On January 5, 1935, I sailed for Brazil at the invitation of Dr. Adolpho Lutz, to study the frogs of Southeastern Brazil in field and laboratory, and finally to collaborate with Dr. Lutz in a paper on the Hylidae.

The first several weeks of my stay in Rio de Janeiro were spent mostly at the Instituto Oswaldo Cruz, of which Dr. Lutz has long been an important connection, studying the preserved frogs and taking notes of Dr. Lutz' long observations on their life histories. Many short field trips were made into the mountains surrounding the city of Rio de Janeiro, as well as some longer ones to Petropolis, the summer capital of the emperors, in the Organ Mountains, from which important material was obtained.

For three weeks in March collections were made in the state of Minas Geraes with the assistance of Dr. Lutz' trained laboratory servant, Joaquim Venancio, who is especially adept at locating frogs in new, unexplored places and in catching them. On this trip Dr. and Mrs. Emmanuel Dias added much to the success of the expedition by their helpful knowledge of the country. Much collecting was done in and near Bello Horizonte, the city in which the naturalist Lund lived and wrote of Brazilian fauna. An excursion to Ouro Preto of two days yielded a good series of frogs. After leaving Bello Horizonte, the party proceeded to Lassance, a little railroad town 600 miles north of Rio de Janeiro, at which place the Instituto Oswaldo Cruz has a branch. An attempt was made to visit the type localities from which Dr. Lutz had formerly described new species. The last lap of the Minas trip extended north to Pirapora, on the Rio São Francisco, where the collecting of frogs and fishes proved to be better than anywhere else. New genera and species of fish were taken from the river here, as this watershed had not
formerly been worked by a collector.

After the return to Rio, preparations were made to go south to São Paulo to visit the Instituto Butantan, which is under the efficient direction of Dr. Afranio do Amaral. Two days were spent in Butantan seeing the excellent scientific work being done there, not only in making serum for snake bite, but also for smallpox and various other infectious diseases. Due largely to the fine work of this institute, the public health in São Paulo seems to be decidedly better than that in the surrounding country. A visit to the Museu Paulista at Ypiranga under Dr. Amaral's guidance afforded an opportunity to obtain from the director, Dr. Taunay, some extremely valuable bird and mammal skins, of which there were formerly no examples in the National Museum collection. Permission was secured from Dr. Hoehne, the eminent botanist, to visit the biological station at Alto da Serra, a beautiful bit of rain forest on the crest of the Serra da Cubatão between São Paulo and Santos. A number of rare frogs were secured in the three days of collecting there. A one-day trip to Santos yielded some good marine material, including a fine lot of fish bought at the market there.

My last important excursion, made in the company of Dr. Lutz and his daughter and the colored servant, was in early May to Nova Friburgo in the heart of the Organ Mountains five hours by train from the city of Rio de Janeiro. Here the party was most cordially entertained for five days by an American lady, Mrs. V.E. Schilling, on whose large estate some interesting frogs were secured, but as the cold season was approaching, it was not easy to find them in numbers.

I sailed for New York on May 23rd, having successfully obtained permission to bring my large collection out of the country. The material, when unpacked and distributed in the National Museum, proved to be of great interest to all the departments concerned, and as the localities visited were those from which the National Museum had not received any material of importance in most orders, the value of the collection was doubled thereby.
If someone were to ask you this question offhand, "What is one of the most characteristic sounds of Brasil, one which would probably attract the notice of a foreigner visiting the tropics for the first time?" what would you say? Perhaps you would hasten to mention the ringing of the church bells all over Brazil of a Sunday morning. Or perhaps the jingling of the donkey-harness, or the clatter of wooden shoes on hard cobblestones might seem more expressive of the busy activities of urban existence. But if you go away from these things out into the country, whether to the mountainous uplands or to the coastal regions bordering the Ocean, you will hear the true voice of Brazil - the chorus of singing frogs.

Your train may pass for a little distance on an elevated trestle near a marsh, and even above the roar of the driving wheels you can distinguish a volume of sound that seems to come from all parts of the marsh at once, - a rather rhythmic harmony that corresponds almost to measures in music interspersed here and there by a shriller or a deeper note, as if the singers had reached a climax of enthusiasm in their eternal chant. You may never have seen a frog singing, and you ask me how he does it. The whole performance is most amusing even to the usual spectator and becomes of absorbing interest to the scientific investigator, for the voices of different species of frogs are characteristic, and it is often by hearing a strange voice among the chorus that a collector of frogs is able to secure a "new" species - that is, a kind not previously known to science, - which is one of the fond dreams of every collector's heart. The frog singer may be sitting on a little tussock of grass at the border of the marsh, or he may be clinging to the stem of a waterplant some distance from the ground. At any rate, let us suppose that we have got one in view. You will notice that when the call is made, a bubble-like pouch appears momentarily on the throat, and that when the call ceases, the bubble contracts into a little knot of wrinkled skin. When a frog calls, the mouth and nostrils are kept tightly closed and the air is driven back and forth between lungs and mouth. Usually one or two slits are present on the floor of the mouth, and the air escaping through them is caught in a pocket of the subhyoid or adjacent muscles which it dilates, into one or more balloon, like resonating organs. The sacs are continuations of the lining of the mouth-cavity covered by more or less thinned sheets of muscles & skin. Now as to the actual sounds made by frogs and toads, opinions may differ as to their musical quality. Some are certainly not music, but noise, in its truest sense. Some frogs utter a plaintive whining which is most irritating and nerve-wracking to a human listener after enduring it for a short time. Other species pipe, whistle, or chirrup as one does to encourage a horse. One species gives a cry which sounds exactly like that of a small baby, and it is this sound heard at night in out-of-the-way places which has given rise locally in many places to a superstition that the ghost of an unbaptized baby haunts the spot in which it was buried.
Sometimes the people who live near have actually plowed up the field in the expectation of finding an infant's body, in order to bury it with proper rites. They never find the dead baby, but they often drive away or destroy the frog so that the "ghost" is successfully laid.

The frog chorus is heard only in the mating season, which in Brazil lasts for most of the summer. The males make the call to summon the females to the shallow pool where mating takes place. The eggs often numbering several hundreds from a single female at one laying, are deposited in the water, by many species of frogs. The thin gelatinous coating covering each egg begins to absorb water as soon as it is laid, and soon makes a cushion jelly-like cover for the tiny black embryo developing inside. In three or four days the egg has grown and elongated into a tiny form resembling an Indian club in shape. Movement now takes place within the egg, the thin jelly-like tissue is broken, and the newborn tadpole awkwardly lashes its way to the surface, being at the moment without gills or tail, and hangs there with the small head end uppermost, and the heavy body still containing most of the yolk-nourishment hanging down. At this stage the tadpoles look like tiny black beads floating in the water. By the next day gills have sprouted from the side of the neck and a flat rudder-like tail has begun to make its appearance, and from now on the power of locomotion is greatly increased, so that young tadpoles become very difficult to catch. The gills allow the absorption of oxygen from the water in about the same manner that a fish breathes. The mouth of the tadpole is at this stage equipped with a diminutive horny black beak, almost like that of a parrot, with which it scrapes off the green scum of algae and other microscopic plants for food, or nibbles tiny scrapes of dead animal tissue that may come its way. Its body rapidly grows and elongates and becomes characteristic of its species in color, shape and mouth structure. In a few days the gills are reabsorbed and disappear, and the tadpole now foreshadows its coming terrestrial life by the development of two nostrils on top of its head, and must rush to the surface every few minutes to get a lungful of air. Some tadpoles of particular species attain a rather large size, almost as big as a hen's egg in fact, and are often very sluggish, lying all day in the shallows in the gray mud which almost perfectly conceals them, or moving about like aimlessly animate gumdrops, in search of something to eat. This passive existence lasts for some weeks, often for months, and then a new phase appears with the development of the hind legs, which first show as tiny brad-like structures at the sides of the tail, but which soon grow into a good resemblance of the legs of the adult. The fore-arms appear next, and the head also has undergone changes in contour, the nose becoming more pointed, the beak disappearing, a true frog-mouth taking its place, and a flat eardrum developing on the side of the head. Now the tail shortens and diminishes and is finally completely absorbed into the body tissue, and we have a tiny terrestrial frog, that leaves the water completely and hops about in the mud looking for food in the shape of insects that he can capture and devour. If our friend the frog is fortunate enough to escape being eaten up by his older brothers or by the numerous enemies which are always on the watch, he will continue to grow and thrive during the winter season, and by the following spring will take his place as a member of the chorus which I spoke about at the beginning of my talk.
The special study of the frogs in the vicinity of the City of Rio de Janeiro, as well as those in places in Minas Geraes and Sao Paulo, was begun about fifteen years ago by Dr. Adolphe Lutz, the most eminent Brazilian scientist doctor, and pioneer in the field of the tropical medicine. He has described and recorded for the first time many new kinds of frogs, and has devoted his attention to a study of their most interesting and peculiar life histories. He has taken me to quiet ponds in which we found the nest of a giant tree-frog (Hyla faber), a shallow basin of mud built up with mud walls several inches high in almost architectural regularity near the water's edge, and in which the female deposits her long string of eggs which are rendered safe from the depredations of egg-eating fishes by the fortress which she has built around them. There we saw her one night, sitting on the edge of her little castle-craddle, guarding her eggs, her eyes shining like black jet in the light of our electric torches. Beside her, the blue waterlilies stood near surface of the pool into which the young tadpoles would wriggle as soon as the next rain came to wash away the mud walls of the retaining dam, just as their parent's instincts had told her would happen. Around us the glassy dark leaves of banana trees met with the rain reflected our torchlights with a kind of unearthly luminescence while from the small shrubs came the booming, loud cry of the males of this same species calling in the dark for their mates. There a purely terrestrial frog lived, the large edible species Leptodactylus ocellatus, with its leopard-spots of brown on a pale green skin. Its feet were long and the toes were slender; not swollen at the tips into the dishes which characterize the arboreal tree-frogs, and which enable them to cling to a vertical surface, and to leap and climb among the branches of trees and shrubs.

I particularly remember a beautiful lagoa nea Lassance in Minas Geraes, in which I collected frogs and fishes ten days ago. evening was just coming on when we arrived at the spot, and the white herons were winging their way to their roosts from their all-day fishing expedition in the marsh. The sharp outline of the Serra do Cabral stood out in dark blue against the lemon yellow of the evening sky. We dipped our nets for fish and tadpoles while the light lasted, and then put on our head-lamps and waded in hipboots among the small shrubs that grew up through the water in the search for a frog described by Dr. Lutz as Pseudeo helobodactyla, a very slippery frog which is entirely aquatic, with webbed toes for swimming, and queer popping eyes located on top of its head, so that it can hang in the water with only its eyes and nostrils above the surface, waiting for an unwary insect to fly within range of its swift upward leap. In a couple of hours we had caught twenty or so of the wary and active species, and I marveled at the beauty of their striking coloration, a soft velvety green on the body, pale yellow below, the hind-legs striped with a handsome pattern of chocolate and cream-color. The pseudo had a peculiar bellowing cry that sounded much like those of the long horned zebras, that had...
frequented the borders of the marsh earlier in the day. Tiny truefrogs living on the bushes that grew up out of the water had voices that sounded like the winding up of ten thousand tiny watches. The querulous cry of one of the less musical species rang out from time to time, and the trilling bird-like call of one of the toad species frequently came from the shore.

The wonder Book of nature always repays the student for his efforts by a thousand unsuspected facts of the most striking interest, as well as with visions of unforgettable loveliness for all who care to see them.

Look around you when you go into the forests or the open country; and the sheen of a blue butterfly’s wing, in the instantaneous flash of a humming bird, in the glimpse of a orchid shining like a purple star from the gray gloom of tree-trunks— in one of these or in other experiences just as wonderful and breath-taking, you will find the soul of the tropics and the truest fascination of Brazil.
Mr. Russell
City Editor Post
8 P.M.
formerly been worked by a collector.

After the return to Rio, preparations were made to go south to São Paulo to visit the Instituto Butantan, which is under the efficient direction of Dr. Afrânio do Amaral. Two days were spent in Butantan seeing the excellent scientific work being done there, not only in making serum for snake bite, but also for smallpox and various other infections diseases. Due largely to the fine work of this institute, the public health in São Paulo seems to be decidedly better than that in the surrounding country. A visit to the Museu Paulista at Mairipora under Dr. Amaral's guidance afforded an opportunity to obtain from the director, Dr. Taunay, some extremely valuable bird and mammal skins, of which there were formerly no examples in the National Museum collection. Permission was secured from Dr. Koebele, the eminent botanist, to visit the biological station at Alto da Serra, a beautiful bit of rain forest on the crest of the Serra da Caxuã between São Paulo and Santos. A number of rare frogs were secured in the three days of collecting there. A one-day trip to Santos yielded some good marine material, including a fine lot of fish bought at the market there.

My last important excursion, made in the company of Dr. Lutz and his daughter and the colored servant, was in early May to Nova Friburgo in the heart of the Organ Mountains five hours by train from the city of Rio de Janeiro. Here the party was most cordially entertained for five days by an American lady, Mrs. V.B. Schilling, on whose large estate some interesting frogs were secured, but as the cold season was approaching, it was not easy to find them in numbers.

I sailed for New York on May 23rd, having successfully obtained permission to bring my large collection out of the country. The material, when unpacked and distributed in the National Museum, proved to be of great interest to all the departments concerned, and as the localities visited were those from which the National Museum had not received any material of importance in most orders, the value of the collection was doubled thereby.
AN EXPEDITION TO BRAZIL

Doris M. Cochran

On January 5, 1935, I sailed for Brazil at the invitation of Dr. Adolpho Lutz, to study the frogs of Southeastern Brazil in field and laboratory, and finally to collaborate with Dr. Lutz in a paper on the Hyliidae.

The first several weeks of my stay in Rio de Janeiro were spent mostly at the Instituto Oswaldo Cruz, of which Dr. Lutz has long been an important connection, studying the preserved frogs and taking notes of Dr. Lutz' long observations on their life histories. Many short field trips were made into the mountains surrounding the city of Rio de Janeiro, as well as some longer ones to Petropolis, the summer capital of the emperors, in the Organ Mountains, from which important material was obtained.

For three weeks in March collections were made in the state of Minas Gerais with the assistance of Dr. Lutz' trained laboratory servant, Joaquim Venancio, who is especially adept at locating frogs in new unexplored places and in catching them. On this trip Dr. and Mrs. Emanuel Mes added much to the success of the expedition by their helpful knowledge of the country. Much collecting was done in and near Bello Horizonte, the city in which the naturalist lived and wrote of Brazilian fauna. An excursion to Cero Preto of two days yielded a good series of frogs. After leaving Bello Horizonte, the party proceeded to Lassance, a little railroad town 600 miles north of Rio de Janeiro, at which place the Instituto Oswaldo Cruz has a branch. An attempt was made to visit the type localities from which Dr. Lutz had formerly described new species. The last lap of the Minas trip extended north to Pirapora, on the Rio Sao Francisco, where the collecting of frogs and fishes proved to be better than anywhere else. New genera and species of fish were taken from the river here, as this s adaptor had not
The Dragon Lizard of Komodo

by Dr. Doris M. Cochran

Assistant Curator, Division of Reptiles and Amphibians
United States National Museum, Washington, D.C.

Are there really dragons?

We have got so accustomed to living in the machine age that we have forgotten our childish thrills about fairy princesses guarded by fierce dragons in enchanted castles. But while the fairy princesses & the enchanted castles are myth, the dragon has become a reality, for we have acquired one for the zoo! He is not breathing flames or darting fire from his forked tongue — that would be a little too much to ask, after so long a journey as he has just taken — all the way from Komodo Island, which is a mere speck on the map somewhere near Borneo and Lombok, east of Java in the Dutch East Indies. But perhaps the dragon of to-day is a little tamed and subdued, in comparison to the death-dealing mythological creature whose imaginary exploits used to beguile our ancestors who had no radio crooners to entertain them.

The Komodo dragon-lizard belongs to the Order Reptilia and the Suborder Sauria, or Lizards. Family Varanidae, or Turtles, which means that he is a reptile, a cold-blooded vertebrate creature related more closely to the snakes than to any other living thing, and a little more distantly to the turtles & crocodiles, which belong to different suborders of the Reptilia.
The biggest things of their kind always have an unfailing attraction for us, and the Komodo lizard probably deserves the credit for being the biggest lizard in the world today. Big males are known to reach a length of 3 meters or 9 feet, the long powerful tail of course being included in this measurement, and their weights in good condition will be close to 200 pounds. The lower jaw measures over 10 inches in length, and the lizard has sharp, pointed teeth not unlike those of a crocodile, with which he is able to rend an under the body of a wild pig or small deer. They are not, however, hence the hate, though lactating. In Komodo, their native island, they live on the hills, mountains, slope, and through the fields of sunburnt tropical vegetation, retiring at night into a burrow which they excavate under loosened tree roots or under rocks. An abundance of wild game exists on Komodo, and the lizards which is a swift and powerful runner, probably does not have much difficulty in bringing down a good dinner for itself whenever they have the need of it. The lizards flock readily to baited traps, and this is their undoing so far as their freedom is concerned, but for all their voracity they are very watchful. The little young lizards seem especially to fear the old ones, and will dash off with great speed if one of the big fellows approaches the bait. Their curved, scimitar-shaped claws are used for dismembering their food while the slender teeth with bladelike tips tear off huge.
pieces of meat which are gulped down whole. Their table manners are not nice, but perhaps they are necessary under the circumstances!

In captivity, the natural wildness of these lizards seems to be lost, and they soon become friendly towards their captors. Two pets of the London Zoo, named Sumba and Sumbawa, came to be trusted to take walks with the late Curator of Reptiles Mr. F. M. L. Chapman or to Miss Joan Proctor, and she was not afraid to let small children stroke the heads of these captive monsters.

Although the Komodo lizard was first described by a Dutch scientist named Reichen in 1912, the first ones to be brought to live in America were not until 1926, when the Douglas Burden Expedition was started from the American Museum of Natural History in New York to secure live ones for the Bronx Zoo, as well as skins and skeletons for a museum group. The Dutch Colonial government gave the expedition a permit to kill and capture fifteen of the lizards, and the two which were brought back alive graced the Bronx for several months.

The next live dragon lizards to appear in America were those which I have just referred to, now living in the London Zoo. They were sent by the Governor of the Dutch East Indies, with a plentiful notice of their arrival had been given in advance, in ideal cages with artificial sunlight, a fine swimming pool...
potted palm trees, their cage proved to be a miniature Komodo, in which they dwelt happily, consuming eggs and chickens, and allowing themselves to be petted without resenting such familiarity. Others have since been secured to Berlin, and this also has proved docile in captivity.

The dragon lizard which now holds the limelight at our Washington zoo is one of four which were landed recently at Vancouver by two young ethnologists, Lawrence Grossvold and Willard Berner of Massachusetts, who had been in the East Indies to study the native people and their customs. One of the lizards died on route, and the remaining is now in the Bronx in New York. The one in our zoo is about seven feet long and weighs about 80 pounds, but will probably begin to gain weight when regular feeding is resumed. The photographs give a good idea of his appearance, with a massive head and extremely well-muscled legs and tail. The whole entire skin is pocked in appearance, looking like a very dingy beaded bag. The eyes are black, due to the large papils, the weight of is very keen. The sense of smell is likewise fully developed. The long two-forked tongue is a tactile organ, used as a sensitive finger tip might be, to explore objects in which the lizard is interested, for the skin of the body is so thick that very little knowledge can come through it. The lizard heard of his surroundings.
Another peculiarity of this most interesting lizard is revealed only when the skull is compared with that of most other lizards. In the Komodo lizard, as well as in the other smaller members of the genus to which it belongs, there is a very hole in the top of the skull in the occipital region on the back part of the head. This is the "pneumal eye," and is a remnant of a third eye, which in some reptiles now extinct was functional and upward-looking. There is only one reptile in which the "pneumal eye" is better developed than it is in the Komodo lizard and his close relatives — that is in the tuatara of New Zealand, a lizard-like creature which deserves the name of "living fossil." There are many fossil lizards of the family, Varanidae, which are closer to our Komodo lizard in many skeletal features as are any of his living relatives.

The Dutch government has fortunately realized the interest and value of the Komodo lizard, and prevents them from being ruthlessly shot by all come. Otherwise they might suffer the same fate at the hands of the leather hunters as do their relatives in Siam, the Malay Peninsula and the Philippines, some of which grow nearly as long as the Komodo lizard and yield fine tough skins for the leather industry.

A great deal more might be said about the dragon lizard
and his relatives. But come to the Zoo to see him for yourself!