





COVER

New birds of Amazonia


Fifteen species
are described
in the largest
Brazilian
ornithological
discovery of the
past 140 years

Marcos Pivetta

PUBLISHED IN MAY 2013

Brazilian ornithology has not witnessed such a significant contribution to the expansion of our knowledge of biodiversity since the second half of the 19th century: 15 new species of birds of the Brazilian Amazon region will be formally described for the first time in a series of scientific articles expected to be published in July in a special volume of the *Handbook of the Birds of the World* from by the Spanish publishing house Lynx Edicions. The volume is the latest in an encyclopedic and educational 17-book collection that is used as a reference source by amateur and professional ornithologists alike.

The descriptions are authored by individuals from three Brazilian research institutions: the Zoology Museum of the University of São Paulo (MZ-USP), the National Institute for Amazonian Research (Inpa) in Manaus, the Emílio Goeldi Museum of Pará (MPEG), in Belém, as well as the Louisiana State University Museum of Natural



New species of jay of the
genus *Cyanocorax* now
threatened with extinction;
this species is found only
along the edges of natural
prairies in the southern
Amazonas State



A *poiaeiro-de-chicomendes*, the popular name of a species of the family Tyrannidae (at left) soon to be described. Below, a new species of scythebill



Science (LSUMNS) in the United States. Such a large collection of new Brazilian birds has not been presented to the world in a single work since the 1871 publication of *Zur Ornithologie Brasiliens* by Austrian ornithologist August von Pelzeln (1825-1891), which described 40 species of birds collected by naturalist Johann Natterer (1787-1843), also Austrian, on his trips through the Brazilian Amazon.

Eleven of the new species are endemic to Brazil, and four can also be found in Peru and Bolivia. Eight occur west of the Madeira River in western Amazonia; five only inhabit areas located between the Madeira and Tapajós rivers in the heart of the northern region; and two are found only in habitats east of the Tapajós in the state of Pará, in the easternmost region of the tropical forest. In the special volume of the *Handbook*, the authors describe the morphology (forms and structures), genetics and vocalization (song and other sounds) of the new species. Specific maps for each species also show their locations of occurrence. Until the book is officially published, however, the scientific names and some details of the anatomy and lifestyle of the new species cannot be revealed.

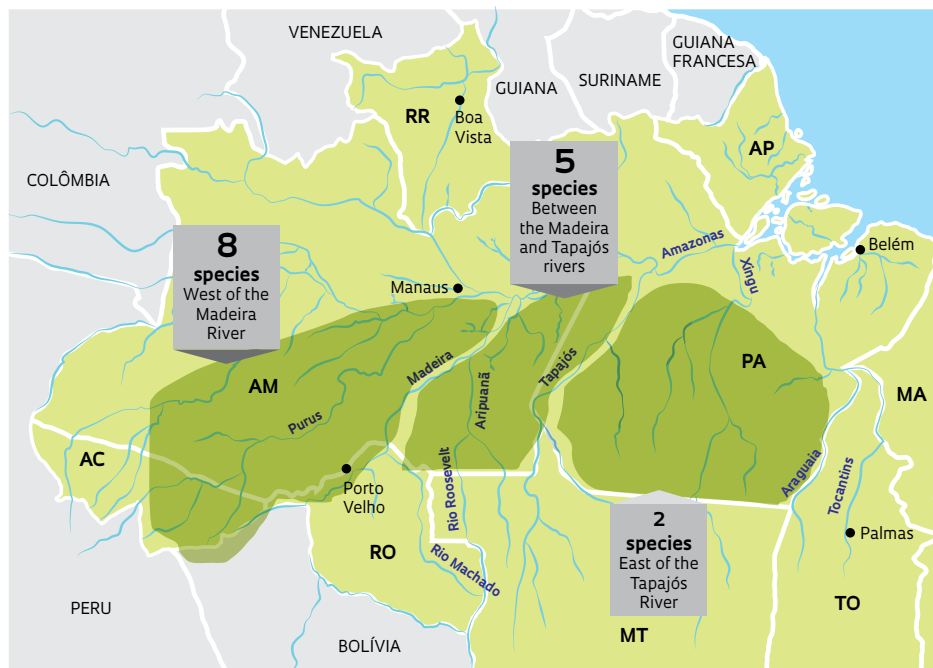
The largest and most spectacular of these birds—all of which are previously unknown and undocumented in the scientific literature—is a jay of the genus *Cyanocorax* that is approximately 35 centimeters in length. It lives only on the edges of natural prairies amidst the forest between the Madeira and Purus rivers in the state of Amazonas. “This jay is threatened with extinction,”

says Mario Cohn-Haft, curator of Inpa’s ornithology department and principal discoverer of the *cancão-da-campina*, the popular name for the bird. “Its habitat is in jeopardy, and we could lose the species before we have time to do an in-depth study.” Its principal region of occurrence is a prairie complex 150 kilometers south of Manaus in an area near Highway BR-319, which connects that Amazonas State capital to the city of Porto Velho. The highway is being repaved, and the researchers fear that the access it will provide to the area will put the species’ habitat at risk. “The new jay also occurs in an area of natural prairies in southern Amazonas near Porto Velho where there are many settlers from southern Brazil who confuse it with the *gralha-azul* or Azure Jay [the state bird of Paraná],” Cohn-Haft notes.

With the exception of a bird of the order Piciformes, which includes toucans and woodpeckers, the other Amazonian species here described belong to the order Passeriformes. Popularly known as passerines, the members of this group account for approximately 55% of known bird species and include sparrows, canaries, tyrant flycatchers, etc. In addition to the jay and a distant relative of the toucan, the book will describe five species of the family Thamnophilidae (which includes antbirds), four from the family Dendrocolaptidae (all new types of woodcreeper), three from the huge family Tyrannidae (which includes 400 species found from Alaska to Tierra del Fuego) and one from the small family Polioptilidae (which has at least 10 species that are

Where the new birds live

The 15 recently discovered species occur in three large regions of Amazonia



Not since the 19th century has such a large number of new Brazilian bird species been described at once

commonly known as gnatcatchers).

In numerical terms, the new Amazonian species represent an increase of nearly 1% in Brazil's avian biodiversity. "We have the second highest number of known bird species in the world, about 1,840," says Luís Fábio Silveira, curator of the ornithology department at the USP Zoology Museum, one of the coordinators of the initiative. "Only Colombia has more species than we do—approximately 1,900. But a decade from now, we'll probably reach 2,000 known bird species in Brazil. The country's museums contain a number of specimens of unknown birds native to various biomes, and these will be described in the next few years."

Birds are the most extensively studied vertebrate group in biology, yet it appears that much remains to be learned, especially in the Amazon, despite the fact that this region has been the focus of a great deal of research over recent decades. "Biodiversity in general, even in regard to the birds of this biome, is far from fully evidenced," says ornithologist Bret Whitney, a researcher with LSUMNS and principal coordinator of the endeavor. "There is still a long way to go for Amazonia to be considered sufficiently well known to enable us to plan and sustain the

existing and future biodiversity reserves." Outside his academic life, Whitney is a partner in Field Guides, an ecotourism company that takes people on birdwatching tours in various parts of the world, including the Amazon.

Several of the dozens of Amazon expeditions over the last 10 years that have led to the discovery of new species were partially or fully paid for by a FAPESP-financed project that Silveira headed. Other expeditions received support from Brazil's National Council for Scientific and Technological Development (CNPq), the Ministry of the Environment, the Biodiversity Research Program of the Ministry of Science and Technology, state-level ministers, and even the National Geographic Society in the US. On one such expedition through the tropical forest last year, approximately twenty researchers and post-graduate students from institutions participating in the project rented a boat for

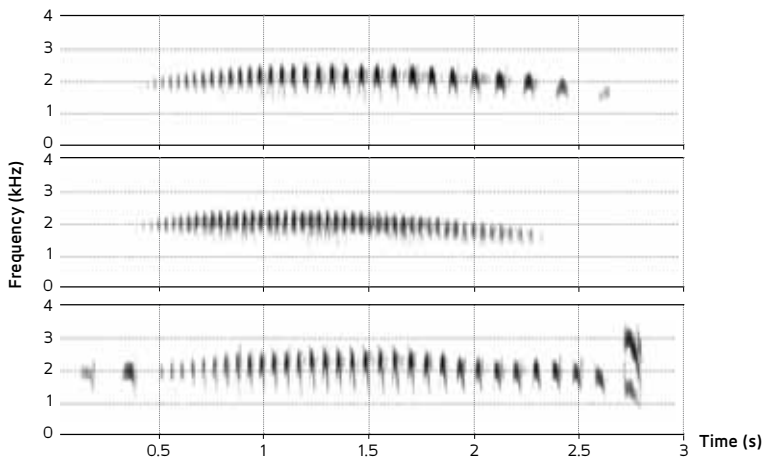
a month (for R\$75,000) to look for new bird species as they cruised along the Sucunduri River, a tributary of the Madeira.

On other occasions, the scientists have even needed armed protection to go into areas that could be home to new types of birds. A common locale of one of the new species, a scythebill called the *arapaçu-de-bico-torto*, is the Altamira National Forest near Highway BR-163 in Brazil's southern Pará State. The area is a conservation unit managed by the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA). "But to be able to work safely in the reserve, we had to be escorted by soldiers from the Brazilian army. There was an illegal gold mine operating inside the unit," says Dr. Alexandre Aleixo of the MPEG ornithology department. "The stress of working in that kind of place is considerable and, if it weren't for the Army's presence, we wouldn't have been able to do it."

In modern times, the process of describing recently discovered species takes place on the pages of scientific journals rather than in books. However, because of the importance and singularity of this group of new Amazonian bird species, the encyclopedia's publishers and the authors of the papers chose an alternate route. Each new species was the focus of a separate paper (a scientific article) written along the lines of what would be prepared for an academic journal. The *Handbook* team hired the services of a group of specialists

Bird song

Graphs demonstrate the differences between the vocalizations of similar species of the genus *Herpsilochmus* (at right)



to handle the peer review process and approve the texts containing the formal descriptions of each species. In science, a text that describes a new life form and labels it with a Latin name consisting of two terms, genus and species, is the equivalent of a birth certificate for that species. It also serves as basic documentation of a region's biodiversity—in this case, birds of the Amazon—and as a basis for formulating public policy on the environment.

The initiative to publish all of the new species at once took shape last year under the leadership of Whitney, Silveira, Cohn-Haft and Aleixo, with the ongoing participation of post-graduate students from their respective institutions. The group was producing texts for the 17th volume of the *Handbook*, which will purportedly contain information on bird species recently discovered throughout the world from 1992 to 2011. The species formally described by scientists during that period were not covered in the other 16 books in the series, which summarized and organized data on each member of the known bird families. This special volume is expected to cover 68 species initially, all of which have been formally described in papers published in scientific journals over the past two decades, yielding an average of fewer than four new species discovered each year. The extra book will ultimately cover 83 species including the 15 Amazonian species, the scientific descriptions of which will appear in the book on an exceptional basis. The group's thinking in choosing to reveal the nine species in a single work was to call attention to the importance of preserving the biodiversity of the Amazon region where two-thirds of the bird species in Brazil are found. "If we published each paper

Brazil has the second highest number of known bird species in the world, approximately 1,840

separately in different journals, it wouldn't have the same impact," Silveira says.

The act of looking for birds in nature calls to mind an image of an ornithologist wearing Bermuda shorts, a t-shirt and a hat, carrying binoculars and perhaps a camera. One item not mentioned, however, is absolutely mandatory for an ornithologist: a recording device. Most of the 15 new species were initially identified by their song, which to a specialist's ear has a different or unfamiliar sound. "You don't need to be highly gifted to recognize a different song. It's a matter of training," Whitney says. "It's like recognizing a new song by your favorite band when you hear the first chord."

Only two decades ago, the description of a new bird species, as was true for most living creatures, was based only on the uniqueness of its anatomy and outward appearance. If the plumage and bone structure of a specimen significantly differed from the features found in already known species, the animal could be labeled as a member of a new species. Today, in addition to morphology, two additional basic criteria are used to propose the existence of a new bird species: analysis of its vocalizations and its genetic material. "Some researchers now propose a new bird species even when



Bico-chato-do-sucunduri (above).
New species of the family
Bucconidae (at right)



only one of those three parameters is shown to be different from that of other known species,” Silveira notes. “We are conservative in our work, and we have proposed a new species only when we found differences in at least two of the three criteria.”

Aided by special software, the recorded song of each candidate for a new bird species was compared with homologous vocalizations of similar species. At times, only a few seconds of comparison were enough to confirm the first impression perceived by the trained ears of the ornithologists: the sound frequencies emitted by the new species differed from the songs produced by related birds, even for some species that were physically very similar. For each new discovery, the researchers also sequenced a few thousand pairs of gene bases present in nuclear DNA and in mitochondria, which are cell organelles that are responsible for energy production and have their own independent genome that is frequently used for studies of phylogeny.

This genetic material was compared with the DNA of already-known species to verify their uniqueness and, whenever possible, to establish kinship relations or a phylogenetic tree for the new species. “For many of the new birds we are describing, the confirmation that it was a different species was actually obtained from the genetic component of the analysis,” Aleixo comments. “This reinforces the importance of obtaining genetic material as part of scientific specimen collection—a process that unfortunately is not yet in practice at a number of museums and collections across Brazil.”

Genetic studies can provide valuable information about species origins. The evolutionary history of two of these newly described birds—two antwrens (*chorozinhos*) of the genus *Herpsilochmus*—is a good illustration of the inroads possible with this approach. The two species are nearly identical morphologically, but their vocalizations are clearly distinct. One of the birds inhabits a stretch along the right-hand side of the Madeira River, and the other lives only on the left bank. In this case, the Madeira, the banks of which can be as much as 10 kilometers apart at some points, functions as a natural barrier between the two bird populations, which have no contact with one another. The long-term separation of the two groups of *chorozinhos* has led to an evolutionary process that biologists have termed speciation: the emergence of a new species—in this case, two—created by the fragmentation of a common ancestral population that now occurs in environments that have no communication (vicarious effect). Despite enormous morphological similarities among the two populations of *chorozinhos*, genetic studies have revealed—shockingly—that they were separated by the Madeira two million years ago.

The role played by the major rivers of the Amazon in the emergence of new life forms through the creation of geographic barriers insurmountable to many species is well known to science. What is new, ornithologists say, is that even waterways that are not as immense can play the same role in certain cases. At least three new species were discovered, for example, in the region between the Aripuanã and Machado rivers in the southern Amazonas State and northern Rondônia State: one of the *chorozinhos* mentioned above, the *choquinha-do-rio-roosevelt* and the *cantador-de-rondon* (these are the popular names for the birds). That area, which is also traversed by the Roosevelt River, served as a refuge for minor bird species that became “captive” and, over the years, developed their own features within the territory between the river banks. “Some rivers in Amazonia have changed their course through evolutionary history,” Silveira notes. “Sometimes this process of riverbed accommodation separates populations of birds that once lived in the same environment.” The many rivers that wind through the greater tropical forest are an abundant source of biodiversity within and around their waters. ■

Project

Systematics, taxonomy and biogeography of Neotropical birds: The Cracidae as model (2007/56378-0); **Grant mechanism** Regular Line of Research **Project Award**. Coord. Luís Fábio Silveira (MZ-USP); **Investment** R\$86,928.28 (FAPESP).