

Report on the journey down the river Paraná to Assuncion and the return journey over Buenos Aires, Monte- video and Rio Grande

made by

Dr. Adolpho Lutz, Dr. H. C. de Souza Araujo and Dr. O. da Fonseca.

From January to March 1918.

(With Plates.)

Summary of the diaries of Drs. Lutz and Araujo.

(Inset numbers refer to illustrations.)

In the beginning of the year, a journey down the river Paraná was made at the expense of the government of Paraná and the Instituto O. CRUZ by Drs. ADOLPHO LUTZ, HERACLIDES DE ARAUJO and O. DA FONSECA jun. Photographs were taken by Drs. ARAUJO and FONSECA. The commission started from São Paulo, stopping first at Baurú¹⁻², then at Itapura where they saw the celebrated falls of the river Tietê^{3,4} and soon reached the Paraná⁵, staying in Tres Lagoas on the Matto Grosso bank. There began the journey on the Upper Paraná which, though very wide, was hardly known until a few years ago; even now, its banks are only very sparsely inhabited. The medical commission embarked on a small steamer, the Paraná⁶, which took them to Porto Tibiriçá⁷⁻¹⁰, a settlement of the Companhia de Viação São Paulo Matto Grosso with extensive pastures, in which the cattle, transported from Matto-Grosso on the opposite bank, may rest. From

Porto Tibiriçá they went downstream¹¹⁻³¹ to Porto Mojoli³²⁻⁴³ in a barge towed by a gazoline launch belonging to the Empresa Matto-Larangeira. Porto Mojoli is a settlement of the same Company, above the celebrated falls of the Paraná, called Salto Guayra or Sete Quedas. Enormous quantities of Matto brought from Matto Grosso are sent by rail from this place to Porto Mendes⁴⁶ where the river again becomes navigable. After having been the guests of the Empresa for some time and making several excursions^{44,45} the travellers proceeded to Porto Mendes⁴⁶ and went on board one of the steamers of the regular service on the Lower Paraná⁴⁷.

They next stopped at the military settlement and colony Iguassú⁴⁸⁻⁵⁸, one of the remotest points of the southern frontier of Brasil which is still very difficult to reach by land. Near it, they saw the cataracts of the Iguassú⁵⁹⁻⁶⁶ river. These belong partly to the argentinian Misiones, partly to Brazil. There are more visitors on the argentinian side but the scenery is finer when seen from the brazilian bank. There are small hotels on both sides. The commission stayed for some

time in the Brazil Hotel and explored the place which seems destined to become a center of great attraction. They also visited Porto Bertoni⁶⁷ on the Paraná, the residence of a Swiss naturalist, Dr. BERTONI, who has spent most of his life in Paraguay.

From Iguassú the travellers descended the Paraná on the *España*⁴⁹, passing the mouth of the Iguassú⁶⁶ where Argentine, Brazil and Paraguay meet. From here downwards the right bank is paraguayan while the left belongs to the argentinian Misiones. Owing to the facilities of steam navigation, there are many settlements⁶⁸ where timber is felled and shipped. Between them, the forest is still unbroken. Only near Encarnacion and Posadas the shores become gradually more cultivated, while the river broadens to a width of 4 kilometers. Posadas, on the argentine shore, is the capital of the Misiones and Encarnacion on the opposite bank is an important paraguayan port, connected by railway with the capital, Assuncion. Both are rising places.

After a visit to Posadas^{69a} and a short stay in Encarnacion⁶⁹, the travellers went by rail to Assuncion⁷⁰⁻⁷³ where they were very kindly received by the authorities and the physicians. With Dr. MIGONE, the director of the bacteriologic Institute, they went to San Bernardino on lake Ipacarahy⁷⁴ and visited the remainders of the Rio Salado⁷⁵, where there is a focus of Mal de Cadeiras (equine trypanosomiasis). They also visited the Botanical Garden in Trinidad⁷⁶⁻⁷⁸, where they saw interesting plants and various collections and made studies in the hospitals and the bacteriologic institute. After a pleasant evening, spent with the doctors of Assuncion, they embarked for Buenos Aires on the large river-steamer Bru-xellas, descending first the Paraguay⁷⁹, then the Paraná. They stopped at many ports, some of them belonging to important towns⁸⁰. After three days journey they arrived in Buenos Aires⁸¹⁻⁸² where they stayed several days and returned to Rio by water, first visiting Montevideo. They stopped several days in Rio Grande⁸³⁻⁸⁷ but barely touched Florianopolis⁸⁹, Itajahy⁹⁹, São Francisco¹⁰⁰⁻¹⁰¹, and Para-

naguá. Dr. ARAUJO however stayed in the city of Rio Grande⁹⁵⁻⁹⁸ and visited several places⁸⁸⁻⁹⁴ in the same state before returning to Rio.

Entomological, zoological and botanical notes

by

Dr. Adolpho Lutz.

1. Insects observed on board while travelling.

While travelling during many days and by various crafts on the Paraná and its afluentes, I was able to make some entomological observations, the results of which, combined with others obtained under similar conditions, are not altogether devoid of biological interest.

In day-time, few insects are seen on the larger rivers. Those met with are mostly butterflies which attempt to cross the river, either isolated or in bands, as some *Pieridae* for instance. They seldom settle on board. Most of them keep near the banks where they can be seen on wet spots or at rest on canoes and barges moored there. One kind of *Libythea* seemed to prefer the deck of barges to any other resting place and gathered there in large numbers. The same may be said of some large *Hymenoptera*.

In the woods bordering the rivers, *Coleoptera* must be plentiful but only a few isolated specimens are seen flying over the water.

Some *Tabanidae* follow the rivers and invade the boats even in broad daylight, as for instance *Lepidoselaga lepidota* and two kinds of *Diachlorus*: *flavitaenia* and *bimaculata*, generally easily distinguished but showing forms of transition. These species are never found far from the rivers where their breeding places must be looked for. The larvae are still unknown, like those of some species of *Esenbeckia*, which also accompany the river though they do not favour broad daylight. *Chelotabanus aurora*, a decidedly fluvial species, is seen at dusk. Like *Lepidoselaga*, it is also found on the rivers of northern Brazil.

When the boats are at a good distance from the shore, mosquitos are not seen in daytime. At twilight and at night, some species, chiefly of *Mansonia* and *Cellia*, are attracted by the lights and may appear on board, but they are not nearly so numerous as when the boat is near to, or moored at the bank.

Several kinds of *Simulium* apparently like following rivers where the air is always damp. Sometimes they are found up to thirty miles from their breeding places; I had already noticed this on the São Francisco river, and observed it again on the Paraná. *Simulium amazonicum* is found on all the large rivers, where there are falls, and is most annoying when one travels by water. On shore, horses are more persecuted than their riders.

In the ports some flies belonging to the *Anthracidae* and *Muscidae* groups came on board, while others bred there or were shipped with goods.

At night, many more insects appear, specially when the boats are well lit. On dark nights they are more numerous but generally small in size. The moths are mostly small and *Microlepidoptera* prevail. The diptera are chiefly small *Nematocera* with aquatic larvae, specially *Chironomidae*. When the river winds through marshy regions, their number increases considerably. *Trichoptera* and *Neuroptera* with aquatic larvae are also found in many individuals, but in few species. Most of them are *Plecoptera* of the genus *Perlodes*; *Ephemera* appear occasionally, while some species of *Trichoptera* are more regularly observed. I noticed a *Leptonema* and another one, which probably belongs to a new genus of *Macronematinae* (*Hydropsychidae*). A goodly number of brazilian *Trichoptera* is already known but there must be many more. Their preservation is difficult, as the body is very soft while the antennae are fragile and often extremely long.

Unlike the clear streams coming from the mountains, the turbid waters of large rivers, depositing quantities of mud, are unfavourable media for aquatic larvae and only a small number of species have adapted themselves

to them, though there may be many individuals. They are of practical interest as food for fishes but their study must be left for the future.

Where many insects appear, spiders are always found and this is true even on board ship.

2. Blood-sucking Diptera.

According to all accounts, the summer of 1917-18 was unfavourable for the collecting of insects in the regions of the Paraná and of Paraguay through which we passed. This was due to a spell of dry weather just before the summer and to a great frost in winter, which was still indicated by the large number of dry branches hanging on the trees. To add to this, the best season was already over and we were only able to collect on river banks or on board ship. In spite of these difficulties, we collected and preserved about 600 insects, besides many which were not mounted. We did not find many new species but made some interesting observations on the distribution of hematophagous diptera. Partly for this reason and partly on account of its practical interest, I shall deal with this group first, beginning with the *Culicidae*.

Culicidae.

Anophelinae. Of this sub-family, we only found two kinds of *Cellia*. One was *C. argyrotarsis* which must be considered the transmissor of malaria among the inhabitants of the Upper Paraná and the crews of boats who spend the night in foci of infection. Some specimens were caught in Porto Tibiriçá and many others were captured on board the launch, on an excursion to the Ivahy river. Of *C. albimana*, only a few specimens appeared on the Upper Paraná. At the time the river was high and the conditions unfavourable to the breeding of these mosquitos; as it happens on other rivers, many more might have been found at a different period. In any case the intervention of other mosquitos is not necessary to explain the presence of malaria in this region.

Culicinae. We found *Stegomyia* (the transmissor of yellow fever) in Baurú and also in large numbers in Tres Lagoas (Matto Grosso), the first station on the Corumbá railway. If the other stations on the same line are not already invaded by *Stegomyia*, it is safe to say that they will soon be, as this mosquito is easily spread by railway. In the ports Tibiriçá, Mojoli, Mendes and in Iguassú we found no *Stegomyiae*. They are only seen when imported, as they are not natives of that region. I saw them again in Encarnacion, Assuncion and San Bernardino and on the earlier part of the journey. *Stegomyia* is found in Buenos-Aires, La Plata and Montevideo. I am not sure whether it occurs in Rio Grande or not. Only once during my stay did I see a mosquito flying in the peculiar way which characterises the male *Stegomyia*.

The most troublesome Culicidae met with on the journey were:

Culex fatigans (nowadays *quinquestratus*)

Culex confirmatus (nowadays *scapularis*)

Culex albofasciatus MACQ.

Ianthinosoma Arribalzagae

Mansonia titillans

The common night-mosquito, *C. fatigans* WIED., is so ubiquitous that it hardly seems worth mentioning in which places we found it.

C. scapularis ROND., more known as *C. confirmatus*, is very common on the Upper Paraná. In houses or boats in motion it is not numerous, but as soon as the latter come alongside the bank, *C. scapularis* invades them, together with *I. Arribalzagae*. It is however only when one penetrates into the depths of the thickets on the shore, that the former becomes really unbearable. Strange to say, the larvae of this species are seldom found. This fact and the frequent occurrence of rubbed specimens lead me to believe that *C. scapularis* enjoys a long life. We did not find a single breeding place of the larvae of this species, during the whole of the journey.

From Iguassú to Encarnacion, mosquitos are, generally speaking, more rare; *C. scapularis* is however frequently found in Paraguay and in the Argentine, where there are trees.

C. albofasciatus resembles *C. scapularis* in many ways. It attacks in day-time, even in full sun-light and its bite is rather painful. When attracted by artificial light, it enters houses and boats in great numbers; yet it can hardly be considered a house mosquito. The first specimens were found below Corrientes; while crossing a marshy region below Paraná, the boat was completely invaded by *C. albofasciatus*. Until a short while ago, this species was only known from the Argentine, but I found it very abundant in the harbour of Rio Grande where it came on board. I caught several females, some of which were gorged with blood; others I allowed to sting. The eggs obtained from them were laid separately and of the same shape as those of *Stegomyia*. They sink easily, but develop even under water, though less quickly. The larvae take at least five days to develop; they have a short and stout respiratory tube and, after the last moult, about fourteen curved compound spines on each comb. These are generally almost equal but the basal one is shorter and the two last ones longer; the tuft corresponding to each comb is composed of nine bristles and is nearer to the apex. The antennae are short and have no bristles. The larval stage lasts about two weeks; many of our larvae died, probably because the conditions under which they were raised were defective and different to the normal ones. The nymphal period is a little less than three days.

We found regular swarms of *Ianthinosoma Arribalzagae*. It is not wanting on the Lower Paraná and in Paraguay, while on the upper river and its affluents, above Porto Mojoli, it formed a real line of defense, attacking all the people who went on shore and invading the boats lying alongside. In some places the number of females settling on the travellers' clothes surpassed anything I had hitherto seen, but luckily only a few of

them were able to bite. When one penetrates deeper into the woods, found on the banks of all the rivers, their number decreases rapidly while that of *C. scapularis* increases. *I. Arribalzagae* is found exclusively on the banks of rivers in which the musty breed, as often there is no other water in the neighbourhood. I did not succeed in obtaining any larvae and believe that they either live in deep water, or cling to plants. At the waters edge grew a continuous fringe of *Eichhornia*, but their immersed parts were covered with mud and we found no larvae on them. I got many eggs of *I. Arribalzage*; they were isolated, black and like those of *Stegomyia* in shape. Unfortunately, though I made repeated and prolonged experiments under varying conditions, no larvae were hatched; this points to very peculiar biologic conditions. The period of incubation is probably very long.

Some specimens of this gnat were quite typical but others seemed to form a transition to *I. albigenu*, of which we also found characteristic specimens. *I. albigenu* is probably only a variety of *I. Arribalzagae*.

The other two species of *Ianthinosoma* are comparatively rare, evidently because they require different conditions.

I found *Mansonia titillans* both on the upper Paraná (Tres Lagoas, Porto Tibiriçá and Mojoli and between these places) and on the lower part of the river. It often came on board at dusk. *M. titillans* is common on the Salado river near San Bernardino (Paraguay). In the earlier part of the journey we saw many specimens with reddish scutum, which must be a variety; typical specimens, with brown scutum, appeared further South.

On the Upper Paraná, I found two specimens of a *M.* species I had already seen on the San Francisco and in Pernambuco, where I found its larvae on the roots of *Pistia stratiotes*. Perhaps it was *M. pseudotitillans*, which is very common on the Amazon. On this journey, we only saw a few specimens of *P. stratiotes* and those I exami-

ned had no larvae on them. *Taeniorrhynchus* species were conspicuously rare during the whole journey.

Psorophora ciliata came on board several times, both in the Upper and on the Lower Paraná. It is common enough in Paraguay, and Dr. MIGONE collected three color varieties of it near the river Salado. On an excursion to this river, made with him, we also found the three varieties. Besides the typical form, there is an ochraceous one and an almost black one, which must not be mistaken for *Ps. Holmbergi*. The latter is restricted to a small zone; we caught only one female that came on board below Paraná.

In the Iguassú falls, I noticed some *Culex serratus* and one specimen of *C. crinifer*. Wood mosquitos breeding in *Bromeliae* were rare because there were few of these plants, and those not in favorable conditions; at Iguassú only, did I obtain some larvae, but they were not very interesting. Some of the places we passed were covered with *Chusquea gaudichaudi* and would be very suitable for studying the fauna of this giant bamboo. Unfortunately they had flowered the year before and in consequence were dead. Between Porto Mojoli and Porto Mendes, we found a few living ones, from which I bred *Carrolia iridescens* and *Hylconops longipalpis*. There were also some larvae of *Sabettinus* and *Megarrhinus* but they died on the journey.

In the same woods grew a great many specimens of *Urera subpeltata* MIQ (?), the stems of which sometimes hold water. Dr. ARAUJO and I picked and examined many of them, but all we found was one larva of the *Dendromya* type. We did not succeed in raising it, so the species remains uncertain. We intend to investigate this point at the earliest opportunity.

Chironomidae, subfm. Ceratopogoninae.

Some small blood-sucking *Ceratopogoninae* with spotted wings, generally known as "mosquitos polvora", or "polverinos" and belonging to the genus *Culicoides*, were

found in Porto Tibiriçá, Porto Mojoli, on the river Pequery and at the Iguassú falls. They enter houses, specially open verandahs. All specimens probably belonged to the same species, described in my monograph as *C. debilipalpis*. Dr. MIGONE also found them in Porto Bertoni. I found the first larvae of wood *Culicoides* discovered in South America, in some rain water which had gathered in the bark of a felled tree in Iguassú, but unfortunately I did not succeed in raising them. Dr. MIGONE gave me some "polverinos" of another species, *C. horticola* LUTZ, in Paraguay. It seems that *Cotocripus pusillus* is also found. The distribution of the genus *Culicoides* is rather hap-hazard, but the species, of which there are few, range over great stretches of land.

Simuliidae.

The larvae of the *Simuliidae* or black-flies, of which there are some twenty or thirty species in Brazil, live in running water or in falls. Only a few kinds are found in the larger rivers, which always carry and deposit great quantities of mud; there are not many even in the rapids and falls, but some of them attack man.

The best time for studying them is when the river is low. Now, during our journey the river was high and made the gathering of *Simulium* in its first stages very difficult. Only at great cost did I obtain a few larvae and pupae above the Guayra falls.

Three species of *Simulium*, all of which attack man, were described by Mr. SCHROTTKY from Paraguay. Believing them to be new, the author named them: *S. inexorable*, *S. paraguayense* and *S. paranaense*. As I already suggested, the first is synonymous with *pertinax* KOLLAR, the most common species of Rio de Janeiro. *S. paraguayense* agrees with specimens I have since determined as such. As for *paranaense*, I found no species that could be considered as undoubtedly the same.

S. pertinax is quite common all along the mountainous coast of Brazil, from Sta. Catharina to Bahia, though only on the lower mountains. I never saw it more than 800 m. above sea-level. Large colonies of its larvae and pupae are found on the more horizontal ledges of rock in the falls of mountain streams and brooks, for instance near Rio above the Cascatinha (Tijuca), on the Gavea and in the Serra da Estrella. Inland the same species occurs at moderate elevations, e. g. on the Tocantins, the Paraná and the Paraguay.

I found *S. paraguayensis* in and near the river São Gonçalo (Lassance, Minas), in the Rio Grande (which flows into the Paraná), at the great fall of the Paranapanema and in sundry other falls. It also seems frequent in Tucuman. SCHROTTKY says that on the Upper Paraná it is common, though never seen at any distance from the river. In the woods near Iguassú, I saw swarms of *S. paraguayense*; only a few of them would bite but they were very annoying. Fortunately, the irritation produced is less painful and of shorter duration than that caused by *S. pertinax*.

Though, I know the nymphae of *S. paraguayense*, I did not find any on this journey, a fact doubtlessly due to their being covered by the flood. Under these circumstances, the presence of such a large number of adults points to great longevity.

Besides these, I found two other species, only one of which, the "piúm" of North Brazil (*S. amazonicum*), attacks man; a few specimens were caught at the Iguassú falls. The other, *S. orbitale*, (so named because it prefers to sting horses at the orbital margin, though it attacks other parts of the body as well), we met on the Upper Paraná in Porto Mojoli and just above the cataracts of Guayra in which it must breed. We gathered the very characteristic larvae and nymphae above the Iguassú falls. They are generally found in all large falls such as those of Pirapora, Paulo-Afonso, Avanhandava etc. Up to now, this species is the only one found in the two

first mentioned. It is unusual for them to be directly fixed on stones; as a rule they are attached to plants, principally to *Podostemaceae* which only grow in falls. In its earlier stages *S. amazonicum* also lives on them.

Lately, I received the following species from Dr. MIGONE, who collected them in Puerto Bertoni, long after I had left:

1. *Simulium pertinax* KOLLAR.
2. *Simulium orbitale* LUTZ.
3. *Simulium paraguayense* SCHROTTKY
4. *Simulium amazonicum* GOELDI.
5. *Simulium subpallidum* LUTZ.

From Prof. WOLFFHUEGEL I received:

1. *Simulium pertinax* (from Puerto Aguirre).
2. *Simulium rubrithorax* (from BONPLAND).

Simulium subviride n. sp. was not rare in Puerto Mojoli; I caught it on horses. *S. incrustatum*, a rather common kind, came on board between Porto Mojoli and Porto Tibiriçá.

Psychodidae.

The only specimen of *Phlebotomus*, seen on this journey, was caught after dark in a wood near Iguassú by the light of a lantern. It was a female of *Ph. longipalpis*, a species which also occurs in Paraguay, from where Dr. MIGONE kindly sent me some specimens.

3. Faunistic distribution of Tabanidae.

I have made a great many observations on the very complex distribution of South-American Tabanidae. Not only is it independent of politic frontiers, but almost even of geographic ones. The widest rivers do not oppose a real barrier, and the Andes are the only chain of mountains which separate different faunae almost completely.

Some species are common in Brazil and also in the neighbouring countries, while others appear sporadically in places separated by great distances; most of them however have centers from which they radiate over a limited area, near which they are then sub-

stituted by other closely allied forms. Mean temperature and vertical elevation are important factors in the distribution of Tabanidae; there is also a marked difference between the mostly wooded coast and the campos found inland.

But for the above mentioned common and widely distributed species, the fauna of the Northern States is quite different from that of the middle regions and of the South. On this journey we found the fauna of the two latter regions and chiefly the species living inland, as well as the ubiquitous forms. During the best part of our travels, I only collected on board or at the river side without the help of horses; only in Porto Tibiriçá, Porto Mojoli, in Iguassú and Paraguay, between San Bernardino and the Salado river, did we have horses or mules.

Among several hundred collected specimens there was only one male. In the earlier days of our travels we had much rain. The season was favourable for most kinds but it was already late for some, so that our catalogue of about 25 species is far from complete.

Follows a list of Tabanidae with indications of the places in which they were caught (species characteristic of the local fauna, in italics):

Tabanidae from the region round Porto Tibiriçá.

1. *Erephopsis xanthopogon*
2. *Esenbeckia Clari*
- 2a. *Esenbeckia Clari* var. *nigricans*
3. *Selasoma tibiale*
4. *Lepidoselaga lepidota*
5. *Diachlorus bimaculatus*
6. *Chlorotabanus mexicanus*
7. *Odontotabanus aurora*
8. *Macrocormus sorbillans*
9. *Neotabanus ochrophilus*
10. *Neotabanus triangulum*
11. *Neotabanus comitans*
12. *Leucotabanus leucaspis*

Porto Mojoli region.

1. *Erephopsis ardens*
2. *Chrysops costatus*
3. *Chrysops leucospilus*
4. *Diachlorus flavitaenia*
5. *Cryptotylus unicolor*
6. *Odontotabanus aurora*
7. *Odontotabanus cinerarius* (with blackish wings)
8. *Phaeotabanus limpidadex*
9. *Phaeotabanus aphanopterus*
10. *Tabanus cayennensis* (seen, not caught)
11. *Macrocornus sorbillans*
12. *Catachlorops intermedius*

Puerto Bertoni (Paraguay).

I saw the following species in the collection of Mr. A. DE WINKELRIED BERTONI.

1. *Erephopsis ardens*
2. *Epipsila eriomeroides*
3. *Esenbeckia* nov. spec.
4. *Dichelacera alcicornis*
5. *Odontotabanus fuscus*
6. *Neotabanus ochrophilus*
7. *Macrocornus trizonophthalmus*

Iguassú region.

1. *Erephopsis ardens*
2. *Catachlorops intermedius*

Paraguay (Assuncion region).

1. *Erephopsis ardens*
2. *Erephopsis marginata*
3. *Chrysops parvifascia*
4. *Dichelacera modesta*
5. *Tabanus importunus*
6. *Neotabanus ochrophilus*
7. *Neotabanus triangulum*
8. *Leucotabanus leucaspis*
9. *Diachlorus bipunctatus*
10. *Pseudacanthocera marginata*
11. *Tabanus interpunctus* n. sp.
12. *Tabanus monogramma*
13. *Tabanus fuscofasciatus* var.
14. *Chlorotabanus mexicanus*

15. *Macrocornus pseudosorbillans*
16. *Poecilosoma quadripunctatum*
17. *Chrysops costatus*
18. *Chrysops crucians*
19. *Chrysops laetus*
20. *Chrysops leucospilus*
21. *Chrysops nigricorpus*
22. *Chrysops parvifascia*

The first eight species were collected between San Bernardino and the river Salado, in March; the others were determined from specimens gathered by Dr. MIGONE before that date. I believe that I saw *Tabanus cayennensis* as well, and I observed *Poecilosoma quadripunctatum*. *Lepidoselaga albipes* and *Dichelacera trigonotaenia* are also found in Paraguay.

I have published a note on the Tabanidae of the North West of São Paulo and of Matto-Grosso, in our Memorias.

After my return to Rio, I received some further collections, which, with other earlier ones from the same places, augment the lists of these local faunae.

Follows a list of:

Tabanidae from Misiones.

Collected by VAN DE VENNE and sent by Prof. WOLFFHUEGEL:

1. *Erephopsis ardens*—Porto Aguirre, river Iguassú and Bonpland.
2. *Pseudoscione longipennis* (RICARDO)—Misiones.
3. *Chrysops costatus*—Bonpland.
4. *Chrysops fuscipex*—Bonpland.
5. *Diachlorus flavitaenia*—Paraná river.
6. *Tabanus fuscofasciatus*—Bonpland.
7. *Poecilosoma quadripunctatum* (F.)—Bonpland.
8. *Leucotabanus leucaspis*—Bonpland.
9. *Leucotabanus ocellatus* n. sp.—Misiones.
10. *Chelotabanus aurora*—Iguassú, falls; Porto Aguirre.
11. *Stictotabanus conspicuus*—Misiones.
12. *Catachlorops intermedius*—Misiones.
13. *Di cladocera macrospila*—Misiones.

To these we may add some species described by MACQUART with the mention "Du

territoire des Missiones". Some must belong to a part of the Missiones with a very different fauna.

14. *Tabanus fenestratus* — MACQUART
15. *Tabanus angustus* «
16. *Tabanus missionum* «
17. *Tabanus Hilarii* «
18. *Tabanus trigonophorus* «

Tabanids from Uruguay, sent by Mr. JUAN TREMOLERAS.

1. *Tabanus (Macrocornus) rubescens* BIGOT.
2. *Tabanus fuscofasciatus* MACQ.
3. (*Neotabanus*) *pungens* WIED. syn. *comitans* WIED.
4. *Neotabanus dorsiger* WIED.
5. *Neotabanus triangulum* WIED.
6. *Neotabanus trivittatus* F.
7. *Neotabanus ornatissimus* BRETHES.
8. *Neotabanus angustus* MACQ.
9. *Neotabanus missionum* MACQ.

Previously obtained species:

10. *Chrysops uruguayensis*
11. *Dichelacera trigonotaenia*
12. *Neotabanus angustus*
13. *Neotabanus bonariensis*
14. *Neotabanus missionum*
15. *Neotabanus trigonophorus*

Tabanus pictipennis described by MACQUART from Maldonado is not represented in our collections.

Most of these species are found in the neighbouring countries as well.

To facilitate the comparative study of the Tabanidae, I give lists of those found in the other southern states of Brazil; they are from collections seen or made by me.

State of Rio Grande do Sul:

1. *Erephopsis marginalis*.
2. *Erephopsis ardens* (S. Leopoldo — MACQUART).
3. *Dichelacera lacerifascia*
4. *Dichelacera multiguttata*.
5. *Dichelacera trigonotaeniata*
6. *Dichelacera unifasciata*

7. *Dichelacera alcicornis*
8. *Poecilosoma histrio*
9. *Poecilosoma monogramma*.
10. *Poecilosoma quadripunctatum*
11. *Dicladocera macrospila*
12. *Dicladocera guttipennis*
13. *Dicladocera potator*
14. *Macrocornus sorbillans*
15. *Neotabanus angustus*
16. *Neotabanus bonariensis*
17. *Neotabanus missionum*
18. *Neotabanus triangulum*
19. *Neotabanus trigonophorus*
20. *Neotabanus ochrophilus*
21. *Chelotabanus impressus*
22. *Chrysops crucians*
23. *Chrysops leucospilus*

State of Santa Catharina.

The Tabanidae from Santa Catharina, which I have, are mostly from a small collection made by me in São Bento or from a larger one, made by Dr. PINTO GUEDES along the coast. They came from wooded mountainous regions and are like those from the corresponding regions of São Paulo, Paraná, Matto Grosso and Rio de Janeiro.

I found only two new species but also some rare or undescribed ones, as will be seen from the following list:

1. *Erephopsis sorbens*
2. *Erephopsis aurimaculata*
3. *Erephopsis incisuralis*
4. *Chrysops laetus*
5. *Diachlorus bivittatus*
6. *Diachlorus flavitaenia*
7. *Stigmatophthalmus altivagus*
8. *Acanthocera longicornis*
9. *Acanthocera eristalis*
10. *Acanthocera nigricorpus*
11. *Dichelacera alcicornis*
12. *Catachlorops intermedius*
13. *Catachlorops praetereuns*
14. *Catachlorops rufescens*
15. *Amphichlorops flavus*
16. *Rhabdotylus planiventris*
17. *Dicladocera furtata*.
18. *Dicladocera macula*
19. *Dicladocera potator*

20. *Dicladocera rufipennis*
21. *Poecilosoma quadripunctatum*
22. *Leucatabanus nigristigma*
23. *Neotabanus triangulum*
24. *Odontotabanus impressus*
25. *Chlorotabanus mexicanus*
26. *Stictotabanus conspicuus* n. sp.
27. *Leptotabanus nigrovenosus*
28. *Stibasoma Willistoni*
29. *Stibasoma semiflavum*
30. *Poecilosoma punctipenne*
31. *Erephopsis nigricorpus*
32. *Dichelacera rubricosa*

Coast and mountains of the coast of Paraná.

The Tabanidae found on the coast and its mountains belong to a fauna which extends from São Paulo to Santa Catharina. To prove this statement I give a list of a few species from my collection:

- Erephopsis sorbens*
- Chrysops costatus*
- Stibasoma Willistoni*
- Rhabdotylus planiventris*
- Catachlorops intermedius*
- Poecilosoma punctipenne*
- Poecilosoma quadripunctatum.*

4. Zoology notes.

Mammalia: The *ariranha* (*Lutra paranaensis*) is probably the most characteristic mammal of the Brazilian part of the Paraná river. We saw several specimens of it while travelling and observed a very tame young female in the hotel of Porto Tibiriçá. We also met several bands of *Capivaras* (*Hydrochoerus capibara*); they are best seen from the river as they are amphibious in their habits.

We crossed extensive stretches of quite unhabited land (*sertão*) where all the primitive fauna still exists. Most mammals are rarely seen, but spoor and other indications of them are frequent on the river shores. The *anta* (*Tapirus americanus*) is still common on the Paraná and its affluents, and in the campos of Matto Grosso the big stag

(*Caryacus paludosus*) is quite at home. The large armadillo (*Priodontes giganteus*) may be traced by its large burrows. Once we enjoyed the rare sight of seeing a slate blue armadillo (*Tatus novemcinctus*—*tatú azul*) swimming across a pretty wide river. Another time we saw a *coati*, (*Nasua socialis*), drifting down the Paraná on a dead branch until it was swallowed by one of the whirlpools. At Iguassú we were given a small hare (*Lepus brasiliensis*) quite common there.

In the woods near the Iguassú falls we saw one or two *cotias* (*Dasyprocta* spec.). These and a few bats, caught in a cave, bring the list of mammals observed by us to a close.

We saw no monkeys, of which there can be but few species in the woods we crossed, nor did we even hear the characteristic howling of the larger kinds.

Aves: The aquatic birds we saw are generally met with on all the large rivers, unless they have been persecuted. We never saw a great number, probably on account of the high level of the river and other unfavourable conditions. The only exception was a large flock of white herons. The only species I had not yet observed in its wild state was *Chauna cristata*. I saw several of those on a sandbank of the lower Paraná and heard their strange voices on the Salado river. We also watched several tame ones in the garden of the Empresa ALLICA.

There were many araras on the banks of the river a large band of the red and green Kind (*Sittace choloptera*) was a new and pleasant sight. The blue and yellow species, known by the name of *Canindé*, (*Sittace caerulea*), only appeared in small flocks. In some places toucans, parrots and pigeons were common and very conspicuous, as they perched on the dry stems of the giant bamboo (*Chusquea Gaudichaudi*). The Jacutinga (*Pipie jacutinga*) is a common game bird all along the Brazilian part of the river Paraná.

REPTILIA: In Iguassú I received a dead *jararaca* (*Lachesis lanceolata*) 140 cm. long. The *jararacusú* and the *urutú* (*L. jararacussú* and *alternata*) were also found. In the mu-

seum of Trinidad (Assuncion) I saw a rattlesnake, belonging to the type of Northern Brasil, and some *Lachesis*, of which a few were like *N. Neuwiedii* and others more like the species inappropriately called *L. cutiara*. There were also several species of *Elaps*.

PISCES: On the upper Paraná we only saw a few fishes which were caught on hooks during our excursions. Besides a fine *Surubiy* there were a few *dourados*, *pacús* and *matrinchem*. A live specimen of *Lepidosiren paradoxus* was seen near Assuncion where it is not uncommon. Its native name is *Piramboia*.

CRUSTACEA: Just below the Salto de Guayra, or "das Sete Quedas" we found some *Phyllopora* in active parthenogenic reproduction, in two pools of rainwater. They belonged to the genus *Eulimnadia*; the species may be *brasiliensis* SARS; at any rate the differences seemed too slight to distinguish a new species in this somewhat variable group. Their shells were covered with minute threadlike algae and the usual infusoria found on aquatic animals. *Phyllopora* were again found in shallow places of lake Ipacarahy and determined as *Estheria Hislopi* BAIRD. In the plankton of the same lake we found three kinds of *Cladocera*, previously observed by ANIDITS, and determined by DADAY as *Diaphanosoma brachyura* LIEVIN, *Ceriodaphnia cornuta* SARS, and *Bosmina longirostris* LEYDIG. There was also a *Copepod*, *Diaptomus conifer* SARS, according to DADAY. All these species are also found in Europe.

INSECTA: To the entomological notes given above, I would add that, in Iguassú we received a fine *Fulgora* (vulgo *Jequitiranaboia*), of the species found in São Paulo and Rio; also a fine specimen of *Anoplocerus armillatus*, (*Prionidae*), one of the largest beetles known. In BERTONI'S collection I found a specimen of *Cuterebra Schmalzi*, first described by me from specimens collected in Santa Catharina.

5. Botanical notes.

The shores of the upper Paraná are entirely covered with woods. At the riverside there are many *Cecropias*, a series of large ficus and numerous leguminosae. Bamboos are plentiful and a giant species often grows higher than the surrounding trees. Larger and smaller creepers form real curtains hiding the roots and stems of the trees. At the waters edge there is often a continuous fringe of *Eichhornia* tufts. They are sometimes swept away by the currents and form floating islands, known as *Camalotes*. In some places grasses take their place. Where there are cliffs *Cuphea melvilla* may be found beneath, while the rocks are covered by cactus and bromeliaceous plants.

In the midst of all this foliage few blossoms are seen. We noted a few flowering *Cassia* and *Inga* trees and *Bignoniaceae* with white, yellow, pink and purple blossoms.

On the rocks at and in the Iguassú falls we only saw a large and conspicuous *Graminea*.

At the mouth of the Iguassú and lower down, a *Croton* with long inflorescences was very abundant on the riverside; it alternated with *Sapindaceae* and *Saramby*. Green bamboos and dead *Chusquea* stems were also plentiful. This vegetation continued till near Encarnacion, being only interrupted by artificial clearings.

A creeper looking like *Mesechites sulphurea* was found near Porto Bandeira and seen again at Encarnacion, together with another apocynaceous plant with white flowers; these had a long and narrow tube and opened only at night.

In the campo near Encarnacion I saw several plants new to me, for instance two *Verbenae*, one of which had red flowers another interesting *Verbenacea*, a conspicuous blue *Labiata* and an *Ipomoea* (? *malvacea*). An *Eryngium* was plentiful, also *Mimosa pudica*, an *Angelonia* and other plants belonging to the *Scrophulariaceae*.

The flora was the same till Assuncion. There we found also *Ipomoea fistulosa* in moist places, while in the water I noticed

two kinds of *Echinodorus*, a *Maranthacea* and a *Butomacea*. *Araujia stenophylla*, the latex of which may contain flagellates, as Dr. MIGNONE discovered, was also plentiful. In the botanical garden we saw *Victoria regia* which is found in Paraguay.

On our excursion to the Rio Salado we noticed *Celtis glycocarpa*, a striking *Bignoniacea* and several other plants with showy blossoms.

Climatology and Sanitary Conditions

by

Dr. H. de Souza Araujo.

CLIMATOLOGY. There is not a single meteorologic station in the territory ranging from Baurú in the state of São Paulo, to the mouth of the Iguassú, on the frontier of the Argentine Republic and the state of Paraná, so I made rough notes on the altitude, mean and maximum temperature, rain falls etc. in the diary I kept during the journey.

From São Paulo to the river Paraná: the initial altitude is about 800 m.; in Baurú it falls to 500; in Porto Jupiá on the left bank of the Paraná to 250 m..

We were in the middle of January 1918 and the weather rainy. On the first four days of the journey the temperature oscillated between 26° and 30° C.

During the five days we spent in Porto Tibiriçá, it varied between 25. and 36. C., while the atmospheric pressure oscillated between 738 and 740 mm. This place is 270 m. above sea-level and the region is very warm; in summer the thermometer often registers 40° C.

On the second day of the journey from Porto Tibiriçá to Porto Mojoli (27. I. 18) the temperature ranged from 25. C. to 36; there was a thunder-storm in the afternoon. The pressure varied between 742 and 749 mm. On the following days we had from 25° to 30° C.

Porto Mojoli in the Guayra district is under the tropic of the Capricorn; it has an altitude of 225 m. Thanks to information obtained from

the engineer of the Mate Laranjeira Comp., Mr. SIDWELL WILSON, we have more data about the climate of this region. KOEPPEN considers the climate of the Upper Paraná (paraguayan and argentinian zones) as sub-tropical. In later years there have been quite severe winters and rather warm summers in Porto Mojoli and Iguassú. Considerable oscillations of temperature and a mean temperature below 2° C. have also been registered. So, if one accepts Em. de MARTONNE's classification, the data obtained lead one to put the brasilian part of the Upper Paraná under the head of *temperate, with warm summer*. KOEPPEN includes all the paraguayan and argentinian territory on the left bank of the Paraná in his definition of a *temperate climate with warm summer*. In view of the continual heat and dampness, MARTONNE considers the basin of the Paraná and the Paraguay as *tropical, chinese type*. The information given me and my own observations support MARTONNE's opinion.

SANITARY CONDITIONS. The whole region of the State of São Paulo, between Baurú and Porto Tibiriçá, through which we travelled, is decidedly infected with Malaria. Ankylostomiasis and Chagas' disease are also widely spread, the former in high proportion. In the "sertões" of the North West, along the Itapura-Corumbá railway-line, Leishmaniosis is very common. *Triatoma* and *Phlebotomus* are very plentiful; the former transmits Chagas' disease, the later is suspected of carrying *Leishmania*. There are also many cases of Leprosy in this zone.

A short time ago two cases of granuloma venereum were in treatment at the Baurú hospital; the patients were cured by injections of emetic. During a certain season, cases of tropical Ulcer, caused by VINCENT's fuso-spirillar association, are common in the whole of the North-West.

Syphilis, Gonorrhoea and other venereal diseases are not rare along the railway track. Trachoma, Amoebic Dysentery and Typhoid fever occur less often.

On the right bank (Matto-Grosso) the diseases are the same as those found on the

left (São Paulo). In Tres Lagoas, where we stayed the most common were ankylostomiasis and malaria. We found a great many specimens of *Triatoma sordida* in this town.

In Porto Tibiriçá, we treated 38 patients, almost all with malaria or ankylostomiasis. We also saw a typical case of *Dysphagia spasmodica* (mal de engasgo).

From Porto Tibiriçá to Porto Mojoli, we travelled in a barge belonging to the Mate-Larangeira Comp; it was towed by a gasoline launch; several of the 16 members of the crew fell ill with malaria on the way.

Near Porto Xavier, we made a visit to an indian settlement between the mouth of the rivers Veado and the Ivahy. Some of the indians (tame Cayuas) were suffering from malaria. In Porto Isabel, on the Matto-Grosso bank, a little below the Iguatemy, we saw about 20 workmen most of which were Paraguayans; some suffered from malaria while others had large two lobed goiters.

Porto Mojoli was founded in 1909 and now boasts 1300 inhabitants, with a great majority of Paraguayans and Correntinos. The town has canalised water and public W. C. in several places. The company, which owns it, furnishes food supplies at moderate prices and there is fresh meat every day. An efficient and strict police service ensures order though the latter may also be attributed to the prohibition of the sale of alcoholic drinks. Most people speak the Paraguayan language (Guarani). A Décauville railway belonging to the Mate company goes from Porto Mojoli, around the Guayra falls which are about 5 kilometers from the town, to Porto Mendes. The company also keeps a physician, a drug-store and a hospital for its workmen. The actual physician is Dr. FRANCISCO VARELLA. When we visited the hospital we saw 37 patients there. Malaria and Ankylostomiasis prevail; the first is brought from Matto-Grosso the second from Paraguay. We also saw some goiters. The sanitary conditions of the settlements, Porto Artaza, Bella Vista, Zororô and Porto Mendes are superior to those of Porto Mojoli and Porto Tibiriçá. All of

them are almost exclusively inhabited by Paraguayans and Correntinos.

Water pipes have been laid in Porto Artaza which belongs to Mr. Julio Allica, who claims that in this settlement hygiene is practised as a sort of religion. The population is Argentinian and there is more morality than in Porto Mojoli. All these settlements form part of the borough of Iguassú.

Iguassú (the town). This old military colony was made a borough in 1917. The town is lit by electricity and has a telegraph office. The water is not canalised. The sanitary state is good. In 1905 and 1906 there was a bad epidemic of malaria, but in the last few years only a few sporadic and imported cases were observed. We saw no patients with ulcers or any other important diseases, with the exception only of some grave cases of leprosy. Iguassú has no physician and no dispensing chemist. Patients whose means allow them to do so go to Posadas, in the Argentine, to be treated.

PARAGUAY: ASSUNCION. This attractive capital occupies the left bank of the Paraguay about 100 m. above sea-level. It has 100,000 inhabitants and about 40 doctors, some of which are foreigners. There is no pipe system, but there are electric trams, fine buildings and public gardens.

SANITARY CONDITIONS. The President of the Republic, whom we visited, showed a great interest in hygiene and specially in rural prophylaxy and told us that in the same year, (1918), he intended to reopen the faculty of Medicine which has been closed for several years. Dr. ANDRÈS BARBERO gave us interesting information about the sanitary condition of the country and about the frequency of leishmaniosis among the patients treated in the department for "bubaticos" of the Assistencia Publica. Dr. BARBERO intends to establish more posts for the treatment of leishmaniosis in other parts of the country, and to begin a campaign against malaria and ankylostomiasis in the near future.

Assumpção has a National Hospital, a Military Hospital, and a Maternity hospital as well as its Assistencia Publica and its isola-

ting hospital where some lepers are interned. There is also a Bacteriologic Institute under the direction of Dr. LUIZ MIGONE. Besides these there are a few private sanatoria.

Chagas' disease has been found in Paraguay. We examined several specimens of *Triatoma megista* with Dr. MIGONE; they were infected. Malaria is found in several regions and even in the neighbourhood of Assuncion. Ankylostomiasis and other worm diseases are spread over the whole country, which is hot, damp and low.

Leishmaniosis is by far the most common skin disease in Paraguay. There are also some foci of Leprosy in different zones. Many cases of Granuloma venereum have been observed in the National Hospital of Assuncion and elsewhere. The real "Bouba" *Framboesia tropica*, and Blastomycosis are unknown. Perhaps these two diseases, found almost all over South America, have only passed unnoticed.

Syphilis and Gonorrhoea are as common in Paraguay, as in Brazil.

We made some excursions, collected many insects and made interesting medical notes.

ARGENTINE. On the return journey, to Brazil, we stopped several days in Buenos Aires. We saw the Bacteriologic Institute, the Faculty of Medicine the Hospitals, Museum and botanical Gardens. The efficient organisation of the hospitals made a very good impression. All the foreign colonies have their hospital and a well arranged medical assistance. The most interesting sections of the Faculty of Medicine are the gynecological museum, the department of experimental physiology, the wards, the botanical and pharmacologic Institute etc.

The bacteriological Institute is quite ready and working under the direction of Prof. KRAUS. In the Muniz Hospital, we saw many cases of typhoid fever, anthrax and leprosy.

Dr. ABERSTURY and Dr. SOMMER gave us interesting information about the prophylaxy of leprosy. Granuloma venereum

and leishmaniosis are quite common in Ramos Mejia and in other hospitals.

URUGUAY MONTEVIDEO. We only spent one day in this fine city, but saw the wards of the MACIEL hospital, the Radiological Institute, the National Syphilicomium and the Natural History Museum.

SOUTH of BRASIL. RIO GRANDE DO SUL. I visited the following towns in this state: Rio Grande, Pelotas, Bagé and Porto Alegre, and made some excursions in the neighbourhood of Bagé and Rio Grande.

Sanitary Conditions. There is a high percentage of Ankylostomiasis in the vicinity of Rio Grande. Malaria is hardly known. Epidemics of Smallpox and of Chickenpox have broken out recently. I registered 7 cases of Leprosy. There is a Charity Hospital in the town. At the time of my stay I found very many mosquitos, specially *Culex albofasciatus* and *Stegomyia calopus*. From Bagé I have little to report; according to several doctors Syphilis is the worst infection. In the interior of this district I caught many specimens of *Neotabanus missionum* and several *Culicidae*. The Bagé hospital is well installed and treats many patients. That of Pelotas also makes a good impression; the municipality has also made an Institute for Hygiene and put it under the direction of Butantan. In this place I saw several lepers and a patient with an ulcer of the lower lip which looked like leishmaniosis.

In Porto Alegre. I remained longer and saw the "Santa Casa", the faculty of Medicine, the Instituto Oswaldo Cruz, Dr. PEREIRA's bacteriologic laboratory etc. During my stay, March and April, several cases of Plague were registered and the town was visited by an epidemic of Typhoid fever. A little while before, there had been a severe epidemic of smallpox. Vaccination is facultative and left to the private initiative of the people who must request it from the public health officer. The medical service is altogether very deficient. Chagas, disease is found in Rio Grande. All the specimens of *Triatoma* we examined in the Instituto Oswaldo Cruz were infected. The principal foci of *Triatoma*

are now known and doctors from the Institutes Borges Medeiros and Oswaldo Cruz have undertaken to clear up this point of local nosography. In Rio Grande, the most common species of "barbeiro" is *Triatoma infestans*.

I saw some lepers and, from the information I gathered from other physicians, I concluded that there must be some 30 patients in the town. In other districts there are other foci, some of them very bad ones.

Filariosis has also been found. I saw no interesting skin diseases.

Dr. PEREIRA jun. and other medical men told me that almost the whole of the suburban population, specially that of the banks of the Guahyba and the Lagoa dos Patos, suffers from ankylostomiasis.

SANTA CATHARINA. It was my second visit, but as before I could not stay long enough to see the capital and some of the ports. I heard of several cases of leprosy in the capital and inland. Ankylostomiasis is extremely common all along the coast but no intensive prophylactic measures have been taken as yet. Malaria seems less widely spread than on the coast of Paraná and São Paulo.

PARANÁ. The coast of Paraná is overrun by Malaria and Ankylostomiasis. I spent the first three months of 1917 in five coast districts, that is in Paranaguá, Morretes, Antonina, Guarakessaba and Guaratuba, to which the government of Paraná had sent me on a medical mission. During that time I made statistics of the prevailing diseases which I intend to use as a basis for a sanitation campaign.

Malaria has been endo-epidemic in the North of the State for the last ten years. The epidemics of 1913, 1915 and 1917 were terrible and caused enormous losses. During the last ones, I directed the medical campaign, being aided by two other physicians. We crossed eight districts and founded an anti-malarial station in the central one; this was under my direction during the last six months of 1917 and the first four of 1918. The campaign gave good practical results.

Now, with the help of the government, we are going to work on a larger scale.

am also making statistics of leprosy in the whole state so that the prophylaxy may be organised. Altogether there must be about 500 lepers in Paraná. Some foci of leishmaniosis have been found. I am also preparing to go the North of the State, to study Chagas' diseases, the transmittor of which is common in Jatahy and elsewhere.

Protozoology and Planktology

by

Dr. O. Ribeiro da Fonseca.

In this chapter I only deal with the data obtained during our journey which can furnish a basis for original research.

I did not give much time or attention to the protozoa found in sweet water, as there is still a lack of good methods for preserving them and circumstances made it impossible to study them "in loco". This is also true of the potamoplankton of the rivers on which we travelled; I gathered samples of it several times, but they were all so poor in specimens as to make their study very difficult. These investigations were limited to the Paraná and the Pequery.

Lake Ipacarahy, in Paraguay, was also studied from a planktologic point of view, but the nets only yielded a great many *Copepoda*, some other small *Crustacea* and a few *diatoms* (*Naviculoidea*). This lake ought to be worth studying, because its water is grey or blackish even in the shallow parts.

The study of protozoa, parasitic in man and other animals, and that of the oceanic microplankton found from the coast that Uruguay (at the limit with Brazilian waters) to of Sta. Catharina, gave much better results. There were new and rare species belonging to one or the other of these groups, as well as interesting biologic and geographic data, which will be published in due time, by Dr. ARISTIDES MARQUES DA CUNHA.

Parasitic protozoa: During the whole of the excursion, I tried to gather interesting material, both from patients and from the game that was shot. I obtained representants of

several groups of Protozoa, specially *Flagellata* and *Ciliata*, but there were some *Neosporidea* (*Myxosporidia*) and some *Telosporidea* (*Gregarina*), as well.

Among the ciliata was *Balantidium coli*, a parasite of man; we found it only once during the journey. The patient showed no symptoms of dysentery, nor did she complain of any other intestinal trouble; all her symptoms were limited to the nervous system. This case we found in Iguassú, while looking for *Ankylostomum* eggs. It was not the first time I found *Balantidium coli*, in a case, where though present, it has no apparent pathogenic effect. (Vide Brazil-Medico vol. 32 n. 4 p. 26.). *Balantidium coli* is common in the interior of the state of Rio; I have come across it, in an apparently harmless condition, several times, while making helminthologic examinations.

To me the most interesting ciliata found in game, were those from the stomach of the big stag (*Cariacus paludosus* DESM.) and the caecum of the "anta" (*Tapirus americanus* BRISS.). I gave them to an assistant of this Institute, Dr. A. MARQUES DA CUNHA, who has not yet determined all of them; they belong to new genera and species and will be described later on, with the exception of one, already described in Brazil-Medico vol. 32 n. 12 p. 161. (1918), under the name of *Prototapirella intestinalis*; *Cycloposthidae*.

The most important flagellate met with on this journey was *Trypanosoma cruzi*. Some specimens of *Triatoma infestans*, we examined in Dr. MIGONE's laboratory, in Assuncion, were copiously infected with it. These specimens came from places near the capital which we did not have time to visit. We also saw several workmen with goiters in Porto Isabel; they all came from the interior of the country. Putting these facts together I feel justified in affirming that *Trypanosomiasis americana* exists in Paraguay. The fact, that it has not been described from that republic, seems to me no argument to the contrary, since, though widely distributed in Brazil, it went unnoticed for a very long time.

Trypanosoma equinum, the cause of equine trypanosomiasis, attacking horses and mules, is distributed over a wide area of the territory through which we passed. We visited one of the historic foci of this disease on the river Salado near San Bernardino. In the same place *Araujia angustifolia* (Asclepiaceae) grows very plentifully. Dr. MIGONE found a *Leptomonas* in the latex of this plant and described it as *L. elmassieni*, in honour of the discoverer of *Trypanosoma equinum*. It has many affinities with this genus.

Leishmaniasis americana, locally called Baurú ulcer, and its agent *Leishmania brasiliensis*, are well-known in this country; they are widely spread in the regions of Paraguay and the north-west of São Paulo in which we travelled. It is interesting to note here, that during the whole of the journey we found only one specimen of *Phlebotomus* and that near the Santa Maria falls of the river Iguassú, a very sparsely populated region, from which no cases of Leishmaniasis were brought to our notice. According to Dr. MIGONE, this is not the only kind of *Leishmania* observed in Paraguay, since he treated (in Assuncion) the only case of Kala-azar or visceral leishmaniasis, as yet found in America.

Owing to the kindness of Dr. CASTRO GOYANA, I was able to examine several cases of dysentery in Baurú (north-west of São Paulo). In one case I found *Chilomastix mesnili* WENYON only; in another the same *Chilomastix* and *Enteromonas hominis*, first described from Rio by me. Both cases were interesting. The first helps to confirm my belief that *Chilomastix* is much more common in the country than in towns like Rio, where *Trichomonas hominis* and *Giardia intestinalis* are more frequent. The presence of *Enteromonas hominis* in the second case I find still more interesting, as, after I described it from Rio, this species was found in two cases in Anglo-Egyptian Soudan by CHALMERS and PEKKOLA; recently, it has been mentioned by MAURICE LÉGER as a parasite of man in French Guyana. Con-

sequently, it must have a very wide geographic distribution.

We found the plasmodia of tertian fever *Laverania malariae* (GRASSI & FELETTI 1890) and *Plasmodium vivax* (GRASSI & FELETTI), but heard of no cases of infection with *Plasmodium malariae* LAVERAN 1881, causing quartan fever.

Fish microsporidia were conspicuous y rare during the whole journey; though I examined all fishes caught on excursions, I only found one infected species; this was *Pseudopimelodus charus*, commonly called "pacú". The parasite was a new species of the genus *Henneguya* which Dr. A. M. da CUNHA and I described as *H. lutzi* (Vide Brazil Medico vol. 32 n. 52 p. 414).

Microplankton. As already explained, I will not deal either with the potamoplankton of the rivers Paraná and Pequery or the limnoplankton of lake Ipacarahy, but shall only give a list of the *Protozoa* and *Diatomacea*, collected from the coast of Uruguay (frontier of Brazil) up to that of Sta. Catharina. I found 59 species, many of which had not been found in brazilian waters before. A more minutious study of these and of other material, collected by Dr. A. M. da CUNHA, is now in the press.

Follows the list:

Cystoflagellata.

- 1—*Noctiluca miliaris* Suriray, 1836.

Tintinnodea.

- 2—*Codonella morchella* Cleve, 1900.
3—*Tintinnopsis beroidea* Stein, 1867.
4—*Tintinnopsis campanula* (Ehrenberg 1840).
5—*Cyttarocylis ehrenbergii* (Clap. et Lachm., 1858) var. *claparedei* (Daday, 1887).
6—*Ptychocylis (Rhabdonella) apophysata* (Cleve, 1900).
7—*Tintinnus ganymedes* Entz, 1885.
8—*Tintinnus lusus-undae* Entz, 1885.

- 9—*Tintinnus amphora* Cl. et Lachm. var. *quadrilineatum* (Cl. et Lachm. 1858).

Schizophyce.

- 10—*Richelia intracellularis* (Schmidt, 1901).
11—*Prorocentrum micans* Ehrenberg, 1838.
12—*Dinophysis ovum* Schuett, 1895.
13—*Dinophysis schuetti* Murray et Whitting, 1899.
14—*Dinophysis homunculus* Stein, 1883.
15—*Glenodinium trochoideum* Stein, 1883.
16—*Goniodoma polyedricum* (Pouchet) Joergensen, 1899.
17—*Peridinium steini* Joergensen, 1889.
18—*Peridinium depressum* Bailey, 1855.
19—*Peridinium divergens* Ehrenberg, 1840.
20—*Peridinium pentagonum* Gran, 1902.
21—*Oxytoxum scolopax* Stein, 1883.
22—*Oxytoxum milneri* Murray et Whitting, 1899.
23—*Ceratocorys horrida* Stein, 1883.
24—*Ceratium candelabrum* (Ehrenberg) Stein, 1883.
25—*Ceratium furca* (Ehrenberg) Clap. et Lachm., 1859.
26—*Ceratium fusus* (Ehrenberg, 1883) Dujardin, 1841.
27—*Ceratium incisum* (Karsten, 1906).
28—*Ceratium belone* Cleve, 1900.
29—*Ceratium pentagonum* Gourret, 1883.
30—*Ceratium penatum* Kofoid, 1907.
31—*Ceratium palmatum* (Schroeder, 1900) Schroeder var. *ranipes*, Cleve.
32—*Ceratium massiliense* Gourret, 1883.
33—*Ceratium trichoceros* (Ehrenberg, 1859) Kofoid, 1908.
34—*Ceratium tripos* (O. F. Mueller, 1777).
35—*Ceratium gibberum* Gourret, 1883.
35a—*Ceratium gibberum* Gourret, 1883 forma *sinistrum* Gourret, 1883.

36 – *Ceratium reticulatum* (Pouchet, 1883) Cleve.

37 – *Podolampas palmipes* Stein, 1883.

38 – *Podolampas bipes* Stein, 1883.

Silicoflagellata.

39 – *Dictyocha fibula* Ehrenberg, 1839.

Diatomacea.

40 – *Melosira borreri* Greville, 1856.

41 – *Paralia sulcata* (Ehrenberg, 1837), Cleve.

42 – *Skeletonema costatum* (Greville, 1886) Cleve.

43 – *Leptocylindrus danicus* Cleve, 1889.

44 – *Guinardia flacida* (Castracane, 1886) Peragallo.

45 – *Rhizosolenia schrubslei* Cleve, 1881.

46 – *Rhizosolenia setigera* Brightwell, 1858.

47 – *Rhizosolenia calvar-avis* Schultze, 1858.

48 – *Rhizosolenia alata* (Brightwell,

1858), forma *genuina* Gran, 1911.

48a – *Rhizosolenia alata* (Brightwell, 1858), forma *gracillima* Cleve.

48b – *Rhizosolenia alata* (Brightwell, 1858), forma *indica* (Peragallo, 1892).

49 – *Bacteriastrum furcatum* Schadb. 1854.

50 – *Chaetoceras schuetti* Cleve, 1894.

51 – *Chaetoceras subtile* Cleve, 1896.

52 – *Cerataulina bergonii* Peragallo, 1892.

53 – *Biddulphia mobiliensis* (Bailey) Gruen., 1859.

54 – *Biddulphia sinensis* Grev., 1866.

55 – *Biddulphia rhombus* (Ehrenberg) W. Smith, 1844.

56 – *Biddulphia favus* (Ehrenberg, 1839), V. Heurck.

57 – *Biddulphia vesiculosa* (Ag.) Boyer, 1824.

58 – *Beilerochea malleus* (Brightwell) V. Heurck, 1858.

59 – *Thalassiothrix nitzschioides* Grue-
now, 1862.

Explanation of Photographs

(Plates 20—75.)

1. Hospital in Baurú.
2. Case of lepra mutilans found in the hospital.
- 3, 4. Falls of Itapura. Right and left side.
5. Ferryboat of the Itapura—Corumbá Railway, in Porto Jupia.
6. Steamer Paraná of the C. de Viação S. Paulo-Matto Grosso.
7. A tame Aririnha (*Lutra paranaensis*) in the hotel of Porto Tibiriçá.
- 8, 9. A tapir hunt on the banks of the Rio Pardo.
10. Stag hunting on the Campos of Matto Grosso.
11. Cecropia trees in the bank of the Paraná.
12. Left bank of the river Guatemv in Matto Grosso.
13. Porto Xavier on the left bank of the Paraná.
14. Mr. Wilson and Dr. Fonseca with a group of Cayuás.
15. One of the travellers covered with mosquitos.
16. Mouth of Rio Veado. Dr. Lutz and Mr. Vasconcellos in a Cayuá canoe, returning from the indian settlement.
17. Indian hut between the rivers Ivahy and Veado.
18. 19. Cayuá Indians.
- 20—22. Cliffs on the right bank of the Paraná.
23. Mouth of Rio Ivahy.
24. Dead giant bamboo on the left bank of the Paraná.
- 25, 26. A Suruby caught in the Paraná.
- 27—30 Views of the Pequery river.
31. Launch Roseira belonging to the Lloyd Paranaense.
32. Porto Mojoli, islands in front of the landing place. (The width of the river is 4 kilom).
33. Ditto. Seen from the river.
34. Ditto. Barges starting for Matto Grosso
35. Ditto. Preparing for departure. Manager Jara, Captain Ricardo Mendes, and Dr. Varella.
36. Ditto. Paraguayan woman and girls.
37. Ditto. Paraguayan woman ready to start for Matto Grosso.
38. Ditto. A house belonging to the Companhia Mate Laranjeiras in which the travellers stayed.
39. Ditto. Spary rising from the falls (Salto de Guayra or Sete Quedas).
- 40, 41. Ditto. Fall n. 18.
42. The Paraná below the Guayra falls (less than one hundred meters wide).
43. Whirlpool below the Guayra falls.
44. Only port on the Pequery, near Manoel Silvino's hut.
- 45 Train on which the the commission travelled from Porto Mojoli to Porto Mendes.
46. House and cable railway in Porto Mendes. A boiler weighing three tons is being hoisted up from the river.
47. Bella Vista on the lower Paraná.
48. The travellers arrive at Porto Iguassú.
49. The Hespanha leaves the port of Iguassú for Posadas.
50. Settlement of Iguassú. Jail and police tation (Paraná state police).
51. Ditto. Station of the federal police (left unfinished).
52. Ditto. Customhouse (in the same state).
53. Two specimens of *Ilex paraguayensis* which furnishes mate.
54. *Araucaria brasiliensis*, the pinetree of Paraná.
55. Iguassú falls. Flowering *Bauhinia*.
56. The river Iguassú three kilometers above the falls.
57. Ditto. Some of the travellers on the bank.
58. Hotel Brazil and a view of the Iguassú falls.
59. Falls of the Iguassú. Argentinian side, with hotel and police station.
- 60, 61. Ditto View taken from the hotel.
- 62—65 Ditto. Brazilian side.

66. Mouth of the Iguassú forming the frontier of three countries: Argentine to the left, Paraguay in the center, Brazil to the right.
67. Puerto Bertoni. The Bell descending the river.
68. Puerto Sete de Agosto on the lower Paraná.
69. Encarnacion (Paraguay) and Posadas (Argentine), on the opposite side of the Paraná.
- 69a. Posadas, the capital of Misiones, seen from Encarnacion.
- 70, 71. Assuncion on the Paraguay river. The prominent building is the government palace.
- 72, 73. Assuncion, port and town.
74. San Bernardino—Lake Ipacarahy.
75. Ditto. Pool of water covered with *Eichhornia spec.*, remainder of the river Salado.
- 76—78. Views of the Botanical Garden in Trinidad, near Assuncion.
79. Groves of Carnauba palms on the Paraguay river.
80. Rosario de Santa Fé (Argentine).
- 81—82. Views of Buenos Aires taken from the roof of the Savoy Hotel.
83. City of Rio Grande. Depot of coal found in that state.
84. Ditto. Transport of the same.
85. Buildings of the Cold Storage Company Swift.
86. Mosquito proof house of the same.
87. Hotel and building where the staff lives.
88. Bagé General hospital.
- 89—91. Hereford cattle on the Santo Antonio ranch.
- 92, 93. Ditto. Establishment for drying meat (Xarque).
94. City of Porto Alegre.
95. City of Rio Grande.
- 96, 97. Flora of the sandy plains round the harbour.
98. Ditto. Cases of caterpillars of the family *Psychidae*.
99. Florianopolis, capital of Santa Catharina.
100. São Francisco, town and harbour.
101. Itajahy, harbour.
102. Ditto Hospital.
- 103—108. Views of Guayra falls and the river below them.