of the bones and joints that is to be attributed the capability in the Toucan of turning its tail upon its back (as represented in the Zoological Journal, vol. ii. pl. xv.), the muscles presenting comparatively few peculiarities, since the motion alluded to is remarkable rather for its extent than the vigour with which it is performed.

The principal *elevators* of the tail are the *sacro-coccygei superiores* (*sacro-sus-caudiens* of Vicq d'Azyr). They arise from two longitudinal ridges on the inferior and convex part of the *sacrum*, and are inserted into the superior spines of the first six *vertebræ* by detached tendons, terminating broadly in the anchylosed *vertebræ*. The principal antagonists of these muscles, *sacro-coccygei inferiores* (*sacro-sous-caudiens* of Vicq d'Azyr), pass over the first five *vertebræ* and terminate in the sixth and anchylosed *vertebræ*: their origins are wider apart than in the preceding pair of muscles, coming off from the margins of the sacro-sciatic notches. In the interval are situated small muscles passing from the transverse processes to the inferior spines of the first six *vertebræ*.

From the limited nature of the lateral motions of the tail the muscles appropriate to these movements are feeble, especially in comparison with those which are observed in the birds that spread their tail-feathers

in flight, in order to regulate their course during that vigorous species of locomotion. These muscles are in number two on each side, arising from the posterior extremities of the *ischia*, and inserted into the expanded anchylosed *vertebræ*. From the disposition of these muscles it is obvious that after the proper *elevators* have raised the tail to a certain height, they also become dorsad of the centre of motion, combine their forces with the *elevators*, and by this addition of power terminate the act of throwing up the tail by a jerk: Mr. Vigors in his observations on the living animal observes, that "in these movements the tail seemed to turn as if on a hinge that was operated on by a spring."

The osseous portions of the mandibles of the Toucan are disposed in a manner adapted to combine with the great bulk of those parts a due degree of strength and remarkable lightness, and the bony structure is consequently of a most beautiful and delicate kind. The external parietes are extremely thin, especially in the upper beak: they are elastic, and yield in a slight degree to moderate pressure, but present considerable resistance if a force is applied for the purpose of crushing the beak. At the points of the mandibles, the outer walls are nearly a line in thickness; at other parts, in the upper beak, they are much thinner, varying from 1-30th to 1-50th part of an inch, and in the lower beak are from 1-20th to 1-30th of an inch in thickness.

On making a longitudinal section of the upper mandible, its base is seen to include a conical cavity, about two inches in length and one inch in diameter, with the apex directed forwards. The walls of this cone consist of a most beautiful osseous network, intercepting irregular angular spaces, varying in diameter from half a line to two lines. From the parietes of this cone, a network of bony fibres is continued to the outer parietes of the mandible, the fibres which immediately support the latter being almost invariably implanted at right angles to the part in which they are inserted.

The whole of the mandible anterior to the cone is occupied with a similar network, the meshes of which are largest in the centre of the beak in consequence of the union which takes place between different small fibres as they pass from the circumference inwards. It is remarkable that the principle of the cylinder is introduced into this elaborate structure: the smallest of the supporting pillars of the mandibles are seen to be hollow or tubular, when examined with the microscope. The structure is the same in the lower mandible, but the fibres composing the network are in general stronger than those of the upper mandible.

The medullary membrane lining these cavities appears to have but a small degree of vascularity. Processes of the membrane, accompanying vessels and nerves, decussate the conical cavity at the base of the beak. The principal nerves are two branches of the fifth pair, which enter at the lower part of the conical cavity, and diverge and ascend as they pass forwards to the end of the bill, giving off branches, which are distributed to the horny covering, and supply it with sensibility.

The air is admitted to the interior of the upper mandible from a cavity situated anterior to the orbit, which communicates at its posterior part with the air-cell continued into the orbit, and at its anterior part with the maxillary cavity. The nasal cavity is closed at every part, except at its external and internal apertures, by the pituitary membrane, and has no communication with the interior of the mandible.

The organ of smell is confined to the base of the upper jaw. The canal, which is traversed by the air and odorous particles in inspiration, forms a sigmoid curve in the vertical direction. The external orifice is on precisely the same perpendicular line as the internal one. It is situated at the posterior surface of the upper mandible, where it is raised above the level of the cranium; the orifice is consequently directed backwards, secure from all injury that might happen to it in the act of penetrating dense or interwoven foliage.

The olfactory canal is at first of almost a cylindrical form, and about two lines in diameter. It passes forwards for about half an inch, receiving from the mesial aspect the projection of the first spongy bone; it then bends downwards and backwards, and is dilated to admit the projections of the two other spongy bones: from this point it descends vertically to the palate, at first contracted, and afterwards dilating to form the internal or posterior orifice. The first or outermost spongy bone is almost horizontal, and has its convexity

directed outwards. The second is nearly vertically placed, with its convexity directed backwards: it terminates in a narrow point below. The third or superior spongy bone makes a small projection towards the mesial plane, about the size of a pea. These spongy bones are formed by inward projections of the inner and posterior osseous parietes of the nasal passage; they are cellular, and air is continued into them from the cranial diploë; but the parietes of the nasal passage are entire and smooth, and lined by a delicate pituitary membrane. The inner table of the skull is continuous with the parietes of the nasal cavity, by means of the bony canal which accompanies and protects the olfactory nerves, and which represents, as it were, a single foramen of the cribriform plate of the mammalia. The communication of the cavity of the cranium with that of the nose is thus similarly formed, and is only obstructed in the recent state by the pituitary membrane, on the posterior *cul de sac* of which the olfactory nerve distributes its branches in a radiated manner. These branches were confined, as Scarpa has observed in other birds, to the pituitary membrane covering the septum narium and the superior spongy bone.

The external orifice of the meatus auditorius is situated about half an inch behind the lower boundary of the orbit. The membrana tympani closes it so obliquely that its plane is directed almost backwards; its anterior edge is consequently about three lines from the external orifice, while its posterior margin is at least six lines from the same point. It is convex outwardly as in birds generally. The apparatus of the internal ear is easily exposed, the semicircular canals being lodged in a delicate reticulation of the diploë of the cranium. These parts, with the ossiculum of communication and the cochlea, do not present any deviations from the ordinary structure worthy of notice.—R. O.

DESCRIPTION OF THE PLATE.

Fig. 1. Section of the cranium and upper mandible of the *Ramphastos Toco*.
- *a*. The cancellated structure of the beak.
- *b*. The cavity at the base.
- *c*. Branches of the fifth pair of nerves.
- *d d*. The external orifices of the nostrils.
- *e*. The osseous parietes of the nasal passages.
- *f*. The osseous tubes protecting the olfactory nerves.
- *g*. The pituitary membrane exposed, and branches of the olfactory nerve radiating upon it.
- *h*. The superior semicircular canals of the internal ear.
- *i i*. Hemispheres of the cerebrum.
- *k*. Cerebellum.

Fig. 2. The upper surface of the tongue.
- *l*. The fringed or feathered portion of the tongue.
- *m*. The orifice of the larynx.
- *n*. The orifice of the pharynx.
- *o o*. Cornua of the os hyoides (*cerato-hyal* bones of Geoffroy).
- *p*. The trachea, or windpipe.
- *q*. The gullet.

Fig. 3. Vertical longitudinal section of the head.
The same letters indicate the same parts as in the previous figures.
- *d*. Shows the internal aperture of the nostrils.
- *r*. The beginning of the spinal chord.
- *s*. The articulating surface of the occipital bone.
- *t*. The nasal septum or partition.
- *u*. The air-cell anterior to the orbit from which the air passes into the mandible.
- *v*. The cancellated structure of the lower jaw.

Fig. 4. Side view of the foot of *Ramphastos Toco*.

Fig. 5. Under surface of the same.

Fig 1.

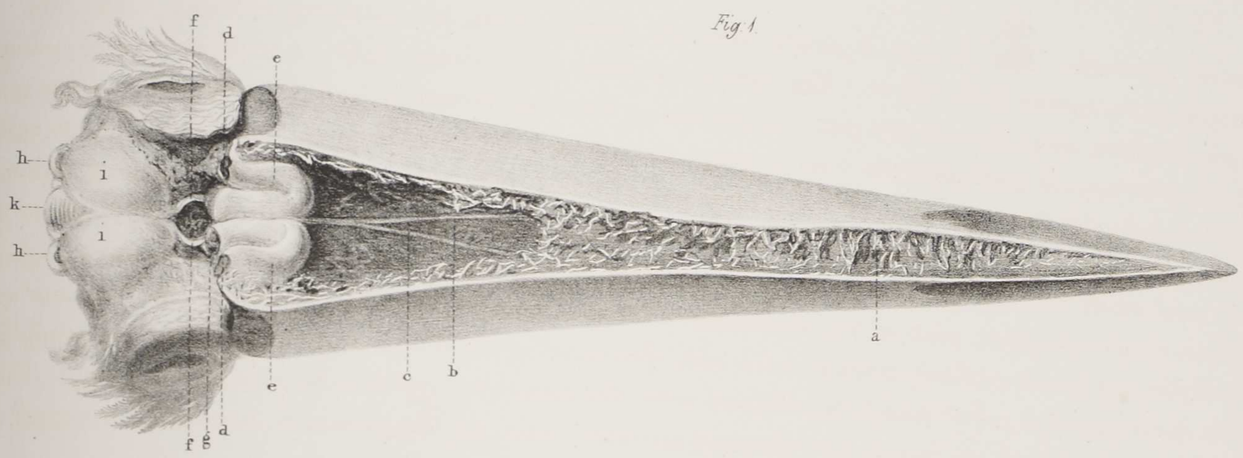


Fig 2.

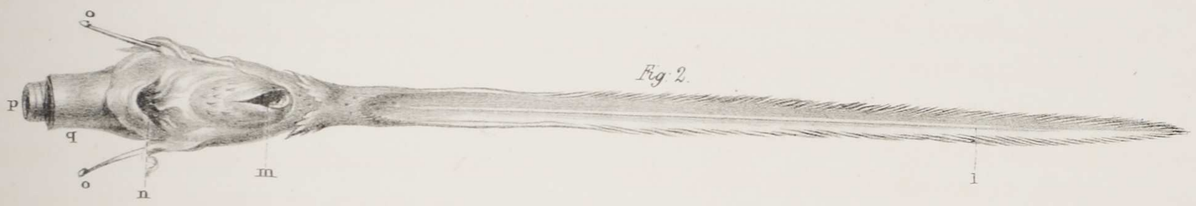


Fig 3.

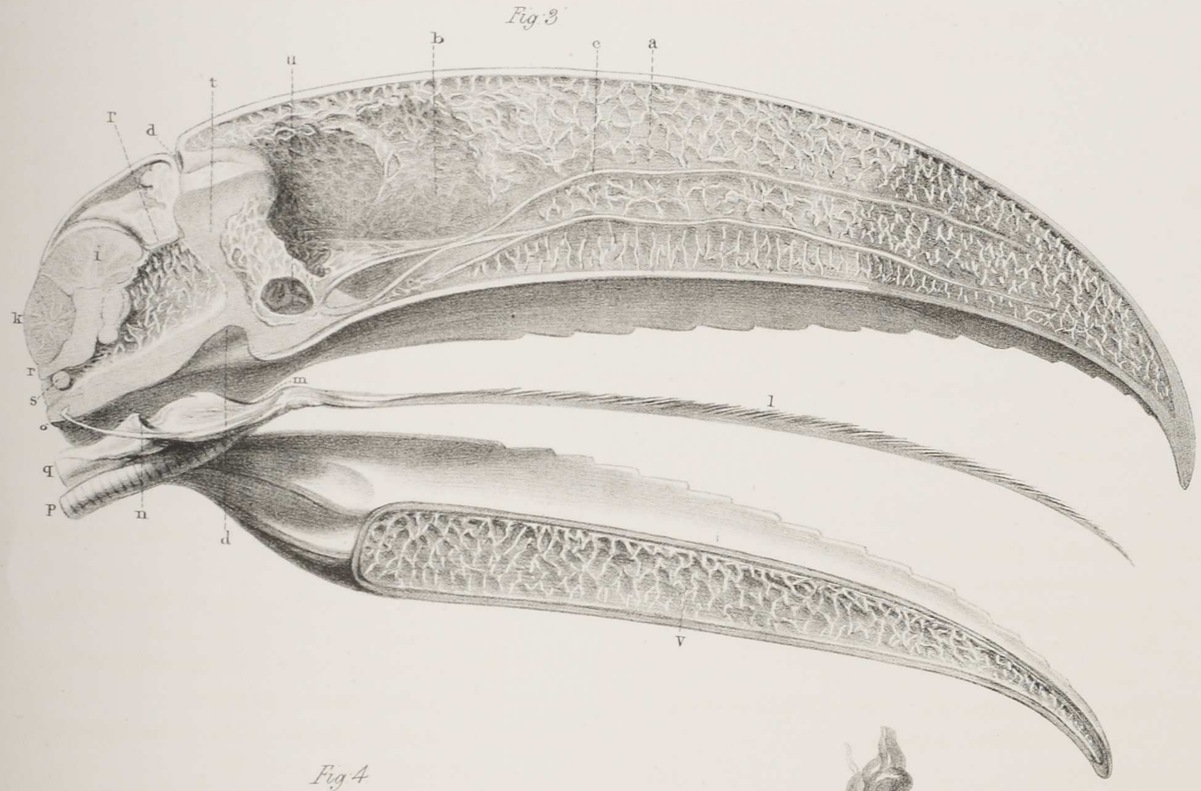


Fig 4.



Fig 5.



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