

Hydrochoerus hydrochaeris.

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Hydrochoerus Brisson, 1762

Hydrochoerus Brisson, 1762:12. Type species *Sus hydrochaeris* Linnaeus, 1766:103.

Hydrochaeris Brünnich, 1772:44-45.

Capiguara Liais, 1872:545. Renaming of *Hydrochoerus*.

Xenohydrochoerus Rusconi, 1934:21-23. Type species *Xenohydrochoerus ballesterensis* Rusconi.

CONTEXT AND CONTENT. Order Rodentia, Suborder Caviomorpha, Superfamily Cavoidea, Family Hydrochoeridae, Subfamily Hydrochoerinae. The genus *Hydrochoerus* includes two living species, *Hydrochoerus hydrochaeris* and *Hydrochoerus isthmus*. Both species are monotypic.

At least four fossil species have been named, but according to our present knowledge, only *H. ballesterensis* Rusconi can be distinguished from the living species (Mones, 1984).

Hydrochoerus hydrochaeris (Linnaeus, 1766)

Capybara, Carpincho

Sus hydrochaeris Linnaeus, 1766:103. Type locality "Río São Francisco en la frontera entre los estados de Alagoas y Sergipe, Brasil" (Mones, 1975a:115) or Surinam (Husson, 1978:451).

Cavia capybara Pallas, 1766:31. Type locality unknown.

Hydrochaerus capybara Erxleben, 1777:193-194. Type locality "America australi."

Capiguara americana Liais, 1872:545. Renaming of *Hydrochaerus capybara*.

Hydrochoerus irroratus F. Ameghino, 1889:911. Type locality "Barrancas de los alrededores de la ciudad de Paraná, provincia de Entre Ríos, Argentina"; Pleistocene?

Hydrochoerus uruguayensis C. Ameghino and Rovereto, in Rovereto, 1914:143-144. Type locality "Castillos, Departamento de Rocha, Uruguay" (Ximenez et al., 1972:22).

Hydrochoerus cololoi Berro, in Francis and Mones, 1968:46, *nomen nudum*.

Mones (1984) provided additional synonymy.

CONTEXT AND CONTENT. No subspecies are recognized. *H. hydrochaeris* evinces a latitudinal cline with body size and mass increasing with increasing latitude. Subspecies could be described but they would be based on extreme populations and arbitrary limits.

DIAGNOSIS. The capybara (Fig. 1) is the largest living rodent. The body is large and heavy with a descendent croup; tail is vestigial; limbs are short; feet perissodactyle, with digits united by moderate webbing; forefeet possess four digits, hindfeet only three; nails hoof-like, strong, and thick. Head is broad; ears are short and rounded; snout large; nostrils small and widely separated. Hair coarse, dark brown to reddish, and light brown to light yellowish gray; hair length ranges from 30 to 120 mm. Skull is heavy (Fig. 2), flat, narrow if both zygomata excluded. Zygomata are strong; jugal is broad, and contributes to the external portion of the glenoid articulation for the mandible. Paroccipital process is extremely elongated. Palate is long, reaching the posterior part of the M3. Bullae are proportionally smaller than in Caviidae. Pterygoid fossae are deep, but not perforated. Infraorbital foramen without a canal for nerve transmission. Angular process of mandible is not everted as in typical Hystricognath rodents; masseteric crest strongly developed. Incisor with a medial anterior groove. First three upper cheekteeth composed of two Y-shaped prisms; M3 with 11 to 14 prisms, the first Y-shaped, the following constituted by single plates, except the posterior ones, which may differ in form. The

highest elasmodonty among Rodentia is shown by M3. Lower cheek-teeth composed of three prisms, in some instances subdivided into as many as six independent plates (m3). The prisms always are separated by thick cement lamina.

The two species are distinguished primarily on the basis of size; *H. hydrochaeris* is larger in nearly all external and cranial characters. *H. isthmus* has wider frontals in proportion to the total skull length; lower diastema proportionally longer; and pterygoids are shorter and thicker than *H. hydrochaeris*.

GENERAL CHARACTERS. Both species are large and massive but *H. hydrochaeris* is conspicuously larger. This species has an average mass for the Venezuelan Llanos population of 48.9 kg ($n = 104$, adult specimens; Ojasti, 1973) with a range of 35 to 65.5 kg. A Brazilian (São Paulo) female weighed 91 kg (Mones, 1973), and an Uruguayan male 73.5 kg. Means and ranges (in parentheses) of measurements (in mm) for the Llanos *H. hydrochaeris* population (Ojasti, 1973) were: total length, 1,212 (1,065 to 1,340, $n = 109$); length of hindfoot, 233 (218 to 252, $n = 110$); height at withers, 566 (500 to 620, $n = 92$); condylobasal length, 223 (208 to 243, $n = 65$). Skull length in Uruguayan specimens averaged 240.9 (213 to 270, $n = 78$).

DISTRIBUTION. *Hydrochoerus hydrochaeris* occurs in eastern Colombia, Venezuela, and the Guianas in northern South America; Amazonian Ecuador, Peru, and Bolivia; Brazil, Paraguay, Uruguay, and northeastern Argentina south to Quequén Chico River (38°17'S) in Buenos Aires Province (Fig. 3). This distribution includes the basins of Orinoco, Amazonas, São Francisco, and La Plata rivers. Water and temperature are main factors in their distribution. The altitudinal distribution reaches a maximum of 1,300 m (Ojasti, 1973).

FOSSIL RECORD. Three subfamilies are recognized within the family Hydrochoeridae: Cardiatheriinae (Upper Miocene–Upper Pliocene), Protohydrochoerinae (Pliocene), and Hydrochoerinae (Upper Pliocene–Recent); the first two are known only from fossil specimens. The Hydrochoerinae includes three genera: *Neochoerus*, *Hydrochoeropsis*, and *Hydrochoerus*, the latter being the only extant one. *Hydrochoerus* likely had its origin in a still unknown species of *Cardiatherium*. The geological range of *Hydrochoerus* is Upper Pliocene–Lower Pleistocene (Uquian) to Recent (Pascual et al., 1967) in South America. References to fossil *Hydrochoerus* in North America (Hibbard et al., 1965; Simpson, 1928) are misidentifications of *Neochoerus* (Mones, 1984).

Remains, all of Pleistocene age, attributed to *Hydrochoerus*



FIG. 1. Photograph of *Hydrochoerus hydrochaeris*. Photograph from a slide by C. H. Tyndale-Biscoe.

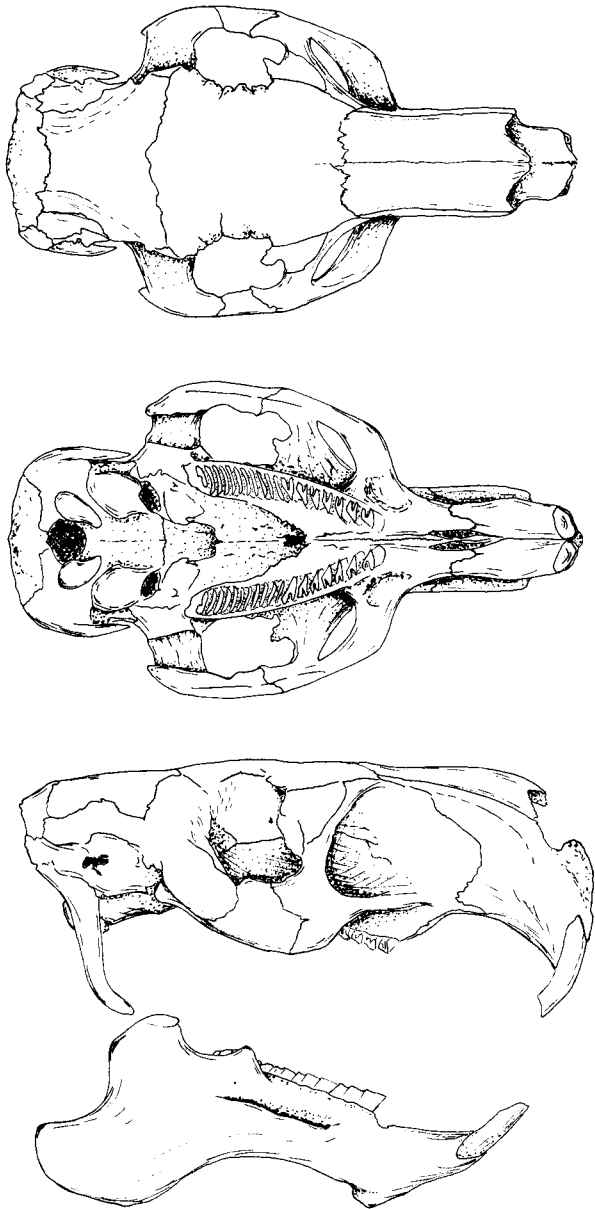


FIG. 2. Dorsal, ventral, and lateral views of the cranium and lateral view of the right mandible of a *Hydrochoerus hydrochaeris* from Uruguay. Greatest length of skull is 270 mm.

hydrochaeris are known from Curaçao (Buissonjé, 1974; Hooijer, 1959), Arapey River, Salto, Uruguay, and Villa Ballester, Buenos Aires (Rusconi, 1934), and Paraná, Entre Ríos (Ameghino, 1889), Argentina. Remains attributed to this species have been reported from Lagoa Santa, Minas Gerais, Brazil (Lund, 1843; Lydekker, 1885), but they might correspond to *Neochoerus sulcidens* (Lund). Other fossil remains, identified as *Hydrochoerus* sp., are known from Curitiba, Santander, Colombia, 1,500 m (Porta, 1969), and Quebrada de Ñaupua, SE Bolivia (Hoffstetter, 1968).

FORM AND FUNCTION. Except for the early description by Buffon (1764), comprehensive anatomical descriptions of capybara are lacking.

The epidermis is undulate with numerous pits and folds, and the dermis contains hair follicles, generally in groups of three. Each hair emerges at an acute angle and each follicle is associated with an arrector pili muscle and a sebaceous gland. Skin structure differs from other rodents in that it has sweat glands in the haired surface (Pereira et al., 1980). The bristle-like hair shows a monozonary configuration, without a real difference between guard hair and overhair; it lacks underhair (Dennler, 1939).

Sexes are distinguishable externally by the presence of a nasal

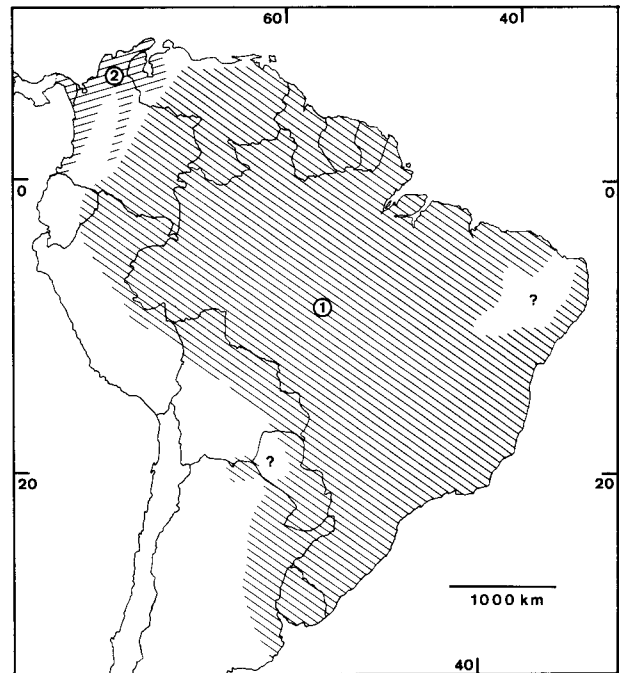


FIG. 3. Geographical distribution of capybaras: 1, *Hydrochoerus hydrochaeris*; 2, *H. isthmius*. Question marks indicate areas where presence of capybaras is unlikely. Modified from Mones and Kühl de Mones (1981).

gland in males (Azara, 1802), which is homologous with the pigmental gland of many rodents (Krölling, 1932). Females have six pairs of ventral mammae (Buffon, 1764; Ojasti, 1973).

The skull is broad and massive and shows a differential post-natal development that particularly involves the bones of the roof, premaxillae, tympanic bullae, and teeth (Massoia and Fornes, 1969; Mones, 1974, 1975b; Preller, 1907).

The vertebral column has sagittal flexibility in the cervical region and rotatory flexibility in the postthoracic-lumbar region (Virchow, 1910). The posterianal skeleton is not particularly adapted for swimming (Krumbiegel, 1940).

The dental formula, as in other Caviomorpha, is $i\ 1/1, c\ 0/0, p\ 1/1, m\ 3/3$, total 20. The M3 is extraordinarily elasmodont with a mesiodistal length similar to that of the three anterior molariform teeth combined. Incisors are antero medially grooved; cheekteeth are composed by cordiform or lamellar prisms separated by cement layers. Incisors in adult males are broader than in females of the same age (Ojasti, 1973).

The tongue has a narrow anterior part and a broad posterior part with a pair of circumvallate papillae. The intermolar eminence is immense, covered with innumerable papillae, and makes the posterior part of the tongue thick and wide (Mayer, 1844; Münch, 1896; Sonntag, 1924). The posterior portion of the soft palate is constricted and constitutes an extended funnel-shaped velum palati, attached to the whole circumference of the fauces and the root of the tongue. This structure is related directly to the abrasive function of teeth (Morgan, 1833). The palatine tonsil is unusual for a rodent, but similar to that of *Perissodactyla* (Hett, 1929). The lumen of the esophagus is covered by a longitudinally folded membrane (Buffon, 1764). The stomach is an oblong membranous bag (Toepfer, 1891). The caecum is large and sacculated because of longitudinal bands (Garrod, 1876; Rengger, 1830). González-Jiménez (1978) reported that the stomach is 0.29 m long, small intestine 6 m, caecum 1 m, colon 2 m, and rectum 0.80 m. The average mass of the liver is 710 g for males that average 42 kg and 630 g for females of 38 kg (González-Jiménez and Parra, 1972). The pH of the digesta ranges from 3.50 in the stomach to 6.86 in the small intestine and 6.03 in the caecum, the main site of fermentation (González-Jiménez, 1978). Lungs are divided into two lobes on the left and four on the right (Dorst, 1973). Adult animals have a heart mass near 200 g; there is a linear relation between body mass and heart mass (Ojasti, 1973). Healthy animals have a spleen with a maximum mass of 100 g, but spleens of animals infected with

Trypanosoma may be double that (Ojasti, 1973). Bradycardia accompanies submergence and breath holding (Szabuniewicz et al., 1978).

The cerebral hemispheres present a peculiar lozenge shape with well-developed fissures and convolutions but authors do not always agree in their identification (Beddard, 1892, 1899; Daresté, 1855; Friant, 1954; Holl, 1900). The cerebellum is small and compact, its folia are arranged in a transverse pattern; it shows a large floccular lobe (Smith, 1902). The electrical activity of neocortex shows a "rapid" sleep phase (Affani et al., 1973). The lower number of neurons in relation to body surface is compensated by their larger size (Spina Franca Netto, 1951).

Kidneys are weakly polylobular with crest and terminal recesses (Arvy, 1973), and are proportionally larger in males than in females; no explanation has been found to this observation (Ojasti, 1973).

External genitals in both sexes remain hidden by an anal sac (Ojasti, 1973; Pocock, 1922). Female reproductive organs consist of paired ovaries, oviducts, bipartite uteri, and a single vagina. Males have testes, epididymides, vasa deferentia, and a prostate, but no differentiated scrotum. No Cowper's glands have been found (Ojasti, 1973). The coagulation time of semen after contact with prostatic liquid was 4 to 5 min (Gley, 1923).

Female body temperature (rectal) ranges between 36.0°C and 36.6°C, depending on the stage of the estrous cycle (López-Barbella, 1982).

ONTOGENY AND REPRODUCTION. The capybara attains sexual maturity at a body mass of 30 to 40 kg or approximately at age 1.5 years, depending on the season of birth and quality of habitat (Ojasti, 1973). Epididymides of adult males contain spermatozoa all year in Venezuela, but relative size of testicles decrease in the dry season (Ojasti, 1973). Capybaras breed all year but the frequency of matings increases sharply at the onset of the rainy season in April and May in Venezuela (Ojasti, 1968) or October–November in Mato Grosso, Brazil (Schaller and Crawshaw, 1981). After a gestation period of approximately 150 days (Zara, 1973; S. López-Barbella, personal communication), most births take place from September to November in the Venezuelan Llanos (Ojasti, 1973). One litter per year is the rule in most areas (Lombardero, 1955; Moojen, 1952; Rengger, 1830; Schaller and Crawshaw, 1981), but many females may breed twice a year if the habitat remains favorable (Ojasti, 1971). Two litters per year also was achieved in captivity in Venezuela (Parra et al., 1978). The frequency of gestation was positively correlated with body mass but independent from the age of the female (Ojasti, 1973). The estrous cycle is spontaneous and averages 7.5 days, as indicated by vaginal smears, luteinizing hormone, progesterone levels, and body temperature (López-Barbella, 1982).

Initial litter size (number of implanted embryos), based on 68 pregnant females from Venezuela, ranges from one to eight and averages 4.8 (Ojasti, 1973). In this sample, 17% of the embryos were resorbed during early development, giving a litter size at birth of 4.0 (range 1 to 7). The resorption rate was independent of season, litter size, age and mass of the mother, and site of implantation. Litter size probably is smaller in Brazil and Paraguay because several authors (Burmeister, 1854; Goeldi, 1893; Krieg, 1929; Rengger, 1830) quote four as the maximum. Popular opinions tend to overestimate the litter size because offspring of several females may gather together and give the impression of one large litter (Macdonald, 1981; Ojasti, 1971; Schaller and Crawshaw, 1981). Crandall (1964) reported poor reproductive performance of capybaras in zoos, but Pichot (1913), Zara (1973), and Parra et al. (1978) indicate successful breeding in captivity.

Capybaras have no nests; birth takes place anywhere in their habitats, but lack of cover increases the risk of avian predation (Ojasti, 1978). Newborn are extremely precocious, fully furred, with complete permanent dentition, and average mass of 1,500 g (Ojasti, 1973). Juveniles suckle until 3 to 4 months of age (Azcarate, 1980; Ojasti, 1973; Zara, 1973), yet milk is a minor component in their diet in comparison with grass.

The age-mass curve up to 2 years for marked, wild living animals was $Y = 1.39 + 1.90X - 0.010X^2$ ($Y =$ mass, kg; $X =$ age, months), and $Y = 2.00 + 2.28X - 0.034X^2$, respectively, for a confined population in natural habitat (Ojasti, 1970, 1978). According to these equations, the average mass at 1 year of age is between 22 and 24 kg, and 37 to 40 kg in 2 years. The average

daily growth was 62.4 g in the wild and 67.0 g in confinement, but Zara (1973) and Parra et al. (1978) reported more than 100 g/day for captive animals on special diets.

The age of adult capybaras to 5 years can be estimated from the degree of ossification of basicranial sutures or epiphyseal grooves of humeri (Ojasti, 1973). The cranial sutures ossify in the following order: 1) exoccipital–basioccipital, 2) presphenoid–basisphenoid, 3) exoccipital–supraoccipital, and 4) basisphenoid–basioccipital. The distal groove of humeri closes first, and the proximal gradually and much later. Seven cranial and six humeral age classes were established and used to compare age structures of different populations (Bone, 1977; Cordero and Ojasti, 1981; Ojasti, 1973; Schaller and Vasconcelos, 1978). Dry lens mass seems to be a useful indicator of age for capybaras (Cordero and Ojasti, 1981; Ojasti, 1973). The maximum age hitherto recorded for captive capybaras is more than 12 years (Crandall, 1964).

ECOLOGY. Capybaras live on a wide variety of lowland habitats in the proximity of water, including forested riverbanks, former riverbeds, brackish wetlands, and mangrove swamps (Krieg, 1929; Macdonald, 1981; Ojasti, 1973). Highest population levels have been recorded on seasonal floodplain savannas in the Colombian and Venezuelan llanos (Cordero and Ojasti, 1981) and Pantanal of Mato Grosso, Brazil (Schaller and Crawshaw, 1981). Commonly regarded as an amphibious animal, it requires water for drinking, wallowing, and protection, dry ground for resting, and grazing lands for foraging. They graze on savannas up to 500 m from the water (Macdonald, 1981; Ojasti, 1973). The interspersed bodies of water, dry ground, pasture, and cover therefore limits the number of herds that an area can support (Ojasti, 1978).

Capybaras living on floodplains face extreme seasonal changes in habitat. In the rainy season, most of the area is inundated, forage is plentiful, and animals disperse over most of the area. They grow, breed, and accumulate subcutaneous fat during this season. However, the trampling effect upon the pastures may be serious in areas of high density, and unusually deep floods are harmful, especially to the newborn (Azcarate, 1980; Ojasti, 1973; Schaller and Vasconcelos, 1978). In the dry season, availability of water decreases gradually and animals concentrate around major rivers and remnants of savanna lagoons. Most grasses desiccate, cover is poor, animals lose mass and suffer starvation, predation, and disease (Ojasti, 1973; Schaller and Crawshaw, 1981).

Much of the best capybara habitat is located on extensive cattle ranches. Management of such areas, including predator control, provision of water for the dry season, burning, sown pastures, and grazing by cattle that keeps the sward short and stimulates tillering, probably improves the habitat for capybaras. Hence, population levels may be higher now in some areas than before settlement (Ojasti and Medina-Padilla, 1972). Population levels on large ranches (up to 100,000 ha) can be estimated by total counts in the dry season when animals are concentrated along the last remnants of water. The highest population estimates for local concentrations range from 2.0 to 3.5 individuals/ha (Cordero and Ojasti, 1981; Macdonald, 1981; Ojasti, 1973). Estimates for entire ranches are lower, seldom exceeding 0.5 individuals/ha.

Capybara herds live in home ranges averaging about 10 ha for high density populations (Azcarate, 1980; Macdonald, 1981), but areas up to 200 ha have been reported (Schaller and Crawshaw, 1981). According to Azcarate (1980), herds spend most of the time on a small core area of less than 1 ha. The home range is marked with scents (nasal and anal glands), and conflicts between residents and intruders take place. However, home ranges seem to be related more to the maintenance of group integrity and organization than with land tenure (Schaller and Crawshaw, 1981).

In a 2-year mark and recapture study, 40% of the animals were recaptured less than 100 m from the marking site, and 80% less than 1,000 m. However, one yearling moved 75 km from the study area along a river in a 6-month period (Ojasti, 1973). In another field study (Azcarate, 1980), daily movements of a herd averaged 1,121 m in the dry season and 787 m in the rainy season. Some ranchers in Venezuela drive capybara herds several km from dry riverbeds to better habitats to avoid mortality caused by drought. However, the animals often return to their original home ranges during the night (Ojasti, 1973).

Early authors (Burmeister, 1854; Goeldi, 1893; Rengger, 1830) listed swamp and waterplants, bark of trees, and several crops as foods of capybara. Reports by Buffon (1764) and Humboldt

(1819) on capybara as a fish eater are quoted frequently, but are rejected by Azara (1802) and later authors. Zara (1973) observed consumption of fish in captivity. However, both the specialization of its digestive tract and research on its feeding biology, performed by González-Jiménez (1978), indicate that capybara is a grazing herbivore. In feeding trials in the Venezuelan Llanos, *Reimarochloa acuta*, *Hymenachne amplexicaulis*, and *Leersia hexandra* were preferred (Ojasti, 1973). Microscopical identification of plant remains in fecal pellets (Escobar and González-Jiménez, 1976) on the same region indicated that the bulk of the consumption consists of *Hymenachne amplexicaulis* and *Leersia hexandra* (semiaquatic species), and *Panicum laxum* of moist savannas. In the dry season, a tiny annual grass, *Paratheria prostrata*, and drought resistant species, *Sporobolus indicus* and *Axonopus* spp., were eaten with increasing frequency. Sedges contributed 16% of the diet at the end of the rainy season, but the intake of forbs, including *Eichornia*, was low. Barlow (1969) reported consumption of *Digitaria*, *Cynodon*, and *Oxalis* in Uruguay. Capybaras are selective grazers that choose forage plants of highest protein content (González-Jiménez, 1978) and, because of their incisors, are able to cut short grasses to ground level. Green grasses, hay, tubers, fruits, and concentrated feeds have been suggested as diets in captivity (Crandall, 1964; Fuerbringer, 1974; Nogueira-Neto, 1973; Pichot, 1913; Zara, 1973). Parra et al. (1978) recommended fresh cut *Pennisetum purpureum* as staple forage and pig meal as a protein rich supplement for penned capybaras.

The best estimate for daily food intake is 70 g of grass (dry matter) per metabolic body weight ($\text{kg}^{0.75}$; Ojasti, 1978). Apparent digestibility ranges from 50 to 85% depending on the quality of foodstuff (González-Jiménez and Escobar, 1975). Digestibility is approximately the same for capybara and sheep fed on grass but is higher for capybara on protein rich diets. Capybaras have a somewhat faster rate of passage than sheep; 85% of the indicator was recovered in 70 h. Average digestibility of native grasses is 52% (Ojasti, 1978). Selective feeding, efficient mastication resulting in very small particle size, and hindgut fermentation contribute to the high digestion efficiency of capybaras (González-Jiménez, 1978; Ojasti, 1973). At the sustained population level of 2 individuals/ha, the consumption of a confined herd was $203 \text{ kcal m}^{-2} \text{ year}^{-1}$ (3.5% of the net primary production), assimilation was 106, fecal excretion 98, respiration 101, and production $4.36 \text{ kcal m}^{-2} \text{ year}^{-1}$ ($27 \text{ kg ha}^{-1} \text{ year}^{-1}$, fresh weight). Caloric equivalents of capybaras in good condition averaged $6,017 \text{ cal/g}$ (dry weight, ash free) and $1,497 \text{ cal/g}$ (fresh weight) (Ojasti, 1978).

Capybaras may compete with domestic livestock for food, especially in the dry season (Escobar and González-Jiménez, 1976; Ojasti, 1973) and destroy pastures and crops (Azara, 1802; Estrada, 1966; Humboldt, 1819; Nogueira-Neto, 1973; Rengger, 1830).

The annual natality rate (number born/average number present), computed from reproductive data and average population structure in the Venezuelan Llanos ranged from 140 to 175% (Ojasti, 1973), whereas actual natality of a population recorded in the field ranged from 57 to 81%. The difference is attributed to reproductive failures and mortality of newborn before they were recorded. Schaller and Crawshaw (1981) reported an average of 1.3 young/female and assume one litter/year in Pantanal, Mato Grosso.

Mortality in newborn from predation by caracaras (*Polyborus plancus*), black vultures (*Coragyps atratus*), and caimans (*Caiman crocodilus*) presumably is high but difficult to record in field (Ojasti, 1973; Schaller and Crawshaw, 1981). Mortality of newborn in confinement (in individual parturition pens) was 43% (Parra et al., 1978). Zara (1973) reported a viability record of 50% at Evansville Zoo. Predation by jaguars (*Panthera onca*) was probably a major agent of mortality (Rengger, 1830) and is still considerable where the large felids are common. Schaller and Vasconcelos (1978) reported mortality of 20 to 30% in 2 months at a locality in Mato Grosso, Brazil, and noted that predation was not greater on a particular age class. Feral dogs prey mostly upon young and cause high mortality in some areas (Macdonald, 1981; Ojasti, 1973). However, hunting for meat and hides is the foremost agent of adult mortality in many areas and is responsible for extreme thinning or extirpation of some capybara populations.

Capybaras are susceptible to equine trypanosomiasis (Clark and Dunn, 1933; Elmasián and Migone, 1904; Krieg, 1929). The symptoms of this disease, called "mal de caderas" (Argentina) or "derrengadera" (Venezuela), are loss of weight, apathy, lack of

coordination of hindlimbs, hair loss, infection of eyes, and often death (Lombardero, 1955; Rangel, 1905). Blood smears of apparently healthy animals may contain trypanosomes (Ojasti, 1973). This disease was reported as the main mortality factor in Mato Grosso (Schaller and Crawshaw, 1981; Schaller and Vasconcelos, 1978). It also is common in Venezuela, but levels of reported mortality are low (Ojasti, 1973). Some ranchers in this area maintain that the trypanosomiasis is milder in horses in areas where capybaras are common. Arcay de Peraza et al. (1981) showed that a strain of *Trypanosoma venezuelense* isolated from capybaras was less virulent to laboratory animals than a strain of equine origin. Bello et al. (1974) detected antibodies of *Brucella abortus* in blood samples of Venezuelan capybaras, but symptoms of this disease in capybaras are unknown. Scabies, caused by *Sarcoptes scabiei*, is common and detrimental in captivity and requires permanent control (Fuerbringer, 1974; Hime, 1974; Keymer, 1972, 1974; Parra et al., 1978).

More than 80 parasite names are found in the specialized literature (Mones, 1981; Mones and Martínez, 1983), including the following groups: several species of *Trypanosoma* (Mastigophora); *Cycloposthium* (Ciliata); two *Eimeria* (Sporozoa); *Taxorchis schistocotyle*, *Hippocrepis hippocrepis* (Trematoda), three species of *Monococcestus* (Cestoda); *Cruorifilaria tubercocauda*, *Vianella hydrochoeri*, *Protozoophaga obesa* (Nematoda); and many species of ticks, among which *Amblyomma cajennense* and *Amblyomma cooperi* seem to be most common. Other groups represented are Pentastomida, Insecta, and Schizomycetes. Most ciliates are probably commensals.

BEHAVIOR. Undisturbed capybara herds in open habitats can be observed all day, making them rewarding subjects for behavioral studies. They rest most of the morning at water's edge under shade when available. During the hottest part of the day they wallow in mudholes or shallow water. The main grazing period begins in late afternoon and continues into the first hours of the night. There appears to be a resting period near midnight and another grazing period for some hours before dawn (Azcarate, 1980; Macdonald, 1981; Ojasti, 1973). Capybaras are slow and selective grazers and spend several hours in this activity. When moving from one area to another they walk steadily, often in line along well established trails, but when pursued they run or trot for the first 300 m or so. They also swim and dive well.

Azcarate (1980) described a set of 30 fixed activity patterns of capybaras and their role in individual and social behaviors. In addition to identifying specific movements and positions, he noted five kinds of sounds produced by capybaras, and he observed scent marking with snout and anal glands. Sexual behavior consists of close pursuit of the female by the male, first ashore, then in water. When the female stops in shallow water, the male mounts her, producing 6 to 10 fast thrusts. Copulation may be repeated up to 20 times at short intervals, with the same or another partner (Azcarate, 1980; Donaldson et al., 1975; Ojasti, 1968).

Capybaras live in herds ranging from a pair or family to complex groups of several adults of both sexes and their offspring. The median group size ranged from 5.6 in July (peak of the rains) to 15.9 in March (driest month) in Venezuela (Ojasti, 1973). Azcarate (1980) and Schaller and Crawshaw (1981) also reported decreases of group size during the rainy season, whereas Macdonald (1981) observed smaller groups (average 6.7 to 7.5) in wet habitats than in drier sites (15 to 27) in the dry season, suggesting that group size is affected by condition of habitat rather than season. During drought, many capybara herds may congregate around the last water holes, forming temporary aggregations of hundreds of animals.

A typical capybara herd is a closed society formed by a dominant male, some adult females with their offspring of different ages, and a few subordinate males on the periphery of the herd (Azcarate, 1980). The dominant male often expels other males from the herd, a process involving different levels of harassment or fighting until the intruder is escorted away from the herd. Most solitary individuals, normally composing from 5 to 10% of the population, are males.

A dominance hierarchy is assumed to exist in wild capybara herds (Azcarate, 1980; Ojasti, 1973; Schaller and Crawshaw, 1981). Agonistic behavior associated with this organization becomes a problem in captivity, especially when new individuals are introduced into an established group (Cruz, 1974; Donaldson et al., 1975; Ojasti,

1978; Parra et al., 1978). Sosa Burgos (1981) found clear-cut and persistent male-dominated hierarchies in confined breeding groups of one male with 4 to 14 females. Rank order of females was correlated with their initial weight. According to this study, the best performing group was five individuals.

GENETICS. The diploid chromosome number of the capybara is 66 (FN = 102). Autosomes consist of 12 pairs of medium metacentrics, 7 pairs of medium submetacentrics, and 13 pairs of small telocentrics. The X-chromosome is a large metacentric, and the Y is a small telocentric. Karyotypes reported for a zoo specimen from an unknown locality (Würster et al., 1971), and for wild-caught specimens from Uruguay (Sáez et al., 1973) and Venezuela (Peceno, 1983), are monomorphic. The karyotype of the Isthmian capybara from the Lake of Maracaibo basin is different: $2n = 64$, FN = 104, and can be derived from the karyotype of *H. hydrochaeris* by one pericentric inversion and one Robertsonian change (Peceno, 1983).

Peceno (1983) examined 44 enzymatic loci of blood and several tissues of 37 specimens from the state of Apure and 16 from the Lake of Maracaibo basin, Venezuela. Variation was detected at eight loci. Mean heterozygosities (H) were 0.082 and 0.073, respectively. The genetic difference between the two populations was low (0.0056), and does not agree with the karyotypic difference noted above.

REMARKS. At least three different generic names have been proposed for the living capybara, but only two of them are in current use. *Hydrochoerus* Brisson, 1762, the oldest and most often used is defended, among others by Merriam (1895), Mones (1973, 1984), and Tate (1935). *Hydrochaeris* Brännich, 1772, was rediscovered by Hopwood (1947) but not used until Cabrera (1961) and some later authors. We advocate use of Brisson's name.

The most common vernacular names are "capibara" (Portuguese), "chigüire/o" (Spanish of Colombia and Venezuela), and "carpincho" (Spanish of Argentina, Paraguay, and Uruguay), but Mones and Kühl de Mones (1981) report some 190 local vernacular names, most of them of Indian origin.

The capybara is hunted for its hide, for meat, or as vermin all over its range (Krieg, 1929; Lombardero, 1955; Mones, 1980; Ojasti, 1973; Rengger, 1830). Tens of thousands of hides are exported annually from several South American countries (Carvalho, 1967; Godoy, 1963; Grimwood, 1969; Lemke, 1981; Ojeda and Mares, 1982). Capybara skin is of high quality and suitable for gloves, belts, shoes, handbags, and other leather articles.

Capybara meat is considered unsuitable for human consumption in some areas, whereas in others it is esteemed as a source of animal protein. Torres Caona (1974) and Assaf and Cruz Marcano (1976) described the properties and quality of capybara meat. In Venezuela the dried and salted meat is highly esteemed for traditional Lenten dishes. Responding to this demand, ranches in the Llanos region manage capybara populations on a sustained-yield basis for commercial harvest of 60 to 80 thousand animals per year in the dry season (Ojasti, in press; Ojasti and Medina Padilla, 1972). González-Jiménez (1977) points out the potential of capybara meat for sausages and other industrial uses.

Because of its potential for meat production, many authors (Fuerbringer, 1974; Lobo, 1923; Nogueira-Neto, 1973; Pichot, 1913) suggest capybaras be reared in captivity. Parra et al. (1978) have several years of experience in breeding capybaras in captivity on an experimental scale but no commercial capybara farms are known to exist.

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LITERATURE CITED

- AFFANI, J. M., A. M. SCARAVILLI, A. M. GORY, AND L. GARCÍA SARMIENTO. 1973. La actividad eléctrica del neocórtex de la vizcacha (*Lagostomus maximus maximus*), de la chinchilla (*Chinchilla brevicaudata*) y del carpincho (*Hydrochoerus hydrochaeris*) (Mammalia, Rodentia). *Physis* (C), 32:181-190.
- AMEGHINO, F. 1889. Contribución al conocimiento de los mamíferos fósiles de la República Argentina. *Actas Acad. Nac. Cien. Córdoba*, 6:1-1027.
- ARCAZ DE PERAZA, L., C. DÍAZ MILÁ DE LA ROCA, AND J. OJASTI. 1981. Comportamiento de una cepa de *Trypanosoma venezuelense* (*T. evansi*) aislada de *Hydrochoerus hydrochaeris* ("chigüire" o "capybara") en animales de laboratorio. *Acta Biol. Venezuelica*, 10:391-418.
- ARVY, L. 1973. Les reins. Pp. 601-742, in *Traité de Zoologie* (P.-P. Grassé, ed.). Masson et Cie., Paris, 16:1-1063.
- ASSAF, A., AND O. CRUZ MARCANO. 1976. Estudio sobre las características físico-químicas de la carne del chigüire. CIEPE, San Felipe.
- AZARA, F. DE. 1802. Apuntamientos para la historia natural de los cuadrúpedos del Paraguay y río de La Plata. Imp. Viuda de Ibarra, Madrid, 2:1-328.
- AZCÁRATE, T. 1980. Sociobiología y manejo del capibara (*Hydrochoerus hydrochaeris*). Doñana Acta Vertebrata, 7:1-228.
- BARLOW, J. C. 1969. Observations on the biology of rodents in Uruguay. *Life Sci. Contrib., Royal Ontario Mus.*, 75:1-59.
- BEDDARD, F. E. 1892. On the convolutions of the cerebral hemispheres in certain rodents. *Proc. Zool. Soc. London*, 1892:596-613.
- . 1899. On the brain of *Hydrochoerus*. *Proc. Zool. Soc. London*, 1899:798-803.
- BELLO, N. A., P. MOCOLLÓN, D. M. VILLEGAS, R. LARSEN, AND G. GÓMEZ. 1974. La brucelosis en animales salvajes. El chigüire (*Hydrochoerus hydrochaeris*). *Vet. Trop.*, 1:117-128.
- BONE, T., G. 1977. Un modelo de simulación para la explotación comercial del chigüire (*Hydrochoerus hydrochaeris*). Unpubl. Undergraduate thesis, Univ. Central Venezuela, Caracas, 86 pp.
- BRISSON, M. J. 1762. *Regnum animale in classes IX. Distributum, sive synopsis methodica*. T. Haak, Leiden, 296 pp.
- BRÜNNICH, M. T. 1772. *Zoologiae fundamenta praelectionibus academicis accommodata. Grunde i Dyrelaernen*. F. C. Pelt, Hafniae et Lipsiae, 253 pp.
- BUFFON, G. L. M. 1764. *Histoire naturelle, générale et particulière, avec la description du Cabinet du Roi*. Imp. Royale, Paris, 12:1-451.
- BUISSONNÉ, P. H. 1974. Neogene and Quaternary geology of Aruba, Curaçao and Bonaire. *Natuurw. Studie Suriname Nederlandse Antillen*, 78:1-293.
- BURMEISTER, H. 1854. *Systematische Uebersicht der Thiere Brasiliens, welche während einer Reise durch die Provinzen von Rio de Janeiro und Minas Geraes gesammelt und beobachtet wurden*. G. Reimer, Berlin, 1:1-343.
- CABRERA, A. 1961. *Catálogo de los mamíferos de América del Sur*. *Rev. Mus. Argentino Cienc. Nat. (Cienc. Zool.)*, 4:309-732.
- CARVALHO, J. C. M. 1967. A conservação da natureza e recursos naturais na Amazônia brasileira. *Atas Simp. Biota Amazônica*, 7:1-47.
- CLARK, H. C., AND L. H. DUNN. 1933. Animal susceptibility to *Trypanosoma hippicum*, the equine trypanosoma of Panama. *Amer. J. Trop. Med.*, 13:273-281.
- CORDERO, G. A., AND J. OJASTI. 1981. Comparison of capybara populations of open and forested habitats. *J. Wildl. Mgmt.*, 45:267-271.
- CRANDALL, L. S. 1964. *The management of wild mammals in captivity*. Univ. Chicago Press, Chicago, 761 pp.
- CRUZ, C. A. 1974. Notas sobre el comportamiento del chigüiro en confinamiento. *Simp. sobre chigüiro y babilla*, Bogotá, Inderena, 45 pp.
- DARESTE, C. 1855. Note sur le cerveau des rongeurs et particulièrement sur le cerveau du Cabiai. *Ann. Sci. Nat. (4) Zool.*, 3:355-365.
- DENNLER, J. G. 1939. Morfografía de los pelos y la configuración del pelaje de mamíferos sudamericanos. *Physis*, 16:207-223.
- DONALDSON, S. L., T. B. WIRTZ, AND A. E. HITE. 1975. The social behavior of capybaras, *Hydrochoerus hydrochaeris*, at Evansville Zoo. *Internat. Zoo. Yearb.*, 15:201-206.
- DORST, J. 1973. Appareil respiratoire. Pp. 484-600, in *Traité de zoologie* (P.-P. Grassé, ed.). Masson et Cie., Paris, 16:1-1063.
- ELMASIÁN, M., AND E. MIGONE. 1904. Mal de caderas chez les animaux domestiques et sauvages (Epidémies parallèles). *Ann. Inst. Pasteur*, 18:587-589.
- ERXLEBEN, J. C. P. 1777. *Systema regni animalis per classes, ordines, genera, species, varietatis cum synonymia et historia animalium. Classis I. Mammalia*. Lipsiae, 636 pp.
- ESCOBAR, A., AND E. GONZÁLEZ-JIMÉNEZ. 1976. Estudio de la competencia alimenticia de los herbívoros mayores del Llano

- inundable con referencia especial al chigüire (*Hydrochoerus hydrochaeris*). Agron. Trop., 26:215-227.
- ESTRADA, H. J. 1966. La ganadería en el Estado Apure. Consejo de Bienestar Rural, Caracas, 215 pp.
- FRANCIS, J. C., AND A. MONES. 1968. Los roedores fósiles del Uruguay. Bol. Lab. Paleont. Vert., 1:35-55.
- FRIANT, M. 1954. Le cerveau d'un rongeur, le cabiai (*Hydrochoerus capybara* Erxl.). Acta Anat., 21:239-248.
- FUERBRINGER, J. 1974. El chigüiro, su cría y explotación racional. Orientación Agropecuaria, Bogotá, 99:5-59.
- GARROD, A. H. 1876. On the caecum coli of the capybara (*Hydrochoerus capybara*). Proc. Zool. Soc. London, 1876:20-23.
- GLEY, E. 1923. Prostate et vésicules séminales de quelques rongeurs du Brésil. Comptes-Rendus Soc. Biol., 89:1133-1135.
- GODOY, J. C. 1963. Fauna silvestre. Evaluación de los recursos naturales de la Argentina (primera etapa). Consejo Federal de Inversiones, Buenos Aires, 8:1-527.
- GOELDI, E. 1893. Os mamíferos do Brasil. Monogr. brasil. Livr. Classica de Alves & Cia., Rio de Janeiro, 1:1-180.
- GONZÁLEZ-JIMÉNEZ, E. 1977. El capibara, una fuente indígena de carne de la América tropical. Rev. Mundial Zootec., 21:24-30.
- . 1978. Digestive physiology and feeding of capybara (*Hydrochoerus hydrochaeris*). In Handbook series in nutrition and food (M. Rechcigl, ed.). CRC Press, Cleveland. Sect. 9, 1:163-177.
- GONZÁLEZ-JIMÉNEZ, E., AND A. ESCOBAR. 1975. Digestibilidad comparada entre chigüires (*Hydrochoerus hydrochaeris*), conejos y ovinos con raciones de diferentes proporciones de forrajes y concentrados. Agron. Trop., 25:283-290.
- GONZÁLEZ-JIMÉNEZ, E., AND R. PARRA R. 1972. Estudios sobre el chigüire (*Hydrochoerus hydrochaeris*). I. Peso de diferentes órganos y partes del cuerpo. Acta Cient. Venezolana, 23 (Supl. 1):30.
- GRIMWOOD, I. R. 1969. Notes on the distribution and status of some Peruvian mammals. Amer. Comm. Internat. Wildl. Prot. and New York Zool. Soc., Spec. Publ., 21:1-68.
- HETT, M. L. 1929. The comparative anatomy of the palatine tonsil. Proc. Zool. Soc. London, 1928:843-915.
- HIBBARD, C. W., C. E. RAY, D. E. SAVAGE, D. W. TAYLOR, AND J. E. GUILDAY. 1965. Quaternary mammals of North America. Pp. 509-525, in The Quaternary of the United States (H. E. Wright and D. G. Frey, eds.). Princeton Univ. Press, Princeton, New Jersey, 922 pp.
- HIME, J. M. 1974. Report of the veterinary officer, Regent's Park, 1972 and 1973. J. Zool., 173:41-50.
- HOFFSTETTER, R. 1968. Nuapua, un gisement de vertébrés pléistocènes dans le Chaco Bolivien. Bull. Mus. Nat. Hist. Nat., Ser. 2, 40:823-836.
- HOLL, M. 1900. Ueber die Insel des Ungulatengehirnes. Arch. Anat. Physiol. (Anat. Abt.), 1900:295-334.
- HOUIER, D. A. 1959. Fossil rodents from Curaçao and Bonaire. Studies Fauna Curaçao and Caribbean Islands, 9(35):1-37.
- HOPWOOD, A. T. 1947. The generic names of the mandrill and baboons, with notes on some of the genera of Brisson, 1762. Proc. Zool. Soc. London, 117:533-536.
- HUMBOLDT, A. VON. 1819. Voyage aux régions équinoxiales du Nouveau Continent fait en 1799, 1800, 1801, 1802, 1803 et 1804, par Al. de Humboldt et A. Bonpland. I. Relation historique, N. Maze, Paris, 2:1-722.
- HUSSON, A. M. 1978. The mammals of Suriname. Zool. Monogr. Rijksmus. Nat. Hist., 2:1-569.
- KEYMER, I. F. 1972. Report of the pathologist, 1969 and 1970. J. Zool., 166:515-540.
- . 1974. Report of the pathologist, 1971 and 1972. J. Zool., 173:51-83.
- KRIEC, H. 1929. Biologische Reisestudien in Südamerika. XV. Zur Oekologie der grossen Nager des Gran Chaco un seiner Grenzgebiete. Z. Morph. Oekol. Tiere, 15:755-785.
- KRÖLLING, O. 1932. Ueber ein Hautdrüsenorgan bei *Hydrochoerus capybara* Erxl. Z. mikr.-anat. Forsch., 29:621-636.
- KRUMBIEGEL, I. 1940. Die Säugetiere der Südamerika-Expeditionen Prof. Dr. Krieg. 6. Wasserschweine und Viscaciidae. Zool. Anz., 132:97-115.
- LEMKE, T. O. 1981. Wildlife management in Colombia: the first ten years. Wildl. Soc. Bull., 9:28-36.
- LIAIS, E. 1872. Climat, géologie, faune et géographie botanique du Brésil. Garnier, Paris, 640 pp.
- LINNAEUS, C. 1766. Systema naturae, per regna tria naturae secundum classes, ordines, genera, species cum characteribus, differentiis, synonymis, locis. Twelfth ed. L. Salvii, Holmiae, 1(part 1):1-533.
- LOBO, A. A. DE F. 1923. Criação doméstica da capivara. Chácaras e Quintais, 27:254.
- LOMBARDERO, O. J. 1955. La historia del carpincho. Diana, Buenos Aires, 17:60-65.
- LÓPEZ-BARBELLA, S. 1982. Una contribución al estudio de la fisiología reproductiva del chigüire (*Hydrochoerus hydrochaeris*) en cautiverio. I. Ciclo estral. Acta Cient. Venezolana, 33:487-501.
- LUND, P. W. 1843. Blik paa Brasiliens Dyreverden för sidste Jordomvaeltning. 5. Afh. Fortsaettelse af Pattedyrene. Om de nulevende og uddøde arter af rovdyyrenes familia. Afh. Kong. Danske Videns. Selskabs Natur. Math., 11:1-82.
- LYDEKKER, R. 1885. Catalogue of the fossil Mammalia in the British Museum. British Mus. Nat. Hist., London, 268 pp.
- MACDONALD, D. W. 1981. Dwindling resources and the social behaviour of capybaras (*Hydrochoerus hydrochaeris*) (Mammalia). J. Zool., 194:371-392.
- MASSOIA, E., AND A. FORNES. 1969. Descripción de *Hydrochoerus* en edad fetal y comparación con los adultos (Mammalia, Rodentia, Hydrochaeridae). Physis, 29:95-99.
- MAYER. 1844. Nachtrag zur vergleichenden Anatomie der Zunge und ihrer Papillen. Nova Acta Caesareae Leopoldino-Carolinae Nat. Curios., 20:737-746.
- MERRIAM, C. H. 1895. Brisson's genera of mammals, 1762. Science, 1:375-376.
- MONES, A. 1973. Estudios sobre la familia Hydrochoeridae (Rodentia), I. Introducción e historia taxonómica. Rev. brasileira Biol., 33:277-283.
- . 1974. Estudios sobre la familia Hydrochoeridae (Rodentia), III. Osteología comparada de la región auditiva de *Hydrochoerus* Brisson, con formas afines. Ameghiniana, 11:39-57.
- . 1975a. Estudios sobre la familia Hydrochoeridae (Rodentia), VI. Catálogo anotado de los ejemplares-tipo. Com. Paleontol. Mus. Hist. Nat. Montevideo, 1:99-130.
- . 1975b. Estudios sobre la familia Hydrochoeridae (Rodentia), V. Revalidación de sus caracteres morfológicos dentarios con algunas consideraciones sobre la filogenia del grupo. Actas 1º Congreso Argentino Paleontol. Bioestrat., 2:463-476.
- . 1980. Estudios sobre la familia Hydrochoeridae (Rodentia), VIII. Sinopsis sobre la situación de la población del carpincho, *Hydrochoerus hydrochaeris* (L.), en el Uruguay. Rev. Fac. Hum. Cienc. (Cienc. Biol.), 1:101-104.
- . 1981. Estudios sobre la familia Hydrochoeridae (Rodentia), XI. Parásitos y patologías de *Hydrochoerus* Brisson, 1762. Lista preliminar. Res. y Com. Jornadas Cienc. Nat., Montevideo, 2:16.
- . 1984. Estudios sobre la familia Hydrochoeridae, XIV. Revisión sistemática (Mammalia: Rodentia). Senckenb. biol., 65:1-17.
- MONES, A., AND U. KÜHL DE MONES. 1981. Estudios sobre la familia Hydrochoeridae (Rodentia), X. Nomenclatura vernácula del género *Hydrochoerus* Brisson, 1762. Rev. Fac. Hum. Cienc. (Cienc. Biol.), 1:225-257.
- MONES, A., AND S. MARTÍNEZ. 1983. Estudios sobre la familia Hydrochoeridae (Rodentia), XIII. Parasitosis y patologías de *Hydrochoerus* Brisson, 1762. Rev. Fac. Hum. Cienc. (Cienc. Biol.), 1:297-329.
- MOOJEN, J. 1952. Os roedores do Brasil. Inst. Nac. Livro, Rio de Janeiro, 214 pp.
- MORGAN, J. 1833. On the anatomy of some of the organs of deglutition in the capybara (*Hydrochoerus capybara*). Trans. Linnean Soc. London, 16:465-469.
- MÜNCH, F. 1896. Die Topographie der Papillen der Zunge des Menschen und der Säugethiere. Morph. Arb., 6:605-690.
- NOGUEIRA-NETO, P. 1973. A criação de animais indígenas vertebrados. Peixes, anfíbios, répteis, aves, mamíferos. Tecnapis, São Paulo, 327 pp.
- OJASTI, J. 1968. Notes on the mating behavior of the capybara. J. Mamm., 49:534-535.

- . 1970. Sobre el crecimiento individual del chigüire (*Hydrochoerus hydrochaeris*). Acta Cient. Venezolana, 21:28-29.
- . 1971. El chigüire. Rev. Defensa de la Naturaleza, 1: 1-10.
- . 1973. Estudio biológico del chigüire o capibara. Fondo Nac. Invest. Agropec., Caracas, 275 pp.
- . 1978. The relation between population and production of the capybara. Unpubl. Ph.D. dissert., Univ. Georgia, Athens, 204 pp.
- . In press. Investigación y manejo del chigüire (*Hydrochoerus hydrochaeris*) en Venezuela. Actas 9º Congr. Latin. Amer. Zool. (Arequipa).
- OJASTI, J., AND G. MEDINA-PADILLA. 1972. The management of capybara in Venezuela. Trans. N. Amer. Wildl. Nat. Res. Conf., 37:268-277.
- OJEDA, R., AND M. A. MARES. 1982. Conservation of South American mammals: Argentina as a paradigm. Pp. 505-521, in Mammalian biology in South America (M. A. Mares and H. H. Genoways, eds.). Spec. Publ. Ser., Pymatuning Lab. Ecol., Univ. Pittsburgh, 6:1-539.
- PALLAS, P. S. 1766. Miscellanea zoologica quibus novae imprimis atque obscurae animalium species describuntur et observationibus iconibusque illustrantur. Hgae Comitum, P. v. Cleff, 224 pp.
- PARRA, R., A. ESCOBAR, AND E. GONZÁLEZ-JIMÉNEZ. 1978. El chigüire: su potencial biológico y su cría en confinamiento. Pp. 83-94, in Informe Anual I.P.A., Univ. Central Venezuela, Maracay.
- PASCUAL, R., E. J. ORTEGA-HINOJOSA, D. GONDAR, AND E. TONNI. 1967. Las edades del Cenozoico mamífero de la Provincia de Buenos Aires. Pp. 3-27, in Paleontografía bonaerense (R. Pascual, ed.). Com. Invest. Cien., La Plata, 4:1-202.
- PECEÑO M., C. 1983. Estudio citogenético y genético-evolutivo del chigüire, género *Hydrochoerus*. Unpubl. Undergraduate thesis, Univ. Simón Bolívar, Caracas, 119 pp.
- PEREIRA, J. N., D. M. JENKINSON, AND E. FINLEY. 1980. The structure of the skin of the capybara. Acta Cient. Venezolana, 31:361-364.
- PICHOT, P. A. 1913. Le cabiai. Bull. Soc. Nat. Accl. France, 60: 97-106.
- POCOCK, R. I. 1922. On the external characters of some hystricomorph rodents. Proc. Zool. Soc. London, 1922:365-427.
- PORTA, J. DE. 1969. Les vertébrés fossiles de Colombie et les problèmes par l'isolement du continent Sud-Américain. Palaeovertebrata, 2:77-94.
- PRELLER, W. 1907. Zur Kenntnis der Morphologie und postembryonalen Schädel Metamorphose von *Hydrochoerus capybara* im Vergleich mit den Schädel der übrigen Caviden und Beschreibung und Vergleichung zweier Schädel von *Dinomys branickii*. Arch. Naturf., 73:377-422.
- RANGEL, R. 1905. Nota preliminar sobre la peste boba y la derrengadera de los equideos de los llanos de Venezuela (Tripanosomiasis). Gac. Med. Caracas, 12:105-113.
- RENGGER, J. R. 1830. Naturgeschichte der Säugthiere von Paraguay. Schweighäuserschen Buchh., Basel, 394 pp.
- ROVERETO, C. 1914. Los estratos araucanos y sus fósiles. An. Mus. Nac. Hist. Nat. Buenos Aires, 25:1-247.
- RUSCONI, C. 1934. Tercera noticia sobre los vertebrados fósiles de las arenas puelchenses de Villa Ballester. An. Soc. Cien. Argentina, 117:19-37.
- SÁEZ, F. A., M. E. DRETS, AND N. BRUM-ZORRILLA. 1973. Cromosomas somáticos y meióticos del carpincho *Hydrochoerus hydrochaeris uruguayensis* (Rodentia: Hydrochoeridae). Trab. V. Congr. Latin. Amer. Zool. (Montevideo), 1:187-191.
- SCHALLER, G. B., AND P. G. CRAWSHAW. 1981. Social organization of a capybara population. Saugetierk. Mitt., 29:3-16.
- SCHALLER, G. B., AND J. M. C. VASCONCELOS. 1978. Jaguar predation on capybara. Z. Saugetierk., 43:296-301.
- SIMPSON, G. G. 1928. Pleistocene mammals from a cave in Citrus County, Florida. Amer. Mus. Novitates, 328:1-16.
- SMITH, G. E. 1902. Nervous system of the Mammalia. Pp. 138-481, in Description and illustrated catalogue of the physiological series of comparative anatomy contained in the Museum of the Royal College of Surgeons of England (C. Stewart, ed.). Royal College of Surgeons, London.
- SONNTAG, C. F. 1924. The comparative anatomy of the tongues of the Mammalia. X. Rodentia. Proc. Zool. Soc. London, 1924: 725-741.
- SOSA BURGOS, L. M. 1981. Comportamiento social del chigüire en relación con su manejo en cautiverio. Unpubl. Undergraduate thesis, Univ. Central Venezuela, Caracas, 120 pp.
- SPINA FRANCA NETTO, A. 1951. Dimensioni e numero dei neuroni in relazione alla mole somatica. Confronti tra due roditori di mole somatica molto diferente. Z. Zellforsch. mikrosk. Anat., 36:222-234.
- SZABUNIEWICZ, M., A. L. SÁNCHEZ, A. SOSA F., B. GIL, M. GÓMEZ, T. PÉREZ, AND F. VEGA. 1978. The electrocardiogram of the capybara (*Hydrochoerus hydrochaeris*, Linné). Zentralbl. Vet. Med., Ser. A, 25:162-171.
- TATE, G. H. H. 1935. The taxonomy of the genera of Neotropical hystricoid rodents. Bull. Amer. Mus. Nat. Hist., 68:295-447.
- TOEFFER, K. 1891. Die Morphologie des Magens der Rodentia. Gegenbaurs Morph. Jb., 17:380-407.
- TORRES CAONA, J. L. 1974. La carne del chigüire como alimento. Orient. Agrop., Bogotá, 99:70-75.
- VIRCHOW, H. 1910. Die Wirbelsäule von *Hydrochoerus capybara* nach Form zusammengesetzt. Sitz. Ges. Naturf. Freunde Berlin, 1910:235-265.
- WURSTER, D. H., J. R. SNAPPER, AND K. BENIRSCHKE. 1971. Unusually large sex chromosomes; new methods of measuring and description of karyotypes of six rodents (*Myomorpha* and *Hystricomorpha*) and one lagomorph (*Ochotonidae*). Cytogenetics, 10:153-176.
- XIMENEZ, A., A. LANGGUTH, AND R. PRADERI. 1972. Lista sistemática de los mamíferos del Uruguay. An. Mus. Hist. Nat. Montevideo, Ser. 2, 7(5):1-49.
- ZARA, J. L. 1973. Breeding and husbandry of the capybara, *Hydrochoerus hydrochaeris*, at Evansville Zoo. Internat. Zoo. Yearb., 13:137-139.

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