

cropus major it is as 1 to 800, the comparison being made on the body of a large old male. The difference between the large and small species of Kangaroo depends on the brain not increasing in proportion to the increase in the bulk of the entire animal. The smaller species in any natural family of Mammalia, resemble the fœtus of the larger species in the greater proportional size of both the brain and the eyes.

2. ON THE MONKEYS OF THE AMAZON.

BY ALFRED R. WALLACE.

The great valley of the Amazon is rich in species of Monkeys, and during my residence there I had many opportunities of becoming acquainted with their habits and distribution. The few observations I have to make will apply principally to the latter particular. I have myself seen twenty-one species; seven with prehensile and fourteen with non-prehensile tails, as shown in the following list:—

- 3 Howlers, viz.—*Mycetes ursinus*, *M. caraya?* and *M. Beelzebub*;
- 1 Spider Monkey,—*Ateles paniscus*;
- 1 Big-bellied Monkey (*Barrigudo* of the Brazilians),—*Lagothrix Humboldtii*;
- 2 Sapajou,—*Cebus gracilis* (Spix) and *C. apella?*;
- 4 Short-tailed Monkeys,—*Brachyurus couxiu*, *B. ouakari* (Spix), *B. rubicundus* (? *Calvus*, B. M.), and a new species;
- 2 Sloth Monkeys,—*Pithecia irrorata* and an undescribed species;
- 3 Squirrel Monkeys,—*Callithrix sciureus*, *C. personatus* and *C. torquatus*;
- 2 Nocturnal Monkeys,—*Nyctipithecus trivirgatus* and *N. felinus*;
- and
- 3 Marmoset Monkeys,—*Jacchus bicolor*, *J. tamarin* and a new species.

The Howling Monkeys are generally abundant; the different species, however, are found in separate localities; *Mycetes Beelzebub* being apparently confined to the Lower Amazon, in the vicinity of Para; a black species, *M. caraya?*, to the Upper Amazon; and a red species, *M. ursinus*, to the Rio Negro and Upper Amazon. Much confusion seems to exist with regard to the species of Howlers, owing to the difference of colour in the sexes of some species. The red and the black species of the Amazon, however, are of the same colour in both sexes. The species of this genus are seminocturnal in their habits, uttering their cries late in the evening and before sunrise, and also on the approach of rain. Humboldt observes, that the tremendous noise they make can only be accounted for by the great numbers of individuals that unite in its production. My own observations, and the unanimous testimony of the Indians, prove this not to be the case. One individual only makes the howling, which is certainly of a remarkable depth and volume and curiously modulated; but on closely remarking the suddenness with which it ceases and

again commences, it is evident that it is produced by one animal, which is generally a full-grown male. On dissecting the throat, much of our wonder at the noise ceases; for besides the bony vessel formed by the expanded "os hyoides," there is a strong muscular apparatus which seems to act as a bellows in forcing a body of air through the reverberating bony cavity.

Of the genus *Ateles*, the four-fingered Spider Monkeys, one species is found only in the Guiana district, north of the Amazon and Rio Negro. Another, probably *Ateles ater*, inhabits the West Brazil district on the river Purus. These monkeys are slow in their motions, but make great use of their prehensile tail, by which they swing themselves from bough to bough; and I have been informed that two have been seen to join together by their hands and prehensile tails, to form a bridge for their young ones to pass over. The Indians also say, that this animal generally moves suspended beneath the boughs, not walking on them.

The next genus, *Lagothrix*, is a very interesting one, being quite unknown in Guiana and Eastern Brazil. The species I am acquainted with (*L. Humboldtii*) is found in the district south-west of the Rio Negro, towards the Andes, which I call the Ecuador district of the Amazon. They are remarkable for their thick woolly grey fur, their long prehensile tails, and very mild disposition. In the upper Amazon they are the species most frequently seen tame, and are great favourites, from their grave countenances, more resembling the human face than those of any other Monkeys, their quiet manners, and the great affection and docility they exhibit. I had three of them for several months before leaving Brazil, and they were on board with me at the time the ship was burnt, when, with their companions, they all perished.

The Sapajou Monkeys, forming the genus *Cebus*, appear to be more generally distributed, and the species have a wider range. They are also frequently domesticated, but offer a remarkable contrast to the species of the last genus, in their constant activity and restlessness, and they have the character of being the most mischievous monkeys in the country.

Each species of the genus *Brachyurus* appears to be confined to a particular district. The *B. couxiu* is a native of Guiana, and does not pass the Rio Negro on the west, or the Amazon on the south. The *B. ouakari* is found on the Upper Rio Negro; the *B. rubicundus* on the Upper Amazon, called the Solimoes; and another species, apparently undescribed, is found on the lower part of the same river.

The Sloth Monkeys, forming the genus *Pithecia*, have an extensive range as regards the genus, but the separate species seem each confined in a limited space. Of the two species inhabiting the Amazon district, one, the *P. irrorata*, is found on the south bank of the Upper Amazon; and another, apparently undescribed and rendered remarkable by a bright red beard round the face and under the chin, occurs only to the south-west of the Rio Negro.

Of the little Squirrel Monkeys, one, the *Callithrix sciureus*, a spe-

cimen of which is now in the Society's Gardens, has an extensive range, being found on both banks of the Amazon and Rio Negro. The *C. torquatus*, a white-collared species, is found only on the Upper Rio Negro, and the *C. personatus* on the Upper Amazon.

Of the curious Nocturnal Monkeys forming the genus *Nyctipithecus* there are two species in this district; one, which appears to be the *N. trivirgatus* of Humboldt, is found in the district of Ecuador, west of the Upper Rio Negro; the other, closely allied, probably the *N. felinus*, on the Upper Amazon. Their large eyes, cat-like faces, soft woolly hair and nocturnal habits render them a very interesting group. They are called "devil monkeys" by the Indians, and are said to sleep during the day and to roam about only at night. I have had specimens of them alive, but they are very delicate and soon die.

Of the Marmozet Monkeys there are three species, though none of them have the characteristic tufts of hair on the head. Each species seems to be confined to a very limited tract of country. The *Jacchus tamarin* is found only in the district of Para, where it is abundant. The *J. bicolor*, a pretty grey and white species, I have only seen on the Guiana side of the Rio Negro near the city of Barra. Another species entirely black, with the face of bare white skin, inhabits the district of the Upper Rio Negro. It appears to be quite new.

The last three genera appear to be to a great extent insectivorous, and I am inclined to think they also devour small birds and mammalia. At least those I have had alive would attempt to pull into their cages any of my small birds which passed near. The little black *Jacchus* last mentioned was particularly savage. He once seized a large parrot by the neck, pulled him into his cage, and bit out a large piece from his bill, and would probably have destroyed it, had I not opportunely come to the rescue. Two other small birds which approached too near his cage he seized and completely devoured.

I will now make a few remarks on the geographical distribution of these animals.

In the various works on natural history and in our museums, we have generally but the vaguest statements of locality. S. America, Brazil, Guiana, Peru, are among the most common; and if we have "River Amazon" or "Quito" attached to a specimen, we may think ourselves fortunate to get anything so definite: though both are on the boundary of two distinct zoological districts, and we have nothing to tell us whether the one came from the north or south of the Amazon, or the other from the east or the west of the Andes. Owing to this uncertainty of locality, and the additional confusion created by mistaking allied species from distant countries, there is scarcely an animal whose exact geographical limits we can mark out on the map.

On this accurate determination of an animal's range many interesting questions depend. Are very closely allied species ever separated by a wide interval of country? What physical features determine

the boundaries of species and of genera? Do the isothermal lines ever accurately bound the range of species, or are they altogether independent of them? What are the circumstances which render certain rivers and certain mountain ranges the limits of numerous species, while others are not? None of these questions can be satisfactorily answered till we have the range of numerous species accurately determined.

During my residence in the Amazon district I took every opportunity of determining the limits of species, and I soon found that the Amazon, the Rio Negro and the Madeira formed the limits beyond which certain species never passed. The native hunters are perfectly acquainted with this fact, and always cross over the river when they want to procure particular animals, which are found even on the river's bank on one side, but never by any chance on the other. On approaching the sources of the rivers they cease to be a boundary, and most of the species are found on both sides of them. Thus several Guiana species come up to the Rio Negro and Amazon, but do not pass them; Brazilian species on the contrary reach but do not pass the Amazon to the north. Several Ecuador species from the east of the Andes reach down into the tongue of land between the Rio Negro and Upper Amazon, but pass neither of those rivers, and others from Peru are bounded on the north by the Upper Amazon, and on the east by the Madeira. Thus there are four districts, the Guiana, the Ecuador, the Peru and the Brazil districts, whose boundaries on one side are determined by the rivers I have mentioned.

In going up the Rio Negro the difference in the two sides of the river is very remarkable.

In the lower part of the river you will find on the north the *Jacchus bicolor* and the *Brachyurus Couxiu*, and on the south the red-whiskered *Pithecia*. Higher up you will find on the north the *Ateles paniscus*, and on the south the new black *Jacchus* and the *Lagothrix Humboldtii*.

Spix, in his work on the monkeys of Brazil, frequently gives, "banks of the river Amazon" as a locality, not being aware apparently that the species found on one side very often do not occur on the other, though the fact is generally known to the natives. In these observations I have only referred to the monkeys, but the same phenomena occur both with birds and insects, as I have observed in many instances.

3. ON THE ANATOMY AND DEVELOPMENT OF ECHINOCOCCUS VETERINORUM. BY THOMAS HUXLEY, F.R.S.

(Annulosa, Pl. XXVIII. XXIX.)

On the 25th of November, 1852, a fine female Zebra, whilst at play within its paddock, accidentally broke its neck. The animal had always appeared to be quite healthy, and it was in perfectly good condition—but, upon examination, its liver was found to be one mass