

A field guide to the

# Mammals of Ecuador



Diego Tirira



**A FIELD GUIDE TO THE  
MAMMALS OF ECUADOR**

**INCLUDING  
THE GALAPAGOS ISLANDS  
AND THE ECUADORIAN ANTARCTIC ZONE**



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**Diego G. Tirira**

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Silky Anteater (*Cyclopes didactylus*). Photo by Diego G. Tirira

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## FOREWORD TO THE FIRST SPANISH EDITION

Mammals are important. Perhaps historically they were important because we are mammals, but in this day and age of global warming, biodiversity loss, human overpopulation and the resulting widespread conservation concerns, mammals are a critical group in many ways. They continue to provide food and clothing for indigenous peoples worldwide, they pollinate and disperse plants, they provide valuable biological control of pests, and they play a critical role in the functioning of every ecosystem on earth. In spite of this, we still know little about the mammals of most regions of this planet.

As with most groups of organisms, mammals increase in diversity as one moves from polar regions to the tropics. This means that maximum diversity is concentrated in a relatively narrow band extending around the earth, and thus centered on the equator. To further maximize that diversity, one need only select spots on the equator that add a significant layer of complexity to the great numbers of species already found there. One such region is that majestic backbone of the Pacific coast of South America, the Andes Mountains, which bisect the equator in the eponymously named country of Ecuador.

Ecuador, situated at this important biogeographic intersection, has fascinated students of mammals for hundreds of years. Early collections of mammals from the region were sent off to European museums for identification and description. Later collections went to museums in North America for further studies and additional descriptions of new species. In recent decades, a small but growing and dedicated homegrown cadre of professional mammalogists has continued the study of Ecuadorian mammals. Professor Diego Tirira, having initiated and produced a series of publications on the mammal fauna of Ecuador, is at the forefront of this movement. The present volume is the latest of that series, and a most welcome addition to our knowledge of mammals of this important region.

The scientific study of mammals, or any other group, results in a widespread body of literature that is difficult for the general public to access. Professional mammalogists use that literature to plan additional studies and continue to incorporate the results of those studies into a better understanding of the fauna as a whole. At some point, the knowledge base becomes large enough to warrant assembling into a format that makes it much more accessible to the public. This, in turn, allows a wider audience to learn about mammals, stimulates students to continue their studies, and causes a growth spurt in our overall familiarity with the fauna.

The mammal fauna of Ecuador has now reached that critical point, and this *Field Guide* will provide a means for many more interested folks to become acquainted with Andean mammals. The casual observer of a monkey, a dolphin, or a small rodent now has a place to turn to in order to try to identify the creature. The field guide provides color

photographs of many species, full-color illustrations of others, and carefully constructed keys for the identification of all species found in Ecuador. Even if all you have is the track of an unknown animal, this guide can help. There are schematic drawings of the tracks of the most common species in each group.

Although field guides are inherently designed to be used when going directly to the group of interest, a little time spent perusing the introductory sections of this guide will well repay the reader. A general overview of mammals helps to set the stage for the detailed species accounts that form the meat of the volume. An interesting look at diversity, both of habitats and of their mammal fauna, reinforces the importance of mammals to all of the biogeographic regions of the country.

The reader with a specimen will want to begin the process of identification by consulting the individual species accounts. Each account begins with both common and scientific names of each species, followed by a series of measurements for key characteristics. A paragraph summarizing important features for identification follows. A brief summary of natural history information helps to whet the reader's appetite for such information, and some idea of the call, if any, is also given. A distribution map is accompanied by a description of the distribution and the habitats occupied by the species in question. The conservation status of each species occupies a portion of each account as well. Finally, local and regional names are given, as appropriate.

Field guides such as this one are the building blocks of what will eventually become a comprehensive fauna of the entire continent of South America. More and more students are undertaking studies of mammals in each of the South American countries. Ecuador is clearly a keystone country for this overall effort. This means that the effects of this book in the long run will reach beyond the borders of the country. The mammal fauna of Ecuador is an important component of the natural resources of the country. That patrimony is well served by Diego Tirira and the *Field Guide to the Mammals of Ecuador*.

Don E. Wilson  
United States National Museum  
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## INTRODUCTION

Mammals are one of the groups of animals with the widest distribution on the planet. They show a remarkable diversity of species that exhibit an unusual heterogeneity for a vertebrate class, not only in anatomy but also in biology, ecology and behavior; this diversification is evident at all taxonomic levels, be it order, family, genus or species. For these reasons, it is difficult to summarize the characteristics of the mammalian class in a few words.

The principal characteristics that unite the mammals and distinguish them from other animals are, among others, the shape of the skull, the development and specialization of teeth, the presence of hair at some stage of their lives, and the presence of mammary glands in females, which nurse the young, feeding them maternal milk. There is practically no place on the planet mammals have not been able to reach, and because they are homeothermic and insulated with fur or subcutaneous fat, they can occupy any type of habitat that holds enough oxygen to breathe; nevertheless, the majority of species are found in tropical regions.

Mammals vary greatly in size, from tiny shrews weighing only about two grams to the huge Blue Whale, which can weigh over 100 tons and reach a length of over 30 meters. Mammals have diversified into forms adapted to running, jumping, digging, swimming, climbing, diving and flying. The majority have four limbs adapted to terrestrial locomotion, but some have them modified for swimming, arboreal existence, or even flying. They also exhibit great variation in their eating habits: primitive forms feed on insects, more specialized groups eat fruit, other vertebrates, plants and pollen, while others drink nectar, sap from trees, and even blood.

Fossil evidence suggests that mammals were derived from a primitive group of reptiles, the synapsids. In these animals one already finds some of the characteristics of mammals, such as dental differentiation, especially the appearance of a developed canine. After their derivation from the synapsids, the mammals split into two branches at an early stage: the monotremes and the eutherians, the latter again split into the marsupials and the placental mammals. For this reason, the mammals are defined as “the last common ancestor of the extant monotremes and eutherians (Marsupialia and Placentalia) and all its descendants” (Rowe 1988; Hopson 1991).

According to the most recent inventory, there are presently 5426 species of mammals on the planet, all of which are allocated to the three major divisions mentioned above. The monotremes (Monotremata or Prototheria) constitute a group of primitive mammals and are found only in Australia and some adjacent islands. The present-day marsupials (Marsupialia or Metatheria) inhabit Australia, South America and part of North America; they are divided into 7 orders, 19 families and 349 species (Wilson and Mittermeier 2015). The eutherians (Placentalia or Eutheria) form the most diverse group of mammals, both in number of species and in geographic distribution; they are divided into 21 orders, 130 families and 5090 species that are located worldwide (Wilson and Reeder 2005).

The marsupials are characterized by an early stage of development in which their young are born, and in some cases carried in a pouch or marsupium located on the mother's abdomen. Although they are presently confined to the Americas and Australia and adjacent islands, there is fossil evidence that they once occupied most of the planet.

In the past, marsupials were considered to be a group that formed the transition to placental mammals; nevertheless, they have now been shown to be an independent group that was derived from another evolutionary branch that appeared about 140 million years ago, possibly in North America. The major adaptive radiation occurred in Australia and South America due to the isolation of these continents for many millions of years. This isolation allowed a remarkable parallel evolution with the placental mammals in other parts of the planet.

It is believed that the most primitive trait of the marsupials is the marsupium, which consists of a pouch or skin fold in the abdominal region serving to partially or entirely cover the mammary glands and shield the young during the period of lactation. Nevertheless, despite it being a peculiar and unique trait within the mammals, not all marsupials possess it, or it may be developed only during the breeding season; it is therefore only considered a secondary characteristic in classification. Thus, the principal differences between marsupials and placental mammals are in their reproductive systems, both anatomically and functionally.

The placental mammals themselves originated from small insectivores similar to modern-day shrews (*Soricidae*), were probably nocturnal, and lived about 140 million years ago, an epoch coinciding with the appearance of the marsupials; however, the placental mammals did not begin the adaptive radiation that now characterizes them until about 40 million years later.

### DIVERSITY

The biodiversity of Ecuador is one of the richest on the planet. Its diversity is favored by three determining factors: its location in the equatorial zone, the upheaval of the Andes, and the influence of the marine currents along its coast. To this should be added the presence of the Galapagos Islands, Ecuador's 200 nautical miles of coastline that encompass both its continental and archipelago territories, and the Antarctic space.

The presence of the Andes may be the most important factor in the extreme richness of Neotropical species. On the one hand, they permitted the formation of a great variety of ecosystems due to their wide altitudinal range (up to 6263 m); on the other hand, their existence presents an important geographic barrier causing isolation of populations, both between the tropics and subtropics of the east and west, and in the temperate and high-Andean zones, which has facilitated the formation of new species.

The equatorial location of the country is another important factor that permits the maintenance of a year-round tropical climate. Marine currents heavily influence climatic, vegetation and distribution along the coast resulting in humid forests in the extreme north due to the warm current of El Niño, while in the extreme south, there are dry forests as a consequence of the low precipitation caused by the cold Humboldt Current.

Ecuador, with its 253,370 km<sup>2</sup>, can be divided into four natural regions (Coast, Andes, Amazon and Galapagos; Plates 1 to 4), eight zoogeographical zones, 29 bioclimatic regions and 25 life zones, 46 different vegetation formations, two marine zones and two bioregions off the continental coasts, and three marine zones and five bioregions around the Galapagos Islands.

In this singular scenario Ecuador unfolds—a small country in surface area, but one with an enormous variety of climates and life zones, making it one of the countries with the most ecosystems and natural environments in the world, which is reflected in the number of species found there. In the specific case of mammals, Ecuador ranks ninth in the world



Plate 1. The Andes, the Chimborazo Volcano, the highest mountain in Ecuador (top), and páramo in El Angel Ecological Reserve, Carchi Province (center). Anden forest, in Otonga, Cotopaxi Province [DGT all].

records, and prints of museum specimens, and then compared and corroborated by the drawings presented by Aranda (1981) and Emmons and Feer (1997).

**Scat.** Fecal remains are probably the traces that provide the most information, as they not only indicate the presence of a species but also, with the help of supplementary information, provide information about the diet of the animal, its food preferences, its home range and its roosting sites, among other ecological aspects. Scat differs between mammal species. The animal's size, diet, conduct and locomotion, and the time of year, are among the important factors that influence the shape, size and consistency of the sample. In scat of carnivores, it is possible to find bones, hairs, feathers or scales from the animals consumed; in insectivores, one may find fragments of the exoskeletons of the insects that form part of their diets; in the mammals that feed on fruit, one finds numerous seeds, which may be identified with the help of a specialist or appropriate keys, or even through germination experiments.

In regard to these kinds of traces, it is worth mentioning the pellets of owls (regurgitated indigestible matter), the study of which has led to finds of small mammals little known to science, as in the case of some mice endemic to the Galapagos.

**Other kinds of traces.** Some traces found less often are just as important as the previously mentioned and may even provide additional information. Such traces include burrows, refuges, roosts, trails, marks on the vegetation, signs of feeding or the remains of food, and smells.

The burrows, refuges and roosts may be simple cavities in the ground or complex subterranean galleries. The small mammals exhibit the greatest variation in refuges, especially the bats, which may be found in hollow trunks, caves, crevices, cavities in rock walls, or among foliage.

Sometimes one finds trees marked by the claws of some carnivore. The most easily distinguishable are the marks made by bears, but one also finds markings made by some felines. Certain rodents, in particular squirrels, have the habit of scratching the bark near their nests; deer and peccaries often rub their bodies against the bark of trees, sometimes leaving traces of hair on tree trunks.

Leftovers of food or other organic remains may reveal the places where certain species feed or what kind of food they consumed. In some cases it is important to know the dentition (the number of incisors and the shape of the bite), especially in frugivorous mammals, as it may help in determining the species or group responsible for the trace.

Many mammals have highly distinctive smells – some of them so strong and penetrating that their identification is made simple. The importance and functions of some of these smells are poorly known, but it is known that some of them serve to mark territories, to attract potential mates or to repel predators. Among the mammals with a characteristic smell are some families or groups of bats, especially the fishing bats (Noctilionidae); various canids, especially the genus *Pseudalopex*; the skunk (*Conepatus semistriatus*); and the peccaries (Tayassuidae), in addition to some felines, mustelids, marsupials, and others.

## HOW TO USE THIS BOOK

The book gives information for each and every one of the wild mammals known from Ecuador. The information given for each species has been arranged by different topics and parameters, as explained below. Some categories have been omitted for certain species, either because the information does not exist or to avoid repetition of the same text for an entire group of species (as, for example, in the case of local names for small mammals).

For some genera of small mammals (shrew-opossums, field mice, shrews and bats) with more than one species occurring in the country, this information has been given in the genus accounts. This has been done to avoid redundancy, or because most species in the genus are poorly known and/or because of the complex taxonomy that exists within the group.

The present treatment includes the native fauna and species that have been formally described. Some mammals new to science, known but as yet undescribed, were not given full entries in this book, but they are mentioned where considered appropriate, under the text of similar species. Introduced mammals have generally been omitted, with the exception of the Brown and House Rats and the House Mouse (family Muridae), and the Vicuña (family Camelidae) because of the high probability of confusing them with similar species of the native fauna.

The nomenclature followed is, with a few exceptions, the one given by Gardner (2008), Wilson and Mittermeier (2009, 2011, 2014, 2015), Wilson *et al.* (2013), and Patton *et al.* (2015). The classification followed is the one given by Wilson (2009). All native species have been numbered according to the sequence in which they appear in the text.

The format followed in the species accounts is the following:

**Measurements.** The measurements given have, as far as possible, been taken from adult individuals of specimens in Ecuador; nevertheless, there were numerous occasions when, due to lack of material, it was necessary to include data from neighboring countries published in scientific journals, from type descriptions, from treatments of the entire ranges of the species, or data extracted by museums or colleagues from other countries. Measurements of many rare species are based on a few specimens only (occasionally on a single specimen), resulting in only a single measurement being given or the measurement has been excluded because of lack of data altogether.

Some of the measurements mentioned below have not been included for all the groups of mammals either because it is not anatomically possible to take the measurement or because it is not important for the group. All measurements are given in millimeters unless otherwise stated. The measurements taken are the following:

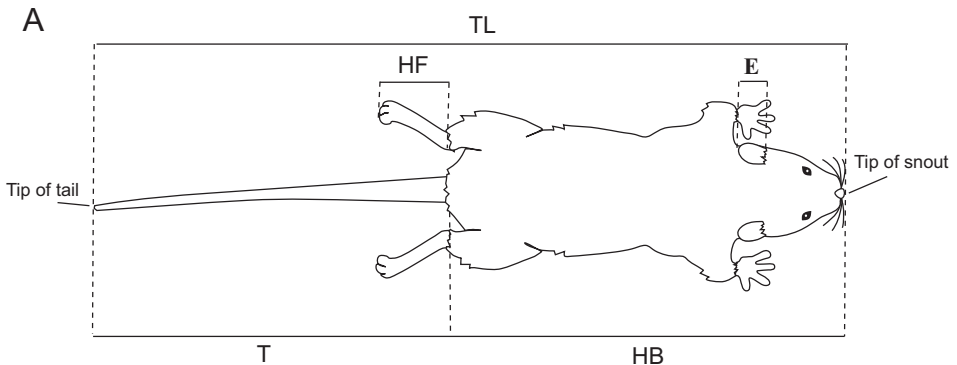
**TL** Total length from the tip of the nose to the tip of the tail (Figure 1A and C). For whales and manatees, the measurement is given in meters (m).

- HB** Combined length of head and body from the tip of the nose to the base of the tail (Figure 1A and B).
- T** Tail length, discounting protruding hair (Figure 1A and B).
- HF** Hind foot length from heel to tip of longest claw (Figure 1A and B).
- E** Ear length from base to tip in frontal view (Figure 1A and B).
- FA** Forearm length (bats only) from elbow to base of thumb (Figure 1B).
- SH** Shoulder height (large terrestrial mammals only) from tip of foreleg toes to highest point on the respective shoulder.
- Weight** Total body mass of adults (excluding gravid females and females with young). Given in grams (g) for most species, in kilograms (kg) for larger mammals, and tons (ton) for large whales.

**Identification.** The characteristics needed for correct identification of each species are given. In many cases, traits that all members of the group share are omitted, as they do not aid in identification. In order to make a correct identification, in most cases it is necessary to observe the animal at close range and in good light, as many of the important details are not distinguishable from a distance. For numerous medium-sized and larger mammals, the information given about their external appearance is sufficient to ensure a correct identification. This is not the case for smaller mammals, for which it is often necessary to observe them in hand, and, in many instances, to examine the shape and number of their teeth (see Dental formula below).

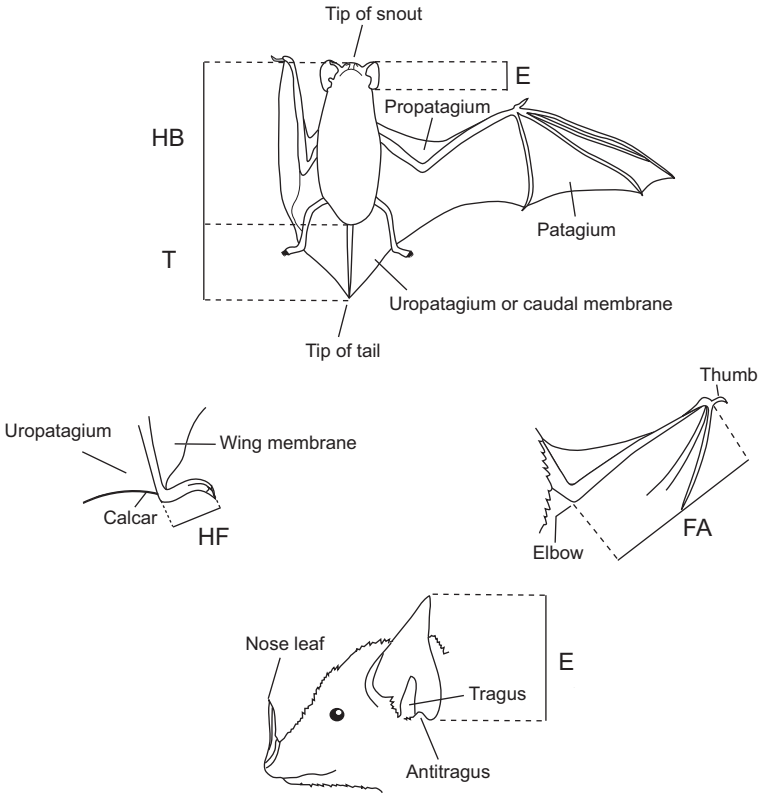
The genus or the size of a species (large, medium or small) is also given, relative to the majority of species in its respective family. The information included is, as far as possible, designed for use with live animals.

The general text for each species is mainly composed of descriptions selected from various bibliographic references. Among the principal references used are Emmons and Feer (1999), Gardner (2008), Tirira (2008), Wilson and Mittermeier (2009, 2011, 2014, 2015), Wilson *et al.* (2013), and Patton *et al.* (2015). Additional references used are given under the

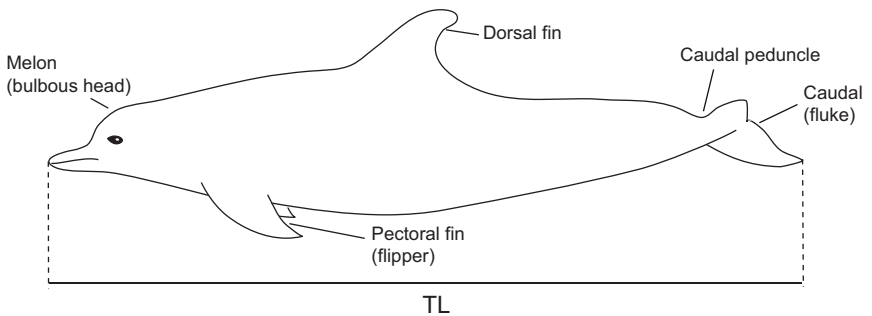


**Figure 1.** Schematic drawing and measurements taken in mammals: **A.** In a mouse. **TL** Total length. **HB** Combined length of head and body. **T** Length of tail. **HF** Hind foot length. **E** Length of the ear.

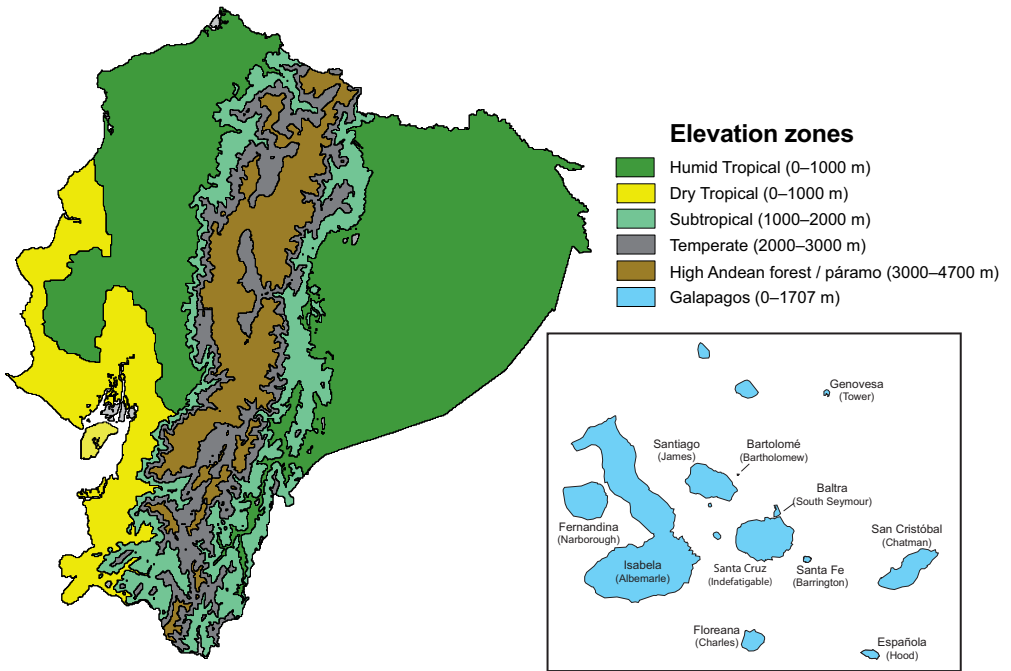
**B**



**C**



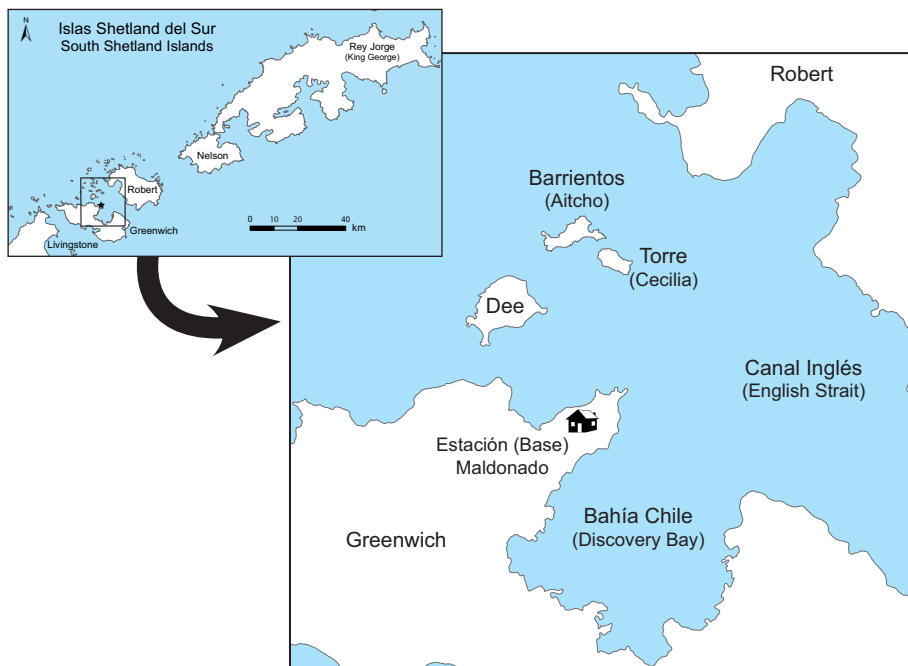
**Figure 1.** Schematic drawing and measurements taken in mammals: **B.** In a bat. **C.** In a cetacean. **TL** Total length. **HB** Combined length of head and body. **T** Length of the tail. **HF** Hind foot length. **E** Ear length. **FA** Length of forearm.



**Map 1.** Zoogeographic map of Ecuador (modified from Albuja *et al.* 1980 and Tirira 1999).

- **Primary forest.** Well-preserved (mature or pristine) natural forest far from the presence and effects of humans.
- **Secondary forest.** Regenerating natural forest that has been subject to natural impacts (tree falls, landslides, and others).
- **Disturbed forest.** Natural forest, regenerating or not, that has been affected by human activities, whether selective or extensive.
- **Gallery forest.** Forest or forest fragments along rivers and creeks on both sides of the stream. They are important for the preservation of hydrological resources and the stability of water courses, and serve as dispersal corridors and refuge for fauna. May connect with other types of forest.
- **Forest edge.** Transition between a natural forest and other types of vegetation, for example, open spaces such as forest clearings, pastures, and cultivations.
- **Plantations.** An artificial environment and product of the planting of native or introduced species of trees.
- **Páramo.** A natural ecosystem in the high parts of the Andes (above 3200 m in altitude). There are several different types of páramo (humid or dry), with grass, shrubs, trees, open sandy areas, among others.
- **Cultivations, pastures and gardens.** Places entirely altered by humans.
- **Beaches.** A natural ecosystem at sea level. It can be sand, rock or stone. Present at Ecuadorian Pacific Coast, Galapagos and Antarctic Ecuadorian Zone.





**Map 2.** Environ of the Ecuadorian Scientific Station, Ecuadorian Antarctic Zone.

Strata referred to are:

- **Upper or canopy stratum.** From 15 m above the ground to top of canopy.
- **Mid or sub-canopy stratum.** Between 5 and 15 m above the ground.
- **Lower stratum.** From 2 to 5 m above the ground.
- **Understory.** Within 2 m of the ground.
- Others specific strata (occupied spaces) are terrestrial, aquatic, marine, and aerial (bats).

Note: The habitats, types of forest and altitudinal ranges given are based entirely on information from Ecuador; in other parts of its range, a species may occur in different habitats and at other elevations.

**Extralimital range.** Gives a brief account of the other countries or regions in which the species occurs. Information is taken mainly from Wilson and Reeder (2005), Gardner (2008), Wilson and Mittermeier (2009, 2011, 2014, 2015), Wilson *et al.* (2013), and Patton *et al.* (2015).

**Subspecies.** Indicates the subspecies that corresponds to the Ecuadorian fauna only. This follows the basic criteria of Wilson and Reeder (2005), Gardner (2008), Wilson and Mittermeier (2009, 2011, 2014, 2015), Wilson *et al.* (2013), and Patton *et al.* (2015); additional information from Cabrera (1958, 1961), and the series *Mammalian Species* has also been used.



Map 4. Indigenous tribes of Ecuador.

The maps present the historical and extrapolated range of each species based on topographical curves (each 50 m), type of vegetation and potential barriers such as rivers and mountains. The reader is encouraged to consult the sections **Distribution and habitat** and **Present status** for a better understanding of the true distribution of the species in question.

The distribution of each species is presented in a polygon format. Maps for mammals so poorly known that the number of records is inadequate for extrapolation show only the particular sites where the animal has been recorded.

As far as possible, I have attempted to present a separate map for each species; nevertheless, to save space, some maps show the ranges of two species of a genus and indicate the area occupied by each.

In order to facilitate the reader's orientation, the location of Quito has been indicated with a black polygon. In maps showing both continental Ecuador and the Galapagos, the distance between one and the other is not necessarily to scale. In some maps for marine mammals, crosses indicate records of stranded or vagrant individuals.

Distribution maps for native species that have been domesticated (Domestic Guinea Pigs, Llamas and Alpacas) show only the area presumed to represent its original range even if the species is now found over a much larger part of the country.

# OPOSSUMS

## Order Didelphimorphia

The order Didelphimorphia is the taxon that includes marsupials presently confined to the Americas. These mammals are characterized by the early stage of development in which the young are born. The order is composed of a single family (Didelphidae), which, after the monotremes, is considered the oldest group of living mammals on the planet; many of their characteristics, therefore, are primitive or poorly developed in comparison to the majority of mammals. The most distinctive anatomic trait of this group is the presence of two entirely independent uteri in the female, which open into a double vagina that terminates in the urogenital cavity. The male possesses a bifid penis situated behind the scrotum and lacks a penis bone (baculum) present in some groups of placental mammals.

The main references used for the present chapter, and which are recommended for further information on the order Didelphimorphia, are: Astúa (2015), Brown (2004), Emons and Feer (1999), Gardner (2008b), Pérez-Hernández *et al.* (1994), and Tirira (2004a, 2011a). Other references that add to the knowledge of Ecuadorian opossums are given under the respective species.

### AMERICAN OPOSSUMS

#### Family Didelphidae

Medium-sized to small mammals. Head relatively large; snout long and pointed; ears naked, relatively broad, rounded, and thin; nose pad also bare; eyes large and widely spaced. Characterized by a large number of teeth; dental formula for the family is: I 5/4, C 1/1, P 3/3, M 4/4, total 50 teeth; incisors short and cylindrical; canines well-developed in the majority of species, resembling those of carnivores. An important trait in the dentition of didelphids is the fact that they only replace the third upper and lower premolars, which in younger individuals resemble molars, but lack a root (standard for milk teeth); the tooth is replaced by a typical premolar; this is an important character in the aging of individuals.

Fur short, dense and woolly in the majority of species, long and coarse in some. Limbs short; hind legs somewhat longer than forelegs; feet have five toes with strong claws except on the hind legs, where the first toe lacks a claw and is opposable, allowing the animal to hold items and climb well; palms of hands and feet with several pads that vary in number and position between species. Tail usually long and strongly prehensile, often naked and covered with scales on nearly all its length. Marsupial pouch absent in the majority of species; when present, may be well-developed or may be reduced to a pair of lateral folds. The number of nipples varies from 7 to 25 between species or even within a species; they may be confined to the abdomen or may extend onto the breast.

The majority of species are arboreal, but some are terrestrial, and one semi-aquatic. Most opossums are omnivorous with a diet mainly composed of insects and other invertebrates such as earthworms, snails and fresh-water crustaceans; they also eat small vertebrates such as lizards, amphibians, and birds and their eggs; the diet includes some fruit and other vegetable matter such as nectar. Most species are nocturnal, but some are also diurnal. Opossums typically construct nests where they spend most of their roosting time, and situate them in holes in trees or the ground, within dense vegetation or occasionally in abandoned burrows of other mammals; they line their nest with twigs and leaves. The gestation period averages 12 to 15 days, after which time the young remain in the marsupium for another 60 to 70 days.

The didelphids include the majority of American marsupials, and they are wide-ranging in South America; only a single species reaches North America, occurring as far north as southern Canada. In Ecuador they are widely distributed. They are found in all regions and climates with the exception of the Galapagos and the highest parts of the Andes, but are commonest in tropical and subtropical forest. Nine genera and 21 species occur in Ecuador.

**Woolly Opossums**  
**Genus *Caluromys***

**Identification.** Medium-sized, body slender. Fur long, fine and woolly; back and flanks reddish brown to pale; underparts creamy yellow to yellowish white, somewhat grayish centrally; adult female with orange-brown groin and mammary region. Head pale gray with a dark central line from the nose to crown, between the ears; ears large and naked. Tail decidedly longer than head and body, densely furred at base; the fur covers 30 to 50% of the tail dorsally and up to 25% ventrally; the naked part of the tail pinkish, whitish or cinnamon brown, with small dark blotches. Female with marsupium; rudimentary in juvenile, in adult consisting of a skin fold on either side of the belly; expanded when contains young. The young grayer than adults. **Similar species:** No other marsupial within its range has up to half of its tail furred; Bushy-tailed Opossum (*Glironia venusta*) is a similar-sized marsupial; its tail is even more furred with some hair extending to the tip; it possesses two broad, blackish facial lines; might be mistaken for Four-eyed Opossums (*Metachirus nudicaudatus* and *Philander*), but they are terrestrial, have a round spot above each eye, and lack blotches on tail and the pale line above the shoulders; species of the genera *Marmosa* and *Marmosops* are much smaller, without dark central facial line, and are furred only to base of tail.

**Natural history.** Nocturnal, frequently active from dusk; arboreal and solitaires. Primar-

ily feed on fruit (mainly pulp), soft plant parts, some insects, other invertebrates, and occasionally small vertebrates; during the dry season, they take nectar from particular flowers; also believed to ingest sap from the bark of certain trees. Forage in the canopy, only very rarely descending to the ground. During day roosts in a tree cavity, lines nest with leaves and twigs. At night they are very quiet and move slowly.

**Local names.** Raposa, zorra, zorro, zorra lanosa, comadreja, raposa yarumbera, guarumbera, coquero; cusumbí, cucumbí (af); juicham, kankákan (ac); piakul, twis-twis (aw); chi'llu (ch); onbicu're (co); siantpitsu, sinik (ki); wea si'si (se, si); juicham, tankájka (sh); milum (ts); naimo, nunganeñe (wa); tsunaku (za).

**Species.** There are three species in the genus *Caluromys*, two in Ecuador:

**DERBY'S WOOLLY OPOSSUM**  
***Zarigüeya lanuda de Derby***  
***Caluromys derbianus* [1]**

Map 5, Plates 5 and I

**Measurements.** HB 225–300; T 384–445; HF 32–47; E 35–40; weight 245–370 g.

**Identification.** Back and flanks bright reddish brown; back with a narrow, pale gray longitudinal line between the shoulders; ears whitish to flesh. Forelegs and hands creamy white; hind legs brown.

**Distribution and habitat.** Western lowlands. Found in tropical and subtropical forest from sea level to 1800 m, but mostly below 1000 m.



Plate 5. American Opossums (Didelphidae): Derby's Woolly Opossum (*Caluromys derbianus*), above [DGT]. Brown-eared Woolly Opossum (*Caluromys lanatus*), below [PS].



Map 168. *Proechimys semispinosus*.



Map 169. *Proechimys simonsi*.

length), and weakly bicolored. Feet long and pale brown to dark brown above.

**Distribution.** Amazonian lowlands. Inhabits humid tropical forest, between 200 and 500 m. Extralimital range: Venezuela, Colombia, Peru, Bolivia and Brazil.

**Subspecies.** *P. quadruplicatus* is monotypic.

**Present status.** Uncommon. Its conservation status is stable. Protected areas: Yasuní NP, Limoncocha BR and Cuyabeno WR.

#### TOMES' SPINY RAT

##### *Rata espinosa de Tomes*

##### *Proechimys semispinosus* [176]

Map 168, Plate 80

**Measurements.** HB 221–290; T 175–192; HF 45–60; E 18–30; weight 320–536 g.

**Identification.** Pelage stiff, aristiform spines moderate in width. Dorsal fur uniform dark reddish brown; below white; rostrum long and narrow. Tail about 63–70% of head and body length, frequently broken (often experiences autonomy between fifth and sixth tail vertebrae), and bicolored. Feet blackish brown above.

**Distribution.** Western lowlands and adjacent Andean slopes. Inhabits humid and dry forest, both tropical and subtropical, from sea level to 1700 m. Extralimital range: Honduras to Colombia.

**Subspecies.** *P. s. rosa* (southwestern), *P. s. semispinosus* (northwestern).

**Present status.** Common and widespread; in some places may be the commonest terrestrial mammal. Its conservation status is stable. Apparently more common in disturbed areas than in pristine. Protected areas: Cotacachi-Cayapas ER, Mache-Chindul ER, La Chiquita WR.

#### SIMONS' SPINY RAT

##### *Rata espinosa de Simons*

##### *Proechimys simonsi* [177]

Map 169, Plate 80

**Measurements.** HB 150–275; T 118–231; HF 45–57; E 21–28; weight 120–380 g.

**Identification.** Pelage soft to touch, aristiform spines narrow. Dorsal fur dark to light reddish brown; below pure white to yellowish white; rostrum long and narrow. Tail proportionately very long (up to 85% of head and body length), and sharply bicolored. Feet medium-sized to long, whitish to pale brown above.

**Distribution.** Amazonian lowlands and eastern slopes of the Andes. Inhabits humid tropical and subtropical forest, between 200 and 1100 m. Extralimital range: Colombia, Peru, Bolivia and Brazil.

**Subspecies.** *P. simonsi* is monotypic.

**Present status.** Common to fairly common, and widespread. Its conservation status is stable. Protected areas: Yasuní NP, Limoncocha BR, and Cuyabeno WR.

## RABBITS AND HARES

### Order Lagomorpha

Lagomorpha was formerly included with rodents, but due to differences in dental and skeletal characteristics, they are now treated as a separate order. One of the most important distinguishing features is the presence of two pairs of upper incisors. The first pair resembles the incisors of rodents (which have only a single pair) in that they grow continuously, but they are enameled on both surfaces (on the front surface only as grooves), whereas rodents only have enamel on the front surface. The second pair is small, without sharp cutting edges, and located behind the first pair. The other teeth are reduced in numbers and modified to an herbivore diet. Another characteristic of the order is that the skull is more restricted in jaw mobility, allowing only lateral, not longitudinal, chewing movements. The lagomorphs have large conspicuous eyes and well-developed ears; they are excellent runners, and most roost in dens; all species are terrestrial. The order is diverse in other parts of the planet but poorly represented in South America, with only three species in a single genus in the family Leporidae. The general references used for this chapter, and which are recommended for further information on the order Lagomorpha, are: Emmons and Feer (1999), and Tirira (1999, 2004a).

### RABBITS

#### Family Leporidae

Medium-sized mammals; females often larger than males. Fur usually thick, soft and dense. In some species, the color of the fur varies in shades of brown, gray and white. The face has a sensory pad around the nasal openings, which are normally hidden by folds of skin, and a naked, Y-shaped cleft extends from the upper lip to around the nose. The ears are much longer than wide and are relatively smaller than in hares. The dental formula for the family is: I 2/1, C 0/0, P 3/2, M 3/3, total 28 teeth. The first upper incisors are straight with sharp cutting edges and grooved on the front surface; they are separated from the buccal cavity by the lips, which are folded and covered with fine small hairs. The elbow joint disallows rotation, precluding use of the forelimbs as hands in the manner of rodents; additionally, the tibia and fibula are fused, the latter articulating with the heel. In general, the hind limbs are longer than the forelimbs and adapted for running and jumping. The feet have five clawed toes, the first of which is very small; the soles are padded. The tail is short and furred; the anal region is naked. The testicles are inguinal (normally found inside the groin), but descend to the scrotum during the mating season; the scrotum is located in front of the penis (prepenial scrotum), as opposed to all other placental mammals.

The family is distributed worldwide. It is only missing from the Australian region (where it has been introduced), most oceanic islands, Antarctica and the most isolated and inhospitable regions of the planet. Only a single genus (*Sylvilagus*) and one species are native to Ecuador. Introduced hares and domestic rabbits are not described in this book.



Map 174. *Balantiopteryx infusca*.



Map 175. *Centronycteris centralis*.

### Shaggy Bats

#### Genus *Centronycteris*

**Species.** There are two species in the genus *Centronycteris*, one in Ecuador: *C. centralis*.

#### CENTRAL AMERICAN SHAGGY BAT

##### Murciélago peludo de Centroamérica

##### *Centronycteris centralis* [184]

Map 175, Plate 83

**Measurements.** HB 41–50; T 18–24; HF 6–9; E 13–17; FA 41–49; weight 4–9 g. Female slightly larger than male.

**Identification.** Fur long, dense and woolly; upperparts brown with slight orange tint; underparts paler, somewhat yellowish. Head furred to nose and chin; face naked and pink; snout and upper lip elongate and beyond lower lip; lower lip with a vertical central groove; ears long and pointed with prominent parallel double folds on inside of rear edge. Wing membranes blackish; no wing sac on the propatagium; caudal membrane joined to base of toes and passing tips of toes when extended; the brown fur of back extends over the base of the caudal membrane; calcar long. **Similar species:** Proboscis Bat (*Rhynchonycteris naso*) has notably elongate snout and mottled fur with two undulating lines on the back; sac-winged bats (*Saccopteryx* spp.) also have two undulating lines on the back and are dark brown.

**Natural history.** Feeds on small insects caught in the air during a slow flight with rapid beating of the wings, resembling the flight of a butterfly; may fly repeatedly over the same area. Shelters in hollow trees, where it forms small colonies; often becomes active late in the day, several minutes before dusk; usually found near bodies of water.

**Distribution and habitat.** Northwestern lowlands, Amazonia and slopes of the Andes. Inhabits humid tropical and subtropical forest from sea level to 1720 m, but usually caught below 1100 m. Found in primary and secondary forest. **Extralimital range:** Mexico to and Peru.

**Subspecies.** *C. centralis* is monotypic.

**Present status.** Uncommon to rare, but wide-ranging. Its conservation status is unknown. **Protected areas:** Cotacachi-Cayapas ER and La Chiquita WR.

**Remarks.** The Ecuadorian populations of this bat were formerly referred to as *C. maximiliani*, a species now believed to be confined to Brazil (central Amazonia and Atlantic coast), the Guianas and Peru.

**Additional references.** Hice and Solari (2002), Simmons and Handley (1998), Timm *et al.* (1989).

#### Chestnut Sac-winged Bat

#### Genus *Cormura*

**Species.** This is a monotypic genus. The single species is *C. brevirostris*.





Plate 88. Vampire Bats (Desmodontinae): *Desmodus rotundus*, top [DGT both]; *Diaemus youngii*, below [MiS]; *Diphylla ecaudata*, center, right [FAR].

mals and birds, but fish and reptiles also form part of their diet. They are primarily nocturnal, but may also be active diurnally on occasion. They are excellent climbers, and several species are good swimmers. Most are solitary and territorial. The family is distributed throughout the world, except the Australian area, and some oceanic islands. Four genera and seven species are native to Ecuador. An important reference used in this section is Sunquist and Sunquist (2009).



Map 000. *Herpailurus yagouaroundi*.

**Jaguarundi**  
**Genus *Herpailurus***

**Species.** This is a monotypic genus. The single species is *H. yagouaroundi*.

**JAGUARUNDI**  
**Yaguarundi**

***Herpailurus yagouaroundi* [310]**

Map 302, Plates 48, 50 and III

**Measurements.** HB 505–645; T 320–609; HF 120–156; E 25–40; SH 350; weight 4.5–9 kg.

**Identification.** Small, body slender and elongate. Fur short, uniform and without spots, brown, grayish brown, reddish brown, buff-yellow or black; belly like back or slightly paler. Head small and blunt, with small rounded ears; muzzle short and neck long. Tail unicolored, long and thin (just over 60% of length of head and body length). Legs short and paws small. The young are similar to adults; a few individuals with small dark spots have been recorded. **Variation:** The most variable wild species of cat; different colorations occur even within the same population; individuals from

humid forest tend to be darker and sometimes have grayer heads. **Similar species:** Tayra (*Eira barbara*) is larger, with head decidedly paler than the rest of its body, inconspicuous ears and a distinct patch on the throat; Bush Dog (*Speothos venaticus*) has a thick body, pointed snout and shorter tail; Puma (*Puma concolor*) is much larger and heavier, with a pale snout and a black-tipped tail; young of Puma have small dark spots all over the body.

**Natural history.** Nocturnal and diurnal, mainly active in the morning and evening; terrestrial but climbs well; found alone or in pairs. Feeds on small mammals such as rats, mice and rabbits; also eats some birds and reptiles. It is an able walker that may move up to 7 km in a day; its home range is extensive, averaging 13.5 km<sup>2</sup>. Sleeps in hollow trees, fallen trunks or in dense vegetation. The female has a litter of one to four young (normally one or two) after a gestation period of 70 to 75 days.

**Distribution and habitat.** Eastern and western lowlands and Andean slopes. Inhabits tropical and subtropical forest from sea level to 1800 m. Found in humid or dry forest, primary, secondary and disturbed; also encountered near human habitations. **Extralimital range:** Extreme south-western USA to Argentina.

**Subspecies.** *H. y. melantho* (eastern); *H. y. panamensis* (western).

**Present status.** Near Threatened, according to the Red Book of Ecuador; included in Appendix II of CITES. It is a widespread feline and well known by local people, since it can adapt to living near them; nevertheless, it is not a common species. It is occasionally killed, especially when it hunts domestic fowl. Its pelt is not sold commercially. **Protected areas:** All within its range.

**Local names.** Yaguarundi, gato de monte, gatillo, tigre-lobo, gato de agua; káyuk yawá (ac, sh); ishu-tilchakta (aw); kē'la (ch); si'an ttesi (co); tuwi puma (ki); nea pi'a yai (se); nea bi'a yai (si); elensh me'sé (ts); aago (wa).



Plate 000. Cats (Felidae): Oncilla (*Leopardus tigrinus*), above, left [DGT]; Margay (*Leopardus wiedii*), above, right [BG/WC], and below [DM].

## PYGMY AND DWARF SPERM WHALES

### Family Kogiidae

Similar to the family Physeteridae, but much smaller. It comprises medium-sized toothed whales with underslung lower jaws, blunt squarish heads, robust bodies tapering abruptly to tail flukes, and the forepart of the head contains a fibrous elastic mass full of oil (the spermaceti organ). The family Kogiidae is distributed worldwide in tropical and temperate waters. It has a single genus (*Kogia*). These species were formerly placed in the family Physeteridae.

#### **Pygmy and Dwarf Sperm Whales** **Genus *Kogia***

**Identification.** Small and robust. Upperparts blackish-brown to bluish gray, palest on sides; underparts white to pale pink. Head shark-like and proportionally smaller than in the Sperm Whale; face projecting forwards, the mouth located rather far back on the underside; there is a peculiar pale area or “false gill” on the side of the head, below the eye and in front of the flipper; lower jaw with or without several longitudinal skin folds on throat; spiracle situated above the eyes and a little to the left of the midline. Dorsal fin pronounced, falcate, short (but over 200 mm tall), rounded, and set on middle of back; the flippers are located behind the false gills and are short, broad and somewhat rounded. **Similar species:** None; although possibly mistaken for a dolphin because of its similar size, it is easily identified by its truncate snout, narrow lower jaw and pale false gills.

**Natural history.** Solitary or in small groups of up to 10 individuals; groups may be composed entirely of adult females and their young, or of younger animals, or they may be mixed with adult males and females. Feeds on fish, squid and octopus in deep water; also eats shrimp and pelagic crabs. Slow-moving and inconspicuous when swimming, but occasionally makes vertical jumps out of the water; when resting, does so near the surface with head and back above the water and fluke below; does not produce any visible spout during exhalation. Easily scared; when threatened or attacked, it expulses a reddish brown liquid from the anal region, forming a dense cloud around it, a mechanism similar in function to the ink of cephalopods.

**Habitat.** These species usually occur in deep water, and most often found at open sea; only rarely approaches to the coast.

**Species.** There are two species in the genus *Kogia*, both in Ecuador.

#### **PYGMY SPERM WHALE**

##### **Cachalote pigmeo**

##### ***Kogia breviceps* [310]**

Map 348, Plate 000

**Measurements.** TL 2.7–4.2 m; weight 342–680 kg.

**Identification.** Throat creases generally absent; dorsal fin short (< 5% of body length); distance from tip of snout to blowhole greater than 10.3% of total length; minimum total length 2.7 m.

**Distribution.** Occasionally recorded around the Galapagos Islands. **Extralimital range:** All tropical and temperate oceans and adjacent seas of the world.

**Subspecies.** *K. breviceps* is monotypic.

**Present status.** Not Evaluated, by the Red Book of Ecuador; Data Deficient, according to IUCN; included in Appendix II of CITES. Rare and poorly known. **Protected areas:** Galapagos MR.

**Local names.** Cachalote pigmeo, ballena de esperma pigmea.

**Additional references.** Jiménez-Uzcátegui and Snell (2014).

#### **DWARF SPERM WHALE**

##### **Cachalote enano**

##### ***Kogia sima* [310]**

Map 348, Plate 000

**Measurements.** TL 2–2.7 m; weight 136–280 kg.

**Identification.** Inconspicuous throat creases; dorsal fin tall (> 5% of body length); distance from tip of snout to blowhole less than 10.2% of total length; maximum total length 2.7 m.

**Distribution.** Occasionally recorded off the continental coast and around the Galapagos. **Extralimital range:** All tropical and temperate oceans and adjacent seas of the world.

**Subspecies.** *K. sima* is monotypic.



Plate 67. Ocean Dolphins (Delphinidae): Spinner Dolphin (*Stenella longirostris*), top [JMa] and center, left [CC]. Rough-toothed Dolphin (*Steno bredanensis*), center, right, and below [GP both].



Plate I. Mammal tracks: DIDELPHIMORPHIA (opossums), Didelphidae: **1.** Woolly Opossums (*Caluromys* spp.) (p. 00). **2.** Water Opossum (*Chironectes minimus*) (p. 00). **3.** Opossums (*Didelphis* spp.) (p. 00). **4.** Mouse Opossums (genera *Marmosa* and *Marmosops*) (p. 00). **5.** Four-eyed Opossums (*Metachirus nudicaudatus* and *Philander* spp.) (pp. 00 and 000). CINGULATA (armadillos), Dasypodidae: **6.** Long-nosed Armadillo (*Dasypos novemcinctus*) (p. 00). PILOSA (anteaters), Myrmecophagidae: **7.** Tamanduas (*Tamandua* spp.) (p. 000). Dotted lines indicate the parts of the track that are not always visible. Tracks of forefeet or forelegs are shown on the left.