

# BOLETIM DO MUSEU DE BIOLOGIA

PROF. MELLO - LEITÃO

SANTA TERESA — E. S. SANTO — BRASIL

GENERAL INFORMATION  
(DIVULGAÇÃO)

— N. 3 — July 16, 1962

List of Augusto Ruschi's writings on TROCHIDIDAE (AVES) published in the Bulletin of the Museum of Biology Prof. Mello Leitão, in the series on Biology, Zoology and General Information during the years 1949 to 1962. The list gives the title and an abstract of each paper.

Relação dos trabalhos publicados por Augusto Ruschi, sobre TROCHILIDAE (AVES) no Boletim do Museu de Biologia Prof. Mello Leitão, Series: Biologia, Zoologia e Divulgação, durante os anos de 1949 à 1962, com o título e um resumo dos assuntos tratados.

Augusto Ruschi

Museu Nacional e Mus. Biol. M. Leitão

SERIE: Biology and Zoology

N.º 1 — Nov. 20.49, pgs. 1-61, with 6 photographs and 5 line drawings.

Title: Botanical and zoological systems; description of the nests of *Glaucis hirsuta hirsuta* (Gmelin) and *Glaucis dohrni* (Bourcier & Mulsant).

In addition to the description of the nests the author presents a systematic redescription of *G. dohrni* based on the abundant material in the collections, showing that there is no difference in the curve of the bill in males and females of this species as some authors proclaim.

Observations on habitat and behavior of the two species.

Data on weight and size of the birds and their eggs.

Incubation period and notes on the young.

Photos and drawings showing nests and birds.

N.º 2 — Nov. 22 49, pgs. 1-51 with 12 photos and 5 line drawings.

Title: Pollination by Trochilidae; feeding area and resettlement. This paper describes all known ways of pollination carried out by humming birds, by way of their tongue,

their head, neck, bill, breast, belly, tail feathers or wings.

The expression "trochilogamous" is coined to designate plants that depend solely on hummers for pollination.

Description of some of the relations between hummers and plants, as well as some of the points that induce the bird to find its way to a certain flower.

What hummers eat, and a detailed study on amounts of carbohydrates, proteins and vitamins consumed by males, females, and nestlings. Various methods were applied in the experiments.

A table showing food eaten by the nestlings of *Phaethornis pretrei* from the moment of hatching to the time they left the nest, includes the number of meals received by each youngster, each day, and also the daily weight of each nestling.

Comparison of contents of gizzards of feeding and non-feeding females. Detail notes on feeding range of several species, and a list of the plants that are visited by hummers.

Suggestions on how to introduce certain species into a given landscape, taking into account the birds, requirements as to feeding range.

Photos and drawings illustrate the descriptions.

N.º 3. — Nov. 28.49, pgs. 1-119, 37 photos, 17 line drawings.

Title: Classification of hummingbird nests.

Having examined a great number of nests of over a hundred different species belonging in more than 70 genera, the author feels justified to establish a system of nest construction for this group. According to shape of nest and building material employed, three main types can be clearly distinguished. The last of the three types is further split up into several sub-types.

Description of nests of *Glaucis hirsuta hirsuta* (Gmelin); *Glaucis dohrni* (Bourcier & Mulsant); *Ramphodon naevius* (Dummont); and *Threnetes leucurus medianus* Hellmayr. Photos and drawings show the nests of the species listed, and also a considerable number of nests of other species so as to illustrate an example of the types and sub-types specified in the classification.

The end is a list containing the numbers of the nests in the illustrations — Ns. 1-54 — and the corresponding numbers in the collections of the following museums: Museu Nacional da Universidade do Brasil, in Rio de Janeiro,

and of the Museu de Biologia Prof. Mello Leitão, in Sta. Teresa, Espírito Santo, including date and site of collection, and the N.º of the female when taken along with the nest.

N.º 4 — Dec. 4.49, pgs. 1-65 with 17 photos and 10 line drawings.

Title: Nests and eggs of the following Trochilidae: *Phaetornis eurynome* (Lesson); *Phaetornis squalidus squalidus* (Temminck); *Phaetornis pretrei* (Delatre & Lesson); *Phaetornis idaliae* (Boucier & Mulssant); *Chlorestes notatus notatus* (Reichenbach); *Colibri serrirostris* (Vieillot); *Lophornis magnifica* (Vieillot); *Hylocharis cyanus cyanus* (Vieillot); *Hylocharis sapphirina latirostris* (Wied); *Eupetionema macroura macroura* (Gmelin); *Eupetionema macroura simoni* Hellmayr; *Anthracoceros nigricollis nigricollis* (Vieillot); *Melanotrochilus fuscus* (Vieillot); *Thalurania glaucopsis* (Gmelin); *Amazilia fimbriata tephrocephala* (Vieillot); *Amazilia lactea lactea* (Lesson); *Amazilia versicolor brevirostris* (Lesson).

In addition to the description and classification of the nests of the birds listed, their eggs are described and have their size and weight registered. Photographs or a drawing show the nests and the eggs. The final part contains site and date of the taking of each nest and the N.º of the female in the collection of skins.

N.º 5 — Dec. 12.49, pgs. 1-55 with 18 photos and 5 line drawings.

Title: Nests and eggs of the Trochilidae: *Chlorostilbon aureoventris pucherani* (Boucier & Mulssant); *Hylocharis sapphirina sapphirina* (Gmelin); *Thalurania furcata eriphile* (Lesson); *Clytolaema rubricauda* (Boddaert); *Stephanoxis landi* (Vieillot); *Aphantochroa cirrochloris* (Vieillot); *Thalurania furcata furcata* Gould; *Polytmus gainumbi thaumantias* (Linnaeus); *Hylocharis cyanus rostrata* Boucard; *Chlorostilbon aureoventris berlepschi* Pinto; *Thalurania furcata baeri* Hellmayr; *Chlorostilbon aureoventris aureoventris* (d'Orbigny & Lafresnaye); *Hylocharis chrysura chrysura* (Shaw); *Popelairia langsdorffi langsdorffi* (Temminck); and the nests illustrated in the monograph of J. Gould. Besides the nests of the species listed the eggs are described and their size and weight noted, with a picture of each. Some observations made on the young and on incubation are also included.

The final part is a careful check of the pictures of the nests in the five volume work of J. Gould as compared with the large number of nests examined by the author in the course of many years. The check revealed that on Plate 16 in Vol. I of Gould's work a *Phaetornis eurynome* (Lesson) and her young are shown on a nest of *Glaucis hirsuta hirsuta* (Gmelin), or of *Rhamphodon naevius* (Dummont), who share the same habitat but have entirely different nests.

N.º 6 — Dec. 18.49, pgs. 1-53 with 14 photos and 2 line drawings.

Title: Nests and eggs of the Trochilidae *Phaetornis ruber ruber* (Linnaeus), *Florisuga mellivora mellivora* (Linnaeus), *Amazilia leucogaster bahiae* Hartert, *Amazilia fimbriata nigricauda* (Elliot), *Leucochloris albicollis* (Vieillot), *Heliostyris aurita auriculata* (Nordman), *Calliphlox amethystina amethystina* (Boddaert). Methods employed to catch hummingbirds and pack them alive for transportation. Some types of cages and bird houses. Heating appliance used for maintenance and reproduction in captivity. Observations on how hummers find their way over long and short distances.

Description of nests and eggs of the species listed, and observations made on incubation and young, are followed by an account of how to catch the hummers in a mist net, with an ordinary butterfly net, by means of a blow pipe (sarabatana), by using a loop made of human or horsehair, and by employing a thin projectable rod somewhat like fishing tackle, the end of which is smeared with a glue made from plants. It is also explained how hummers and other birds can be attracted by showing them a live or stuffed specimen of *Glaucidium brasilianum brasilianum* (Gmelin), commonly called "caburé de sól". This little owl is the natural enemy of the Trochilidae, and when they see one they fly at it in great excitement, oblivious of other dangers, enabling the captor to snatch them unawares. For transportation alive each bird is tied into a little eclose-fitting cotton bag that will keep him quiet for a couple of hours while he lies side by side with his companions in a suitable travelling case. In this manner one hundred birds can easily be sent over long distances without being harmed. During the trip the birds are fed a drink made of 12 to 20% of sugar dissolved in water. The drink is offered them in a small bottle that has a hole in its lower section into which a short tube (1 cm) was incrustated for the bird to insert its beak.

A recipe for a suitable diet for captives, which, will keep them healthy and able to procreate, is also included.

Description of every type of cage and birdhouse, including convenient heating appliance, in use for keeping any kind of hummingbird in captivity.

Description of enemies both in the open and in prison.

A very detailed report of banding experiments and results.

Orientation in long and short distance flight.

The final part consists of a list of 72 species the author was able to maintain in captivity and have them procreate up to the date of writing. Photographs and drawings show pictures of all proceedings, especially of the capture, transportation and maintenance in prison.

N.º 7 — Dec. 28.49, pgs. 1-65 with 16 photos and 1 line drawing.

Title: Observations made on Trochilidae: pairing off and courtship display; the bath, the sun-bath, sleep and torpor, hibernation, temperatures, rest, lifespan, flight, speed and wing vibration; molt, song and other noises; weight of females, their size; weight and size of eggs; incubation period and age of fledgelings; nests and eggs of *Stephanoxis loddigesi* (Gould) and *Chrysolampis mosquitus* (Linnaeus). Migration and raising in captivity.

In describing courtship display in general in the Trochilidae, special reference is made to *Phaetornis pretrei* (DeLattre & Lesson), *Calliphlox amethystina* (Shaw), *Phaetornis ruber ruber* (Linnaeus), *Eupetoneuma macroura macroura* (Gmelin), *Melanotrochilus fuscus* (Vieillot), and *Colibri serripetris* (Vieillot), and a graph presented showing the route followed in nuptial display by each species. The bath may be a dip in a river or a brook, or in a cup of a bromeliad; ablution on dew-or rain-wet leaves or flowers; a show in the spray of a waterfall or below a melting ice-block. Analysis of the movements the birds make to put the body in contact with the moisture. The sun-bath during the still hours of the day is often interspersed with song or scratching, the bird lighting one foot around the base of its bill in search of tiny mites that cause an itch.

Description of cherished sleeping sites, of how the bird drops off to sleep, and of the moment when sleep turns into torpor in which they spend the night. The author found that the birds' temperature may drop up to 7.ºC from nor-

mal during the first stage, that of falling sleep. Torpor as in hibernation sets in when the temperature drops further. In this connection notes on nine different species are given.

Observations on the lifespan of hummingbirds based on the banding of thousands of free living individuals, and also on captives, are registered. Specimens of *Phaetornis pretrei* attained the age of 14 years in the authors cages. Other species reached 5 to 8 years.

Description of flight in courtship display and analysis of each separate movement for calculation of speed and number of wing vibrations. Several species were studied in this connection.

The role of plumage and molt in the life of the entire family, with special emphasis on mating display.

Song of certain species and scrutiny of onomatopaic phrases.

Song of certain species and scrutiny of onomatopaic phrases.

A list of 46 species and sub-species, their weight and size of females and eggs, incubation period, and number of days the young stay in the nest.

Having made an intensive study of the migratory habits in the Trochilidae of Brazil and of the Andes, the author comes to the conclusion that three main groups can be distinguished, as follows: non-migratory species, which make up the largest number; sedentary or sub-migratory species, also quite numerous, mostly Brazilian and non-Andean, intertropical; and genuine migrants, fewer in number and all living in outposts of the area.

Based on personal observation and taking into consideration habitat and biotop of a great number of species in the third group, the author builds up a theory concerning the origin of the Trochilidae. He thinks they started in the equatorial Andes where to this day the greatest number of species are at home. He stresses the probability that the rich and varied plant life in the successive altitudes with its abundance of micro-climates has favored evolution and differentiation. The region in question contains more different plants than any other place on earth and provides abundance of nooks and niches, which is the decisive factor to promote the prosperity of these birds.

This paper also describes the nests and eggs of *Stephanoxis loddigesi* and *Chrysolampis mosquitus*, and contains some observations made on incubation and young of both species.

In the chapter on domestication and rearing reference is made to the author's activities on the subject since 1934, when he began to study hummers, until the time when he succeeded in raising them in captivity and have them reproduce. There is a detail account of observations made right near the nest, of certain species, of how the nest was built, when the eggs were laid, incubation, the mother tending the young from the day they hatched to the moment the young left the nest. Observation of successive sprouting of feathers, their color and shape. Observation was not limited to the hours of day-light but was carried on into the night, sometimes with the aid of an artificial moon.

Concerning food, all rations the mother brought for the young were examined, their number registered, and the time of day. Dejections of young while in the nest were counted. The observations disclosed that the number of rations fed the young by their mother, from their first day until leaving the nest, practically constant in each species. The figures for *Phaetornis pretrei* cover from 22 to 35 days because in this hummer the nursing period varies in length, the young sometimes leaving sooner and sometimes later. Carbo-hydrates and proteins in the food are specified, also the amount swallowed by young and adults of several species, in the wilds and in prison.

Remarks and experiments in connection with the time spent by the female in nest construction. Depending on her urge to lay it may take from one to thirty days. An account is presented of the female's actions in building the nest, in brooding the eggs, in caring for the young.

Indispensable precautions and provisions necessary for procreation in confinement.

A series of photographs show a nest with young being fed by their mother, in captivity. Another series depicts completely domesticated 2nd and 3rd generations of *Phaetornis pretrei*.

The section on temperature includes a topic on how hummers manage to survive in bad weather, such as a sudden persistent cold spell. They succeed because they know how to find the exact spot where most warmth is reflected by the soil.

N.º 8 — Jan. 17.50, pgs. 1-20 with 1 photograph and 2 line drawings.

Title: The range, and feeding and nesting areas of *Phaetornis pretrei* (Delattre & Lesson) as studied on several consecutive generations from 1938 to 1946.

This program was carried out in a 7 km wide area around the town of Santa Teresa. All data necessary for this kind of work were gathered in that area, including banding of juveniles and adults of subsequent generations and their repeated recapture in order to determine the exact extent of nesting area and feeding range and the dimension of the territory each individual needs to satisfy its vital necessities. Altitude and countryside. Biological observations and measurements of the growing youngsters in many of the clutches. The graphs give a schematic outline of the territory, feeding area, nesting range and clutches examined. Detail observations on incubation, feeding of the young, and proceedings in nest construction. Percentage of survival of young.

N.º 9 — May 6, 51, pgs. 1-8 with 2 photographs and 2 line drawings.

Title: Pterylography in *Eupetionema macroura macroura* (Gmelin) and *Phaetornis pretrei* (Delattre & Lesson).

Description of all feather tracts in a 13 day old *E. m. macroura* entirely feathered. Also number of adult feathers in each tract; same for the 12 day old *P. pretrei*. Total number of telcoptiles in each pterila at the age of 2 years for both species. Drawings explain the tracts described.

N.º 10 — Jul. 24.51, pgs. 1-115.

Title: Trochilidae of the Museu Nacional.

This paper is a catalog of the collections of skins in the Museu Nacional of the Universidade do Brasil. Nearly 2000 skins were examined. It includes the literature consulted for each species and genus. Distribution is brought up to date. The serial number (of the Museum) of each skin in the collections is shown, and all data on the tag, including site, date collected, collector and sometimes altitude. The final section contains biological notes by the author on the following species: *Rhamphodon naevius* (Dummont), *Glaucis hirsuta hirsuta* (Gmelin), *Glaucis dohrni* (Boucier & Mulsant), *Threnetes leucurus medianus* Hellmayr, *Phae-*



*tornis eurynome* (Lesson), *Phaetornis squalidus squalidus* (Temminck), *Phaetornis pretrei* (Delattre & Lesson), *Phaetornis idaliae* (Bourcier & Mulsant), *Phaetornis ruber ruber* (Linnaeus), *Eupetonema macroura macroura* (Gmelin), *Eupetonema macroura simoni* Hellmayr, *Melanotrochilus fuscus* (Vieillot), *Florisuga mellivora mellivora* (Linnaeus), *Aphanotochroa cirrochloris* (Vieillot), *Amazilia leucogaster bahiae* (Hartert), *Amazilia versicolor brevirostris* (Lesson), *Amazilia fimbriata tephrocephala* (Vieillot), *Hylocharis chrysurus chrysurus* (Shaw), *Hylocharis cyanus cyanus* (Vieillot), *Hylocharis sapphirina sapphirina* (Gmelin), *Chlorestes notatus notatus* (Reichenbach), *Chlorostilbon aureoventris pucherani* (Bourcier & Mulsant), *Thalurania glaucopsis* (Gmelin), *Thalurania furcata furcatoide* Gould, *Thalurania furcata eriphile* (Lesson), *Colibri serrirostris* (Vieillot), *Anthracothorax nigricollis nigricollis* (Vieillot), *Clytolaema rubricauda* (Boddaert), *Calliphlox amethystina amethystina* (Boddaert), *Heliothrix aurita aurita* (Nordmann), *Stephanoxis lalandi* (Vieillot), *Lophornis magnifica* (Vieillot), *Popelairia langsdorffi langsdorffi* (Temminck).

N.º 11 — Sep. 22. 53, pgs. 1-21.

Title: Check list of the birds in the State of Espírito Santo.

This is a check list of the birds of Espírito Santo, arranged in order of families. A total of 636 species and sub-species is recorded from the skins collected and preserved in the following institutions: Museu de Biologia Prof. Mello Leitão, in Santa Teresa, E. Santo; Museu Nacional da Universidade do Brasil, in Rio de Janeiro; Divisão de Caça e Pesca, do Ministério da Agricultura (Fish and Game Division of the Ministry of Agriculture) in Rio de Janeiro; and Department of Zoology, State of S. Paulo). It includes 28 species and sub-species of hummers that live in Espírito Santo.

The first part is an introduction in Portuguese, English and German.

N.º 12 — Sep. 28. 53, pgs. 1-13.

Title: Trochilidae of Brazil.

This is a checklist of the humming-bird species collected for the Museu de Biologia Prof. Mello Leitão, both alive and preserved, in the years 1934 to 1953. Distribution of 131 species mentioned as brought up to date. Some are

new for Brazil, namely: *Colibri delphinae delphinae* (Lesson), *Phaetornis bourcieri whitelyi* Boucard, *Phaetornis griseogularis griseogularis* Gould, *Lophornis chalybea verreauxii* J. & Verreaux, *Thalurania furcata fissilis* Berlepsch & Hartert, *Hylocharis cyanus conversa* Zimmer, *Chrysuronia oenone josephinae* (Bourcier & Mulsant), *Talaphorus chlorocercus* (Gould), *Amazilia fimbriata laeta* (Hartert), *Amazilia viridigaster cupreicauda* Salvin & Godman, *Heliodoxa gularis* (Gould).

N.º 15 — Nov. 29. 53, pgs. 1-13 with 4 protographs.

Title: Nests, eggs, and some observations on the Trochilidae *Polytmus theresiae theresiae* (Da Silva Maia), *Lophornis chalybea verreauxii* J. & Verreaux, *Lophornis gouldii* (Lesson), *Phaetornis nattereri* (Berlepsch) *Chrysuronia oenone josephinae* (Bourcier & Mulsant), *Popeiairea langsdorffi melanosternon* (Gould), and *Anthracothonax viridigula* (Boddaert).

Nests and eggs of the species listed are described and depicted.

Biological data on incubation and yung. Principal flowers visited by the procreating females.

N.º 16 — Dec. 26. 53, pgs. 1-11.

Title: The Trochilidae *Amazilia lactea lactea* (Lesson), *Heliomaster squamosus* (Temminck), *Lophornis chalybea chalybea* (Temminck), *Discosura longicauda* (Gmelin), *Chrysolampis mosquitus* (Linnaeus), new in the State of Espírito Santo, and reasons for their recent appearance there.

Having collected and studied Trochilidae in the State of Espírito Santo for 20 years, the author found the species listed for the first time in that State. He thinks that the recent change in weather in his State due to extensive deforestation of virgin forest in the Rio Doce valley to the north is responsible for the incursion of the hummers. He backs up his supposition by an analysis of landscape and climate of the region, and describes the former virgin forest of the east coast at its climax — Martius' *Driadae*. A rapid survey of the more common plants in the wole of the State of Espírito Santo is also included. The author foresees that still other species are bound to transfer their domain to Espírito Santo in the near future. The end is a list of the 33 species and subspecies at at present living in the region in question.

N.º 17 — Nov. 10, 1955, pgs. 1-24.

Title: Notes on the trochilifauna of the marshes in Mato Grosso, between Cáceres and Tapirapóan, that is, between the northern part of the swamps and the slopes of the Parecis mountains.

Headings of chapters: I — Introduction. II — Acknowledgements. III — Procedure. IV — Site, climate and ground structure. V — Various theories on the formation of the "cerrado", and plant life of the region. In this latter chapter the author relates the theories exposed by Warming (climate), Rawitscher and others (Biotica), Alvim and Araujo (ground structure). The author thinks the origin of the "cerrado" cannot be explained satisfactorily by any of these theories taken singly, but that they all combine towards its formation. The essence of the author's idea about the development of the "cerrado" — which covers over a million and a half km<sup>2</sup> of the country — is that its plant-life mirrors climate and soil, being the result of the combination of all three factors. VI — Notas on bird-life in the region with a list of the species seen on occasional visits. VII — "Barreiro das Araras" and "Barreirão" are the names of places where nitrous fluid oozes from the ground, and where Psittacidae of the genera *Ara*, *Amazona*, *Propyrrhura*, *Tirica*, and *Pionus* may be seen by the thousands scraping up and eating the salty mud. In "Barreirão" it is the mammals that dig up the dirt, sometimes leaving hollows 2 m deep by to 4 m in width, and over 1 km long. Performers are *Tapirus*, *Cervus*, *Mazama*, *Aguti*, *Dasipus*, *Felis*, and some smaller animals. They lap up the nitrous earth and eat it. VIII — A list of the Trochilidae collected and notes concerning them. The following species were taken, home to keep alive and some for preservation: 1 — *Glaucis h. hirsuta* (Gmelin), 2 — *Phaetornis hispidus hispidus* (Gould), 3 — *Phaetornis pretrei* (Delattre & Lesson), 4 — *Phaetornis nattereri* (Berlepsch), *Campylopterus largipennis aequatorialis* Gould, 6 — *Eupetionema macroura macroura* (Gmelin), 7 — *Florisuga mellivora mellivora* (Linnaeus), 8 — *Amazilia versicolor milleri* (Bourcier), 9 — *Amazilia versicolor versicolor* (Vieillot), 10 — *Amazilia fimbriata nigricauda* (Gmelin), 11 — *Amazilia chionogaster hirsuta* (Gould), 12 — *Hylocharis chrysurus chrysurus* (Shaw), 13 — *Hylocharis cyanus conversa* Zimmer, 14 — *Hylocharis sapphirina sapphirina* (Gmelin), 15 — *Chlorostilbon mellisugus pheopygus* (Tschudi), 16 — *Thalurania furcata harreri* Hoffmayr, 17 — *Chlorostilbon aureoventris aureoventris*

(d'Orb. & Lafresn), 18 — *Colibri serrirostris* (Vieillot), 19 — *Polytmus guainumbi thaumantias* (Linnaeus), 20 — *Anthraco thorax nigricollis nigricollis* (Vieillot), 21 — *Chrysolampis mosquitus* (Linnaeus), 22 — *Heliactin cornuta* (Temminck), 23 — *Heliomaster furcifer* (Shaw), 24 — *Heliomaster longirostris longirostris* (Audb. & Vieillot), 25 — *Calliphlox amethystina amethystina* (Boddaert), 26 — *Lophornis gouldii* (Lesson), 27 — *Lophornis chalybea verreauxi* J. & Verreaux.

In chapter III, Procedure, the author explains how it happens that a collection of Trochilidae may turn out incomplete even if made by an ornithologist if the collector has no previous experience in the hummingbird world as a whole. Sometimes a flowering tree attracts many species from far away, as was seen on a *Vochysia* sp. in bloom in that region where *Amazilia versicolor versicolor*, *Amazilia versicolor mulleri*, and *Amazilia fimbriata nigricauda*, as well as *Chlorostilbon aureoventris* and *Chlorostilbon mellisugus phaeopygus*, and still other species belonging in other genera all visited assiduously. The time of year the collection is made is also important, as some species are permanent, never leaving the region, while others, of the minor-migrative group, and even true migrants, are seen occasionally but not the year round. A chart shows observations made in the gardens of the Museu de Biologia Prof. Mello Leitão, revealing that in 1939 only 4 species were seen, whereas to-day a total of 23 species visit the place in the course of a year, but never all of them show up at the same time. The chart gives the sequence of species coming through in the run of the seasons. Dominance and its variation is shown for winter and summer.

A plan is outlined for those persons who wish to make a near perfect collection of hummers in each region. The end is a list of the literature consulted.

N.º 18 — October 21, 1956, pgs 1-9

Title: The Trochilifauna of Porto Alegre and vicinity.

Description of countryside and plant-life and data on the climate. General remarks on the occurrence of hummingbirds in that part of the country are followed by an explanation of why only the following species were seen and collected during the author's stay in the South: *Phaetornis eurynome* (Lesson), *Eupetionema macroura macroura* (Gmelin), *Melanotrochilus fuscus* (Vieillot), *Aphantochroa cirrochloris* (Vieillot), *Amazilia versicolor versicolor* (Vieillot),

*Amazilia versicolor brevisrostris* (Lesson), *Hylocharis chrysura chrysura* (Shaw), *Chlorostilbon aureoventris berlepschi* Pinto, *Thalurania glaucopsis* (Gmelin), *Colibri serrirostris* (Vieillot), *Anthracothorax n. nigricollis* (Vieillot), *Leucochloris albicollis* (Vieillot), *Clytolaema rubricauda* (Boddaert), *Heliomaster furcifer* (Shaw), *Calliphlox a. amethystina* (Boddaert), *Lophornis magnifica* (Vieillot), *Stephanoxis loddigesi* (Gould). Some remarks and literature consulted.

N.º 19 — Nov. 25, 1957, pgs. 1-6.

Title: The Trochilifauna of the Rio Cajari in Amapá Territory.

Description of the countryside and some data on climate. General remarks on plant-life of the region and on the hummer population. List of the birds collected, either for keeping alive or to be preserved, and observations made on the following species: *Glaucis h. hirsuata* (Gmelin), *Threnetes leucurus medianus* Hellmayr, *Phaetornis superciliosus moorei* (Lawrence), *Phaetornis ruber ruber* (Linnaeus), *Florisuga mellivora mellivora* (Linnaeus), *Hylocharis cyanus viridiventris* Berlepsch, *Hylocharis s. sapphirina* (Gmelin), *Chlorestes notatus notatus* (Reichenbach), *Anthracothorax viridigula* (Boddaert), *Polytmus theresiae theresiae* (Da Silva Maia), *Anthracothorax n. nigricollis* (Vieillot), *Polytmus guainumbi thaumantias* (Linnaeus), *Heliomaster longirostris longirostris* (Aud. & Vieill.), and *Calliphlox a. amethystina* (Boddaert). Bibliography.

N.º 20 — December 12, 1957, pgs. 1-8.

Title: The Trochilifauna of the mouth of the Rio Javari and Rio Amazonas in Benjamin Constant.

Description of the landscape and vegetation of the region, and remarks on the hummingbird population. List of the live birds taken and of those prepared for the collections, as follows: *Glaucis h. hirsuta* (Gmelin), *Threnetes leucurus cervinicauda* (Gould), *Phaetornis h. hispidus* (Gould), *Phaetornis ruber nigricinctus* (Lawrence), *Florisuga m. mellivora* (Linnaeus), *Amazilia fluviatilis laeta* (Hartert), *Chrysuronia oenone josephinae* (Bourcier & Mulsant), *Chlorestes notatus puruensis* (Riley), *Chlorostilbon mellisugus phaeopygus* (Tschudi), *Thalurania furcata simoni* Hellmayr, *Anthracothorax n. nigricollis* (Vieillot), *Polyplancta aurescens* (Gould), *Heliodoxa gularis* (Gould), *Heliomaster longirostris longirostris*

(Audb. & Vieill.), *Heliomaster frucifer* (Shaw) *Lophornis chalybea verreauxi* J. & Verreaux, *Popelairia langsdorffi melanosternon* (Gould), Bibliography consulted.

N.º 21 — June 26, 1958, pgs. 1-6.

Title: The Trochilifauna of Poços de Caldas, State of Minas Gerais.

Description of the countryside and the plants. Remarks on the hummer population. Lista of the species seen and watched by the author while he made preparations to introduce other species in the town park. The species seen were: *Glaucis h. hirsuta*, *Phaetornis eurynome*, *Ph. pretrei*, *Eupetomena m. macroura*, *Melanotrochilus fuscus*, *Colibri serrirostris*, *Thalurania glaucopis*, *Chlorostilbon aureoventris pucherani*, *Amazilia v. versicolor*, *Amazilia v. brevirostris*, *Aphantochroa cirrochloris*, *Leucochloris albicollis*, *Heliomaster squamosus*, *Anthracothorax n. nigricollis*, *Heliothrix aurita auriculata*, *Clytolaema rubricauda*, *Calliphlox a. ameshystina*, *Polytmus guainumbi thaumantias*, *Lophornis ch. chalybea*, *Lophornis magnifica*.

List of species released in the park and their number. Bibliography.

N.º 22 — January 10, 1959, pgs. 1-16.

Title: The Trochilifauna of Brasilia; description of a new representative of the genus *Amazilia* (AVES); introduction of species new to the area.

Description of countryside around Brasilia; its plant-life. Remarks on its native hummingbirds. Specification of the material collected in the area by Dr. E. Sneathlage in 1927, and by Dr. Helmut Sick, in 1958, totalling 7 species. List of live birds taken by the author and of specimens for preservation, 20 species and sub-species in all, including one new sub-species, as follows: 1 — *Glaucis h. hirsuta*, 2 — *Phaetornis pretrei*, 3 — *Phaetornis ruber ruber*, 4 — *Eupetomena m. macroura*, 5 — *Amazilia fimbriata nigricauda*, 6 — *Amazilia versicolor kubitscheki* Ruschi, 7 — *Hylocharis sapphirina sapphirina*, 8 — *Hylocharis chrysurus chrysurus*, 9 — *Hylocharis cyanus conversa*, 10 — *Chlorostilbon aureoventris aureoventris*, 11 — *Thalurania furcata baeri*, 12 — *Colibri serrirostris*, 13 — *Anthracothorax n. nigricollis*, 14 — *Chrysolarapis mosquitos*, 15 — *Heliaetia cornuta*, 16 — *Heliomaster longirostris longirostris*, 17 — *Calliphlox a. ameshystina*.

thystina, 18 — *Lophornis magnifica*, 19 — *Politmus guainumbi thaumantias*, 20 — *Aphantochroa cirrochloris*.

Notes on some of the birds collected. Considerations concerning the introduction of species new to the area, a venture carried out for the first time in the region, and its evident success. Mention of the domesticated species released on Sitio do Ipê.

Bibliography consulted

N.º 23 — Jan. 17, 1961, pgs. 1-12, with 3 black-and-white photographs and 1 color print.

Title: Notes on *Patagona gigas peruviana* Boucard.

Distribution and habitat of the species, observations made, including description of the song, the flight, which is a distinct glide, uncommon among hummers; also of nest construction and clutch in captivity, courtship display and other particulars. The pictures show the nest and how it is being built by the imprisoned bird. This is the largest among the hummingbirds, also the heaviest; so are nest and eggs.

N.º 24 — February 10, 1961, pgs. 1-10, with 2 black-and-white photographs and 1 color print.

Title: Notes on *Oreotrochilus estella chimborazo* (De Lattre & Bourcier) and *Oreotrochilus estella jamensonii* Jardine.

Distribution and habitat. Notes concerning the bath, the flight, the song, and nest and eggs. Temperature readings taken on birds in activity and birds asleep, also during hibernation. Mention of the strong unpleasant odor peculiar to the species and persistent in the preserved skins. It is similar to that of the common cockroach (*Blata orientalis*). *Oreotrochilus e chimborazo* was seen flying around on top of Mount Chimborazo, at an altitude of 5.300 meters. It is the species which lives in the highest altitudes. The pictures show the nest of *Oreotrochilus e. chimborazo* in black and white, and the bird in color.

N.º 25 — February 21, 1961, pgs. 1-8, with 1 black-and-white photograph and 1 color print.

Title: Notes on *Ensifera ensifera* (Boissoneau).

Distribution and habitat. Description of the song, the

bath, the flight, the nest, the eggs, and of other details including courtship display. Special mention is made of the membrane in the lower mandible of this species, and of its function. In the closed bill the membrane folds inside the mandible. It's color is orange red. It acts like a brake to keep the beak from opening more than 65°. In other species the bill opens 180°, f.i. in *Phaetornis*, were it also plays a role in courtship acting as a stimulus for the female. In *Ensifera* the fold, or membrane, helps in preening after the bath in that it is adjustable to feathers the extra long bill in this species cannot reach. The bird places the fold under the feather that needs cleaning, closes the bill and draws it along the feather in a combing motion, leaving it neat and tidy. Another interesting discovery has to do with the position of the bill. The normal position of the beak in the perching bird is vertical, that is, pointing to the ground. Almost always whenever the author saw the beak being raised to nearly level — both in birds at large in Papallata in Ecuador and in captivity in Sta. Teresa — immediately the hummer *Rhamphomicron m. microrhynchum* came and perched on it. The two species are definite opposites in that the latter has the shortest beak and the former the longest. Both inhabit the same biotop. The photograph shows the nest and the color print and adult male.

N.º 26 — March 3, 1961, pgs. 1-7, with 1 photograph of the nest, and a color print of the male.

Title: Notes on *Aglaeactis cupripennis aequatorialis* Cabanis & Heine.

Distribution and habitat of the species. Description of the song, bath, flight, nest and eggs, and of other points, with special mention of a phase in courtship in which the quivering male presents his back to the female while exhibiting the iridescent plumage above the tail. This feature is common to all species of *Aglaeactis* because they all have iridescent feathers on their lower back. The number of vibrations per minute is also given.

N.º 27 — March 10, 1961, pgs. 1-21, with 4 photographs showing nests, and 5 colorprints of the birds.

Title: Notes on *Phaetornis yaruqui yaruqui* (Bourcier), *Boissonneaua jardini* (Bourcier), *Dorifera ludovicae ludovicae* (Bourcier & Mulsant), *Heliangelus viola* (Gould), *Colibri*



*coruscans coruscans* (Gould), *Helianthea torquata fulgidigula* (Gould), *Aglaiocercus kingi margarethae* (Heine).

Distribution and habitat of each species and some biological observations made on wild and captive birds, describing courtship, nest and eggs, bath, song. Number of wing-beats per second. Bibliography consulted.

N.º 28 — April 15, 1961, pgs. 1-10, with 1 black-and-white photograph and 2 color plates.

Title: Notes on *Eutoxeres aquila heterura* Gould and *Rhamphomicron microrhynchum microrhynchum* (Boissonneau).

Distribution and habitat, song, bath, flight, wing-beats per second. Description of nest. Biological observations on both species including an account of how *Eutoxeres* visits the flowers of a gigantic *Heliconia* sp. The flowers sprout from an overhanging inflorescence which is over 1 1/2 m long, and are protected by a substantial red bract. To reach the flowers the bird must climb from one bract to the next, like a bat.

N.º 29 — May 21, 1961, pgs. 1-9, with 1 photograph and 1 color print.

Title: Notes on *Oxypogon guerinii lindenii* (Parzudaki).

Distribution and habitat. Description of song, flight, bath, nest, and eggs. Courtship display.

The author found that this is the only hummer that spends much of his life on the ground, living in meadows of a grass named *Aciacne pulvinata* in the tundra of Abrojo de los Andes. The bird takes nectar from a small whitish flower there, and also tiny insects and driplets of in which those high altitudes are clouded most of the time. The bird moves forward over the grass in small leaps of from 5 to 10 cm at the most as if it were marching. It covers considerable distance in each jaunt lasting 20 minutes or more. This is the first time leaping on the ground was seen in a hummingbird in the wild, and since this kind of activity is peculiar to this hummer and he the only one in the family to do it, we named him after the Greek *oxipogon*, meaning to act like an *Oxypogon*. Bibliography consulted.

N.º 30 — June 26, 1961, pgs. 1-41 with 1 photograph showing resettlement.

Title: Live hummingbirds at the Museu de Biologia Prof. Mello Leitão, during the years 1930 to 1961.

In the introduction the author relates how his inclination to study the Trochilidae received new impulse.

A list of all Trochilidae, in chronological order of the Check List of Birds of the World, of J. L. Peters, Vol. V, 1955 edition. In this list the scientific name of each bird is followed by the popular denomination it receives where it comes from, date captured or received as a donation, date of disposal through death or as donation to other collectors. The list reveals that 204 species and sub-species were maintained in captivity during the period. Mention of the great number of semi-domesticated birds living free in the park of the Museum, over three thousand. Up to twenty kg. of sugar per day go into the syrup to feed them.

All resettlements made in the country by the Museum are listed, complete with the names of all species that nested and reproduced in confinement up to that date.

N.º 31 — January 11, 1962, pgs. 1-24, with 7 photographs.

Title: Notes on *Augastes lumachellus* (Lesson) and *Augastes scutatus* (Temminck).

Description of geology and climate of the region where the species live. Remarks on the locality the author traces as the home of *Augastes lumachellus*. The species had been considered extinct but the author rediscovered it on Chapada Diamantina. He found it to be endemic in the region and non-migrative. It actually occurs only on the plateau in question, in an area extending over roughly 250 km<sup>2</sup>, from Barra da Estiva to Morro do Chapéu, in the State of Bahia.

Distribution and habitat of *A. scutatus*.

Description of countryside and plant life in the two sections inhabited by the species. Notes on their habit of bathing, their song, flight, courtship, and on their nests and eggs.

A list of the skins of both species in existence in the following museums: American Museum of Natural History, New York; United States National Museum, Washington, D.C.; in the States; Museu Nacional do Rio de Janeiro, Departamento de Zoologia, in S. Paulo, and Museu de Biolo-

gia Prof. Mello Leitão, in Sta. Teresa, Espírito Santo, in Brazil. Reference to the live individuals in Museu de Biologia Prof. Mello Leitão, in Sta. Teresa, E.S. Bibliography consulted. The pictures show the countryside and general surroundings in the birds' native habitat.

N.º 32 — January 24, 1962, pgs. 1-7, with 2 photographs.

Title: A new representative of the genus *Colibri* (Trochilidae) found around Andaray, State of Bahia.

In the introduction the author focusses certain particulars connected with the trochilifauna that are common to the areas inhabited by the birds in Bahia and to those parts of Venezuela that have their name ending in "tepui", f.f., Uei-tepui, Chimatá-tepui, and others which all possess marked endemic bird-life.

Distribution of the genus *Colibri* in Brazil.

Description of the new sub-species *Colibri delphinae greenewalti*, discovered in Andarai, based on type N.º 7341, in Museu de Biologia Prof. Mello Leitão, including weight and temperature which is 41.ºC. The pictures show the habitat of the new species herein described.

N.º 33 — March 16, 1962, pgs. 1-4.

Title: Phases of the courtship of the Trochilidae. Consecutive steps. The author describes the successive courtship proceedings observed in hummingbirds and sets up their classification.

Courtship display studied and analysed in over 100 species belonging in 50 different genera permits distinction of five separate steps, as follows: 1st step: spotting the female; 2nd step: following her; 3rd step: meeting; 4th step: plumage exhibit; 5th step: copula.

Abstract in English. Bibliography.

N.º 34 — April 12, 1962, pgs. 1-6, with 1 line drawing.

Title: Crest tuft and eyelids of *Lophornis chalybea chalybea* (Vieillot) and *Lophornis chalybea verreauxi* J. & Verreaux. Their color and function in courtship.

The author describes how he discovered about this peculiar crest and its great biological meaning in the life of these hummers. Although the birds have been known to

science for several centuries, this is the first time a detail description is made of the crest tuft peculiar to these two species only. The blue in the crest is rather intensive and very important in the display. Description of the five steps of courtship and a picture showing the tuft.

Abstract in English and literature consulted.

N.º 35 — May 3rd 1962, pgs. 1-2.

Title: Molt in *Heliomaster furcifer* (Shaw) and *Heliomaster squamosus* (Temminck).

For the first time the author points out the existence of neutral molt in representatives of the hummingbird family. Detail description of these molts.

Abstract in English and bibliography.

N.º 36 — May 25, 1962, pgs. 1-2.

Title: Molting in *Calliphlox amethystina amethystina* (Boddaert) and *Calliphlox amethystina mitchellii* (Bourcier).

Description of the molt in the two species. The author concludes that the details observed in the molt of these two species justify plainly that the latter is merely a sub-species of the former and not an autonomous species as heretofore thought.

The author stresses the importance of biological observation in order to clarify the systematic position of dubious species.

Abstract in English and literature consulted.

N.º 37 — June 1962, pgs. 1-2.

Title: Molting in *Chrysolampis mosquito* (Linnaeus) and *Chlorestes notatus notatus* (C. Reichenbach)

Description of the normal molts, two in *Chrysolampis* and one in *Chlorestes*, and certain peculiarities not shared by other Trochilidae.

Abstract in English and literature.

N.º 38 — July 5, 1962, pgs. 1-8.

Title: Molt in the Trochilidae.

Having studied a great many moltings in over one hundred species of hummers the author finds that in a general way two cases can be distinguished: normal molts and ex-

ceptional ones. Descriptions in connection with this important detail are here examined for the first time from a more experimental angle.

Abstract in English and literature consulted.

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GENERAL INFORMATION

N.º 1 — January 8, 1960, pgs. 1-28, with 7 pages of line drawings.

Title: Artificial keys for the identification of genera and species of the Trochilidae of Brazil, and a short description of each species and sub-species.

Description of the parts of a hummingbird illustrated in a line drawing of *Lophornis magnifica*. Key of the genera found in Brazil, with the N.º of the fig. showing the genus type for Brazil; keys of the species and a short description of each and its distribution in Brazil.

N.º 2 — January 23, 60, pgs. 1-32, with 9 photographs and 3 line drawings.

Title: How to catch birds alive and pack them conveniently to be sent on long or short trips.

Description of some types of cages and bird houses suitable to keep the tenants in good condition and have them reproduce in captivity. The author relates his method first published in 1946, in *Seleções Agrícolas* N.º 2, of June, and in *Boletim do Museu de Biologia Prof. Mello Leitão* N.º 6, of Dec. 18.1949, illustrated, referring to hummingbirds, which he invented and developed in the years of 1934 to 1939, and gives an account of the method's successful application with a number of birds of different families.

Description of how to catch birds with the "sarabatana" (a blow pipe), with an ordinary butterfly net, with a "puçá" (a loop net made of vegetable fibre), with a loop, and with a pliable rod with a viscous tip. Instructions to place the bird in its travelling suit (a small cotton bag, with a picture of a hummer undergoing the process, and also a picture of the most convenient travelling case for the purpose, in which the birds will not get hurt or injured during the trip.

Description of feeders preferred by hummers and other birds.

Description of the author's method of attracting wild birds in the woods, in orchards, in fields and in shrubbery. Description of bait to insure a good crop of wild birds, especially hummers.

The end is a description, with pictures, of all existing types of cages that may be recommended to house and rear hummingbirds in captivity.